MAS
ENVIRONMENTAL

Local Gov Issues, Acoustics, Health & Safety, Food Hygiene, Planning, Pollution, Licensing, Nuisances, Catering Design

[redacted]
Santa Pod Raceway
Airfield Road
Podington
Wellington, Northants
NN29 7XA

Our ref: SPLPLet181025

25th October 2018

Dear [redacted],

Re: Local Plan 2030 - Santa Pod Raceway

I am responding to your request to review the draft Bedford Borough Local Plan 2030 and its implications for operations at Santa Pod Raceway with respect to noise. I have previously provided advice on the proposed residential development near Sharnbrook, referred to as the Colworth Garden Village. As you are aware the proposed Colworth Garden Village development would have serious consequences for the operations at Santa Pod. I concluded within my most recent review of the proposed development:

> *Based on my experience of the site and its operations I am confident that without substantial changes at the Santa Pod site, which would require the co-operation of the raceway owner / operator, the proposed development would lead to the demise of the Santa Pod business as a direct result of noise complaints and potential noise nuisance claims.*

MAS has made several submissions outlining fundamental issues with proposed residential development in the vicinity of Santa Pod. Whilst Colworth Garden Village appears to have been removed from the section discussing 'amount and distribution of housing development' within the Local Plan 2030, it still lists the intent for 500 new homes in Sharnbrook. Within the documentation on the Bedford Borough Council website for the Local Plan 2035, there are 31 potential development sites listed in Sharnbrook. Many of these are a sufficient distance away from Santa Pod Raceway for there to be no serious noise concerns. However, sites 622 'Lee Farm New settlement', 616 'Colworth Park' and site 231 'Colworth Park' all lie within the Colworth Garden Village development area, within close proximity of Santa Pod and therefore serious risks regarding noise impact and land use conflicts remain.

Rather than repeat the numerous issues regarding noise impact at these proposed development sites, within the Colworth Garden Village development area, I have attached my previous assessments as appendices to this letter. They set out the core principles of noise impact assessment and highlight the concerns with proposals for residential development within close proximity of Santa Pod. In brief, there has been no evidence to date to demonstrate that an acceptable sound environment can be

achieved at housing within close proximity of Santa Pod. I have provided a summary of previous submissions in the table below.

Table 1: Summary of previous submissions

	Appendix		
	A	**B**	**C**
Date	**15th May 2017**	**15th February 2018 / 15th March 2018**	**4th October 2018**
Title	Proposed Residential Development by Wrenbridge. Noise Impact Assessment in relation to Santa Pod Raceway	Proposed Residential Development by Wrenbridge. Noise Impact Assessment in relation to Santa Pod Raceway	Letter to Chair and Members of the Executive - Colworth Garden Village
Content	Review of developer's noise impact assessment and independent assessment of potential impact provided by MAS.	Update of previous report following meeting with developer's acousticians.	Response to Rapleys letter stating development could achieve sufficient noise mitigation without co-operation of Santa Pod.
Conclusions	→Site not suitable for residential development. →Criteria adopted by the developer to assess impact misrepresents and underestimates impact from Santa Pod. →Developer's noise survey does not cover typical / worst case events and so underestimates impact. →No evidence that mitigation will achieve sufficient reduction in noise from Santa Pod for development to be considered acceptable.	→No agreement reached between acousticians on appropriate decibel criteria. →Agreed that any mitigation required would need to be substantial (e.g. planning permission required by Santa Pod). →Developer's modelling and predicted noise levels do not account for acoustic character, recognised as responsible for two thirds of noise annoyance. →Proposed development fails to meet objectives of planning guidance (NPSE, NPPF, PPG). →Development highly likely to result in complaints to local authority.	→Mitigation measures required to reduce noise likely to result in unsatisfactory living conditions for residents. →At no point has there been any evidence presented to demonstrate that appropriate noise solution can be secured without the co-operation of Santa Pod. →Without substantial changes at Santa Pod site complaints and potential nuisance claims likely to arise. →Introduction of new residents within close proximity of Santa Pod will result in land use conflicts.

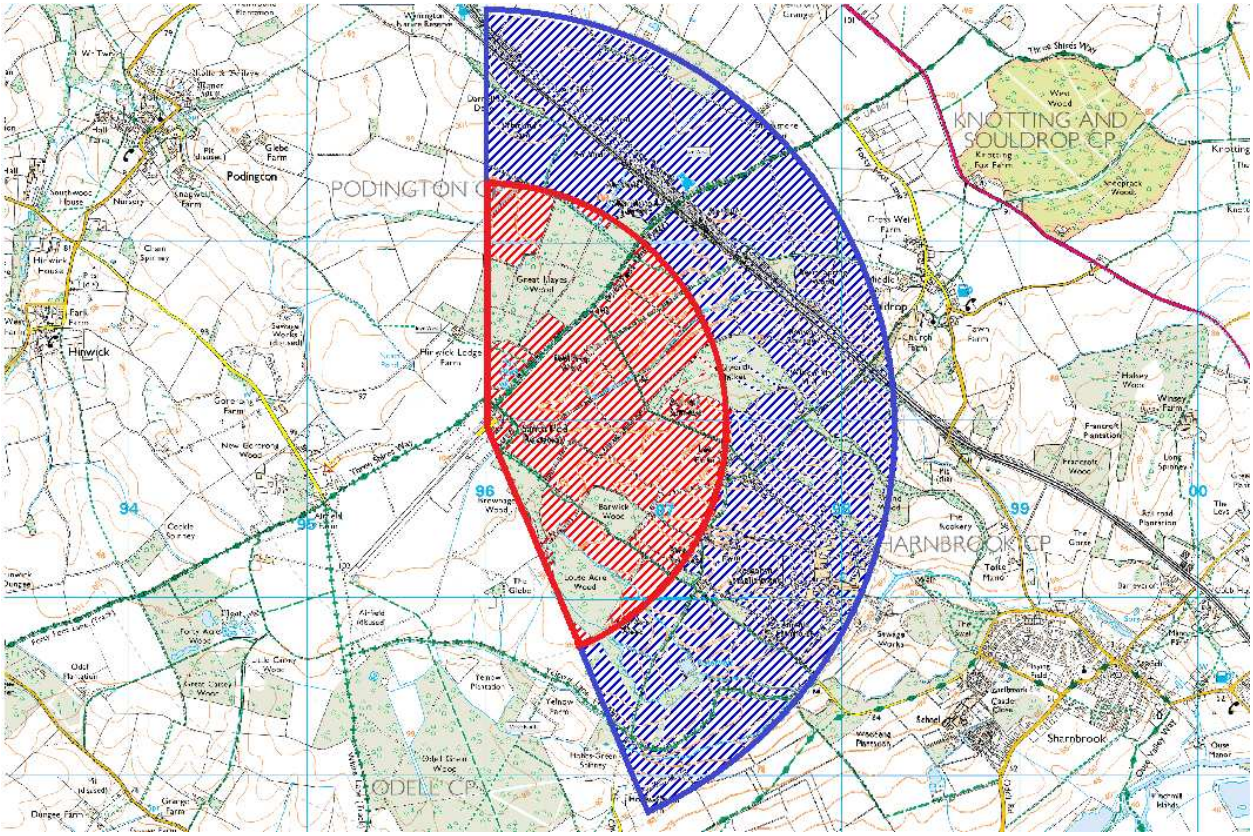
There have historically been complaints of Santa Pod noise at the nearby villages of Souldrop, Sharnbrook and Podington. The village of Podington lies upwind of the raceway for much of the time and as such, noise tends to be propagated towards Souldrop, to the north east, and Sharnbrook to the east of the raceway. The proposed housing sites in Sharnbrook (sites 622, 616, 231) are also located downwind of the raceway in prevailing wind directions. The close proximity of these sites to the raceway combined with increased impact due to downwind propagation means that development in this area would be subject to noise from the raceway for the majority of events.

Based on experience at this site and having reviewed the locality of several other major racing venues, I have recommended below 'noise buffer zone' around Santa Pod for residential development. The plan below shows two buffer zones around the raceway in predominantly downwind conditions. The first area closest to the track, highlighted in red, covers a distance approximately 1.3-1.4km from the

Santa Pod start line. I strongly advise against any housing within this area. Housing development approved within this area would indicate substantial changes needed at Santa Pod and potential demise of the business due to noise complaints or severe restrictions on the operation and use of the raceway.

The second area, highlighted in blue, covers a distance approximately 2.4km away from the Santa Pod start line. The distance of 2.4km approximately corresponds with the distance from the raceway to the nearest residential housing in Podington and Souldrop, where there has historically been a campaign of noise monitoring as discussed in previous submissions. As above, I strongly advise against any housing within this area. Within this area any proposed housing would require significant and substantial mitigation, both at the development site and at the raceway. There would need to be robust evidence at the outline planning stage that any development could reduce noise to within acceptable levels. As such, information would need to be provided on where the level of acceptability is set (i.e. a target noise limit) and how this would be achieved. The target noise limit should account for the nature and character of the Santa Pod noise including specific attention drawing noise features and cumulative impact from other related noise impacts associated with large events, for example helicopter rides and late night music noise. A long term average noise limit (i.e. a 16 hour daily average) is inappropriate and would misrepresent impact. Impact should be judged on shorter time intervals, for example 15 minute values.[1]

Figure 1: Proposed noise buffer zones for residential housing within 1.4km and 2.4km of Santa Pod



[1] This follows a precedent set at other racing circuits.

With reference to the distance afforded between housing at other raceway venues and that proposed above, the above noise buffer zones fall within the magnitude of separation distance afforded between other major racing venues and nearby residential settlements. Maps are provided in appendix D, a summary is provided in table 2 below.

Table 2: Examples of UK race circuits and distance to nearby settlements

Race track	Distance to settlements	Positive wind vector towards settlement?[2]	Comment
Snetterton	1.7km	Yes (downwind)	
Rockingham	2.6km 3.5km 2.1km	Crosswind Downwind Crosswind	
Silverstone	1.6km 2.1km	Crosswind Downwind	
Oulton Park	900m	Downwind	Controls on the type of event that occurs on a day to day basis, controlled by static testing and drive by levels.
Donington Park	2.5km 1.6km	Crosswind Downwind	
Bedford Autodrome	1.8km 3.7km	Crosswind Downwind	
Brands Hatch	100m 1.3km	Upwind Downwind	Controls on number of days for 'high level' vehicles, static and drive by testing.

The above table shows that the noise buffer zones proposed in figure 1 above fall within similar distances (between the track and nearby settlements) as found at other major racing circuits.

In summary, there remain serious concerns regarding plans for housing both within the 2030 and 2035 Bedford Borough Council Local Plan. Allocation of housing within approximately 1.4-2.4km of Santa Pod Raceway conflicts with basic town planning principles where noise sensitive and noise generating uses should be separated as far as practicable. Proposed development in this area fails to meet the principles of national planning policy to mitigate and minimise adverse noise impact and provide an improvement to health and quality of life through good acoustic design. Whilst the 2018 National Planning Policy Framework introduces the 'agent of change' principle, placing the onus on the developer to mitigate against adverse noise impact, there has been no robust evidence to date that shows that this can be achieved in the case of Santa Pod and certainly not pertaining to good acoustic design and use of the space within a resident's expectations (e.g. free use of external amenity space, open windows etc).

Yours sincerely,

[redacted]

Senior Acoustic Consultant MAS Environmental Ltd

[2] Assuming prevailing wind directions is south westerly / westerly.

Appendix A - MAS Noise Impact Assessment - 15th May 2017

MAS ENVIRONMENTAL

Local Gov Issues, Acoustics, Health & Safety, Food Hygiene, Planning, Pollution, Licensing, Nuisances, Catering Design

Proposed Residential Development by Wrenbridge

New Settlement at Colworth, Bedfordshire

Noise Impact Assessment

in relation to

Santa Pod Raceway

15th May 2017

Provided by MAS Environmental Ltd

Prepared by: [redacted]

Reviewed by: [redacted]

Reference: SPR170515

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1.0 Executive summary

1.1 MAS Environmental Ltd ("MAS") were appointed by Santa Pod Raceway to review a noise impact assessment and noise survey by Peter Brett Associates (PBA) submitted in support of planning proposals for a new settlement in Sharnbrook, Bedfordshire.[1]

1.2 MAS have historically undertaken a number of noise monitoring exercises for Santa Pod Raceway both on site and in the community and as such have significant experience and understanding of the nature and character of noise impact from the site.

1.3 The noise from Santa Pod contains a variety of acoustic features/characteristics that should be considered in any assessment of noise impact. Many of the characteristics attract and hold attention compared to other sources of ambient sound that are expected e.g. road traffic, birdsong.

1.4 The proposal fails to achieve a fundamental principle of planning and noise where noise sensitive land uses are located as far away as practicable from noisy land uses. This is a primary method of noise control.

1.5 The proposal fails to meet the aims of the NPSE as described within the PPG on noise to mitigate and reduce adverse noise impacts to a minimum and to improve the health and quality of life through effective management of noise.

1.6 The ability for Santa Pod to continue as a business would be restricted by the proposal in terms of potential for site development and relocation of noisy activities to different areas of the site. This is a legitimate planning concern echoed in the NPPF.[2]

1.7 There are clear requirements in planning policy and guidance for noise character to be considered in any assessment of noise impact. This has not been addressed in the noise impact assessment and is a fundamental omission.

1.8 The site generates a number of noise sources including loud music and racing noise. These impacts are considered in isolation in the noise impact assessment and consideration of cumulative impacts, including from other sources of noise from the site, should be factored into the assessment.

1.9 The noise from Santa Pod includes characteristics such as engine and exhaust, wheel spinning, high revving etc. Drag racing generates high noise levels for a short duration. It has rapid onset characteristics that attract the listeners attention. Such characteristics can be intrusive when received in the context of a home environment.

1.10 The acceptability of Santa Pod noise within dwellings with windows shut has been considered; however, this does not resolve the potential for enforcement action to be taken against the Santa Pod site. Windows would need to be sealed shut and not permitted to be opened at a future point. If windows could be opened and noise was unreasonable with windows open new residents could complain to the local authority who could take enforcement action. This could ultimately result in the demise of the raceway.

[1] Preliminary Noise Impact Assessment Report and Environmental Sound Survey Report dated 17th February 2017.
[2] NPPF paragraph 123 bullet point 3.

1.11 The criteria adopted in the noise impact assessment is based on guidance that is relevant only for steady continuous noise sources and not those with specific character. The guidance is based primarily on research of transportation noise with few, if any, other sources considered. Assessment using this criteria will misrepresent and underestimate the impact of noise with specific characteristics such as that generated at the Santa Pod site.

1.12 Music noise is considered in isolation and not in the cumulative context of multiple events at the Santa Pod site. The criteria proposed in the noise impact assessment is not appropriate and underestimates the number of events at the site.

1.13 Manned monitoring of the Santa Pod site was undertaken in wind conditions that are likely to significantly underestimate impact from the site. The events monitored are not representative of typical worst case events that generate higher levels of noise. This is a significant omission.

1.14 No detailed analysis of noise impact from Santa Pod or ambient / background sound levels without Santa Pod noise is presented or considered in the noise impact assessment. The character of the noise is not described and there is no information of the nature, frequency and duration of site noise. As such it is not possible to adequately determine how noise will impact at the proposed settlement and the noise impact assessment misses key features of noise impact that could result in intrusive noise level and types at the proposed settlement site.

1.15 Noise sources that have specific character, such as those found at Santa Pod, are not accurately described or reflected by a long term average LAeq level and describing such noise sources with this measure will underestimate resident's response to the noise.

1.16 Extracts from trackside monitoring at Santa Pod demonstrate the intermittent and variable character of the noise on site and that will be reflected in the community. The monitoring demonstrates a highly variable noise environment with a range of noise levels and noise characteristics including intermittency, some regularity, impulsive and sudden onset sound.

1.17 Significant impact can arise and be missed using long term averages and comparisons. They are not appropriate for this type, level and character of noise. The same event can result in maximum levels 25-41dB above the background sound environment, short term averages 12-17dB above the background sound level, but a 16 hour average level that would be similar to the existing ambient noise level without Santa Pod noise.

1.18 Frequent noise events of a reasonably high level are likely to be experienced throughout the proposed settlement site. These events are impulsive and unpredictable and as such will attract attention and be difficult to acclimatise to and ignore.

1.19 MAS have considered the practicality of mitigating noise at the Santa Pod site and due to the length of the drag strip and the moveable nature of various sources of noise, it was concluded that whilst reductions could be made they would be minimal and of limited benefit.

1.20 The proposed development seeks to introduce a large number of new residential receptors that are unlikely to be familiar with the character and nature of motorsport noise to a site that holds regular events throughout the year and generates a number of noise impacts with specific character. This combination is highly likely to result in complaints to the local authority.

1.21 The noise impact assessment notes that the local authority receives complaints relating to Santa Pod activity in the villages of Podington, Souldrop and Sharnbrook. These villages are located 2-3km from the Santa Pod site. The proposed development seeks to introduce a large number of noise sensitive receptors at a distance of 500m - 1km from the site. Complaints are expected.

2.0 Introduction

2.1 MAS Environmental Ltd ("MAS") were appointed by Santa Pod Raceway to review a noise impact assessment and noise survey submitted to support planning proposals for a new settlement in Sharnbrook. This report reviews the methodology undertaken to assess noise impact and considers whether an acceptable noise environment could be achieved at the proposed development site. Whilst the noise impact assessment considers environmental noise as a whole including that from Santa Pod Raceway, this report considers only noise generated at Santa Pod Raceway (Santa Pod).

2.2 Santa Pod is located in a predominantly rural area with villages located to the north west, north east and east of the site. The A6 runs to the north and east of the site. MAS have historically undertaken a number of noise monitoring exercises both on site and in the community and as such have significant experience and understanding of the nature and character of noise impact from the site. MAS have provided expert evidence in a number of court cases relating to motorsport noise impact and assessment.

2.3 An aerial view of the site is shown below in figure 1 with the proposed new settlement marker in red.

Figure 1: Aerial location of Santa Pod

2.4 In the absence of noise associated with Santa Pod the main sources of noise in the area are from wildlife and particularly birdsong, distant road traffic noise from the A6, local road traffic noise and occasional aircraft. The character of the area is typically rural with relatively benign ambient noise sources and natural sounds that are expected. During Santa Pod events there are a range of noise sources that can be heard within the community including tyre squeal, engine noise, PA noise, music noise, noise associated with fairground rides and helicopter rides. The noise is very dependent on wind direction and upwind conditions can considerably reduce the audibility of Santa Pod noise. There are a range of noise sources generated at the site

and events can run continuously throughout the weekend. The noise impact, and particularly that associated with racing, can be very intermittent and limited in duration. This results in bursts of activity that can be followed by periods with little / no noise. As such it is important to both witness the noise and use appropriate acoustic measures to accurately reflect both the nature and character of the noise. The acoustic character of the noise is such that its true impact is not reflected by considering only the decibel level. This is recognised within guidance.

