

# WIND TURBINE NOISE

MP for Daventry (GB) [Chris Heaton-Harris](http://www.heatonharris.com/reports-publications) <http://www.heatonharris.com/reports-publications>

I am sponsoring the Independent Noise Working Group (INWG) to produce a Wind Turbine Amplitude Modulation (AM) & Planning Control Study. The aim of the Study is to protect communities and wind turbine neighbours from wind turbine noise amplitude modulation. These INWG investigations seek to assess and determine the true facts behind wind turbine noise AM. Then, from this assessment, to arrive at a set of recommendations that can be applied to ensure people living near wind turbines can be protected from noise nuisance and adverse health effects. The good news is that the initial reporting phase of work – which has taken over a year to complete – is now available below. I was pleased to join a group of INWG representatives when they presented their findings to the Minister of State at the Department of Energy & Climate Change (DECC) in mid-October 2015. This report was well received by the Minister.

Responding to the report, a DECC spokesman said the government recognises that turbine noise can be a concern for people living near turbines and said a review has been commissioned which could lead to it being controlled through a new planning condition.

He said: “*DECC has recognised that amplitude modulation (AM) noise produced by wind turbines can be a cause of concern for some residents. DECC has appointed an external consultant to review the available evidence on AM, with a view to recommending how excessive AM might be controlled through a planning condition. The INWG’s study will be considered alongside other evidence that is being gathered as part of this review.*”

Please get in touch with me for more information.

**Chris Heaton-Harris MP**

November 2015

## What is the Independent Noise Working Group?

The Independent Noise Working Group (INWG) formed during August 2014, is a multi-disciplinary team fully independent of the wind industry supply chain with expertise or access to expertise including acoustics, environmental health (LPA), health & sleep, legal & planning, physics, meteorology, statistics & data analysis. INWG is jointly sponsored by Chris Heaton-Harris MP (Conservative, Daventry) and the National Alliance of Wind Action Groups (NAWAG). The objective of the INWG being to conduct an independent and scientific study into wind turbine noise AM that is able to credibly challenge the methodologies and findings of the Institute of Acoustics (IoA) sponsored AM study published to date. The INWG steering committee consists of:

- Richard Cowen, LLB: Solicitor specialising in planning then criminal law. Has been actively involved with NAWAG on legal issues including noise and the Den Brook judgment.
- Richard Cox: Electrical engineer with a career in the power generation industry.
- Anne Crowther BSc ACA: Chartered Accountant, former venture capitalist and consultant (finance and management accountant), now business owner.
- Bev Gray: Company Director (Retired) Battery back-up DC power supplies for electricity generation and distribution companies, rail, communication and utility industries.
- Melvin Grosvenor: Consultant supporting rural communities with wind turbine proposals. Senior Management & Regulated Finance experience.
- Mike Hulme: Co-founder of the Den Brook Judicial Review group which along with professional, scientific and legal expertise achieved the unprecedented Den Book AM noise conditions.
- Trevor Sherman: An international management consultant specialising in senior executive coaching and leadership development training.
- John Yelland MA DPhil (Oxon) MinstP FIET MIOA: A professional physicist and engineer with experience in acoustics spanning over 40 years.

## What are the initial findings from the INWG Research?

The initial research has come up with some dramatic and disturbing findings:

