



Independent Noise Working Group

## Wind Turbine Amplitude Modulation and Planning Control Study

### **Work Package 3.1 - Study of Noise and Amplitude Modulation Complaints Received by Local Planning Authorities in England**

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## Abbreviations

AM	Amplitude Modulation
BC	Borough Council
CC	City Council
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
DEFRA	Department of Environment, Food and Rural Affairs
DC	District Council
EAM	Excessive Amplitude Modulation
EHO	Environmental Health Officer
ETSU	ETSU-R-97 The Assessment & Rating of Noise from Wind Farms
GPG	Good Practice Guide to the application of ETSU
IoA	Institute of Acoustics
IoA GPG	Institute of Acoustics Good Practice Guide
LPA	Local Planning Authority
MAS	MAS Environmental
NRMS	Noise reduction management system
ReUK	RenewableUK, the wind industry trade association
Salford	University of Salford 2007 Research into AM of Wind Turbine Noise
WP	Work Package

## **1 Executive Summary**

1.1 This study uses survey data to provide insights into the current views of involved English Local Planning Authority (LPA) professionals on how to prevent, control and mitigate industrial wind turbine noise including the phenomenon of excess amplitude modulation (EAM) that gives rise to most complaints. The questions asked were:

- 1 Have you received noise complaints?
- 2 Have you received AM complaints? and
- 3 If yes, how do you deal with them?

1.2 Responses from LPA professionals to these questions are quantified and mapped, mitigations are analysed, and assessments are made about how they deal with EAM at all stages in the planning and enforcement processes. Gaps and omissions are highlighted.

### **1.3 Extent of the problem**

In England, of the 203 responses to the survey 54 LPAs have received complaints about noise from industrial wind turbines. This should not be interpreted as 27% of wind farms giving rise to noise complaints; many of the LPAs which reported no complaints may well have no operating wind farms in close proximity to housing. Of the 54 LPAs, 17 have also investigated complaints about EAM. Over 600 individual complaints had been received with the majority being in the five year period 2010-14. The main clusters of complaints are in the East of England, East and West Midlands, North West and South West. There are less in the South East, with just one in Yorkshire and the Humber and one in the North East.

### **1.4 Awareness of mitigations**

There is a high level of awareness amongst LPAs of the issues and debate on EAM. LPA executives keep themselves informed through public sources. They recognise that EAM in industrial wind turbines is as yet an unresolved issue but appear to act in ignorance of the judgement of the Court of Appeal in the Den Brook case. Some LPAs show strong confidence in ETSU-R-97 ('ETSU') and its companion Good Practice Guide (GPG). Others challenge its validity and are seeking a more robust way to deal with EAM at all stages in the application and development process. They are calling for objective science-based guidance on measuring and testing for EAM as well as nationally agreed standards that are consistently applied and proven mitigations for EAM. There are many frustrations with the current arrangements.

### **1.5 Inconsistent & Inconclusive**

Not only are incidents of EAM more frequent than the wind industry hitherto has claimed, the progress in resolving them is inconclusive and there are inconsistent approaches to dealing with it across the country. Some LPAs have agreed curtailment of operation with the wind turbine operators while investigations continue, others have only proceeded with investigations. None of the LPAs described a working mitigation for EAM other than

curtailment. Some LPAs have taken a proactive approach on EAM by investing time and effort with developers at the pre-application stage.

## 1.6 **Broader Issues**

A significant part of the public debate on industrial wind turbine noise generally, and on EAM specifically, is about protecting the health and well-being of the public who are wind farm neighbours, but there were no mentions of this by the respondents. There is an indication that wind farm neighbours who are well organised in local groups and with professional support can make better progress with their complaints than others. On the other hand, scatter gun complaining may not be effective. There is also a hint of a 'silent majority' who suffer in silence without knowing how to complain, or because of a fear of adverse implications, if, for example, they had to disclose any complaint should they wish to sell their house. For communities, a barrier to complaining might be the fear of adversely affecting community funding from wind turbine operators. This leads to the conclusion that a 'community charter' would be valuable for all sides.

## 2 Foreword

**Chris Heaton-Harris MP (Daventry, Conservative)**  
**House of Commons, London SW1A 0AA, November 2014**

*"There are big gaps between the way in which opposing stakeholders see the issue and scale of noise from industrial wind turbines, in particular the phenomenon of Amplitude Modulation (AM).*

*On one side the Department of Energy and Climate Change (DECC) and the wind industry believe they can proceed with planning applications and development of industrial wind farms guided solely by ETSU-R-97 and its companion Good Practice Guide. They claim the incidences of complaints about noise and AM are rare and that planning conditions and statutory nuisance are the best remedy.*

*On the other side wind farm neighbours and concerned people, both in my constituency and those of fellow MPs, tell us this is not the case on the ground. They cite numerous examples of householders suffering from sleep deprivation and associated health issues as a result of wind turbines, and of feeling disempowered to take action or complain. They also say ETSU-R-97 is outdated, provides inadequate protection to individual householders and is in serious need of overhaul or replacement. They claim the issues and incidence of AM are not understood by Local Planning Authorities (LPA), local Environmental Health Protection Officers (EHO) and the Planning Inspectorate. They are also concerned that Statutory Nuisance is not an effective tool to combat this problem.*

*There is a third factor that seriously concerns me. This is the lack of professional agreement on the underlying science of AM, its cause and how it should be managed at all stages in the planning process. Planning or legal precedents can be created by argument between professional representatives of both sides with a limited understanding of the science before a planning inspector or judge with even less understanding of it.*

*My early August 2014 letter to LPA Chief Executives had a number of objectives. First, to ensure they were aware of the concerns of our constituents and the range of problems being caused by wind turbine noise in general. Second, to bring to their attention the disputed issue of AM and to provide them with sources of information for their EHOs. Third, to quantify the incidence of actual noise and AM complaints to allow comparison to counter claims by opposing stakeholders".*

### **3 Objectives**

This Work Package (WP) uses the results of a survey of involved local planning officers across England to address the following objectives:

- 1 To assess the extent of noise and excess amplitude modulation (EAM) complaints received by Local Planning Authorities (LPA) in the last five years.
- 2 To establish how LPAs investigate and mitigate for noise and EAM nuisance and through this to determine the guidance they need.
- 3 To assess the frustrations and ideas coming forward from LPAs and through this determine a way forward.

## 4 Background

4.1 In his foreword to this Study, Chris Heaton-Harris MP explains why he wrote to the Chief Executives of 265 LPAs in England advising them of the public's concerns about wind turbine noise, bringing to their attention the debate on EAM and asking them to report the incidence of noise and EAM complaints in their Authority. The full text of his letter is in Appendix A. Let us look at the three main steps that led up to Chris Heaton-Harris writing this letter:

### 4.2 A Meeting with the Secretary of State at DECC in London

First, early in 2013 Chris Heaton-Harris offered to sponsor a meeting between a group of his constituents and The Right Honourable Ed Davey, Secretary of State at the Department of Energy & Climate Change (DECC). The constituents wanted to make a representation about the adverse impact of noise from industrial wind turbines and the way noise was being dealt with in the planning application process.

4.3 Originally planned for March 2013, the meeting took place in October 2013. In addition to the Secretary of State, present at the meeting were representatives of his department, of the Department of Environment, Food and Rural Affairs (DEFRA) and of the Institute of Acoustics (IoA). Chris Heaton-Harris's party comprised constituents Richard Cox, David Unwin and Trevor Sherman along with Mike Stigwood of MAS Environmental (MAS), a professional acoustician.

4.4 At the meeting David Unwin and Richard Cox presented what they called 'The Bad Science' behind current wind turbine noise guidelines. They summarised as follows: *"In our view the Good Practice Guide fails to demonstrate that it is based on sound science"*, concluding that in their view: *"In the current absence of effective noise guidelines we believe that only by enforcing a minimum separation distance (typically in the order of 2km for the current generation of industrial wind turbines) can a reasonable degree of protection be provided against noise nuisance"*.

4.5 They went on to comment on EAM suggesting that the science behind it was being systematically hidden stating: *"Amplitude Modulation or EAM is the most intrusive noise characteristic of turbine noise so we fail to see how excluding it from the IoA Good Practice Guide (IoA GPG) terms of reference can be justified. As a result the science behind EAM stays hidden and the wind industry pretends it is not an issue"*.

4.6 This theme was then taken up by Stigwood, who advised the Secretary of State: *"There are serious noise issues in the UK caused by wind turbines. The problem is growing; as decision makers downplay the complaints of people affected, whilst the body of scientific evidence is increasing"*. Stigwood gave an update on a study he was in the process of completing on noise complaints from over 70 UK wind farms, with his final report being due for release in early 2014. He gave the Secretary of State a summary of his study under the heading *'Evidence of Failure of Wind Farm Guidance to Protect Well-Being'*:

- 1 All but one of the wind farms causing noise complaints he had investigated were consented as being compliant with the ETSU protocol.
- 2 More than 75 wind farms are causing noise complaints leading to evidence of harm such as sleep disturbance ;
- 3 Potentially 80-160 wind farms are causing problems with 1,000s of homes affected;
- 4 His research shows EAM is the main problem and is caused by *all* large wind turbines.