2.5 The new settlement is proposed to the east of Santa Pod and expands from the existing settlement of Sharnbrook. The proposed location is shown in figures 2 and 3 below.

Figure 2: Proposed settlement location

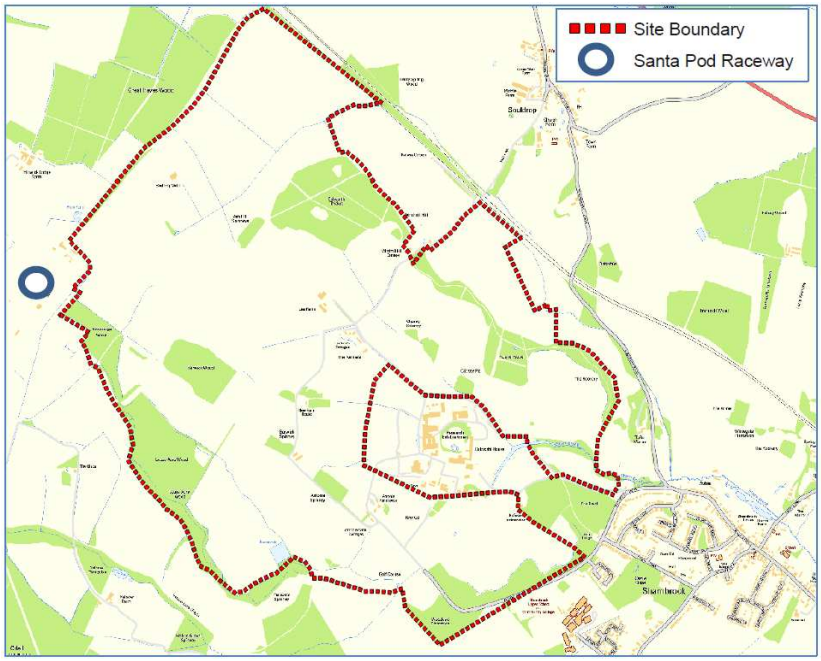


Figure 3: Indicative layout of proposed settlement

3.0 Guidance and criteria

3.1 The noise impact assessment submitted to support the application details much of the relevant planning guidance, policy and existing standards used to assess noise from various sources. These have not been repeated here except where comment is necessary due to application, relevance or interpretation.

3.2 One of the most basic principles in noise control is that noisy activities should be separated from noise sensitive uses as far as practicable i.e. to separate noise generating and noise sensitive uses via land use planning. Thus, noise sensitive land uses such as residential development should be located as far away as possible from sites that generate noise. In this respect the proposed development site fails to achieve this basic aim and instead locates residential development within 500m of a busy raceway. This is considered inadequate.

3.3 The existing village of Sharnbrook is approximately 3km from Santa Pod and other nearby settlements such as Poddington and Souldrop are located approximately 2-2.5km from the site. Whilst individual properties are located closer to the site, the proposed settlement introduces a large number of noise sensitive residential receptors adjacent a noisy site with negligible separation distance.

3.4 The lack of adequate separation distance is accompanied by a lack of appropriate noise mitigation demonstrated at the development site. The consequence for noise impact is to effectively undermine two of the core aims of the Noise Policy Statement for England (NPSE):[3]

→ Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

→ Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

3.5 The site does not minimise adverse impacts by nature of its location and proposing residential development within close proximity of the Santa Pod site. In fact, the contrary is true and the proposal seeks to expose a large number of new dwellings to noise from the raceway. Whilst mitigation has been highlighted within the noise impact assessment, it has not been adequately addressed and there is no clear evidence that noise impacts could be sufficiently mitigated. This is discussed further below.

3.6 There is a clear aim both in the NPSE and other planning documents such as the Planning Practice Guidance (PPG) and National Planning Policy Framework (NPPF) that new development should seek to improve health and quality of life and as such that residents should, arguably, be exposed to a similar or better sound environment than

[3] Great Britain. Department for Environment and Rural Affairs (DEFRA) (2010) *Noise Policy Statement for England.* London: TSO

existing housing to demonstrate those improvements.[4,5] It is clear that new development should not expose residents to a lower quality sound environment. The proximity of the proposed development would by its nature expose new residents to higher levels of motorsport and associated noise than existing residents in the villages of Souldrop, Podington and Sharnbrook experience. As noted above, mitigation measures have been mooted but there is no demonstrative evidence that these could be effective and would adequately reduce noise to similar levels experienced elsewhere in the community.

3.7 The NPPF states that planning decisions should aim to:

→ recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

3.8 The existing land use of the proposed settlement site is predominantly rural / agricultural and forms an important buffer between the Santa Pod site and residential development in Sharnbrook. Its development would ultimately change the character of that area and enforce restrictions on Santa Pod in terms of how the site could be used, for example there would be limited options for relocation of noisier activities around the site due to the very close proximity of housing to the east of the site and the restricted area available to Santa Pod.

3.9 **Planning Practice Guidance (2014) (PPG).** Government planning guidance was revised in 2014. The Planning Practice Guidance (PPG) removed guideline decibel values from the assessment of impact and broadened the noise impact assessment approach to include, for example, consideration of impact in context and other relevant factors such as combining influencing factors affecting impact and the potential for noise mitigation.

3.10 The noise impact assessment report submitted with the proposed settlement assesses the potential for adverse noise impact primarily with reference to decibel levels and although it notes noise character and maximum noise levels briefly within the report no discussion or assessment on the effect of these noise aspects has been provided.

3.11 The PPG provides guidance on how to decide whether noise could be a concern and what factors might contribute to that assessment. These include:

→ the source and absolute level of the noise together with the time of day it occurs

→ for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise

→ the spectral content of the noise and the general character of the noise

[4] Great Britain. Department for Communities and Local Government (2012) *Planning Practice Guidance*. London: TSO. Available from: http://planningguidance.planningportal.gov.uk/

[5] Great Britain. Department for Communities and Local Government (2012) *National Planning Policy Framework*. London: TSO. Available from: http://planningguidance.planningportal.gov.uk/

→ cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration

3.12 Some of the above factors have been noted within the noise impact assessment, for example that noise from Santa Pod has a specific character, but these factors have not been assessed and are not accounted for in the long term averaging approach that has been adopted in the assessment. This is discussed further below.

3.13 It is also noted that the PPG states:

→ The potential effect of a new residential development being located close to an existing business that gives rise to noise should be carefully considered. This is because existing noise levels from the business even if intermittent (for example, a live music venue) may be regarded as unacceptable by the new residents and subject to enforcement action.

3.14 Whilst it is noted that mitigation in terms of closing windows has been considered in the noise impact assessment, the risk of enforcement action has not been adequately addressed. It is likely to be necessary to seal shut windows and for residents not to be able to open these windows at any future point as otherwise there is an expectation and entitlement for residents to open windows. If noise was found to be excessive with windows open there could be a legitimate nuisance claim against Santa Pod. Thus, even if acceptable internal levels could be achieved with windows shut this would not prevent action being taken against Santa Pod should residents prefer to have windows open. As such this is a serious concern and implication for the continuing operation of Santa Pod as a business. This is contrary to the guidance provided within the NPPF at paragraph 123 explained above.

3.15 **World Health Organisation Guidelines (1999) (WHO 1999).[6] Guidance on sound insulation and noise reduction for buildings (BS8233:2014) (BS8233).[7]** Both documents have been used to assess noise impact from Santa Pod at the new settlement site. It is acknowledged within the noise impact assessment that BS8233 is for use with anonymous noise sources, those that do not have specific character. The WHO guidelines deal predominantly with noise from transportation sources such as highways, railways and aircraft. They are not appropriate for assessing the impact on residents from noise sources that have specific character and are recognisable from a specific site, activity and operator, such as motorsport noise arising from Santa Pod. The noise impact assessment acknowledges that noise from the Santa Pod site has specific characteristics unlike the ambient sound environment without motorsport and associated noise. Despite the apparent understanding that Santa Pod noise should not be assessed using this guidance the noise impact assessment continues to use it as a basis for acceptability.

3.16 By adopting these guideline levels the noise impact assessment assesses noise impact from Santa Pod in time periods of 16 hours for daytime and 8 hours at night time. This is entirely inappropriate when considering the nature and character of noise impact

[6] Berglund B., Lindvall T., & Schwela D.H., (eds) World Health Organisation (WHO) (1999) *Guidelines for Community Noise.* Geneva: WHO

[7] British Standards Institution (2014) *BS8223:2014: Guidance on sound insulation and noise reduction for buildings*. London: BSI.

from the site. In effect, the noise from Santa Pod is averaged out over the entire day and so subsumed within all other environmental noise. This gives the impression that it will not differ much from the existing sound environment whereas in reality the noise associated with Santa Pod is clearly distinguishable within the community and will be more so at such short separation distances as proposed in the new settlement. It is instructive that the UK courts have repeatedly rejected this type of 'longer term averaging' methodology.[8] Local authorities and the UK courts in a number of cases have applied LAeq,T noise limits ranging from 10 minutes to 1 hour. The aim being to reflect the intrusiveness of motorsport noise over a shorter time period than an entire day i.e 12-16 hour.

3.17 **Music noise.** The noise impact assessment sets LOAELs and SOAELs for music noise based on 1 to 3 music events per year and based on the Environmental Noise Control at Concerts Code of Practice. This is inappropriate both because this significantly underestimates the number of events at Santa Pod but more importantly it considers the impact from music noise in isolation. The Concert Code considers music noise only and as highlighted in the Government's PPG the cumulative impacts of more than one source should be considered. There is not only noise from music but also from racing and this can be on one or separate days. It is more appropriate to consider the music noise cumulatively and as such in the context of multiple events throughout the year. As noted by the EHO and referenced in the noise impact assessment a criteria of inaudibility is considered more likely to result in acceptable impact.

3.18 In summary, the proposed settlement fails to meet basic and fundamental requirements of planning and noise policy and guidance. Separation distances are inadequate and undermine multiple planning principles outlined in national planning criteria. Important factors of acoustic assessment, again highlighted by national planning criteria, have been missed or neglected and include a failure to consider cumulative impacts (music, racing and associated activity), character of the noise (rapid onset, frequency content), the regularity of events, change in noise level over time, penetration within the dwelling, occurrence of the noise, impact at weekends and on bank holidays, increased impact during summer months when residents will want to use external amenity areas etc. The methodology applied omits these important factors.

[8] See for example Lawrence & Anor v Fen Tigers Ltd & Ors [2011] EWHC 360 (QB) 4th March 2011 and in particular discussion around paragraph 202-203.

4.0 Noise monitoring

4.1 The noise monitoring detailed in the noise impact assessment includes periods of attended and unattended measurements. It is acknowledged in the noise impact assessment that manned noise monitoring was undertaken in upwind conditions. As such much of the impact described by these manned surveys could significantly underestimate impact. It is MAS' experience that wind direction does have a significant effect on noise impact in the community. This is contrary to the guidance contained within British Standard BS7445 parts 1 to 3 that short term environmental noise measurements should be obtained under a positive wind vector i.e. wind emanating from Santa Pod towards proposed residential dwellings. This is a basic requirement for environmental noise monitoring.

4.2 Furthermore, it is MAS' experience that the events monitored and used in the noise impact assessment do not represent those that typically generate the highest levels of noise impact or longest duration of impact. The assessment understates the true noise impact likely to be experienced at residential receptors.

4.3 Whilst the noise impact assessment notes that audio recordings where made to assist with the identification of noise sources no detailed analysis of events is presented in the noise impact assessment. The character of the noise, noise event patterns and frequency of occurrence are not evident. This is specifically highlighted in the PPG as a relevant factor and is key for Santa Pod noise due to its intermittency and specific character.

4.4 There is little detailed analysis of the ambient and background sound levels in the noise impact assessment. MAS' experience from community monitoring is that the sound environment in the community is dictated largely by nearby birdsong, local road traffic and overhead aircraft. Long term averages are more likely to be influenced by these sources rather than Santa Pod noise particularly where racing is intermittent. As such use of long term averages could miss the impact of Santa Pod noise and simply compare ambient noise from non Santa Pod sources on different days. This will depend on the measurement location and event.

4.5 It is not clear from the noise impact assessment what assessment of Santa Pod noise has been made other than long term averages and an 'event LAeq', which is undefined and could still relate to a long term average of noise. Whilst it is agreed that the most appropriate method for assessing impact from Santa Pod noise is to compare it to the existing sound environment, the noise impact assessment does this using long term averages which will underestimate impact as discussed further below.

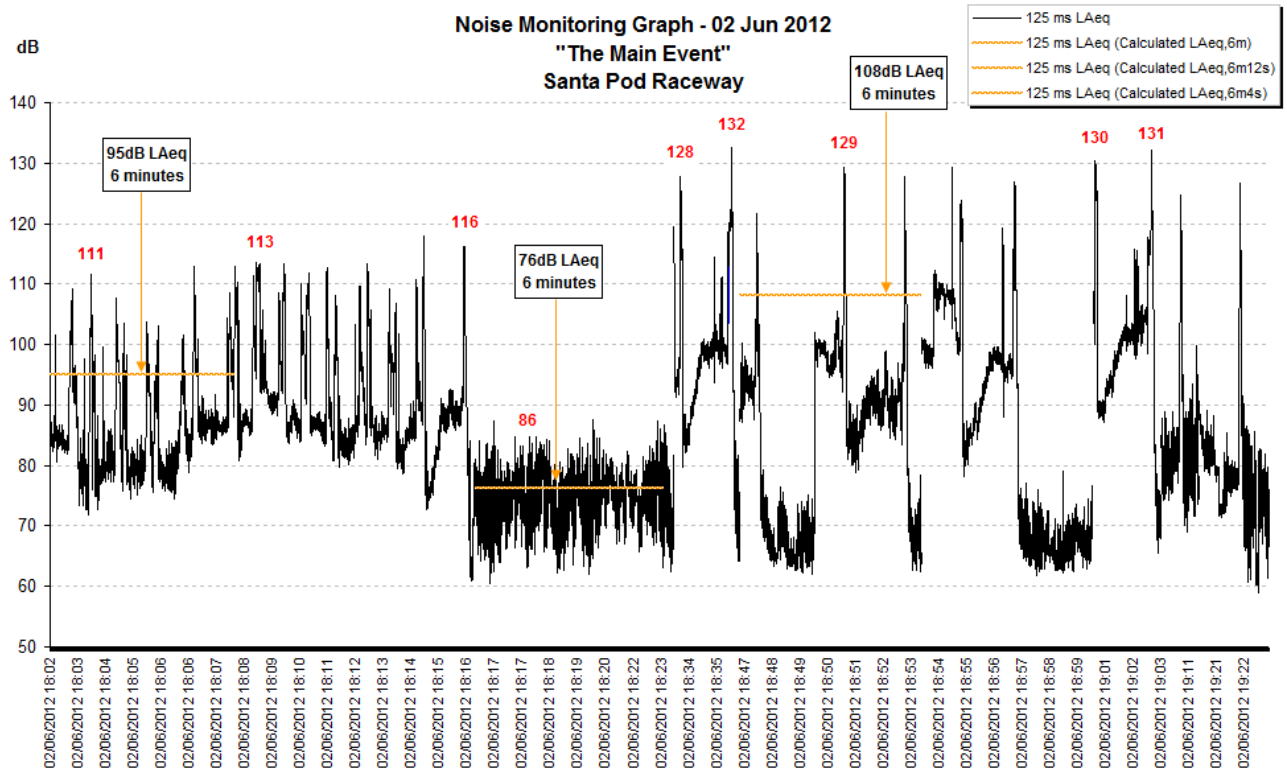
4.6 In summary, whilst it is acknowledged in the noise impact assessment that noise from Santa Pod contains specific character features no assessment of this and the associated impact has been made. There is little detailed analysis and as such assessment of the frequency and pattern of noise impact as required in guidance cannot be made. As such the noise impact assessment omits key features of noise impact that could result in intrusive noise and inherent characteristics at the proposed settlement site.

5.0 Noise impact and noise character

5.1 As noted above, the character of the noise from Santa Pod is specific to each event and can include a number of variable and intermittent noise sources. Noise sources that have specific character, such as those found at Santa Pod, are not accurately described or reflected by a long term average LAeq level and describing such noise sources with this measure will underestimate a future resident's response to the noise.

5.2 The graph below shows an extract from trackside monitoring at Santa Pod. The graph shows monitoring over a period of approximately 1.5 hrs though monitoring was not constant throughout with breaks when there were breaks in racing. The graph shows the intermittent and variable character of the noise on site. This will be reflected within the community. The measured noise levels are dominated by activity at Santa Pod with the peaks in noise levels corresponding to revving engines or racing.

Figure 4: Extract of trackside monitoring at Santa Pod



5.3 The red numbers above peaks in the measured data graph give the maximum noise level of the event. These can be seen to range from 86dB LAmax,f when there is no racing to 111-116dB LAmax,f and up to 132dB LAmax,f depending on the type of vehicle racing. Three short term averages have also been compared to show the variability of short term average noise levels on site, 76dB LAeq,6min when there is no racing and between 95dB LAeq,6min and 108dB LAeq,6min depending on the race event. The graph shows a highly variable noise environment with a range of noise level and noise character including intermittency, some regularity, impulsive and sudden onset sound etc. The racing continued in a similar manner between 2pm and 7.30pm.

5.4 The above impact can be estimated at the nearby settlement by assuming an approximate distance attenuation. A basic reduction of approximately 56dB is assumed based on a distance of 650m, well within the proposed settlement area. The table below compares the decibel values of the raceway noise at this distance using different parameters and averaging intervals.

Table 1: Example of noise impact expressed using different parameters and time periods

	Trackside	At 650m (settlement)
Maximum level 1	111dB LAmax	55 dB LAmax
Maximum level 2	116 dB LAmax	60 dB LAmax
Maximum level 3	132 dB LAmax	76 dB LAmax
Short term average 1	95dB LAeq	39 dB LAeq
Short term average 2	108 dB LAeq	52 dB LAeq
Event average (5.5 hours)	107 dB LAeq	51 dB LAeq
Day average (16 hours)	102 dB LAeq	46 dB LAeq

5.5 The table shows that whilst over a 16 hour day the impact of a noisy event could be in the region of 46dB, significantly below any criteria proposed in the noise impact assessment and likely not dissimilar to average noise levels without Santa Pod noise, maximum noise levels in the region of 60-76dB LAmax,f would have arisen and are highly likely to be perceived as intrusive by residents. This highlights the problem with representing impact using long term averages. The table shows that averaging event noise from 5.5hr to 16hr reduces the LAeq by 5dB.

