THE HIGH COURT

[2024] IEHC 136

[2018 8457 P]

BETWEEN:

MARGARET WEBSTER AND KEITH ROLLO

PLAINTIFFS

AND

MEENACLOGHSPAR (WIND) LIMITED

DEFENDANT

AND

[2018 8458 P]

BETWEEN:

ROSS SHORTEN AND JOAN CARTY

PLAINTIFFS

AND

MEENACLOGHSPAR (WIND) LIMITED

DEFENDANT

JUDGMENT of Ms. Justice Emily Egan delivered on the 8th day of March 2024

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Glossary

GLOSSARY Term	Definition
Aerodynamic Noise	Noise emitted by a wind turbine due to the passage of air over the blades.
Amplitude modulation, AM	In the context of wind turbine acoustics, this normally refers to a periodic variation in the sound level of the broadband spectrum of the aerodynamic sound.
AM Value	In broad terms I refer to this as the measurement of the peak to trough differential in AM noise levels
Background Noise	The ambient noise level already present within the environment in the absence of wind farm operation.
Bin	A bin is a subset or group into which data can be sorted; in the case of windspeeds, bins are often centred on integer windspeeds with a width of 1 m/s. For example, the 4m/s windspeed bin would include all data with windspeeds of 3.5 to 4.5 m/s.
Blade Pitch	The pitch motor turns (or pitches) blades out of the wind to control the rotor speed, and to keep the rotor from turning in winds that are too high or too low to produce electricity.
Broadband	A wide range of sound frequencies

BS 4142	*BS4142: 2014 Method for rating and assessing industrial and commercial sound.* BS 4142 is a method to assess the impact on humans in residential premises. It is appropriate for assessing sound levels outside a building that are from: industrial premises, manufacturing premises or fixed installations, mobile plants, vehicles, trains or ship movements.
Cut-in Windspeed	The windspeed at which a turbine produces a net power output.
dB	Decibel, the unit of measure of sound.
dBA	A-weighted decibels, the unit of measure of sound adjusted to reflect the perception of sound to the human ear.
Defra Guidance	*Windfarm Noise Statutory Complaint Methodology, 2011* A methodology developed by the Department for Environment, Food and Rural Affairs for the assessment of statutory noise nuisance complaints pertaining to wind turbine noise.
Draft WEDG 2019	Draft revised Wind Energy Development Guidelines issued by the Department of Housing, Local Government and Heritage in December 2019 and since withdrawn.
EPA	Environmental Protection Agency

EPA NG3	*EPA Guidance Note on Noise Assessment of Wind Turbine Operations at EPA Licensed Sites, EPA NG3* (June, 2011).
EPA NG4	*Environmental Protection Agency Office of Environmental Enforcement (OEE) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (January, 2016)
ETSU	*ETSU-R-97: The Assessment and Rating of Noise from Wind Farms* published by the Department of Trade and Industry in 1996. ETSU is the primary framework by which planning conditions pertaining to wind farms are set in the United Kingdom
ETSU Review	*A Review of Noise Guidance for Onshore Wind Turbines produced by WSP UK Limited* commissioned by the Department for Business, Energy and Industrial Strategy and published in February 2023.
Façade Level	The noise level closer to a façade of a building which is subject to a higher noise level than in an open area (free field conditions) due to reflections.
Fixed noise limit	A noise condition in a planning permission which does not limit WTN by reference to background noise levels but instead sets a fixed limit (or a range of fixed limits)

Free Field	An environment in which there are no reflective surfaces affecting measurements within the frequency region of interest.
GPG	*A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*' published by the Institute of Acoustics (IOA) in 2013.
Hertz (Hz)	Hertz, the unit of measure for the frequency of a sound in cycles per second.
Hub	The centre of the rotor
Hub Height	Height of wind turbine tower from the ground to the centre-line of the turbine rotor.
10-metre standardised windspeed	A formula pursuant to which, irrespective of the hub height of the turbine, windspeed is extrapolated down to a 10 metre height using a standard wind shear profile.
Hub Height Windspeed	The windspeed at the hub height of the turbine or at the centre of the rotor.
IOA	The Institute of Acoustics
IOA RM	A reference method published by the Institute of Acoustics in 2016 for measuring and rating amplitude modulation in wind turbine noise.
ISO 1996-2	A standard published in 1996 by the International Organization for the

	standardisation of measurements "*Acquisition of data pertinent to land use*" ("ISO 1996-2")"
ISO 1996-2, 2017	The 2017 edition of ISO 1996-2
L5	The sound level exceeded for 5% of the measurement period.
L90	The sound level exceeded for 90% of the measurement period. For example, L90 (10 min) is the level exceeded for 90% of the measurement time of 10 minutes.
L95	The sound level exceeded for 95% of the measurement period.
Lden	This is a composite of long term leq valued for day, evening and night. It is determined by averaging the L day with the L evening plus a 5 dB penalty and the L night plus a 10 dB penalty.
Leq T, energy time-averaged sound level	A sound level measurement index, which averages all of the sound energy in a period over the measurement time T. For example, Leq $_{10}$ is the average sound level over a 10 minute period.
Lmax	This represents the upper value of the sound pressure levels measured in a given period.

Low frequency noise	The definition of low frequency noise can vary, but it is generally accepted to be within the range of 10Hz to 150Hz.
Masking	The process by which the threshold of audibility of one sound is raised by the presence of another (masking) sound.
Mechanical Noise	Noise emitted by a wind turbine from machinery usually within the nacelle.
m/s	Metres per second.
Night Hours	2300-0700 hours on all days
Noise	Sound that is subjectively judged to be undesired in a given context.
Phase 2 Report	*Wind turbine AM review: Phase 2 report.* 3514482A Issue 3 WSP | Parsons Brinckerhoff, 2016. Department for Business, Energy & Industrial Strategy. A study suggesting a range of decibel penalties by reference to **AM values** for inclusion in planning permissions for wind turbines.
Quiet Waking Hours	1800-2300 hours on all days plus 0700-1800 hours on Sundays and 1300-1800 hours on Saturdays.
Relative noise limit	A noise condition in a planning permission which limits WTN to a certain level above background noise.

SCADA data	SCADA is a computer system with software tools used for controlling and monitoring the wind turbine. It measures *inter alia* windspeed, speed of rotation, blade pitch and decibel level. SCADA data is retained and can be re-produced. The SCADA data for both T1 and T2 was included in the defendant's discovery.
Shadow Flicker	Term used to describe the short-lived effect of shadows cast by rotating blades of wind turbines when the sun passes behind them, which occurs under certain combinations of geographical positions and time of day.
Sound	Energy that is transmitted by pressure waves in air or other materials and is the objective cause of the sensation of hearing. Commonly called noise if it is unwanted.
Sound Frequency	Sound comprises a range of frequencies extending from the very low, such as a rumble of thunder, to high frequencies, such as those generated by a small bell. Allowing for individual variation, the audible range of frequencies for the human ear is generally in the region of 20Hz to 20,000Hz.
Sound Pressure	Sound pressure is usually measured in A-weighted decibels, which are generally denoted as dBA. The decibel scale is logarithmic and not linear in nature. This means that if, for example, two instances of the same sound level occur at the same time and each has a sound

	level of 30dBA, their combined level will be 33dBA, and not 60dBA.
Spectrogram	A visual representation of the spectrum of frequencies in a signal as it varies with time. In acoustic terms it shows the acoustic frequency content of the raw noise data which is helpful in identifying the main sources of noise and clarifying whether it is wind turbine related.
Spectrum, spectral content	Sounds are typically made up of acoustic energy present in many frequencies of the audible spectrum. The frequency spectrum describes this signal 'content'.
Stable atmospheric conditions	Conditions under which the mixing of layers in the atmosphere is minimised. This leads to a much greater increase in wind speed with height.
Supplemental Guidance Note 5	One of six Supplementary Guidance Notes to the GPG published by the IOA in 2014. *Supplementary Guidance Note 5 on Post Completion Measures* governs the technical aspects of ETSU planning compliance assessments.
Total operational noise (level)	In the context of wind turbine acoustics, this normally refers to the total sound environment considered at a given location. In the present case, total operational noise comprises the wind turbine noise and the background noise.

WEDG 1996	*The Wind Farm Development Guidelines for Planning Authorities* issued by the Department of Local Government in 1996.
WEDG 2006	*The Wind Energy Development Guidelines 2006*, issued by the Department of the Environment, Heritage and Local Government in December, 2006.
WHO 2009	*Night Noise Guidelines for Europe* (2009) ISBN 978 92 890 4173 7
WHO ENGER	*Environmental Noise Guidelines for the European Region* (2018)
Wind Shear	A description of the increase in windspeed with height above ground level.

Introduction

1. The plaintiffs are two couples[1] who claim they have been interfered with, over a substantial period of time, in the use and enjoyment of their homes, at Ballyduff, Enniscorthy County Wexford. The claim is for private nuisance in the form of noise and vibration generated by two nearby wind turbines, owned and operated by the defendant. The plaintiffs also complain of shadow flicker.

2. Ms. Webster and Mr. Rollo ("the Webster Rollos"), own Hill House (HH), and until recently Ms. Carty and Mr. Shorten ("the Carty Shortens") owned Nettlefield (NF). The nearer of the two turbines, Turbine 2, ("T2") is located some 359 m from the Carty Shorten house and some 369 m from the Webster Rollo house and the further turbine, Turbine 1, ("T1") is some 652 m from the Carty Shorten house and some 655 m from the Webster Rollo house. Each of the turbines are 74.5 m in hub height and as they are located on a height, the height difference between the plaintiffs' houses and T1 and T2 respectively is 169 m and 152 m. The relative locations of the turbines and the plaintiffs' houses means that the prevailing south westerly winds blow from the direction of the turbines towards the plaintiffs' houses. It is also common case that because the plaintiffs' houses are located in the lee of a hill (on which the turbines are placed), they are sheltered from the prevailing wind and are in a "wind shadow" (which I understand to mean a location that is generally calm and sheltered).

3. The windfarm was built on foot of a grant of planning permission dated 16th April, 2004. Condition 15 states that noise levels from the turbines when measured at the nearest inhabited house shall not exceed 40dBA (15 minute leq[2]) at a windspeed of 5 m/s and 45dBA (15 minute leq) at a windspeed in excess of 10 m/s. Due to grid connection difficulties, there was a delay in the implementation of this planning permission and the two turbines did not become operational until February 2017.

4. In addition to seeking damages for nuisance and an injunction to prevent nuisance, the plaintiffs maintain that the windfarm is operating otherwise then in compliance with its planning

[1] Although the Webster Rollos have since separated.
[2] In this judgment, I will in general refer to this as "leq" regardless of the time interval involved. This is primarily to distinguish this measurement from L90.

permission and seek relief pursuant to section 160 of the Planning Development Act, 2000 (as amended).

5. O'Moore J. directed that the trial of the proceedings would proceed in a modular fashion with module 1, which is the subject matter of this judgment, dealing only with the issue of liability and module 2, if required, dealing with the issue of damages and remedy. However, during the course of the trial of module 1, it was agreed that this module would also determine the entitlement or otherwise of the Webster Rollos to damages for personal injuries[3] and that the assessment of the quantum of such damages (if any) would be taken up in module 2.

6. It was expected that module 1 would run for five weeks. However, it is clear that the parties' estimate of the time required to try the numerous factual, technical and legal issues in dispute was utterly unrealistic . It should be noted that this is the first private nuisance claim in relation to WTN that has run to judgment in this jurisdiction, or it appears in the United Kingdom. The only comparable authority cited to me by the parties is a judgment of the Supreme Court of Victoria of New Zealand of 12th March, 2022, *Noel Uren v Bland Hills Wind Farm Pty Ltd* [2022] VSC 145.

7. The trial of module 1 very significantly over-ran its original estimate and was heard over the course of 51 days between 22nd November, 2022 and 6th November, 2023. In total, the plaintiffs called 11 witnesses and the defendant called five witnesses. The combined book of transcripts of the hearing of the proceedings runs to over 6000 pages.

The nature of wind turbine noise ("WTN")

8. Wind turbine noise ("WTN") typically consists of both aerodynamic noise caused by the interaction of the rotors with the surrounding air and mechanical noise created by the mechanical elements of the turbine. It is the first of these that is in issue here.

9. Wind turbine aerodynamic noise is typically broadband in nature in the sense that it is evenly distributed across the frequency spectrum; but it can exhibit lower frequency content.

[3] In the form of pure psychological injury.

Sound with significant lower frequency content is both more intrusive and less effectively attenuated by barriers such as windows, walls and insulation.

10. Although WTN can be constant it usually exhibits period fluctuations in level, the frequency[4] of which is related to the blade passing frequency of the turbine rotors. This volume change is known as amplitude modulation ("AM")[5].

11. Two categories of wind turbine AM have been identified in the literature and guidelines: The first is AM in the mid and upper frequency[6] ranges. The sound which this produces, is that which we commonly associate with windfarms and is best described as a swishing sound. This blade swish, which I will refer to as ("swish AM") is commonly described as "*normal AM".* The second category of AM has a lower frequency sound character and is best described as a "whoomph" or thump sound ("thump AM"). Thump AM is commonly described as *"abnormal AM", "adverse AM"* or *"excessive AM".*

12. In broad terms[7], the extent to which AM fluctuates as the rotors turn is measured by the differential between the peak and the trough of the sound levels – i.e., the peak to trough differential ("the AM value"). If the AM value is high, then the perception will be of a louder sound changing to a quieter sound, and vice versa. This will increase the intrusiveness of the WTN. Conversely, if the AM value is low, then the perception will be of a sound which is more steady and monotonous. Swish AM and thump AM can each display either high or low AM values.

13. In addition to variations in its spectral content (swish AM/thump AM), and its AM value (high or low values), AM can also exhibit other distinct characteristics such as:

- regular AM with little variation in rhythm.
- erratic AM with no clear periodicity or rhythm which exhibits sudden bursts or isolated peaks of noise and is often accompanied by high AM values.

[4] Note the two different uses of the word frequency, i.e., to define spectral content and, as here, to describe the temporality of blade passing.
[5] Graphs prepared by one of the plaintiffs' experts derived from the noise monitoring on site which are attached at paras 434 and 435 might be helpful in illustrating AM.
[6] Here "frequency" refers to spectral content.
[7] There are some nuances to this which I will outline below when discussing eh IOA RM.

- Intermittent or variable AM which disappears and returns again, or which fades in and out.

14. Although the plaintiffs complain that the WTN causes an unwelcome general increase in noise levels at their properties, the key feature of their case is that the AM associated with these turbines (but primarily the closest turbine, T2) renders it objectively unreasonable.

Summary of plaintiffs' and defendant's case

Plaintiffs' case

15. In brief, the plaintiffs' case is that whilst the assessment of WTN nuisance is an objective and not a subjective exercise, it is not determined by decibel level alone but by reference to all of the characteristics of the WTN. The assessment is not purely quantitative but also qualitative. Close attention must therefore be paid to all the characteristics of the WTN such as its decibel level, whether there is swish or thump AM, its AM values, the erraticism, impulsivity or variability of its AM and the duration, frequency and timing of the intrusion occasioned thereby.

16. The plaintiffs maintain that even if a windfarm benefits from planning permission, the noise conditions in the permission cannot provide the litmus test for determining whether the WTN constitutes an unreasonable interference with amenity.

17. To demonstrate the features of the WTN complained of in this case, the plaintiffs' experts carried out noise monitoring over extensive periods both externally and internally at HH and NF. The plaintiffs present the results of this noise monitoring in audio recordings and in graphical format. They maintain that, when assessed against relevant quantitative and qualitative criteria, this data supports the contention that the WTN poses a substantial nuisance.

Defendant's case

18. The defendant argues that the noise conditions in the windfarm planning permission comprise a wholly reliable indicator as to what levels of WTN are objectively reasonable at this location. Therefore, because the WTN is said to comply with the conditions in the planning permission, nuisance cannot be established.

19. The defendant argues that the plaintiffs' experts' audio recordings and graphs were not recorded or analysed in accordance with established methodologies. It maintains that the plaintiffs' experts' approach is novel and bespoke and therefore of little assistance to the court.

20. A further overarching argument of the defendant is that the plaintiffs' complaints are subjective only and that the test for nuisance is objective. The defendant relies on three key items of evidence that it submits established that the expectations of an objectively reasonable ordinary person have not been *"exceeded"* in this instance:

i. The evidence of its acoustic experts, to the effect that the noise conditions incorporated into the planning permission for the windfarm comprise a reasonable objective standard in respect of noise emissions.
ii. Evidence said to demonstrate that the windfarm is operating in compliance with the said noise conditions.
iii. The evidence of Ms. McGinn the purchaser/occupier of NF to the effect that in general the WTN is not adversely affecting her enjoyment of the property.

Structure of this judgment

21. At the outset, I will summarise my findings on the issues to be tried in this case. After outlining the legal test for nuisance, I will set out the key factual evidence and then detail the court's site visit. Next, I will provide a brief overview of the expert evidence.

22. To place the arguments of the parties in context, it will then be necessary to review the regulatory framework under which planning authorities set noise conditions for wind farm developments.

23. Moving on to the main body of the judgment, I will first consider the defendant's argument that the noise conditions in the planning permission for this windfarm are binding on the court because they comprise a wholly reliable indicator of what constitutes objectively reasonable WTN at this location. The defendant also contends that the WTN complies with these noise conditions. This means that if this argument were to succeed, it would be dispositive of the claim.

24. Thereafter, I will consider the reliability of evidence of the plaintiffs' experts, including the audio recordings (and associated graphs) derived from their noise monitoring at the plaintiffs' homes. After this, I will consider what criteria ought to best guide this court in the nuisance assessment and then analyse the WTN as against a range of relevant quantitative and qualitative criteria.

25. After making certain findings of fact, I set out my reasons for concluding that nuisance is established in this case.

26. I will then explain why I direct the parties to re-engage in mediation in an attempt to identify appropriate and proportionate mitigation measures. Finally, I will examine the plaintiffs' claim to damages for personal injuries and close by briefly considering the plaintiffs' application pursuant to s. 160 of the Planning and Development Act 2000.

Issues to be tried and summary of the court's findings

27. I set out below the issues for determination together with an overview of my conclusions in relation to each issue. It should be emphasised that this is only a very brief summary of my reasons for those conclusions and that the real analysis thereof is set out in the body of the judgment.

Issue 1: Is the court bound by the noise condition in the planning permission in assessing what is objectively reasonable for the purposes of determining a claim for nuisance? Is the noise condition in the planning permission a wholly reliable indicator of what WTN is reasonable?

No.

Is the permission binding on the court in its nuisance assessment?

The defendant argues that, *as a matter of law*, a permission which specifically regulates the matter complained of – in this instance, WTN – prevents the court from concluding that operation in accordance therewith constitutes a nuisance. The defendant relies upon *Smyth v Railway Procurement Agency and anor* [2010] IEHC 291 (*"Smyth v RPA")* in which Laffoy J. held that, if operated in accordance with the Line B order, the operation

of the LUAS would be in accordance with law and could not constitute a nuisance. Effectively, the defendant seeks to equate the legal impact of the Ballyduff planning permission with that of the Line B Order in *Smyth v RPA.* However, the two cannot be equated. This aspect of Laffoy J.'s reasoning is concerned with the defence of statutory authority in respect of a development authorised by legislation. Its logic cannot be read across to a decision made by a planning authority in the form of a single planning permission.

Is the permission a wholly reliable indicator of what WTN is reasonable?

In any event, I am not satisfied that the permission does specifically regulate the matter complained of by the plaintiffs. The Ballyduff permission regulates WTN by way of decibel levels only and cannot establish an objective yardstick for the particular aspects of the WTN complained of by the plaintiffs in this case – the AM.

Neither the Ballyduff permission nor the planning file as a whole reveal any consideration, assessment or regulation of this feature of WTN. The permission cannot therefore be seen as a wholly reliable indicator of what AM values and other AM characteristics are objectively reasonable.

This lacunae in the permission may be contrasted with the evidence in *Smyth v RPA.* The process under consideration in *Smyth v RPA* incorporated a searching and comprehensive investigation, analysis and assessment of all noise aspects of the project. On the evidence therefore, Laffoy J. was satisfied that the noise conditions thereby derived were a wholly reliable indicator as to what the ordinary person whose requirements[8] are objectively reasonable would expect in terms of noise control.

Furthermore, I do not accept that in the circumstances of this case the defendant can profit from an argument that the court must show curial deference to the Ballyduff planning permission. Curial deference was urged on the court because, it is said, the Ballyduff permission reflects prevailing standards and expertise pertaining to WTN at the time of the grant of permission (and indeed to date). However, the interpretation of the permission argued for by the defendant does not reflect prevailing planning guidance at the time of the grant of the Ballyduff permission - the 1996 Wind Energy

[8] Even if I am wrong in this, I am not in any event satisfied that the defendant has demonstrated that the WTN complies with the noise limits set out in the permission. See para 341 for a summary of why this is so, with the full analysis preceding that.

Development Guidelines (WEDG 1996) [9]. Conversely, if the Ballyduff permission is interpreted in harmony with WEDG 1996, then I am far from being satisfied that the WTN complies therewith. Further, contrary to the defendant's argument, the noise limits laid down in the Ballyduff permission do not reflect current expertise on the impact of the relevant characteristics of the WTN complained of here-such as high AM values and thump AM.

Issue 2: Is compliance with the planning permission demonstrated?

2 (a): For the purposes of the nuisance case, which party bears the onus of demonstrating compliance or non-compliance (as the case may be) with the noise condition set out in the planning permission?

In the nuisance action, the defendant bears the onus of proving the defence advanced; namely that the WTN complies with the noise condition in the Ballyduff permission when correctly interpreted.

2 (b): What is the correct interpretation of the noise condition in the permission?

There is an ambiguity in the planning permission. It is clear that at a windspeed of 5m/s, WTN may not exceed 40 dBA leq. It is also clear that at windspeeds in excess of 10m/s WTN may not exceed 45 dBA leq. However, the permission does not specify the applicable limit at windspeeds between 5 m/s and 10 m/s.

The correct interpretation of the planning permission is that noise levels from the turbine may not exceed 40 dBA leq at windspeeds between 5 m/s and 10m/s. The higher limit of 45 dBA leq only applies for windspeeds in excess of 10 m/s.

2 (c): What does the compliance data show?

The defendant seeks to demonstrate compliance with the Ballyduff noise condition by reference to noise monitoring conducted at HH, rather than at NF. However, compliance with the noise condition cannot be demonstrated by noise measurements taken at HH because NF is the measurement location designated in the permission.

[9] Which provided that noise levels measured externally at any dwelling house should not exceed 40 dBA Leq as to which see para 184 below.

On the correct interpretation of the noise condition in the Ballyduff permission, compliance is not demonstrated by reference to the NF data because total operational noise- i.e., WTN and background noise - at night-time exceeds 40 dBA leq from windspeeds of 7m/s. Total operational noise also exceeds 45 dBA leq at windspeeds in excess of 9.5 m/s. Although the defendant argues that this is not attributable to WTN, but to other factors, it bears the onus of so demonstrating by refence to background noise studies. No such studies have been tendered to the court.

Even if one overlooked the fact that HH is the incorrect measurement location, there is a paucity of data at HH during night-time at windspeeds in excess of 8m/s such that the HH data could not reliably demonstrate planning compliance. Further, even if one were to overlook this frailty, total operational noise at HH exceeds the limit of 40 dBA leq set in the noise condition at windspeeds in excess of 6m/s. Therefore, in the absence of background noise studies, compliance cannot be demonstrated.

Issue 3: Is the character of the locality to be assessed on a "windfarm basis" or a "no windfarm basis"?

Nuisance is to be assessed by reference to the character of the relevant locality. There is permission for a windfarm at this location. Because of the planning permission, the plaintiffs cannot fairly contend that audible WTN (with some degree of AM) is in and of itself an unreasonable interference. On the other hand, the defendants cannot contend that because WTN is known to occasionally demonstrate certain particularly intrusive characteristics – for example high AM values or thump AM - these characteristics are necessarily part of the locality. WTN which entirely dominates the plaintiffs' sound environment could not have been reasonably anticipated by the grant of permission. Therefore, whilst a windfarm at this location is part of the locality, WTN with the characteristics identified above cannot be said to form part of the locality.

Issue 4: What criteria ought the court consider in the assessment of nuisance?

The methodology developed by the (United Kingdom) Department for Environment, Food and Rural Affairs for the assessment of statutory noise nuisance complaints pertaining to WTN, the *Windfarm Noise Statutory Complaint Methodology, 2011* ("the Defra Guidance") is of considerable assistance in establishing an assessment framework. The Defra Guidance identifies both quantitative and qualitative criteria

("the Defra criteria") to be weighed and assessed with care and professionalism in adjudicating upon statutory WTN nuisance complaints.

Issue 5: Does the court accept that the criticisms advanced by the defendant undermine the reliability of the plaintiffs' acoustic experts' evidence and the data on which same is based?

In general, no.

In so far as concerns the 2017 external NF data, the 2017 internal HH data and the 2021 internal NF and HH data, the court is satisfied that the audio recordings and associated time domain graphs presented by the plaintiffs' experts, MAS Environmental Ltd ("MAS"), reliably present the general noise character at the plaintiffs' homes.

The IOA RM published by the Institute of Acoustics for "rating" AM values is not the exclusive permissible method for presenting and analysing AM. In considering AM values and the general impact of AM on site, regard may therefore be had to the MAS audio recordings (and associated graphs) prepared on foot of the 2017 external NF data, the 2017 internal HH data and the 2021 internal NF and HH data.

MAS's calculation of AM values as derived from the time-domain graphs is sufficiently reliable to inform this court's analysis. The AM levels thereby derived will differ by a reasonably modest extent from those likely to be derived over the same time intervals under the IOA RM.

Furthermore, the impression of AM gained from the audio recordings and time domain graphs is confirmed by the IOA RM analysis performed by MAS of the internal 2021 HH and NF data. Although precise AM values cannot be calculated for the HH master bedroom specifically, one can approximate the relevant AM values by reference to the AM values presenting in another room in the same house.

Due to an inadvertent error, the external NF 2021 audio recordings were recorded at façade level rather than in the free field and furthermore a double skinned windshield was not used. I will therefore have no regard to these audio recordings, to the MAS time domain graphs pertaining to these audio recordings or to MAS's purported IOA RM analysis of this data.

Issue 6: Does an analysis under the Defra criteria support the argument that the characteristics of the WTN amount to a substantial interference with the plaintiffs' use and enjoyment of their land?

Yes, for the reasons which follow:

Sensitivity of the complainant

To quote Henchy J. in *Hanrahan v. Merck Sharp Dohme (Ireland) Ltd* [1988] ILRM 629 ("*Hanrahan*") the *"notions and standards of behaviour and responsibility* [of all four plaintiffs] *correspond with those generally pertaining among ordinary people in our society at the present time, who seldom allows his emotions to overbear his reason, whose habits are moderate and whose disposition is equable."* In short, the plaintiffs are "*ordinary persons with reasonable objective expectations".*

Level of the noise/ loudness

The noise levels presenting, when combined with other features, give rise to significant potential for dominance and unacceptable intrusiveness.

Type of noise

Even on the most conservative analysis, the MAS audio recordings and time domain graphs show that, at the time of measurement, the WTN at the plaintiffs' homes exhibits AM values in excess of 5 or 6dBA. I accept that this is a regular and sustained state of affairs. Regular and sustained peak to trough differentials of 5 or 6 dBA, if audible at a sufficient level will suggest an unreasonable impact. I find that clearly audible AM values of this order (and higher) are a substantial feature of the WTN at the plaintiffs' homes. Indeed, AM values of 10 dBA are regularly present both externally and internally.

Irrespective entirely of its high AM values, the WTN displays considerable intermittency/variability (when the AM disappears and returns again or fades in and out), impulsivity (sudden changes in sound level) and erraticism (i.e., when AM exhibits no clear periodicity or rhythm). These characteristics are particularly evident in light of the high AM values. The WTN also commonly presents as a clear whoomphing sound and exhibits distinct thump AM, both of which are highly variable

and unpredictable. This is WTN that an objectively reasonable person should not be expected to tolerate.

Aggravating features - Spectral content of the noise

Whilst lower frequency noise is not the dominant characteristic of this WTN, there is a significant element of audible lower frequency noise which manifests as thump AM.

Characteristics of the neighbourhood

The character of this quiet rural locality includes a permitted windfarm development. However, the characteristics of the neighbourhood do not include WTN which dominates the plaintiffs' sound environment or WTN which displays excessive AM values, thump AM and other particularly attention drawing characteristics.

The exceedance of WTN over background noise

Planning guidance for wind turbines commonly recommends a "relative noise limit" of 5 dBA over background noise for each windspeed bin. The plaintiffs have not proven on the balance of probabilities that the WTN exceeds background noise by in excess of 5 dBA at a range of windspeeds. On the other hand, as a result of the characteristics of its AM, the WTN regularly dominates the plaintiffs' sound environment.

The impact of the noise on basic needs such as sleep

The World Health Organisation Night Noise Guidelines, 2009 and its Environmental Noise Guidelines for the European Region, 2018 are not of particular assistance in deciding whether this WTN is such as to unreasonably impact upon sleep. I find that the WTN displays characteristics of high AM values and thump AM which have a very high potential to disturb sleep. I find as a fact that, particularly when turning at moderate to higher speeds of rotation, the turbine regularly disturbs the plaintiffs' sleep.

How easily the noise can be avoided/ Measures to reduce or modify the noise

The plaintiffs' ability to avoid the WTN externally is extremely limited. Internally, shutting the windows and attempting to mask the noise may assist. However, such measures will often be ineffective to mitigate sleep impacts in particular.

How often the noise occurs and the time of day or night when the noise occurs

I accept the evidence of the plaintiffs' experts and the plaintiffs themselves that the conditions so demonstrated occur commonly and on a sustained basis. I also accept that these unreasonably intrusive conditions are particularly prevalent during the most sensitive times of the day; in the early morning and at night and in the evenings.

Issue 7: What is the response of the defendant and its experts to the plaintiffs' case? Does the evidence of the defendant's experts suggest that the WTN is not a substantial interference with the plaintiffs' use and enjoyment of their land?

No. The defendant's experts have provided no persuasive evidence in response to the points discussed in the above analysis. The defendant's experts did not engage in any meaningful way with the characteristics of the WTN as demonstrated on the audio recordings, time domain graphs and spectrograms prepared by MAS which are identified as amounting to unreasonable interference with amenity.

Issue 8: Did the acoustics experts fail to discharge their duties to the court?

No. I do not find that either Mr. Stigwood (one of the plaintiffs' two acoustic experts) or Mr. Carr (one of the defendant's two acoustic experts) failed to discharge their duties as experts to the court. However, the testimony of both these witnesses, displayed less of a sense of balance than one would expect, which inevitably impacts to some degree upon the weight to be afforded to their evidence.

The defendant's second acoustic expert (Mr. O'Reilly) gave evidence only in relation to planning compliance and offered no evidence on the issue of nuisance.

In assessing whether nuisance is present therefore, I have therefore placed considerable weight upon the evidence of the plaintiff's other acoustic expert, Ms. Large, who I find to be a non-partisan and reliable witness.

Issue 9: Does the court accept the plaintiffs' evidence as to the characteristics of the noise and that such characteristics occur commonly and on a sustained basis?

Yes, for the reasons set out above.

Issue 10: Does the court find that the WTN is a substantial interference with the plaintiffs' use and enjoyment of their land? Is liability in nuisance established?

Yes, for the reasons set out above. Two particular features of the WTN render the noise an unreasonable interference. First, there are frequent and sustained periods of WTN with AM values widely acknowledged to be associated with high levels of annoyance. Second, the WTN exhibits thump AM which is a characteristic known to lead to adverse reaction in the community.

I accept that the noise impact demonstrated on the audio recordings (and associated graphs) occurs commonly and for sustained periods. WTN which exhibits these characteristics on a regular and sustained basis is unreasonable and exceptional.

I find that the plaintiffs' complaints are objectively justified in that the WTN interferes with the ordinary comfort and enjoyment of their homes. When it occurs, this interference is a substantial interference.

While the WTN is liable to annoy during the working day, higher prevailing background noise levels and the fact that the occupants are not trying to relax, or sleep means that, objectively speaking it does not in general substantially interfere with the plaintiffs' enjoyment of their property.

On the other hand, I find that the WTN poses a nuisance to the plaintiffs in the evenings and at weekends when one could reasonably expect to be enjoying recreation in the garden and/or peace in one's dwelling.

Demonstrably the WTN also poses a nuisance at night and in the early morning when a quiet environment is at a premium.

The plaintiffs are entitled to damages for unreasonable interference with the enjoyment of their property. The measure of such damages is for module 2. The issue of whether an injunction ought to be granted and if so the terms of such injunction is also for module 2. Likewise, the issue of whether the plaintiffs ought to be confined to damages in lieu of an injunction is for module 2.

I direct the parties, in advance of module 2, to engage in mediation to devise appropriate mitigation measures and if possible, to resolve all outstanding issues between them.

Issue 11: Does the court accept the defendant's submission that the evidence of Ms. McGinn means that nuisance is not made out in this case?

No. Whether or not interference by way of noise is, to quote Henchy J. in *Hanrahan,* "*beyond what an objectively reasonable person should have to put up with"* will depend

on the objective nature of the noise and not on the reaction of particular individuals to the noise. Ms. McGinn's reaction to the WTN whilst undoubtedly of relevance to the issues in the case, does not outweigh the other evidence to the effect that objectively speaking, the WTN is intolerable and unreasonable.

Issue 12: Are Mr. Rollo and Ms. Webster entitled to an award of damages for personal injuries in the form of pure psychological injury?

No.

I reject the defendant's submission that the claim to personal injuries must be struck out as being in breach of s. 12 of the Personal Injuries Assessment Board Act 2003.

However, I take the view that reasonable foreseeability of pure psychological injury is a precondition to the award of damages for such an injury. In my view, the defendant could not reasonably have foreseen a risk of either personal injury or recognisable psychiatric illness as a consequence of the noise emitted by the turbines. Mr. Rollo may not therefore recover damages for pure psychological injury even though same was caused by the WTN and its consequences.

Issue 13: Is the defendant guilty of negligence?

No. The parameters of the contended for duty of care and the specifics of any breach of such duty have not been identified with sufficient particularity to establish liability in negligence. In my view, therefore, the plaintiffs cannot succeed in a claim for negligence.

Issue 14: Have the plaintiffs made out a case for relief under s. 160?

Although for reasons already explored, I am not satisfied that the defendant has demonstrated that the WTN complies with the noise condition in the planning permission, this issue was not part of the pleaded case. I am not satisfied that the plaintiffs have made out a case of breach of planning permission on any of the grounds pleaded. As such, the present application pursuant to s.160 must fail.

The legal test for the tort of nuisance

28. As observed by Laffoy J. in *Smyth v RPA*, the definitive statement of what is required to establish the tort of private nuisance is to be found in the judgment of the Supreme Court in *Hanrahan*. Henchy J. identified the legal basis of the tort in nuisance as follows:-

> *"To provide a basis for the award of damages for the private nuisance relied on, the plaintiffs have to show that they have been interfered with, over a substantial period of time, in the use and enjoyment of their farm, as a result of the way the defendants conducted their operations in the factory…"*

29. Later in the judgment Henchy J. confirmed that:

> *"The plaintiff is not entitled to insist that his personal nicety of taste or fastidiousness of requirements should be treated as inviolable. The case for damages in nuisance… is made out if the interference is so pronounced and prolonged or repeated that a person of normal or average sensibilities should not be expected to put up with it. It is not necessary that an interference by objectionable smell should be so odious or damaging that it affects the plaintiffs' health. It is enough if it can be said that a reasonable person in the plaintiffs' circumstances should not be expected to tolerate the smell without requiring the defendants to make financial amends."*

30. Thus, to succeed in a claim for nuisance, the plaintiff must show interference with the ordinary use, enjoyment and comfort of their property. As I will come to at para 346 below, nuisance is always assessed by reference to the character of the particular locality.

31. The interference with the ordinary use, enjoyment and comfort of the property must be substantial in the sense that it is pronounced and prolonged or repeated. The intrusion must be "*pervasive, persistent, frequent and intolerable*", per Charleton J. describing noise nuisance in *Lanigan & ors v. Barry & ors* [2008] IEHC 29.

32. In *Lanigan v. Barry,* Charleton J. observed that *"There must be a real and definitive infringement on the comfort and convenience of the persons occupying or using the premises or land in order to establish as actionable wrong".* Furthermore, the temporal quality of the alleged problem is of relevance. Close attention must be paid to the timing, duration and impact of the occurrence complained of.