4.7 He summarised as follows. *“ETSU is incapable of controlling and/or preventing adverse effects or being modified to achieve that purpose. The well-being of a significant minority of communities is being jeopardised”*. He concluded that in his view: *“EAM is common and not rare as suggested by UK Government policy. Reliance by UK Government on experts of known persuasion (who are reliant on industry and derive major income with pointless compliance tests that do not fail) is the reason for the problem. The same problem arises with the Institute of Acoustics who are dominated by acousticians reliant on the industry and who selected a working group dominated by individuals of known persuasion.”* Stigwood claimed that, regardless of methodology, operational wind farms shown to be compliant with ETSU are causing complaints and that all wind farms causing serious problems comply with ETSU guidance. He described EAM as the cyclic rise and fall in noise levels described as a 'thumping', 'whooshing', 'beating' and said *“The main problem with AM is the character of the noise, not the decibel level”*. To prove his point, throughout his presentation he played a recording of EAM from Cotton Farm Wind Farm in Cambridgeshire, available at: [http://www.masenv.co.uk/~remote\\_data/](http://www.masenv.co.uk/~remote_data/)

#### 4.8 A Presentation to the IoA Workshop in Newport South Wales

Second, Richard Cox was invited to give a paper at an IoA Workshop on the topic held in Newport South Wales in March 2014. He chose as his theme: *‘A Critique of the RenewableUK (ReUK) report on wind turbine amplitude modulation: What it tells us and what it does not’*. In his paper Cox provided a critical examination of the study ReUK had released in December 2013 about wind turbine AM<sup>1</sup>. In the study ReUK acknowledged that AM is a problem *“too large to ignore”*. They also claim that AM is *“now largely understood”*, but also claim that *“occurrence of EAM is rare and infrequent and where it does occur, a mitigation scheme can be implemented”*. Cox refuted the latter saying: *“the claims made by ReUK are not supported by the evidence provided within the report or elsewhere”*. He claimed the ReUK study was based on the Salford<sup>2</sup> report which found 4 cases of EAM from 133 sites surveyed, and ReUK extrapolated this data to suggest that at the time of their report only 15 sites out of 521 or 3% would be affected by EAM.

4.9 Richard Cox was critical of ReUK’s methodology: *“It seems quite incredible that during the three years of the research project into AM, ReUK did not bother to survey the incidence of EAM and quantify the noise nuisance. As a result they have no evidence to support their claim that EAM is limited and infrequent or otherwise. Meanwhile, Mike Stigwood has identified EAM at over 70 sites”*. He went on to cite other 2013 EAM studies from outside the UK where high incidence of EAM is reported. And whilst the ReUK study summary claims

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<sup>1</sup> ReUK December 2013 Wind Turbine Amplitude Modulation: Research to Improve Understanding as to its Cause and Effect

<sup>2</sup> University of Salford July 2007 Research into Aerodynamic Modulation of Wind Turbine Noise



that EAM is caused by stalled flow due to wind shear and turbulence it failed to provide any actual evidence linking blade stall with EAM. Buried deep in the report is a direct admission by the authors that there are other causes including propagation effects.

4.10 Cox summarised as follows: *“We are therefore provided with conclusive evidence that EAM is a physical consequence of the propagation of rotating turbine blade trailing edge noise. Stall is not the cause of EAM and I believe the only mitigation available is to shut down turbines”*. The ReUK study appears to agree with Cox on the matter of mitigation: *“There is, therefore, currently no clear case history of successful mitigation of OAM noise, except through curtailment of turbine operation”*. If stall were the cause of EAM then mitigation would be possible by adjusting the blade pitch to avoid stall, which would reduce power a little, but not to zero as curtailment would. If ReUK really believed in stall they would surely propose blade pitch adjustment.

4.11 Finally, Cox was critical of the AM Planning Condition proposed by the ReUK study. *“The basis of ReUK’s proposed AM condition runs counter to the evidence relating to the effects of EAM. Importantly EAM nuisance is a character issue, not a loudness issue. Therefore the AM condition should operate completely independent from the noise assessment and its associated noise loudness condition”*. In making this point Cox was echoing the statement Mike Stigwood had made to The Secretary of State in October 2013: *“The main problem with AM is the character of the noise, not the decibel level”*.

#### 4.12 **Six Months’ Silence**

Third, despite these criticisms and new evidence, the first six months of 2014 had seen no response from either DECC or ReUK. In April 2014 David Unwin, Richard Cox and Trevor Sherman convened a meeting with Chris Heaton-Harris to agree a way forward. It was agreed that LPAs should be made aware of the debate on EAM control and to invite them to quantify the incidence of wind turbine noise and EAM complaints in their areas. The letter from Chris Heaton-Harris to LPAs and this report are the main outcomes of this meeting.

## 5 Methodology

- 5.1 With the help of his Parliamentary Assistant David Hoy, Chris Heaton-Harris MP compiled a list of 423 English local authorities sourced from *OpenlyLocal* (<http://openlylocal.com/>). By cross referencing these to DCLG sources and eliminating most Metropolitan Boroughs, all London Boroughs and most County Councils for whom the issue is not relevant, this was reduced to a short list of 265 LPAs. This list, designated 'Non-Metropolitan Planning Authorities (England)', included the full name and postal address of each LPA. Where available from the Municipal Yearbook, the name of each Chief Executive was added.
- 5.2 The letter reproduced at Appendix A was send out by post to the named Chief Executive of each of the 265 LPAs on or around 9<sup>th</sup> August 2014. Completed responses and holding acknowledgements were received by letter and email and controlled by David Hoy. A cut-off date of Friday 19<sup>th</sup> September 2014 was agreed and on this date all the emails and letters received by David Hoy were handed over to Trevor Sherman for logging and analysis. David Hoy also provided the original database he had used for the mailing in the form of an MS Excel file.
- 5.3 Trevor Sherman reviewed all the replies for anomalies, duplicates and any requiring a response. The latter were referred back to Chris Heaton-Harris. All replies were scanned in batches to PDF with optical character reading (OCR) to enable copy & paste of contents and search.
- 5.4 The existing Excel database fields were extended to include:
- 1 Log (number 1-265)
  - 2 Reply Date
  - 3 Batch
  - 4 MP (added from TheyWorkForYou <http://www.theyworkforyou.com/>)
  - 5 MP Party (added from TheyWorkForYou <http://www.theyworkforyou.com/>)
  - 6 Plus additional fields to assist the administration and analysis.

## 6 Survey Results

- 6.1 The survey results demonstrate the extent of wind turbine noise issues across England – addressing the first objective of this study.

### Profile of the mailing list:

District	200
County	1
National Park	10
Unitary	53
Metropolitan Borough	1

### Responses:

Useable replies	205
Acknowledged, no reply	3
No reply	57

### Responder title:

Chief Executive	64
EHO	51
Director	6
Other	78

### Industrial Scale Wind Turbines in LPA?

Yes	43
No	89
Unstated	72

### All Noise Complaints?

Yes	54
No	148

### AM Only Complaints?

Yes	17
No	180

- 6.2 The overall number of complaints received by LPAs cannot be accurately established since this was not a question asked directly in Chris Heaton-Harris's letter.
- 6.3 In the 54 instances where the number of noise complaints received was stated, the total number is 589, an average 11 in each LPA. There were 16 instances where the LPA indicated that multiple complaints had been received, but did not quantify this. If we take each one of these 16 to be just 2 complaints we can safely say at least 600 noise complaints have been processed by the LPAs. Taking a modest view, there are 47% of LPAs with Industrial Wind Turbines that reported having received noise complaints.
- 6.4 Although the letter from Chris Heaton-Harris did not request the number of complaints, 27 of the 47 incidents of noise were quantified as being six or fewer complaints. One LPA (Waveney and Suffolk Coastal DCs combined) indicated they had received 465 complaints (Appendix C). This somewhat skews the overall results. Extracting Waveney from the sample gives us an average of three complaints over the remaining 46 LPAs. The next highest numbers of complaints reported are 23 (Plymouth) and 12 (King's Lynn and West Norfolk & Cornwall). Eighty percent of the complaints are recent, occurring in the 5 year period 2010-14.
- 6.5 The 16 LPAs that reported an unquantified number of noise complaints were:

Allerdale BC	Lewes DC	South Cambs DC	Teignbridge DC
Barrow-in-Furness BC	North Devon DC	South Hams DC	Tendring DC
Bolsover DC	North East Derbys DC	Stroud DC	Torridge DC
Braintree DC	Northumberland CC	Swale BC	West Lancashire DC