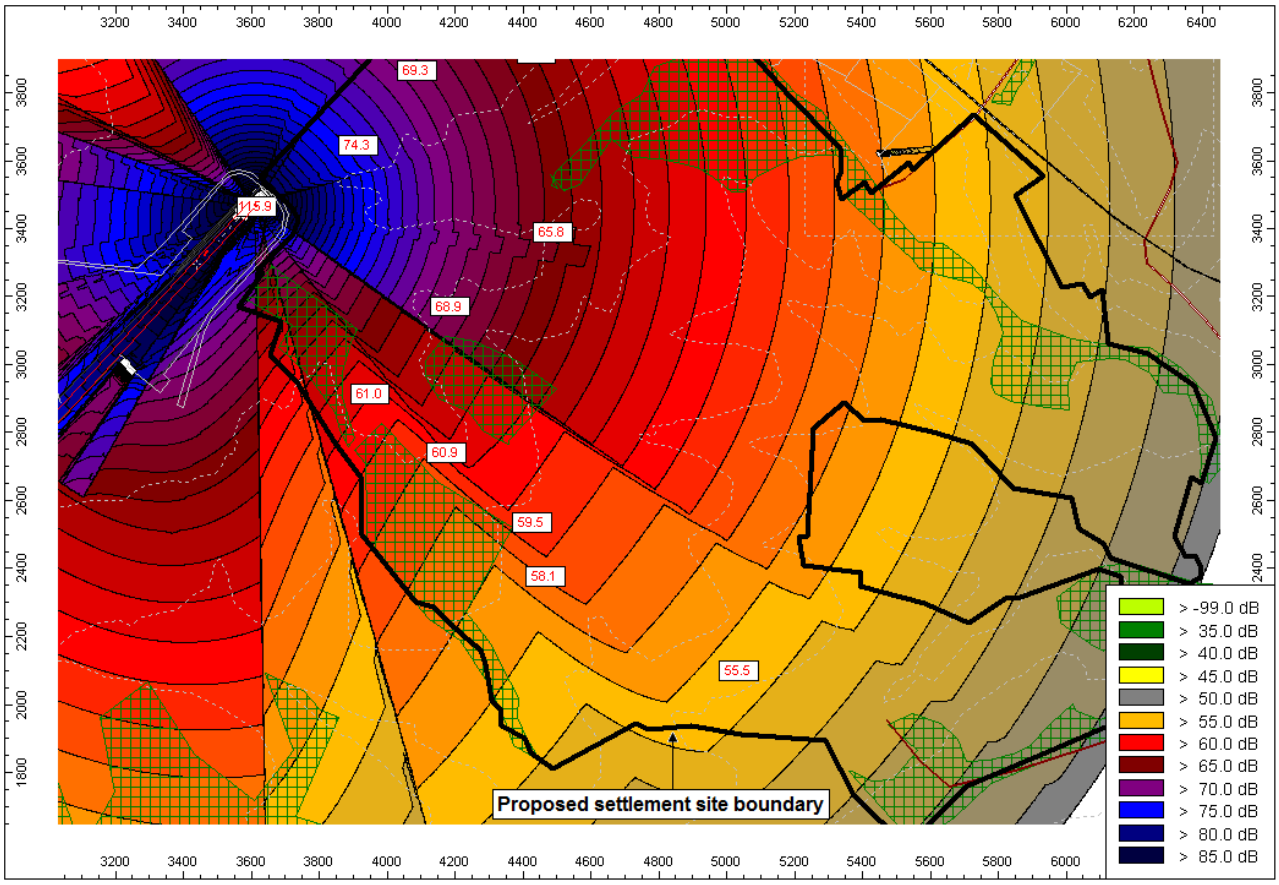
5.6 Similarly comparing the change in impact with and without Santa Pod noise using long terms averages is inappropriate and will underestimate impact. Daytime background sound levels in the area when there was no noise from Santa Pod are shown in the noise impact assessment and were often in the region of 35dB(A) - 40dB(A) LA90,T. Daytime ambient noise levels were in the region of 40-45dB(A) LAeq,T. The short term average level 2 event is 12-17dB above the background sound level and 7-12dB above ambient levels. Maximum levels would be 25-41dB above the background sound environment. However, using a 16 hour average the Santa Pod noise would be 10dB above the background sound environment but within the existing ambient sound environment, which using the assessment table in the noise impact assessment would be considered to be a negligible / minor change. Thus, significant impact can arise and be missed using long term averages and comparisons. They are not appropriate for this type, level and character of noise.

5.7 The impact across the proposed settlement site can be estimated with noise mapping software. The predicted noise level of a maximum noise level event is shown in figure 5 below. The noise map assumes a trackside maximum noise level of 116dB LAmax,f, typical of events measured above. Hard / reflective ground at the site has been assumed but semi absorbent ground outside of the Santa Pod site. Structures on site have been mapped including spectator stands and on site buildings.[9] Receiver spacing

[9] These are based on structures in place during 2012-2013 and could be subject to change. The noise map is demonstrative only and shows the extent of impact assuming that there are on site structures / barriers that form some screening between on site and off site noise. I understand that there have been no significant changes or additions to these structures since 2012 / 2013.

is at 2m and predicted noise levels are at 1.5m high. Predictions are made in accordance with ISO9613-2.

Figure 5: Exemplary noise map showing maximum noise levels predicted at the nearest locations of the proposed settlement



5.8 The noise map again shows that when considering maximum noise levels and intermittent characteristics of the noise generated at Santa Pod, impact at the proposed settlement site is far higher than suggested using long term average noise levels and comparisons. As noted in WHO guidelines and in the PPG on noise, where sources of noise are not continuous the number of noise events, their absolute level along with the frequency and pattern of noise should be considered. The above analysis shows that there could be frequent noise events of a reasonably high level experienced throughout the proposed settlement site. These events are impulsive and unpredictable and as such will attract attention and be difficult to acclimatise to and ignore.

5.9 In summary, the noise impact assessment bases assessment of impact on long term averages that do not accurately reflect the character of the noise or its impact. The use of long term averages and comparisons vastly underestimates impact. As noted in Government guidance and World Health Organisation guidance, where a noise is not steady and continuous the character of the noise should be considered. This has not been done in the noise impact assessment. The nature of the noise is intermittent, though at times regular impact occurs. The noise is impulsive and consists of high maximum noise levels that would be clearly distinguishable at the proposed settlement site.

6.0 Mitigation, design and layout

6.1 The noise impact assessment suggests that mitigation would need to be considered both at the proposed settlement site and at the Santa Pod site to render noise levels and impact acceptable. Whilst mitigation would help to reduce noise impact it has not been demonstrated whether this can successfully be achieved.

6.2 MAS have considered the practicality of mitigating noise at the Santa Pod site and due to the length of the drag strip and the moveable nature of various sources of noise, it was concluded that whilst reductions could be made they would be minimal and of limited benefit.

6.3 The noise impact assessment notes that a higher standard of glazing and acoustic trickle vents would likely be needed for housing. In addition to this the glazing would need to perform well at lower frequencies and this can often be a limiting factor for glazing. Assuming that glazing with sufficient reduction could be achieved the possibility of single aspect housing and fixed windows would need to be considered to prevent the potential for enforcement action against Santa Pod.

6.4 Whilst satisfactory internal levels could be achieved using substantial building elements, there is no evidence that satisfactory noise levels could be achieved in garden areas. As noted above, the character of the noise from Santa Pod and its intermittency and impulsivity will make it clearly audible in garden areas even if lower levels could be achieved. This would likely coincide with periods of increased garden use at weekends during the summer. It is clear context related factors have not been considered within the assessment.

6.5 It is also evident from prospective layouts that areas of the site will be used as external amenity or wildlife areas. As noted in the PPG consideration of whether these areas will be subject to adverse noise impact should also be assessed but has not been addressed in the noise impact assessment. It is unlikely that areas close to the Santa Pod site would be used for rest and relaxation due to the noise from the site and as such these areas would not serve as acoustic spaces to be enjoyed as intended.

7.0 Conclusions

7.1 The site is not considered suitable for residential development and fails to meet a fundamental planning objective of separating land uses that generate noise from those sensitive to noise.

7.2 The proximity of the proposed settlement site results in a failure to meet a number of planning objectives including appropriate consideration of the impact of the development on existing businesses, mitigating and minimising adverse noise impact and ensuring that the development enhances quality of life. The settlement proposes introducing a large number of new residential receptors that are unfamiliar with the character and nature of motorsport in the area to a site that holds regular events throughout the year and generates a number of noise impacts with specific character. This combination of factors (acoustic, non acoustic and context) is highly likely to result in complaints.

7.3 The criteria adopted in the noise impact assessment for assessing noise from Santa Pod uses long term averages that misrepresent and underestimate impact from the site. Whilst the noise impact assessment acknowledges that Santa Pod noise has specific character it fails to assess impact with respect to these different characteristics.

7.4 The manned and unmanned surveys have a number of limitations that result in impact from Santa Pod being underestimated. Measurements were undertaken in weather conditions that will underestimate impact in downwind conditions. No detailed analysis of the site noise versus background and ambient noise has been undertaken and as such there is no clear analysis of how an event will be perceived by residents at the proposed settlement site.

7.5 The potential for adverse impacts are identified in the noise impact assessment despite reliance on indicators that will underestimate impact. Mitigation has been considered but no detailed proposals or evidence is presented to show that acceptable levels across the proposed settlement site could be achieved. Using a methodology that considers decibel level, context, character, nature and frequency of the noise from Santa Pod, significant adverse impacts are identified as likely to arise.

Appendix A - Glossary of terms

This glossary is harmonised with relevant British and ISO standards which are referenced. Some definitions vary slightly due to updates since written and with other noise guidance documents.

A-Weighting - This is a function which attempts to simulate the characteristics of human hearing at lower levels. Hence a dB(A) reading is an estimate of what we actually hear for quieter sounds whereas dB(LIN), {dB(C) on simpler instruments}, is an objective reading of what is actually physically present. However, for louder and low frequency sounds dB(C) correlates better to the human ear.

Note, dB(A) has been proven not to be so effective in weighting for human hearing at low frequencies.

Acoustic environment – Sound at the receiver from all sounds as modified by the environment. The acoustic environment can be the actual environment or simulated, outdoors or inside, as experienced or in memory. [ref BS ISO 12913-1 2014]

Ambient sound – Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far. The ambient sound comprises the residual sound and the specific sound when present. [ref BS4142 2014]

Ambient sound level (La = LAeq,T) – Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far at the assessment location over a given time interval, T. [ref BS4142 2014]

Attenuation – The loss in energy level of the sound usually used in relation to the loss due to sound passing through a structure or enclosure.

Background sound level (LA90,T) – The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest number of decibels. It is the underlying level of noise in the absence of the source and normally excludes most short duration noises (depending on time interval relative to the presence of source noise) (see **Residual sound level**). [ref BS4142 2014]

Note: Many other guidelines and documents reference background noise level. There is a general move to sound level.

Background sound level ("influenced") - In many situations the background sound level can be measured either when the source or premises from which sound emanates, or is associated with, is not operating. Alternatively the intermittency of the source means that it does not have any appreciable effect on the background level, which is a statistical level based mainly on sound that continues with limited breaks. Where this is not the case the measured sound level will be increased and thus influenced.

Background sound level ("uninfluenced") - This refers to any measurement of the background sound level that has not been increased due to noise associated with the source.

Broadband Noise – This is noise covering the whole of the audible frequency range. Compare to narrow band noise which is noise made up of only a very narrow band of frequencies. It will normally exhibit tonality.

Character (of the noise) - Noise character refers to specific features of a noise or sound that render it more intrusive and / or more likely to attract a listeners attention. Noise character can refer to distinguishable or discrete continuous tones (for example hums, whines, hissing or screeching), distinct impulsivity (bangs, clatters, thumps, clicks, pulses) or any other irregularity that attracts attention or makes the noise readily distinctive in relation to the pre-existing acoustic environment.

Context - This includes the interrelationships between person and activity and place, in space and time. The context may influence the soundscape through auditory sensation, interpretation of auditory sensation and the responses to the acoustic environment (see **Soundscape**). Context is also objectively measured using weightings for character and emergence of the sound above the background sound environment (loudness and relative character).

C-Weighting – see **A-Weighting** above.

Decibel (dB) - A unit or level, derived from the logarithm of the ratio between the value of a noise energy quantity and a reference value. For sound pressure level the reference quantity is 20µPa, the threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain / instantaneous damage. A change of 1 dB of the same sound is only perceptible under special conditions.

dB(A): (see A-Weighting) - This is decibels measured on a sound level meter weighted by a scale which is designed to reflect the weighting placed on noise by the human ear. A noise meter incorporates a frequency weighting device to create this differentiation. The dB(A) scale is now widely accepted. Measurements in dB(A) broadly agree with people's assessment of loudness for broadband noise. A change of 3 dB(A) of the same sound is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background sound level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

dB(Z): The Z-weighting is a flat frequency response of 10Hz to 20kHz ±1.5dB. This response replaces the older "Linear" or "Unweighted" responses as these did not define the frequency range over which the meter would be linear.

DnT,w: See weighted level difference.

Equivalent continuous A-weighted sound pressure level (LAeq,T) - The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. LAeq is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is obtained by continuously integrating ('adding up the energy of') a fluctuating sound signal and dividing by the elapsed time, to give the true mathematical average of any time varying signal. An LAeq reading must always be related to a measurement time interval and should not be read as an instantaneous value of sound pressure.

Façade level - Sound pressure level 1m in front of the façade. Façade level measurements are typically argued 1 to 2dB higher than corresponding free-field measurements because of the reflection from the façade in BS8233 2014 and 2-3dB in many other standards and guidance documents giving a range of 1-3dB.

FFT (Fast Fourier transform) Analysis – A method using digital signal processing to produce very rapid narrowband frequency analysis of acoustic signals. It can be used to equate audible sounds into decibel levels and / or enable a range of analysis of temporal sounds.

Filtering - Octaves & 1/3 Octaves - In general most noise is broad band i.e. it contains energy in virtually all the frequencies across the audio range in different combinations so that it has certain recognisable characteristics. To determine the frequencies at which most of the energy is concentrated, a sound signal is filtered into bands, commonly octave and 1/3 octave bands. Information from such filtering is widely used for diagnostic work and to determine noise control measures. (see **Octave band 1/1** and **Octave band 1/3**)

Free-field level - Sound pressure level away from reflecting surfaces. These are typically measurements made between 1.2 to 1.5m above the ground and at least 3.5m away from other reflecting surfaces. To minimize the effect of reflections the measuring position has to be at least 3.5m to the side of the reflecting surface (not 3.5m from the reflecting surface in the direction of the source). [ref BS8233 2014]

Frequency – This is the number of air vibrations or pressure fluctuations per second. The unit is the hertz (Hz).

Hertz (Hz) – See **Frequency** above.

Impulsivity - Used to describe an acoustic feature of single or repeated sound events of short duration such as a bang, shot or sudden impact of metal on metal etc. It is generally assessed subjectively as perceived by the listener and demonstrates rapid onset in the change in sound level and overall change in sound level. [ref BS4142 2014]

Lnight,outside - The long term equivalent outdoor A weighted sound pressure level established over a period of a year during night time hours (8 hours, typically 23:00 - 07:00). The Lnight,outside is a key parameter of the WHO 2009 Night Noise guidelines which was taken from the Environmental Noise Directive and is typically taken at the facade without reflections (free field level) rather than the facade level given for night time noise disturbance in the WHO 1999 guidelines. It is normally measured / calculated at a height of 4m.

Logarithmic – A scale where the exponent indicating the power to which a fixed number, the base, must be raised to produce a given number. The base used in acoustics is 10. Thus the logarithm of 10 = 1, the logarithm of 100 = 2 and the logarithm of 1000 = 3. In terms of sound energy, an increase of 10 decibels equates to a 10 fold increase. The human ear is sensitive to a very wide range of sound pressure levels (intensities). Measuring human response to sound with a linear scale would not be practical as the scale would be too large and hence a logarithmic scale, in the form of decibels, is used.

Loudness – An observer's auditory impression of the strength of a sound. It is a subjective effect which is a function of the ear and brain as well as the amplitude and frequency of the

sound. Whilst loudness is a subjective perception, a value can be attributed to loudness, which is typically measured in phons. Loudness is related to sound intensity and takes account of the sensitivity of the human to ear to certain frequencies.

Low frequency noise – This is normally considered to be noise ranging from 20 Hertz (pressure fluctuations per second) to 200-250 Hertz, depending on the reference. In music it is the bass region as opposed to alto and soprano.

Masking – The process by which the threshold of hearing of one sound is raised due to the presence of another.

Maximum (A weighted) sound level (LAmax) - The highest value A-weighted sound level with a specified time weighting that occurs during a given event. The time weighting (see below) used (F or S) should be stated. All measurements were 'fast' in this survey. [ref BS5228-1 2009+A1 201410]

Measurement time interval (Tm) - Total time over which measurements are taken. [ref BS4142 2014]

Meter response and time weightings - Most practical sound sources cause fluctuating readings. If the level fluctuates too rapidly, an analogue pointer may move so erratically that it will not be possible to obtain a meaningful reading, or with impulsive sound the meter may not respond quickly enough to obtain an authentic reading. Sound level meters are therefore provided with a variable time response control with settings:-

'S' Slow - Meter response is over damped with a time constant of approx 1 second or 1000ms. The setting tends to average out fluctuations in the readings.

'F' Fast - Permits the instrument to follow and indicate levels that do not fluctuate too rapidly; the time constant response is 125ms.

'I' Impulse - Uses a special electrical circuit with a time constant of about 35ms (of the same order as the response time of the human ear) to permit a very rapid response for investigating very sudden, short duration, impulsive sounds. This setting incorporates a detector which in effect stores the signal for sufficient time to allow it to be displayed. Also a slow decay rate is incorporated with time response of approx 1500ms to allow more easy reading of the maximum value as the indicator moves back relatively slowly.

'P' Peak - Higher grade meters often incorporate this setting which enables the absolute peak (as opposed to the rms) value of an impulsive waveform to be measured. A time constant of the order of 20 - 50 micro seconds is now involved to permit the following of very sharp impulsive events. Evidently electrical signal storage is also required to permit the meter to register the peak of such very fast events.

Noise - Sound perceived by the receiver to be unwanted.

Octave band 1/1 (single) - Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit. [ref BS4142 2014]

[10] This edition of BS5228-1 2009 includes updates from February 2014.

Octave band 1/3 (third)- Band of frequencies in which the upper limit of the band is 21/3 times the frequency of the lower limit. [ref BS4142 2014]

Percentile level (LAN,T) - A-weighted sound pressure level obtained using time-weighting "F" which is exceeded for N% of a specified time interval. Typically the percentile level can be changed on modern sound level meters e.g. LA90,T, LA10,T, LA50,T etc. [ref BS8233 2014].