33. Likewise, the frequency of occurrence must be considered. Occasional, temporary or fleeting events cannot in general give rise to a nuisance However, depending upon the nature of the particular interference in issue, there may be no requirement that the nuisance is

continuous and unremitting 24 hours a day. Provided the impact occurs with sufficient regularity and frequency, nuisance may be established even though the relevant interference waxes and wanes somewhat. Further, the same level or character of noise that may not be a nuisance during the day can be a nuisance in the evenings if it regularly disturbs rest and relaxation, or at night if it regularly disturbs sleep.

34. In *Hanrahan,* Henchy J. stated:

> *"…In so far as the nuisance alleged consists of interference with the ordinary comfort and enjoyment of the property of the plaintiff, his evidence must show sensible personal discomfort, including injurious affection of the nerves or senses of such a nature as would materially diminish the comfort and enjoyment of, or cause annoyance to, a reasonable man accustomed to living in the same locality…"*

35. Central to the assessment of whether nuisance is made out in a particular case is therefore the notion of the reasonable person, of which Henchy J. stated:

> *"To my mind the reasonable man connotes a person whose notions and standards of behaviour and responsibility correspond with those generally pertaining among ordinary people in our society at the present time, who seldom allows his emotions to overbear his reason, whose habits are moderate and whose disposition is equable.*
>
> *It is clear from the authorities on the law of nuisance that what an occupier of land is entitled to as against his neighbour is the comfortable and healthy enjoyment of the land to the degree that would be expected by an ordinary person whose requirements are objectively reasonable in all the particular circumstances. It is difficult to state the law more precisely than that."*

36. Later in the judgment to similar effect:

> *"As I have pointed out earlier in this judgment, by reference to the cited passage from the judgment of Gannon J in* Halpin and Ors v Tara Mines Ltd*, where the conduct relied on as constituting a nuisance is said to be an interference with the plaintiffs' comfort in the enjoyment of his property, the test is whether the interference is beyond what an objectively reasonable person should have to put up with in the circumstances of the case.*

37. The court must try to discern what could reasonably be "*expected by an ordinary person whose requirements are objectively reasonable in all the particular circumstances".* The court is concerned with what could reasonably be expected by an ordinary member of society - the putative objectively reasonable person.

38. What amounts to a material or substantial interference is not judged by what the plaintiff (or indeed any other identified individual) subjectively find annoying or inconvenient. As stated by Laffoy J. in *Smyth v RPA* the "*nub of the matter is whether the evidence establishes that the plaintiffs' complaints… [are] objectively justified"..;*

39. Society is entitled to expect that its ordinary members will exhibit a reasonable degree of tolerance, that they will be guided by a "live and let live" ideology. The question is whether making allowances for that, objectively unreasonable interference is established. The primary focus must remain on the objective nature of the interference itself, rather than on the response of the plaintiff (or indeed the response of any other identified individual). The question is whether the *interference* is objectively unreasonable. The court must hold the balance and the assessment is one of degree, applying the common sense of ordinary people.

40. The onus of proof in establishing nuisance is clearly on the plaintiff throughout. Once, however, nuisance is established, *"it is no defence to such a claim, if established, that the activities complained of were carried out with the highest standards of care, skill and supervision and equipment"* (Henchy J. in *Hanrahan*). Unlike a plaintiff who pursues a claim for negligence, it is not necessary to show any breach of duty of care to succeed in a nuisance action.

41. This case concerns the production of renewable energy, which is clearly of vital importance to the society and to everyone who lives in it. Nevertheless, and correctly in my view, the defendant does not argue that this factor carries decisive weight in determining whether nuisance is established[10]. In *Hanrahan*, Henchy J. stated that it is no defence to a nuisance claim, if established, *"that such activities are of great public importance and cannot conveniently be carried out in any other way"*.

42. On the other hand, however, the public interest may be of relevance in the context of remedy. Although a plaintiff who establishes nuisance has a *prima facie* right to an injunction such that the defendant bears the legal burden of demonstrating that damages rather than an injunction is an appropriate remedy, the public interest must inevitably be a factor in the court's

[10] Note that I deal separately below with the legal relationship between a grant of permission and the entitlement to sue for nuisance arising from conduct that is said to be consistent with that permission.

assessment of an appropriate remedy. At the very least it means that a generalised injunction ought not to be granted where a tailored injunction more suitable to the particular interference held to constitute nuisance is warranted.

43. This case comes before the court at a time when existing planning guidance regulating, *inter alia*, the noise aspects of wind farm developments in Ireland, the Wind Energy Development Guidelines, 2006 ("WEDG 2006") is presently under review. Whilst draft revised *Wind Energy Development Guidelines* were published in 2019, ("draft WEDG 2019"), these have now been withdrawn. In the absence of clear policy guidance from the government on WTN, the assessment in an individual case is a classic matter of degree on which the court must exercise judgment. As Henchy J. states "*it. is difficult to state the law more precisely than that"*.

44. In terms of damages, it appears that the approach of the Irish courts might differ from the courts of England and Wales in awarding damages for personal injuries to a plaintiff who succeeds in nuisance claim. In this case, choosing between these differing approaches would not be decisive. This is because, in my view, lack of foreseeability would in any event, prevent recovery for the particular personal injuries claimed here - pure psychological injury.

45. Finally, before closing out this brief review of the legal test for nuisance, it is convenient to deal with defendant's submission that the claim of the Carty Shortens for private nuisance should fail, *in limine,* because they no longer own, or occupy NF.

46. The defendant correctly submits that it is an essential element of the tort of nuisance that the plaintiff has a right to occupy the land affected and, further, that the plaintiffs have produced no authority for the proposition that a former owner of an interest in land has standing to maintain a claim for damages for historic nuisance even after the land in question has been sold to a third-party

47. The point, however, is that at the time of the institution of these proceedings in 2018, the Carty Shortens were the owners of NF. In my view, they do not lose *locus standi* as a result of having sold the property during the currency of the proceedings. Rather, they retain an entitlement to advance a claim to damages in nuisance for any unreasonable interference with amenity occasioned during the period of their ownership and potentially for diminution in the

sale price. Further argument on heads of damage, and quantum of damages, etc. is a matter for module 2.

Factual evidence

Evidence of Ms. Margaret Webster

General impact of turbines

48. HH and NF are situated in a quiet rural valley close to the Sliabh Bhuí mountains in County Wexford. It was put to Ms. Webster that there were other windfarms in the area, the closest of which is "*some two or three kilometres*" away. Ms. Webster's evidence is that, absent the Ballyduff turbines, ambient noise is generally characterised by the sounds of nature. The rear elevations of both HH and NF are sheltered from the prevailing south westerly winds by a high hill on which the turbines are placed.

49. Although the Ballyduff windfarm comprises two turbines, it is the closer turbine, T2 which is the source of complaint. When T2 is shut down for maintenance, one can still hear T1 turning; but it is not intrusive.

50. When they noticed the turbines being erected Ms. Webster and Mr. Rollo were initially optimistic. They assumed that because of their location in a sheltered valley some distance beneath the turbines, HH would be shielded from impact. However, their view is that the opposite is the case; because HH is so sheltered, the wind rarely approaches the house from a direction that would mask the sound of the turbine. Combined with the prevailing low level of other background noise, this substantially increases the impact of the turbines.

51. Ms. Webster's evidence is that the WTN is annoying and ever changing. The noise varies with wind direction and windspeed which dictate blade orientation and speed of rotation respectively. Windspeed is of more obvious influence than wind direction; in general, the faster the rotors turn, the worse the noise. In addition, time of day and weather impact on the intensity of the WTN. The noise is considerably louder at night and in winter. It also varies according to whether there is rain, cloud cover or clear skies. Taking into account atmospheric conditions, the effect of the WTN is more often than not *"very intense*". Ms. Webster recounts that when the noise and vibrations from the turbine are intense, she experiences a feeling of anxiety and overall unease that she cannot shake off.

52. Ms. Webster's evidence was that, when turning quickly, T2 emits a range of distinctive sounds. In addition to a swishing sound, it emits *whoomph* and *whump* sounds and intermittent louder *thumping* or *whacking* noises. These sounds are often accompanied by disturbing vibration, meaning that she could regularly "*feel"* as well as hear the noise. This is perceived as pressure coming from the air as the blades rotate, which feels like *"a pummelling inside* [her] *body".* All of this, Ms. Webster states, is a frequent characteristic of the WTN, particularly at night.

53. The noise is highly variable and unpredictable in loudness, intensity and character. It can change from a *thump thump* or a *whump whump* to a kind of *whack whack* noise within minutes or even seconds. The noise can dissipate overnight and then pick up in the morning or the opposite can happen.

54. In cross-examination, Ms. Webster fully accepted that there are periods, perhaps for several days at a time, when the noise is not intrusive. When turning slowly, T2 makes a light whooshing sound which is quite consistent. At times, particularly during the summer, this sound might be barely audible inside the house. However, she stated that, for the most part, particularly in the wintertime, the noise is more rather than less intrusive. As a very broad guess, Ms. Webster estimated that the noise is intrusive 80% of the time.

55. The turbine is audible both outside and inside the house at all times of the day including at night with the windows closed. It is audible in all rooms of the house even in the sitting room which was the furthest room away from the turbine. When the turbine is rotating quickly, the WTN is not merely audible but dominant both inside and outside the house, with the windows open and closed. The sounds of daily activities such as boiling a kettle, using the washing machine or watching television generally mask the WTN. However, without such masking noise, one can hear the WTN in all areas of the house, The WTN frequently intrudes to the extent that Ms. Webster finds it difficult to concentrate or relax. At its worst, and particularly at night, Ms. Webster described a sensation of being able to hear and feel every rotation of the turbine. Ms. Webster accepted that other sounds - such as passing cars or farm machinery- might also occasionally be heard in her bedroom with the window closed. However, such noise ceases at a certain point in the day. By contrast, when it is turning rapidly, the noise and vibrations of the turbine intrude into Ms. Webster's bedroom, even when the window is closed, on a "*24/7*" basis.

56. The HH master bedroom is at the front of the house, but its gable wall faces broadly (if obliquely) towards T2. It was put to Ms. Webster that the defendant's experts would say that it was "*beyond the realm of physics"* that the WTN could be heard in the master bedroom at the front of HH, but the defendant's experts did not give such evidence. Although Mr. Carr did not hear WTN in the master bedroom of HH at the time of his site visit, he only spent between five and ten minutes in the bedroom on this occasion.

57. Ms. Webster's evidence was that the WTN and vibrations pass through the gable wall into the master bedroom. She stated that, in her experience, the WTN was much louder, more annoying and more easily audible than it appeared on the internal audio recordings taken by her experts in HH in 2017 and 2020/2021.

58. Prior to the erection of the turbine, Ms. Webster had slept well. Her evidence is that the WTN causes three different kinds of sleep disturbance. The first is difficulty in falling asleep. Ms. Webster states that there have been countless nights when she can hear the WTN in her bedroom and needs to use music or other background sound to distract attention from this unpleasant sound and aid sleep. This occurs at least ten times a month. Second, when the WTN is at its worst, it can completely wake her up "*bolt upright"*. What wakens her is not so much the absolute level of the noise but a change in its character which has a jarring effect, particularly if she is in a light sleep. These sudden awakenings occur ten to fifteen times a year. Third, even when the WTN is lower, there is a general detrimental impact on sleep quality; although she would sleep through the night, Ms. Webster nonetheless wakes exhausted. To mitigate the noise from the turbines, Ms. Webster tried to sleep with the windows closed as often as possible, which particularly, in the summer months can be quite uncomfortable.

59. Ms. Webster also described shadow flicker, which occurs in early spring and late summer, as follows; *"the light on a sunny day would change from the kind of dappling light that occurs when sunlight comes through trees to a full shadow falling suddenly followed by an instant return of light*." This would herald alternate periods of darkening and lightening occurring with great rapidity. Shadow flicker occurs in the valley in front of HH, in their garden and on the walls or floors of rooms in their house. It is very difficult to escape the flicker which is visible even with the curtains drawn. Although shadow flicker would only be inside the house a couple of weeks a year, it is present in the valley and garden for longer periods which is still disconcerting.

Interactions with Mr. Brazil

60. In July 2017, the Webster Rollos alerted the director of the defendant company, Mr. Brazil to their experience of the noise. Initially, Mr. Brazil suggested improving their windows and insulation towards which he would contribute €4,000. The Webster Rollos felt that insulation was a large financial undertaking which would not in any event be effective as against low frequency WTN.

61. On 14th August, 2017, Mr. Brazil and Mr. Conor Brennan attended HH for a meeting with the Webster Rollos and the Carty Shortens. As an alternative to contributing towards the cost of insulation, Mr. Brazil suggested that the plaintiffs sign a "*noise acceptance agreement"* pursuant to which they would receive an annual inflation linked payment of €4,000 per annum for the duration of the planning permission for the turbine. This agreement would be noted on the title deeds of HH (and NF) and would bind all purchasers thereof. A further requirement of the agreement was that Mr. Brazil would have a right of first refusal if their property was ever put on the market.

62. The plaintiffs asked Mr. Brazil if the turbines could be turned off or turned down at night or at weekends. This request was not acceded to.

63. Mr. Brazil also informed the plaintiffs that it would be possible to install a computer programme to turn off the turbines when there was a risk of shadow flicker. However, this proposal was not actioned by the defendant.

64. A few days after the August 2017 meeting, Mr. Rollo telephoned Mr. Brazil to reject the proposal of a noise acceptance agreement, and an initiating letter followed from the plaintiffs' solicitor. It was suggested to Ms. Webster in cross examination that this rejection had been premature as the proposal of €4,000 per annum was "*just opening negotiations"* which could have continued were it not for their solicitor's correspondence. Ms. Webster's response was that they wanted to enjoy living in their house and did not want to be paid to endure the noise.

Impact on the Webster Rollo relationship

65. Ms. Webster's evidence was that after a few years of living with the turbine, her 16 year relationship with Mr. Rollo started to disintegrate. In Ms. Webster's view the pervasive

noise and ongoing lack of sleep caused by the WTN was a significant factor in the destruction of the relationship. Her belief is that the WTN brought the couple to the stage where they were both so exhausted, discouraged and low that they could no longer fight for the relationship. Ms Webster was worried for Mr. Rollo's safety and well-being, and she suffered episodes of panic and tearfulness.

66. By December 2020, it was obvious that Mr. Rollo needed to remove himself from the situation and wait out the legal process. In early 2021, the couple having made the decision to separate in any event, Mr. Rollo moved out of HH. This was clearly a very low point for both Ms. Webster and Mr. Rollo.

Noise diaries

67. Ms. Webster (and for the majority of this time, Mr. Rollo) kept a noise diary from August 2018 to October 2021. This diary chronicles their experience of the WTN, both day and night.

68. The Webster Rollo noise diary records intrusive, unpredictable WTN varying in intensity. In harmony with their oral evidence, the diary describes, whoomphing, thumping, banging, hacking, slapping and whacking sounds. It regularly records that the house vibrates and hums with these sounds which appear to hit the gable wall of the master bedroom and come through the walls and ceilings. The diary very regularly records the couple's inability to have a restful night's sleep and the exhaustion which follows.

69. An intermittent but consistent feature of the diary is that it records the Webster Rollo's relief and gratitude when the turbines are quiescent marred by trepidation of the inevitable recommencement of the noise. The strong impression is of being unable to control one's own private environment which is dominated by the turbine. Ms. Webster encapsulated this in stating that she and Mr. Rollo felt "*at the mercy of whatever way the turbine was going to be acting on a particular day to ensure that it produced a maximum output of energy*."

70. Ms. Webster was cross-examined at length about entries in the couples' diary. Counsel for the defendant noted that she occasionally records "*I can hear the turbine*" (or words to similar effect) and suggested that she was therefore intolerant of any level of audible WTN,

particularly at night. Having reviewed all of the diary entries, it is abundantly clear that Ms. Webster and Mr. Rollo do not equate mere audibility with nuisance. The evidence is that, when turning slowly, the light noise produced by the turbine is not a cause of nuisance even if it can be heard internally. What primarily disturbs Ms. Webster's relaxation and sleep is when the turbine is turning "full tilt". At such times, there is no respite anywhere in the house irrespective of whether the windows are open or closed. Ms. Webster stated: *"I can tell you with honesty and with certainty it wakes me from my sleep"*. It was also suggested to Ms. Webster that her diaries were overly dramatic. She accepted that some of her entries focussed on her poor experience but that there were also other more routine entries. This is correct.

71. The primary theme of this cross-examination was by way of a compare and contrast exercise as between (a) particular diary entries, (b) a ten minute extract from the SCADA[11] data recorded at T2 pertaining to the same 24 hour period as the diary entry and (c) the SCADA data at the time of the court's site visit. Counsel noted that Ms. Webster - and indeed all of the plaintiffs - had confirmed that at the time of the court visit, the WTN was not intrusive either externally or internally. It was suggested to Ms. Webster that this compare and contrast exercise showed that, even when the SCADA data revealed identical conditions to those then pertaining at the time of the court's visit, the diaries still record high levels of nuisance[12].

72. However, any such exercise will be heavily influenced by the precise segment of SCADA data chosen as a comparator with the relevant diary entry. Given that the plaintiffs' unanimous experience is that the WTN can change in character within a matter of minutes, there is little weight to be attached to a disconnect between an isolated 10-minute segment of SCADA data and the correlating diary entry which seeks to summarise the main features of the WTN over the preceding 24 hour period. It is also important to bear in mind that, often several diary entries might even be completed together in a "clump" after a few days.

73. By way of example, Mr. Rollo's diary entry for 19th August, 2018 reads –"*Awakened by turbine again! Left for work at 5.30 extremely noisy. Turbine quiet late afternoon."* Counsel for the defendant cross examined Ms. Webster (and not Mr. Rollo who authored the diary entry

[11] The SCADA data records windspeed, speed of rotation, blade orientation and power output at ten minute intervals.

[12] I have been informed that the 10 m standardised windspeeds at the time of my visit varied between a minimum windspeed of 3m/s and a maximum windspeed of 6.2 m/s with 10 minutes averaging between 4.1 and 4.8 m/s over the time of the visit.

in question) by reference only to 10 minutes of SCADA data ending at 5.30 am. This SCADA data shows that windspeed, speed of rotation and wind direction were similar to those pertaining at the time of the court's visit. However, when plaintiffs' counsel re-examined Ms. Webster by reference to the full 24 hour SCADA data it became clear that earlier in the night, both windspeed and speed of rotation were significantly higher (particularly between midnight and 3 am approximately). It was also evident that, as noted by Mr. Rollo, both windspeed and speed of rotation dropped in the late afternoon.

74. The same limitation applies to the cross examination conducted by reference to Mr. Rollo's, dairy entry of 8th September, 2018 which records :"*Kept awake by turbine all night. Noise the same all day."* The SCADA data for 4 am - on which Ms. Webster was cross examined - shows windspeed and speed of rotation only modestly above levels recorded at the time of the court visit. However, the complete SCADA data for the day in question reveals higher windspeeds and speeds of rotation for the night hours both before and after this particular time. It also records higher windspeeds and speeds of rotation throughout the bulk of the day (particularly from 2.30pm).

75. Ms. Webster also emphasised that in addition to windspeed and speed of rotation , wind direction and weather conditions have a huge impact on how noise and vibration would be experienced. The latter two of these factors are not captured by the SCADA data. She further emphasised that one should not interpret a particular diary entry in isolation. Rather, entries have to be placed in the context of the days that surround them. Several days of lack of sleep tend to wear one down, reduce tolerance and increase frustration levels which might naturally influence diary entries later in the relevant sequence.

76. This in my view is the case for Ms. Webster's diary entry of 3rd December, 2021 which records: "Turbine very loud all day and night. Turing very fast and "aggressive" almost when outside feels like I'm being pummelled by force from turbine if I stand in back yard near driveway". Counsel pressed Ms. Webster on a 10 minute segment of SCADA data captured at 2pm on 3rd December. Such an exercise entirely glosses over the fact that the preceding night's SCADA data - again only put to Ms. Webster in re-examination - shows that windspeed and speed of rotation were indeed high. This dovetails with Ms. Webster's diary entry for 2nd December which records "very loud" noise that night. A different picture however emerges during the day of 3rd December. Although I accept that Ms. Webster's experience of being

"pummelled" occurred when she went outside late in the evening (at which stage the wind had picked up), it is fair to say that the SCADA data suggests that during much of the day windspeed and speed of rotation were not high when compared to conditions at the time of the court's visit (indeed they are generally lower). The point, however, is that this entry followed what could fairly be described as a bad week. Ms. Webster describes the WTN during the preceding week as "very noisy", as making "whooshing and clapping" sounds at night and "very distracting". As stated, it is also recorded as "very loud" overnight on 2nd/3rd December. Ms. Webster was not challenged on any of these entries, whether by reference to the SCADA data or otherwise. Ms. Webster also records an earache for the whole of the preceding week which of course will accentuate the impact of WTN (and, I assume of all noise). In reality, the entry for 3rd December, 2021 is probably more consistent with Ms. Webster's experience of the week as a whole than with the specific day it records. The entry also supports the impression of Prof. Kevin Gournay, Chartered Psychologist - who gave evidence on behalf of the plaintiffs - that Ms. Webster's level of tolerance of the WTN is decreasing over time. Overall, I find that the entry for 3rd December, 2021 represents a rare and uncharacteristic occasion on which Ms. Webster allowed her more generalised frustration – most likely accentuated by physical discomfort resulting from persistent earaches - to bleed into a specific diary entry. Whilst I accept Prof. Gournay's view that such increasing sensitivity is not unusual, I have nonetheless been cognisant of it.

77. In my view, the themes pursued in this part of the cross examination ought to have been put to the plaintiffs' experts-which did not occur. This is because, whilst it is clear that windspeed and speed of rotation heavily influence the level and characteristics of WTN, a range of other factors are also highly relevant. Such factors include relatively small changes in wind direction and blade pitch and, as Ms. Webster states, prevailing meteorological conditions. These factor all influence thump AM, which is described as the most intrusive aspect of the WTN at Ballyduff. Demonstrably, Ms. Webster, as a lay witness, is unqualified to explain such matters. Rather, she stated that the diary is intended to be experiential and deferred to experts to explain what factors might influence or explain the characteristics of the WTN which she records in her diary entries.

78. Overall, I find that Ms. Webster's diary entries, like her oral evidence, presented a balanced and truthful account of her experience of the WTN. I make a similar finding in relation

Mr Rollo's diary entries up until mid to late 2020[13]. From over three years of diary entries, the defendant pointed to only a handful of diary entries which it contends are inconsistent with the SCADA data. Of these, I find that only one – that of 3rd December, 2021 – can fairly be characterised as inconsistent with the SCADA data for the day on question. Further, this inconsistency pertains to only part of the relevant 24 hour SCADA data and further arises only if one considers the diary entry in isolation from the week of which it forms part. As Ms. Webster states: "*We are people living in our home; it is not a scientific experiment, it's our home and we are experiencing this on a continuous basis*". Bearing in mind the quality of other evidence supporting Ms. Webster's account of the overall characteristics of the WTN, I attach very little weight to a frailty in a single diary entry.

Evidence of Mr. Keith Rollo

79. Mr. Rollo has worked as a rigger for many years and is accustomed to heavy machinery and loud noise. The WTN is highly variable and unpredictable. He described it as horrendous during the winter months when its accompanying vibration penetrates the fabric of the building throughout the house. Mr. Rollo shared Ms. Webster's view that the internal audio recordings taken in HH under-represent the general impact of the WTN in the house. This is partly because, as Mr. Stigwood explains, human hearing is directional (in the sense that one is more conscious of a sound from a specific source) and also because the audio recordings could not convey the sense of vibration and pressure that is felt in the house.

80. The impact of the noise affected Mr. Rollo most profoundly through his sleep. At night, the turbine frequently makes a thumping, whacking and slapping noise; like the side of the house was being hit by something. When it was suggested to him that shutting the windows would diminish the sound, Mr. Rollo accepted that the turbine is less noisy with the windows closed. However, although on windy winter nights he would sleep with the windows closed, Mr. Rollo's general preference is to sleep with the windows slightly open. In any event, Mr. Rollo stated that, even with the windows closed, and despite wearing professional noise cancelling headphones, the noise and vibrations caused by the turbine still disturbed his sleep. Like Ms. Webster, Mr. Rollo's sense is that the noise and vibrations come though the walls of the house. At times, the whole house vibrates with the noise. As a result, all attempts to mask the WTN using both professional noise cancelling headphones and industrial earplugs (which

[13] See para 461for an analysis of Mr. Rollo's reaction to the turbine from mid to late 2020.

he had obtained from work) were unsuccessful because, he could still feel the noise "*through my bones*".

81. When unable to sleep, Mr. Rollo moved to the sitting room because it was at the front of the house and did not have a gable wall facing the turbine. Although the noise intruded, as it did in every room of the house, he would try to sleep with the television on to mask it. However, Mr. Rollo's sleep pattern remained extremely disrupted, and on many nights, he would get no more than two hours sleep. This meant that he frequently rose feeling exhausted and stressed. This exhaustion was hazardous as Mr. Rollo's job involves working at heights.

82. Mr. Rollo's evidence was that the constant noise and lack of sleep "*broke* [him] *down*". He developed mental health problems and ultimately contemplated suicide. In late 2020, Mr. Rollo's solicitor became concerned and referred him to Prof. Gournay who recommended that he see his General Practitioner, Dr. Ford. Dr. Ford in turn referred Mr. Rollo into a self-harm counselling programme where he attended ten or twelve sessions. After the conclusion of this programme, Mr. Rollo's employer arranged further counselling which concluded very recently.

83. In early 2021, Mr. Rollo accepted that because of the dark thoughts he was having, he had to leave the house urgently. He moved out in March 2021, initially staying with family friends. Mr. Rollo's current residence is about half an hour from HH in an estate in Wexford town.

84. On leaving the house, Mr. Rollo's sleep pattern initially improved but then disimproved again. He is still suffering from depression and continues to take anti-depressant medication.

Evidence of Ms. Joan Carty and Mr. Ross Shorten

85. Ms. Carty and Mr. Shorten owned NF until comparatively recently and sold it to Ms. Maura McGinn in August 2021 (as to which see further below). Ms. Carty described the range of sounds emanating from the turbine, the most difficult and intrusive of which is a loud whomping or thumping sound with associated reverberation and vibration. This loud whomping and thumping noise is very hard to listen to for any period of time and is audible from every room in the house. Mr. Shorten's evidence was to a similar effect; he recounted that the noise, the vibration and the sense of pressure in the air are overpowering and upsetting.

86. The couple's evidence was that as a result of the WTN, and its associated vibrations, it was impossible to sleep in the master bedroom, even with the window closed. The noise intrusion forced them to vacate the master bedroom which is a dormer and move to a somewhat quieter bedroom downstairs. However, the WTN still disturbed their sleep.

87. Because of the WTN, Ms. Carty and Mr. Shorten no longer enjoyed visiting NF. They found the WTN to be extremely intrusive during a 5 day period they spent working on the patio outside their house in August 2017. Even with a music speaker outside to try and mask the WTN (albeit at a volume at which they could still converse), they were disturbed by the whomp whomp sound as the blades cut through the air. Ms. Carty said that after the turbine started turning, she never again sat on the patio to read. In addition, they stopped having guests to the house because they were embarrassed about the noise and intrusion from the turbine.

88. When the couple raised these difficulties with Mr. Brazil, he indicated that he might, in due course, be prepared to buy NF as he had known that it had was previously on the market. He also arranged for monitoring equipment to be installed at NF on the understanding that the results would be furnished to the Carty Shortens. Although Mr. Shorten requested this data both verbally and in writing, it was never furnished.

89. The couple's evidence was that the house was placed on the market in September 2018 and was ultimately sold at a price significantly below its full value, to Ms. McGinn.

90. Two additional witnesses as to fact were called by the plaintiffs.

Evidence of Ms. Maura McGinn

91. The plaintiffs called Ms. Maura McGinn, the current occupant of NF. She purchased NF from the Carty Shortens on 12th April, 2021. Ms. McGinn stated that the WTN was pretty obvious when she viewed the house. She knew that she could not have afforded to buy the house were it not for the presence of the turbines.

92. On her first night in the house, Ms. McGinn was shocked by the WTN which was exceedingly loud and kept her awake. Ms. McGinn was concerned that she made a mistake in

purchasing the house and worried that she would be unable to sleep in the master bedroom upstairs. However, Ms. McGinn "persevered" and continues to sleep upstairs.

93. Ms. McGinn does not generally spend the whole week in the house as she works in Dublin a few days a week. When she is going to bed at night, the rhythmic nature of the noise can *"get in on"* her and it can be hard to fall asleep. Alternatively, she might wake to the WTN and then find it more difficult to get back to sleep. As she points out, when you hear the turbine, it is very difficult to un-hear it. Overall, although the turbine can interrupt her sleep, Ms. McGinn stated she was a good sleeper.

94. The turbine generally makes noise all the time, apart from on very still days. The noise outside is louder and stronger. Inside the noise is much quieter downstairs, but it can definitely be heard upstairs. Ms. McGinn describes the noise as a "*whoomph, whoomph, whoomph kind of noise".*

95. In general, Ms. McGinn is careful not to focus on the noise and tries not to let it bother her. She would be afraid that if she did focus on the WTN for too long, it would start to get in on her.

96. Ms. McGinn is from a large family and lots of people come to visit. She finds herself being quite defensive of the turbine and therefore warns her family about the turbine before they visit. Whenever workmen come to the property, they refer to the turbine and to the noise. Her surveyor recommended that she put in additional insulation for the house. Although she followed this advice, this made no real difference in the noise levels.

97. Under cross-examination, Ms. McGinn confirmed that she did not regret buying the property. Her first night in the property had been a particularly noisy night and her general approach is to try not to pay too much attention to the turbine. She has managed to get used to the noise or has learnt to ignore it such that she conceded[14] that *"it doesn't seem… to be creating a terribly great problem for[her]in [her]enjoyment of the property".*

[14] In answer to a question posed by counsel for the defendant.

Evidence of Ms. Ashley Doran

98. Ms. Ashley Doran lives at Ballyduff. Ms. Doran's house is located 313 metres from the Webster Rollo's house. There is a distance of 601 metres between T2 and Ms. Doran's house and a distance of 808 metres between T1 and Ms. Doran's house.

99. Ms. Doran stated that the turbines make a deep, heavy reverberating noise which she describes as groaning and whomping sounds. Reverberations are experienced both inside and outside the house. The WTN is disturbing and disorientating making it hard to focus or concentrate. On occasion the intensity of the sound and vibration makes her dizzy and queasy. At times, the sound of the turbines hurts her ears. It is difficult to cope with the inconsistency of the WTN which varies from *"quiet"* to *"thunderous*" depending on the meteorological conditions. The WTN disturbs her sleep and Ms. Doran has started sleeping in the room furthest from the turbine. Both she and her husband sleep with earphones which they use to mask the sound of the turbines. Overall, although Ms. Doran's husband, finds the turbine "*a bit annoying*" he manages to put it out of his head and get on with things.

Evidence of Mr. John Brazil

100. Mr. Brazil, who is an experienced developer of on-shore windfarms, and director of the defendant company gave evidence to the following effect. WTN will always be greatest directly downwind. In his view, the higher noise levels on the MAS NF crosswind planning compliance graph[15] was not reflective of WTN but of extraneous noise. Mr. Brazil's view is that the Ballyduff WTN is not abnormal or out of the ordinary as regards either to its noise levels or its AM. In his experience, the AM was of normal "blade swish" variety. However, he accepted that he had only been on the plaintiffs' properties for very limited periods of time. Mr. Brazil accepted that from time to time, there would inevitably be audible windfarm noise internally at both HH and NF. He maintained however that there would be no real audible noise in the HH master bedroom or that it would be "*very very low*".

101. Mr. Brazil confirmed that although the audio recordings taken by the plaintiffs' experts accurately recorded the sound where the microphones were placed, these were only "snapshots" and would not necessarily be typical of the normal day to day experience of the

[15] As to which see para 115 above and para 335 -340 below.

windfarm. This assertion was not taken up by the defendant's experts who did not suggest that the audio recordings were unrepresentative of general WTN at the measurement locations.

102. Mr. Brazil accepted that he had not asked his experts to assess the character of the WTN. He had not requested them to either listen to or asses its AM or other characteristics. Rather, he had relied entirely upon the fact that the planning compliance graphs prepared by his experts showed that external noise measurements were compliant with the planning permission and with WEDG 2006. Mr. Brazil also confirmed that if WEDG 2006 had applied at the time of the Ballyduff planning application, planning permission would not have been granted for turbines within 500 metres of an existing house without consent of the householders.

103. Mr. Brazil also indicated that the average capacity factor for the windfarm would be in the mid-30s per cents. This means that most of the time, the wind is insufficient for the turbine to operate at full capacity. Even on a very windy week one would anticipate only a 50% capacity factor.

Site visit

104. As agreed, the court carried out a site visit on 1st December 2022.

105. The plaintiffs' residences are in the lee of a high hill on which the turbines are situate. T2 is clearly visible on a height behind the houses. The dwellings are off a minor road in a quiet and tranquil rural area, which is sparsely populated. The ambient sounds of the locality are those generated in the natural environment such as wind noise, foliage stirring and birdcalls. One could also expect the usual array of domestic sounds from human activities and the sounds of the Webster Rollo's dogs. In addition, although not apparent on the day of the court visit, I gather one encounters the sounds of farm machinery and local traffic. There are no other businesses in the area.

106. At the time of the court's site visit, it was a dry, mild day. One could discern that HH and NF are in a sheltered location almost scooped into the hill. The air was very still close to the plaintiffs' houses. Having said that, bearing in mind the clement day, the wind was generally quite calm even some short distance away from the plaintiffs' houses. Indeed, at the

time of my visit, average 10 minute 10 m standardised windspeeds for T2 varied between only 4.1 m/s and 4.8 m/s and T2 was rotating only slowly.

107. The WTN was audible outside and inside both houses including in the master bedroom at NF and in the master bedroom at HH with the windows open (but not with the windows closed). When asked, all four plaintiffs expressed the view that although it was audible both inside and outside their houses, they would not consider the WTN presenting at the time of the court's visit to be intrusive. I am in agreement with this assessment.

Brief Overview of Expert Evidence

Acoustics experts called by parties

108. The plaintiffs called two acoustics experts. Mr. Mike Stigwood, a qualified environmental health officer, is an Environmental Health Consultant and Acoustician and Director of MAS. At the time of reporting, Ms. Large was a Senior Acoustic Consultant at MAS.

109. The defendant also called two acoustic experts. Mr. Shane Carr, a qualified environmental health officer with a post graduate diploma in acoustics and is a Director of Irwin Carr Consulting. Mr. Brendan O'Reilly is an Acoustic Engineer and Director of Noise and Vibration Consultants Ltd.

110. Although I will now briefly summarise the evidence of the acousticians, I will in due course consider same in more detail as I proceed through my analysis of key issues in the case. This will unavoidably involve some repetition, which I will attempt to keep to a minimum.

111. Later in this judgment, I will also consider the arguments advanced by each party that the opposing acoustics experts failed in their duty to the court.

Noise data presented by plaintiffs' experts

112. Ms. Large carried out two noise surveys at the plaintiffs' houses between 10th November, 2017 and 15th December, 2017. Monitoring equipment was set up which recorded long term high quality - 100 milli-second audio - internally at HH (on foot of which the "2017

HH internal data"[16] was derived) and externally in the garden / patio area at the rear of NF, (on foot of which "the 2017 NF external data" was derived). The internal HH audio recordings were recorded by a microphone placed in a home office/bedroom on the ground floor at the back of HH. Audio was recorded with the window both open and closed. The external NF audio recordings were recorded with a microphone placed approximately 3.5m away from the house façade-which is an appropriate free field location. Where relevant, I refer to this collectively as "the MAS 2017 data".