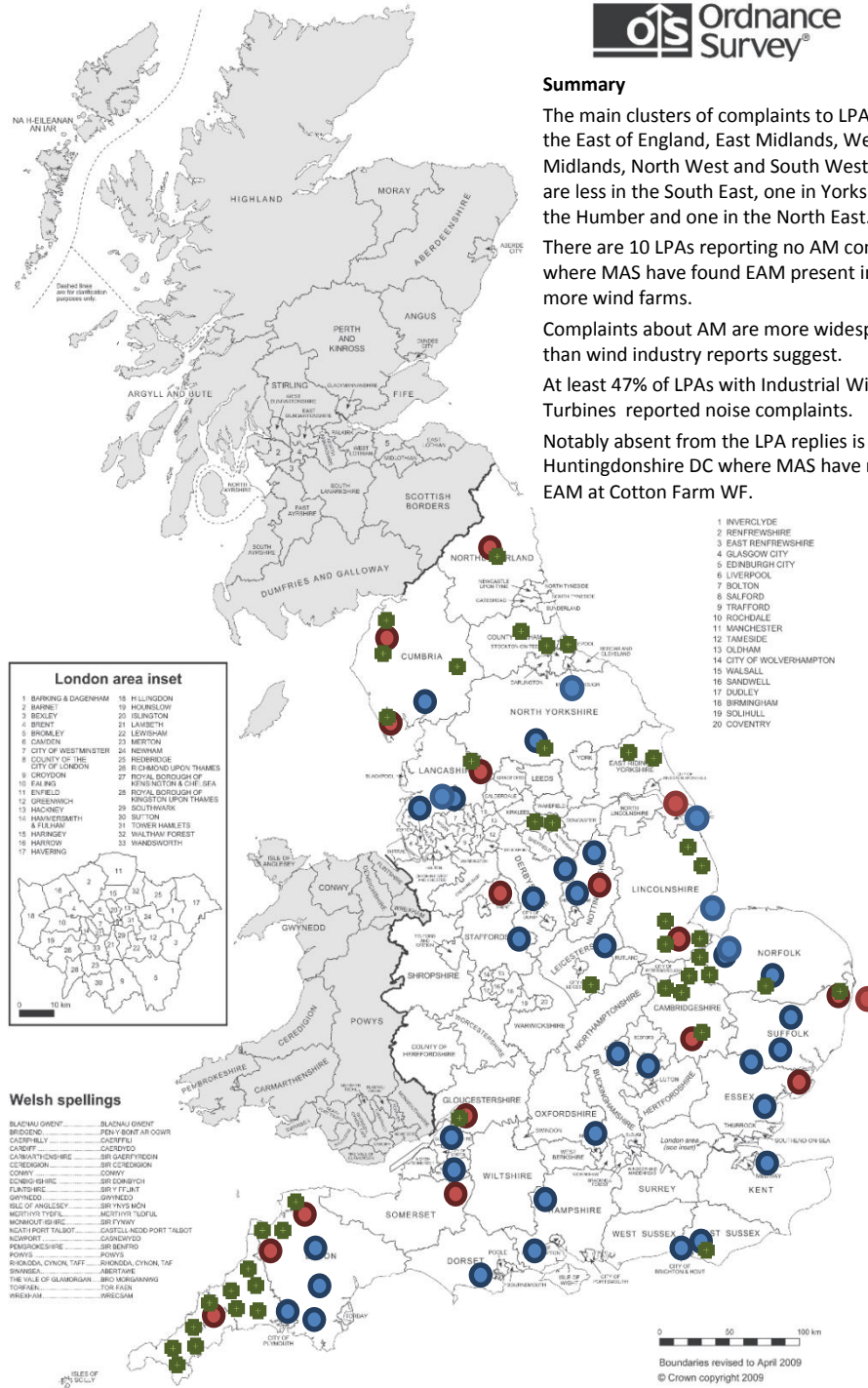
# 7 Mapping the Complaints

NB: markers show the LPA district, not the exact location of wind farms. Scotland & Wales were not part of the Study.

Key:

- Noise only complaint: ● MAS Environmental discovered EAM – 43 locations (see Appendix E): +
- Noise & AM complaint: ●

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## 8 Mitigating Actions

8.1 The second objective of this study is to address issues surrounding the possible mitigating actions available to LPAs. The final paragraph in Chris Heaton-Harris’s letter to LPAs reads:

*“The purpose of this letter is to ask whether you have had:*

- 1 Any complaints about noise from wind turbines?*
- 2 If you have had reports of amplitude modulation?*

*Finally, I'd like to know, if the answer to either of those two questions is positive, whether you found excessive noise or AM upon investigation and what actions you might have taken to mitigate the problem detected”.*

8.2 The LPA responses on mitigation can be grouped into 6 categories. The 30 examples given represent more than 60% of the total of 47 LPAs saying they had dealt with noise complaints. A representative sample of the verbatim comments from LPAs is shown below and on the following pages, grouped around seven possible responses:

**Abatement:** an Abatement Notice was considered or served (4 examples)

**Defect:** a mechanical defect or other fault was found in the turbine(s) and was rectified (7 examples)

**Curtailement:** a curtailment of operation of operation or noise reduction management system (NRMS) was agreed and put into action (3 examples)

**Closure:** removal of turbine(s) was agreed and actioned (3 examples)

**Pending:** the case being referred to is still under investigation or being monitored (9 examples)

**Actions:** proactive work by the LPA Environmental Health Officer (EHO) with the developer at the pre-application stage (4 examples)

**Guidelines:** this consists of the development and adoption of supplementary guidelines or planning policies (3 examples)

### 8.3 Abatement

<i>“In the case of 4 of the complaints, there was no evidence of a statutory nuisance. In the final case, involving an individual turbine, an Environmental Protection Act 1990 Abatement Notice was served to resolve the matter”.</i>	David Allenby, Head of Planning, Harrogate BC
<i>“We considered serving abatement notice on 2 x 20m turbines in grounds of school. The noise of the turbines was subjectively likened by officers and complainants to that of helicopter blades or a steam train running at speed. Turbines dismantled before enforcement taken. Proven Energy identified fault with turbine blades”.</i>	Graham Hooper, Senior Environmental Protection Officer, Plymouth CC
<i>“We were able to show that the noise amounted to a nuisance and an Abatement Notice was served. This turbine was subsequently removed.”</i>	Simon Hill, Environmental Protection Team Leader, South Oxfordshire DC

#### 8.4 Defect

<i>"The Council received complaints in relation to turbines at 5 different locations. Complaints at two locations were resolved following maintenance of the turbines".</i>	James Buckingham, Corporate Manager, Mid Suffolk DC
<i>"One complaint in relation to a medium sized wind turbine in 2012 which related to a technical fault causing a tonal sound at a certain wind speed. Remedy from manufacturer"</i>	Andy O'Brien, Chief Executive, East Staffordshire BC
<i>"We have only received one complaint about two wind turbines which were producing a tonal noise. However this was resolved when we requested the operator to service the turbines, after which the noise disappeared".</i>	Kevin Finan, Chief Executive, Mid Devon DC

#### 8.5 Curtailment

<i>"One investigation has found excessive noise or AM. Using curtailment of operation to shut down the turbines at certain wind speeds and directions pending investigation by independent noise consultant."</i>	G Wilson, Head of Housing and Health, Allerdale BC
<i>"Officers from HDC formally invoked planning condition 24 at Cotton Farm following the receipt of AM type noise complaints. Since identifying the noise limit breaches the operators have implemented a 'curtailed' operational mode as opposed to full operation. I can confirm that officers have heard occurrences of AM noise, however our investigation is on-going and we have yet to determine whether a statutory noise nuisance exists, or is likely to occur or recur."</i>	Greg Kearney, Environmental Health Officer, South Cambridgeshire DC
<i>"The Council have received complaints about noise from wind turbines and in the main these complaints related to amplitude modulation. A Noise Reduction Management System (NRMS) was developed which controls whether or not the turbines operate in certain wind speeds and directions."</i>	Phil Huck, Executive Director, Barrow-in-Furness BC

#### 8.6 Closure

<i>"Complaints were received from many local residents surrounding a mid-sized wind turbine newly installed in the grounds of a local school. AM may have formed a component of the nuisance noise. Used an Abatement Notice. No remedies proved successful so the turbine was removed".</i>	Barry Wyatt, Strategic Head (Development Services) Stroud DC
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## 8.7 Pending

<p><i>"Another 2014 complaint does have an amplitude modulation element to it. This investigation is currently ongoing, with discussions taking place with all parties concerned with an aim to provide a mutually acceptable solution."</i></p>	<p>Alan Batty, Business Manager- Environmental Health, Newark and Sherwood DC</p>
<p><i>"The Case Officer has a working knowledge of the occurrence and causes of AM. He has requested the wind farm operator technical team investigate if over-pitching had occurred during the times stated by the resident when what was understood to be AM events occurred."</i></p>	<p>Geoff Paul, Director - Planning, Economy &amp; Housing, Northumberland County Council</p>
<p><i>"We have received complaints regarding wind turbine noise from the 21 wind turbine wind farm located at Fullabrook. These complaints have included allegations of amplitude modulation, which have in some instances been witnessed by our investigating Officer. An extensive sound level monitoring exercise has recently been carried out by an acoustic consultant on behalf of the wind farm operator. The purpose was to determine the extent of the tonal noise problems which continue to be reported at certain locations. Once submitted the report, which will included a detailed mitigation plan, will be reviewed and verified by our own acoustic consultant prior to us determining what to do next."</i></p>	<p>Andy Cole, Service Lead - Environmental Protection North Devon DC</p>
<p><i>"Some residents have complained of AM-type noise at certain times. The investigation is still on-going and the Council has yet to verify either a statutory nuisance, or the existence of AM at these particular wind turbines."</i></p>	<p>Phil Kirby, Chief Executive, Broadland DC</p>