> **LA90,T**: The A-weighted sound pressure level exceeded for 90% of the specified measurement time interval. It is a statistical measurement. In BS4142 2014 (and generally) it is used to describe the background sound level. Thus for a measurement time interval of 1 minute it would equate to the quietest 6 seconds of sound. For a measurement time interval of one hour it would be the quietest sound for 10% of the time (or 6 minutes). If a machine runs continuously without a reduction in sound for 54 minutes and then stops it would represent the quietest 6 minutes of sound but if run for 55 minutes it would represent the quietest period of machine sound.

LA10,T: The A-weighted sound pressure level exceeded for 10% of the time. It represents the highest sound pressure levels within any measurement time interval. The LA10,18hour is typically used as a measure of road traffic noise.

Pitch – Frequency is an objective measure whereas the term pitch is subjective and although mainly dependent on frequency, is also affected by intensity. See also **Tonality**.

Rating level (LAr,Tr) – The specific sound level of a source plus any adjustment (penalty or weighting) for the characteristic features of the sound. It is used in BS4142 2014 for rating and assessing industrial and commercial sound. [ref BS4142 2014 and BS7445-1 2003 for tonal character and impulsiveness of sound]

Receiver - Person or group of persons who are or who are expected to be exposed to environmental noise.

Reference time interval (Tr) - Specific interval over which the specific sound is determined. For BS4142 2014 this is 1 hour during the day from 0700 to 2300hrs and a shorter period of 15 min at night from 2300 to 0700hrs. [ref BS4142 2014]

Residual sound level - Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T. [ref BS4142 2014]

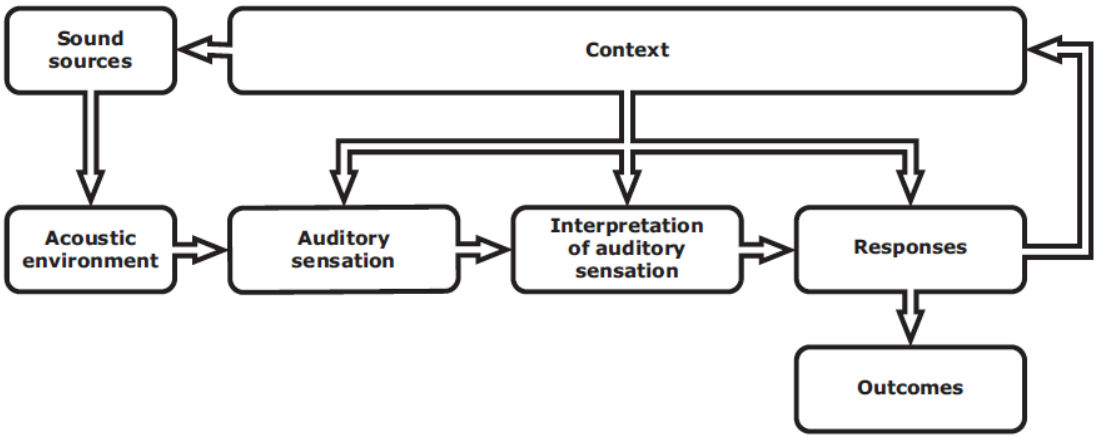
Rw - See Sound reduction index.

Sound power level - Sound power is a measure of the flow of sound energy with reference to a unit of time measured in watts (W). The sound power level is an expression of this energy in a logarithmic scale. The sound power level, unlike the sound pressure level, is independent of room or environmental effects and distance.

Sound pressure level - Sound pressure is measured in pascals (Pa) and is created by fluctuations in air caused by sound. The sound pressure level is an expression of this pressure in decibels. The sound pressure level is variable depending on distance from the source and the interaction of the source with the environment (e.g. reflections).

Soundscape – The acoustic environment as perceived or experienced and/or understood by a person or people, in context (see 'acoustic environment' and 'context'). Figure 1 illustrates that soundscape is people's perceptions or experiences and/or understanding of an acoustic environment. The measurement, assessment or evaluation of soundscape is through the human perception of the acoustic environment.

Figure 1 - Elements in the perceptual construct of soundscape



[ref BS ISO 12913-1 2014]

Sound reduction index, R, Rw, Rw + Ctr - a level that describes the sound reducing properties of a building element or partition. The weighted sound reduction index (Rw) is a laboratory measurement undertaken in accordance with ISO 717 and provides a standardised value, using a reference curve, which allows comparison between different building elements using the Rw value. The addition of the "Ctr" term, i.e. Rw + Ctr, provides an additional weighting which allows for sound sources with lower frequency spectral dominance.

Specific sound level (Ls = LAeq,Tr) - The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T. [ref BS4142 2014]

Tonality – Tonal sound gives a definite pitch sensation. It usually occurs where the sound energy in a narrow range of frequencies is greater than those either side of that narrow range. It will appear as a peak on a graph of sound energy shown in decibels versus the audible spectrum. It can often be shown by comparing adjoining octave band (1/3) spectra. A formal definition of tonality varies between standards. Where one 1/3rd octave band is more than 5dB above those either side, the noise contains a tone or alternatively as assessed by narrow band analysis. [ref BS7445-2 1991 / ISO1996-2 1987]. In BS4142 2014 the level differences between adjacent 1/3rd octave bands that identify a tone are:

15dB in the lower frequencies (25Hz - 125Hz)
8dB in the mid frequencies (160Hz - 400Hz)
5dB in the higher frequencies (500Hz - 1000Hz)

Weighted level difference Dw, DnTw, DnTw + Ctr - The weighted level difference gives a single number value for the airborne sound insulation performance of building elements or partitions etc. As with the sound reduction index, the DnTw is a standardised weighted level difference, standardised to a reverberation time of 0.5 seconds, and allows comparison of different building elements. The addition of the "Ctr" term, i.e. DnT,w + Ctr, provides an additional weighting which allows for sound sources with lower frequency spectral dominance.

Appendix B - MAS Noise Impact Assessment 15th February / 27th March 2018

MAS ENVIRONMENTAL

Local Gov Issues, Acoustics, Health & Safety, Food Hygiene, Planning, Pollution, Licensing, Nuisances, Catering Design

Proposed Residential Development by Wrenbridge

New Settlement at Colworth, Bedfordshire

Review of Noise Impact

in relation to

Santa Pod Raceway

15th February 2018

Updated 27th March 2018

Provided by MAS Environmental Ltd

Prepared by: [redacted]

[redacted] (Additions to the Exec Summary March 18)

Reference: SPR180215/MAS

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CONTENTS

1.0 Executive summary

1.1 MAS Environmental Ltd ("MAS") were appointed by Santa Pod Raceway to review a noise impact in relation to planning proposals for a new settlement in Sharnbrook, Bedfordshire.[1]

1.2 In addition, post the initial analysis described in this report, we have met with acoustic consultants for Colworth development at the site to enable them to understand the issues and difficulties. This Executive Summary includes some of the wider issues arising from subsequent analysis and discussions not covered in the main report. After a full day meeting with the Developer's acousticians it can be concluded:

- In relation to the critical issue, whether Colworth could be developed without resulting in the demise of Santa Pod; none of those represented were able to confirm or agree an appropriate decibel related criteria or range of controls that would protect Santa Pod from litigation for noise nuisance should the development proceed. No challenge has been made against the appropriateness of the criteria applied by MAS and which is based on common findings of the courts, other local authorities and also Bedford Borough Council in relation to other similar sites.

- There is no evidence to undermine the criteria applied by MAS and critically moving housing nearer and over a wider range of wind directions increases the frequency and duration of impact that must arise and not just increase the resulting noise level. Adverse impact is not just about noise level and noise character but the frequency and duration of occurrence. This substantially increases the risk of nuisance and is a consideration thus far unchallenged. We have obtained nothing from the meeting that enables us to be remotely positive about this problem.

- There is no challenge to the criteria adopted by the Council's EHO that average noise levels 10dBA above background sound level occurring on a regular basis would amount to unacceptable impact. This criteria concurs with judgements in other cases including the critical case of Lawrence versus Fen tigers 2011 upheld in the Supreme Court in 2014.

- There is agreement any mitigation required would be substantial and relate to significant limitations on the form of residential development as well as major infrastructure changes at Santa Pod. The latter requires planning permission on which there can be no guarantee and especially that additional controls would not be imposed. Furthermore, there is no evidence or reasoned logic that such measures would be, even remotely, sufficient. Conversely evidence indicates some of the more important elements of the noise impact cannot be readily mitigated, in relation to its impact upon much of the proposed development site.

[1] Preliminary Noise Impact Assessment Report and Environmental Sound Survey Report dated 17th February 2017.

- Evidence indicates whilst mitigation may reduce some sources of noise 7-9dBA as a best case reduction this remains less than half the reduction needed and not only can there be no assurance levels can be suitably mitigated, *prima facie* the evidence shows it cannot with a wide margin remaining. In other cases evidence indicates some sources may only reduce about half a decibel where the gulf remains.

- It is noted whilst there are various mechanisms such as removing all permitted development rights for all the dwellings, there are substantial complexities in such approaches and no guarantee of what can be achieved or could be mandated in the future. It was clear nothing can be mandated and there is therefore no evidential basis to conclude even forms of mitigation that can be engineered could be achieved.

- The developers can offer no evidence of the true level of impact at the development site and agree a major programme of monitoring and investigation would be required before the extent and degree of adverse impact expected could be fully recognised or more carefully predicted. There was no evidence level would be lower than the conservative values used.

- It was not disagreed that any possible way forward would need a substantial change to the current master plan and proposed layout such that the currently proposed Colworth and any future layout may need to be radically different, for example to include a substantial industrial buffer/screening zone. Discussions on the possibility of this were to be considered by the Developer's acousticians.

- There has been no challenge to the predicted levels of impact as indicated by the MAS evaluation and outlined in this report. In turn this indicates development is unsuitable as it would lead to the demise of Santa Pod.

- Modelling of noise emission levels cannot, at this stage, confirm with any certainty the resulting impact and a long programme of testing would be required to calibrate or validate any model. Furthermore it cannot address noise impact which relates to non-acoustic factors which are recognised as responsible for 2/3rd of noise annoyance.

- The meeting achieved consensus on a mechanism and process for better determination of the extent of the problem and also the extent of noise reduction achievable. This process could take 6-24 months and would then simply provide greater certainty over the size of the problem.

- The divide between surety of acceptable noise levels and what is achievable remains substantial and is indicated as remaining in excess of 10-15dBA, even when assuming theoretical best case mitigation is achievable. This remains too far above any criteria of acceptability and is, in any event, dependent on major infrastructure changes at Santa Pod. Achieving a suitable resulting development remains wholly unachievable and impractical therefore and the exhaustive meeting has not resolved any issues.

1.3 The fundamental principles of national planning policy of protecting existing development cannot be met in this case and the prospect of the demise of this nationally recognised facility if development proceeds is apparent. Current adverse impact at villages further away is adverse but does not exceed nuisance criteria due to the reduced sound energy levels, greater atmospheric and distance reduction in noise but also the reduced frequency and duration of impact caused by changing wind direction and upward sound refraction leading to far greater periods of sound shadow. These forms of protection would be lost in relation to Colworth due to its size and nearness.

1.4 MAS have historically undertaken a number of noise monitoring exercises for Santa Pod Raceway both on site and in the community and as such have significant experience and understanding of the nature and character of noise impact from the site.

1.5 The noise from Santa Pod contains a variety of acoustic features/characteristics and also non-acoustic elements that should be considered in any assessment of noise impact. Many of the characteristics attract and hold attention compared to other sources of ambient sound that are expected e.g. road traffic, birdsong. They intrude therefore at low sound energy levels.

1.6 The proposed development locates residential dwellings (i.e. noise sensitive land use) within close proximity of a noisy site. This goes against basic principles for avoiding adverse noise impact.

1.7 It is clear and consistent across guidance that when assessing noise impact, a range of factors must be considered in addition to the absolute noise (decibel) level. Assessment of decibel level alone from race events indicates that adverse impact will be generated at the proposed development site as a result of Santa Pod activities. Assessment of additional factors, such as noise character and music noise from events, including at night, serves to increase adverse impact.

1.8 Government guidance places emphasis on improving health and quality of life but also not placing unreasonable restrictions on industry or commerce. Substantially higher noise levels occurring much more often are predicted at the proposed development site than currently exist in nearby communities. Thus, health and quality of life for those at newer housing in the area cannot be improved compared to existing communities.

1.9 Existing communities have expectation of intrusion from Santa Pod as they have evolved along with Santa Pod. This same form and level of expectation cannot exist for any new community who naturally expect development is permitted with their quality of life already protected as part of the assessment process.

1.10 There is a unanimous acceptance across guidance for avoiding significant adverse impacts and for minimising and mitigating noise impact as far as practicable. Proposed mitigation affords minimal benefit and significant adverse impacts are demonstrated to continue.

1.11 When assessing noise impact from entertainment venues long term averages have generally been dismissed by the courts and shorter term average noise limits (5-15 minute LAeq) have been adopted. Noise limits set for other motorsport venues range

from 42-47dB LAeq,T again as a short term value. Maximum noise levels have also been considered and controlled at the site boundary and in the community, including within the Bedford district. The objective is to stop short periods of high noise which is precisely what happens at Santa Pod.

1.12 Conservative estimated noise levels at the proposed development site, based on levels previously measured in nearby community locations, exceed noise limits used at other raceways including within the Bedford district (42-47dB LAeq,T) by a significant margin, from around 10-30dB(A) depending on source type and meteorological conditions etc. This gulf is simply too large to be addressable by mitigation such as screening.

1.13 Maximum noise levels can be compared with noise limits set for Palmer Promosport at Thurleigh in the Bedford area, which is approximately 8km from Santa Pod and within the same local authority area. The Palmer Promosport site boundary level is set at 65dB LAmax and thus much lower levels are expected in the community. This site boundary level is exceeded across much of the proposed development site with maximum levels ranging from 65-74dB LAmax,f.

1.14 Decibel levels are set not just to protect dwellings but other users of the countryside and outside amenity areas. Specialised housing such as single aspect dwellings that are devoid of noise sensitive rooms facing a site cannot address this problem. The 65dB LAmax level was set in part to protect other countryside users.

1.15 At these levels, and given the specific character of motorsport noise, the sound environment in and around dwellings and generally at the proposed development site will often be dominated by Santa Pod noise. Noise levels will often be twice as loud as background sound levels and at times significantly above this. Santa Pod noise will be heard as a distinct noise source and will be heard indoors, on occasions and in many areas with windows shut.

1.16 Santa Pod emissions contain significant low frequency noise content which is recognised as more annoying than other sources of noise. As a consequence a greater margin of protection is needed than for many motor sport sites. Furthermore, screening and mitigation reduces the mid and higher frequency sound level content to a greater amount leading to a resulting source of noise that is more dominated by low frequency noise. None of this is factored into the considerations but indicates a greater disparity likely arises.

1.17 It is noted that the proposed development site will often be downwind of Santa Pod in prevailing wind directions and as such can expect higher noise levels for much of the time and limited respite due to meteorology and nearness. The incidence of adverse impact increases therefore compared to existing developments.

1.18 Comparison of predicted noise levels with current screening and the addition of an 8m high, 800m long barrier, when using modelling, shows that little additional reduction is afforded despite significant additional screening. Additional physical mitigation at the site, even in an extreme form, does not afford sufficient reductions to meet or come close to previously accepted planning criteria for motor sport noise.

1.19 Mitigating noise by altering the site layout will direct source noise towards nearby villages already effected by Santa Pod noise and in the prevailing wind direction,

which will serve to increase propagation. It would also place music venues used during larger events held at the site closer to villages to the north and east of the Santa Pod site thus increasing impact from this aspect of the site's operations. This is not therefore a viable option.

1.20 Altering the site layout would also require planning permission and in turn the Council will be obligated to impose noise controls not currently in place. This is a negative step imposing further restrictions on the operation of Santa Pod.

1.21 Mitigating noise by reducing the number of events held at Santa Pod would serve to reduce noise impact; however, significant reductions in activity at Santa Pod would be needed. Comparing a typical range of events at other venues, normally 1-3 event days could be of uncontrolled decibel levels and a further 4-10 event days typically restricted by absolute levels or a reasonably large exceedance of the background sound levels. For a greater number of event days, they would require restriction by their emergence above background sound energy levels. This would prevent all but a few events and even the majority of those would require significant restriction such that drag racing could not continue.

1.22 Current "Drifting" events benefit from reduced impact as their tyre squeal is of a higher sound energy frequency and so better screened by ground features and reduced by atmospheric absorption. These benefits would be reduced where housing development was much closer. The extent of the change is not easy to predict but is likely to be greater than adjustments for distance alone indicate.

1.23 The event days considered in the analysis above would include all music noise emissions and effectively would allow one major event a year only.

1.24 Those moving to the area are unlikely to have any experience or expectation of the noise from Santa Pod, particularly given the largely rural area around the proposed development site and lack of obvious visual clues indicating that there could be noise disturbance from a raceway. The norm is to expect their environment is adequately protected and thus unlike existing villages, absence of significant intrusion is what is normally expected.

1.25 The proposed housing development fails to meet numerous objectives of planning guidance and seeks to introduce a large number of noise sensitive receptors at a distance of 500m - 1km from the Santa Pod site. Noise at dwellings will be dominant, at times highly intrusive and significantly above background sound levels. Widespread complaints are expected and control by way of statutory nuisance (whether privately or by the Council), use of Community Protection Notices or common law action should be expected.

1.26 The proposal fails to meet the aims of the NPSE as described within the PPG on noise to mitigate and reduce adverse noise impacts to a minimum and to improve the health and quality of life through effective management of noise. It also fails to protect Santa Pod or any future development of the site.

1.27 The development site will be impacted by 3 turbines which, post their approval, are recognised to cause potential problems of excess amplitude modulation. Research shows this is a common noise feature of this size of turbine causing serious annoyance. The problem is internationally recognised as serious and common. Whilst

this impact is mainly at night, it adds cumulatively to the noise impact and therefore potentially exacerbates adverse reaction in the community due to the cumulative adverse features of the sound environment.

2.0 Introduction

2.1 MAS Environmental Ltd ("MAS") were appointed by Santa Pod Raceway to review noise impact of the raceway at proposed housing in a new settlement in Sharnbrook. This report reviews guidance and standards, levels of acceptability at other racing venues and considers whether an acceptable noise environment could be achieved at the proposed development site. Whilst the noise impact assessment for the proposed housing site should consider environmental noise as a whole including that from road traffic noise, wind turbine noise and Santa Pod Raceway, this report considers only noise generated at Santa Pod Raceway (Santa Pod).