113. The second noise survey was carried out in December 2020 and January 2021. Due to Covid restrictions, neither Ms. Large nor Mr. Stigwood could travel to Ireland and the monitoring equipment was sent to Ireland and set up under their instruction by the plaintiffs' solicitor. Audio recordings were recorded internally at HH between 4th December, 2020 and 19th February, 2021 (on foot of which the "2021 HH internal data" was derived) and internally at NF between 22nd February, 2021 and 10th March, 2021 (on foot of which "the 2021 NF internal data" was derived). Finally, there was also an external survey at NF between 10th March, 2021 and 21st May, 2021 (on foot of which "the 2021 NF external data" was derived). The internal HH audio recordings were recorded with a microphone placed in the same home office/bedroom as in 2017. The internal NF audio recordings were recorded with a microphone placed in the master bedroom of NF, which is a dormer at roof level. Once again, the windows were sometimes open and sometimes closed. The external NF audio recordings were recorded with a microphone which, inadvertently, was placed closer to the exterior façade than would be appropriate for free field measurements[17]. It also appears that, again inadvertently, the microphone was not protected with a double skinned windshield. Where relevant, I refer to this collectively as "the MAS 2021 data".

114. The evidence tendered on behalf of plaintiffs as describing or representing the WTN noise at HH and NF was therefore advanced in a number of ways, as follows:

i. The factual evidence of the plaintiffs, Ms. Doran and Ms. McGinn as to their experience of the noise on site

[16] In each case, such data consists of audio recordings, time domain graphs of the said audio recordings and spectrograms showing the correlation between the noise and spectral frequency. Where applicable I refer to these graphs collectively together as "the associated graphs"
[17] It appears that this only came to light shortly before the trial.

ii. extracts from Webster Rollo diaries,

iii. factual and opinion evidence from Ms. Large and Mr. Stigwood as to their personal experience of the noise on site during their site visits in 2017 and 2021.

iv. (as just described at para 112 and 113 above) long term high quality 100 millisecond audio of the sound taken within the dwellings and in the patio of NF. Approximately 25 of these audio recordings were played to the court ranging in duration form 30 seconds to 10 minutes [18]Certain internal audio recordings were played to the court in a sound studio. These audio recordings were tendered to demonstrate the features of the WTN such as its dominance, the presence of both swish and thump AM and the erraticism of the AM;

v. 100 millisecond time-domain graphs (i.e., temporal graphs plotting the noise levels against time) presenting the audio recordings at iv above. The MAS reports included approximately 100 of these graphs[19] ranging in duration from 25 seconds to 25 minutes. These graphs were tendered to demonstrate the features of the WTN such as its AM values[20] and the presence of thump AM;

vi. graphs plotting the WTN by frequency spectra (spectrograms) together with graphs comparing the noise on site to permitted levels of low frequency noise. These graphs were tendered to demonstrate the presence and significance of thump AM;

vii. opinion evidence from Ms. Large and Mr. Stigwood and, to a limited extent Mr. Mayer, in respect of all of the aforesaid;

viii. in respect of the AM specifically, Mr. Stigwood prepared further graphs on foot of the MAS 2021 data by way of purported IOA RM analysis. The IOA RM is explained at paras 194 *et seq* below)[21].

ix. Mr. Stigwood also prepared a planning compliance graph in respect of NF demonstrating noise levels in crosswind conditions (at the wind quadrant northwest

[18] Disregarding, the 2021 NF external audio recordings, approximately 25 external and internal audio recordings were played to the court. The vast majority of the internal audio recordings played to the Court were recorded with the window slightly ajar.

[19] Ms Large's first report includes approximately 55 separate time domain graphs- approximately 30 external NF graphs, and 25 internal HH graphs (most of which were recorded with the window ajar). Ms Large's second report includes approximately 20 further internal HH time domain graphs (with the window ajar). Mr Stigwood's first report includes approximately 10 further internal HH time domain graphs (with the window ajar) and approximately 20 internal NF time domain graphs (with the window ajar). As stated, I disregard, the 2021 NF external data.

[20] An example of two of these graphs is to be seen at paras 434 and 435 below.

[21] Mr Stigwood's IOA RM graphs of the internal NF and HH data as derived from the noise monitoring on site is attached at para 451.

through to northeast[22]). I will refer to this as "the MAS NF crosswind planning compliance graph"[23]

Evidence of Ms. Sarah Large and Mr. Mike Stigwood

115. Mr. Stigwood accepted that Mr. O'Reilly's planning compliance graphs demonstrated planning compliance in the downwind direction using the ETSU methodology. By contrast, his evidence was that the MAS NF crosswind planning compliance graph showed a fairly consistent exceedance of the noise limits in the permission.

116. However, MAS's overall opinion was that planning compliance (and planning guidance generally) was of limited relevance to the nuisance assessment. They view planning control and nuisance as separate frameworks with different aims and objectives. The purpose of the planning system is to regulate the development of land in the public interest. Planning authorities perform their functions by reference to a range of environmental, social, economic and policy considerations. Although they will consider the potential effect of proposed development on the amenity of any neighbouring properties, planning authorities are not obliged to give this factor any particular weight in the assessment. By contrast, MAS state that the impact on amenity will be the key consideration in a nuisance assessment.

117. Ms. Large and Mr. Stigwood consider that the Defra Guidance, which assesses both qualitative criteria (dominance, erraticism, impulsivity and variability etc) and quantitative criteria (decibel level, AM values) provides a more suitable methodology for the assessment of nuisance. In contrast to planning controls which proceed on the basis of external noise measurements only, the Defra Guidance recognises that as most complaints of noise nuisance relate to sleep disturbance, internal monitoring should be undertaken to see whether it corroborates complaints.

118. MAS also contended that *BS 4142:2014-Method for rating and assessing industrial and commercial sound* (BS 4142) provided a useful methodology of assessment of WTN nuisance.

[22] In this respect, Mr. O'Reilly's planning compliance graphs all relate to directly downwind conditions.
[23] This is attached and further discussed at para 335 below.

119. The results of the 2017 and 2021 external and internal noise monitoring were presented and analysed in four separate expert reports prepared by Ms. Large and Mr. Stigwood [24] which were extensively opened in evidence to the court. As stated, Mr. Stigwood also played extracts from the audio recordings to the court.

120. Ms. Large and Mr. Stigwood observe that the plaintiffs' houses are in wind shadow and that the area is extremely quiet. In Mr. Stigwood's opinion, absent the windfarm, this would be a *"low noise environment"* as defined in WEDG 2006.

121. In Ms. Large's view, the plaintiffs' noise environment was entirely dominated by the WTN on every day of her lengthy noise survey. Moreover, the period of adverse impact was almost continuous. The WTN causes a stark and significant change in the sound environment which will be perceived as a doubling of the overall loudness, and at times, a quadrupling of the overall loudness. MAS was of the view that WTN exceeds background noise by considerably more than 5 dBA.

122. In Ms. Large's opinion, the impact is further exacerbated by excessive AM values, thump AM and the overall unpredictability of the WTN which means that one cannot predict and plan, adding a further layer of intrusion. MAS's evidence is that the 2017 and 2021 data demonstrates that long periods of high AM value are a very common feature of this WTN. In Ms. Large's view, the 2017 data shows that the levels of AM frequently modulate by 10 dBA and that AM values in excess of 13 to 15dBA are common. In MAS's view, the audio recordings also demonstrate prominent thump AM. Spectrum analysis confirms the presence of lower frequency noise, which is heard as thump AM, felt as vibration and perceived as a sense of pressure. This is a particular feature of the internal environment in HH. The 2017 and 2021 data also shows that the AM is impulsive (with a pattern of rapid rise and fall), erratic (with no clear periodicity or rhythm) and intermittent/variable (it disappears and returns again or fades in and out). Mr. Stigwood's view was that, due to stable atmospheric conditions enhancing sound propagation, this AM intrusion occurs more during the night.

123. Ms. Large did not apply the IOA RM to her data to "rate" the AM values as, in her view, such an exercise is directed only towards the calculation of a penalty for planning

[24] MAS reports dated: 27th June, 2018, 12th January 2021, 3rd October, 2022 and 6th November, 2022.

purposes. As the IOA RM is a 10 minute averaging method, it tells one nothing about what is happening within each 10 minute segment in terms of spectral frequency or the character of the WTN. As such, Ms. Large felt that the IOA RM would not tell her anything that had not been already established from her own analysis of the data.

124. Mr. Stigwood accepts that the IOA RM analysis is "*pretty good at giving you certainly a first glance at whether there is an AM problem".* However, it is not the only method of evaluating AM values. Mr. Stigwood maintains that the application of the IOA RM analysis to the 2021 NF external audio recordings yields average AM values of 8 dBA which would attract an average 5dBA penalty pursuant to draft WEDG 2019. Mr. Stigwood also opines that, when a noise nuisance complaint relates to the indoor noise environment, the IOA RM analysis should be applied to internal measurements. In this case, doing so yields similar results to those derived externally.

125. In Ms. Large's view, the sleep disturbance reported by the plaintiffs was consistent with and supported by her noise data and by her own experience of the WTN on site which all demonstrated significant adverse noise impact. The WHO criteria[25] for night-time sleep disturbance (which is based on the Lmax[26] of noise rather than its average decibel level) are exceeded by the WTN. Indeed, due to low background noise and significant lower frequency energy, one would expect sleep impacts at even lower levels.

126. In Ms. Large's view, the WTN, which occurs all day and all night is dominant and oppressive both outside, and within the dwellings. There is no respite from the WTN, and its worst impact often coincides with the most sensitive times of the day. The sound character is highly changeable with multiple attention-drawing characteristics. At a basic level, the ability to be "quiet" in one's own home and undisturbed by unwanted noise is prevented by the operation of the wind farm. The WTN causes annoyance, disturbs sleep and then inhibits recovery by preventing subsequent rest and relaxation.

127. In MAS's view, the 2017 and 2021 data comprises objective evidence to corroborate the plaintiffs' complaints of significant adverse impact on the use and enjoyment of their

[25] WHO 2009 Night Noise Guidelines for Europe
[26] The maximum AM peaks of noise

dwellings. The WTN exceeds normal boundaries of acceptability and expected intrusion by a substantial margin. When compared to a substantial number of windfarms that she has previously assessed, Ms. Large views the Ballyduff WTN as exceptional. Overall, she viewed the noise intrusion from the Ballyduff turbine as worse than any other case of WTN that she had previously encountered.

Noise data presented by defendant's experts

128. The evidence tendered by the defendant as to the WTN at HH and NF was advanced in the following ways:

i. planning compliance graphs prepared by Mr. O'Reilly at both HH and NF[27]
ii. Mr. Carr's opinion evidence on the HH compliance graphs. Mr. Carr did not address the NF compliance graphs.
iii. the factual evidence of Mr. Carr as to his experience of the noise in the bedroom at HH for a period of 5 to 10 minutes on the day of the joint site inspection.
iv. Comment by Mr. Carr on some of the plaintiffs' experts' evidence.

Evidence of Mr. Shane Carr

129. Mr. Carr observes correctly that all WTN assessments assume that as windspeed increases so too does the background level. In comparing the "turbine on" and "turbine off" scenarios, MAS does not take account of the expected increase in background noise levels associated with windier conditions. MAS is therefore not comparing like with like. Mr. Carr also criticises MAS's failure to correlate its data with windspeeds, wind direction or meteorological conditions.

130. Mr. Carr's view was that the planning condition sets a fixed limit at different windspeeds, namely 40 dBA leq at 5 m/s and 45 dBA leq at 10 m/s. In his view, no noise limit applies between those windspeeds.

131. Mr. Carr assessed planning compliance by reference to Mr. O'Reilly's HH compliance graphs. In Mr. Carr's view, these show that total operational noise complies with the noise

[27] Mr. O'Reilly's planning compliance graph for night-time in downwind conditions at both NF and HH are attached at paras 326 and 308 below.

limits in the planning permission in directly downwind conditions. There was therefore no necessity for background noise measurements.

132. Further, Mr. Carr and Mr. O'Reilly (and indeed one of the plaintiffs' experts, Mr. Mayer) all gave evidence that WTN noise would be expected to be at its greatest in this downwind quadrant. In Mr. Carr's view, crosswind conditions are associated with a 2dBA reduction in turbine noise. In Mr. Carr's view therefore, any exceedances of the noise conditions in the planning permissions shown on the MAS NF crosswind planning compliance graph were not caused by turbine noise.

133. Mr. Carr also viewed the WTN as compliant with WEDG 2006. Further, Mr. O'Reilly's HH planning compliance graph for daytime hours showed that measured noise levels at low windspeeds without the windfarm operating, were above 30dBA L90. This was not therefore a *"low noise environment"* as defined in WEDG 2006.

134. Mr. Carr [28] also expressed the view that the measured noise levels at HH complied with the recommended limits set out in draft WEDG 2019. Indeed, he stated that the HH noise levels were so low as to ensure that there was "*sufficient headroom*" to incorporate any penalty for AM that might be imposed by draft WEDG 2019.

135. Mr. Carr's view is that a planning compliance assessment is a key aspect of a nuisance assessment. Both planning regulation and nuisance consider the impact on residential amenity within established frameworks.

136. By contrast, the MAS analysis is qualitative and *"generic*". He also criticises the MAS approach as "*novel* "and "*bespoke"*. In Mr. Carr's opinion, MAS failed to rigorously apply any appropriate guidelines to the assessment of nuisance. Whist he noted that the Defra Guidance does not measure nuisance by reference to a particular fixed decibel limit, one must still assess nuisance in accordance with *"some recognised standards or guidance*" (such as the planning permission, WEDG 2006, the IOA RM or draft WEDG 2019).

[28] The defendant's planning expert, Mr. Lawlor, agreed with Mr. Carr in this regard.

137. Under the Defra Guidance, the plaintiffs must, by reference to such guidance show that an established threshold of impact or "*threshold of significance"* is being exceeded. That "*threshold of significance"* was not exceeded in this case because, in Mr. Carr's view the overall noise levels at Ballyduff were generally "*very low"*. This was not therefore a borderline or "*critical"* case requiring him to either carry out any further monitoring or to listen and form a view on the character of the noise. In any event, Mr. Carr rejected the view that one should or even could assess nuisance by listening to the noise. This is because various people have various different opinions about what constitutes an unreasonable interference. In essence therefore, whilst he accepted that the audio recordings accurately capture the sound environment where they were situated, Mr. Carr viewed them as of little value in determining whether nuisance was made out.

138. Mr. Carr rejected the relevance of BS 4142 as it applied to industrial noise generally but not specifically to WTN.

139. Mr. Carr's evidence was that MAS had also failed to ensure that their noise measurements were taken in accordance with best practice. Mr. Carr accepted that the MAS 2017 audio recordings (i.e., the HH internal audio recordings and the 2017 NF external audio recordings collected on foot of Ms. Large's noise survey) accurately measured sound levels at the point of the microphones. However, due to sound reflections, the 2017 HH internal audio recordings (and associated graphs) were not necessarily reflective of noise levels in the wider room or in different rooms in the same house.

140. Mr. Carr's most trenchant criticism was reserved for the MAS 2021 data which was recorded by the plaintiffs' solicitor who is not an appropriately qualified "*competent person*". As regards the 2021 NF external audio recordings, good practice requires that that measurements are made in the free field between 3.5 and 20 metres from a dwelling. However, due to inadvertence this did not occur, and the noise was recorded at façade level. As a result, although Mr. Carr accepts that the audio recordings accurately captured the noise environment where the microphones were placed, the use of façade level measurements (instead of free field measurements) increases overall noise levels. Moreover, the 2021 NF external audio recordings were gathered without the use of an appropriate windshield which means that wind contamination cannot be excluded. Mr. Carr noted that MAS had screened that part of the MAS 2021 data that was included in the expert reports and had also screened the audio recordings

played to the court. However, he does not accept that this screening is effective to exclude wind contamination because one cannot always hear how wind affects the microphone. Furthermore, Mr. Carr also stated that one cannot take façade measurements where there is a significant low frequency content to the noise.

141. As regards the 2021 NF internal audio recordings and the 2021 HH internal audio recordings, Mr. Carr again contended that the noise levels at the point of the microphone would not necessarily reflect noise levels in other parts of the house.

142. Mr. Carr was extremely critical of MAS's methodology in presenting AM. He stated that the IOA RM defines AM and sets out a strict methodology (in terms of measurement methodologies and postprocessing) for rating AM values. This in turn allows for consistent assessment. By contrast, the MAS approach to calculating AM values (computing the differential between AM peaks and AM troughs on the time domain graphs) exaggerates the level of AM. To explain this, Mr. Carr noted that Mr. Stigwood himself had accepted that the AM values as calculated on foot of the MAS time domain graphs would typically overstate the AM values when compared to those produced by the IAO RM by *"1 to 2 dB".*

143. Mr. Carr noted that Mr. Stigwood also had purported to undertake an IOA RM analysis of the MAS 2021 data discussed above (the 2021 NF external audio recordings and the 2021 HH and NF internal audio recordings). In Mr. Carr's view, this data could not form the basis for a valid IOA RM assessment. This was for several reasons.

144. First the 2021 NF external audio recordings were taken at façade level which distorts AM. Related to this is the criticism that Mr. Carr maintains that one cannot take façade measurements where there is a significant low frequency content to the noise.

145. Second the 2021 NF external audio recordings were captured without the use of an appropriate windshield. In this latter respect, Mr. Carr opined that even if one were to accept that the screening exercise carried out by MAS was adequate to exclude contamination from the specific data included in their reports and from the audio recordings played to the court, this was irrelevant to the IOA RM assessment which was based on a far more extensive cache of data - 6 weeks of continuous data. Mr. Stigwood had not screened this more extensive cache of data for contamination and yet had input it all into the IOA RM analysis.

146. Third, as stated above, Mr. Carr viewed Mr. Stigwood's IOA RM analysis of the 2021 NF and HH internal data as of no value. This was because - in addition to the fact that the monitoring equipment was set up by the plaintiffs' solicitor rather than by MAS - the IOA RM analysis is not intended to be carried out on internal measurements.

Evidence of Mr. Brendan O'Reilly

147. Mr. O'Reilly confined himself to presenting the defendant's evidence in relation to compliance with the planning permission. Mr. O'Reilly's view was that the Defendant was fully compliant on both the HH and NF data. He accepted however that the polynomial line (or trendline) for the NF night-time graph was 43.5 dBA L90, which is above the planning permission limit of 43dBA L90. In Mr. O'Reilly's view this potential exceedance could be fully explained by the noise of the wind in the trees close to the NF measurement location.

148. Mr. O'Reilly also accepted that the MAS NF crosswind planning compliance graph shows an exceedance of total operational noise above the permission limits but stated that "*it had nothing to do with the turbine*" and was more likely noise from wind in the trees. In Mr. O'Reilly view, contributions from wind were evident on both the daytime and night-time compliance graphs. Although in rural Ireland, the biggest contribution to increased noise levels is the wind in the trees, people are generally habituated to it and therefore never complain about it or even notice it. Mr. O'Reilly accepted that the plaintiffs' properties were in a wind shadow and that the wind environment at hub height was very different to the wind environment at the properties.

Planning experts called by parties.

Evidence of Ms. Ann Mulcrone and Mr. Gavin Lawlor

149. The evidence of the plaintiffs' expert, Ms. Ann Mulcrone, a town planner and former president of the Irish Planning Institute, was restricted to the pleaded allegations of breach of the permission for the purposes of the s. 160 application. I will detail this evidence when considering issue 14 below.

150. Similarly, the evidence of the defendant's expert, Mr. Gavin Lawlor, a town planner recently elected to the Council of the Irish Planning Institute, was largely responsive to the s. 160 application. In addition, in harmony with Mr. Carr, he also expressed the view that the

whole purpose of the fixed noise limit in planning permissions is to protect the residential amenity of nearby residents. In essence, such a noise condition is inserted to eliminate nuisance. In his view, the noise limits in the permission carefully balance the acceptable noise and the desired outcome of renewable energy. He stated that the WTN was "*meticulously compliant*" with condition 15. In addition, Mr. Lawlor tendered a similar view to that of Mr. Carr in relation to the interpretation of the planning permission with which I deal with below.

Evidence of Mr. Dietrich Mayer

151. The plaintiffs led evidence from Mr. Dietrich Mayer, a qualified Mechanical and Automotive engineer who now operates as a Wind Energy Consultant advising on the execution of wind development. Although Mr. Mayer clearly has a high degree of practical experience in wind farm developments, I entertain some doubt as to whether he is sufficiently qualified to give expert evidence. I will therefore briefly summarise Mr. Mayer's evidence but will have regard to it for the purposes of context only.

152. Mr. Mayer's view is that bearing in mind their proximity to the plaintiffs' homes and the local topography it ought to have been recognised at the time of the installation of the turbines that there was a significant risk of unacceptable noise and high levels of AM.

153. In their present location, the usual proportionate relationship between noise levels at the receptors and at the rotor tips is distorted due to their respective heights and to the fact that the houses are in a wind shadow.

154. The speed of rotation of the blades is a critical factor for the generation of noise. If windspeeds accelerate steeply, the blade angle will change, and extra noise will be produced because of a disruption of the laminar flow. In gusty conditions the turbine has to exert a lot of control, producing frequent fast pitching activities and associated peaks in noise.

155. Other factors that can increase noise emission are the misalignment of blades and blade pitch. In addition, air inflow turbulence could play a role here because the operation of T1 will create a wave effect in the airflow towards T2 which will cause increased loads and sound emission from T2.

156. The WTN could be reduced by a number of methods. One ought first check that the rotors were clean, undamaged and properly aligned. The turbine rotors could be serrated, or appliances could be added to the blades to reduce the sound power level. One could also, if required, de-rate T2 at certain times and operate it in power reduced mode. As noted in the manufacturer's technical data sheet: *"For a noise sensitive site it is possible to operate the E70 with a reduced rotational speed and a reduced rate of power during the night."* Enercon can also provide a software programme to eliminate shadow flicker at impacted properties.

Evidence on shadow flicker

157. Although this is fundamentally a noise nuisance case, the plaintiffs also complain of nuisance in the form of shadow flicker.

158. By agreement, the parties submitted a shadow flicker report of Jennings O'Donovan & Partners dated 24th May, 2017 prepared by Mr. David Kielty. Mr. Kielty's report, which was based on modelling rather than on-site assessment, found that the plaintiffs' dwellings could potentially experience an impact from shadow flicker as they are within ten rotor diameters of the Ballyduff windfarm. The report shows that the total predicted hours per year of the shadow flicker at HH and NF on a *"worst case"* scenario is:

NF (34.2 Hours Per Year)
HH (35.6 Hours Per Year)

159. This calculation is based on topography alone and assumes that the sun is always shining and that there is no cloud cover. It also excludes vegetation, forestry, buildings and other man made buildings which in a *"real"* context would screen the flickering effect of the wind turbines. The report states that T2 is the largest contributor to shadow flicker occurrence.

160. The report then finds, by way of a desktop survey, that the actual hours of sunlight at Ballyduff represent 35% of the total hours of daylight and that therefore shadow flicker will only potentially occur for 35% of the predicted worst case time. Reduction factors were therefore applied which produced the following results:

NF (34.2 Hours Per Year) Reduction @ 35% = 12.0 Hours shadow flicker per year

HH (35.6 Hours Per Year) Reduction @ 35% = 12.5 Hours shadow flicker per year

161. The conclusion is as follows: *"Although there is no agreed standard for shadow flicker impact in Ireland, the [WEDG 2006] recommends that shadow flicker at dwellings within 500m of a turbine should not exceed either 30 hours per year or 30 minutes per day."*

162. The report concludes that the Ballyduff Windfarm has the potential to introduce shadow flicker impacts that may exceed this WEDG limit of 30 minutes per day when sunshine occurs. However, the predictions do not take into account weather conditions or the presence of natural features e.g., trees and hedges which will reduce sunlight. The report concludes that the impact of such factors renders it likely that the 30-hour guidance limit is satisfied in practice.

Medical evidence of Prof Kevin Gournay and Dr. Declan Murray

163. As Ms. Webster and Mr. Rollo seek damages for personal injuries, the psychological impact of the WTN was addressed by Prof. Kevin Gournay, Chartered Psychologist and Prof. of the Institute of Psychiatry, Psychology and Neuroscience, Kings College, London - who gave evidence on behalf of the plaintiff - and Dr. Declan Murray consultant psychiatrist of Glebeview Clinic- who gave evidence on behalf of the defendant. Both experts were eminently experienced and qualified and gave evidence in a measured, considered and independent manner.

<u>Medical opinion in respect of Margaret Webster</u>

164. There was a divergence of views as between the medical experts in relation to Ms. Webster. Prof. Gournay's view is that she satisfied the criteria for a recognisable psychiatric illness; a depressive disorder, which he classified as mild to moderate. This resulted from a complex range of synergies; principally anxiety concerning Mr. Rollo together with sleeplessness and irritability caused by the WTN.

165. Dr. Murray's view was that Ms. Webster had not suffered from an identifiable psychiatric disorder. Whilst there is no doubt that the WTN and the disintegration of her relationship with Mr. Rollo had imposed considerable stress on Ms. Webster, she has coped with that stress. Therefore, although Dr. Murray accepted that Ms. Webster experienced sleep difficulties, felt down in herself and had become tense and irritable, his key point is that her

reaction was understandable; she succeeded in managing her emotions and reactions. In short, her psychological reaction to the circumstances was not disproportionate. Nor did Dr. Murray view Ms. Webster's symptoms of depressed mood and diminished interest as sufficiently pervasive or prolonged to qualify as a psychiatric injury.

166. With respect for the contrary view of Prof. Gournay, I agree. Ms. Webster has had to tolerate an extremely difficult situation for the past number of years. Overall, however I accept the evidence of Dr. Murray that her reaction to the WTN is not disproportionate to the circumstances that she is experiencing. As such, I also accept his view that Ms. Webster has not suffered from a recognisable psychiatric illness and does not currently so suffer.

Medical opinion in respect of Keith Rollo

167. When Prof. Gournay first examined Mr. Rollo in December 2020 he was extremely concerned for his mental well-being. Mr. Rollo's history was of expressed emotions of hopelessness and helplessness in the face of unremitting WTN and impulsive thoughts of suicide. These red flags for suicide, when juxtaposed with the fact that Mr. Rollo worked at heights, providing him with suicidal means and opportunity, prompted Prof. Gournay to take the extremely unusual step of intervening in the legal proceedings. He informed the plaintiff's solicitor of his concern and strongly suggested that the wind turbine was turned off at night so that Mr. Rollo's chronic sleep disturbance might be mitigated. As I note above, a request to this effect was refused by the defendant.

168. Prof. Gournay diagnosed Mr. Rollo as suffering from a major depressive disorder of at least moderate severity with low mood, sleep disturbance, irritability and anger. Dr. Murray did not substantially disagree.

169. There was some disagreement between Prof. Gournay and Dr. Murray in relation to Mr. Rollo's progress after diagnosis. On this, I find that Mr. Rollo's depression improved significantly after he moved away from the turbine in early 2021. However, in mid-2022, he experienced a recurrence of his symptoms. This recurrence was characterised by anxiety rather than depression and was in the mild to moderate range. Mr. Rollo attributed this recurrence to the upcoming court case which is an entirely reasonable explanation. I accept Dr. Murray's view that Mr. Rollo's depression has now substantially resolved, albeit that some residual

symptoms persist at a subclinical level. In addition, Mr. Rollo remains vulnerable to further episodes of depression and anxiety in the future.

170. In terms of causation, Dr. Murray opined that although the windfarm contributed to Mr. Rollo's depression, other potential risk factors mean that it is possible that he could have developed depression in any event. I find that this is improbable as most of the vulnerabilities described were longstanding and yet Mr. Rollo had never before suffered from depression. Mr. Rollo's past history appears to have been of a robust person. He had not previously experienced sleep disturbance or psychiatric symptoms save for a brief transient episode of anxiety.

171. Given the absence of any prior insomnia and the temporal relationship between the operation of the turbine and the onset of Mr. Rollo's sleep disturbance, I conclude that the WTN is the sole cause of this sleep disturbance. Further, in light of the well described relationship between sleep disturbance and depression, I accept Prof. Gournay's view that Mr. Rollo's depression was entirely reactive to the external stressor posed by the WTN and the resulting long term sleep disturbance.

172. Accordingly, I find on the balance of probabilities that the cause of Mr. Rollo's depression was the WTN and the sleeplessness associated therewith. I am fortified in this view by the fact that the medical records demonstrate significant improvement - no doubt assisted by modalities such as antidepressant medication and counselling - once Mr. Rollo moved away from the turbine.

173. I accept Prof. Gournay's view that the unremitting WTN, his lack of sleep and his depression ultimately affected Mr. Rollo's personality and outlook. I further accept that for a period of time, probably commencing in mid to late 2020 and perhaps continuing for a couple of months after he moved out of HH, this impacted upon Mr. Rollo's overall response to the WTN which was often characterised by obsessive ruminations. I also accept that this personality change was a manifestation of Mr. Rollo's illness and was also therefore precipitated by the WTN.

Planning Guidance in relation to Wind Energy Developments

174. The defendant's primary defence is that it is not open to this Honourable Court to find that the threshold for nuisance impact should be set at a specific level other than the noise limit set out in the planning permission and that because the WTN complies with this noise limit, nuisance is not established. I should consider this argument at the outset because, if accepted, it would be dispositive of the case.

175. Before embarking on this exercise, however, it is necessary to refer to planning guidance on wind turbine developments at the time of the grant of the Ballyduff planning permission. This is important to the interpretation of the Ballyduff planning permission (which, as we shall see is a matter of dispute between the parties). An understanding of the planning framework is also required to assess another aspect of this argument; namely the defendant contends that both the noise limits set in the Ballyduff permission and the WTN which it produces comply with all appropriate planning guidance on WTN at the time of the grant of permission. In addition, an appreciation of more recent planning guidance on wind turbine developments is similarly of relevance as the defendant also argues that both the noise limits set in the Ballyduff permission and the WTN is in compliance with current expertise on WTN[29]. Therefore, in addition to summarising planning guidance at the time of the grant of permission and to date, I will where relevant, highlight how same might be applied to the Ballyduff permission or to the WTN itself. At a later section of this judgment, I deal separately with the Defra Guidance (which is not planning guidance but rather guidance on the assessment of statutory nuisance complaints concerning WTN).

Guidance pre-dating the planning permission

176. The parties opened two key pieces of guidance pre-dating the permission: first, the ETSU-R-97 guidelines, *The Assessment and Rating of Noise from Wind Farms* published by the Department of Trade and Industry in 1996 ("ETSU") and second, WEDG 1996.

[29] Thus, the defendant argues that "*the permission limits continue to reflect the current combined wisdom and expertise of appropriately qualified experts as to what levels of WTN"* [are reasonable]. It further contends that because the WTN complies with those permission limits, it reflects that current wisdom and expertise and is by definition not unreasonable.

ETSU

177. ETSU sets out a framework for noise levels thought to offer a reasonable degree of protection to windfarm neighbours without placing unreasonable restrictions on windfarm developments. Since its adoption, ETSU has been the primary framework by which planning conditions pertaining to wind farms are set in the United Kingdom. It is also the primary methodology by which planning compliance continues to be assessed in both the United Kingdom and Ireland.

178. ETSU assumes that WTN relative to background noise is likely to be greatest at low windspeeds. However, it acknowledges that assumption does not always hold true for turbines on hillier sites which may experience high winds, whilst the sheltered receptor will experience low levels of wind generated noise.

179. ETSU recommends that noise limits should be set relative to existing background noise at the nearest noise sensitive properties and that the limit should reflect the variation in both the WTN and background noise with windspeed.

180. Ultimately, a combined relative and fixed limit was recommended. In general, WTN would be limited to 5 dBA L90 above the background sound levels (the relative limit) or a value in the range of 35 to 40 dBA L90 (the fixed limit), whichever is greater. In low noise environments, the day-time level of the L90 of the wind farm noise should be limited to an absolute level within the range of 35-40 dBA L90.

181. An absolute night-time limit of 43 dBA L90 was recommended as appropriate to protect sleep. This limit was not felt to offer sufficient protection to external amenity in quiet areas during the day.

182. The ETSU approach applies the noise limit only to WTN and not to total operational noise, which is a combination of WTN and background noise. As it will often be difficult to isolate one from the other, ETSU assumes that if total operational noise is below the relevant noise limit, then no further action is necessary. Conversely, if total operational noise is above the relevant noise limit, then a correction for the influence of the existing background noise should be performed. In such circumstances, compliance cannot be demonstrated without ascertaining background noise.

183. In 2013, the Institute of Acoustics (IOA) released a *Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* ("GPG") which addressed many technical aspects of ETSU. In 2014, the IOA published six Supplementary Guidance Notes to the GPG, which provided further information on specific aspects of the assessment procedures. For present purposes the most important of these is Supplementary Guidance Note 5 on Post Completion Measures ("Supplementary Guidance Note 5") which governs the technical aspects of ETSU planning compliance assessments.

WEDG 1996

184. WEDG 1996 were the relevant planning guidelines at the time of the grant of planning permission in this case. These provided that noise levels measured externally at any dwelling house should not exceed 40 dBA Leq and that tonal or impulsive qualities in the noise should be avoided. I pause to note that although I find that the noise limits set in the Ballyduff permission are generally in accordance with WEDG 1996, total operational noise is frequently above 40 dBA Leq.

Guidance post-dating the planning permission

WEDG 2006

185. The current assessment framework applying to the grant of planning permission for wind farms is set out in the planning guidelines issued by the Department of the Environment, Heritage and Local Government in December, 2006, WEDG 2006.

186. WEDG 2006 characterises aerodynamic noise from wind turbines as general broadband noise which can display some "character" ("swish"). The possibility of thump AM is not mentioned. Noise limits should be applied to external locations. The chosen measurement index is L90 which is intended to allow reliable measurement without corruption from relatively loud transitory noise events from other sources.

187. In general, significant noise problems are unlikely where the distance from the nearest turbine to any noise sensitive property is more than 500 metres. I pause to note that T2 is of course 359/369 metres from the plaintiffs' dwellings.

188. During the day, WEDG employs a combination of relative and fixed noise limits. The language here is somewhat ambiguous. The guidelines provide for "*a lower fixed limit of 45 dBA or a maximum increase of 5 dBA background noise"* without specifying whether it is intended that the lower or greater of these two limits apply. I accept the defendant's argument that planning authorities are free to choose whichever of these limits is greater. Therefore, save in low noise environments, WEDG 2006 deems it acceptable to set a limit of 45 dBA L90 irrespective of background noise levels.

189. WEDG 2006 notes that during the night the protection of external amenity becomes less important, and the emphasis should be on preventing sleep disturbance. It provides that a fixed limit of 43 dBA will protect sleep inside properties during the night.

190. The defendant argues that the Ballyduff permission complies with the recommendations in WEDG and that the WTN experienced at the plaintiffs' homes also so complies. Strictly speaking, confirming compliance with WEDG requires an assessment of whether or not this is a low noise environment. There is presently no compelling evidence either way on this issue[30]. I will therefore give the defendant the benefit of the doubt and assume that the above noise limits apply.

191. As such, the two noise limits set out in the Ballyduff permission (40 dBA leq and 45 dBA leq), which are either below or equal to the WEDG noise limits (45 L90during the day and 43 L90 during the night) therefore comply with WEDG 2006.

192. The defendant consequently argues that because the Ballyduff WTN complies with the noise limits in the permission. this means *a fortiori*, that the WTN also complies with WEDG 2006.[31] I will accept, for the sake of argument, that this is so.

193. The key point however is that the issue of compliance or otherwise with the WEDG 2006 limits is largely beside the point. This is because, for reasons I will explain in due course,

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[30] See para 512 below for an analysis of the parties' respective evidence on background noise levels.

[31] For reasons I will detail below, I am of the view that the Ballyduff WTN is not in fact in compliance with the permission because the defendant has misinterpreted the permission limits. That however is not of immediate relevance because, as at this point of my discussion, I am considering whether the defendant is correct in submitting that the Ballyduff WTN complies with the *WEDG* noise limits.

I do not view WEDG 2006 as delineating the parameters of WTN nuisance in this particular case.

Developing understanding of AM and the Institute of Acoustics (IOA) Reference Method (IOA RM)

194. Whilst ETSU and WEDG 2006 continue to be applied in the UK and Ireland respectively, it is now recognised that there is a need to address noise impacts in a more nuanced way.

195. Although the ETSU methodology is intended to absorb any additional impact due to AM into the noise limits it recommends, it does not fully address the potential impact of AM in WTN in at least three respects. First, ETSU understood AM as overwhelmingly of the "swish" variety and no real account is taken of the possibility of AM of a lower frequency character, "thump AM". Second, ETSU primarily contemplates AM values of *"up to"* 3 dBA. Indeed, the ETSU Review[32] points out that on the basis of the comments in ETSU, the value of 3 dBA is sometimes referred to as the 'expected level' of AM. However, it is now apparent that AM can display AM values much greater than this. Third, ETSU assumes that as distance from the turbine increases beyond 50 metres, the rhythmic swishing would become less pronounced, reducing audibility. It is now clear that "thump AM" - compared with "swish AM"- can be discerned at longer ranges and over different wind directions.