## 8.8 Actions

<p><i>"We try to apply controls to protect local residents against noise at the planning application stage. However, we have experienced difficulties in controlling applications for individual wind turbines, especially where other individual turbines exist in the area that have already received planning permission. We currently request that they meet a standard of lower than 35 db(A) at the nearest noise sensitive premises and take into account accumulative impact."</i></p>	<p>Tony Clark, Managing Director, Richmondshire DC</p>
<p><i>"Given the number of sites, we have relatively few noise complaints. It must however be recognised that this is largely due to the considerable amount of involvement which Environmental Health Officers have at the development stage of such applications. Without the continued ability to intervene at that stage it is likely that the noise produced from these wind farms would be subject to fewer controls which would undoubtedly result in more complaints."</i></p>	<p>Sean Hall, Principle EHO (Environmental Protection), South Lakeland DC</p>

8.9 Guidelines

<p><i>“Our draft Wind and Solar Supplementary Planning Document does contain information about Amplitude Modulation (see from para 14.3). Consultation on this draft document ended on 7 July 2014 and responses are now being reviewed.”</i></p>	<p>David Oliver, Chief Executive East Northamptonshire Council</p>
<p><i>“One of the Council's Senior Environmental Health Officers is a long-standing Member of the Institute of Acoustics (IoA) and she is well aware of the debate concerning noise from wind farms, particularly over the issue of amplitude modulation (AM). The council will be guided by the advice in the IoA Good Practice Guide and Supplementary Guidance Notes. I consider that Milton Keynes Council is reasonably well informed and up to date in this subject area.”</i></p>	<p>Carole Mills, Chief Executive, Milton Keynes Council</p>
<p><i>“Our Community Protection and Environmental Protection Units formed a Wind Turbine Assessment Panel (WTAP) to ensure that a consistent approach to assessing the noise data received with wind turbine planning applications. The work of WTAP has resulted in the production of a document - Minimum Information Requirements for Wind Turbine Planning Applications which stipulates what information is required from applicants with regard to noise and allows us to assess noise reports relating to wind turbines consistently, equally and equitably. The document also provides example planning conditions for both large and small scale wind power developments and does make several references to Amplitude Modulation.”</i></p>	<p>Chris Selby, Senior Officer Community Protection, Cornwall Council</p>

8.10 Summary & Conclusions on Mitigation

Where there have been noise only complaints (no element of EAM) the mitigating actions such as Abatement, Defect and Closure as described above have been conclusive and a solution has been achieved. However, where there have been AM related complaints, as described in Curtailment and Pending above, there does not appear to be a conclusion. The Curtailment cases indicate further investigation and testing is taking place during curtailed operation. The only difference with the Pending cases is there has been no curtailment of the operation of the wind turbines whilst further investigation and testing takes place.

8.11 Two LPAs were specific about their ‘prevention v cure’ approach to ensuring proactive consultation on noise conditions at the pre-application stage. Since this could be a significant opportunity for proactive public protection, it is worth examining the full text from Richmondshire DC: *“We try to apply controls to protect local residents against noise at the planning application stage. However, we have experienced difficulties in controlling applications for individual wind turbines, especially where other individual turbines exist in the area that have already received planning permission. We currently request that they meet a standard of lower than 35 db(A) at the nearest noise sensitive premises and take into account accumulative impact. Many applicants, including planning agents, have little*



*understanding of noise issues which means the supporting information is lacking. Much of the manufacturers' details for the turbines themselves are from countries outside the UK which do not apply the same noise criteria or recognise noise impact in the way we do. Officers are always wary that in trying to determine an application there are inconsistencies with the original data presented and so protection they would like to provide to local residents may not always be achieved in practice."* This indicates a frustration about the consistency and availability of reliable support information on noise and AM, and a potential risk to public protection.

8.12 Two commonly suggested methods for handling nuisance from EAM are by a planning condition imposed at the time of consenting a wind farm or by recourse to Statutory Nuisance legislation should it be subsequently discovered. Neither of these methods are robust. The issues raised will be addressed in more detail in subsequent Work Package (WP) reports dealing with the general legal issues that surround them – WP6 - and case studies of the way they have worked in practice at Den Brook – WP4 - and Cotton Farm – WP9.

8.13 From this we can conclude:

- 1 There does not appear to be a standard approach across LPAs for curtailment of operation when EAM complaints are identified;
- 2 None of the LPAs quoted here have described a clear definition of potential mitigation for EAM;
- 3 The adoption of well-informed guidance on detecting and remedying EAM is highly desirable;
- 4 Prevention may better than cure but for this to be achieved, more consistent and reliable information is required about noise/EAM and its causes.

## 9 Getting to Grips with EAM

- 9.1 Finally, to assess the frustrations and ideas coming forward from LPAs and through this determine a way forward, the survey attempted to assess whether or not local planning officers find that current approaches to turbine noise in the planning system are satisfactory or might be improved. In his letter, Chris Heaton-Harris tells LPAs:

*“The combined research confirms all large wind turbines can cause AM problems and warrant control by way of a planning condition..... The debate over the form of control needed continues”.*

- 9.2 The responses enable us to attempt to answer questions such as: How aware are the LPA respondents about EAM? What guidance and support are they seeking on it? What frustrations are they experiencing? What ideas do they have to offer on wind turbines?

It is possible to recognise four types of response categorised as:

**Aware:** LPA respondents describe how and what they know about EAM (33 examples)

**Guidance:** LPAs asking for guidance, national standards and consistency in dealing with EAM (9 examples)

**Frustrations:** LPAs express their frustration on the inadequacy of protection from noise/EAM (3 examples)

**Ideas:** An idea from a Chief Executive who looks at the broader picture (1 example)

### 9.3 Aware

<i>“We were not able to substantiate a complaint about noise as the complainant withdrew the complaint when it was realised that it may impact on any future sale of his property”.</i>	Simon Joynes, Chartered Environmental Health Practitioner, Central Bedfordshire Council
<i>“We too are aware of concerns regarding noise and the phenomenon of 'Amplitude Modulation' (AM). We have found that AM is detectable by its tonal characteristic as well as its volume and this has allowed our intervention within existing powers, even where there is no safeguarding condition.”</i>	Lynn Aisbett, Chief Executive, Melton BC
<i>“I am aware of the issues of AM noise from large-scale turbine developments, and indeed have been following with interest the reports in relation to the Den Brook wind farm.”</i>	Mr Kerry Pitt-Kerby, Manager, Environmental Protection & Private Sector Housing, North Dorset DC
<i>“I am also aware of Amplitude Modification being discussed on a regular basis through trade publications such as Acoustics Bulletin through the Institute of Acoustics website (<a href="http://www.ioa.org.uk">www.ioa.org.uk</a>) where a number of professionals discuss research into this worldwide issue.”</i>	Tim Nichols, Head of Environmental Health and Licensing, Brighton and Hove CC

<p><i>"I can confirm that the Council is fully aware of the issue in respect of amplitude modulation (AM). However, your letter is helpful, particularly the reference to the condition applied at the Den Brook wind farm and I have forwarded on your letter to my Environmental Health officers for their information."</i></p>	<p>Bill Murphy, Head of Planning &amp; Regulatory Services, Isle of Wight Council</p>
<p><i>"As an acoustician I am well aware of the issues raised in your letter and of the concerns with regard to wind farm noise particularly amplitude modulation and I share your concerns about these."</i></p>	<p>Julian Smith, Divisional Environmental Health Officer, Wycombe DC</p>

#### 9.4 Guidance

<p><i>"Your letter was very timely as Council officers are currently looking at AM issues in connection with the proposed Navitus Bay Wind Farm. In answer to your questions, I am afraid we have very little experience in this area".</i></p>	<p>Dave Yates, Chief Executive, New Forest DC</p>
<p><i>"Whilst our Councils have not experienced issues associated with AM, I am aware that other local authorities have experienced problems and would welcome greater research and some nationally set/ agreed definitive standards."</i></p>	<p>James Buckingham, Corporate Manager - Environmental Protection &amp; Planning Enforcement Babergh DC &amp; Mid Suffolk DC</p>
<p><i>"As a general comment on the matter, it is acknowledged that there is a current lack of agreed, tried and tested guidance on amplitude modulation. Planning conditions are currently relied upon to prevent any occurrence and it is understood that different Local Authorities may well be applying different wording and standards."</i></p>	<p>James Arnold, Joint Assistant Director - Planning &amp; Environmental Health, Bolsover DC</p>
<p><i>"In the case of the Kessingland turbines, the operators have made significant attempts to research the meteorological conditions which give rise to the phenomenon and taken steps to control the way the turbines operate under those conditions in an attempt to reduce the likelihood and extent of future incidence of AM noise. This has not been entirely successful partly because the absence of any clear understanding about the physical mechanisms which cause AM or any standard agreed method of recognising, predicting or mitigating it. Consequently, it is very difficult to challenge whether the "best practicable means" have been used, with the result that (in the case of Kessingland) proceedings for statutory nuisance would be likely to fail due to the 'best practicable means' having been employed to resolve the issue."</i></p>	<p>Stephen Baker, Chief Executive, Waveney DC</p>
<p><i>"A significant amount of time was spent producing and agreeing the noise control conditions for one application of 19 x 3MW turbines. The potential for amplitude modulation (AM) was discussed. At that time it was felt that the issue of</i></p>	<p>Steve Robinson, Chief Executive, Cheshire West and Chester</p>