1. Excessive Amplitude Modulation (EAM) is a Significant Factor. Noise complaints from wind farms are primarily related to a phenomenon called Amplitude Modulation (AM). This is commonly described as a 'whoomp', 'swish' or 'beating' type noise. It is the character of the noise that tends to make AM wind farm noise most intrusive. A recent Scottish study found that at 1-2km from the wind farm, 72% of those suffering audible noise strongly disliked the noise. When it becomes intrusive to people we call it EAM, or Excessive Amplitude Modulation. These noise components are not covered by the ETSU guidelines and we know of only one wind farm planning decision in the UK where a planning condition has been imposed for AM noise (Den Brook, Devon).
2. There Have Been Decades of Deception. The wind industry has consistently denied the existence of EAM. Our research shows show that EAM is a frequent occurrence potentially affecting all industrial wind turbines, often for long periods of time and most frequently during the night time. A 2014 survey of Local Planning Authorities (LPAs), completed by Chris Heaton-Harris MP (Conservative, Daventry) and analysed by the INWG, shows that 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. LPAs in the survey call for guidance on measuring and testing for EAM as well as nationally agreed standards that are consistently applied and provide effective mitigations for it. There is also anecdotal evidence of a 'silent majority' who suffer in silence without knowing how to complain, not wanting to get 'involved' or because of a fear of adverse implications; if, for example, they had to disclose any complaint should they wish to sell their house.
3. Existing Legal Remedies are Found Wanting. We have found that the remedies available for wind farm neighbours affected by turbine noise are not fit for purpose. Statutory Nuisance has been actively advocated by the wind industry and supported by Planning Inspectors. Evidence however suggests that an Abatement Notice is not an effective control to protect nearby residents from EAM. Others such as private nuisance and similar legal actions have been considered but these place too much risk and burden on residents for a problem not of their making with likely long term adverse financial implications. In addition, there has been a recent trend of secondary operators forming individual shell companies for each wind farm. The impact of this was highlighted in July 2015 when David Davis MP (Conservative,

Haltemprice and Howden) introduced a Bill in Parliament with the purpose of requiring wind farm developers to obtain public liability insurance for any nuisance that they may cause to nearby residents. In particular this is aimed at noise nuisance. One of his constituents had a problem with noise from a local wind farm but had found it impossible to sue because the wind farm operator was purely a shell company with very limited assets.

4. Wind Turbine Noise Adversely Affects Sleep and Health. It is abundantly clear from the evidence examined by a world renowned expert in sleep medicine working with the INWG that wind turbine noise adversely affects sleep and health at the setback distances and noise levels permitted by ETSU. There is no reliable evidence that wind turbines are safe at these distances and noise levels, not a single study. In contrast there is an increasing volume of studies and evidence outlined to the contrary. There is particular concern for the health of children exposed to excessive wind turbine noise. The inadequate consideration of EAM is a major factor in the failure of ETSU to protect the human population. The denial of this by the wind industry is reminiscent of other health issues in the past. For example, the tobacco industry and the adverse effects of cigarette smoking.
5. ESTU is Not Fit for Purpose. We show irrefutable evidence to discredit wind industry and government claims that ETSU provides a robust noise assessment methodology. This conclusion is supported by the recent Northern Ireland Assembly report, January 2015, into wind energy where it recommends, "*Review the use of the ETSU-97 guidelines on an urgent basis with a view to adopting more modern and robust guidance for measurement of wind turbine noise, with particular reference to current guidelines from the World Health Organisation*".
6. We Need an Effective Planning Condition for AM. The wind industry claims that an AM planning condition is not necessary and that the legal remedy of Statutory Nuisance provides adequate protection are thoroughly discredited by the evidence we have published. Without an AM planning condition there is no effective remedy for wind farm neighbours against excess noise. The relevance of EAM in causing noise complaints has driven the wind industry to ensure that an AM planning condition is not applied as standard planning practice. The application of an AM planning condition to the Den Brook (Devon) wind farm planning consent during 2009 presented a serious risk to the wind industry of a similar planning condition becoming the standard for future wind farm consents. The wind farm developer for the Den Brook wind farm has gone to enormous effort, at enormous expense, over an 8 year period to ensure first that an AM planning condition is not applied, then to have the applied planning condition removed, and finally to have it sufficiently weakened presumably to ensure it prioritises operation of the wind farm rather than provide the intended protection against EAM.
7. There is a Lack of True Independence. The wind industry strategy of obfuscation capitalising on the trusted position of the Institute of Acoustics (IoA) as a scientific institution is discussed in our research findings. We find that the IoA through its wind turbine Noise Working Group, and latterly its specialist subgroup the AM Working Group devoted to the study of excess amplitude modulation, have consistently operated for the benefit of the onshore wind industry in the UK and to the detriment of local communities hosting wind turbines. This is also arguably against both the IoA Code of Ethics and that of the Engineering Council, its governing body. The effect has been to both obfuscate and hide problems related to wind turbine noise assessment from government and from the Planning Inspectorate.