196. Concerns about AM, particularly lower frequency "thump" AM, led to the commissioning of several UK government funded surveys. Ultimately, in 2016, the findings of two parallel AM studies were reported. The first was the IOA led investigation ("the IOA AM report") which states:

> *It is now generally accepted that there are two manifestations of wind turbine AM. An observer close to a wind turbine will experience 'blade swish' because of the directional characteristics of the noise radiated from the trailing edge of the blades as it rotates towards and then away from them. This effect is … not generally expected to be significant at typical separation distances, at least on relatively level sites. The Renewable AM project… has coined the term 'normal' AM (NAM) for this inherent characteristic of WTN, which has long been recognised and was discussed in ETSU-R-97 in 1996 (ETSU, 1996)*

[32] As to which see further para 216 below.

> *In some cases, a form of AM is observed at residential distances from a wind turbine (or turbines). The sound is generally heard as a periodic 'thumping' or 'whoomphing' noise containing relatively low frequencies… The prevalence of this type of modulation is subject to debate. On sites where it has been reported, occurrences appear to be occasional, although they can persist for several hours under some conditions, dependent on atmospheric factors, including windspeed and direction.…The Renewable UK AM report adopted the term 'Other AM' (OAM) for this characteristic. Elsewhere it might be reported as Excessive Amplitude Modulation (EAM).*

197. The purpose of the IOA AM report was to devise a method for measuring and rating AM in WTN. The primary goal was to develop a methodology to be used within the planning regime. I will consider in due course[33] the relevance of the methodology ultimately developed by the IOA for rating AM ("the IOA RM") to the exercise currently being conducted by this court.

198. The second 2016 study, the Phase 2 report, concluded that AM controls were needed at development planning stage and that this was best achieved by means of a suitable penalty scheme whereby, increasing levels of AM would attract a decibel penalty which would be added to the relevant sound power levels for the purposes of fixing decibel limits.

199. In simple terms the combined effect of the IOA RM and the Phase 2 Report is as follows: first, pursuant to the IOA reference, turbine related AM is calculated over ten seconds blocks. This is measured by deducting the L95 (the sound power level exceeded for 95% of the time) from L5 (the sound power level exceeded for 5% of the time). Provided that at least 50% of the ten second blocks contain detectable AM, average AM is logged for that 10 minute period. Thereafter, the AM value for each ten minute period is to be converted to a penalty which is then correlated with the relevant windspeed and incorporated into the decibel limit at the windspeed in question.

<u>Proposed revisions to WEDG 2006</u>

200. In Ireland, the Department of the Environment, Community and Local Government has produced three different draft guidance documents proposing various revisions to WEDG 2006.

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[33] See para 421 *et seq.*

Proposed revision to Wind Energy Development Guidelines 2006 – targeted review in relation to noise, proximity and shadow flicker, December 11th, 2013.

201. On 11th December, 2013, the Department published proposed revisions to WEDG 2006 on which it invited submissions ("the 2013 draft revision"). The 2013 draft revision recognised that distinctive special audible characteristics of WTN including impulsiveness, AM and low frequency presented a challenge. WTN can be influenced by a variety of factors not directly related to distance such as topography, ground cover, windspeed and direction.

202. The 2013 draft revision recommended 40 dBA L90 as an outdoor limit which would apply irrespective of day or night. Exceptions were possible in the case of consent of the windfarm neighbour impacted. I note that total operational noise at NF is in excess of 40 dBA L90 at windspeeds above approximately 8 m/s. Total operational noise at HH is in excess of 40 dBA L90 at windspeeds above approximately 6 m/s.

2017 Preferred draft Approach.

203. In 2017, a preferred draft approach was circulated. The preferred draft approach proposed a relative noise limit of 5 dBA above existing background noise within the range of 35 to 43 dBA L90 with 43 dBA L90 being the maximum noise limit permitted day or night. The noise limit would be further reduced to take account of AM and low frequency noise. I note that total operational noise at NF is in excess of 43 dBA L90 at windspeeds of 9.5 m/s and above.

204. The preferred draft approach provided that shadow flicker would be eradicated in full by technology and appropriate modelling at design stage. It was expected that strategic environmental assessment would be undertaken and that guidelines would be finalised and issued by the first quarter of 2018.

Draft revised Wind Energy Development Guidelines December 2019 ("draft WEDG 2019").

205. Draft WEDG 2019 was issued for public consultation in December 2019 ("draft WEDG 2019"). Their aim was "*to strike a better balance between addressing the concerns of the local communities in relation to wind farm proposals, whilst maintaining Ireland's ability to deliver on its binding energy policy obligations, and ensuring that there is greater, and earlier, community engagement by windfarm developers*".

206. The noise limits in the draft WEDG 2019 were undoubtedly more onerous than the WEDG 2006 and afford a higher level of protection to people who live in the vicinity of any future wind farm developments. The defendant in the present case submits that the WTN complies with draft WEDG 2019. Although I emphasise that WEDG 2019 is draft guidance only and further that it has now been withdrawn, I will nonetheless consider whether the defendant is correct in this argument.

207. Draft WEDG 2019 notes that the principle of a 5 dBA increase above background levels has been regarded as good practice for many years and proposed the adoption of this basic structure subject to a lower limit value of 35 dBA L90 and an upper limit value of 43 dBA L90. Effectively, this imposed a limit of 35 dBA L90 as a default until the 5 dBA above background levels exceeds this and 43 dBA L90 is the maximum noise permitted day or night, regardless of background noise level. Therefore, although the defendant contends that the Ballyduff WTN complies with draft WEDG 2019, compliance cannot be assessed, still less confirmed, absent a background noise study at this site.

208. Draft WEDG 2019 also recognised the particular challenges posed by thump AM. It notes that although the characteristic sound close to a wind turbine could be described by the listener as a regular 'swish' which decreases rapidly with distance, under adverse conditions at a distance of several hundred metres from the turbine, whoomphing or thumping type noise can dominate and cause annoyance at lower levels than noises without such characteristics. While such AM can occur over extended periods it tends to vary in intensity, adding to the annoyance.

209. Draft WEDG 2019 proposed a rating penalty for certain special audible characteristics (tonal noise and AM) in addition to a fixed threshold for low frequency noise. It was felt that subjective listening tests and direct measurements did not provide a reliable method of quantifying AM for the purposes of applying the penalty scheme. Accordingly, draft WEDG 2019 recommended the application of the IOA RM as an objective and reliable methodology for quantifying AM.

210. Draft WEDG 2019 acknowledged that the setting of a threshold for excessive AM is not straightforward. It notes that available research at that time did not identify a clear level at which the impact of WTN AM becomes "significant" "excessive" or "unacceptable". However,

research suggested an onset of perception at an AM value of about 2 dB and above this, rising annoyance with increasing AM values is expected. Moreover, the research highlighted a very strong relationship between annoyance and the overall sound power level - i.e., overall loudness- of the WTN.

211. The penalty scheme proposed in draft WEDG 2019 operates by penalising higher AM values as follows:

- AM with an AM value of less than 3 dB - no penalty
- AM with an AM value of 3dB to 10 dB - sliding scale of penalties ranging from 3 to 5 dB
- AM with an AM value of more than 10 dB - 5 dB penalty.

212. Draft WEDG 2019 recommended using only night-time measurements to isolate WTN from other potential noise sources. Draft WEDG 2019 noted that AM has been shown to occur in both downwind and crosswind conditions and that where a complaint relates to AM noise all wind directions associated with AM should be included in determining the rated noise level. I pause here to note that the defendant's compliance data only relates to one wind direction: directly downwind.

213. In any event, total operational noise at NF is in excess of 43 dBA L90 at windspeeds above 9.5 m/s. If therefore the Ballyduff WTN attracts any AM penalty, then total operational noise would exceed the recommended maximum noise limit in draft WEDG 2019. The plaintiffs' experts have purported to perform an IOA RM analysis which is said to suggest an AM penalty of 5 dB. For various reasons, I accept the defendant's argument[34] that the plaintiffs' IOA RM cannot be relied upon to calculate likely penalties under draft WEDG 2019.

214. I deal separately at para 471 below with the defendant's expert's contention that the WTN would comply with the recommended limits in draft WEDG 2019 regardless of any character penalty that could be applied. Suffice it to say for the moment that, as the defendant has not even attempted to estimate background noise or to calculate what penalties might apply, I am at a loss to see how it can confidently contend that the WTN complies with draft WEDG 2019.

[34] The defendant's argument is set out at para 143 above.

215. Draft WEDG 2019 also recommended that shadow flicker would not to be tolerated at all. It notes that shadow flicker can easily be prevented through the installation of sensor-based switches / control mechanisms.

ETSU Review

216. The Department of Business, Energy and Industrial Strategy in the UK commissioned a review of ETSU, which was completed in October 2022 and published in February of 2023 ("the ETSU Review"). The primary aim of the ETSU Review was to make a recommendation on whether, in view of United Kingdom government policies on noise and Net Zero, and available evidence, ETSU required updating. The ETSU Review concludes that current regulation in relation to the potential impact of AM in particular should be reviewed and updated. Although, unsurprisingly, its recommendations have not yet been actioned, the ETSU Review provides a helpful objective overview of how the science has moved on since ETSU.

217. The ETSU Review observes that the need for official guidance on the control of AM in wind turbine sound was the single most common theme arising in its review. AM annoyance is influenced by both the AM values and the spectral frequency of the WTN. Increased annoyance is associated with thump AM, which propagates further, and is more effective at transmitting through structures. The ETSU Review notes that AM values for thump AM can be greater than for swish AM. It also notes that there is strong evidence demonstrating that thump AM is more prevalent at night, due to atmospheric conditions. Although thump AM is difficult to predict, it can potentially be mitigated by control of the blade pitch angle.

218. The ETSU Review concluded that AM is secondary to the overall sound level in determining subjective responses, and that the added impact of AM can be quantified as a change in the equivalent sound level. For planning purposes, the ETSU Review therefore favours a methodology similar to that recommended by draft WEDG 2019 - i.e., the use of IoA RM to rate AM combined with a decibel penalty system for AM.

219. In summary, in so far as relevant, my view in respect of the application of all the above planning guidelines to the Ballyduff windfarm is as follows:

220. I am satisfied that the noise limits set in the Ballyduff permission comply broadly with WEDG 1996. These noise limits also broadly comply with WEDG 2006. However, as the permission does not purport to relate the noise limits to background noise or to regulate AM, the permission does not "comply" with draft WEDG 2019. In other words, the permission does not reflect draft WEDG 2019.

221. I am not satisfied on the balance of probabilities that the WTN on site complies with WEDG 1996. I accept for the sake of argument that the WTN complies with WEDG 2006. Although the defendant maintains that the WTN also complied with the recommendations in draft WEDG 2019, this has not been demonstrated. Clearly, in the absence of a background noise assessment and a fully compliant IOA RM assessment of possible AM penalties, one cannot be satisfied one way or the other on whether the WTN complies with draft WEDG 2019. In any event, as draft WEDG 2019 has now been withdrawn this is not in my view an issue which I have to determine.

Relevance of planning permission-two potential zones of relevance of the permission

222. The grant of planning permission for a particular use is of potential relevance to a nuisance claim in two distinct ways.

223. First, the grant of planning permission (and its terms and conditions) may permit the very intrusion (for example, noise) which is alleged by the plaintiff to constitute a nuisance. In the present case, the question is the extent, if any, to which the planning permission (or the noise condition specified therein) can be relied on as a defence to this nuisance claim.

224. Second, as stated at para 30 above, nuisance is always assessed by reference to the character of the particular locality. The grant of permission for the development impugned may authorise the use of the defendant's property for certain purposes potentially changing the character of the locality. In the present case, the question is whether the plaintiffs' locality should be seen as including the defendant's windfarm at Ballyduff.

Issue 1: is the court bound by the noise condition in the planning permission in assessing what is objectively reasonable for the purposes of determining a claim for nuisance? Is the noise condition in the planning permission a wholly reliable indicator of what WTN is reasonable for the purposes of determining a claim for nuisance?

The defendant's argument

225. In *Cork County Council v. Slattery Pre Cast Concrete Ltd* [2008] IEHC 291, Clarke J. observed:

> *"It is, of course, the case that the mere fact that a party operates in accordance with a valid planning permission does not give that party the right to commit a civil wrong to neighbouring properties. Therefore, the mere fact that [the defendant] might operate in accordance with a valid planning permission does not, of itself, preclude the possibility that there might nonetheless be a nuisance actionable at the suit of neighbouring property owners."*

226. The defendant does not dispute that as a matter of common law and statute,[35]planning permission cannot deprive a property owner of a right to object to what would otherwise be a nuisance. The grant of planning permission for a particular development does not mean that the development is lawful, but that a bar to the use imposed by the planning law in the public interest has been removed.

227. Notwithstanding this, the defendant nonetheless argues that the court is *"bound"* by the terms and conditions of the planning permission in assessing what is objectively reasonable for the purposes of this nuisance claim. This argument was advanced in a number of different ways which I will consider below.

228. In its oral submissions the defendant argued that the court was bound to accept and apply the noise limits in the planning permission as a wholly reliable indicator of what the ordinary person would expect in terms of noise control. Although purporting to accept that planning permission cannot *per se* provide a defence to nuisance, it was argued that *as a matter of law*, a permission which specifically regulates the matter complained of – in this instance,

[35] Section 34 (13) of the Planning and Development Act 2000 provides that a person shall not be entitled solely by reason of a planning permission to carry out any development.

noise – prevents the court from concluding that operation in accordance therewith constituted a nuisance. That, it was said[36] was "*the end of the matter"*.

229. The defendants' closing written submissions were more nuanced and argued that the planning permission is "*a key item of evidence*" establishing that the expectations of an objectively reasonable person had not been *"exceeded"* in this instance. The permission noise limits therefore comprise evidence of a "*reasonable objective standard*".

230. Finally, the defendant argues that the noise limits in the permission ought to benefit from curial deference.

231. The defendant maintains that *Smyth v. Railway Procurement Agency* is binding authority in support of these arguments. It is therefore necessary to consider *Smyth v. RPA* in considerable detail.

Smyth v. RPA

232. The plaintiffs' ("the Smyths") case was that the newly established Green Line LUAS light railway system operated by the defendant ("RPA") caused them a noise nuisance. They sought an order directing the RPA to erect an appropriate acoustic barrier together with damages for nuisance, negligence and breach of statutory duty.

233. Supported by several of their neighbours, the Smyths maintained that the noise of the trams had an adverse impact on the amenity of their back gardens (which backed on to the LUAS tracks); that it was difficult to hold a normal conversation in the garden; that the noise of the trams was very intrusive in the kitchen, dining area and living areas of their house and that the noise impact in the bedrooms at the rear of the house (which were roughly level with the tracks) was such as to cause serious sleep disturbance which was their single greatest complaint. The Smyths experienced difficulty getting to sleep and were obliged to close their bedroom windows and ultimately to move out of their master bedroom at the back of the house.

234. An understanding of the statutory context and process underlying the development of the Green Line, a major public infrastructural project, is crucial to appreciating the approach

[36] Quoting from para 34.9 of *Smyth v RPA*, as to which see para 252 below.

taken by Laffoy J. in *Smyth v RPA to* (1) the legal effect of the Line B Order pursuant to which the LUAS was established; and (2) the consequent ascertainment of the appropriate objective standard to apply to the Smyths' nuisance complaint.

235. The Transport (Dublin Light Rail) Act 1996 ("the 1996 Act") enabled the Minister for Public Enterprise ("the Minister") by order to authorise the construction and operation of the light rail. The statutory process required that the application to the Minister was accompanied by an Environmental Impact Statement ("EIS") including detailed forecasting on noise emissions. The EIS included detailed analysis of the likely noise impacts on an area by area basis. The likely exceedance of the noise of the trams over the background noise was rated into three categories: "*slight"*, *"moderate"* and *"significant"*. Where necessary, mitigation measures in the form of acoustic screening were proposed for certain areas.

236. The application was published and any persons likely to be affected had a statutory entitlement to make submissions to the Minister. The Minister was mandated to appoint an inspector to conduct a public inquiry and submit a report of the resulting findings and recommendations. All affected landowners and occupiers and other interested parties were entitled to appear at the inquiry.

237. Judge Sean O'Leary ("the inspector") was appointed as inspector to conduct the inquiry which proceeded in three stages considering first, the *prima facie* need for the light rail, secondly whether the scheme was practicable, viable and safe and thirdly the impact of the Green Line on local communities. The issue of noise and vibration was a key issue to the third stage. The inspector heard evidence from an acoustic engineering consultant who had contributed to the sections of the EIS on noise. The inspector considered the area by area analysis conducted by this expert, commended the objectivity of his evidence and ultimately concluded that if operated in accordance with the noise conditions set out in the EIS, the noise and vibration impacts of the LUAS would be "*slight*". The inspector recommended the inclusion of detailed noise conditions in the Line B order together with general conditions in relation to monitoring noise emissions.

238. S.I. No. 280/1999- Transport (Dublin Light Rail) Act, 1996 (Line B – St. Stephen's Green to Sandyford Industrial Estate Light Railway) Order, 1999 ("the Line B Order") promulgated in September 1999- expressly authorised the construction and operation of the

Green Line and as recommended by the inspector, included a condition (condition 28) obliging RPA's predecessor ("NPS") to agree daytime and night-time limits at each relevant location with the appropriate local authority. Condition 28 further required that; in default of agreement, such matters would be determined by the Minister.

239. Two particular findings assist in understanding the significance of *Smyth v. RPA* to the issues at hand. First, Laffoy J. found that - as NPS had not in fact sought to agree or have such limits determined, condition 28 had not been complied with. Second, the court found, as a fact, that the LUAS operated in accordance with the conditions set out in the EIS and also within the more exacting limits published by the National Roads Authority in October 2004.

240. The courts' reasoning in *Smyth v. RPA* has two primary components.

First component of court's reasoning in *Smyth v RPA* - possible application of the defence of statutory authority

241. First, Laffoy J. determined that if the Green Line had been operated in strict accordance with the Line B Order, then that would be a complete answer to the claim in nuisance. In such circumstances the defendants would be operating the Green Line in accordance with the law and there could be no question of the perpetration of a civil wrong. Thus, at para. 3.7, Laffoy J. states:

> *"The real issue, the liability of the defendants for noise generated by the operation of the Green Line, is primarily determined by what the Acts of the Oireachtas and the secondary legislation under which the defendants operate the Green Line authorise them to do."*

242. Paragraph 32.10 is to broadly similar effect:

> *"The defendant is a statutory body, which by virtue of (the 1996 Act) has power to operate the Green Line in accordance with the terms of the Line B Order. If, as a matter of the proper construction of the Line B Order, the defendants are entitled to operate the Green Line at the rear line of No. 3 in the manner in which they are operating it, they are operating it in accordance with law, that is to say, in accordance with an Act of the Oireachtas and the secondary legislation made under it, both of which enjoy the presumption of constitutionality and that is a complete answer to the plaintiffs' claim. Alternatively, if the defendants are not operating the Green Line at that location in accordance with the terms of the Line B Order, the ordinary principles of common law apply in the defence to the plaintiffs' claim for nuisance."* (Emphasis added)

243. Counsel for the defendant invoked the language of para 32.10 and submitted that, *"at a high level*" its logic provided a *"complete answer*" to the plaintiff's claim in the present case. This aspect of the defendant's approach is somewhat contradictory. On the one hand it accepts that these passages in *Smyth v. RPA* concern the defence of statutory authorisation and cannot be read across to a grant of planning permission. On the other hand, it relies upon para 32.10 (and similar passages) to argue that because the planning permission for the Ballyduff turbines sets specific noise limits (with which it is asserted it complies), this provides a complete defence to a claim in nuisance in a manner equivalent to that provided by the Line B Order.

244. This cannot be correct. This component of Laffoy J.'s reasoning concerns an argument based on the defence of statutory authority. *Smyth v. RPA* does not support an argument that compliance with specific noise limits in a planning permission is necessarily a complete answer to a claim for noise nuisance. There is a difference between development specifically authorised by legislation and development on foot of a decision made by a planning authority in the form of a single planning permission. Indeed, it is relevant to note that although she reviews Irish and England & Wales authorities in relation to the impact of planning decisions on nuisance, Laffoy J. ultimately considered these authorities to be of "*little relevance*" to the case before her.

Second component of court's reasoning in *Smyth v. RPA*-"*wholly reliable indicator"*

245. The second component of Laffoy J.'s reasoning – pithily framed in the concluding sentence of para 32.10 (see above) - was that because the Line B Order had not in fact been strictly complied with (due to non-compliance with condition 28), the ordinary principles of common law applied in assessing the claim to nuisance. As the present case does not concern the defence of statutory authority, it is this second component which is of direct relevance.

246. Laffoy J. observed that the kernel of the plaintiffs' case was that the Green Line subjected them to serious noise nuisance, including sleep disturbance. Laffoy J. accepted the *bona fides* of the Smyths and concluded that there was no doubt on the evidence that they subjectively perceived that the operation of the Green Line interfered with the ordinary comfort and enjoyment of their home. However, the existence of nuisance is established by applying an objective standard. The defendant emphasises to this court that, in determining what that objective standard was, Laffoy J. adopted the noise conditions set out in the Line B Order itself.

247. The crucial passage of the judgment upon which the defendant places most reliance appears at para. 34.2:

> *"Even though the Line B Order has not been strictly complied with in the operation of the Green Line by the defendants since 2004, because of non-compliance with condition 28, the process which led to the making of the Line B Order in accordance with the Act of 1996, and its outcome, in my view, is a wholly reliable indicator as to what the ordinary person whose requirements are objectively reasonable would expect in terms of noise control and noise mitigation in the operation of the Green Line.*
>
> "*Every person who was likely to be affected by the operation of the Green Line had a statutory entitlement to make submissions to the Minister and to attend at the public inquiry conducted pursuant to the Act of 1996 and to make submissions,* inter alia, *on the proposals in the EIS in relation to noise and to noise mitigation. The question of noise was addressed at the public hearings and in the Inspector's report. He took cognisance of the views of the members of the public who appeared and made representations. On the basis that the projected noise levels identified in the EIS would be observed, and subject to compliance with conditions in relation to specific areas, and the general condition in relation to monitoring and fixing day-time and night-time limits, the Inspector found that the noise aspects of the project appeared to be satisfactory. There has been no challenge to that finding.*
>
> *…Therefore, I consider that I am entitled to treat the inspector's finding* [that the noise aspects of the project as set out in the EIS was satisfactory] *as the starting point of identifying the yardstick in applying the objective test. But for the fact that it has not been fully implemented, as conditioned into the Line B Order by (the NPS), it would be conclusive."*(Emphasis added)

248. Here, Laffoy J. is not solely concerned with the defence of statutory authority but with the common law principles governing the tort of private nuisance. The learned judge considered that the noise conditions in the EIS and the Line B Order were a proxy for the objective test of what is reasonable. She was satisfied that the inspector's finding in relation to the noise levels predicted in the EIS were a "*wholly reliable indicator*" as to what the ordinary person whose requirements are objectively reasonable would expect in terms of noise control. Therefore, operation of the Green Line within the noise levels predicted in the EIS – which were conditioned in the Line B Order - did not infringe the comfortable and healthy enjoyment expected by an ordinary person whose requirements are objectively reasonable in the particular circumstances. Laffoy J. therefore held that the Smyths had not established nuisance.

<u>The proposition of law contended for by this defendant</u>

249. This defendant effectively seeks to substitute the words "*the 2004 planning permission*" for the words *"the process which led to the making of the Line B Order in accordance with the*

Act of 1996" in para. 34.2 of Laffoy J.'s judgment. Counsel opened this particular passage to the court and stated, *"we say exactly the same thing pertains here."*- in other words that the limits in the permission are, as a matter of law, a wholly reliable indicator of what is objectively reasonable in terms of noise.

250. However, this aspect of Laffoy J.'s finding in *Smyth v. RPA* was based on the evidence before her. Weight is placed on the statutory genesis of the process culminating in the Line B Order. Weight is also placed on the robustness of the process, the evident depth of the consideration of the noise impacts complained of and the need for acoustic barriers. All this provides the context for Laffoy J.'s finding that the noise limits were *"a wholly reliable indicator".*

251. This is evident from the very passage relied upon by this defendant (para. 34.2) in which Laffoy J. highlighted the following pertinent aspects of the statutory process and the resulting noise conditions: (a) every person who was likely to be affected by the operation of the Green Line had a statutory entitlement to make submissions; (b) such a person had a statutory entitlement to attend at the public inquiry and to make submissions *inter alia* on the proposals in the EIS in relation to noise limits and mitigation; (c) the question of noise was addressed at the public hearings and in the inspector's report; (d) the inspector took cognisance of the views of the members of the public who made representations; (e) the inspector determined that on the basis of the projected noise levels and mitigation measures identified in the EIS the noise impact of the project would be satisfactory and (f) there had been no challenge to that finding. These factors permitted the court to treat the inspector's finding as the yardstick to be applied in determining the objective test.

252. It cannot be gainsaid that the process under consideration in *Smyth v. RPA* was not only of statutory origin; it also incorporated a searching and comprehensive investigation, analysis and assessment of all noise aspects of the project. The relevance of these considerations to Laffoy J.'s finding is further evident at para. 34.9. Laffoy J. stated that if the NPS had complied with condition 28 and if the daytime and night-time limits set had accommodated the level of noise complained of by the Smyths then "*… that would have been the end of the matter."* She continued:

> *"The defendants would be operating the Green Line in accordance with the law and there could be no question of the perpetration of a civil wrong on the plaintiffs. Where, in pursuance of a statutory process*

of the type formerly provided for in the Act of 1996, and now provided for in the Act of 2001, standards are established for permitted environmental effects and impacts of the construction and operation of a major public infrastructure, such as a public transport system, those are the standards by reference to which the statutory undertaker is authorised and required to act. In such circumstances, it is not open to an occupier of property in the vicinity of the infrastructure to contend that some other standard should be applied. In this case, in my view, as a matter of law, it was not open to the plaintiffs to contend that the Green Line must be operated in accordance with the WHO guidelines or the BS Code requirements so as to avoid committing a nuisance."(Emphasis added)

253. This finding of the court was on the evidence before it. The statement of principle expressed in this passage may not simply be applied to a totally distinguishable process such as a grant of planning permission for a single windfarm, particularly where (as will be further discussed below) that process does not reveal detailed consideration of the impact of WTN. In short, the above passage does not support the proposition of law advanced by this defendant.

Key item of evidence/ wholly reliable indicator of what noise is reasonable?

254. The defendant also relies upon *Smyth v. RPA* to argue that the planning permission is "*a key item of evidence*" establishing that the expectations of an objectively reasonable person *"have not been exceeded".*

255. However, there is no comparison between the statutory process culminating in the Line B Order and that culminating in the granting of Ballyduff planning permission and, in particular, the adoption therein of the condition 15 noise limits.

256. The process leading to the grant of permission in this case was as follows. On 25th November 2003, the defendant applied to Wexford County Council ("the planning authority") for planning permission. The application includes no specific information on expected noise emissions. In contrast to the large number of submissions considered by the inspector prior to the making of the Line B Order, although duly advertised, no submissions were made by any effected landowners in relation to the Ballyduff application generally or in relation to the anticipated noise aspects specifically.

257. The report prepared by the planning authority's planner ("the planners report") of 22nd January, 2004 noted that the proposed site was in an elevated rural area which might prove suitable for a windfarm. Whilst the planning authority had not yet formally adopted a wind

strategy for the locality, the draft strategy identified certain areas in north Wexford where windfarms could be encouraged and the proposed Ballyduff turbines were in one such designated area. In contrast to the inspector's highly specific, area by area consideration of the likely noise impacts of the Green Line, the planner's report contains no assessment – formal or otherwise - of the likely levels of background noise or of the potential impacts of WTN (or shadow flicker) on residential amenity.

258. On 16th April, 2004, the planning authority granted permission for a period of 20 years duration. Condition 15 provided that noise levels from the proposed development when measured at the nearest inhabited house shall not exceed 40 dBA leq and 45 dBA leq at windspeeds of 5m/s and in excess of 10 m/s respectively. Beyond stating that the noise limits set out in condition 15 were "*In the interests of residential amenity and the proper planning and development",* the rationale for the selected noise limits is not elucidated. Although I believe the noise limits broadly reflect the limit of 40 dBA leq generally recommended in WEDG 1996, there is no express reference to that guidance.

259. As the grant of permission was not appealed, there was no consideration by An Bord Pleanála – or its inspectors – of the anticipated noise impacts.

260. Therefore, whilst it goes without saying that the permission is a "*planning consent … given after due process for a development*" (in the words of Charleton J. in *Lanigan v Barry*,), the process is not comparable to the process held by Laffoy J. in *Smyth v. RPA* to establish a wholly reliable indicator of what is reasonable in terms of noise impacts.

Planning permission does not fully regulate the matter complained of

261. In any event, even if the specific noise limits set out in the planning permission were a wholly reliable indicator of what is objectively reasonable in this locality in terms of absolute noise levels, this would not assist the defendant for two important reasons.

262. First, the Ballyduff permission essentially regulates WTN decibel levels only. Although the ETSU approach takes into account blade swish and absorbs a certain level of AM into the recommended noise limits, AM values were then anticipated to be in the order of 3 dBA and of the swish variety. The ETSU methodology - upon which both the Ballyduff planning permission and WEDG 2006 is based - cannot therefore establish a yardstick for the particular

aspects of the WTN complained of by the plaintiffs in this case, high AM values, thump AM and the intrusion and dominance that accompanies those features. Neither the Ballyduff permission nor the planning file as a whole reveal any consideration, assessment or regulation of these features of WTN. How then can the permission comprise a wholly reliable indicator of whether the noise characteristics complained of here - high AM values and thump AM etc - are objectively reasonable?

263. Second, for reasons which I will explain below, compliance with the noise limits in the Ballyduff planning permission is not in any event demonstrated. Therefore, even if a grant of planning permission were to provide an absolute defence to a private nuisance action or to provide a wholly reliable indicator of what WTN must be considered reasonable at this location, it could not on the facts provide a defence in this case.

264. In short, I find that neither as a matter of law nor fact is the permission a wholly reliable indicator of what is objectively reasonable at this locality in terms of WTN.

The condition 28 argument

265. The defendant makes a related argument that if a development benefits from planning permission, but that permission does not fully regulate aspects of the noise complained of (AM, particularly, thump AM), then the court must (a) attempt to ascertain whether, and if so, how the planning authority might have regulated this impact had it directed its mind to it and (b) proceed accordingly.

266. This argument is based on a specific aspect of *Smyth v. RPA*. At 34.2, Laffoy J. stated:

> *"However, in light of what I consider to be the proper construction of the Line B Order and in particular, condition 28, it is necessary to consider what day-time and night-time limits would have been agreed to, or determined, if the (NPA) had complied with condition 28 prior to the commencement of operation of the Green Line in 2004 and to consider whether the operation of the Green Line at the rear of No. 3 would have come within those limits"*

267. In other words, having determined that the RPA had not complied fully with the terms of the Line B Order by failing to set specific daytime and night-time limits, Laffoy J. turned to consider as a matter of probability what daytime and night-time limits might have been agreed or determined had condition 28 been complied with.

268. The defendant gears off this logic to argue that as a matter of law this court is confined to considering "*what*…[AM] *limits…would have been … determined",* by the planning authority at the time of the grant of permission in 2004.

269. However, this misses the rationale for Laffoy J.'s approach to the condition 28 issue. Consideration of what daytime and night-time limits might have been set under the Line B Order was relevant for two reasons. First, because, correctly construed, this is what condition 28 required. The exercise was therefore performed to simulate what would have occurred had the statutory process been correctly complied with. Second, such consideration was relevant in light of the court's finding that, for reasons I have already explored, the noise limits which would have been set in accordance with the statutory process (and all it entailed) were themselves a wholly reliable indicator - a conclusive yardstick - for what was objectively reasonable. This aspect of the *Smyth* case is in my view *sui generis.*

270. I therefore cannot accept the defendant's submission. The court is not bound by the approach that the planning authority might have taken in relation to AM in 2004. At that time, this feature of WTN was, to put the matter neutrally, incompletely understood.

Curial deference

271. In *Kelly v Simpson* [2008] IEHC 374, Charleton J. noted that:

> *"The effect of a planning decision can be that what would have been a nuisance because of the intrusion on the quiet, comfort and enjoyment of those occupying the area, as it was prior to the lawful grant of a development through planning permission, may be changed into something which those living in the area will simply have to tolerate … Those who are elected to fulfil the role of the local planning authority can be hoped to take a longer term view as to how the development of their area could best be effected through fitting in housing and industry within an appropriate setting and without ruining the economic draw of an area."*

272. The defendant in the case before me accepts that the granting of planning permission does not create an immunity from being sued for nuisance. It nonetheless contends that very significant weight must be attached to the views of the planning authority. When asked to identify an authority in support of this proposition, the defendant points to a passage from *Lawrence & Anor v Fen Tigers Ltd & Ors* [2014] 2 All ER 622, in which the Supreme Court accepted that there are circumstances in which the terms of a planning permission will be relevant in a nuisance case, with Lord Neuberger stating as follows at paragraph 96:

> *"However, there will be occasions when the terms of a planning permission could be of some relevance in a nuisance case. Thus, the fact that the planning authority takes the view that noisy activity is acceptable after 8.30 am, or if it is limited to a certain decibel level, in a particular locality, may be of real value, at least as a starting point as Lord Carnwath says in para 218 below, in a case where the claimant is contending that the activity gives rise to a nuisance if it starts before 9.30 am, or is at or below the permitted decibel level. While the decision whether the activity causes a nuisance to the claimant is not for the planning authority but for the court, the existence and terms of the permission are not irrelevant as a matter of law, but in many cases they will be of little, or even no, evidential value, and in other cases rather more."*

273. This passage is hardly a ringing endorsement of the proposition for which the defendant contends - i.e., that the court is bound to accept the planning conditions as a wholly reliable indicator of what is reasonable in terms of noise impact.

274. In a slightly different argument, the defendant contends that the planning permission is a *"pre-baked"* determination of what is reasonable. It is argued that an assessment of what WTN a reasonable person would be prepared to put up with at this location is "*hardwired into the process"* leading to the grant of permission.

275. This, the defendant asserts is evidenced by the fact that the noise limits in the Ballyduff permission reflect and incorporate (a) planning guidance at the time of the grant of permission, (b) the practice of planning authorities and An Bord Pleanála at the time of the grant of permission (c) current planning guidelines, i.e., WEDG 2006 and (d) current expert scientific knowledge both nationally and internationally in relation to the regulation of windfarm noise.

276. I cannot agree.

(a) Planning guidance at the time of the grant of permission

As I explain below at para 285 *et seq*, as the defendant interprets the Ballyduff permission, the noise limits do not in fact reflect or comply with WEDG 1996 which was the applicable planning guidance at the time of the grant of permission[37]. Conversely, as I will also explain at para 301 *et seq* below, if the Ballyduff permission is interpreted in accordance with the

[37] WEDG 1996 provides that noise levels measured externally at any dwelling house should not exceed 40 dBA Leq and yet the defendant argues that the planning permission permits noise levels of 45 dBA Leq for all windspeeds over 5 m/s.

applicable noise limits in WEDG 1996, then total operation noise exceeds the condition 15 noise limits.

(b) the practice of planning authorities and An Bord Pleanála at the time of the grant of permission

Planning practice at the time of the grant of permission was by no means homogenous. Mr. Lawlor furnished the court with 28 different planning decisions taken by a range of planning authorities and by An Bord Pleanála as representing planning practice roughly contemporaneous with the grant of the Ballyduff permission. Approximately half of these planning permissions applied a 5 dB penalty to WTN if the noise contained *inter alia* distinct impulses such as bangs, clicks, clatters or thumps or if the noise was irregular enough in character to attract attention. Clearly therefore, even at the time of the grant of permission, certain planning authorities and An Bord Pleanála were attempting to regulate and limit precisely the kind of characteristics of which the plaintiffs here complain. In light of this I find it difficult to see how the defendant can maintain that a planning permission which sets only an absolute decibel limit and effectively ignores AM reflects planning practice at the time of the grant of permission.