2.2 Santa Pod is located in a predominantly rural area with villages located to the north west, north east and east of the site. The A6 runs to the north and east of the site. MAS have historically undertaken a number of noise monitoring exercises both on site and in the community and as such have significant experience and understanding of the nature and character of noise impact from the site. MAS have provided expert evidence in a number of court cases relating to motorsport noise impact and assessment.

2.3 An aerial view of the site is shown below in figure 1 with the proposed new settlement marker in red.

Figure 1: Aerial location of Santa Pod

2.4 In the absence of noise associated with Santa Pod the main sources of noise in the area are from wildlife and particularly birdsong, distant road traffic noise from the A6, local road traffic noise and occasional aircraft. The character of the area is typically rural with relatively benign ambient noise sources and natural sounds that are expected. It is noted that wind turbines have recently been erected in the area and this will influenced the character of the locality to some extent.

2.5 During Santa Pod events there are a range of noise sources that can be heard within the community including tyre squeal, engine noise, PA noise, music noise, noise

associated with fairground rides and helicopter rides. There are a range of noise sources generated at the site and events can run continuously throughout the weekend. The noise impact, and particularly that associated with racing, can be very intermittent and limited in duration. This results in bursts of activity that can be followed by periods with little / no noise. As such it is important to both witness the noise and use appropriate acoustic measures to accurately reflect both the nature and character of the noise. The acoustic character of the noise is such that its true impact is not reflected by considering only the decibel level. This is recognised within guidance.

2.6 The noise is very dependent on wind direction and upwind conditions can considerably reduce the audibility of Santa Pod noise.

2.7 The new settlement is proposed to the east of Santa Pod and expands from the existing settlement of Sharnbrook. The proposed location is shown in figures 2 and 3 below.

Figure 2: Proposed settlement location

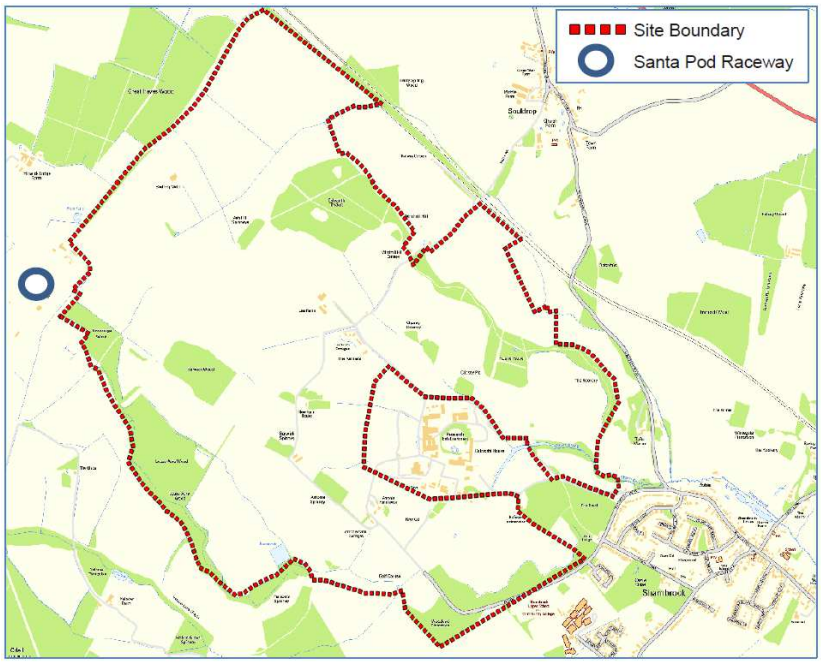


Figure 3: Indicative layout of proposed settlement

3.0 Guidance and criteria

3.1 This section provides a very brief summary of key points from guidance and criteria as they relate to this case.

3.2 One of the most basic principles in noise control is that noisy activities should be separated from noise sensitive uses as far as practicable i.e. to separate noise generating and noise sensitive uses via land use planning. Thus, noise sensitive land uses such as residential development should be located as far away as possible from sites that generate noise. In this respect the proposed development site fails to achieve this basic aim and instead locates residential development within 500m of a busy raceway. This goes directly against the most basic guidance for avoiding land use conflicts.

3.3 The following paragraphs summarise key excerpts from relevant guidance documents *[my emphasis]*.

3.4 **Noise Policy Statement for England (NPSE):**[2]

- Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, *contribute to the improvement of health and quality of life* through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

3.5 **National Planning Policy Framework (March 2012) (NPPF).**[3] The NPPF states that planning decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impact on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of *their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established*;

3.6 **Planning Practice Guidance (2014) (PPG).**[4] The Planning Practice Guidance (PPG) removed guideline decibel values from the assessment of impact and broadened the

[2] Great Britain. Department for Environment and Rural Affairs (DEFRA) (2010) *Noise Policy Statement for England.* London: TSO
[3] Great Britain. Department for Communities and Local Government (2012) *National Planning Policy Framework*. London: TSO. Available from: http://planningguidance.planningportal.gov.uk/

noise impact assessment approach to include, for example, consideration of impact in context. The guidance notes that 'there is not a simple relationship between noise levels and the impact on those affected' and lists a number of factors that influence whether noise could be a concern. Factors that influence whether noise could be a concern include:

- the source and absolute level of the noise together with the time of day it occurs
- for non-continuous sources of noise, *the number of noise events, and the frequency and pattern of occurrence* of the noise
- the spectral content of the noise and *the general character of the noise*
- *cumulative impacts of more than one source* should be taken into account along with the extent to which the source of noise is intermittent and of limited duration
- If external amenity spaces are an intrinsic part of the overall design, *the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.*

3.7 It is also noted that the PPG states:

- The potential effect of a new residential development being located close to an existing business that gives rise to noise should be carefully considered. This is because existing noise levels from the business even if intermittent (for example, a live music venue) may be regarded as unacceptable by the new residents and subject to enforcement action.

3.8 **IEMA Guidelines for Environmental Noise Impact Assessment. (2014).**[5] This guidance provides general advice for undertaking an assessment of noise impact. It notes that:

- The noise impact and the consequential *effect can only rarely be properly determined solely by the simple numerical difference* in the value of a particular noise indicator.
- It is only by taking account of these factors that the magnitude of the effect of a given noise impact on sensitive receptors can be properly identified: averaging period, time of day, nature of the noise source, frequency of occurrence, spectral characteristics, absolute level of the noise indictor, influence of the noise indicator used.
- Averaging noise. The longer the averaging time period of the indicator, the more likely it is that a small change in it could be masking a larger and potentially substantial change that only occurs fro a short part of the averaging period.

[4] Great Britain. Ministry of Housing, Communities & Local Government (2014) *Planning Practice Guidance : Noise.* London: TSO. [Online: https://www.gov.uk/guidance/noise--2]
[5] Institute of Environmental Management & Assessment (IEMA) (2014). *Guidelines for the Environmental Noise Impact Assessment.*

- For a given level of noise, it is often considered that a source which emits a continuous level is less annoying or disturbing than a source that is intermittent enough to attract attention. This approach means that *the nature of the noise source and how its nature changes needs to be taken in to account.*

3.9 **World Health Organisation Guidelines (1995).**[6]

- By tradition, the exposure to noise from various sources is most commonly expressed as the average sound pressure level over a specific time period, such as 24 hours. This implies that the same average level of chosen time can either consist of a larger number of events with a relatively low, indeed almost nonaudible level, or a few events with a high level. This technical concept does not agree with common experience on how environmental noise is experienced, nor with the neurophysiological characteristics of the human receptor system.

- Thus, *it is relevant to consider the importance of the background level, the number of events, and the noise exposure level independently when assessing the effects of environmental noise on man*.

- Guideline Values for Dwellings. Recommended guideline values for bedrooms inside are 30 dB LAeq for steady-state continuous noise and 45 dB LAmax. *Lower levels may be annoying depending on the nature of the noise source.*

3.10 **World Health Organisation Guidelines (1999) (WHO 1999).**[7]

- LAeq,T should be used to measure continuing sounds, such as road traffic noise or types of more-or-less continuous industrial noises. However, *when there are distinct events to the noise*, as with aircraft or railway noise, *measures of individual events* such as the maximum noise level (LAmax), or the weighted sound exposure level (SEL), *should also be obtained in addition to LAeq,T*.

- The annoyance response to noise is affected by several factors, including the equivalent sound pressure level and the highest sound pressure level of the noise, the number of such events, and the time of day.

3.11 In summary, it is clear and consistent across guidance that when assessing noise impact, a range of factors must be considered in addition to the absolute noise (decibel) level. Government guidance places emphasis on improving health and quality of life but also not placing unreasonable restrictions in industry. There is a unanimous acceptance for avoiding significant adverse impacts and for minimising and mitigating noise impact as far as practicable.

[6] Berglund B., & Lindvall, T. (eds) World Health Organisation (WHO) (1995) *Community Noise*. Sweden: WHO
[7] Berglund B., Lindvall T., & Schwela D.H., (eds) World Health Organisation (WHO) (1999) *Guidelines for Community Noise.* Geneva: WHO

4.0 Guideline values for motor sport noise

4.1 The paragraphs below summarise controls set at other motor sport venues.

4.1.1 **Coventry v Lawrence 2014 -** Arguments based on the WHO guidelines were considered in considerable detail by the court and rejected. Reliance was placed on emergence of the noise over background sound.

- The primary control was set at 45dB LAeq,15min. At a later hearing, with agreement of the complainant, higher levels of up to 55dB LAeq,15min were permitted on a limited number of occasions (12 weekends per year).

4.1.2 Palmer Promosport – Thurleigh Bedfordshire

- 45dB LAeq Mon-Fri (40dB 17:30-20:00) at nearest residential property.
- Maximum level on the boundary of the site - 65dB LAmax 08:00- 17:30 (55dB 17:30 – 20:00).

4.1.3 Red Lodge Karting, Cambridgeshire

- Community limit of 42-46dB LAeq,5min at the boundary of residential property, depending on the time and type of vehicle operated.

4.1.4 Bruntingthorpe Proving Ground

- Community limit of 40dB LAeq(10 minute) applied to certain activities including karting that required planning permission.

4.1.5 Rockingham Motor Speedway – Northamptonshire

- Community limit 47dB LAeq during the day at the boundary of any residential property.
- One unsilenced event a year (i.e. Formula 1).

4.2 Guidance on levels of acceptability of motor sport noise can also be taken from legal judgements where the use of appropriate noise descriptors has been debated. Many have relied on use of WHO guideline values set over a 16 hour average daytime, a similar averaging approach has been proposed by the developer in this case.

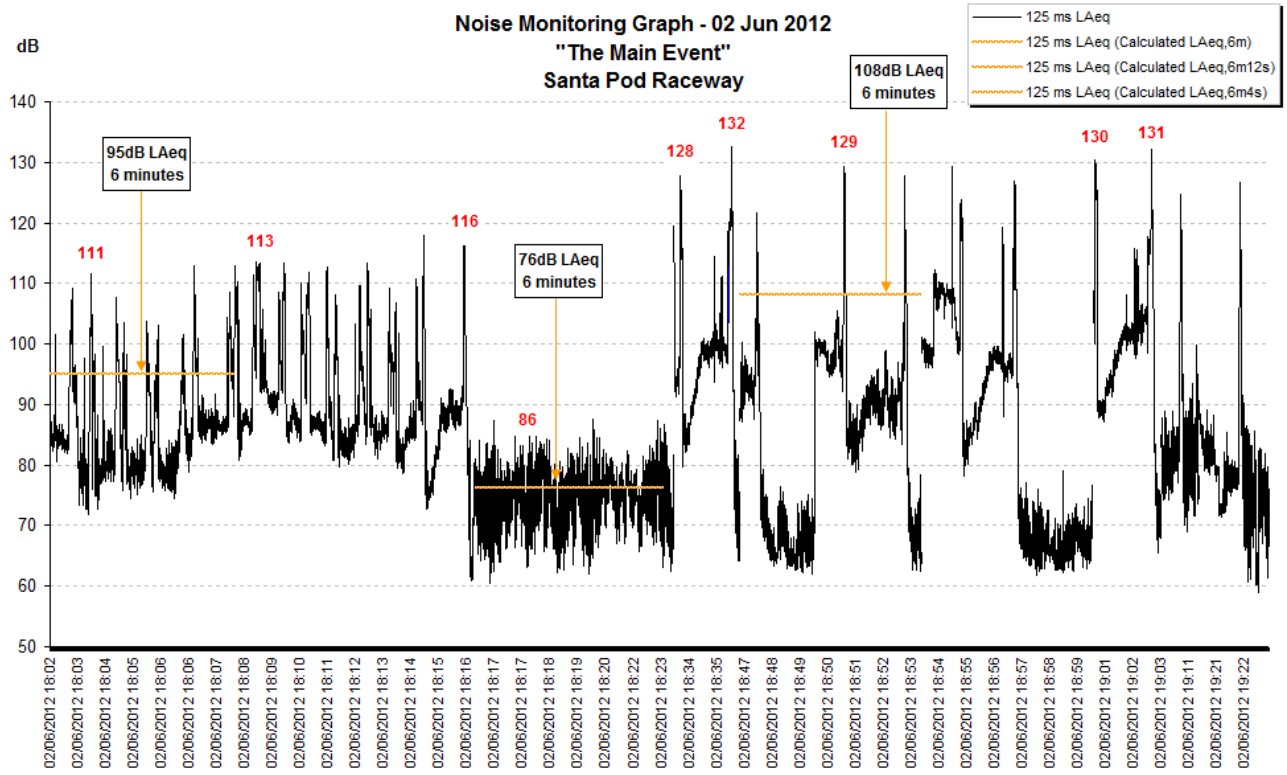
- **Elvington Estates v City of York Council 2009** - Motor sport case where reliance on the WHO rejected.
- **Watson V Croft Promo-Sport 2009** - Motor sport case where controls set by the court are wholly unrelated to WHO guideline values.
- **Bontoft and Others v East Lindsey DC 2008** (upheld in CoA) - Refuse truck noise on site and highway where reliance on the WHO Guideline values was rejected.

4.3 In summary, long term averages have generally been dismissed and shorter term average noise limits (5-15 minute LAeq) have been adopted. These range from 42-47dB LAeq,T. Maximum noise levels have also been considered and controlled at the site boundary and in the community.

5.0 Community noise impact

5.1 The graph below shows an extract from trackside monitoring at Santa Pod. The graph shows the intermittent and variable character of the noise on site. This will be reflected within the community. The measured noise levels are dominated by activity at Santa Pod with the peaks in noise levels corresponding to revving engines or racing.

Figure 4: Extract of trackside monitoring at Santa Pod



5.2 The red numbers above peaks in the measured data graph give the maximum noise level of the event. These can be seen to range from 86dB LAmax,f when there is no racing to 111-116dB LAmax,f and up to 132dB LAmax,f depending on the type of vehicle racing. Three short term averages have also been compared to show the variability of short term average noise levels on site, 76dB LAeq,6min when there is no racing and between 95dB LAeq,6min and 108dB LAeq,6min depending on the race event. The graph shows a highly variable noise environment with a range of noise level and noise character including intermittency, some regularity, impulsive and sudden onset sound etc. The racing continued in a similar manner between 2pm and 7.30pm.

5.3 Community monitoring was also undertaken throughout the racing season in 2012. Community noise levels were highly variable, as demonstrated in figure 4 above, and dependent on meteorological conditions. A sample of community measured noise levels from different events is summarised in table 1 below along with associated distances from the start and finish of the raceway and the end of the race strip.

Table 1: Summary of community measured noise levels (15min, LAeq)

Event	Location	dB LAeq, 15min	Wind direction / speed	Receiver location vs wind	Distance from start line	Distance from finish line	Distance from end of raceway
The Main Event	Podington	61	ESE 4-5m/s, cloudy	downwind	2km	2.1km	2.4km
	Souldrop	36		upwind / crosswind	2.3km	2.8km	3.3km
Easter Thunderball	Souldrop	38	W 3-4m/s, cloudy	downwind / crosswind	2.5km	3km	3.6km
Bug Jam	Souldrop	42	Variable, 1-2m/s, warm, part cloudy	n/a	1.7km	2.2km	2.6km
		41					
		47					

5.4 The table above shows a range of measured noise levels and a range of weather conditions. Given the large distances between Santa Pod and the community monitoring locations there are likely to be significant effects on noise propagation due to the meteorological conditions. Comparison of measured levels in Podington (downwind) and Souldrop (largely upwind) during "The Main Event" shows that over similar distances there can be a substantial difference, which will be largely influenced by meteorology. It is noted that the proposed development site will often be downwind of Santa Pod in prevailing wind directions and as such can expect higher noise levels for much of the time and limited respite due to meteorology.

5.5 Attenuation of sound over distance can be estimated for point sources (e.g. a stationary car revving its engine) and line sources (e.g. a road with constant road traffic flow). The noise source at Santa Pod has elements of both. The basic distance attenuation of a point source is 6dB per doubling of distance and for a line source, 3dB per doubling of distance. This is the loss of sound energy by distance alone and does not account for increased or reduced sound attenuation due to meteorology (wind vector, temperature inversions etc).

5.6 Table 2 below compares the simultaneous on site and community short term LAeq levels measured at two Santa Pod events. The reduction is given between levels measured on site and in the community simultaneously (3rd column). Distance attenuation has then been estimated assuming that all the noise is generated at the start line[8] i.e. using the distance between the community location and the start line at Santa Pod (4th and 5th columns). Comparison of the actual reduction and estimated distance attenuation shows that distance attenuation is better estimated by point source attenuation than line source.

[8] NB this is not the case in reality and considerable noise will also be generated along the track to the finish line.

Table 2: Summary of actual reduction over distance compared to estimated distance attenuation - short term LAeq events

Event	Community location	Reduction (on site - community)	Distance attenuation (line source)	Distance attenuation (point source)
The Main Event	Podington	44dB(A)	26	52
Bug Jam	Souldrop	54-55dB(A)	25	51

5.7 Using a simple distance attenuation calculation, an estimate of the 15 minute LAeq at nearest dwellings on the proposed development east of Sharnbrook can be provided based on levels previously measured in community locations. The estimated value at the proposed development site is based on point source attenuation[9] and it is noted that depending on the weather conditions values could be slightly lower and slightly higher than estimated. As above, the distance used is between the start line at Santa Pod and some of the nearer proposed residential development to the north east (approx 400-600m from the start) and south / south east (approx 600m from the start) of Santa Pod.

Table 3: Estimated 15 minute LAeq levels at nearest housing on proposed development site

Event	Measurement location	dB LAeq, 15min	Distance from start line	Estimated dB LAeq 15min at proposed dwellings NE of Santa Pod	Estimated dB LAeq 15min at proposed dwellings SSE of Santa Pod
The Main Event	Podington	61	2km	75	72
	Souldrop	36	2.3km	52	48
Easter Thunderball	Souldrop	38	2.5km	54	50
Bug Jam	Souldrop	42	1.73km	55	51
		41		54	50
		47		60	56

5.8 The final two columns of table 3 above can be compared to criteria from other raceways, summarised in section 4 above. Estimated noise levels exceed criteria (42-47dB LAeq,T) by a significant margin.