<p><i>AM did not have sufficient evidence base to be able to adequately define AM or write conditions that would control it."</i></p>	
<p><i>"It is clear that AM is a topic with increased public awareness, and there is significant research being undertaken to fully understand the mechanism that results in AM. However, whilst there is such a difference in opinion around this complicated issue, any conditions or enforcement is likely to be widely open to challenge."</i></p>	<p>Garry Payne, Chief Executive, Wyre BC</p>
<p><i>"The Council's acoustic consultant had drafted a condition relating to amplitude modulation to be included as a condition should planning permission be granted. However although such a condition was accepted in the Den Brook decision, planning inspectors in subsequent appeals have failed to uphold such a condition. At the time of writing, current practice is not to assign a planning condition to deal with AM. In light of this the Council felt it could not proceed with an AM condition. Clearly the quicker the issue of amplitude modulation can be agreed by all parties the better for all who are involved in dealing with wind farm applications."</i></p>	<p>Janet Waggott, Chief Executive, Ryedale DC</p>

## 9.5 Frustrations

<p><i>"In the view of my EHO the latest proposed condition from the IoA (of which he is a member) is too complex, imprecise and virtually unenforceable. In his opinion a review of ETSU-97 is well overdue which should include sample planning conditions, including one for OAM condition which is relevant, precise and enforceable. I would be grateful if you would not identify this Authority in your report."</i></p>	<p>Chief Executive</p>
<p><i>"In Summary, taking all the circumstances and the amount and quality of all the evidence gathered into consideration we do not believe there is a realistic prospect of being able to demonstrate the existence, or likely recurrence, of a noise amounting to a statutory nuisance to the standard required to justify service of an abatement notice under the terms of section 80 of the Environmental Protection Act 1990. We sought to bring our extensive and very direct experience in this field to bear in a recent application for planning consent for a very similar turbine just 14km from the Kessingland site, but despite our best efforts the Planning Inspector rejected our arguments about what we believed to be the very real risk of AM noise causing disturbance to residents and approved the application on appeal"</i></p>	<p>Stephen Baker, Chief Executive, Waveney DC.</p>

9.6 Ideas

<p><i>"May I offer some general thoughts and another way to approach this matter? I'm taking it that your general concern is over the inappropriate siting of wind farms. In a recent meeting with Brandon Lewis, I suggested there might be merit in having a land use category called 'Energy Generation'. We have land use category for houses; for industry; for retail. These sub-divide into different types of industry B 1, B2, B8 etc. Likewise different types of retail etc. My proposition is the absence of a land use category is an accident of history. When land use categories were established only the crown generated electricity. It used crown prerogative rather than the planning system. Similarly, the phenomenon of wind and solar farms is a relatively recent one. The energy ownership and generation landscape is different now, but the planning system just does not reflect that. It has not kept pace. If a land use category existed (and sub categories) then local authorities could better plan and control the sites that such activities take place on, and the types of activities that take place on them. A good ground for a planning application is that other better sites have been designated via the local plan and/or that the applicant's site does not meet the necessary criteria for such a use. By formalising a land use category it provides a discipline in terms of the policy criterion and studies and surveys necessary. So distance from residential, impact assessments on noise, visual amenity etc, all flow. Currently, local Windfarm applications pop-up on ad-hoc sites and are dealt with in an ad-hoc way. In effect, this is what we have done in Kettering and it seems to be working. I venture to suggest that if, and it is an if, what you seek is to stop unsuitable sites from coming forward, then perhaps the land use category might be helpful. After all, that's how we do it with every other type of planning application. I know Philip (Hollobone) supports this approach and you may care to talk to him. Alternatively, I would be happy to provide further information. I apologise if I have been presumptive in the foregoing. I'll leave you to judge the merits of this suggestion".</i></p>	<p>David Cook, Chief Executive, Kettering BC</p>
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## 9.7 Summary & Conclusions on Getting to Grips with AM

Executives at all levels in LPAs are aware of the issues and the debate on EAM. They keep themselves informed through public sources. In their minds this would appear to be currently an unresolved issue – that is, work in progress.

9.8 There is a requirement from LPAs for precision and certainty in dealing with EAM conditions and EAM complaints. This would include:

- 1 More information and evidence on the causes of EAM;
- 2 Reliable methods for predicting it, especially at the planning application and conditions setting stage;
- 3 Sound guidance on measuring and testing for its presence;
- 4 Nationally set and agreed standards relating to it that are consistently applied;
- 5 Proven mitigations for it.

9.9 One EHO, through his Chief Executive and on condition of anonymity, was very critical of the AM condition being proposed through the Institute of Acoustics. The same EHO believes ETSU should be overhauled and include a condition for AM<sup>3</sup> which is “*relevant, precise and enforceable*”.

9.10 One Chief Executive has taken a broader strategic view of how to ensure the appropriate siting of industrial wind turbines through land use categories. From this idea he suggests “*distance from residential, impact assessments on noise, visual amenity etc*” all follow. In many ways his idea is a more strategic version of the ‘prevention vs cure’ tactics described in the previous section.

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<sup>3</sup> The EHO actually refers to ‘OAM’ – or Other Amplitude Modulation – which is a concept introduced in December 2013 by ReUK

## 10 Gaps & Omissions

10.1 We are aware of a number of possible gaps and omissions in both the survey and analysis of its results. Between them, the 195 responding LPAs contributed over 18,000 words in response to Chris Heaton-Harris's letter. Some were very short. For example, simply 'No' to the two questions at the end of his letter. Some were formal replies in a Freedom of Information (FOI) format. Others were free-flowing, comprehensive and provide valuable insights into how Chief Executives, Senior Managers and Environmental Health Managers see the issues and current debate surrounding noise and Amplitude Modulation. Apart from one Chief Executive who asked for anonymity, respondents replying to an MP should expect, and perhaps want, their comments to be in the public domain. So, apart from the preceding sections in this study, what other valuable conclusions can we deduce from this wealth of information?

### 10.2 Health

Given the volume of information provided by LPAs we can look at the information and safely ask: What were the omissions and what did they not say? Here is an example: In his letter Chris Heaton-Harris said: *"Constituents have made MPs increasingly aware of a range of noise problems, including sleep disturbance over recent years ...."* Despite this direct reference to the protection of people's health, only one LPA made a reference to this subject. The Chief Executive of Waveney & Suffolk Coast said: *"On four occasions, the noise emitted from the turbines has been adjudged in the opinion of the visiting officers to be of sufficient intensity in circumstances which was likely to cause significant interference with use and enjoyment of the complainant's property"*. LPAs have employees with titles such as 'Environmental Health Officer' and 'Public Health Protection Managers'. Is it possible that in focussing on meeting standards such as ETSU, LPA have lost sight of their duty towards the public's health and well-being?

### 10.3 Mind the Gap

We have already seen that there is an immense gap between the way in which opposing stakeholders see the issue and the scale of noise from industrial wind turbines, in particular EAM. For example, ReUK have extrapolated the data from the Salford report to suggest that 15 sites out of 521, just 3%, would be affected by EAM. The Renewable Energy Foundation (REF) used a Freedom of Information Request in 2009 to establish the names and number of the wind farms in the Salford report where local authorities were reporting EAM. This amounted to four of the 27 studied where there were noise complaints (15%). Mike Stigwood of MAS claims: *"Potentially 80-160 wind farms are causing problems with 1,000s homes affected. Research shows Excess Amplitude Modulation (EAM) is the main problem and caused by all large wind farms."* In this Study we discovered that of 205 LPA responding, 54 have received complaints about wind turbine noise and of those 17 were about EAM (32%). In total there were over 600 individual complaints mostly clustered in the five year period 2010-14. However, we do not know exactly how many wind farm or single turbine locations were involved, or their names. The current incidence of EAM complaints is much higher than predicted by ReUK and the Salford report. If they are as high as Mike Stigwood of MAS suggests, then there is a 'silent majority' out there knowing they are unhappy about

some effect of their neighbouring wind farm, but unsure of how to describe it, who to tell, or how to complain. The Central Bedfordshire EHO said a complainant withdrew their complaint when it was realised that it may impact on any future sale of their property. This also indicates there is a further 'silent majority' unwilling to complain for this and other reasons.

#### 10.4 **Community Charter**

The evidence of this study is that even if they do complain, the response wind farm neighbours get will depend on their LPA. Some investigate and negotiate a curtailment of operation during the investigation. Some only investigate. Some do not appear to know what to do or how to do it. What would be highly desirable is a form of standard and agreed approach to a 'community charter' whereby wind farm neighbours know how to complain and what to expect. Could this be backed up by an Ombudsman service?

- 10.5 Consider the response from the South Cambridgeshire EHO (see 8.5 above) in which he refers to EAM complaints about the Cotton Farm wind farm. Here it would appear that an organised and determined local group of people have engaged with the LPA and the developer with substantial back up evidence.
- 10.6 Contrast this with Waveney & Suffolk Coastal DC's (see Appendix C for the full text of the LPA response) where 465 individual complaints have been received from 44 residents from a total of 800 living within 1km of two turbines at Kessingland. In response the council's officers made 107 separate site visits, finding a potential noise nuisance on only four of these visits. This indicates that a scatter gun approach by wind farm neighbours doesn't work. It brings the complaints process into disrepute and fails to resolve the noise problem.
- 10.7 Perhaps communities that simply don't have the resources to complain effectively against what can be a powerful and well-resourced adversary, need and deserve the support of a 'community charter'.