(c) Current planning guidelines, i.e., WEDG 2006

and

(d) current expert scientific knowledge both nationally and internationally in relation to the regulation of windfarm noise

Although I accept for the sake of argument that the noise limits in the Ballyduff permission and indeed the WTN itself comply with WEDG 2006, I cannot accept the defendant's submission that *"the permission limits continue to reflect the current combined wisdom and expertise of appropriately qualified experts as to what levels of WTN would and would not be objectively reasonable"*. Although the defendant contends that the permission complies with draft WEDG 2019, a comparison would not support this proposition. The essential methodology of draft WEDG 2019 sets maximum decibel limits by reference to background noise and penalises "excessive" AM. Demonstrably a permission which permits noise emissions up to 43 dBA L90 without regard to either background noise or possible AM impact does not reflect draft WEDG 2019.

Conclusion on issue 1

277. Depending upon the evidence, the court may in a nuisance action place considerable weight on the terms of a planning permission. The fact that the planning authority takes the view that a particular noise is acceptable at a particular locality, may be highly relevant. However, there is a spectrum of relevance depending upon the circumstances. At one end of the spectrum are cases where there is no assessment at all of the matter complained of. Such planning permissions are likely to be of no relevance in a nuisance case. At the other end of the spectrum are cases where the particular aspect of the development complained of is the subject of detailed conditions reflecting modern guidance and best practice. Such permissions (and the planning guidance on which they are based) are likely to constitute a strong indicator of what is objectively reasonable. At the mid-point will be cases where, for example the planning permission is opaque in its rationale, where the science in the area has moved on since the grant of permission or where the particular matter complained is incompletely regulated by the permission. Such permission is certainly not irrelevant to the nuisance assessment; but, in a WTN case, it can only assist on those aspects of the WTN which it purports to regulate.

278. I find that, at best, the Ballyduff planning permission is at this mid spectrum point. The permission regulates only one aspect of the WTN, the absolute decibel limit. The basis for the decibel limit chosen is unclear. Scientific knowledge and best practice now establish that significant elements of the noise impact are not regulated by the permission.

279. Indeed, the defendant's argument that the noise limits set out in the permission are paramount is particularly weak here. Although the planning permission was granted in 2004, it was not implemented until 2017 due to grid connection difficulties. If the permission had been implemented in April 2004, the turbines would be de-commissioned in the next few months. When such a long hiatus ensues between grant and implementation of a permission, there will always be a risk that evolution in scientific knowledge and amenity standards will bear down on the operation of the development.

Issue 2: Is compliance with the planning permission demonstrated?

Issue 2 (a): For the purposes of the nuisance case, which party bears the onus of demonstrating compliance or non-compliance (as the case may be) with the noise limits in the planning permission?

280. An unusual feature of this case is that, although the planning permission is a key piece of evidence, neither party had apparently adverted to an obvious ambiguity in the noise condition in the planning permission.

281. Condition 15 states:

> *"15. Noise levels from the proposed development when measured at the nearest inhabited house shall not exceed 40dBA (15 minute leq)[38] at a windspeed of 5 metres per second and 45dBA (15 minute leq)[39] at a windspeed in excess of 10 metres per second. Measures shall be made in accordance with I.S.O. Recommendations R1996/1 'Acoustics – Description and Measurement of Environmental Noise. Part 1 : Basic qualities and procedures…'*

282. It is clear that at a windspeed of 5 m/s, WTN may not exceed 40 dBA leq. It is also clear that at windspeeds in excess of 10 m/s, WTN may not exceed 45 dBA leq. However, the permission does not specify the applicable limit at windspeeds between 5 m/s and 10 m/s. There is therefore an ambiguity in the permission. Moreover, the resolution of this ambiguity impacts on whether or not the defendant has demonstrated that the WTN complies with condition 15.

283. The defendant suggests that the resolution of this ambiguity is not a justiciable issue in the context of the nuisance case because the plaintiffs have not pleaded any specific breach of the condition at windspeeds between 5 m/s and 10 m/s. I am satisfied that in the nuisance action, the defendant bears the onus of proving the defence advanced; namely that the WTN complies with the permission, correctly interpreted.

284. As it was therefore apparent that this ambiguity in the permission had to be resolved, I re-listed the matter and heard legal submissions from both parties on the interpretation of the permission. Although I take the view that the interpretation of a planning permission is primarily a legal matter for the court and does not turn on factual or expert evidence, I also afforded the parties an opportunity to call such further evidence as they deemed necessary

[38] For brevity, 40dBA leq
[39] For brevity, 45dBA leq

either relating to or arising from this issue. The defendant re-called its acoustician, Mr. Carr, and its planning expert, Mr. Lawlor, who both gave evidence on the interpretation of condition 15. The defendant did not call further evidence to demonstrate that the WTN complied with the permission as interpreted by its counsel in argument or as interpreted by the testimony of its experts (which were quite different). Nor did the defendant call evidence on whether the WTN complied with the permission limits as interpreted by the plaintiffs. The plaintiffs did not consider it necessary to call any further evidence concerning the interpretation of the permission or relating to whether the WTN complied with the permission limits.

Issue 2(b): What is the correct interpretation of the noise limits in the permission?

285. As noted in Simons on Planning Law, 3rd Ed'n (Browne) at 1-141: Planning permission enures for the benefit of the land, and all persons who may be interested. A planning permission is therefore to be construed objectively, with the words given their ordinary and natural meaning, as would be understood by members of the public without legal training, as well as by developers and their agents. It appears that there are four alternative constructions of condition 15.

I. The interpretation urged upon the court by the defendant's experts Mr. Carr and Mr. Lawlor is that condition 15 sets only two defined limits; namely a limit of 40 dBA leq at 5 m/s and a limit of 45dBA leq at 10 m/s. If the WTN complies with these two specific limits, then that is the end of the matter. The defendant's experts therefore maintain that there is no noise limit at windspeeds between 5 m/s and 10 m/s. I pause to note that this was not the interpretation urged by counsel for the defendant in legal submissions to the court.[40]

   Mr. Carr argued that this interpretation is in compliance with WEDG 2006 which permits WTN of up to 45 dBA L90 without apparent reference to windspeed. However, any suggestion that one should interpret the permission by reference to WEDG 2006 is entirely incorrect. No evidence has been given that these guidelines were available, even in draft form at the time of the grant of this permission in April 2004. Indeed, even if they had been published in draft form, they could not inform the interpretation of the permission until formally adopted.

   By contrast, whilst extrinsic evidence may not generally be admitted in the interpretation of a planning permission, as the present permission is ambiguous, regard

[40] See part III below.

may be had to WEDG 1996 which provides the policy context referable to the determination of the planning permission. WEDG 1996 proceed on the assumption that WTN is most perceptible at lower windspeeds because of lower background noise. As such, it is all the more difficult to discern a valid rationale for apparently imposing a noise limit at 5 m/s and at 10 m/s but imposing no limit between 5 m/s and 10 m/s. Where appropriate, a planning permission is to be given a purposive interpretation to achieve its objective. The interpretation contended for by the defendant's experts would rob condition 15 of much of its utility. The turbine reaches maximum power output at approximately 9 m/s and, on the interpretation contended for, would at that point be subject to no noise limit.

As WEDG 1996 viewed WTN as being most impactful at lower windspeeds, this suggests that the intent of condition 15 was to control noise levels at low as well as at high windspeeds. Members of the public will give a planning permission a common sense interpretation, not a technical interpretation. It is in my view most unlikely that ordinary and reasonably informed members of the public without legal training would favour an interpretation which would permit the turbine to reach its natural maximum power out-put with no applicable noise limit.

The defendant's experts stated that as wind rises, so too does speed of rotation and consequently WTN. They therefore argue that, by definition, if WTN is no greater than 45 dBA leq at windspeeds of, or in excess of, 10 m/s, then compliance with that limit at lower windspeeds can be assumed. Conversely, if WTN were to rise to e.g., 50 dBA leq at a windspeed of 7 m/s, then it would necessarily also be significantly higher than 45 dBA leq at a windspeed of 10 m/s. Hence, they argue, it is necessary only to measure compliance at these two specified levels.

This ignores the fact that the turbine might require to be de-rated and operated in a constrained mode in order to secure compliance with the permission noise limits Indeed, it is common case that noise emissions for this model of turbine are predicted to climb by 14 dBA leq between cut in speed (which is slightly below 5m/s) and maximum power output (at approximately 9 m/s). If WTN is already or close to 40 dBA leq at comparatively low windspeeds (between 5 m/s and 10 m/s) then an increase of 14 dBA leq would bring WTN at maximum power output at 9m/s to a level substantially in excess of the 45 dBA leq permission limit. In short, even if compliant at 5m/s and/or 10 m/s, unconstrained, WTN might considerably exceed the condition 15 limits at windspeeds of 6m/s, 7m/s, 8m/s and 9m/s.

Therefore, one cannot comfortably assume that simply measuring noise emissions at 5 and 10m/s will necessarily protect residential amenity from WTN at these intermediate windspeeds. On the contrary, ensuring compliance at all windspeeds might require operational constraints and such operational constraint must be benchmarked against some noise limit. I therefore take the view that there must therefore be some noise limit between 5 m/s and 10 m/s. The question is: what is that nose limit? There are three candidates.

II. One might conceivably interpret the permission as providing that WTN may not exceed 40 dBA leq at 5 m/s and 45 dBA leq for all windspeeds above that. In a moment of refreshing harmony, neither party contended that this was the correct interpretation. I agree. This is a most unlikely interpretation as the permission specifically uses the words "*in excess of 10 metres per second",* in permitting noise of 45 dBA leq. To interpret the permission as permitting noise of 45 dBA leq at windspeeds between 5 m/s and 10m/s would be to wholly ignore the words *"in excess of 10 metres per second".*

III. The interpretation urged upon the court in the defendant's legal submissions[41] is that the noise limit permits WTN to increase incrementally between 5 m/s and 10 m/s, such that the noise is limited to 40 dBA leq between 5 m/s and 6 m/s, 41 dBA leq between 6 and 7 m/s, 42 dBA leq 15 between 7 and 8 m/s, 43 dBA leq 15 between 8 and 9m/s, and 44 dBA leq 15 between 9 and 10 m/s. This interpretation would require the court to insert detailed text into the condition to govern these intermediate windspeeds. If such a sliding scale of noise limits was the intended meaning, one would expect the permission to specify the interval windspeeds and corresponding noise limits. One would at the very least expect the condition to reference the principle of a sliding scale.

IV. The interpretation for which the plaintiff contends is that noise levels may not exceed 40 dBA leq at windspeeds of between 5 m/s and 10m/s and that the higher limit of 45 dBA leq only applies for windspeeds in excess of 10 m/s.

WEDG 1996 provides that generally noise levels measured externally at any dwelling house should not exceed 40 dBA leq. As the condition 15 limit of 45dBA leq is

[41] Albeit not supported by the defendant's experts.

considerably in excess of this generally applicable limit, there is little reason to assume it should be engaged at lower windspeeds.

Rather, it is reasonable to interpret the condition as reflecting the assumption that because background noise is lower at low windspeeds, this is when the impact of WTN is greatest. It is reasonable to assume that the permission means just what it says and is intended to restrict noise levels to the generally recommended limit of 40 dBA leq until windspeeds were comparatively high - in excess of 10m/s - at which point an uplifted limit of 45 dBA leq was judged acceptable.

I note that Mr. Carr indicated that he would not expect WTN to be as high as 40 dBA leq at the cut in speed of 4 m/s or 5 m/s. This is consistent with an interpretation pursuant to which the noise levels are permitted to gradually rise from a low base at cut in speed to 40 dBA leq at 10 m/s, but not beyond that until windspeeds exceed 10 m/s. A natural gradual ramp up of WTN with windspeed to 40 dBA leq is thus catered for.

286. In short, it is my view that, logically, some noise limit must apply at windspeeds between 5 m/s and 10m/s. Both the specific wording of the condition and the policy context drive me to the conclusion that the relevant permission limit between 5 m/s and 10 m/s is 40 dBA leq.

287. I emphasise that I do not purport to interpret any planning permission other than the one now before me. In particular, if similar wording were to appear in a windfarm permission granted after WEDG 2006, then this might affect matters. WEDG 2006 permits noise levels up to 43 dBA L90 (45 dBA leq) and 45 dBA L90 (47 dBA leq) for night-time and daytime, respectively. With reference to these guidelines, therefore, the argument that the permission is intended to limit WTN generally to 40 dBA leq would be significantly weaker.

Technical approach to assessment of compliance with planning compliance

ETSU approach

288. I accept the defendant's argument that although not expressed as such, condition 15 is an ETSU derived limit. The defendant's approach was therefore to assume that if the total operational noise is below the level set in condition 15, planning compliance may definitively be concluded. I accept that this approach complies with ETSU.

289. I also accept the defendant's contention that in accordance with standard practice, the GPG and Supplementary Guidance Note 5 govern the technical aspects of compliance (windspeed calculation, sound measurement, data collection, data filtering etc). [42]

290. Technical aspects of compliance are also referred to in condition 15 itself which states that measurements shall be made in accordance with ISO 1996-1, "*Description and measurement of environmental noise*" (ISO 1996). ISO 1996 comprises 3 parts. Part 1, which does not deal with measurements *per se* but rather with "*Basic quantities and procedures*", and cross - refers to Part 2; "*Acquisition of data pertinent to land use*" ("ISO 1996-2"). ISO 1996-2 which includes recommendations on measurement methodologies has been updated twice since 1996; in 2007 and 2017 ("ISO 1996-2, 2017") respectively. As the parties agree that it would not be standard practice to apply these later editions to a planning compliance assessment, I will apply the 1996 version.

291. The application of the following principles in assessing planning compliance are, to a greater or lesser extent in dispute. On each such contest, I prefer the defendant's approach.

L90

292. In measuring noise levels, the defendant's expert, Mr. O'Reilly used the L90 rather than the Leq metric specified in condition 15. The plaintiffs object on the basis that the L90 metric will have a smoothing effect on intermittent noise sources and will therefore fail to represent AM. Further, as L90, is a measure of the sound power level exceeded 90% of the time, it will of necessity be lower than the leq sound power level. Its use, however, is standard practice in the ETSU methodology which uses a conversion metric of plus 2 dBA as between L90 and Leq. The defendant's expert adopts this approach which I accept as an entirely legitimate approach.

[42] As we will see, the GPG/ Supplementary Guidance Note 5 are of particular relevance to the impact of wind direction on noise levels at the plaintiffs' houses in assessing planning compliance ("directionality").

10 or 15 minute leq?

293. Condition 15 sets the noise limits by reference to 15-minute leq intervals. However, I accept that, because the SCADA data is recorded in 10-minute intervals, it was appropriate to assess compliance by reference to 10 minute intervals.

Windspeed

294. Because windspeed varies with turbine hub height (which differs from turbine to turbine), setting noise limits by reference to hub height windspeed would result in inconsistency. A formula was therefore developed pursuant to which, irrespective of the hub height of the turbine, windspeed is extrapolated down to a 10 metre height using a standard wind shear profile. This enables sound emissions from turbines of different physical heights to be compared and regulated. The GPG states that unless otherwise stated, reference to windspeed is to the 10-metre standardised windspeed.

295. The defendant's planning compliance evidence and argument was presented as against both standardised 10 metre height windspeed and hub height windspeeds (without contending for either one or the other). As argued by the defendant I apply the GPG in other contexts. In the interests of consistency therefore, I will proceed on the assumption that compliance is also to be assessed as against standardised 10 metre height windspeed.

296. As I understand it, the standard practice for plotting windspeeds is that bins are centred on integer windspeeds with a width of 1 m/s. For example, the 5 m/s bin would include all data at windspeeds of 4.5 to 5.5 m/s etc. When applied to this permission, this would mean that condition 15 permits WTN of 40 dBA leq for windspeeds of 4.5 m/s to 9.5 m/s and 45 dBA leq for windspeeds in excess of 9.5 m/s.

Filtering

297. To minimise the effects of extraneous noise sources, ETSU recommends that measurements are taken during quiet waking hours (1800-2300 hours on all days plus 0700-1800 hours on Sundays and 1300-1800 hours on Saturdays) and night hours (2300 to 0700). The defendant's compliance data is therefore limited to these times.

298. I accept the view of both parties that planning compliance should be assessed primarily by reference to night-time data. Mr. O'Reilly has filtered out all night-time data between the hours of 4am to 7am to exclude elevated noise levels due to extraneous bird song during the dawn chorus. Mr. Stigwood is critical of this approach which excludes over a third of time data irrespective of the fact that the dawn chorus lasts for a comparatively short time.

299. Mr. Carr accepts that a more nuanced approach to filtering the dawn chorus might have been more appropriate, particularly because at higher windspeeds (i.e., at the right hand side of the graph) one would not expect the dawn chorus to have an appreciable impact on overall noise levels. However, having considered the GPG and Supplemental Guidance Note 5, I am satisfied that Mr. O'Reilly's approach is consistent with the ETSU methodology and I accept its validity.

300. Supplementary Guidance Note 5 provides that compliance measurements should be undertaken in downwind conditions unless there is a specific requirement to measure in other wind directions (such as complaints during cross wind conditions), and that all data except that corresponding to such conditions should be filtered out. Mr O'Reilly took this approach and filtered out all wind directions other than directly downwind of the turbine. Mr. Stigwood disputes the validity of this and maintains that the worst case noise prorogation conditions at this site actually occur in crosswind conditions. For reasons I will explain, I accept the validity of the defendant's approach as being more consistent with Supplementary Guidance Note 5.

Issue 2 (c): What does the compliance data show? - Evidence tendered on planning compliance

301. Mr. O'Reilly carried out noise monitoring at NF from 18th May 2017 to 15th June 2017. His evidence is that the noise monitoring equipment was placed on a terrace in the back garden approximately 17 m from the house at a height approximately level with the eves of the house. Mr. O'Reilly prepared two charts on foot of this monitoring and informed Mr. Brazil that the noise levels complied with the planning permission.

302. A month or so later Mr. O'Reilly was instructed to carry out monitoring at HH which he found strange. Mr. O'Reilly proceeded to conduct monitoring at HH between 6th August to 4th September, 2017. His evidence is that the noise monitoring equipment was placed on a bag

of sand in the patio at the back of the house 4.5 metres from the façade of HH, and 2.1 metres from the "end of" an adjacent garage door. Mr. O'Reilly informed Mr. Brazil that this monitoring also demonstrated planning compliance. He was, however instructed to hold off from writing a compliance report.

303. It was not until January 2021 that Mr. O'Reilly was instructed to write a compliance report. He was requested to present the HH data only. In the meantime, the NF noise monitoring data (referred to immediately above) appears to have gone missing and was only recovered from Mr. O'Reilly's computer in December 2022.

HH planning compliance data

304. The primary data advanced by the defendant was in the form of compliance graphs in respect of HH showing WTN in downwind conditions.

Incorrect measurement location

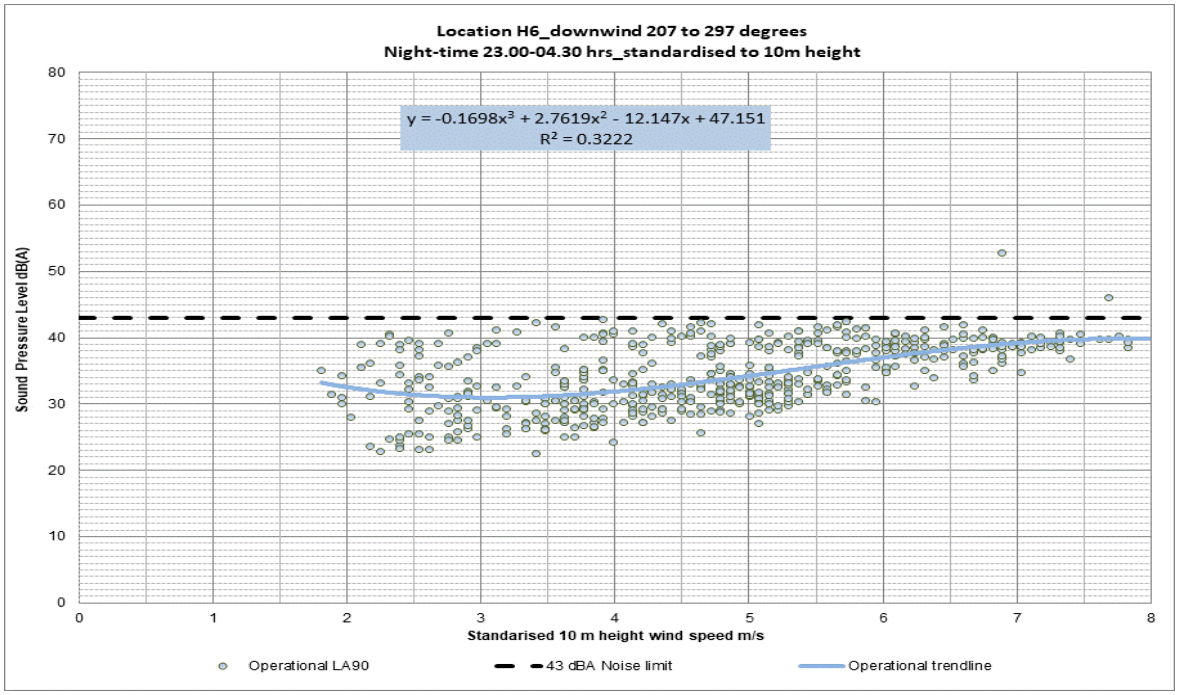
305. Condition 15 requires the measurement of noise levels at the nearest inhabited house. The nearest inhabited house is NF and not HH. Although as I say, Mr. O' Reilly took compliance measurements at NF in June 2017, for reasons which are not entirely clear to me, only the HH data was referenced in the defendant's experts' reports as the basis for the planning compliance assessment.

306. The defendant argues that as the two houses are only ten metres apart, it is unlikely that there is a substantial difference between their respective compliance levels. However, the data derived from HH and NF is quite different both as regards total operational noise and as regards the background sound levels they suggest.

307. As this was the approach taken by the defendant, I will consider the HH compliance data first. Having done so, I will turn to consider the NF compliance data.

Incorrect interpretation of condition 15

308. Mr. O'Reilly produced a number of graphs in which he presents total operational noise at HH during the period of his monitoring. The downwind HH night hours compliance graph (with the dawn chorus removed) is below.



309. Each data point represents a ten-minute period of noise measurements on the L90 metric. Each data point is therefore an average of the L90 noise levels (i.e., the noise level exceeded for 90% of the time during the 10-minute measurement period). In the graph below, these data points are then plotted as against windspeeds (standardised to 10 m), and a trend line is derived. This trend line represents an average of the data points which themselves represents the lowest 10% of the noise levels obtained. The trend line is then compared to the permission limits. In order to compare this data, which was on the LA 90 metric with the Leq metric used in the planning permission, Mr. O'Reilly applied a 2 dBA correction. He therefore assumed that the condition 15 limits of 40 dBA leq at a windspeed of 5 m/s and 43 dBA leq was 38 dBA L90 and the condition 15 limits at a windspeed in excess of 10 m/s was 43 dBA L90.

310. The above HH compliance graph demonstrates that the trend line is below 38 dBA L90 (40 Leq 10) at 5m/s and below 43 dBA L90 (45 Leq 10) at 8 m/s during quiet waking hours. Mr. O'Reilly therefore interpreted this graph as demonstrating compliance and the plaintiffs' expert did not demur in this particular respect.

311. However, neither expert had adverted to the ambiguity in condition 15. I have determined that, correctly interpreted, condition 15 limits WTN to 40 dBA leq between 5 m/s and 10 m/s. Although neither party's experts therefore tendered on this precise basis, the data

speaks for itself. It suggests that total operational noise at HH is in excess of 40 dBA leq for windspeeds in excess of 6 m/s.

312. Total operational noise above the permission limits does not of course establish planning non-compliance as the noise limit applies only to WTN and not to total operational noise. However, if total operational noise exceeds the noise limit, then the developer must ascertain and deduct background noise levels from total operational noise. The defendant has not carried out this exercise. Therefore, whilst non-compliance with the permission has not been conclusively demonstrated, nor has compliance been demonstrated[43].

Insufficient data

313. There is no data at moderate to high windspeeds on the HH night-time graph. Mr. O'Reilly stated that the NF data is far more complete, robust and overall "*better data*" than the HH data. Mr. O'Reilly had been happy with the NF data and expressed surprise that he had been asked to prepare a second set of readings. As such, it is hard to fathom the defendant's focus on the HH data to the complete exclusion of the NF data.

314. There is no noise data at HH during night hours at windspeeds above 8 m/s. It is not possible to reliably assess compliance at 8 m/s (which includes all data in 7.5 to 8.5 windspeed bin) as there are no data points between 8 and 8.5 m/s. Indeed, there are apparently only 5 valid data points between 7.5 m/s and 8 m/s. Compliance at night may therefore only be assessed up to 7 m/s (which includes all data in the 6.5 m/s to 7.5 m/s windspeed bin). For the same reason one cannot assess compliance at windspeeds of 9, 10, 11, 12 etc m/s.

315. Mr. Carr's response to this problem was to rely upon the data collected during quiet waking hours which shows that total operational noise increased from 39.5 dBA L90 at windspeeds of 7m/s to 42.4 dBA L90 at 9 m/s. Mr. Carr suggests that one could assume the same increase at night-time thereby combatting the paucity of data above 8m/s at night. With respect, this is to urge a rather *à la carte* approach to compliance assessment. I have been referred to no guidance which would permit of such an approach.

[43]I deal separately below with whether a façade level deduction may be made in light of the measurement location.

316. On the contrary, the GPG requires that compliance data reflect either likely worst case noise conditions or the conditions complained of by the complainant (or both). Supplementary Guidance Note 5 provides that it will usually be necessary to carry out noise monitoring for around 1 month to obtain the necessary range of windspeeds and wind directions to ensure that noise limits are being met for worst case downwind propagation conditions.

317. As the plaintiffs' greatest complaints are at higher windspeeds, the absence of data at moderate to higher windspeeds, there is no assessment of the potential worst case WTN. Further, whilst they also complain of noise intrusion during the day, the plaintiff's primary complaint is of noise disturbing their sleep at night. Reliance on the quiet waking hours data at HH cannot fill the lacunae in the monitoring data.

318. This is no mere matter of detail. Although windspeeds during Mr. O'Reilly's monitoring were considerably lower, higher windspeeds are by no means unusual at this location. Mr. Carr prepared two tables of indicative windspeeds which show that windspeeds in excess of 7 m/s occurred 60% of the time during the MAS 2017 monitoring period and 35% of the time during the MAS 2021 monitoring period. Planning compliance clearly could not be established without including these windspeeds in the compliance data.

319. In addition, the inability to assess compliance at windspeeds in excess of 8 m/s means that even if I were to accept the defendant's expert's interpretation of the permission (which would require compliance testing at only 5 m/s and 10 m/s) compliance could still not be demonstrated. Nor, in the absence of data at the relevant windspeeds could compliance with the "sliding scale" interpretation contended for by counsel for the defendant be demonstrated.

Incorrect positioning for façade deduction

320. ETSU and Supplementary Guidance Note 5 require the placement of a microphone at a free field location, which as per ISO 1996-2 is at least 3.5 metres from the façade of a building. Mr. O'Reilly's report states that he positioned the microphone 4.5 metres from the façade of HH, and 2.1 metres from the *"end of"* an adjacent garage door. The measurements are neither free field measurements nor façade measurements, but a hybrid of both.

321. ISO 1996-2 states *"Note:-if measurements are made 1 to 2 m in front of the façade of a building…an approximation to the incident sound level may be obtained by subtracting 3dB from the measured value".* Mr. O'Reilly relies on proximity to the garage door to make a deduction of *"at least 2 dBA"* from the measured values. There are two difficulties with this.

322. First, I am unconvinced of the robustness of these measurements insofar as concerns the location of his microphone. It was put to Mr. O'Reilly in cross-examination that his measurements were inaccurate, and that the monitoring equipment had in fact been placed 8.8 metres rather than 4.5 metres from the house façade. He freely conceded that this could be the case as he had only "*stepped out"* rather than measured distance to the house. This means that the reported measurements contains at least one significant inaccuracy, potentially almost doubling the distance from the house façade. It was also put to Mr. O'Reilly that he had also underestimated the distance from the microphone to the garage door. Mr. O'Reilly denied this and said that he had measured this distance with a tape measure. However, Mr. O'Reilly did not recall the site visits and did not take contemporaneous notes of same. As such, I must doubt the accuracy of a measurement first committed to paper several years after his site visit. This is not a reliable basis for claiming a 2 to 3 dB deduction in the measured sound levels.

323. Second, a façade deduction is dependent upon the angle of incidence as between the microphone and the façade. ISO 1996-2 applies this deduction to the measurements taken "*in front"* of the façade. In this case, the angle of incidence as between the microphone, the turbine and the contended for façade (the *"*garage door") is entirely unspecified. Mr. O'Reilly's report states that the microphone was positioned 2.1 metres from *"the end*" of the garage door, which does not suggest that it was perpendicular to the door. Indeed, nor do the photographs taken by Mr. O'Reilly of the monitoring equipment *in situ* so suggest.

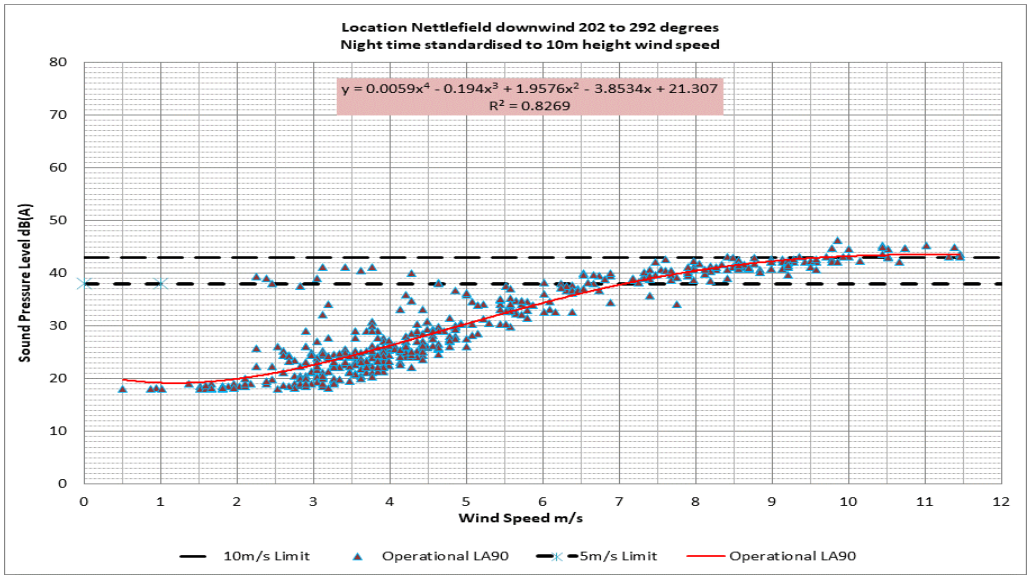
324. The onus is on the defendant to demonstrate planning compliance. In the absence of reliable measurements of both the distance to the façade and the angle of incidence, this is an exercise in conjecture. Whilst it is therefore perfectly possible (and indeed is likely) that some deduction should apply, one cannot without more know what that deduction should be.

325. In any event, this issue is largely academic as it appears unlikely that a 2-3dB reduction would bring total operational noise between 5 m/s and 10 m/s into compliance with the permission limit of 40 dBA leq.

NF planning compliance data.

326. On foot of his noise monitoring in May/June 2017, Mr. O'Reilly prepared downwind NF planning compliance graphs. However, these were not referenced in either Mr. O'Reilly's expert report or in Mr. Carr's reports. Further, no evidence was tendered in relation to the NF compliance data by the defendant's primary acoustics expert Mr. Carr over the course of his 7 days of evidence to the court. This data was only first introduced by Mr. O'Reilly on day 47 of the trial. In addition, notwithstanding repeated requests over a period of over five years the NF data was not at any stage furnished to the Carty-Shortens or to their solicitor. Furthermore, the NF data was not, (as the defendant accepts it ought to have been) included in the defendant's affidavit of discovery. In fact, the continued existence of the NF data only came to light in December 2022 during the course of the trial. It was first furnished to the plaintiffs on day 24 of the trial.

The downwind NF night hours compliance graph (with the dawn chorus removed) is below:



327. The NF graphs show that total operational noise exceeds the permission limit of 40 dBA leq at windspeeds between 7 m/s and 10 m/s. At a windspeed of 9m/s, it exceeds the limit by perhaps as much as 4 dB.

328. In addition, Mr. O'Reilly accepted that the NF graphs demonstrate that total operational noise at night exceeds even the 45 dBA leq limit in the permission from windspeeds of 9.5 m/s. As such, total operational noise exceeds the upper permission limit of 45 dBA leq even under the interpretation favoured by the defendant's experts whereby compliance is assessed only at 5 m/s and at 10 m/s.

329. For a number of reasons, the defendant argues that this exceedance is not attributable to WTN but to wind noise.

330. First, it emphasises that the turbine reaches maximum power levels at 9 m/s and that one would not therefore expect WTN levels to increase beyond 9 m/s. As such, it is argued that the exceedance of total operational noise over 45dBA leq at windspeeds in excess of 9 m/s cannot be WTN and must be background noise, specifically wind noise. Although I have been furnished with thousands of pages of guidance, not one document suggests that one could safely make this assumption.

331. Second, the defendant argues that these measurements were taken 17 m from NF and thus closer to the turbine. However, ETSU permits noise monitoring to be carried out some distance from a residence and states: *"In order to ensure that measurements of wind turbine noise are not influenced by reflections off buildings the microphone should be positioned at least 10m away from the façade"*. Indeed, Mr. Carr states that the GPG permits measurements between 3.5 and 20 m from a dwelling. Given the distance from the turbine to NF - 369 m - I fail to see how this additional distance could make an appreciable difference to the level of WTN.

332. Third, the defendant submits that the NF noise levels are elevated because they were taken at a height approximately level with the roof of NF. Yet, no effort has been made by the defendant to calculate what the impact of the additional height may be. Moreover, I have been referred to no guidance which would permit of an unspecified reduction in noise levels by reason of height.

333. Finally, the defendant suggests that because the monitoring equipment was placed 17 m back from the house and thus closer to the tree line, the increased noise levels can be explained by wind in the trees. Mr. Stigwood rejects the suggestion that such noise could have an appreciable impact on the noise levels recorded on Mr. O'Reilly's compliance graphs. His view is that although not as sheltered as the house, the monitoring location chosen is still sheltered. There is therefore a conflict of views on this issue upon which the court has entirely insufficient evidence to adjudicate.

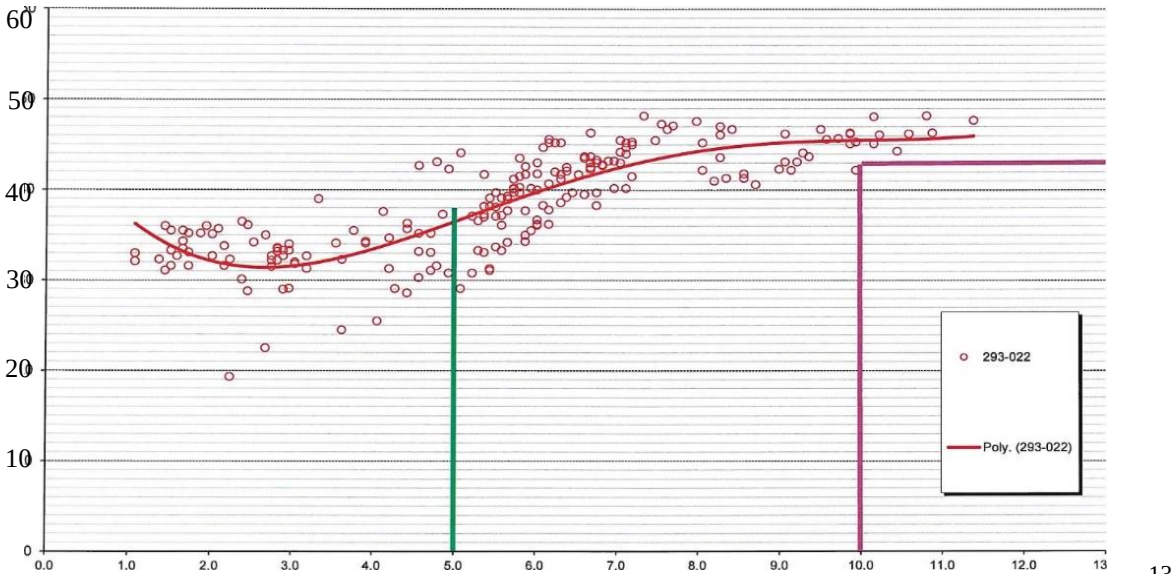
334. The point, however, is that I do not need to decide upon the merits of any of the defendant's above arguments. ETSU is crystal clear. If total operational noise is in excess of the relevant permission limit, then it is for the defendant to ascertain background noise levels at the relevant measurement location and deduct same from total operational noise. The defendant has made no effort to do this. Accordingly, whilst it may be that background noise levels are a substantial contributor to the noise levels appearing on Mr. O'Reilly's NF graphs, the present state of the evidence means that compliance is not demonstrated.