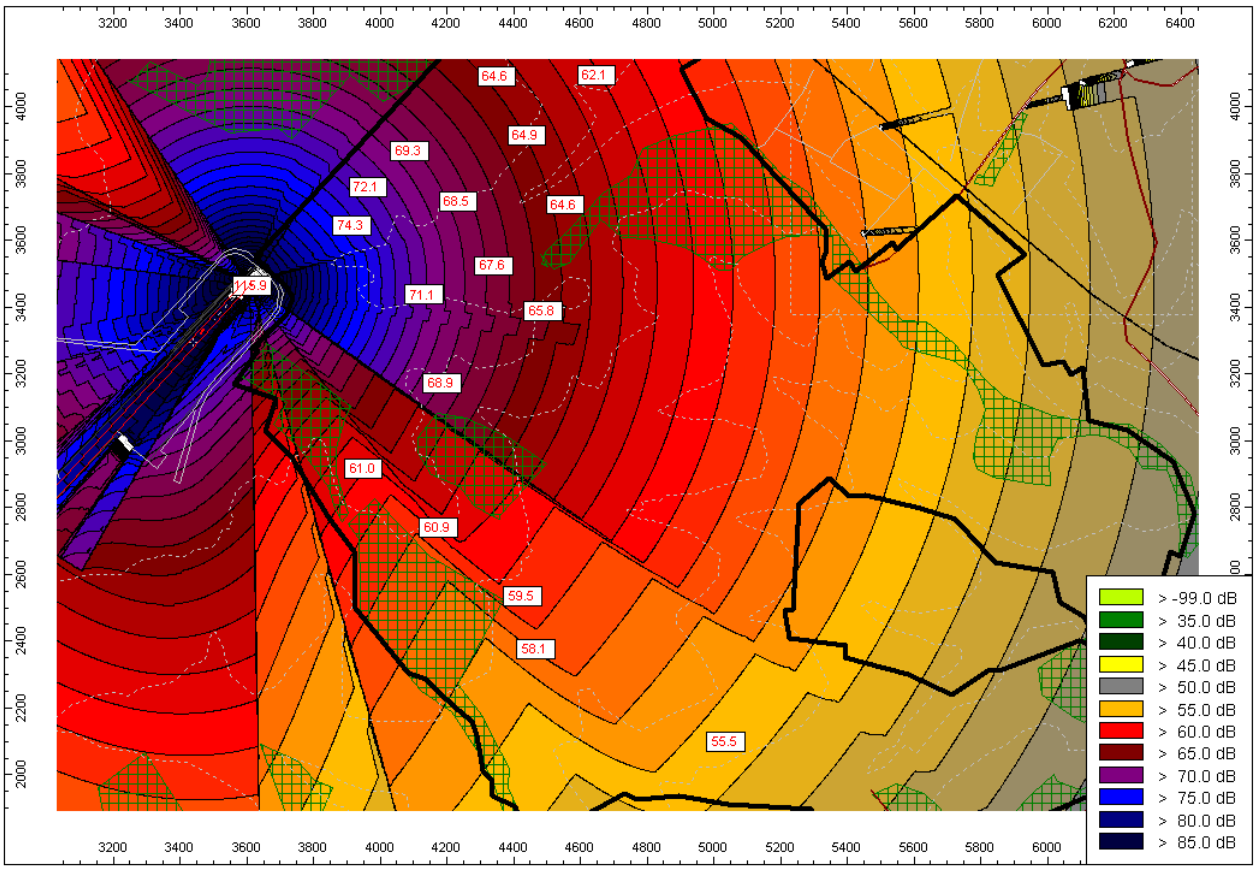
5.9 Predicted maximum noise levels were provided in a previous MAS report and are presented again below.[10] Maximum noise levels can be compared with noise limits set for Palmer Promosport, which is approximately 8km from Santa Pod and within the same local authority area. The Palmer Promosport site boundary level is set at 65dB LAmax and thus lower levels are expected in the community. With reference to figure

[9] This is shown above to be more accurate than line source attenuation.

[10] Hard / reflective ground at the site has been assumed but semi absorbent ground outside of the Santa Pod site. Structures on site have been mapped including spectator stands and on site buildings. Receiver spacing is at 2m and predicted noise levels are at 1.5m high. Predictions are made in accordance with ISO9613-2.

4 below, this site boundary level is exceeded across much of the proposed development site with maximum levels ranging from 65-74dB LAmax,f.

Figure 5: Noise map showing maximum noise levels predicted at the nearest locations of the proposed settlement



6.0 Mitigation and additional screening

6.1 As discussed above, community noise levels can be highly variable depending on meteorology. This will, inevitably, also have some influence on the effect of mitigation and results in uncertainty with noise mapping and estimated noise levels that are based on neutral / downwind propagation conditions. At times levels will be high and lower than suggested by modelling.

6.2 Notwithstanding the above limitations, an idea of the effectiveness of mitigation can be investigated by looking at a simplistic case. The noise model above assumes that there is already some screening on site, afforded by the existing spectator stands, bunding and buildings around the start line. Using this layout, a short term LAeq event has been modelled and the estimated noise levels at the nearest dwellings at the proposed development site are shown in figure 6 below.

6.3 The second noise map below (figure 7) shows the same scenario but this time with a 8m barrier in a U shape around the spectator stands and start line. It is approximately 800m in length. This is not a plausible mitigation measure but shows an extreme case looking at maximum potential reduction from screening.

6.4 Comparison of the two noise maps shows that little additional reduction is afforded despite significant additional screening. There is a 1-3dB reduction generally observed across the proposed development site.

6.5 This is due to diminishing benefits from adding screening where some already exists. As there is already a level of screening in place, the greatest benefit from screening has already been achieved and adding to this screening does not have the same benefit as if there were no screening currently at the site. For example, and assuming the same scenario, the difference in predicted noise levels with no screening at the site and with an 8m barrier around the spectator stands and start line is of the order of 3-8dB(A). This is more in accordance with that suggested in the noise assessments submitted with the proposed housing development to date. It suggests that predictions do not fully account for the screening currently on the Santa Pod site and so predicted mitigation has therefore been overestimated.

6.6 In summary, additional physical mitigation at the site, even in an extreme form, is shown to have limited benefit and is unlikely to reduce noise levels sufficiently to meet previously accepted planning criteria for motorsport noise.

Figure 6: Predicted short term LAeq with current site layout

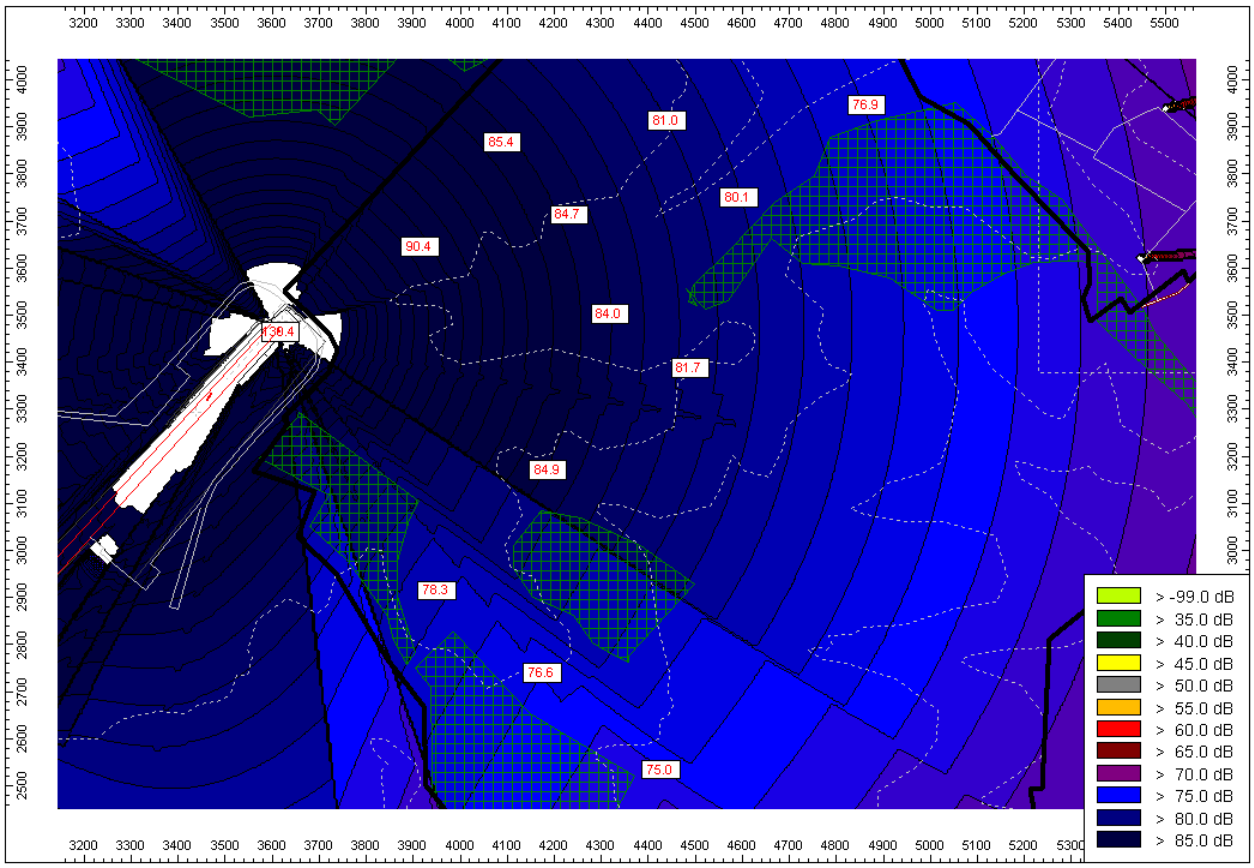
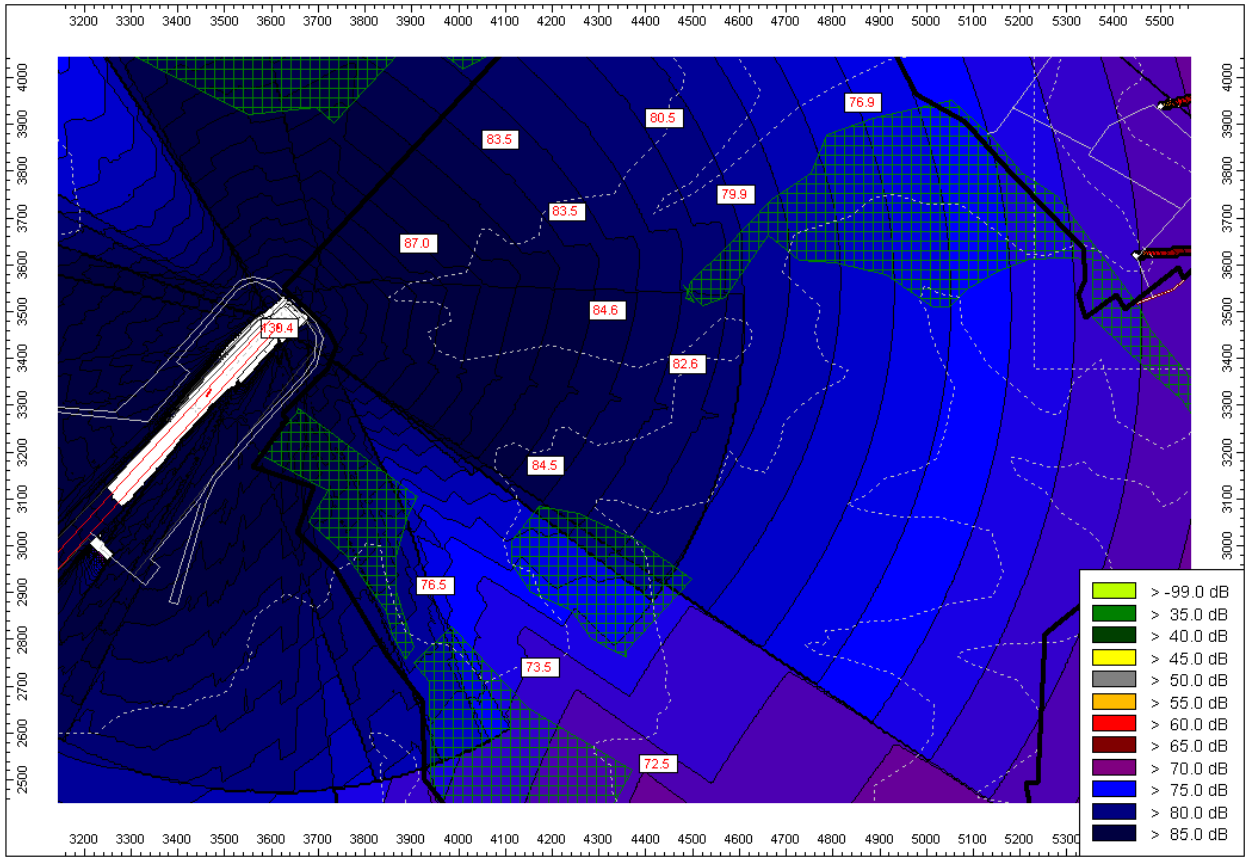


Figure 7: Predicted short term LAeq with additional 8m high 800m long U shaped barrier



6.7 Mitigating noise by altering the site layout has been proposed; however, changing the layout will direct source noise towards nearby villages already effected by Santa Pod noise and in the prevailing wind direction, which will serve to increase propagation. It would also place music venues used during larger events held at the site closer to villages to the north and east of the Santa Pod site thus increasing impact from this aspect of the site's operations. There are also complications with this proposal in relation to gaining planning permission for significant changes to the site and its operation.

6.8 Increasing respite from noise can also be used to mitigate against the effects of noise impact. This often includes having weekends, including bank holidays, where residents know there will be no noise impact for example, having regular planned respite such as 1 weekend of respite in every 3. Incorporating this type of respite management in to the Santa Pod calendar would result in a significant reduction to the number of events held. Events in 2018 are scheduled for every weekend throughout the summer (May - September) including some large events on successive weekends. Limits on the number of noisier events could also be considered and at other sites have been limited between 10-40 days. Assuming 10-20 noisier days are permitted, Santa Pod would need to cancel 2-3 of its major events, potentially more depending on the level and type of noise from the events.

7.0 Conclusions

7.1 The site is not considered suitable for residential development and fails to meet a fundamental planning objective of separating land uses that generate noise from those sensitive to noise.

7.2 The divide between surety of acceptable noise levels and what is achievable remains substantial and is indicated as remaining in excess of 10-15dBA, even when assuming theoretical best case mitigation is achievable. This remains too far above any criteria of acceptability and is, in any event, dependent on major infrastructure changes at Santa Pod.

7.3 Achieving a suitable resulting development remains wholly unachievable and impractical therefore and the exhaustive meeting has not resolved any issues.

7.4 In relation to the critical issue, whether Colworth could be developed without resulting in the demise of Santa Pod; none of the acousticians for the Developer are able to confirm or agree an appropriate decibel related criteria or range of controls that would protect Santa Pod from litigation for noise nuisance should the development proceed.

7.5 No challenge has been made against the appropriateness of the criteria applied by MAS and which is based on common findings of the courts, other local authorities and also Bedford Borough Council in relation to other similar sites.

7.6 Guidance repeatedly emphasises the need to consider a range of factors when deciding on the acceptability of noise impact and not relying on an average decibel level or change in this level alone. This is particularly important for sources of noise that are not steady and continuous but highly variable throughout the day and within shorter time periods as is the case here for Santa Pod.

7.7 Notwithstanding the need to consider a range of factors, estimated average 15 minute Santa Pod noise levels at the proposed development site exceed noise limits in place at other raceways sites in many cases by a substantial margin. Thus, noise level alone indicates adverse impact without additional consideration of character and context etc.

7.8 Maximum noise levels predicted at the proposed development site similarly exceed limits considered acceptable at other nearby sites by a substantial margin.

7.9 The general character of the Santa Pod noise is one that attracts attention and will stand out in stark contrast to the generally rural character of the area.[11] The Santa Pod noise consists of short bursts of high level activity. Those moving to the area are unlikely to have any experience or expectation of the noise from Santa Pod, particularly given the largely rural area around the proposed development site and lack of obvious visual clues indicating that there could be noise disturbance from a raceway.

7.10 There is a general aim within Government planning policy to improve the quality of new housing and this includes ensuring that housing and associated amenity spaces

[11] NB the character of the area will be changed to some extent by the operation of the 3 wind turbines in close proximity of the development site.

are not subject to adverse impacts. Within the PPG there is a requirement for external amenity spaces to be considered so that they can be enjoyed as intended. The indicative layout of the site, as shown in figure 3 above, shows green and nature spaces within very close proximity of the start line at Santa Pod. Given the high levels of noise within close proximity of the start line these spaces are likely to be avoided, including during weekends particularly during the summer, when residents would be expected to gain most use from these spaces but when racing at Santa Pod will be at its most frequent. As such there is a clear land use conflict.

7.11 The proposed housing development fails to meet numerous objectives of planning guidance including:

- Failure to promote good health and quality of life through the effective management of noise (NPSE). Estimated noise levels at the proposed development site are significantly higher than those at other nearby housing and thus a poorer standard of living is created. Proposed noise mitigation achieves minimal reduction.

- Fails to meet Government PPG objectives to avoid significant observed adverse effects and achieve a good standard of amenity. Noise from Santa Pod at the proposed development site is likely to result in residents avoiding use of gardens within close proximity of the raceway during events. Residents are likely to close windows to avoid the noise and there is the potential for sleep disturbance from late night music venues associated with some weekend events held at the site. This indicates significant observed adverse effect levels will arise at the proposed development site. Further, it is unlikely that external amenity space within close proximity of the raceway start will be used as intended due to high levels of noise. Thus, a good standard of external amenity is not achieved.

7.12 MAS have considered the practicality of mitigating noise at the Santa Pod site and due to the length of the drag strip and the moveable nature of various sources of noise, it was concluded that whilst reductions could be made they would be minimal and of limited benefit. This is further evidenced by the noise mapping provided above, showing that addition of an 8m high barrier results in reductions of the order or 1-3dB. This is not sufficient to reduce estimated 15 minute LAeq noise levels at the proposed development site to within planning criteria set for other similar motorsport sites.

7.13 The proposed development seeks to introduce a large number of new residential receptors that are unlikely to be familiar with the character and nature of motorsport noise to a site that holds regular events throughout the year and generates a number of noise impacts with specific character. This combination is highly likely to result in complaints to the local authority.