## Appendix A: Chris Heaton-Harris Letter

Letter sent by Chris Heaton-Harris MP to the named Chief Executive of 265 English LPAs

*You may be aware of the work of fellow MPs and I to raise awareness of the problems of wind farm noise impacting upon local communities and our attempts to bring about a change in the way their control is approached. I write to update you on important changes over the understanding of noise problems, to ensure there is uniformity across the country.*

*Constituents have made MPs increasingly aware of a range of noise problems, including sleep disturbance over recent years and in particular a phenomenon known as amplitude modulation (AM), which noise engineers working for the wind industry had repeatedly denied as only a rare problem not warranting control. Indeed, one Environmental Health Officer from the South-West has reported how disturbing AM is.*

*In 2013, independent researchers demonstrated this problem was serious and extremely common. This work was supported by other independent research in Japan and finally, after the weight of supporting evidence became clear, industry experts released their own long awaited research confirming it was a significant problem warranting control and ending their previously successful attempts to prevent controls that left communities unprotected.*

*The combined research confirms all large wind turbines can cause AM problems and warrant control by way of a planning condition. The industry still argues over the frequency that this problem arises, but the extensive Japanese research has independently confirmed it is a common problem causing serious annoyance. Regrettably, almost all wind farms and turbines currently operating in the UK do so without controls over AM. If you are not familiar with this noise phenomenon, I understand some clips are available for viewing online. They are best listened to using good quality headphones at [http://www.masenv.co.uk/listening\\_room](http://www.masenv.co.uk/listening_room). Noise near an operating wind farm can also be experienced at: [http://www.masenv.co.uk/~remote\\_data/](http://www.masenv.co.uk/~remote_data/).*

*The debate over the form of control needed continues. I understand a condition has been proposed by industry representatives, but this has been independently tested against the largest databases of wind farm noise in the UK and shown it does not prevent AM. Therefore, it cannot be recommended. I understand the industry now accepts there are problems with their proposed condition. The only condition so far accepted by the courts as a means of control of AM, is the condition applied to the Den Brook wind farm although, currently, the only means of stopping AM noise impact is to stop the turbines at the times it occurs.*

*The purpose of this letter is to ask whether you have had:*

- 1. Any complaints about noise from wind turbines?*
- 2. If you have had reports of amplitude modulation?*

*Finally, I'd like to know, if the answer to either of those two questions is positive, whether you found excessive noise or AM upon investigation and what actions you might have taken to mitigate the problem detected.*

*Many thanks in advance for your assistance on this matter.*

**Appendix B: List of Local Planning Authorities Contacted**

Log	Reply Date	Non-metropolitan Planning Authorities (England)
1	10/09/14	Adur DC
2	18/08/14	Allerdale BC
3	12/08/14	Amber Valley BC
4	08/08/14	Arun DC
5	15/08/14	Ashfield DC
6	12/08/14	Ashford BC
7	12/08/14	Aylesbury Vale DC
8	22/08/14	Babergh DC
9	27/08/14	Barrow-in-Furness BC
10	16/09/14	Basildon DC
11	18/08/14	Basingstoke & Deane BC
12	11/08/14	Bassetlaw DC
13	02/09/14	Bath & North East Somerset Council
14	18/08/14	Bedford BC
15		Blaby DC
16	15/08/14	Blackburn with Darwen BC
17	18/08/14	Blackpool Council
18	10/09/14	Bolsover DC
19	Late	Boston BC
20	08/09/14	Bournemouth BC
21	12/08/14	Bracknell Forest BC
22	08/08/14	Braintree DC
23	21/08/14	Breckland DC
24	14/08/14	Brentwood BC
25	14/08/14	Brighton and Hove CC
26		Bristol CC
27	Late	Broadland DC
28	18/08/14	Bromsgrove DC
29		Broxbourne BC
30	08/08/14	Broxtowe BC
31	12/08/14	Cambridge CC
32	20/08/14	Cannock Chase DC
33	09/08/14	Canterbury CC
34	14/08/14	Carlisle CC
35		Castle Point
36	11/08/14	Central Bedfordshire Council
37	28/08/14	Charnwood BC
38	10/08/14	Chelmsford BC
39	21/08/14	Cheltenham BC
40		Cherwell DC
41	14/08/14	Cheshire East
42	12/09/14	Cheshire West and Chester

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Log	Reply Date	Non-metropolitan Planning Authorities (England)
43		Chesterfield BC
44	07/08/14	Chichester DC
45	11/08/14	Chiltern DC
46	12/08/14	Chorley BC
47	07/08/14	Christchurch BC
48	27/08/14	Colchester BC
49		Copeland BC
50	08/08/14	Corby BC
51	14/08/14	Cornwall Council
52		Cotswold DC
53	02/09/14	Durham County Council
54	21/08/14	Craven DC
55	13/08/14	Crawley BC
56	12/08/14	Dacorum BC
57	Late	Darlington BC
58	07/08/14	Dartford BC
59	14/08/14	Dartmoor National Park Authority
60	18/08/14	Daventry DC
61		Derby CC
62	13/08/14	Derbyshire Dales
63	03/09/14	Dover DC
64	11/08/14	East Cambridgeshire
65	11/08/14	East Devon
66		East Dorset DC
67		East Hampshire DC
68	13/08/14	East Hertfordshire DC [East Herts DC]
69	19/08/14	East Lindsey DC
70	18/08/14	East Northamptonshire Council
71	Late	East Riding of Yorkshire Council
72	14/08/14	East Staffordshire BC
73		Eastbourne BC
74	14/08/14	Eastleigh BC
75	22/08/14	Eden DC
76	13/08/14	Elmbridge BC
77	07/08/14	Epping Forest DC
78	11/08/14	Epsom & Ewell BC
79	15/08/14	Erewash Borough
80	18/08/14	Exeter City
81	11/08/14	Exmoor National Park Authority
82		Fareham BC
83	27/08/14	Fenland DC
84	05/09/14	Forest Heath DC
85	18/08/14	Forest of Dean DC
86	07/08/14	Fylde BC
87	28/08/14	Gedling BC

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Log	Reply Date	Non-metropolitan Planning Authorities (England)
88		Gloucester CC
89	12/08/14	Gosport BC
90	07/08/14	Gravesham BC
91		Great Yarmouth BC
92	19/08/14	Guildford BC
93		Hambleton
94	23/08/14	Harborough DC
95	27/08/14	Harlow Council
96	14/08/14	Harrogate BC
97	07/08/14	Hart DC
98	11/08/14	Hartlepool BC
99	26/08/14	Hastings BC
100	08/08/14	Havant DC
101		Herefordshire Council
102	08/08/14	Hertsmere BC
103		High Peak Borough
104	19/08/14	Hinckley & Bosworth DC
105	08/08/14	Horsham DC
106		Huntingdonshire DC
107	12/09/14	Hyndburn BC
108	12/08/14	Ipswich BC
109	13/08/14	Isle of Wight Council
110	07/08/14	Council of the Isles of Scilly
111	28/08/14	Kettering BC
112	15/09/14	King's Lynn & West Norfolk BC
113	Late	Hull CC
114		Lake District National Park Authority
115		Lancaster CC
116	21/08/14	Leicester CC
117	16/09/14	Lewes DC
118	14/08/14	Lichfield DC
119		Lincoln CC
120	15/08/14	Luton BC
121		Maidstone BC
122	18/08/14	Maldon DC
123	13/08/14	Malvern Hills DC
124	21/08/14	Mansfield DC
125		Medway Council
126	03/09/14	Melton BC
127	13/08/14	Mendip DC
128	08/08/14	Mid Devon DC
129	22/08/14	Mid Suffolk DC
130	08/08/14	Mid Sussex DC
131	19/08/14	Milton Keynes Council
132		Mole Valley DC

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Log	Reply Date	Non-metropolitan Planning Authorities (England)
133	18/08/14	New Forest DC
134	18/08/14	New Forest National Park Authority
135	20/08/14	Newark and Sherwood DC
136	19/08/14	Newcastle-under-Lyme BC
137	28/08/14	North Devon DC
138	11/08/14	North Dorset DC
139	10/09/14	North East Derbyshire DC
140	27/08/14	North East Lincolnshire Council
141	12/08/14	North Hertfordshire DC
142	Late	North Kesteven DC
143		North Lincolnshire Council
144	22/08/14	North Norfolk DC
145		North Somerset Council
146	12/08/14	North Warwickshire BC
147		North West Leicestershire
148	04/09/14	North York Moors National Park Authority
149	07/08/14	Northampton BC
150	22/08/14	Northumberland County Council
151		Northumberland National Park Authority
152	14/08/14	Norwich CC
153	12/08/14	Nottingham CC
154	18/09/14	Nuneaton & Bedworth
155		Oadby & Wigston DC
156		Oxford CC
157		Peak District National Park Authority
158	08/09/14	Pendle BC
159	11/08/14	Peterborough CC
160	27/08/14	Plymouth CC
161	08/08/14	Poole BC
162	20/08/14	Portsmouth CC
163		Preston CC
164	14/08/14	Purbeck DC
165	11/08/14	Reading BC
166		Redcar and Cleveland
167	18/08/14	Redditch BC
168		Reigate and Banstead BC
169	01/09/14	Ribble Valley BC
170	14/08/14	Richmondshire
171	28/08/14	Rochford DC
172		Rosendale
173		Rother DC
174	13/08/14	Rugby BC
175		Runnymede BC
176	22/08/14	Rushcliffe BC
177	15/08/14	Rushmoor BC