Wind Direction - the MAS NF crosswind planning compliance graph

335. The key to compliance monitoring is to ensure that the compliance testing is carried out under worst case conditions. According to the GPG, this is generally assumed to be downwind unless there are complaints in other wind directions. Mr. O'Reilly therefore presented compliance data only for downwind conditions and the other three quadrants were filtered out.

336. As referenced above, the defendant did not discover the NF monitoring data until mid-trial. When this data was finally made available, Mr. Stigwood interrogated it and formed the view that the worst case of WTN (in terms of absolute dBA or sound power level) apparently applied in crosswind and not downwind conditions.

The MAS NF crosswind planning compliance graph is below.



337. Mr Stigwood contends that this graph demonstrates that total operational noise exceeds the permission limits. Because the NF data was not made available until well into the trial, the purported non-compliance demonstrated in crosswind conditions could not have been pleaded.

338. I will admit this evidence and will, accordingly consider whether it impacts upon planning compliance.

339. The defendant contends, with some merit, that it would be extremely unusual if worst case noise propagation were to occur in crosswind conditions. It argues that the higher readings in crosswind conditions at NF are not attributable to WTN but to the fact that wind coming from this direction would be incident upon the treeline located to the west of the plaintiffs' house. This could be a perfectly coherent explanation for the elevated levels[44]. On the other hand, if the elevated levels were attributable to wind noise one would expect the noise to continue to climb as the wind increases. This however is not what the graph shows. Rather the noise increases up to 10 or 11m/s and then levels off. Mr Stigwood therefore argues that it is more likely that these elevated levels reflect WTN which levels off when maximum power output is reached at 9m/s approximately.

340. However, I accept the defendant's argument that compliance measurements need only be undertaken in downwind conditions unless there is a specific requirement to measure in other wind directions such as complaints during cross wind conditions. Overall, the evidence is not particularly consistent with complaints in cross wind conditions. As such, compliance monitoring in cross wind conditions was not required. I will therefore place no reliance upon the MAS NF crosswind planning compliance graph.

Summary and conclusions in relation to planning compliance.

341. In summary, it does not seem to me that the defendant's data demonstrates compliance with the planning permission for the following reasons:

a) Compliance cannot be demonstrated by reference to the HH compliance data because NF is the appropriate measurement location. Further, there is a paucity

[44] The Good Practice Guidelines acknowledge that in rural or semi-rural areas noise generated by wind in the trees is generally a dominant noise source at higher windspeeds and therefore proximity of the monitoring location to trees and vegetation and the type of such vegetation may be significant.

of night hours HH compliance data at all windspeeds above 8m/s. One cannot be confident that worst case WTN has been assessed.

b) Although this issue is largely academic due to point a) above, I am not satisfied on the balance of probabilities that Mr. O'Reilly correctly positioned the measuring equipment - either as regards distance from the façade or angle of incidence - to capture façade level measurements, I do not accept therefore that it is appropriate to deduct 3 dB from the HH measurements.

c) In any event, on the correct interpretation of condition 15, the HH night hours compliance graph shows that total operational noise exceeds the limits set out in the permission at windspeeds above 6 m/s.

d) Furthermore, the inability to assess night hours compliance at HH at windspeeds in excess of 8 m/s means that even if I were to accept the defendant's experts' interpretation of the permission (which would require compliance testing only at 5 m/s and 10 m/s) compliance could still not be demonstrated in the absence of data at 10 m/s.

e) Compliance at HH has therefore not been demonstrated.

f) NF is the closest inhabited house and the NF data is more complete and therefore robust. For that reason, compliance ought to have been adjudged by reference to the night hours NF compliance data.

g) The NF monitoring was not carried out at façade level and no façade deduction is indicated from the noise levels measured.

h) On the correct interpretation of condition 15 total operational noise as shown on the NF night hours compliance graph exceeds the limits set out in the permission at windspeeds above 7m/s.

i) Total night hours operational noise at NF also exceeds 45 dBA leq at windspeeds in excess of 9.5 m/s. Therefore, even if I were to accept the defendant's experts' interpretation of the permission (which would require compliance testing only at 5 m/s and 10m/s) compliance could still not be demonstrated.

j) Although the defendant argues that any exceedance of total operational noise over 45 dBA leq at NF is attributable to background noise/wind noise, the onus is on the defendant to so demonstrate by refence to background noise studies. No such evidence has been tendered to the court.

k) In addition, although the defendant contends that this exceedance may be due to monitoring height, it bears the onus of so demonstrating. No such robust evidence has been tendered to the court.

l) Compliance at NF has therefore not been demonstrated.

342. In the case of HH total operational noise exceeds 40 dBA leq between 6 m/s and 10 m/s by approximately 2 dBA. The exceedance at NF - which is the correct property for compliance testing - is greater, perhaps up to 4 or 5 dBA. An exceedance of this order is potentially a material deviation from the noise limits in condition 15.

343. I accept that on the defendant's experts' interpretation of the permission, the exceedance of total operational noise over 45 dBA leq at 9.5 m/s and above is marginal, perhaps no more than a decibel overall. However, this is largely beside the point as I do not accept that this is the correct interpretation of the planning permission. Moreover, the defendant's chosen defence to this action is to maintain that the planning permission is the appropriate metric for assessing nuisance. In contrast to the plaintiffs, who argue that the test for nuisance is both quantitative and qualitative, the defendant argues that the test is purely quantitative and that the WTN is "*meticulously compliant"*[45] with the permission limits. Whilst I reject the argument that the nuisance assessment is exclusively quantitative, it could only ever carry weight if meticulous compliance is in fact demonstrated. Mr. Carr's evidence was that he would regularly advise wind farm developers in adopting mitigatory strategies to bring down WTN by a decibel or two to ensure compliance. There is no suggestion therefore that relatively modest exceedance would not be viewed by the planning authority as non-compliance or would not require the adoption of mitigation measures. Therefore, even if the interpretation that the defendant's experts place on the planning permission is correct, I would not be disposed to hold that compliance is demonstrated.

344. In short, I do not accept the defendant's arguments on Issue 1 or Issue 2.

345. The defendant's arguments are not therefore dispositive of this case, and I will now turn to the key question of whether nuisance is established on the evidence.

[45] In the words of the defendant's planning expert, Mr. Lawlor.

Issue 3: is the character of the locality to be assessed on a "windfarm" or "no windfarm" basis?

346. The character of locality is an important factor in any nuisance assessment. Here also a dispute arises as to the relevance of the planning permission.

347. The plaintiffs and their experts present the locality as a quiet rural location *simpliciter.* To assess nuisance, they therefore compare the current scenario to a "no turbine" scenario.

348. The defendant argues that the planning permission defines the character of the locality, which is therefore presented as a rural location with a windfarm at reasonably close proximity with all that that entails.

349. Should one assess the character of the locality with or without the Ballyduff windfarm?

350. In general, the Irish courts have tended to afford weight to the decisions of the planning authorities in determining the character and nature of the locality. In *Lanigan v. Barry*, Charleton J. considered the relevance of planning permission in determining whether an actionable nuisance had occurred. At para. 22 of the judgment, Charleton J. stated:-

> *"In considering the issue as to the amenity of an area, regard should be had to its immediate history and its character prior to the commencement of the activity complained off. The character of a neighbourhood may, however, change. This may be due to economic deprivation or to the development within the area of enterprises and structures which change its character. In that regard, the wider question as to how an area is to develop is to be determined in accordance with the Planning and Development Act, 2000. The legislation is an example of the application of democratic principle to the important question as to how the area in which a citizen lives, or carries on his or her business, may change. … Were the legal mechanism of the scrutiny of planning permission not to exist and were it not the case that notice must now be given in a direct manner through what is in effect an advertisement as to what may happen at the site of a proposed development, then persons might feel aggrieved at being taken by surprise when a factory, set of apartments or some house extensions, suddenly spring up beside them. The legal mechanism is there, however, to allow participation in decisions which may affect the environment, the value of property and the nature of such quiet and comfort as may be the settled expectation of people in any particular area. Therefore, where planning consent is given after due process for a development, including a change of use, the issue as to what is a nuisance will be determined according to the character of that neighbourhood as authorised by relevant planning permissions and as declared by the development plan."*(Emphasis added).

351. In *Gillingham Borough Council v. Medway (Chatham) Dock Company Ltd* [1992] 3 All ER 923 at 934 Buckley J. had noted that Parliament had set up a statutory framework and delegated the task of balancing the interests of the community against those of individuals to the local planning authority. The right to object, the provision for appeals and enquiries and the added safeguard of judicial review applied but, ultimately, a planning authority could, through its development plans and decisions, alter the character of a neighbourhood rendering innocent activities which, prior to that change, would have been an actionable nuisance.

352. In *Lanigan v. Barry*, Charleton J. quoted these passages which in his view emphasised the primacy of the planning process in setting local standards of amenity.

> *"24. This does not mean that a nuisance is authorised by a planning permission granted in accordance with the development plan of a local authority. On the contrary, people retain their rights but according to the standard, judged against the nature of the locality, that the law sets.*
>
> *25. All of this emphasises the primacy of the planning process in setting local standards of amenity. That process can not be ignored or flaunted or undermined by deception. The standard of amenity that is reasonably to be expected by people living in an area can change as an area is lawfully developed. The nature of businesses suitable for an area can also change as an area is developed by lawful means. Unless the business activity be regarded as unduly sensitive, and therefore unsuitable for the character of an area in which it is situated, no one is entitled to use a planning permission to destroy the business of a neighbour"* (Emphasis added).

353. In *Smyth v. RPA*, Laffoy J. also referred to the then recent English authority in *Watson v. Croft* [2008] 3 All ER 1171 in which the Court of Appeal restated the basic principle that a grant of planning permission does not affect the property rights of third parties but that the implementation of that planning permission may so alter the nature and character of the locality as to shift the standard of reasonable user which governs the question of nuisance or not.

354. I accept the defendant's submission that, as a matter of law and fact, part of the character of the locality where the plaintiffs' homes are located is that there is planning permission for a windfarm. I also accept that this inevitably brings with it some degree of visual and aural intrusion - some degree of aerodynamic noise and some AM - which the plaintiffs would be expected to tolerate. However, in the words of Charleton J, "*this does not mean that a nuisance is authorised by [the] planning permission. On the contrary,* [the plaintiffs] *retain their rights but according to the standard, judged against the nature of the locality, as including a windfarm."*

355. Here the plaintiffs do not base their claim to nuisance on the mere presence of the turbines in a quiet, rural area. Nor does their evidence suggest any objection to some aerodynamic noise or some swish AM of the kind one would usually expect.

356. On the other hand, no reasonable person could reasonably have expected that this permission had authorised WTN which regularly dominates the soundscape and exhibits AM and other characteristics rendering it unreasonably difficult to work, or uncomfortable to relax or sleep. Although the character of the locality includes a windfarm, it is still the case that depending upon the level of intrusion and on its duration and frequency, the WTN associated therewith might be such that ordinary people could not reasonably be expected to tolerate it without mitigation, without compensation, or possibly at all. Whilst the plaintiffs cannot expect their location to be as peaceful as if there was no windfarm, they can nonetheless expect that noise intrusion from the permitted windfarm will not be unreasonable.

357. The court's assessment here must be reasonably exacting. Because of the planning permission, the plaintiffs cannot fairly contend that audible WTN is by definition an unreasonable interference. On the other hand, the defendant cannot say that because (particularly in more recent times) WTN is known to occasionally demonstrate certain particularly intrusive characteristics - for example prominent or thump AM - the grant of planning permission means that the plaintiffs have no remedy if these characteristics present themselves in a manner that is unreasonable in all the circumstances. WTN of this latter nature could not have reasonably been anticipated on foot of the Ballyduff planning permission and is not therefore part and parcel of this locality.

Conclusion on issues 1, 2 and 3

358. In the circumstances of this case, the Ballyduff planning permission does not dictate the boundaries of actionable nuisance. While the decision of the planning authority grants planning permission at a general level for a windfarm at this location, it does not purport to address or regulate the key aspects of the WTN which are complained of here - AM with high AM values and low frequency characteristics.

359. Whilst a windfarm is part of this neighbourhood, this does not mean that the plaintiffs should be expected to tolerate any and all noise nuisance that goes with that use. All that the

planning permission can be said to authorise is WTN of a particular decibel level whereas this case is not about the decibel level of the noise but rather its character. It cannot be therefore said that the characteristics complained of are authorised by the planning permission and must be seen as part of the locality.

360. Furthermore, it has not been demonstrated that the WTN is within the noise limits specified in the permission in any event. Therefore, even if this case revolved around decibel levels only, I could not be satisfied that the permission authorises WTN at the level that presently pertains or that WTN at these levels is part of the character of the locality.

Issue 4: What criteria ought the court consider in the assessment of nuisance?

Defendant's argument-the line in the sand

361. The defendant correctly submits that the question of whether the WTN is an objectively unreasonable interference with the plaintiffs' amenity cannot be determined by reference to the plaintiffs' subjective evidence. It further argues that the plaintiffs have made no attempt to establish what their requirements are or, how they can be regarded as objectively reasonable.

362. Thus, the plaintiffs have failed to:

- identify by way of the ETSU methodology the decibel level beyond which noise becomes objectively unreasonable and poses a nuisance or;
- identify, in a manner analogous to the draft WEDG 2019 methodology, the precise parameters pursuant to which noise of a particular decibel level combined with a particular level of AM becomes objectively unreasonable and poses a nuisance.

363. In short, the plaintiffs have not identified a line in the sand, a line of acceptability. Unless and until such a line is identified and applied, it is said that the court cannot assess the matter. Irrespective of how the WTN is experienced by the plaintiffs, this line must determine

the outcome of the case. However, the defendant's attempt to identify what the line should be are in my view unconvincing.[46]

364. The primary "line" identified by the defendant and its experts is of course the planning permission. For all the reasons explained above, I find that the line cannot be supplied by condition 15 (with which in any event compliance has not been demonstrated) as it does not regulate what is said to be the most intrusive aspects of the Ballyduff WTN, namely AM, particularly thump AM.

365. Nor, for the same reason, can the line be supplied by WEDG 2006 (with which, for the sake of argument, I accept the WTN complies). WEDG 2006 does not provide the court with any yardstick - objective or otherwise - against which to assess what AM values or what degree of thump AM is objectively reasonable.

366. Similarly, although the defendant places huge reliance on IOA RM, that methodology is not intended to capture the subjective annoyance response and does not purport to be a yardstick for nuisance. The IOA RM cannot tell one what the noise sounds like. Crucially, the defendant's experts do not contend that the IOA RM differentiates between swish and thump AM. Despite Mr Carr's very heavy reliance upon it, the IOA RM is not a "recognised standard"" capable of assessing the impact of AM, and thump AM in particular. The only yardstick of which I have been informed for identifying and assessing the impact of thump AM is the qualitative yardstick advanced by the plaintiffs' expert; to record, listen and analyse the WTN and to correlate same with spectral frequencies by means of a spectrogram.

367. Even leaving these difficulties aside, the IOA RM is not in any case "self-executing". The IOA RM only assists in establishing a "line" if it is used to rate AM values per windspeed on foot of which one then calculates a penalty and then incorporates that penalty into a defined decibel limit. In other words, the IOA RM could only even provide a yardstick for objectively reasonable noise if deployed in a manner analogous to the draft WEDG 2019 methodology.

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[46]As I note above in my summary of the expert's evidence, Mr Carr's opinion was that nuisance must be assessed in accordance with "*some recognised standards or guidance"*. In this respect, Mr. Carr relied primarily on the planning permission and WEDG 2006, but also mentioned draft WEDG 2019 with which he asserted the WTN complied. He also relied heavily on the IOA RM.

368. Yet the defendant and its experts do not see this logic through. Although it maintains that it complies with draft WEDG 2019, the defendant also distances itself from that guidance. The defendant emphasises that although consideration was being given in draft WEDG 2019 to changing the basis of regulation from that set out in WEDG 2006 – principally to bring down maximum noise limits from 45 dBA L90 to the 43 dBA L90 or 5 dBA over background and to reflect a penalty for AM - this draft guidance has not been brought forward. The defendant's uncontradicted evidence is that the present practice of planning authorities is to fix permission noise limits for wind farms in accordance with WEDG 2006 - i.e., by reference to fixed decibel limits only with no penalty for AM.

369. The defendant therefore argues that because this is the present practice of local authorities, the court ought to adopt a similar approach in its assessment of nuisance in this case. I do not agree. The issue is not whether or not WEDG 2006 remains the current regulatory framework for windfarms in this country or indeed whether the Ballyduff WTN complies therewith. Neither WEDG nor present planning practice can determine the matter at hand because they do not reflect current expert scientific knowledge on WTN. Current expert scientific knowledge at least informs more recent publications such as draft WEDG 2019 and the ETSU Review (although of course the first of these has been withdrawn and the second has yet to be formally adopted). Unlike these more recent publications, WEDG 2006 does not even consider the extent to which those aspects of the WTN which are the source of complaint in this case may be said to be objectively reasonable.

370. The fact that AM and thump AM remain to be regulated does not mean that the court should ignore these characteristics. I fail to see how it can credibly be said that merely because an acknowledged problem has not been regulated in the planning sphere the court should now ignore the problem in the context of a nuisance action.

371. This review of WEDG 2006 is clearly a difficult and long-drawn-out process and the same is evidently the position in the UK. In and of itself this demonstrates just how complex and multifactorial the impact of WTN can be.

372. This ongoing evolution reveals the fallacy of a related argument advanced by the defendant; namely that the plaintiffs must demonstrate non-compliance with WEDG 2006 and that the failure to do so effectively means that nuisance is not established. The plaintiffs do not

rely upon non-compliance with current planning guidance as establishing nuisance. They argue - correctly in my view - that existing planning guidance effectively (WEDG 2006) is not responsive to the issues complained of - AM, thump AM etc.

373. I think it is fair to conclude that the current direction of travel in wind energy planning guidance is towards setting decibel limits combined with a penalty for character such as AM together with limits on low frequency noise. However, the recommended decibel levels in draft WEDG 2019 might go up or they might go down. The suggested penalties for AM might also go up or they might go down. The permitted exceedance over background noise might go up or it might go down. Likewise, the current low frequency curve may be adjusted.

374. Draft WEDG 2019 is perhaps a reasonably up to date indicator (2019) of what might have been considered appropriate in terms of WTN, AM, low frequency noise etc. However, it is no more than that. Draft WEDG 2019 has since been withdrawn. I therefore criticise neither party for failing to carry out a formal assessment of the Ballyduff WTN as against these draft guidelines. I do, however criticise the defendant's casual assertion that it complies with draft WEDG 2019 (indeed with "*headroom*") when there is little credible basis for this view.[47]

375. I should say that this court would place very considerable weight upon up-to-date, scientifically robust planning guidelines on wind energy developments which advised on the particular decibel level at which WTN, when combined with AM of a particular nature, is considered an acceptable interference with amenity. If responsive to the particular aspect of the noise complained of, such guidance would be highly persuasive in a nuisance action. A plaintiff who sought to argue that such guidance did not represent a reliable – if not a wholly reliable – indicator of what is objectively reasonable would, in my view, bear a heavy onus. However, no such guidance currently exists; planning guidance in this jurisdiction (and elsewhere) can fairly be described as flux and cannot identify the line of acceptability.

376. This raises a further principled objection to the notion that the plaintiffs must identify a line in the sand upon which this court must rule. Although the defendant does not overtly request a line to be drawn for every windfarm, this would seem to be the terminus of its argument.

[47] I explain this further at para 206 *et seq* above and 471 below.

377. Yet, there is currently a government policy in evolution in relation to the wind energy development which one would expect to consider at least some of the crucial components of this line in the sand. WEDG 2006 is in the course of review. It would in my view represent a wholly unwarranted intrusion on the executive function for the court to attempt to draw the line of acceptability for windfarm noise. Not only does the court have no jurisdiction to do this, but it also lacks the expertise to even attempt this task.

378. In short, neither the parties' experts nor the court can or should attempt to set a line of acceptability for the community as to what constitutes unacceptable windfarm noise. That is not the purpose of this litigation.

The Defra criteria

379. Ms. Large and Mr. Stigwood identified BS 4214, *Methods for rating and assessing industrial and commercial sound* and the Defra Guidance as the methodologies of most assistance to the court in the assessment of WTN nuisance.

380. I accept the defendant's contention that BS 4142 applies to the assessment of industrial and commercial sound generally and that it is not appropriate to apply it when there is other more specific guidance on windfarms, such as the Defra Guidance.

381. I accept that the Defra Guidance is of considerable assistance. Although the Defra Guidance relates to complaints of (United Kingdom) statutory noise nuisance and not to private nuisance, it is a *"recognised standard or guidance"* on the assessment of WTN nuisance. The Defra Guidance provides a helpful framework under which to analyse the various elements of a WTN nuisance complaint.

382. Whilst not necessarily subscribing to the Defra Guidance to the same extent as the plaintiffs' experts, Mr. Carr referred to it in his direct evidence. In particular he referred on several occasions to the following passage:

> *"Because there are no fixed decibel levels and noise index based standards that act as thresholds for the onset or as a definitive test for Statutory Nuisance, the primary uses of noise measurement will be establishing the intensity of the noise complained of and whether an established threshold of impact is being exceeded as an indicator of impact; and to assist in deciding if the complainant is being more than*

ordinarily sensitive. Consequently, the choice of noise index will depend on what guideline, standard or limit value is used to assist in making this judgment or articulating the reasons for a decision".

383. Mr. Carr argues that this means that the plaintiffs must demonstrate that a threshold of impact or "*threshold of significance*" has been exceeded before they can establish nuisance. At a broad level, I accept that this is so. The courts will not entertain claims for minor annoyances and the interference with the use of the plaintiffs' land must exceed a minimum level of seriousness to justify the law's intervention.

384. However, I do not accept that this "*threshold of significance*" is determined by decibel level alone, by the noise limits in condition 15 or indeed by WEDG 2006. Sound levels which can be measured by a sound level metre or other measuring system describe only the amount of energy in a sound but do not provide any other information about its qualities. Therefore, as the Defra Guidance makes clear, noise measurement are helpful but not determinative. The Defra Guidance states that the assessment must be made *"in the context of the specific complaints made and the circumstances of each case, there is no one size fits all approach that can be applied in all situations; instead, a bespoke investigation is required in each case".* Ironically, one of the criticisms Mr. Carr levels at the MAS assessment methodology is just that - that it is, in his words, *"bespoke"*.

385. The criteria identified by the Defra Guidance as relevant to the "*bespoke investigation*" - together with certain other pertinent considerations identified by the plaintiffs' experts - which purely for the sake of brevity I will refer to collectively as "the Defra criteria"- are as follows:

- sensitivity of the complainant.
- the level of WTN;
- the type of noise – e.g., the prevailing AM value and the variability, regularity and predictability of the noise;
- whether any aggravating characteristics are present in the WTN - the spectral content of the WTN and whether thump AM is present;
- the characteristics of the neighbourhood where the WTN occurs;
- the exceedance of WTN over background noise;
- the impact of the WTN on basic needs such as sleep;
- how easily the WTN can be avoided and what measures could reduce or modify the WTN;

- the time of day or night when the WTN occurs;
- the duration and how often the WTN occurs.

386. The above factors reflect the fact that human hearing is obligatory in the sense that our brains are constantly analysing and interpreting sound. Human responses to sound therefore combine both physiological and psychological responses. Noise is related to human response and is routinely described as unwanted sound or sound that is considered undesirable or disruptive. The difference between a sound and a noise is dependent on a number of objective and subjective variables. This all means that the characteristics of a given sound can have a considerable influence on our reactions. I accept Ms. Large's evidence that constant sound with minor change to volume, frequency or character can be easily accustomed to. By contrast, sound characteristics that attract attention and render the sound more discernible are generally considered to increase annoyance. Negative responses are therefore associated with variable, unpredictable sounds and with unexpected changes in loudness such as impulsivity, erraticism and intermittency. Assessment of noise nuisance must consider all of these variables.

387. I also note that the Defra criteria are quite similar to those listed by the EPA in *EPA NG4: Environmental Protection Agency Office of Environmental Enforcement (OEE) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* ("EPA NG4") [48]. Although this guidance, unlike the Defra Guidance, is not windfarm specific, it can only be seen as an endorsement of the view that both quantitative and qualitative factors must be weighed and assessed with care and professionalism in each case.

388. It is my view, that a robust assessment of a windfarm noise private nuisance complaint cannot be conducted without reference to factors such as the Defra criteria.

Issue 5: Do the criticisms advanced by the defendant undermine the reliability of the plaintiffs' experts' evidence - and the data on which it is based - on nuisance?

389. Before assessing the evidence presented in this case as against the Defra criteria, it is first necessary to consider the reliability of the audio recordings (and the associated graphs)

[48] This notes that the potential impact of noise is dependent on a wide range of factors such as:
• *The subjective loudness/the measured sound pressure level;*

which the plaintiffs' experts placed before the court. In particular, it is necessary to determine whether the various criticisms levelled at this evidence by the defendant and its expert, Mr. Carr, mean that the court ought not to treat this evidence as reliable or probative in determining whether nuisance is made out.

Purpose of the plaintiffs' audio recordings and the associated graphs

390. Both parties agreed that the court should hear the MAS audio recordings and consider the associated graphs. However, the defendant contends that this data is relevant for "context" only. Beyond that, it is said, the court ought to pay it no further regard.

391. Mr. Carr contended that the MAS approach of presenting such data to the court was novel and bespoke and would not be considered best practice.

392. By contrast, Mr. Stigwood states that no other existing methodology allows one to appreciate the complainant's noise environment. He states that the same audio/graphical presentation method has been adopted both by MAS and by opposing experts in every wind farm nuisance case in which he has been involved.

393. Mr. Stigwood used a barking dog analogy to illustrate the drawbacks of relying solely upon average decibel levels to assess nuisance. The leq 10 of a barking dog over a ten-minute period tells one nothing about the character or intermittency of the barking. One loud bark might produce the same average decibel level average as ten lower barks. Yet, a single bark might disturb for ten seconds whereas ten lower barks would pose considerably greater disturbance. Further, as L90 considers only the level exceeded 90% of the time, neither the single loud bark nor the ten lower barks would alter the L90 decibel level.

394. I accept that both the L90, and to a lesser extent the 10 or 15 minute leq averages, are relatively insensitive to rapid fluctuations in noise level such as AM. A complaint centred on the changing character and nature of AM cannot be analysed by average decibel level alone pursuant to either the L90 or leq metric. Moreover, WTN can present at higher or lower frequencies giving rise to swish and thump AM respectively. Yet, these cannot be distinguished using either L90 or leq.

395. Because the plaintiffs complain of high AM values, it would undoubtedly have been of considerable assistance if either party had performed a long term assessment of external AM values at NF or HH in strict accordance with the IOA RM. This however had not been achieved.[49] On the other hand, the defendant has not contended that the IOA RM can differentiate between the impact of swish and thump AM, which is one of the plaintiffs' crucial complaints. The plaintiffs also complain of other features which the IOA RM is not designed to capture or assess - such as erraticism, impulsivity, variability/intermittency and general unpredictability of the AM.

396. Any robust noise nuisance investigation must engage with the complaint actually made. It simply cannot be credibly argued that - an assessment of whether these plaintiffs' subjective complaints are objectively justified - requires no more than a comparison with the noise limits set out in the planning permission and in WEDG 2006.

397. Indeed, it appears that even a planning compliance investigation often involves actually listening to the noise, Supplementary Guidance note 5 advises:

> *Irrespective of the requirement to carry out tonal analysis, it may be useful to carry out audio recordings for 2 minute samples in every 10 minute interval in all cases to allow for subjective evaluation of any noise effects and particularly of any time histories produced to assist with any discussions about the acoustic character of the noise…., It should be noted that a subjective assessment of this nature would normally be carried out with regard to a diary of complaints or certain wind conditions that have been found to correlate with complaints since listening to all data would usually be impractical.*

398. In short, the nuisance assessment requires an engagement with and an evaluation of the plaintiffs' complaints in light of all of the evidence which tends to either corroborate or undermine those complaints. In my view the audio recordings of the WTN and the associated graphs are important components of this evidence.

399. I emphasise that the exercise undertaken by MAS is not simply to assess nuisance by listening to the WTN. Rather, the plaintiff's evidence places the features of the WTN - such as its AM values and the presence of thump AM - in context. MAS estimate general AM values on site in a manner that enables one to compare these values to guidance (such as the Phase 2 Report and draft WEDG 2019) which identify AM values at which annoyance is known to

[49] Indeed, MAS had intended to conduct a formal IOA RM analysis on foot of the 2021 NF external data. For reasons I will explain, however, this data is not sufficiently robust to provide a valid basis for IOA RM analysis.

occur. MAS does not merely identify thump AM on the audio recordings. It correlates the WTN by using spectrograms to confirm the presence of lower frequency sound energy manifesting as audible thump AM. Although Mr. Carr is no doubt correct in stating that various people have various different opinions about what constitutes an unreasonable interference; it is unfair for him to imply that MAS simply played the audio recordings of the WTN to the court and then said, "*isn't this awful?"*.

Contamination/Differentiation

400. The defendant submits that the audio recordings might be contaminated by ambient noise, principally wind noise.

401. Mr. Stigwood and Ms. Large did not subjectively listen to the several months of audio recordings collected at both residences. However, Mr. Stigwood did listen to and screen - both aurally and visually (including by spectral correlation) - the audio recordings played to the court and forming the basis for the associated graphs presented in the MAS reports. Therefore, the data presented to the court, and to which I have had regard, has been screened by MAS.

402. Mr. Stigwood was confident that he could discriminate as between ambient sounds and WTN. After listening to almost 25 such recordings (excluding the 2021 NF external audio recordings), I accept that this is generally the case for both the external and internal audio recordings. When AM is present - as it was on virtually every single recording - the WTN is rhythmic in nature, albeit highly changeable and unpredictable. It rises and falls, often quite sharply, every couple of moments. It also disappears and returns again, fading in and out. This noise is distinctive and quite unlike wind or other extraneous noise. Wind gusts, birdsong, footsteps, etc can in the main be separately identified and discerned.

403. The defendant was furnished with all of the audio recordings and the associated graphs well in advance of the trial and has had a full opportunity to review the material. It was suggested to Mr. Stigwood in cross-examination that Mr. Carr would assert that "*many of the recordings*" included wind noise in addition to WTN. In fact, this evidence was not given by Mr. Carr who identified extraneous noise in only a handful of recordings. In each case, the extraneous noise was either entirely obvious or had already been highlighted by Mr. Stigwood in his graphs or oral evidence.

404. Furthermore, as Ms. Large and Mr. Stigwood note, different noise sources carry different frequencies. Therefore, spectrum analysis by means of a spectrogram informs one of the source of the noise and identifies - and thus assists in the exclusion, if necessary – of extraneous noise, such as wind gusts and birdsong.

405. Mr. Stigwood stated that in order for wind noise to play a significant role in the general character or loudness of the sound environment presented on the audio recordings, it would have to be of a nature and at a level far in excess of that which he would consider normal. No convincing evidence was given to contradict this.

406. In this regard, I note that it is not disputed that Ms. Large correctly set up and calibrated the monitoring equipment and used a double skinned windshield to protect the microphone from wind noise when capturing the 2017 external NF audio recordings.

407. The 2021 MAS data was set up by the plaintiff's solicitor under the instruction of MAS. Inadvertently, the microphone was not fitted with a double skinned windshield. However, for internal recordings (the 2017 internal HH audio recordings and the 2021 internal NF and HH internal audio recordings) I consider this to be of minor importance. As Mr. Stigwood points out, the room in which the recording equipment was placed effectively serves as a windshield; internal audio recordings will only be materially affected by wind over the microphone when there is a through wind inside the room. This in turn requires windows or doors to be wide open on both sides of room; these were not the conditions of measurement.

408. Therefore, save during stormy periods, which were clearly identified to the court, I find that wind noise does not contribute substantially to the sound environment on the 2017 internal HH audio recordings or the 2021 internal NF and HH internal audio recordings played to the court (and in the graphs presented in the MAS reports). I am satisfied that extraneous noise can be - or had been - separately identified and does not distort one's aural appreciation of the impact of the WTN on the audio recordings or one's interpretation of the associated graphs.

409. I accept the opinion of Mr. Carr that the position is different in respect of the 2021 NF external data which, as I say, was gathered without a double skinned windshield. I accept that wind contamination cannot confidently be excluded. I also accept that placing the monitoring equipment too close to the exterior façade will tend to increase noise levels by up to 3 dB,

which also has the potential to distort AM values. Mr. Carr's related criticism that one cannot take façade measurements where there is a significant low frequency content to the noise, was not put to Mr. Stigwood, which reduces its weight. However, in light of the first two difficulties just discussed, I have in any event entirely disregarded the 2021 NF external data (the audio recordings and all associated graphs) in all of my consideration.

Are the audio recordings selected for playback and analysis representative of the WTN on site?

410. Clearly, MAS did not record the plaintiffs' entire soundscape for the last seven years. Equally, it would not be possible to present to the court all of the audio recordings as this spans several months of monitoring. MAS therefore selected only certain audio recordings (and the associated graphs) on which to focus in their reports and only a subset of these were played to the court. No doubt the recordings (and the associated graphs) chosen were those adjudged to best represent the different features of the WTN complained of by the plaintiffs. Indeed, this is made clear by Mr. Stigwood in his report of October 2022.

411. However, this is really the only practical way to present the audio recordings (and the associated graphs) of the WTN to the court. Crucially, the defendant's expert made no suggestion that the audio recordings selected were unrepresentative of the features of the WTN of which the plaintiffs complain. Mr. Carr has listened to all of the audio recordings referred to in the MAS reports (and has presumably examined all of the associated graphs) and did not contend that those chosen for presentation to the court were unrepresentative of the audio recordings (and the associated graphs) as a whole.

412. Mr. Carr accepted that the audio recordings (and associated graphs) accurately captured and represented the sound environment at the positions where the microphones were placed. He was present in court throughout the presentation and analysis of the audio recordings (and the associated graphs) and did not demur from the opinions expressed by the plaintiffs' experts as to the identified features of the WTN. He did not suggest that the various features identified by MAS occurred only rarely or usually on the audio recordings. There is no suggestion that these features were "outliers". Rather, Mr. Carr's view was that, having "*dipped in and out"* of the full suite of MAS audio recordings, (taken over several months), the general picture was broadly similar.

413. In short, therefore, the court can, and indeed should, have regard to the 2017 external NF data, to the 2017 internal HH data and to the 2021 internal HH and NF data, all of which together are representative of the character of the WTN.

Issues arising in relation to internal audio recordings

414. Although Mr. Carr accepted that the internal audio recordings accurately capture the sound at the location where the microphone was positioned, allowance must be made for *"room modes*." Noise measurements within buildings can be inconsistent due to the influence of room acoustics such as acoustic reflections from surfaces and absorption from soft furnishings, carpets and beds etc. This can create different sound fields resulting in potential over or underestimation of the typical exposure in the room.

415. The defendant contends that to counteract the impact of room modes ISO 1996-2, 2017 recommends the use of several different recording devices at various locations throughout the room rather than via a single microphone. I am concerned that this objection was not adequately put to Mr. Stigwood.

416. I note that ISO 1996-2, 2017 applies to all environmental noise sources such as road and rail noise, aircraft and industrial noise. Unlike the Defra Guidance therefore, ISO 1996-2, 2017 is not WTN specific. Ms. Large and Mr. Stigwood's evidence was that all internal measurements complied fully with the Defra Guidance which states that the effects of sound reflections and absorption can be appropriately managed by positioning the microphone at least 0.5m from any sound reflecting vertical room surface or sound absorbing objects such as items of furniture or curtains etc.

417. I accept that, for present purposes, this is an adequate response to the issue of room modes. This is particularly the case as the plaintiffs' primary complaint does not relate to noise levels *per se* but to noise character.