#### **What are the INWG Recommendations to National Government?**

- Replace ETSU. Replace the use of ETSU, as recommended by the Northern Ireland Assembly report January 2015, with a procedure based on the principles of BS4142: 2014. This will bring wind turbine noise assessment into line with other industrial noise controls. New guidance of this type should be formulated in a Code of Practice that sets out a BS4142: 2014 type methodology that reflects noise character and relates impact to the actual background noise level and not an artificial average.
- Introduce an Effective AM Planning Condition. Based on the experience at Cotton Farm wind farm in Cambridgeshire, where there has been long term professional and independent noise monitoring, we recommend an effective AM planning condition should be part of every wind turbine planning approval unless there is clear evidence it is not needed. For assessing and controlling wind turbine noise AM, it is recommended that:
  - Where wind turbine noise level and character require simultaneous assessment then BS4142:2014 should be used. The rated wind farm noise level should not exceed +10dB above the background noise level.
  - Where only wind turbine noise AM requires assessment then a Den Brook type planning condition should be used.
- Continuous Noise Monitoring. Continuous noise monitoring of wind turbines should become a standard planning condition for all wind turbine planning approvals as recommended in the Northern Ireland Assembly report, January 2015. This should be funded by the wind turbine operator but controlled by the Local planning Authority (LPA) with the noise data made openly available to ensure transparency. The Cotton Farm community noise monitor describes an example of how this can be achieved. See: [http://www.masenv.co.uk/~remote\\_data/](http://www.masenv.co.uk/~remote_data/)
- Further Research into the Impact of Low Frequency Noise. There is a need to commission independent research to measure and determine the impact of low-frequency noise on those residents living in close proximity to individual turbines and wind farms as recommended in the Northern Ireland Assembly report, January 2015.
- Issues of Ethics, Conflict of Interest & Independence. The government should deal decisively with the ethical issues surrounding the Institute of Acoustics (IoA) wind turbine noise working groups. Government departments should disassociate themselves from the IoA until conflict of interest and ethics issues are resolved and full transparency is restored.

There are a total of 13 work packages in this study. The ones marked with an asterisk (\*) are published below. The rest will follow soon.

#### **Work Package 1 (\*)**

Work Package Title: The Fundamentals of Amplitude Modulation of Wind Turbine Noise

Lead Author & Work Package Objectives:

Dr John Yelland investigates the science behind wind turbine noise and amplitude modulation. The objective of WP1 is defined as: To provide a technical description and definition of a characteristic of wind turbine noise that has become known as amplitude modulation and to investigate its measurement, its possible causes and any feasible mitigation.

#### **Work Package 2.1 (\*)**

**Work Package Title:** Review of Reference Literature

**Lead Author & Work Package Objectives:** Richard Cox presents the results of a review of the available literature on wind turbine noise (WTN). Over 160 documents are included in the INWG study of amplitude modulation and of these at least 85 documents can be considered technical in content. This contrasts with the IoA AMWG literature review, which lists a total of just 35 documents.

The objectives of INWG WP 2.1 are defined as:

- Review the evolution of knowledge regarding WTN and AM;
- Collate the reference literature relevant to this INWG study and produce a common reference list for the study work packages;
- Provide a short description of each reference document.