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Log	Reply Date	Non-metropolitan Planning Authorities (England)
178	02/09/14	Rutland County Council
179	Late	Ryedale DC
180	27/08/14	Sandwell Metropolitan BC
181	08/08/14	Scarborough BC
182	21/08/14	Sedgemoor DC
183		Selby
184	15/08/14	Sevenoaks DC
185	18/08/14	Shepway DC
186		Shropshire Council
187		Slough BC
188	15/08/14	South Bucks DC
189	12/09/14	South Cambridgeshire DC
190	12/08/14	South Derbyshire
191	20/08/14	South Downs National Park Authority
192	18/08/14	South Gloucestershire DC
193	27/08/14	South Hams DC
194	21/08/14	South Holland
195	13/08/14	South Kesteven
196	14/08/14	South Lakeland DC
197	14/08/14	South Norfolk
198		South Northamptonshire
199	11/08/14	South Oxfordshire DC
200	03/09/14	South Ribble BC
201	14/08/14	South Somerset DC
202	14/08/14	South Staffordshire
203		Southampton CC
204	18/08/14	Southend-on-Sea BC
205	11/08/14	Spelthorne BC
206		St Albans City & DC
207	05/09/14	St Edmundsbury BC
208	27/08/14	Stafford BC
209	28/08/14	Staffordshire Moorlands DC
210	14/08/14	Stevenage BC
211	20/08/14	Stockton-on-Tees BC
212	29/08/14	Stoke-on-Trent CC
213	14/08/14	Stratford-on-Avon
214	02/09/14	Stroud DC
215		Suffolk Coastal DC
216		Surrey Heath BC
217	15/09/14	Swale BC
218	11/08/14	Swindon BC
219	12/08/14	Tamworth BC
220	15/08/14	Tandridge DC
221	08/08/14	Taunton Deane BC
222	05/09/14	Teignbridge DC

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<b>Log</b>	<b>Reply Date</b>	<b>Non-metropolitan Planning Authorities (England)</b>
223	22/08/14	Telford & Wrekin Council
224	14/08/14	Tendring DC
225	11/08/14	Test Valley BC
226	19/08/14	Tewkesbury BC
227	18/08/14	Thanet DC
228		The Broads Authority
229	11/08/14	Three Rivers DC
230		Thurrock Council
231	21/08/14	Tonbridge and Malling BC
232	28/08/14	Torbay Council
233	29/08/14	Torridge DC
234	21/08/14	Tunbridge Wells BC
235	08/08/14	Uttlesford DC
236		Vale of White Horse DC
237	27/08/14	Warrington BC
238	28/09/14	Warwick DC
239	12/08/14	Watford BC
240	11/08/14	Waveney & Suffolk Coastal DCs
241	11/08/14	Waverley BC
242	13/08/14	Wealden DC
243	21/08/14	Wellingborough
244	13/08/14	Welwyn Hatfield BC
245	18/08/14	West Berkshire Council
246	08/09/14	West Devon BC
247		West Dorset DC
248	19/11/13	West Lancashire DC
249	08/08/14	West Lindsey
250		West Oxfordshire
251		West Somerset
252		Weymouth & Portland BC
253		Wiltshire Council
254		Winchester CC
255	12/08/14	Royal Borough of Windsor and Maidenhead
256	07/08/14	Woking BC
257	15/08/14	Wokingham BC
258	12/08/14	Worcester CC
259		Worthing BC
260	18/08/14	Wychavon DC
261	12/08/14	Wycombe DC
262	Late	Wyre BC
263		Wyre Forest DC
264	14/08/14	City of York
265	08/08/14	Yorkshire Dales National Park Authority

## **Appendix C: Waveney DC in Partnership with Suffolk Coastal DC Response**

Response from Stephen Baker, Chief Executive of the combined Waveney and Suffolk Coastal DCs in Lowestoft.

### **Freedom of Information/ Environmental Information Request- 14082 (WDC)**

#### **Request:**

Have you had:

1. Any complaints about noise from wind turbines?
2. Any reports of amplitude modulation?

If the answer to either of those two questions is positive whether you found excessive noise or AM upon investigation and what actions you might have taken to mitigate the problem detected.

#### **Response:**

We are aware of the research around AM noise to which you refer, and also the current debate around its validity and conclusions.

We have had complaints about noise from two turbines in Kessingland, which is just South of Lowestoft. We have investigated these complaints extensively and have experienced at first hand the effects of AM noise from both; indeed, we believe some of the recordings at [www.masenv.co.uk](http://www.masenv.co.uk) are of those turbines.

As you will be aware, the Council is required under the terms of part 3 of the Environmental Protection Act 1990 to take "such steps as are reasonably practicable" to investigate these complaints. In pursuance of this, Council Officers have visited residents' homes and the general area of those turbines, sometimes on receipt of a complaint and sometimes on their own recognisance. Complaint logs have been correlated against meteorological data to attempt to determine under what conditions noise problems arise and the results of this analysis have been used to try to anticipate problems and plan monitoring.

During some such visits, sound recordings and noise measurement data has been collected. Those recordings included a period of 9 consecutive days when a complainant hosted a recording device inside the bedroom of a dwelling and made a series of 45 digital sound recordings, each of 30 seconds duration at times when a perceived problem existed. These recordings were reviewed first by our own Officers and subsequently independently reviewed by external experts. These particular recordings did not yield evidence of any significant contribution from turbine noise and neither did they provide any evidence supporting the existence of a noise amounting to a statutory nuisance.

A brief summary of our investigations to date is as follows:

There are approximately 800 residential properties within 1 km of these turbines. In total, we have been contacted by 44 residents about noise.



These 44 individuals have contacted us on 465 separate occasions since the turbines were commissioned. Council officers have visited complainants' homes or the general area on 107 occasions.

- 13% of our officers' visits have taken place within 1 hour of a resident's complaint,
- 24% have taken place within 2 hours;
- 33% have taken place within 4 hours;
- 37% have taken place within 8 hours;
- 54% have taken place within 24 hours.

On four occasions, the noise emitted from the turbines has been adjudged in the opinion of the visiting officers to be of sufficient intensity in circumstances which was likely to cause significant interference with use and enjoyment of the complainant's property.

On the remainder of these occasions, the noise emissions were not judged as representing, or likely to represent a significant interference.

On a number of occasions, visits shortly after the time of the complaint have resulted in no significant noise emissions being noted by the visiting officer, suggesting an over-sensitive response on the part of affected individuals, casting doubt on the reliability of their observations and their evidential value.

On one occasion, the turbines were found to be inoperative in effectively windless conditions. This was verified not only by the direct observations of the officer attending, but also by cross referencing the time and date of the complaint with the hub data provided by the turbine operators, once again casting significant doubt on the reliability of the observations of the individuals concerned and their evidential value.

I should add that it has been demonstrated beyond doubt that these turbines operate within the parameters set by the noise condition attached to their planning consent.

Whether or not we do find ourselves in a position to take legal action, there is a significant obstacle to achieving resolution through the statutory powers available to the Council; namely, the "best practicable means" defence made available under the terms of section 82(9) of the Environmental Protection Act 1990, which provides a turbine operator with a defence against proceedings for nuisance if they have taken the "best practicable means" to prevent or counteract the effects of the nuisance.

In the case of the Kessingland turbines, the operators have made significant attempts to research the meteorological conditions which give rise to the phenomenon and taken steps to control the way the turbines operate under those conditions in an attempt to reduce the likelihood and extent of future incidence of AM noise.

This has not been entirely successful partly because the absence of any clear understanding about the physical mechanisms which cause AM or any standard agreed method of recognising, predicting or mitigating it. Consequently, it is very difficult to challenge whether the "best practicable means" have been used, with the result that (in the case of Kessingland) proceedings

for statutory nuisance would be likely to fail due to the "best practicable means" having been employed to resolve the issue.

In Summary, taking all the circumstances and the amount and quality of all the evidence gathered into consideration we do not believe there is a realistic prospect of being able to demonstrate the existence, or likely recurrence, of a noise amounting to a statutory nuisance to the standard required to justify service of an abatement notice under the terms of section 80 of the Environmental Protection Act 1990.

We sought to bring our extensive and very direct experience in this field to bear in a recent application for planning consent for a very similar turbine just 14km from the Kessingland site, but despite our best efforts the Planning Inspector rejected our arguments about what we believed to be the very real risk of AM noise causing disturbance to residents and approved the application on appeal.