418. The plaintiffs' experts do not contend that the audio recordings played to the court precisely replicates WTN noise levels at every point in the room or indeed in every room in the house. Rather they are intended to convey an impression of the plaintiffs' sound experience

and to demonstrate and corroborate the features of the WTN of which the plaintiffs complain. I am satisfied that the internal audio recordings are more than adequate for that purpose.

419. The defendant also submits that because the 2021 HH and NF internal monitoring was set up by the plaintiffs' solicitor, rather than by experts, it ought to be disregarded. This, in my view, would be a wholly disproportionate response to the minor criticisms advanced by the defendant, such as for example, the position of the microphone flex. I can see no point of real substance here, and I will therefore have regard to this data.

Criticisms of the plaintiffs' experts' presentation and analysis of the AM on site

420. Ms. Large and Mr. Stigwood presented and analysed the AM on site by reference to the audio recordings and associated time domain graphs. Their opinion was supplemented by their own experience on site. In Ms. Large's opinion, the AM on site is substantial and excessive. Mr. Stigwood's view is to similar effect. He states that there sustained periods of AM of the highest levels of modulation variation that he has ever seen occur commonly. His view is that this AM *"impacts on residential amenity in a manner and form rarely found so excessive*".

421. The defendant advances several interrelated criticisms of the plaintiffs' experts' presentation and analysis of the AM on site:

a. AM may only be presented or analysed through the application of the IOA RM;
b. The MAS presentation and analysis of AM by way of audio recordings and time domain graphs is unreliable and ought to be disregarded in any nuisance assessment.
c. The MAS presentation and analysis of AM by way of audio recordings and time domain graphs exaggerates AM.

422. Separately, Mr. Stigwood also sought to the apply the IOA RM to the 2021 MAS data and to present the results of that analysis. The defendant advances two interrelated criticisms of Mr. Stigwood's IOA RM analysis of the AM on site

d) The 2021 MAS data is unreliable and the IOA RM cannot be reliably applied thereto either to derive a penalty or at all.
e) The 2021 NF external data is unreliable and the IOA RM cannot be reliably applied thereto either to derive a penalty or at all.

f) The 2021 NF and 2021 HH internal data is unreliable and the IOA RM cannot be reliably applied thereto either to derive a penalty or at all.

423. I will consider these points in turn.

(a) Exclusivity of the IOA RM in nuisance investigations

424. The defendant's attitude towards the IOA RM is somewhat contradictory. On the one hand, the defendant contends that the only acceptable method for demonstrating AM to the court is via the IOA RM. Yet, despite acknowledging that "*this case is all about AM*", the defendant has not itself carried out an IOA RM assessment of the AM on site.

425. Ms. Large and Mr. Stigwood both accept that the IOA RM can provide useful information tending to confirm the level of AM present in the audio recordings (as depicted on the associated time domain graphs). However, in their view, the IOA RM provides no more than an overall impression of the extent and regularity of such impact. They reject the position that it is mandatory to apply the IOA RM to an AM complaint in a nuisance case and point out a number of drawbacks to the methodology (none of which were in substance disputed by the defendant's experts):

- The IOA RM depicts average AM values in a specific ten minute period as a point on a graph but tells one nothing about the quality of the AM during the period. It may not identify many features of AM said to be most intrusive in this case such as erraticism and impulsivity. Crucially, it is not contended by the defendant that the IOA RM can discriminate between swish and thump AM.
- The IOA RM produces a single value for a 10-minute period. It is not apt to fully represent AM that is variable or intermittent -i.e., AM that disappears and returns again or fades in and out - which is one of the plaintiffs' main complaints. Purely by way of example, if a particular ten minute period has five 60-second blocks of high AM value interspersed by five 60-second blocks of low AM value, the IOA RM will derive an AM value which is the approximate average of the AM depicted over the entire period. Alternating high and low AM, which can be extremely intrusive, is not accommodated by the IOA RM. The same lacunae might equally result from the requirement of the IOA RM that at least 50% of the 10-second blocks in the relevant 10-minute period contain detectable AM before even being included in the analysis.

- The IOA RM can produce both false negatives and false positives. As above, periods of substantial AM can, be smoothed out by the averaging effect. False positives, such as dogs barking, or cars backfiring cannot be recognised and filtered out because the IOA method is effectively automated.

426. The IOA AM report states that its primary goal is to develop a methodology which can be used within the planning regime. It also states that consideration could be given to its use within the (United Kingdom) statutory nuisance regime as well. The IOA RM has several merits and provides an objective benchmark for rating AM. However, the report emphasises that it is possible for AM to be evaluated in different ways, including subjectively. It states that noise nuisance investigations, for example, need not be limited to any particular method of assessing WTN and would often involve many other factors such as the time of day and the character of the neighbourhood. Furthermore, factors such as the duration and frequency of occurrence may be relevant in determining subjective responses. Therefore, the report acknowledges that the availability of the IOA RM does not preclude other assessments being made.

427. I therefore reject as ill-founded the defendant's argument as to exclusivity of the IOA RM in nuisance investigations. In considering the impact and level of AM on site, it is appropriate to have regard to the MAS audio recordings and associated time domain graphs even though these are not, and do not purport to be, presented by way of an IOA RM analysis.

428. Having said that, the IOA RM analysis, in contradistinction to the audio recordings and time domain graphs (which cover short periods only) is apt to demonstrate AM values over more extended time periods. However, in the present case such a more consistent picture is demonstrated by Mr. Stigwood's IOA RM analysis of the 2021 internal HH and NF data on which I comment below.

<u>(b) can audio recordings and time domain graphs be used to present/assess the AM on site?</u>

429. The defendant also criticises the use by MAS of time domain graphs to present and assess AM in this case. The IOA AM report considers their use as follows:

The use of the time-domain method

Most respondents agreed that a time-domain method, based on examination of a time-series plot to determine the typical, average, or maximum peak-to-trough values, is very suitable for the assessment of short-term 'clean' WTN data with minimal corruption by other ambient noise. The method has the benefit of relative simplicity. However, the strong majority view was that it was not suitable for rigorous assessment of AM, especially when there was significant noise from other sources, because it was unable to discriminate between fluctuations in noise levels resulting from wind turbine AM and those resulting from variations in other ambient noise. Significant subjective (visual or aural) screening is required to overcome this fundamental deficiency, which is considered to be impracticable for the analysis of long-term data (perhaps covering periods of weeks or months)…

AMWG comments

There is some benefit in having a simple method of assessing AM, for example for the purpose of forming an initial conclusion about the validity of a noise complaint…

Any output from such a method would be open to question unless accompanied by time histories which demonstrated (on subjective judgement) the presence of clear AM with no significant contribution from other ambient noise, or using tools such as autocorrelation spectra. However the AMWG does not consider that the method is a robust basis for an assessment metric which may be adopted in a planning condition. Wind turbine AM, where it occurs, is an intermittent occurrence. The assessment of AM on a particular site would generally involve long-term measurements to establish the frequency and duration of occurrence and the particular wind conditions. Reliance on a time-domain method only, which may appear more direct to non-specialists, is not considered to be practicable or robust, because unlike a frequency-domain method, it is unable to detect WTN AM on the basis of its distinctive periodicity and therefore requires significant subjective 'filtering'.

430. The concern of the IOA was that the time domain method would require significant subjective (visual or aural) screening to discriminate between fluctuations in noise levels resulting from wind turbine AM and those resulting from variations in other ambient noise. Therefore, the output would be open to question unless accompanied by time histories which demonstrated (on subjective judgement) the presence of clear AM with no significant contribution from other ambient noise, or using tools such as autocorrelation spectra.

431. This is in substance the exercise carried out by MAS in relation to the audio recordings and time domain graphs it presents.

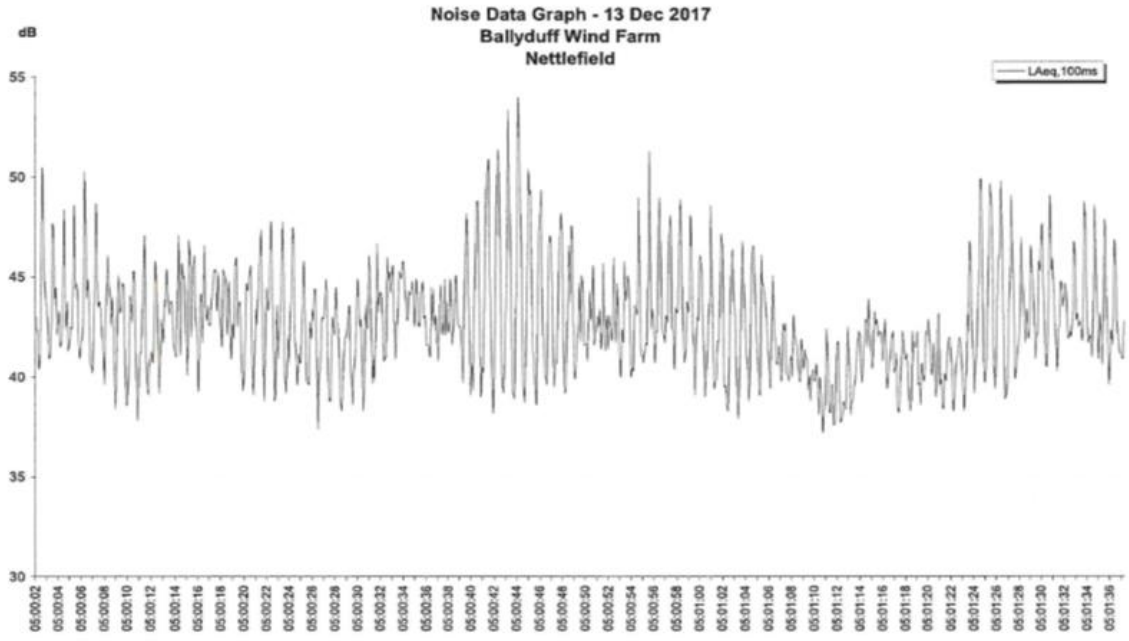
432. Further, the time domain data demonstrates consistency between the AM values typically presenting at both properties over both periods of monitoring. In my view, this

consistency strongly supports the proposition that, overall, MAS's method of presenting and calculating AM values is reliable.

433. With the exception of the 2021 NF external data, I therefore find that the MAS time domain data is sufficiently robust to reliably demonstrate the features of wind turbine AM and to calculate AM values over the periods presented in the graphs[50].

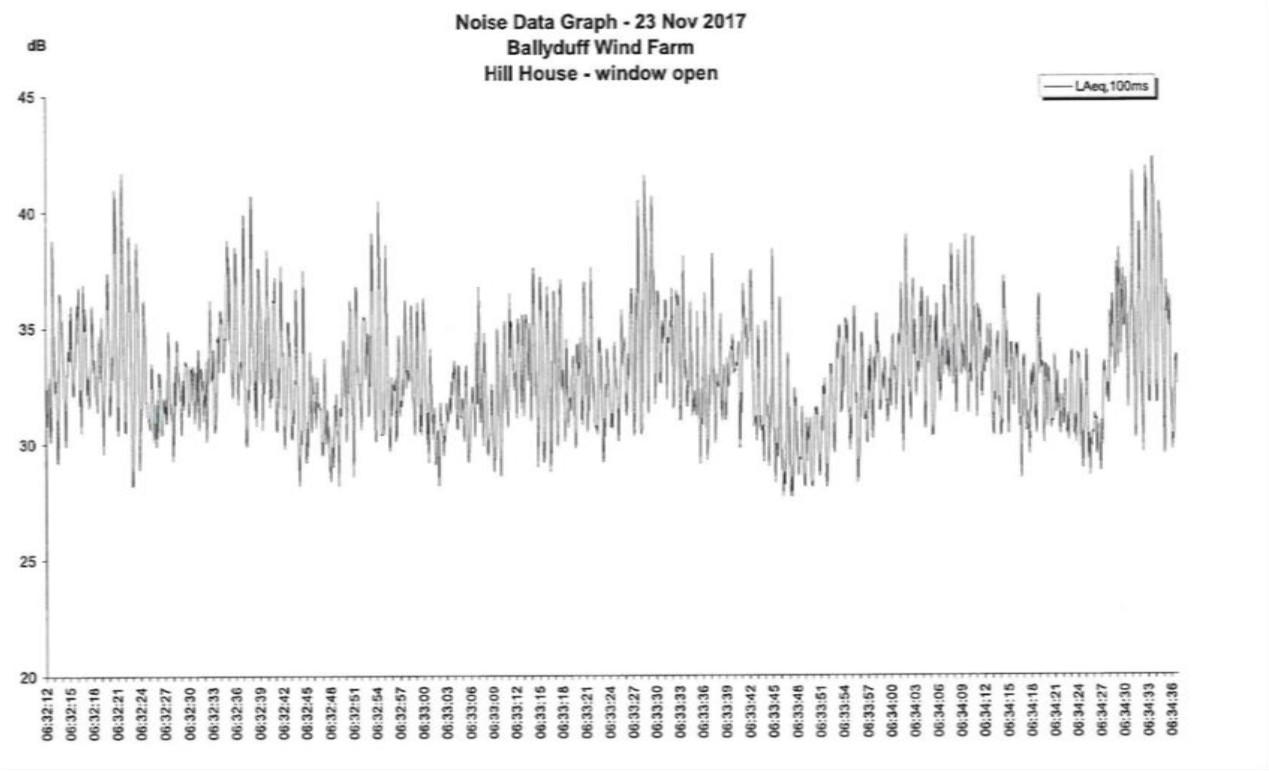
434. Purely for illustrative purposes, I attach below one of Ms. Large's time domain graphs demonstrating the AM externally at NF on 13th December, 2017 at 05.00.

Figure 26: Amplitude modulation -Nettlefield - 13/12/2017 05:00



435. I also attach one of Ms. Large's time domain graphs demonstrating the AM internally at HH (with the window open) on 23 November, 2017 at 06.32.

[50] I deal separately below with the far more extensive data used as an input to Mr. Stigwood's IOA RM analysis.



(c) Do time domain graphs exaggerate AM?

436. Ms. Large and Mr. Stigwood have computed AM values by calculating the differential between the highest peak and lowest trough sound levels in any particular modulation. The defendant states that this may overstate the AM when compared to the IOA RM. This is because the IOA RM calculates AM values by subtracting the L95 from the L5 over the relevant 10 second and 10 minute periods. Mr. Carr emphasises that Mr. Stigwood's report acknowledges that IOA RM derived values "*will typically understate AM peak to trough values*…(when compared with the time domain method) *by 1-2 dBA".* Mr. Carr did not however contend that the likely divergence as between the two methodologies would be any greater than this.

437. Although not calculated over specific 10-second or 10-minute intervals, I accept that the plaintiff's experts' calculation of average or typical AM values as derived from the totality of the time-domain graphs is sufficiently reliable to inform this court's analysis.

(d) Use of 2021 MAS for IOA RM analysis

438. As stated, the plaintiffs' experts' calculation of AM value is derived from their time domain graphs. These graphs represent specific time intervals only. Although the defendant's experts did not contend that the audio recordings and time domain graphs were unrepresentative of the WTN generally, more extensive data would have been of value in

assessing long term average AM values at a range of windspeeds. Further, although I reject the proposition that the IOA RM is the exclusive methodology for presenting and analysing AM in general or AM values in particular, one would nonetheless reasonably expect that, in a case which is *"all about AM"*, the plaintiffs' experts (and indeed the defendant's experts) would have formally applied the IOA RM in this case.

439. Indeed, it is clear that Mr. Stigwood set out to perform just such an exercise and to apply the IOA RM to the six weeks of data gathered on foot of the 2021 monitoring. To that end, his October 2022 report presents three IOA RM graphs: first, an IOA RM graph prepared on foot of the 2021 NF external audio recordings; second, an IOA RM graph prepared on foot of the 2021 NF internal audio recordings and third an IOA RM graph prepared on foot of the 2021 HH internal audio recordings. Each such graph plots the average 10-minute AM value over the relevant six weeks as calculated in accordance with the IOA RM. However, for different reasons which I will now explain, none of these three graphs is prepared in full compliance with the IOA RM methodology.

(e) Use of 2021 NF external data for IOA RM analysis

440. Mr. Stigwood's opinion is that the IOA RM analysis of the 2021 NF external audio recordings suggests that average AM values over the six weeks of data were in the order of 8 dBA and would incur an AM penalty of 5 dB under draft WEDG 2019.

441. Mr. Carr indicated that he was unable to stress test this conclusion because he could not discern how the data had been post-processed and analysed by Mr. Stigwood. It is hard to give this much credence. The defendant has had Mr. Stigwood's report and all of the underlying data for some time and could have performed its own IOA RM analysis.

442. However, I accept that due to the absence of a double skinned windshield and because the external NF 2021 audio was recorded at façade level, it cannot form the basis of a valid IOA RM analysis, and I do not accept it for that purpose. I consider immediately below the IOA RM analysis of the 2021 NF and HH internal audio recordings.

(f) use of 2021 NF internal and 2021 HH internal data for IOA RM analysis

443. The defendant correctly observes that the plaintiff's most serious complaints concern indoor noise particularly at night. It nonetheless objects to MAS's presentation of an internal IOA RM analysis.

444. The IOA AM report considers the usefulness, for its purposes, of internal measurements.

> **Is it appropriate to measure AM outdoors in free-field?**
>
> This question generated considerable discussion. Most respondents observed that complaints regarding AM often concerned indoor noise, particularly at night. It could therefore be thought logical to measure noise inside dwellings. Furthermore experience suggests that there is a variable 'transfer function' between indoor and outdoor perception of AM and in some cases, higher levels of AM may be detected indoors than outdoors. However, most respondents accepted the difficulties in measuring noise inside, including the influence of room modes and the resulting spatial variations in noise level, as well as the influence of domestic noise sources…
>
> For the purposes of defining and applying a method for rating AM, most thought that measuring indoors presented too many practical difficulties and outdoor measurements were strongly preferred. Measuring outside is also consistent with most other environmental noise assessment procedures. It was suggested by some that additional indoor measurements would be appropriate if complaints related specifically to noise indoors.
>
> **AMWG comments**
>
> The working group's objective is to define a metric that can be used reliably within the planning system, and external measurements are the only practicable option. For specific complaint or nuisance measurements, investigators are of course free to make internal measurements and assessments in connection with the specific issues. Indoor measurements are problematic for a variety of reasons including, access difficulties, corruption by other sources, and room modes which could result in different responses in different positions in the room. These factors can cause a large variation in noise levels which can affect reproducibility. It is considered unnecessary to account for all of these factors when wind turbine AM can be measured reliably outdoors.

445. Ultimately, therefore, the IOA AM report concludes that as the objective of the working group is to define a metric that can be used reliably within the planning system, external measures were the only practical option. This is entirely logical as it would not be possible for a planning noise condition to be set by reference to internal measurements at specific houses. However, the IOA AM report also acknowledges that for a specific complaint or for nuisance measurements investigators are free to take internal measurements.

446. In considering the robustness of the IOA RM analysis of the internal data, two specific issues arise.

447. First, unlike the other data presented to the court, MAS has not subjectively screened the six weeks of 2021 internal NF and HH data input into the IOA RM for contamination from domestic sources. However, I note that the Carty-Shortens moved out of the master bedroom at NF bedroom in July 2017. Even at the time of the 2017 MAS data collection[51] the master bedroom was therefore unoccupied. Moreover, at the time of collection of the 2021 MAS data[52] the whole house was unoccupied. This tends to mitigate if not exclude many potential sources of domestic contamination which might otherwise undermine the analysis of long term internal data under the IOA RM.

448. The position is different in relation to HH which was occupied during all monitoring periods. As there may be undetected contamination from domestic sources, the IOA RM of this data is less robust. However, as there is no suggestion that there is a significant difference between the AM or the AM values experienced as between the two properties, the 2021 NF internal data may be seen as a fair proxy for the AM values experienced internally at HH.

449. Second, as the IOA points out room modes could result in different responses in different positions in the room. This would be an obvious problem if one was using the data collected to calculate potential AM penalties for the purposes of a planning condition. This requires consistency and ease of replication as between different affected dwellings. However, as room modes have been adequately dealt with by compliance with the recommendations in the Defra Guidance,[53] there can be no objection to the use of the internal data to derive a general picture of AM values at the two properties.

450. I accept therefore that the IOA RM analysis of the 2021 NF internal data is sufficiently robust. Whilst therefore strictly speaking it is not a "formal" IOA RM analysis (because the IOA RM is only formally applicable to external free field data), it is nonetheless evidence of weight.

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[51] Note: the 2017 MAS data was not used for the IOA RM analysis but for the analysis of AM values using the time domain method.
[52] Note: this was the data used for the IOA RM analysis
[53] See para 416 above.

451. As such, I accept the opinion of Ms. Large and Mr. Stigwood that the impression of AM gained from the audio recordings and time domain graphs is confirmed by the IOA RM analysis of the internal data. I attach Mr. Stigwood's internal IOA RM analysis pertaining to both NF and HH for the time period 4th December, 2020 - 18th February, 2021 below.

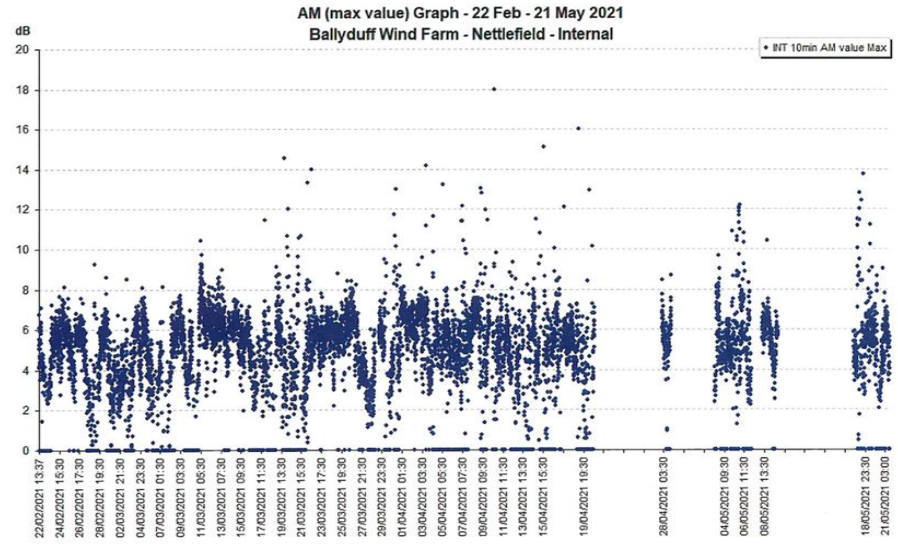
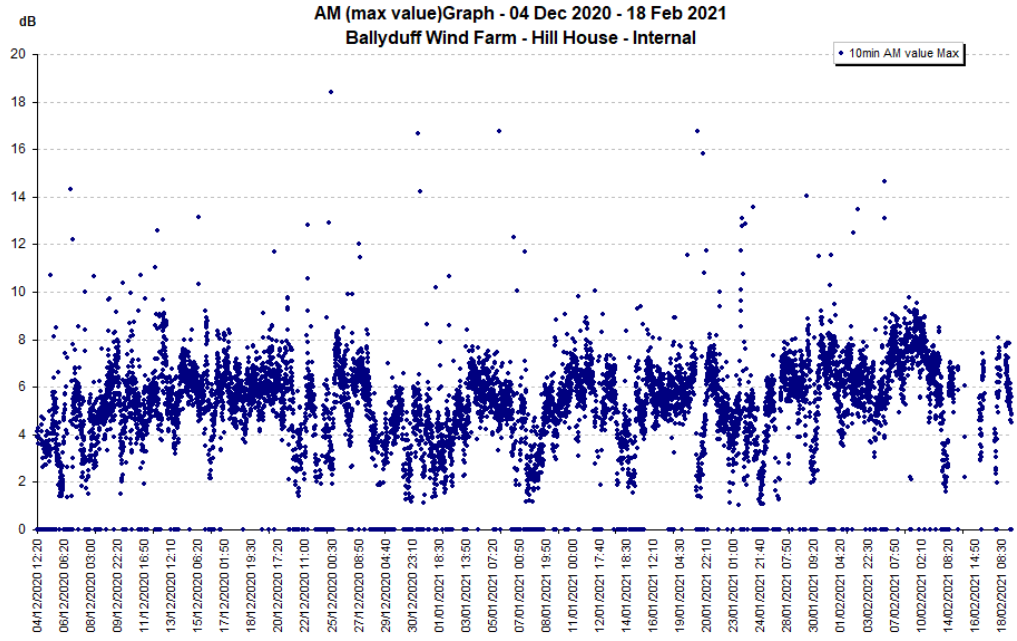


Figure 36: Summary of IoA AM analysis – Nettlefield - Internal



Absence of measurements in HH bedroom

452. In general, measurement errors can occur when a room is occupied at the time of noise monitoring. In NF, the master bedroom was unoccupied, and monitoring was conducted without difficulty. However, HH has been in continuous occupation. Further, due to the WTN,

Ms. Webster finds the master bedroom is the only room where she can sleep in. It would clearly not have been practical or reasonable to require her to vacate this room for an extended period of time to facilitate monitoring. Internal monitoring was therefore conducted in a home office situated downstairs at the back of the house facing the turbine. The master bedroom is on the other side of the house and faces the valley.

453. The defendant's legal submissions argue that Ms. Webster and Mr. Rollo have not made out a case in nuisance because there are no noise measurements or internal audio recordings from the master bedroom at HH.

454. Ms. Large's evidence was that an internal noise assessment is an assessment of the house in general. The intent is to find a location that is reasonably representative of the noise impact at that dwelling rather than to place a microphone in every single room. Ms. Large's view was that the home office where the microphone was placed was representative of the noise level in all of the rooms at the rear of the dwelling, upstairs and downstairs. Whilst she accepted that noise levels at the front of the house, where the master bedroom is situated, would probably be different, there was no evidence of a significant change in the overall character and impact of the noise.

455. Mr. Carr did not suggest that the AM values or indeed the impact of AM and thump AM would be appreciably reduced as one proceeds from the back to the front of the house. Whilst there will always be some variation throughout a dwelling, WTN, particularly with low frequency content, is not well attenuated by structures and will penetrate buildings.

456. Although therefore AM values cannot be accurately calculated for the HH master bedroom specifically, this is of little import. As I understand it, Mr. Carr, who has carried out many nuisance investigations, has never considered it necessary to take any internal readings at all for the purposes of measuring internal AM values. Nor has he ever performed an internal IOA RM analysis. There can therefore be little objection to approximating AM value in the master bedroom by reference to the values presenting in another room in the same house.

Issue 6: Does an analysis under the Defra criteria support the argument that characteristics of the WTN amount to a substantial interference with the plaintiffs' use and enjoyment of their land?

457. I set out below my analysis of the Ballyduff WTN under what I call the "Defra criteria". In doing so, I primarily consider the relevant expert evidence advanced by both parties on each criterion. In this regard, whilst the plaintiffs' experts carried out an in-depth analysis of the WTN by reference to the Defra criteria, the defendant's experts did not. However, in so far as the defendant's experts addressed the issues arising, I set out below the key aspects of their response to the evidence of the plaintiffs' experts in respect of each criterion. As will be apparent, although I do not accept all of the conclusions of the plaintiff experts, e.g., their calculation of background sound levels and their application of the 2009 WHO Lmax limit - I accept the substance of the other points made which together are more than sufficient to establish on the balance of probabilities that the impact of the WTN is objectively unreasonable.

Sensitivity of the complainant

458. In *Smyth v. RPA,* the uncontradicted evidence of the RPA's acoustic expert was that the Smyths were not among a group who could be classified as "ordinary". Rather they were highly sensitive and representative of only a very small proportion of the population - 2.5% - who would experience a high level of annoyance at the noise levels demonstrated. In the present case the defendant has tendered no evidence whatsoever that any of the plaintiffs are highly sensitive or hypersensitive to noise, or indeed otherwise.

459. On the contrary, the evidence of the medical experts is that Ms. Webster is a woman whose basic disposition is one of considerable resilience and fortitude who does not allow herself to become overwhelmed by emotion. She approached the turbine with an open and optimistic frame of mind and did not expect it to negatively impact on her enjoyment of her property to a substantial extent. In addition, there is no suggestion of significant sleep disturbance prior to the commencement of the operation of the turbine. In the case of Ms. Webster (and indeed Mr. Rollo), this is confirmed by discovery of several years of prior medical records.

460. I also accept Dr. Murray's opinion, that Ms. Webster has not suffered from any pathological reaction to the WTN. I find that Ms. Webster's reaction to her experience of the

windfarm at least for the first several years of its operation – was entirely proportionate and in no way hypersensitive. She has, as Dr. Murray said, coped with a difficult situation by managing her reaction to it and managing her emotions. In accordance with Prof. Gournay's view, I further find that, although Ms. Webster describes the WTN as getting worse - which objectively is unlikely to be the case – this perception can reasonably be attributed to its cumulative impact which is becoming more difficult for her to cope with.

461. In so far as concerns Mr. Rollo, the evidence of both medical witnesses is that he is a robust person who is not risk adverse or hypersensitive. I find that Mr. Rollo did not meet the diagnostic criteria for depression until mid to late 2020, three years after the turbine was erected. From mid to late-2020, I find that the WTN brought about a hypersensitive condition in Mr. Rollo who was formerly a well-balanced person. Even at this stage, Prof. Gournay's opinion was that whilst there will always be a difference between how two normal people will respond to the same stimuli, a substantial number of reasonable people would react in precisely the same way as Mr. Rollo. As Charleton J. stated in *Lanigan v. Barry*, although a plaintiff cannot be a sensitive soul who complains unreasonably, the defendant cannot use this argument if his own conduct has resulted in the plaintiff being hypersensitive to the intrusion in question (quoting from *Salmond on the Law of Torts* (London, Sweet & Maxwell, 1977).[54]

462. In short, all indications are therefore that the Webster-Rollos are reasonable, tolerant individuals. I have no reason to believe that the position is otherwise in relation to the Carty Shortens.

463. I also accept the truthfulness of their evidence as to their experience of the WTN. In this, I am assisted to some extent by the clinical impression of both medical witnesses that Mr. Rollo was very straightforward and was not attempting to present a false impression. Dr. Murray stated that "*everything points to a very genuine responder who was not exaggerating his symptoms".* Both medical witnesses also formed a similar impression in relation to Ms. Webster. I formed a similar view in relation to all four plaintiffs.

[54] As will become apparent, this observation may have a particular resonance with respect to Mr. Rollo.

464. Overall, I find that, to quote Henchy J. in *Hanrahan*, the *"notions and standards of behaviour and responsibility* [of all four plaintiffs] *correspond with those generally pertaining among ordinary people in our society at the present time, who seldom allows emotions to overbear reason, whose habits are moderate and whose disposition is equable.* In short, the plaintiffs are, to quote Henchy J. again, ordinary persons *"whose requirements are objectively reasonable in all the particular circumstances".* To quote from the defendant's legal submissions, the plaintiffs are *"ordinary* [persons] *with reasonable objective expectations".*

465. Establishing that the plaintiffs are ordinary persons *"whose requirements are objectively reasonable in all the particular circumstances"* and that their evidence of the turbine impact is unexaggerated is of course only one step in the assessment of nuisance. This is because the primary focus of the assessment must remain on the objective nature of the interference itself.

466. I therefore move on to consider the other Defra criteria.

Level of the noise/ loudness

467. The plaintiffs' experts time domain data presents only short term measurements and therefore does not inform one of general noise levels at a range of windspeeds. For this, one needs to rely upon the defendant's planning compliance data as described at 300 *et seq* above.

468. Mr. Carr's view was that the overall noise levels from these wind turbines should be a significant factor in determining whether nuisance is made out. He states that the Ballyduff noise levels are "*very low"*[55].

469. However, this tells us comparatively little as it would be the case with WTN in general. In contrast to other forms of industrial noise, WTN is not by its nature received at high dBA levels; hence the relatively low absolute noise limit suggested in draft WEDG 2019 of 43dBA L90/45dBA leq.

[55] This fed into Mr. Carr's impression that this was not a borderline or *"critical"* case requiring a more nuanced assessment.

470. In order to consolidate his view that the Ballyduff noise levels are "*very low*" Mr. Carr stated that the HH data demonstrates that the WTN complies with this recommended limit in draft WEDG 2019. Indeed, he states that there is "*headroom*" to spare. He further asserts that the WTN would comply with this recommended limit regardless of any character penalty that could be applied.

471. As I mention above at para 214, I fail to see a valid basis for this assertion. To summarise:

- Unlike WEDG 2006, draft WEDG 2019 proposed a relative rated noise limit of 5 dBA above existing background noise within the range of 35 to 43 dBA L90. Compliance cannot therefore be established without assessing background noise levels.
- Even if noise levels were within range, character penalty for AM may well result in non-compliance. The defendant has made no attempt to calculate - or even estimate - what level of possible character penalty might apply.
- There is no HH night hours data from comparatively low windspeeds of 8 m/s.
- The *"headroom"* contended for is in part at least premised on a 3 dB façade deduction from the measured noise levels at HH. In light of the lack of clarity as to Mr. O' Reilly's measurement position at HH and due to the failure to record and calculate the angle of incidence, I am not satisfied that this 3 dB façade deduction can be applied (see para 320 -325 above)

472. The NF data - upon which Mr. Carr did not comment - is even less convincing in this respect. During night hours, total operational noise is either at or slightly beyond the maximum total permitted noise level in draft WEDG 2019 (43 dBA L90) from windspeeds of 9.5m/s. There is no assessment of either background noise levels or potential AM penalty. Depending upon how these factors play out, there is a clear potential for breach of the indicative limit in the draft WEDG 2019.

473. In Mr. Carr's view, the overall noise levels from these turbines are well below the point at which a breach of planning permission or nuisance would arise. In actual fact, on the correct interpretation of condition 15, total operational noise at both locations is well above the 40 dBA leq limit set in the permission.

474. One of the defendant's other key submissions was that average sound levels below 30 dBA leq could never constitute nuisance. Provided this is understood to apply to external sound levels, this is generally correct. It is also however somewhat beside the point as total operational noise during night-time exceeds 30 dBA leq at HH and NF at windspeeds above 4 m/s and 6 m/s respectively. In addition, the MAS 2017 NF external data includes numerous examples, albeit for brief time intervals, when external sound levels are 41, 42, 43 dBA leq.

475. Turning to internal sound levels, Mr. Carr states that noise levels below 30 dBA leq would not be expected to impact one's ability to sleep.

476. Again, this point goes nowhere as the defendant's planning compliance data shows that total operational noise externally at NF rises to 40 dBA leq at windspeeds of 7m/s and to 45 dBA leq at windspeeds of 9 m/s. Allowing for an external to internal transfer function of approximately 10 dBA (with windows slightly open), one would anticipate that internal levels would be above 30 dBA leq on a regular basis.

477. In direct examination, Mr. Carr was asked about his impression of the WTN in the main bedroom at HH where he spent 5 to 10 minutes during the site visit on 8th November, 2018. Mr. Carr confirmed that the purpose of this visit was "*more of a listening experience… just hearing it rather than there to take measurements to show any compliance or otherwise"*. He stated that he could hear the wind turbine outside but that the impact of the turbine reduced significantly internally. Mr. Carr's evidence was that he stood in the HH master bedroom with the window open and couldn't hear the turbine.

> *Q. And in terms of your own experience inside the property, would you have considered the noise that you were able to barely hear to comprise a nuisance or not?*
> *A. No, not inside that bedroom.*

478. Although my own experience on the day of the site visit was different, I fully accept that Mr. Carr was unable to hear WTN in the HH master bedroom over this 5 to 10 minute period. However, it cannot realistically be contended that such a short visit could ever mirror the plaintiffs' experience of the WTN in the master bedroom over so many years.

479. Whilst the key complaint here is not of the absolute average decibel levels, I conclude that as total operational noise during night hours externally at NF reaches 45 dBA leq (and due to a paucity of data, maximum sound levels at HH are unknown), there is significant potential for dominance and unacceptable intrusiveness when combined with other features.

Type of noise

480. I fully accept Mr. Carr's opinion that the AM values calculated by Ms. Large and Mr. Stigwood on foot of the time domain graphs cannot be directly equated with values derived under the IOA RM. In other words, the application of different metrics will yield different AM values.

481. However, Mr. Stigwood's report-suggests that the AM values calculated on his time domain method would differ by 1 or 2 dBs from those likely to be yielded on foot of the IOA RM. As I observe at para 436 above, Mr. Carr did not contradict this passage and indeed drew it to the court's attention. In my view, it is reasonable to expect that when the AM is regular rather than intermittent/ variable (i.e. AM that disappears and returns again or fades in and out), the AM values derived under both methods for a particular time interval would generally be of a similar order.