### **Work Package 2.2 (\*)**

**Work Package Title:** AM Evidence Review

**Lead Author & Work Package Objectives:**

Sarah Large looks primarily for evidence of audible amplitude modulation noise in support of its existence and prevalence. Amplitude modulation (AM) can be defined as the regular (cyclic) variation in noise level, usually at blade passing frequency, which exhibits a change in the noise character of the wind farm noise as the decibel level rises and falls.

### **Work Package 3.1 (\*)**

**Work Package Title:** Study of Noise and Amplitude Modulation Complaints Received by Local Planning Authorities in England

**Lead Author & Work Package Objectives:**

Trevor Sherman analyses responses from a survey of local planning authorities (LPAs) to determine the extent of the wind turbine noise problem across England.

The objectives of INWG WP 3.1 are defined as:

- To quantify the noise and excess amplitude modulation (EAM) complaints received by LPAs in the last five years;
- To establish how LPAs investigate and mitigate for noise and EAM nuisance and through this determine the guidance they need;
- To assess the frustrations and ideas coming forward from LPAs and through this determine a way forward.

### **Work Package 3.2 (\*)**

**Work Package Title:** Excessive Amplitude Modulation, Wind Turbine Noise, Sleep and Health

**Lead Author & Work Package Objectives:**

Dr Christopher Hanning summarizes the effects of Excessive Amplitude Modulation (EAM) on people living close to wind turbines including annoyance, sleep disturbance and health effects through a review of the available health related literature. His report discusses ETSU's inability to protect noise sensitive receptors from sleep disruption and therefore harm to their health and in this context to consider the contribution of EAM.

The objective of WP3.2 is defined as:

- To summarize the effects of Excessive Amplitude Modulation (EAM) on people living close to wind turbines including annoyance, sleep disturbance and health effects through a review of the available health related literature.

### **Work Package 4 (\*)**

**Work Package Title:** Den Brook

**Lead Author & Work Package Objectives:**

Mike Hulme documents the legal, planning and technical issues surrounding the Den Brook AM planning condition (2009). This work package details the enormous effort Renewable Energy Systems (RES), the wind farm developer, has gone to over the last 8 years to ensure first that an AM planning condition is not applied, then to have the applied planning condition removed, and finally to have it sufficiently weakened presumably to ensure it prioritises development of the wind farm rather than provides intended protection against EAM.

The objective of WP4 is defined as:

- To document the legal, planning and technical aspects surrounding the Den Brook AM planning conditions.

### **Work Package 5A (\*) & 5B (\*)**

**Work Package Title:** Draft AM Planning Condition

**Lead Author & Work Package Objectives:**

Sarah Large investigates options for the control of AM.

The objectives of WP5 are defined as:

- To conduct a review of existing or proposed methods of identifying and controlling EAM.
- To develop and propose one or more EAM control methods for further testing with the view to use as an EAM planning condition.
- To ensure that any EAM condition takes account of the psycho-acoustic response as far as practicable and account for other character features associated with AM (e.g. tonality, low frequency noise, impulsivity).

And that the final AM condition should be:

- Provided in a simple format that can be applied as a standard planning condition that is comprehensible to the lay person.
- Accompanied by relevant software or guidance notes on its application and use.
- Must be robust and must prevent AM that has been justifiably complained of and / or is deemed to constitute noise nuisance.

### **Work Package 6.1 (\*) & 6.1A (\*)**

**Work Package Title:** Legal Remedies & Supplementary Paper

**Lead Author & Work Package Objectives:**

Richard Cowen considers the legal issues surrounding wind turbine noise nuisance.

The objectives of WP6.1 are defined as:

- To assess the legality of the Den Brook Condition relating to EAM following the judgement of the Court of Appeal;
- To assess the legal appropriateness of other remedies such as Statutory and Private Nuisance that have been recommended since that judgement or may be available to persons affected by EAM;
- To recommend the most appropriate course of action that will provide legal protection to residents hosting wind farms should EAM occur.