**Appendix D: List of LPAs Receiving Noise & EAM Complaints**

<b>Non-metropolitan Planning Authorities (England)</b>	<b>Noise Complaints?</b>	<b>EAM Complaints?</b>
Allerdale BC	Yes	Yes
Amber Valley BC	Yes	No
Babergh DC	Yes	No
Barrow-in-Furness BC	Yes	Yes
Bassetlaw DC	Yes	No
Bath & North East Somerset Council	Yes	No
Blackburn with Darwen BC	Yes	No
Bolsover DC	Yes	No
Boston BC	Yes	No
Braintree DC	Yes	No
Breckland DC	Yes	No
Brighton and Hove CC	Yes	No
Broadland DC	Yes	Yes
Central Bedfordshire Council	Yes	No
Cornwall Council	Yes	Yes
Darlington BC	Yes	No
East Riding of Yorkshire Council	Yes	Yes
East Staffordshire BC	Yes	No
Gedling BC	Yes	No
Harrogate BC	Yes	No
Hull CC	Yes	No
King's Lynn & West Norfolk BC	Yes	No
Lewes DC	Yes	No
Maldon DC	Yes	Unclear
Melton BC	Yes	Unstated
Mendip DC	Yes	Yes
Mid Devon DC	Yes	No
Mid Suffolk DC	Yes	No

<b>Non-metropolitan Planning Authorities (England)</b>	<b>Noise Complaints?</b>	<b>EAM Complaints?</b>
Milton Keynes Council	Yes	No
New Forest DC	Yes	Unstated
Newark and Sherwood DC	Yes	Yes
North Devon DC	Yes	Yes
North East Derbyshire DC	Yes	No
North Kesteven DC	Yes	No
Northumberland County Council	Yes	Yes
Pendle BC	Yes	Yes
Plymouth CC	Yes	No
Purbeck DC	Yes	No
South Cambridgeshire DC	Yes	Yes
South Gloucestershire DC	Yes	No
South Hams DC	Yes	No
South Holland	Yes	Yes
South Lakeland DC	Yes	No
South Oxfordshire DC	Yes	No
Staffordshire Moorlands DC	Yes	Yes
Stroud DC	Yes	Yes
Swale BC	Yes	No
Teignbridge DC	Yes	No
Tendring DC	Yes	Yes
Test Valley BC	Yes	No
Torridge DC	Yes	Yes
Waveney & Suffolk Coastal DCs	Yes	Yes
West Lancashire DC	Yes	No
Wyre BC	Yes	No

## Appendix E: Known Wind Farms causing or known to have caused complaints

MAS have compiled a list of over 30 wind farms across the UK that they are aware of as generating Excess Amplitude Modulation (EAM)

MAS have measured unreasonable wind farm noise or been asked to investigate complaints of noise from wind farms at 13 developments including Bicker Fen, Blaen Bowi, Coldham, Darracott, Delabole, Fullabrook, Deeping St Nicholas, North Pickenham, Red Tile and Swaffham. The occurrence of EAM is often noted by the industry as rare; the table below contains only wind farms generating EAM of which MAS are aware due to written evidence. MAS understand there are many other cases. As can be seen from the table below, the occurrence of EAM is not specific to turbine make, model, size, rated power or number of turbines.

*Table updated August 2014*

From: [http://www.masenv.co.uk/Operational Wind Farms](http://www.masenv.co.uk/Operational_Wind_Farms)

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Wind Farm	Location	MW per turbine	No. of turbines	Hub Height (m)	Reference	English LPA
Site C / D / E	ANON			64	MAS have measured EAM	
Site F	ANON	275kW	1	55	MAS have measured EAM and significant tonality	
Site N	ANON	50kW	1	23.6	MAS have measured EAM and significant tonality	
Site X	North East England	ANON	15+	ANON	Direct complaint evidence and measured data	
Tallentire	Cumbria	2MW	6	80	Direct complaint information	Allerdale BC
Wharrels Hill, Bothel	Cumbria	1.3MW	8	76	Complaints by residents of EAM, post Salford	Allerdale BC
Hazlehead	Yorkshire	2MW	3	60	Indirect complaints from residents - developer undertaking monitoring	Barnsley Metropolitan BC
Royd Moor	South Yorkshire	500kW	13	35	In Salford but not added, MAS heard	Barnsley Metropolitan BC
Harlock Hill	Cumbria	500kW	5	35	In Salford, but no direct evidence	Barrow-in-Furness BC

Work Package 3.1 – Study of Noise & AM Complaints received by LPAs in England

Wind Farm	Location	MW per turbine	No. of turbines	Hub Height (m)	Reference	English LPA
Bicker Fen <sup>4</sup>	Lincolnshire	2MW	13	59	Statement from complainant - clear case	Boston BC
North Pickenham <sup>4</sup>	Norfolk	1.8MW	8	80	MAS measured - residents not complaining officially	Breckland DC
Swaffham <sup>4</sup>	Norfolk	1.8MW	1	67	Complaints and MAS measured, missed by Salford	Breckland DC
Coal Clough	Lancashire	400kw	24	30	In ETSU missed in Salford	Burnley BC
Aggregate Ind Newquay	Cornwall	0.5MW	1	59	Audio examined	Cornwall
Bears Down	Cornwall	600kW	16	30	Salford - clear case added, recent complaints from residents	Cornwall
Carland Cross	Cornwall	400kw	15	30	In ETSU and Salford - now repowering and complaints received from residents	Cornwall
Cold Northcott	Cornwall	300kw	22	25	In ETSU - in Salford but not added by them	Cornwall
Cregan Gate	Cornwall	50kW	1	25	Complaints from residents	Cornwall
Delabole	Cornwall	2.3MW	4	99 (tip)	Direct complaints and advice of acoustician	Cornwall
Four Burrows	Cornwall	300kW	15	30	In Salford - 'another' noise complained of	Cornwall
Lowermoor Water Treatment Works	Cornwall	100kW	1	30	Direct complaint from resident	Cornwall
Roscarnick Farm	Cornwall	275kW	1	32	Reported by residents as 'thumpy', turbine off much of the time	Cornwall
St Breock	Cornwall	450kW	11	35	In Salford but not added	Cornwall
South Sharpley	Easington District	1.3MW	2	65	Evidence from affected residents	Durham County Council
Conisholme <sup>4</sup>	East Midlands	800kW	20	65	Evidence from others	East Lindsey DC
Mablethorpe <sup>4</sup>	Lincolnshire	600kW	2	65	Indirect evidence	East Lindsey DC

<sup>4</sup> These 14 wind farms are in areas where there have been no AM complaints to the LPA

Work Package 3.1 – Study of Noise & AM Complaints received by LPAs in England

Wind Farm	Location	MW per turbine	No. of turbines	Hub Height (m)	Reference	English LPA
Lissett	Yorkshire	2.5MW	12	80	Controls introduced to reduce noise	East Riding of Yorkshire
Six Penny Wood	East Riding of Yorkshire	2MW	10	80	Confirmed by residents, complaints to LA, compliance measurements	East Riding of Yorkshire Council
Askham <sup>4</sup>	Cumbria	660kW	7	40	Salford - clear case added	Eden DC
Coldham <sup>4</sup>	Cambridgeshire	1.75MW	8	60	Statements from complainant matches EAM	Fenland DC
Whittlesey <sup>4</sup>	Cambridgeshire	1.8MW	1	80	Turned off at night	Fenland DC
Swinford <sup>4</sup>	Leicestershire	2MW	11	80	MAS have measured EAM	Harborough DC
Knabs Ridge <sup>4</sup>	North Yorkshire	2MW	8	58	Complaints and MAS measured - post Salford	Harrogate BC
High Volts <sup>4</sup>	County Durham	2750kW	3	60	Indirect evidence	Hartlepool BC
Cotton Farm <sup>4</sup>	East Anglia	2MW	8	80	MAS have measured EAM	Huntingdonshire DC
Red Tile / Warboys <sup>4</sup>	Cambridgeshire	2MW	12	59	MAS measured and complaints - missed by Salford	Huntingdonshire DC
Glyndebourne <sup>4</sup>	Lewes District	850kW	1	44	Independent source - see also article in Private Eye No.1334	Lewes DC
Fullabrook	Devon	3MW	22	65	Complaints by many residents of AM, post Salford	North Devon Council
Lynemouth	Northumberland	2MW	13	78	Indirect evidence / information	Northumberland County Council
Walkway Wind Farm	Sedgefield District	2MW	7	69	Evidence from affected resident clearly identifies AM	Sedgefield BC
Wadlow	Cambridgeshire	2MW	13	80	MAS have measured and confirmed with direct observations	South Cambridgeshire DC
Deeping St Nicholas	Lincolnshire	2MW	8	59	In Salford and added, MAS confirmed	South Holland DC
Gedney Marsh (Red House)	Lincolnshire	2MW	6	59	Indirect evidence	South Holland DC
Lynch Knoll	Gloucestershire	500kW	1	42	In Salford but not added	Stroud DC
Darracott	Devon	850kW	3	50	Complaints by residents of EAM clearly ID EAM	Torridge DC
Forestmoor, Bradworthy	Devon	1MW	3	48	Evidence of others	Torridge DC

Wind Farm	Location	MW per turbine	No. of turbines	Hub Height (m)	Reference	English LPA
Kessingland	Suffolk	2.05MW	2	80	Complaints and MAS measured, post Salford	Waveney DC

Many references derive from the Salford report. Reference to "not added" or "added" means that there was evidence of EAM but Salford did or did not include it as EAM related in their study. "MAS have no direct evidence" means they have not been able to verify that complaints relate to EAM.