7.14 Previous noise impact assessments note that the local authority receives complaints relating to Santa Pod activity in the villages of Podington, Souldrop and Sharnbrook. These villages are located 2-3km from the Santa Pod site. The proposed development seeks to introduce a large number of noise sensitive receptors at a distance of 500m - 1km from the site. Complaints are expected.

Appendix A - Glossary of terms

This glossary is harmonised with relevant British and ISO standards which are referenced. Some definitions vary slightly due to updates since written and with other noise guidance documents.

A-Weighting - This is a function which attempts to simulate the characteristics of human hearing at lower levels. Hence a dB(A) reading is an estimate of what we actually hear for quieter sounds whereas dB(LIN), {dB(C) on simpler instruments}, is an objective reading of what is actually physically present. However, for louder and low frequency sounds dB(C) correlates better to the human ear.

Note, dB(A) has been proven not to be so effective in weighting for human hearing at low frequencies.

Acoustic environment – Sound at the receiver from all sounds as modified by the environment. The acoustic environment can be the actual environment or simulated, outdoors or inside, as experienced or in memory. [ref BS ISO 12913-1 2014]

Ambient sound – Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far. The ambient sound comprises the residual sound and the specific sound when present. [ref BS4142 2014]

Ambient sound level (La = LAeq,T) – Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far at the assessment location over a given time interval, T. [ref BS4142 2014]

Attenuation – The loss in energy level of the sound usually used in relation to the loss due to sound passing through a structure or enclosure.

Background sound level (LA90,T) – The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest number of decibels. It is the underlying level of noise in the absence of the source and normally excludes most short duration noises (depending on time interval relative to the presence of source noise) (see **Residual sound level**). [ref BS4142 2014]

Note: Many other guidelines and documents reference background noise level. There is a general move to sound level.

Background sound level ("influenced") - In many situations the background sound level can be measured either when the source or premises from which sound emanates, or is associated with, is not operating. Alternatively the intermittency of the source means that it does not have any appreciable effect on the background level, which is a statistical level based mainly on sound that continues with limited breaks. Where this is not the case the measured sound level will be increased and thus influenced.

Background sound level ("uninfluenced") - This refers to any measurement of the background sound level that has not been increased due to noise associated with the source.

Broadband Noise – This is noise covering the whole of the audible frequency range. Compare to narrow band noise which is noise made up of only a very narrow band of frequencies. It will normally exhibit tonality.

Character (of the noise) - Noise character refers to specific features of a noise or sound that render it more intrusive and / or more likely to attract a listeners attention. Noise character can refer to distinguishable or discrete continuous tones (for example hums, whines, hissing or screeching), distinct impulsivity (bangs, clatters, thumps, clicks, pulses) or any other irregularity that attracts attention or makes the noise readily distinctive in relation to the pre-existing acoustic environment.

Context - This includes the interrelationships between person and activity and place, in space and time. The context may influence the soundscape through auditory sensation, interpretation of auditory sensation and the responses to the acoustic environment (see **Soundscape**). Context is also objectively measured using weightings for character and emergence of the sound above the background sound environment (loudness and relative character).

C-Weighting – see **A-Weighting** above.

Decibel (dB) - A unit or level, derived from the logarithm of the ratio between the value of a noise energy quantity and a reference value. For sound pressure level the reference quantity is 20μPa, the threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain / instantaneous damage. A change of 1 dB of the same sound is only perceptible under special conditions.

dB(A): (see A-Weighting) - This is decibels measured on a sound level meter weighted by a scale which is designed to reflect the weighting placed on noise by the human ear. A noise meter incorporates a frequency weighting device to create this differentiation. The dB(A) scale is now widely accepted. Measurements in dB(A) broadly agree with people's assessment of loudness for broadband noise. A change of 3 dB(A) of the same sound is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background sound level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

dB(Z): The Z-weighting is a flat frequency response of 10Hz to 20kHz ±1.5dB. This response replaces the older "Linear" or "Unweighted" responses as these did not define the frequency range over which the meter would be linear.

DnT,w: See weighted level difference.

Equivalent continuous A-weighted sound pressure level (LAeq,T) - The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. LAeq is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is obtained by continuously integrating ('adding up the energy of') a fluctuating sound signal and dividing by the elapsed time, to give the true mathematical average of any time varying signal. An LAeq reading must always be related to a measurement time interval and should not be read as an instantaneous value of sound pressure.

Façade level - Sound pressure level 1m in front of the façade. Façade level measurements are typically argued 1 to 2dB higher than corresponding free-field measurements because of the reflection from the façade in BS8233 2014 and 2-3dB in many other standards and guidance documents giving a range of 1-3dB.

FFT (Fast Fourier transform) Analysis – A method using digital signal processing to produce very rapid narrowband frequency analysis of acoustic signals. It can be used to equate audible sounds into decibel levels and / or enable a range of analysis of temporal sounds.

Filtering - Octaves & 1/3 Octaves - In general most noise is broad band i.e. it contains energy in virtually all the frequencies across the audio range in different combinations so that it has certain recognisable characteristics. To determine the frequencies at which most of the energy is concentrated, a sound signal is filtered into bands, commonly octave and 1/3 octave bands. Information from such filtering is widely used for diagnostic work and to determine noise control measures. (see **Octave band 1/1** and **Octave band 1/3**)

Free-field level - Sound pressure level away from reflecting surfaces. These are typically measurements made between 1.2 to 1.5m above the ground and at least 3.5m away from other reflecting surfaces. To minimize the effect of reflections the measuring position has to be at least 3.5m to the side of the reflecting surface (not 3.5m from the reflecting surface in the direction of the source). [ref BS8233 2014]

Frequency – This is the number of air vibrations or pressure fluctuations per second. The unit is the hertz (Hz).

Hertz (Hz) – See **Frequency** above.

Impulsivity - Used to describe an acoustic feature of single or repeated sound events of short duration such as a bang, shot or sudden impact of metal on metal etc. It is generally assessed subjectively as perceived by the listener and demonstrates rapid onset in the change in sound level and overall change in sound level. [ref BS4142 2014]

Lnight,outside - The long term equivalent outdoor A weighted sound pressure level established over a period of a year during night time hours (8 hours, typically 23:00 - 07:00). The Lnight,outside is a key parameter of the WHO 2009 Night Noise guidelines which was taken from the Environmental Noise Directive and is typically taken at the facade without reflections (free field level) rather than the facade level given for night time noise disturbance in the WHO 1999 guidelines. It is normally measured / calculated at a height of 4m.

Logarithmic – A scale where the exponent indicating the power to which a fixed number, the base, must be raised to produce a given number. The base used in acoustics is 10. Thus the logarithm of 10 = 1, the logarithm of 100 = 2 and the logarithm of 1000 = 3. In terms of sound energy, an increase of 10 decibels equates to a 10 fold increase. The human ear is sensitive to a very wide range of sound pressure levels (intensities). Measuring human response to sound with a linear scale would not be practical as the scale would be too large and hence a logarithmic scale, in the form of decibels, is used.

Loudness – An observer's auditory impression of the strength of a sound. It is a subjective effect which is a function of the ear and brain as well as the amplitude and frequency of the

sound. Whilst loudness is a subjective perception, a value can be attributed to loudness, which is typically measured in phons. Loudness is related to sound intensity and takes account of the sensitivity of the human to ear to certain frequencies.

Low frequency noise – This is normally considered to be noise ranging from 20 Hertz (pressure fluctuations per second) to 200-250 Hertz, depending on the reference. In music it is the bass region as opposed to alto and soprano.

Masking – The process by which the threshold of hearing of one sound is raised due to the presence of another.

Maximum (A weighted) sound level (LAmax) - The highest value A-weighted sound level with a specified time weighting that occurs during a given event. The time weighting (see below) used (F or S) should be stated. All measurements were 'fast' in this survey. [ref BS5228-1 2009+A1 201412]

Measurement time interval (Tm) - Total time over which measurements are taken. [ref BS4142 2014]

Meter response and time weightings - Most practical sound sources cause fluctuating readings. If the level fluctuates too rapidly, an analogue pointer may move so erratically that it will not be possible to obtain a meaningful reading, or with impulsive sound the meter may not respond quickly enough to obtain an authentic reading. Sound level meters are therefore provided with a variable time response control with settings:-

'S' Slow - Meter response is over damped with a time constant of approx 1 second or 1000ms. The setting tends to average out fluctuations in the readings.

'F' Fast - Permits the instrument to follow and indicate levels that do not fluctuate too rapidly; the time constant response is 125ms.

'I' Impulse - Uses a special electrical circuit with a time constant of about 35ms (of the same order as the response time of the human ear) to permit a very rapid response for investigating very sudden, short duration, impulsive sounds. This setting incorporates a detector which in effect stores the signal for sufficient time to allow it to be displayed. Also a slow decay rate is incorporated with time response of approx 1500ms to allow more easy reading of the maximum value as the indicator moves back relatively slowly.

'P' Peak - Higher grade meters often incorporate this setting which enables the absolute peak (as opposed to the rms) value of an impulsive waveform to be measured. A time constant of the order of 20 - 50 micro seconds is now involved to permit the following of very sharp impulsive events. Evidently electrical signal storage is also required to permit the meter to register the peak of such very fast events.

Noise - Sound perceived by the receiver to be unwanted.

Octave band 1/1 (single) - Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit. [ref BS4142 2014]

[12] This edition of BS5228-1 2009 includes updates from February 2014.

Octave band 1/3 (third)- Band of frequencies in which the upper limit of the band is 21/3 times the frequency of the lower limit. [ref BS4142 2014]

Percentile level (LAN,T) - A-weighted sound pressure level obtained using time-weighting "F" which is exceeded for N% of a specified time interval. Typically the percentile level can be changed on modern sound level meters e.g. LA90,T, LA10,T, LA50,T etc. [ref BS8233 2014].

LA90,T: The A-weighted sound pressure level exceeded for 90% of the specified measurement time interval. It is a statistical measurement. In BS4142 2014 (and generally) it is used to describe the background sound level. Thus for a measurement time interval of 1 minute it would equate to the quietest 6 seconds of sound. For a measurement time interval of one hour it would be the quietest sound for 10% of the time (or 6 minutes). If a machine runs continuously without a reduction in sound for 54 minutes and then stops it would represent the quietest 6 minutes of sound but if run for 55 minutes it would represent the quietest period of machine sound.

LA10,T: The A-weighted sound pressure level exceeded for 10% of the time. It represents the highest sound pressure levels within any measurement time interval. The LA10,18hour is typically used as a measure of road traffic noise.

Pitch – Frequency is an objective measure whereas the term pitch is subjective and although mainly dependent on frequency, is also affected by intensity. See also **Tonality**.

Rating level (LAr,Tr) – The specific sound level of a source plus any adjustment (penalty or weighting) for the characteristic features of the sound. It is used in BS4142 2014 for rating and assessing industrial and commercial sound. [ref BS4142 2014 and BS7445-1 2003 for tonal character and impulsiveness of sound]

Receiver - Person or group of persons who are or who are expected to be exposed to environmental noise.

Reference time interval (Tr) - Specific interval over which the specific sound is determined. For BS4142 2014 this is 1 hour during the day from 0700 to 2300hrs and a shorter period of 15 min at night from 2300 to 0700hrs. [ref BS4142 2014]

Residual sound level - Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T. [ref BS4142 2014]

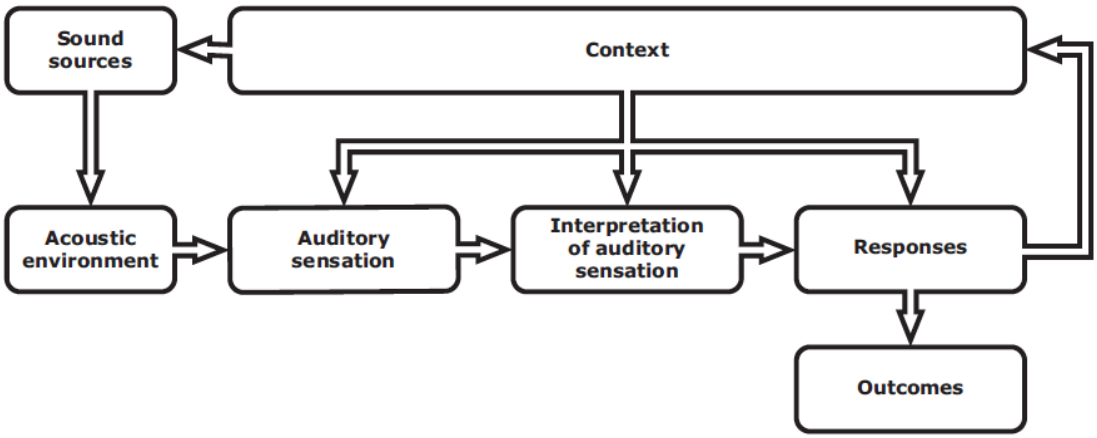
Rw - See Sound reduction index.

Sound power level - Sound power is a measure of the flow of sound energy with reference to a unit of time measured in watts (W). The sound power level is an expression of this energy in a logarithmic scale. The sound power level, unlike the sound pressure level, is independent of room or environmental effects and distance.

Sound pressure level - Sound pressure is measured in pascals (Pa) and is created by fluctuations in air caused by sound. The sound pressure level is an expression of this pressure in decibels. The sound pressure level is variable depending on distance from the source and the interaction of the source with the environment (e.g. reflections).

Soundscape – The acoustic environment as perceived or experienced and/or understood by a person or people, in context (see 'acoustic environment' and 'context'). Figure 1 illustrates that soundscape is people's perceptions or experiences and/or understanding of an acoustic environment. The measurement, assessment or evaluation of soundscape is through the human perception of the acoustic environment.

Figure 1 - Elements in the perceptual construct of soundscape



[ref BS ISO 12913-1 2014]

Sound reduction index, R, Rw, Rw + Ctr - a level that describes the sound reducing properties of a building element or partition. The weighted sound reduction index (Rw) is a laboratory measurement undertaken in accordance with ISO 717 and provides a standardised value, using a reference curve, which allows comparison between different building elements using the Rw value. The addition of the "Ctr" term, i.e. Rw + Ctr, provides an additional weighting which allows for sound sources with lower frequency spectral dominance.

Specific sound level (Ls = LAeq,Tr) - The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T. [ref BS4142 2014]

Tonality – Tonal sound gives a definite pitch sensation. It usually occurs where the sound energy in a narrow range of frequencies is greater than those either side of that narrow range. It will appear as a peak on a graph of sound energy shown in decibels versus the audible spectrum. It can often be shown by comparing adjoining octave band (1/3) spectra. A formal definition of tonality varies between standards. Where one 1/3rd octave band is more than 5dB above those either side, the noise contains a tone or alternatively as assessed by narrow band analysis. [ref BS7445-2 1991 / ISO1996-2 1987]. In BS4142 2014 the level differences between adjacent 1/3rd octave bands that identify a tone are:

15dB in the lower frequencies (25Hz - 125Hz)
8dB in the mid frequencies (160Hz - 400Hz)
5dB in the higher frequencies (500Hz - 1000Hz)

Weighted level difference Dw, DnTw, DnTw + Ctr - The weighted level difference gives a single number value for the airborne sound insulation performance of building elements or partitions etc. As with the sound reduction index, the DnTw is a standardised weighted level difference, standardised to a reverberation time of 0.5 seconds, and allows comparison of different building elements. The addition of the "Ctr" term, i.e. DnT,w + Ctr, provides an additional weighting which allows for sound sources with lower frequency spectral dominance.

Appendix C - MAS letter to Chair and Members of the Executive

MAS
ENVIRONMENTAL

Local Gov Issues, Acoustics, Health & Safety, Food Hygiene, Planning, Pollution, Licensing, Nuisances, Catering Design

The Chair and Members of the Executive
Borough Hall
Bedford Borough Council
Cauldwell Street
Bedford
MK42 9AP

Our ref: SPLet181004

4th October 2018

Dear All,

Re: Colworth Garden Village - Executive Report, 5 September

I have been asked to write to you on behalf of Santa Pod Raceway and directly in response to a letter addressed to you from [redacted] Rapleys regarding the above proposed development and associated report. The Rapleys letter discusses the removal of housing allocation to the Colworth Garden Village site.

The letter notes that Rapleys prepared an extensive and informed evidence base in support of the proposals for development at Colworth Garden Village, including lengthy engagement with local authority officers. MAS Environmental Ltd ("MAS") and Santa Pod Raceway ("Santa Pod") have similarly undertaken this process. MAS have been working with Santa Pod since 2011 and as such have an excellent knowledge of the site, informed by practical experience and monitoring of existing noise levels at the site and in / around local communities.

Rapleys assert in their letter that they can secure an appropriate noise solution for the site without the co-operation of the raceway owner / operator. Neither MAS nor Santa Pod have seen any evidence to support this assertion. Based on my experience of the site and its operations I am confident that without substantial changes at the Santa Pod site, which would require the co-operation of the raceway owner / operator, the proposed development would lead to the demise of the Santa Pod business as a direct result of noise complaints and potential noise nuisance claims.

The proposal for housing in such close proximity of Santa Pod Raceway goes directly against core principles of acoustics, that new noise sensitive development should be separated (and ideally located as far away as possible) from noisy activities. It is logical that the introduction of a significant number of new residents, with little or no expectation or understanding of motor sport noise, close to a busy raceway will cause land use conflicts.

Whilst Rapleys state that they can engineer a solution to achieve acceptable noise levels, this again goes against basic principles of good acoustic design. Without the co-operation of Santa Pod Raceway it relies on mitigation at the development site. This will primarily involve orientation of housing, single aspect housing and localised screening (barriers). For screening to be effective it must either be very

close to the source or very close to the receiver. In this case the development would have to utilise tall barriers close to dwellings, particularly where bedroom windows required screening. It is highly likely that the assessment would need to rely on windows being closed to achieve acceptable internal noise levels during racing and large events. This approach, particularly in rural areas where there is an expectation of connection with the external environment, has been rejected at planning inquiries due to the inability of this solution to provide satisfactory living conditions.[1]

Finally, I would like to note there has been discourse between representatives of Santa Pod Raceway and those in support of the Colworth Garden Village development. This culminated in a meeting between the acoustic experts for each party, myself and a colleague on behalf of Santa Pod and four consultants (two from Arup, two from Peter Brett Associates) on behalf of the development. At the end of a prolonged meeting (lasting around 4-5 hours) and significant discussion, we could not reach an agreement regarding the most effective means to achieve mitigation of Santa Pod noise at the development site, we could not agree on whether mitigation could sufficiently reduce noise levels or indeed what noise levels could be agreed as acceptable or appropriate. At no point during the meeting was any evidence presented to demonstrate that an appropriate noise solution could be secured either with or without the co-operation of Santa Pod.