In the Supplementary Paper 6.1A Richard Cowen considers the legal issues for claimants relating to shell companies.

## **Work Package 6.2 (\*)**

Work Package Title: Control of AM noise without an AM planning condition using Statutory Nuisance

Lead Author & Work Package Objectives

Bev Gray reviews from a community perspective the practical experiences and causal effects of Statutory Nuisance (SN) laws when used as a means of protection from Excessive Amplitude Modulation (EAM). This work package compliments WP6.1 – legal review by Richard Cowen.

The objectives of WP6.2 are defined as:

- Review EAM noise nuisance complaints procedures and the difficulties of applying Statutory Nuisance by local authority officers.
- Proposals to ensure a more effective method of EAM control than the existing statutory nuisance.

## **Work Package 7**

Work Package Title: Test of the IoA AMWG methodologies

Lead Author & Work Package Objectives

Sarah Large will test the effectiveness of the AM rating methodology currently proposed by the IoA AM Working Group (AMWG) in their consultation document (Irvine April 2015). The AMWG was set up with the aim of reviewing existing evidence on AM and producing guidance on the assessment of AM. Whilst originally the goal of the group was clearly to provide a means to assess AM, which could then be included in a 'standard' form of planning condition for wind energy development, recent publications released by the IoA AMWG confirm that their scope is now limited to providing a metric for quantifying AM.

## **Work Package 8 (\*)**

Work Package Title: Review of IoA AM Study and Methodology

Lead Author & Work Package Objectives

Richard Cox reviews the activities of the Institute of Acoustics and its Noise Working Groups with respect to wind turbine noise amplitude modulation.

## **Work Package 9 (\*)**

Work Package Title: The Cotton Farm Monitor Experience

Lead Author & Work Package Objectives

Bev Gray provides a review of a rural community's experience in setting up and carrying out long term continuous noise monitoring and recording of wind farm noise.

The objective of WP9 is defined as:

- To document the experience of fighting a wind farm application and the decision to carry out long term noise monitoring by the local community to prove the existence and frequency of noise emanating from a newly built wind farm.

## **Work Package 10 (\*)**

Work Package Title: Report Summary

Lead Author & Work Package Objectives

Richard Cox summarises the Study Work Packages and brings forward the INWG's key finding and recommendations.

## **Other Docs**

Terms of Reference (\*) - Sets out the objectives of the Independent Noise Working Group, sponsors, steering committee and the deliverables.

DECC Presentation 1 (\*) - Richard Cox's presentation to the DECC Minister of State at Westminster on 13 October 2015

DECC Presentation 2 (\*) - Sarah Large's presentation to the DECC Minister of State at Westminster on 13 October 2015

IoA Presentation (\*) - Richard Cox's presentation to the Institute of Acoustics conference in Harrogate on 15 October 2015

## **Attachments**

<a href="#">Work Package 1</a>	1.13 MB
<a href="#">Work Package 2.1</a>	1.39 MB
<a href="#">Work Package 2.2</a>	2.02 MB
<a href="#">Work Package 3.1</a>	994.53 KB
<a href="#">Work Package 3.2</a>	1.37 MB
<a href="#">Work Package 4</a>	515.18 KB
<a href="#">Work Package 5A</a>	3.27 MB
<a href="#">Work Package 5B</a>	2.53 MB
<a href="#">Work Package 6.1</a>	710.89 KB
<a href="#">Work Package 6.1A</a>	216.14 KB
<a href="#">Work Package 6.2</a>	718.45 KB
<a href="#">Work Package 8</a>	482.38 KB
<a href="#">Work Package 9</a>	1.6 MB
<a href="#">Work Package 10</a>	658.61 KB
<a href="#">INWG Terms of Reference</a>	142.63 KB
<a href="#">DECC Presentation 1</a>	872.35 KB
<a href="#">DECC Presentation 2</a>	1.07 MB
<a href="#">IoA Presentation</a>	4.15 MB