I thank you for the time taken to read this letter and trust your understanding that Santa Pod's decision to object to the development was not taken lightly or without due consideration. We will of course continue to work constructively and cooperatively with the local authority and, where appropriate, local developers.

Yours sincerely,

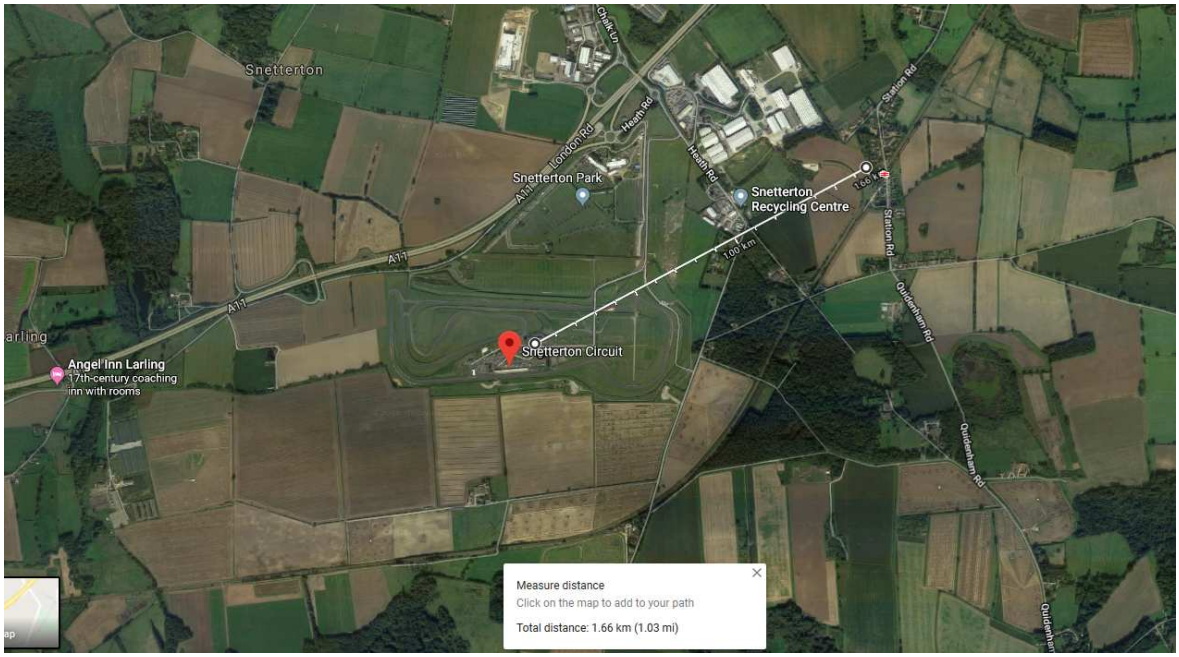
[redacted] [redacted]

Senior Acoustic Consultant MAS Environmental Ltd

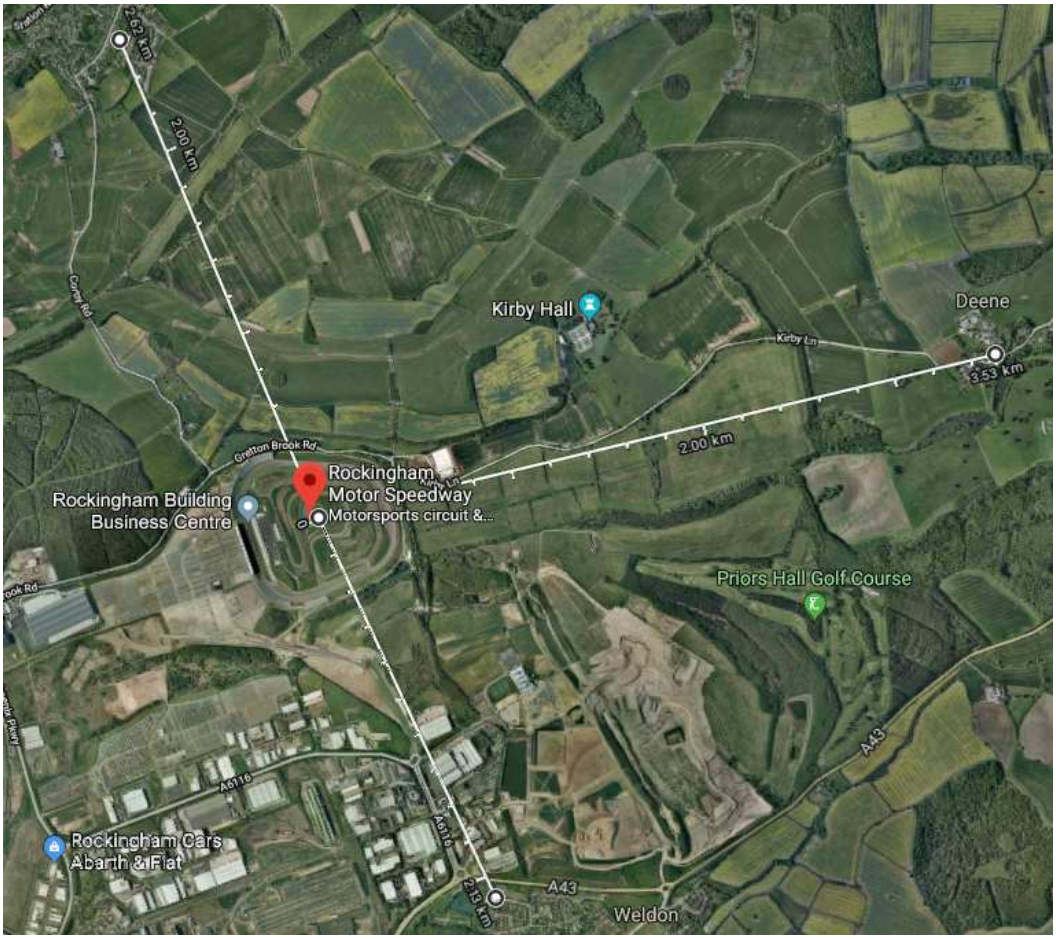
[1] Appeal Ref: APP/P0240/W/17/3175605 100 High Street, Meppershall, Central Bedfordshire, SG17 5LZ

Appendix D - Maps showing race circuits and proximity to residential settlements

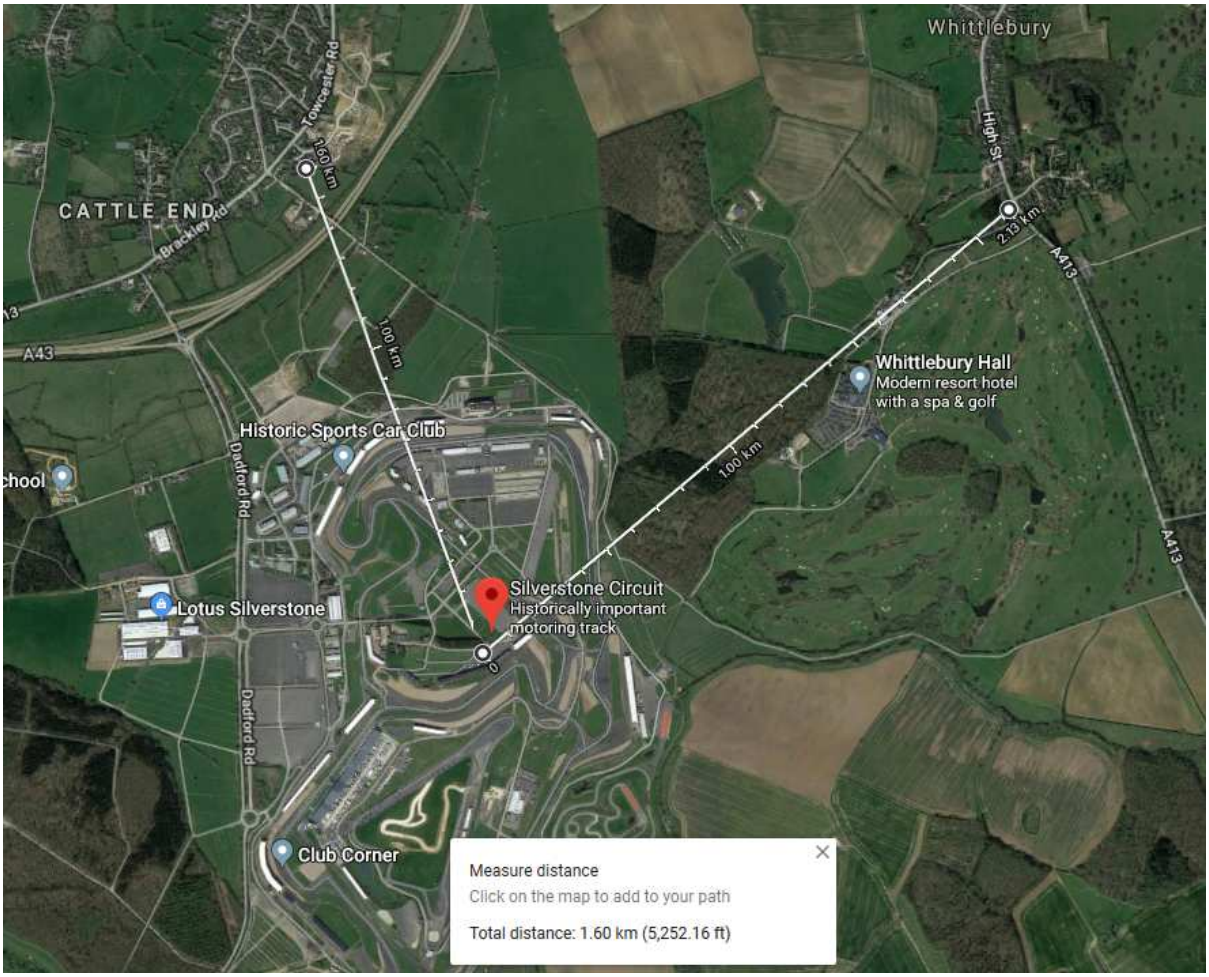
Snetterton



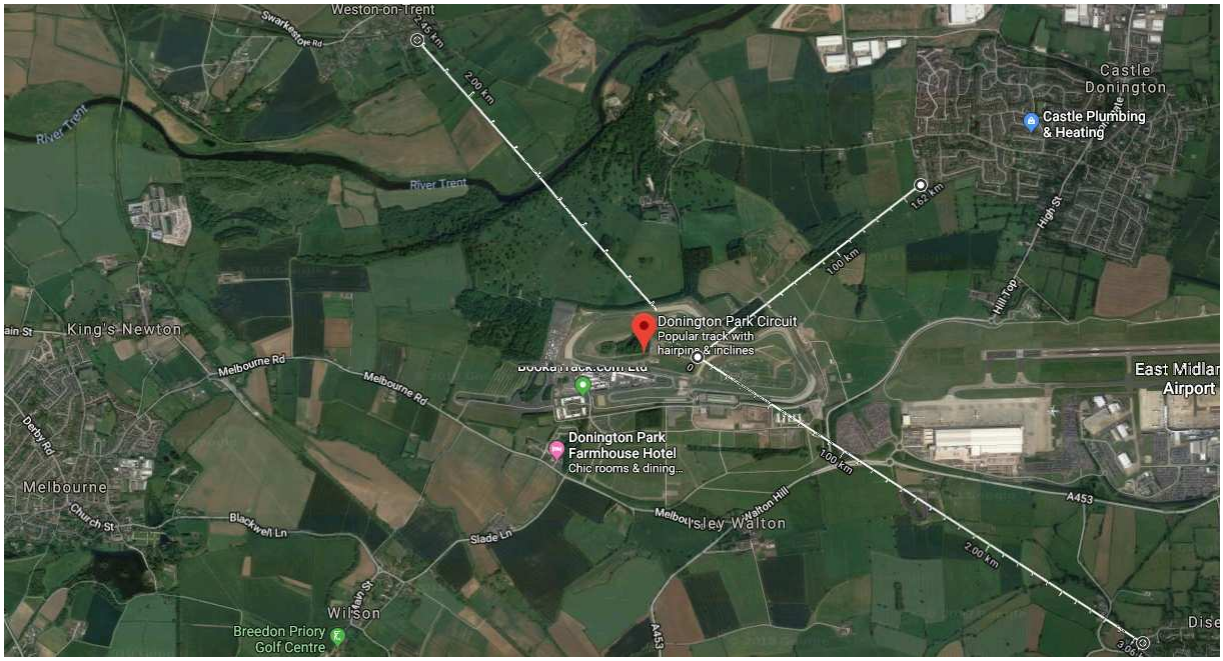
Rockingham



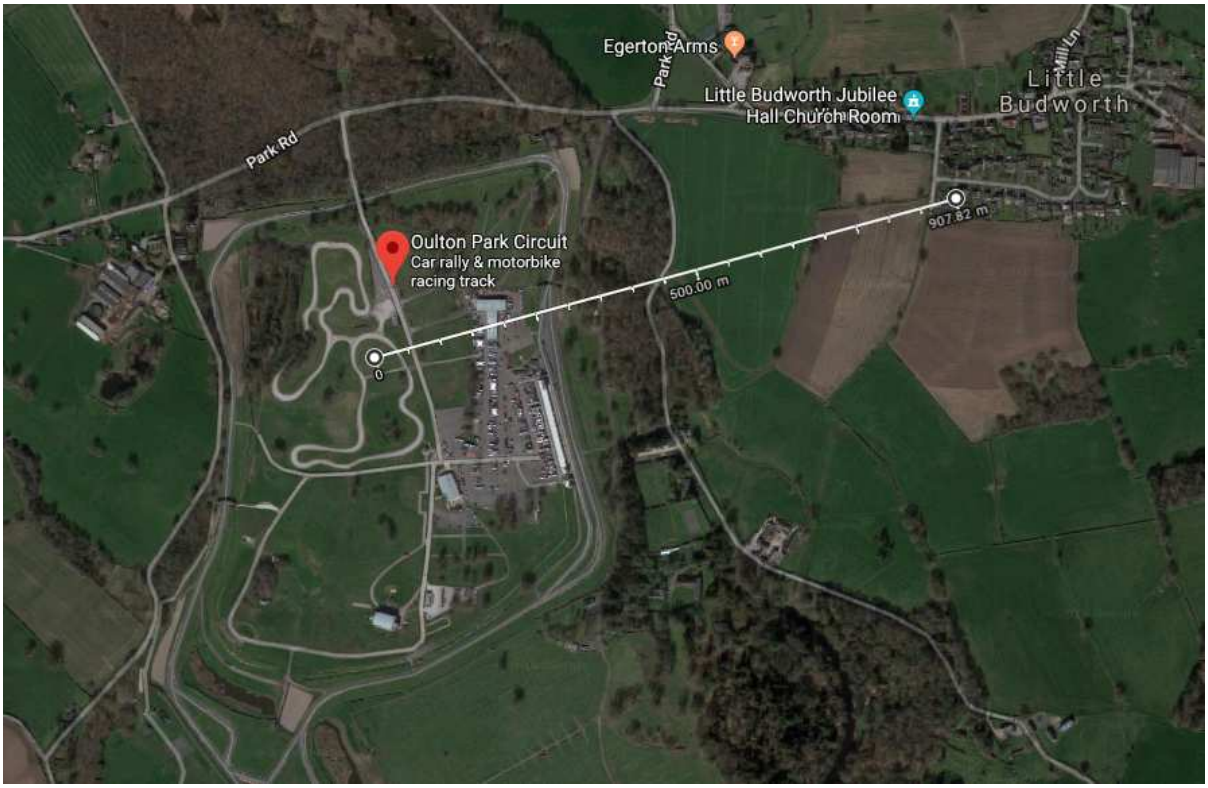
Silverstone



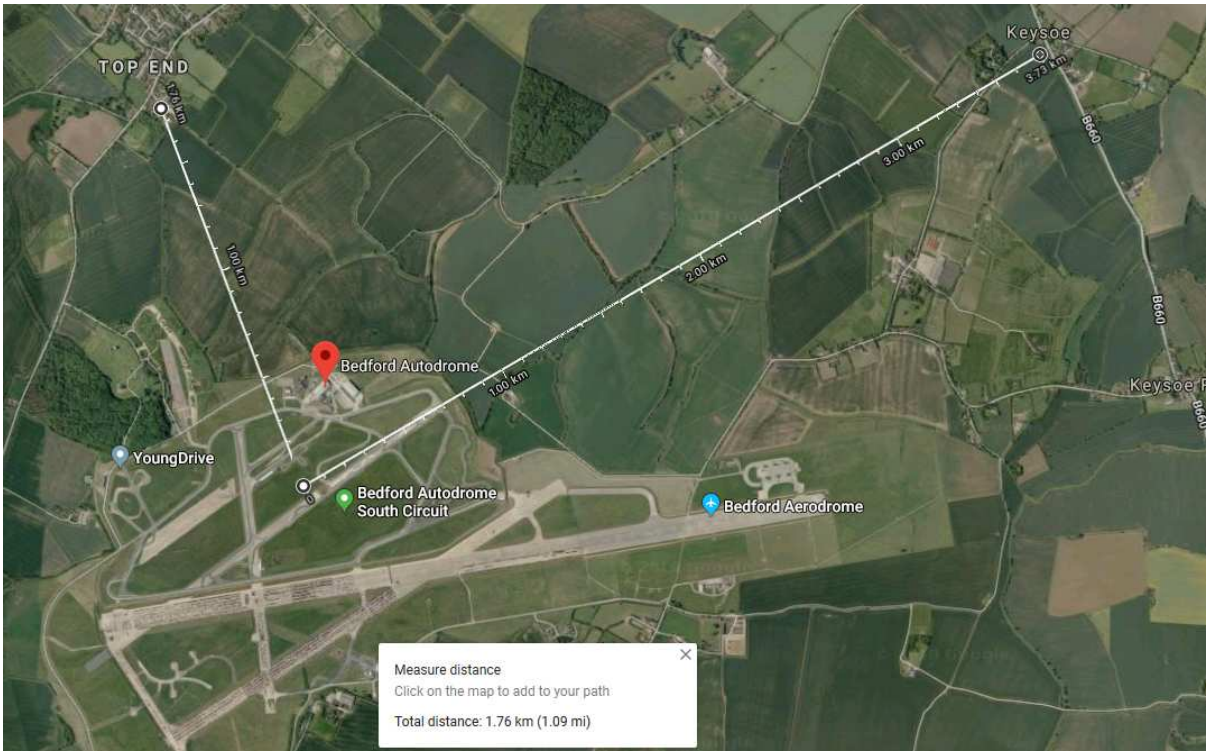
Donington Park



Oulton Park



Bedford Autodrome



Brands Hatch