482. In this regard, I further accept Mr. Stigwood's opinion that the data derived from his application of the IOA RM to the 2021 NF and HH data is generally consistent with and confirmatory of the AM values shown on the time domain graphs produced by Ms. Large in 2017 (on foot of the 2017 NF external audio recordings and 2017 HH internal audio recordings). I further accept that this IOA RM data is also generally consistent with and confirmatory of the AM values on the time domain graphs produced by Mr. Stigwood in 2021 (on foot of the 2021 internal NF audio recordings and the 2021 HH internal audio recordings).

483. I further accept the views of both Ms. Large and Mr. Stigwood that the IOA RM analysis of six weeks of continuous internal data from NF and HH (the 2021 HH and NF internal data), demonstrates regular and substantial internal AM. The primary relevance of this internal IOA RM analysis is in demonstrating consistency of impact over a longer period of time than that represented by the intermittent audio recordings and time domain graphs. This

IOA RM analysis cannot be used for the purposes of calculating potential AM penalties for planning purposes. Indeed, it was not tendered by Mr. Stigwood for that purpose.

484. Draft WEDG 2019 notes, citing the Phase 2 reports that the setting of a threshold for excessive AM is not straightforward and that the available research does not identify a clear onset of increased annoyance from AM or a clear level at which the impact of WTN or AM becomes *'significant', 'excessive'* or *'unacceptable'*. It goes on to note an onset of perception for AM at about 2 dB and an association of rising annoyance with increasing depth of AM above 2 dB. Furthermore, Draft WEDG 2019 recommends attaching penalties for AM values in excess of 3dBA.

485. I accept Ms. Large's evidence that AM values of 5 dBA and above, if audible at a sufficient level, are capable of amounting to an unreasonable impact. This is consistent with the rationale behind the Phase 2 Report and draft WEDG 2019.

486. I further accept Ms. Large's evidence that, on foot of the 2017 monitoring, AM values significantly in excess of 5 dBA are a substantial feature of this WTN. The MAS reports summarise the time domain graphs as showing that: (a) typical AM values on foot of the 2017 HH internal data were 7-13 dBA, (b) typical AM values on foot of the 2017 NF external data were 8-13 dBA, (c) typical AM values on foot of the 2021 HH internal data were 5-12 dBA and 5-14 dBA and (d) typical AM values on foot of the 2021 NF internal data were 5-12 dBA and 5-10 dBA. Mr. Carr accepts that the time domain graphs accurately reflect the sounds at the microphone locations, and he did not dispute the accuracy of these summaries.

487. I conclude that even on the most conservative analysis, the time domain graphs reveal a common thread of AM value in excess of 5 or 6 dBA. Although, as I say these typical AM values cannot be directly translated to values of the same order derived on foot of the IOA RM, this conclusion is nonetheless highly significant. In this regard it must be recalled that the view that AM values in excess of 3 dBA leads to increasing levels of annoyance emerged well before the IOA developed the IOA RM for rating AM. This consensus as to the increased annoyance occasioned by higher value AM therefore developed before and independently of the IOA RM.

488. Ms. Large's evidence went even further. She stated that the time domain graphs show that an AM value of 10 dBA is frequently present both externally and internally. Mr. Carr did

not dispute this finding. He accepted that externally such AM values would be experienced as a doubling and halving of loudness.[56] Mr. Carr was inclined to emphasise that this doubling and halving of loudness was only momentary. I fail to see how this ameliorates matters. If anything, rapid peak to trough rise and fall can be particularly distracting and attention drawing.

489. When further cross examined on this issue, Mr. Carr's view was that internally these 10 dBA peak to trough differentials would not necessarily be appreciated as a halving and doubling of noise because the troughs would be below the level of audibility. I accept the logic of this. On the other hand, he also accepted that internally AM peaks of 40 dBA leq and above - which I emphasise are a regular occurrence internally - would be clearly audible. Indeed, the audio recordings demonstrate that this is manifestly the case. Although therefore internal AM values would not necessarily be experienced as a doubling and halving of loudness *per se*, it cannot reasonably be disputed that this characteristic is highly intrusive and unreasonable, particularly in HH where lower frequency sound and vibration also feature prominently.

490. I accept that the AM is likely to be experienced somewhat differently at each property and that it varies somewhat externally to internally as well as between different rooms and different floors of the houses. However, this does not alter the broad picture emerging.

491. Despite criticising the methodology of the plaintiffs' experts, Mr. Carr did not carry out any monitoring capable of identifying AM values. Nor did he engage with the vast amount of external and internal data collected by the plaintiffs' experts over two lengthy periods of monitoring. This data, which was then painstakingly presented by the plaintiffs' experts in almost 100 separate time domain graphs illustrating AM values (and the other characteristics of the AM), was just brushed over by the defendant's expert.

492. Irrespective entirely of its AM values, I also find that the audio recordings (and the associated graphs) support the plaintiffs' evidence as to the varying character of the WTN. I accept that on occasion the sound is more swishy, constant and monotonous with little variation. This in my view is a sound that one would be expected to habituate to. However, I also accept, and again this was not disputed by Mr. Carr, that the WTN also displays a clear

[56] In this respect, it is common case that a rise or fall of 10 dBA will be perceived as a doubling or halving of volume.

whoomphing sound and distinct thump AM. I accept the evidence of the plaintiffs that this whoomphing and thumping is highly variable and unpredictable.

493. I further accept that the audio recordings and time domain graphs support the plaintiffs' evidence that, overall, the WTN is highly changeable and unpredictable. I accept MAS's view that the AM displays considerable impulsivity (sudden changes in sound level), erraticism (with no clear periodicity or rhythm, exhibiting spikes and double spikes of AM) and variability/intermittency (when AM disappears and returns again). None of this was disputed by Mr. Carr. These latter characteristics, which are particularly evident in light of the high AM values, mean that the WTN lacks any pattern to which one could acclimatise and therefore impacts coping mechanisms.

Aggravating features - Spectral content of the noise

494. Low frequency noise (sound up to approximately 150 hertz) only slightly above the threshold of audibility can cause considerable disturbance and is more difficult to mask and get used to than other types of noise.

495. Ms. Large conducted a spectral analysis of the data collected during the 2017 monitoring period. Her conclusion is that whist there is substantial variability in the spectral content of the noise, low and lower frequency energy is present externally and internally.

496. Ms. Large states that there are many periods when the sound energy is dictated by lower frequency energy at 200/250 hertz. This is important because it impacts upon the character of the AM. Thus, whilst AM in the range of 500 to 800 hertz would be heard as a swish, AM below 315 hertz will be heard as a lower pitched whoomph or rumble or thump. Sound at this end of the spectrum is rumbling in nature and is described as being felt like a vibration as well as merely heard. Ms. Large's evidence was that during the 2017 monitoring period there were also regular periods characterised by lower frequency sound within the 100 to 200 hertz third octave bands. This was manifest both externally at NF and internally at HH. If this low frequency noise occurs at peaks of AM, then it will be heard as a thump or a beat.

497. Ms. Large indicated that this low frequency impact is particularly prevalent internally at HH and notes that low frequency noise propagates further and is more effective at transmitting through structures. Thump AM will therefore be enhanced indoors because it is

less well attenuated by structures. In addition, the ETSU Review observes that thump AM is more prevalent at night, due to atmospheric conditions.

498. All of this is entirely consistent with Ms. Webster and Mr. Rollo's description of thumping noise which comes through the walls and ceiling of their bedroom, particularly at night. Ms. Large also referred the court to the Defra low frequency curve against which the acceptability and audibility of low frequency noise is assessed. Whilst spectrograms of the WTN at HH showed that average sound levels were just below the low frequency curve, lower frequency sound modulated above the curve and would therefore be audible. Ms. Large's report demonstrated that audible low frequency sound at peaks of AM were present on multiple occasions within measurement periods as short as 2 minutes.

499. Ms. Large also gave evidence that in both dwellings she personally experienced periods of significant low frequency noise producing thumps, rumbles and thudding. Subsequent correlation with spectral frequency identified that the periods were impacted by significant low and lower frequency sound energy. Mr. Stigwood's evidence was that the thumping rise and falls of the WTN was the dominant noise internally even with the window shut.

500. Mr. Carr's written report noted that a particular period of low frequency noise identified by Ms. Large would not fall within the audible range. However, he did not give any oral evidence to this effect. In any event, Mr. Stigwood referred the court to other data in Ms. Large's reports which demonstrated that lower frequency noise was clearly audible.

501. Mr. Carr did not conduct any monitoring capable of identifying low frequency characteristics. In his direct evidence to the court, he did not contradict the plaintiff's experts in relation to the presence, and at times, dominance of sound at the lower frequency end of the spectrum. Nor did he contradict the proposition that the audio recordings and time-domain graphs (with associated spectral correlation) confirm that this lower frequency is manifesting as thump AM.

502. When cross examined about the impact of low frequency noise and low frequency AM in particular, Mr. Carr's response was once again to refer to the IOA RM as the appropriate manner in which to present, assess and rate AM. This, in my view, was a wholly inadequate response. Although the IOA AM report expressly recognises that there are two manifestations

of WTN – blade swish and periodic thumping or whoomphing noise containing relatively low frequencies - the metric described in the report does not reflect any change in subjective response with modulation frequency. The defendant does not contend that the IOA RM distinguishes between AM of the swish variety and AM of the thump variety. Therefore, whilst recognising the existence of whoomph or thump AM, the IOA metric is relatively insensitive to it.

503. In light of the above evidence, I find on the balance of probabilities that whilst low frequency noise is not the dominant characteristic of the WTN, there is a significant element of audible low and lower frequency noise which manifests as thump AM. I also accept the evidence of the plaintiffs, and indeed of Ms Large that, even with the windows entirely shut, thump AM is evident and further that one can feel the vibration of thump AM in the structure of both houses.

Characteristics of the neighbourhood

504. The impression I gained of the area during the court visit fully supported the plaintiffs' account of the character of the locality. This is a quiet, rural area and the sound environment is characterised by the sounds of nature. Absent the WTN, there would otherwise be a fairly predictable pattern of noise (e.g. decreasing noise levels at night-time, temporarily increasing noise levels at dawn during the dawn chorus and largely unintrusive levels of noise throughout the day from local traffic and other manmade noise).

505. As this is not in dispute, I accept that the location is in a wind shadow sheltered from the prevailing winds. One would expect that wind related noise at the plaintiffs' properties would, more often than not, be fairly low.

506. Generally, therefore there is little specific manmade noise in the area which the plaintiffs' experts argue contributes to the nuisance posed by the "*alien"* and *"industrial"* character of the WTN. In so doing the plaintiffs' experts assume that, absent the nuisance, the character of the locality would include no WTN at all.

507. This is a false comparison. Mr. Carr's opinion is that it is not appropriate to "set" baseline noise at the level that would be expected without any turbines in the vicinity. As a matter of principle, I agree with Mr. Carr. There is planning permission for a windfarm at this

location which carries with it the assumption of a level of WTN and associated AM and on occasion lower frequency noise. In assessing the character of the area, the court must have regard to the fact of the permission and the existence of such turbines.

508. As I state above, the wind was low at the time of the court's site visit and the 10 m standardised windspeeds at T2 varied and averaged between 4.1 and 4.8 m/s. Although T2 was therefore only turning slowly, the WTN was audible inside and outside both HH and NF. It is common case that, although audible, the WTN evident on this occasion would not be considered unreasonably intrusive.

509. However, the clear and unavoidable conclusion from the audio recordings is that both the external and internal soundscape is dominated by the WTN. Although certain background and extraneous noise is discernible, it rarely masks the characteristic rise and fall of the turbines which is the predominant noise. On the majority of the audio recordings, both external and internal, the WTN is the *only* noise that one can consistently identify. It constantly draws one's attention. Other ambient noise might ebb or flow, but it does not mask the WTN to any appreciable extent. With very few exceptions, the defendant did not by reference to the audio recordings, realistically contend to the contrary.

510. I cannot say whether this dominance is a function of the level of exceedance of the WTN over background noise levels (as to which see below), the high AM values, the comparatively low spectral frequency or the other attention drawing characteristics of the WTN. Most likely it is a combination of all these features. One can say however that this dominance exacerbates the dissonant qualities of the WTN to an extent that an ordinary person would not be expected to tolerate. I am satisfied that windfarm noise such as this cannot be considered part of the character of the locality.

511. Demonstrably, the degree of dominance evident on the majority of the audio recordings is not a constant state of affairs. For a start it must occur at speeds of rotation in excess of those pertaining at the time of the court visit. However, I accept the evidence tendered by the plaintiffs that such dominance occurs commonly and for sustained periods. Such dominance will also be particularly evident at night when the impact of AM - in particular thump AM - is more prevalent and when other background sounds are lower.

The exceedance of WTN over background noise

512. An overriding theme of the cross-examination of Ms. Large and Mr. Stigwood was that they had failed to assess background noise levels at a range of different windspeeds. There is no doubt that this impedes the analysis. For example, whilst total operational noise appears to be above the limits fixed in condition 15, without accounting for background noise one cannot draw a definitive conclusion on planning compliance. For present purposes, it also means that one cannot assess whether this is a "*low noise environment*" within the meaning of WEDG 2006. Nor can one assess the level of exceedance of WTN over background noise in order to benchmark the WTN against the commonly applied relative limit of 5 dBA over background noise (see both WEDG 2006 and draft WEDG 2019).

513. The problem, however, is that a formal background noise assessment cannot be carried out unless both turbines are turned off for a substantial period which is wholly outside the control of the plaintiffs and wholly within the control of the defendant.

514. Mr. Carr stated that the plaintiffs could have estimated background noise levels in a number of different ways, such as in upwind conditions. However, at this proximity, Mr. Stigwood says that WTN would elevate noise levels even in upwind conditions. Alternatively, Mr. Carr suggested that one could estimate background noise levels using a proxy location. However, given that Mr. Carr did not identify a suitable proxy location, I can comment no further on this.

515. In the absence of a formal background noise assessment, both parties advance other evidence to approximate background noise levels.

<u>Evidence of the plaintiffs' experts on background noise</u>

Comparing windy periods with still periods

516. Ms. Large and Mr. Stigwood compared noise levels during periods when T2 was turning very slowly - or not at all - with periods when it was turning more rapidly. The difference in sound levels is then said to approximate the "turbine off" noise level versus the "turbine on" noise level .The contention is that the former approximates "background sound" and that T2 increases background sound levels internally at HH by 10-15 dBA (with the window open) and by 9-11 dBA (with the window shut). In each case, Ms. Large states that

this is more than a doubling of volume.[57] It is also contended that T2 increases background noise levels externally at NF by 15-19 dBA above background noise levels - almost a quadrupling of volume.

517. However, this approach ignores that fact periods of high WTN are generally also characterised by higher windspeeds which, even absent the WTN, would be associated with commensurately higher levels of background wind noise. Windier periods are noisier than still periods.

518. To meet this difficulty Mr. Stigwood argues that residents will be disturbed by high WTN irrespective of the fact that it might be somewhat noisy even without the WTN. He states that psychologically speaking, residents will compare periods of high WTN to periods of calm when WTN and wind noise are absent. Not only do I find his view unconvincing but, in expressing it, Mr. Stigwood was beyond the limit of his area of expertise.

Comparing periods of lull in the windfarm activity with periods of activity at the same windspeed

519. To estimate background noise and approximate the "turbine off" noise level, Ms. Large's report presented data pertaining to a lull in WTN shortly after 4 a.m. on several mornings every week. By correlating this data with the SCADA data for T2, Mr. Stigwood ascertained that an adjustment of the blade angle of T2 occurred at the time of each lull. During the lull, there is a discernible drop in overall noise - by as much as 14 dBA - but crucially, no associated drop in windspeed. He therefore concludes that the drop in noise levels is attributable to the adjustment of T2 and further that background noise at the relevant time is less than the noise level pertaining during the lull (as T1 is still operational). This all suggests that at the times in question WTN exceeds background noise by substantially more than 5 dBA.

520. However, even assuming that this is correct, one cannot extrapolate from here to a proposition that this is generally the case. These lulls, although occurring on a regular basis, are of very short duration (no more than a minute or so).

[57] In this respect, it is common case that a rise or fall of 10dBA will be perceived as a doubling or halving of volume.

521. In any event, a formal assessment of exceedance of WTN over background noise levels is calculated by reference to a range of windspeeds. The plaintiffs' experts merely estimate such exceedance at the particular time of each audio recording without reference to windspeed. This is not a robust assessment methodology.

522. In short, I cannot be satisfied on the balance of probabilities that the WTN exceeds background noise by in excess of 5 dBA such as to breach this aspect of modern planning guidance (WEDG 2006 and draft WEDG 2019).

Evidence of the defendant's experts on background noise

523. I am equally unconvinced by the defendant's suggested approach to the assessment of background noise levels. This was to derive same from Mr. O'Reilly's HH planning compliance graph. The HH planning compliance graph shows that at low windspeeds, the trend line is above 30 dBA L90 which Mr. Carr tentatively suggests might approximate background noise levels. This is not a recognised method of calculating background noise levels. A trend line is designed to present noise levels over the entire graph. Mr. Carr accepted that if a trend line were to be derived for these lower windspeeds only, this would "*pull down the polynomial line"*.

524. In any event, applying the same methodology to Mr. O'Reilly's NF compliance graphs suggests very low background noise levels both during quiet waking hours (well below 30 dBA L90) and night-time hours (well below 20 dBA L90). Furthermore, a line of data points at 20 dBA on both the NF quiet waking hours graph and the NF night-time hours graph which is indicative of unrecorded sound levels below the level of sensitivity of the sound recording instruments. This would pull the trend line down still further, implying that background levels at NF are very low indeed.

Conclusion on background noise

525. Overall, I find that neither the plaintiffs nor the defendant's estimation of background noise levels are reliable.

526. It has not been established that the WTN is in breach of the commonly applied relative noise limit (5 dBA above background noise levels). Nor can I be satisfied on the balance of probabilities that this is a "low noise environment".

527. Notwithstanding this, and recalling my observations at para 509-511 above, I find that on account of its characteristics (rather than its absolute decibel level) the WTN commonly dominates the plaintiffs' sound environment over sustained periods of time.

528. The intent of a relative noise limit is that background sound might mask WTN to a degree, rendering it less distinguishable. Therefore, although it may not be possible to formally assess exceedance over background noise levels, I am nonetheless satisfied that WTN which dominates the plaintiffs' sound environment can fairly be characterised as inconsistent with the purpose and intent of relative noise limits.

The impact of the noise on basic needs such as sleep

EPA Guidance Note on Noise Assessment of Wind Turbine Operations at EPA Licensed Sites ("EPA NG3").

529. In June 2011, the EPA produced a guidance note on the noise assessment of wind turbine operations at EPA licenced sites, EPA NG3. Although EPA NG3 is not applicable to this windfarm, it is nonetheless relevant to note that it expressly recognises the additional annoyance and sleep disruption that can be occasioned by AM. EPA NG 3 records that excessive audible AM attracts attention, particularly if heard while trying to get to sleep either at the start of a night or when a person has been woken by other causes. It states that although the level of noise generated internally, even with windows open, is usually insufficient to cause sleep disturbance, the stress it may generate, even if only just audible, may be sufficient to extend the time required to fall asleep. Such effects may give the impression of a noise which is 5 dBA or more louder than a noise of the same level without any such components. EPA NG3 notes that it is therefore necessary to develop appropriate corrections for regulatory purposes.

WHO Guidance Lmax and Lden

530. Both parties rely on World Health Organisation guidance in relation to the level of sound thought to effect sleep, health and wellbeing. Ms. Large notes that the 2017 HH internal

data shows AM peaks (known as the Lmax) of 40-43 dBA leq with the window open and 20-21 dBA leq with the window closed. She also notes that the 2017 NF external data demonstrates that Lmax is regularly in the regions of 50-50 dBA leq but also reaches 54-57 dBA leq. Ms. Large states that AM demonstrating Lmax of this magnitude would be viewed by the WHO 2009 Night Noise Guidelines for Europe ("WHO 2009") as likely to cause sleep effects.

531. However, this focus on the Lmax of noise has not been carried through to more recent WHO Guidance, the 2018 Environmental Noise Guidelines for the European Union (WHO ENGER). WHO ENGER, which, unlike WHO 2009, contains recommendations on WTN specifically sets a "*conditional recommendation"* for WTN of 45 dBA leq on an Lden basis.

532. Mr. Carr suggests that the noise limits set out in the Ballyduff permission complies with the WHO ENGER recommendation. He also maintains that, as Mr. O'Reilly's compliance graphs show that total operational noise is below 45 dBA leq during quiet waking hours and night hours, the WTN also complies with WHO ENGER.

533. However, Lden is an entirely different measurement metric to either L90 or leq. The Lden (also referred to as "DENL") indicator is calculated as the A-weighted average sound pressure level, measured over a 24-hour period, with a 10 dB penalty added to the average level at night, a 5 dB penalty added to the average level during the evening and no penalty during the daytime. The penalties are introduced to indicate people's extra sensitivity to noise during the evening and night.

534. Neither parties' experts have even attempted to calculate how one might convert the data in Mr. O'Reilly's compliance graphs to the appropriate Lden metric, which in any event should presumably be ascertained for all wind directions (and not solely downwind).

535. Overall, there is entirely insufficient evidence to apply the WHO Lden conditional recommendation in ENGER to this site.

536. In any event, ENGER acknowledges the low quality of the evidence reviewed in the formulation of this recommendation, which is conditional only. Therefore, although the guidance of WHO clearly carries much weight, I do not consider it a robust framework for

assessing whether or not the WTN in the present case is likely to disturb sleep to the extent of posing a nuisance.

Conclusion on sleep impacts

537. Rather, the potential impact of this WTN on sleep must be assessed by reference to the audio recordings (and the associated graphs), all of the expert evidence as to the characteristics of this WTN and to the factual evidence of the plaintiffs, Ms. Doran, Ms. McGinn and the plaintiffs' experts as to the "real world" sleep impacts experience as a result of this WTN. For the reasons set out above, I am satisfied that high AM values and thump AM due to the presence of lower frequency sound energy are common and sustained features of this WTN. These are also the primary characteristics of which the plaintiffs complain. ENGER notes that these characteristics are not captured by standard methods of measuring and that this differentiates WTN from other noise sources. These are characteristics which are known to heighten annoyance and disturb peace, rest and sleep. I therefore find that there is more than adequate evidence in this case to make the case of substantial sleep impacts.

How easily the noise can be avoided/ Measures to reduce or modify the noise

538. Externally, limited measures are open to the plaintiffs to reduce or modify the noise. Although they can attempt to mask the noise by playing music or wearing headphones, this is an unsustainable long term solution. I also find that given its characteristics (e.g., with typical AM values exceeding 5 or 6 dB and regular thump AM etc), the WTN regularly intrudes to an unacceptable degree into the plaintiffs' homes over sustained periods of time. Although overall noise levels will be lower with the windows completely shut, at higher speeds of rotation the WTN- and associated vibration-still intrude to an unacceptable degree. In any event, a large part of the population desire to sleep with their windows slightly open and having to close windows effects, fresh air and connection with the outside world. In a quite rural location such as this (albeit one which includes permission for two turbines) , it is not reasonable to compel residents to shut their windows in an attempt to partially mitigate the impact of unacceptable noise instruction.

539. During the day, this WTN may be somewhat masked by the sounds of household appliances, the dogs and conversation. However, it will be obvious during times of calm. At

night, the plaintiffs have already taken such measures as are reasonably open to them to mask the sound to aid sleep.

540. Whilst the defendant contends that insulation would assist, Ms. McGinn states that this has made very little difference at NF.

541. I do not find the defendant's suggestion that the plaintiffs should simply avoid the worst affected rooms is a reasonable means of escape from the noise. There is no authority whatsoever for this proposition. A resident should be able, without nuisance, to relax or sleep in any room they chose. Having to avoid the rooms where the noise is most intrusive merely demonstrates adverse impact on the ordinary comfort and enjoyment of the house as a whole.

542. There are, however, a range of options identified by Mr. Mayer which could be implemented by the defendant to modify or reduce the noise such as constraining the speed of rotation of T2. None of these have been adequately explored to date by the defendant.

How often the noise occurs and the time of day or night when the noise occurs

543. The intrusiveness of the noise varies as between different audio recordings, each of which will be rendered more or less intrusive by reference to a range of factors such as their sound pressure level, their AM characteristics etc. Moreover, the intrusion noise likely to arise varies with the time of day and the duration over which the noise represented by the recording persists.

544. Unquestionably, the most intrusive feature of the WTN is its AM and thump AM in particular. I accept that, as is typical, this is more pronounced at night. The ETSU Review suggests that the same is true of the early mornings and evenings. This means that the worst noise is likely to conflict with the most sensitive periods of the day when background masking sound levels are lower as compared to WTN. This all tallies entirely with the evidence of the plaintiffs and their experts.

Frequency and duration of noise impact

545. Frequency and duration of impact are critical factors in assessing whether nuisance is made out. One can confidently say that if the conditions complained of pertained only for short periods or on rare occasions then nuisance would not be made out. Equally, if there were a less

intrusive noise source present all day every day, then this also might not be a cause of nuisance. There is no hard and fast level of intrusion which can be set as the barometer for nuisance. One has to make a judgment call based on all of the factors identified above as to how the plaintiffs as objectively reasonable people could be expected to relate to the noise.

546. However, bearing in mind that the defendant's experts did not contend that the MAS audio recordings (and the associated graphs) were unrepresentative of the general WTN on site, I accept the evidence of the plaintiffs' experts (and the plaintiffs themselves) that the conditions so demonstrated occur commonly and on a sustained basis.

Issue 7: What is the response of the defendant and its experts to the plaintiffs' case? Does the evidence of the defendant's experts suggest that the WTN is not a substantial interference with the plaintiffs' use and enjoyment of their land?

547. As will be apparent from the above, I find that the analysis of the WTN - as demonstrated by the MAS audio recordings and the associated time domain graphs and spectrograms - under the Defra criteria strongly corroborates the plaintiffs' evidence of unreasonable interference with residential amenity. It is now appropriate to relate the overall response of the defendant and its experts to all of the above. Does this argument or evidence suggest that the WTN is not a substantial interference with the plaintiffs' use and enjoyment of their land or otherwise incline the court towards a finding that nuisance is not made out?

548. In the preceding sections of this judgment, I have set out and analysed the defendant's experts' evidence on the various issues falling for consideration under the Defra Guidance. At substantial risk of repetition, I will make the following more general observations.

549. Mr. Carr , the defendant's principal witness, gave evidence over the course of approximately 6 days. He appears to have attended the properties for a total of 40 minutes on 8th November, 2022.

550. The following extract from the beginning of his cross-examination assists in an appreciation of Mr. Carr's general approach to this case.

Q. So you got that material [the 2017 and 2021 MAS data]. And what I'm concerned about is, you're

complaining about the listening, and my impression is that you don't see value in the [MAS] recordings, is that right?

A. *Yes.*

Q. *You don't see value in the recordings, is that your evidence, is that right?*

A. *It is. I don't -- I don't believe that the [MAS] recordings were taken in a way that the conclusions or the information that came out of them stand over for the reasons that we have said in relation to how the recordings were taken.*

Q. *Well I'll go back then to my question. Why did you not advise Mr. Brazil to make his own recordings?*

A. *Judge, as I understand this, we have to meet the case that's put to us. We assess the site for compliance with the guidelines and the guidance as I know them and then I reviewed the additional information [i.e. The MAS recordings and their reports], and to my mind the evidence wasn't there to show a nuisance.*

Q. *I see. So, at this point, on reflection, do you think you might be better advised, and Mr. Brazil be better advised, if he had his own measurements?*

A. *Judge, the requirements on Mr. Brazil was to assess -- my understanding of it was to assess compliance with the planning and then to look at any evidence in relation to the other guidelines. And to my mind there still isn't evidence of a nuisance there because the way the other data was obtained.*

Q. *Because of the way the other data was obtained?*

A. *And presented.*

Q. *So, the reality of it is then that the Defendant is meeting this case relying on compliance and relying, in essence, on your advice that there isn't a nuisance, isn't that right?*

A. *Well --*

Q. *Isn't that right?*

A. *The overall noise levels from this wind turbine are a significant factor on whether there is going to be a nuisance there or not. In my mind the overall noise levels from these turbines are well below a threshold that would be significant which point to breach of planning, breach of licensing or a nuisance.*

Q. *So that's the advice you gave to Mr. Brazil and that's really the basis on which this case is fought, is it?*

A. *Well that's my advice.*

This passage exemplifies the three main components to Mr. Carr's evidence.

1. The starting point appears to be to assess whether the WTN complied with the planning permission and with "*guidelines* "and "*guidance"* which in Mr. Carr's opinion it did. The only real data pertaining to the WTN on site put before the court by either of the defendant's witnesses was the planning compliance graphs prepared by Mr. O'Reilly. Mr. Carr's report and oral evidence was based exclusively upon the HH planning

compliance graphs and he did not appear to have informed himself of the NF planning compliance graphs.

For all of the reasons already set out, I do not accept that planning permission is the determinant of nuisance in this case. Furthermore, I do not accept that planning compliance is demonstrated in this case.

The primary pieces of "guidance" relied upon by Mr. Carr were WEDG 2006 the IOA RM and draft WEDG 2019. Although I accept that compliance with WEDG 2006 is demonstrated on the balance of probabilities, this guidance does not in my view, delineate the parameters of nuisance in this case. The IOA RM does not set any "*threshold"* for "*noise levels"* at all, whether for by decibel level or AM values. The defendant's attitude to draft WEDG 2019 varies. On the one hand its counsel submitted that WEDG 2019 is draft only and cannot be the determinant of nuisance. On the other hand, Mr. Carr asserted that the WTN complies with draft WEDG 2019, "*with headroom*". I agree with counsel's point. Whist draft WEDG 2019 might give some indication of the likely future approach to balancing wind turbine development with protection of amenity (which, it appears likely, will involve a combination of relative noise limits and character penalty), it has since been withdrawn and cannot be the determinant of nuisance.

Further, although Mr. Carr asserts that the WTN complies with draft WEDG 2019, this is not even close to being demonstrated on the balance of probabilities.

2. Mr Carr's view is that the overall noise levels are "*very low"* and well below any "*threshold of significance*". Given his overall assessment of the noise levels, this was not a "*critical*" case requiring him to listen to the WTN or to engage in further monitoring.

   However, how is this threshold of significance to be set? In a case which is "*all about AM",* it cannot be set by the bare noise limits designated in the planning permission or in WEDG 2006.

   Further, in so far as draft WEDG 2019 might be said to provide any indication of the *"threshold of significance",* there is no valid basis for Mr. Carr's assertion that the WTN is well below this threshold or otherwise "*low*". On the contrary, Mr. O'Reilly's NF compliance graph shows that from windspeeds of 9 m/s total operational noise levels at NF is right at or slightly over the 43 dBA L90 maximum threshold recommended by draft WEDG 2019 (irrespective entirely of any possible character penalty). The noise levels on the HH planning compliance graphs are admittedly lower,

but these graphs can only inform one on noise levels at comparatively low windspeeds. Likewise, background noise is an unknown so compliance with the draft WEDG 2019 relative limit cannot be assessed at either location.

In short, I do not see compliance with draft WEDG 2019 *"with headroom".*

3. Mr. Carr sees no value in any of the MAS data by reason of the manner in which it was collected and presented.

   Insofar as concerns the collection of the MAS data, there could be no legitimate criticism of the manner in which Ms. Large collected the 2017 MAS data. The 2017 NF external data was recorded with a double skinned windshield in an appropriate free field location and the 2017 internal HH data was recorded in accordance with the Defra Guidance for internal measurements.

   I am fully satisfied that even if one relied upon the 2017 data alone, same is sufficient to confirm high AM values, lower frequency sound content, thump AM etc. Moreover, Ms. Large's opinion, on which she was not contradicted, is that there is no material difference between the 2017 and 2021 data. This supports the conclusion that the 2021 internal data is reliable. Although therefore there is legitimate criticism of the 2021 NF external data (which I therefore disregard), the analysis of the internal NF and HH 2021 data is on balance robust.

   Insofar as concerns the presentation of the MAS data, I am satisfied that the methodology used reliably presents the key features of the plaintiffs' general sound environment - the dominance of the WTN and its erraticism, impulsivity and variability. I am also satisfied that reliance can be placed upon MAS's calculation of AM values which is supported by the application of IOA RM to the 2021 internal data (in particular the 2021 NF internal data which was recorded in an unoccupied house). I am further satisfied that spectral analysis demonstrates significant lower frequency sound manifesting as thump AM.

   For all these reasons, it is entirely illegitimate for Mr. Carr to place "*no value*" on all of this data and to effectively ignore it.

544. Beyond criticising their methodology, the defendant's evidence did not engage at all with the plaintiffs' expert's audio recordings (and the associated graphs). Unless one accepts the contention that the planning permission and WEDG 2006 are the determinants of nuisance, the defendant's experts gave the court very little to go on. Mr. Carr offered little or no substantive evidence in response to the audio recordings (and the associated graphs) illustrating

and analysing the features of WTN. He and Mr. O'Reilly ignored the propositions of the plaintiffs' experts outlined in exhaustive detail that this demonstrates that AM values are excessive, and that low frequency characteristics and thump AM are commonly present in the WTN.

545. The defendant's evidence did not engage in any meaningful way with the evidence of the plaintiffs as to their experience of the WTN. Mr. Carr has not read the Webster Rollo noise diaries. He did not comment in any detail on how the sound might present itself to the residents.

546. The defendant's experts, both of whom are extremely experienced in relation to windfarms, offered no substantive evidence that the impact of the WTN was not as described by the plaintiffs and their experts. There was, for example, no suggestion that the level of erraticism, impulsivity and variability described by the plaintiffs in the AM was not present on the audio recordings or on site. Nor did the defendant's experts contend that thump AM was not a regular feature of the WTN. They did not contradict the plaintiffs' experts finding that this was evident on the audio recordings and indeed, during their visits to the site. Although many passages in the guidance to which he referred noted the distinction between swish and thump AM, Mr. Carr did not address the reported impact of regular, substantial and sustained thump AM at this site.

547. The defendant's experts did not assist the court in understanding how they contend that the experience described by the plaintiffs and features of the WTN highlighted by the plaintiffs' experts on the audio recordings (and the associated graphs) do not represent an unreasonable intrusion on amenity. If indeed this was their opinion it was not, by reference to any of the MAS data (or any other data), either explained or substantiated.

548. Neither Mr. Carr nor Mr. O'Reilly contradicted the view of Ms. Large and Mr. Stigwood that the noise from the Ballyduff turbines is exceptionally intrusive and out of the ordinary for WTN. I therefore accept the evidence of the plaintiffs' experts that this WTN is considerably more intrusive than one would usually encounter. Although Mr. Brazil states that the WTN is not unusual, I cannot accept this as Mr. Brazil has paid only a short visit to the plaintiffs' homes and beyond that has only heard the WTN from the public road which is set back from their properties.

549. Mr. Carr stated that in general he would advise wind turbine operators that if there is an issue with AM complaints, they should try and identify the environmental circumstances under which this occurs to ascertain if mitigation measures are required or can be devised. This is a step which for reasons best known to itself the defendant and its experts have steadfastly declined to take.

550. In many cases, in untangling an issue on which expert evidence has been given, particularly one on which the crux of the case in large part depends, only one of the two competing experts' views can be preferred. This case is somewhat different because whilst the plaintiffs' experts addressed the features of the WTN said to give rise to nuisance in detail, the defendant's experts have not. To emphasise the "appalling vista" that would present should this court find for the plaintiffs, the defendant and its experts stressed that a large number of windfarms are situated within 500 meters of a residence. I have no reason to doubt this. But this case is not about statistics. It is about *this* noise from *this* windfarm as heard at *these plaintiffs' residences*. This is the issue on which I would have appreciated the assistance of the defendant's experts.

Issue 8: Did the acousticians experts fail to discharge their duties to the court?

551. Both sides criticise the experts of the other for failing to understand their duty to the court. The defendant submits that the MAS reports (and Mr. Stigwood's oral evidence in particular) displayed many of the features which were sharply criticised by the Court of Appeal in *Duffy v. Mcgee* [2022] IECA 254. The plaintiffs maintain that Mr. Carr deliberately curated his evidence to focus only on planning guidance and that he deliberately ignored the separate issue of nuisance. It is said that he thereby brought only part of his expertise to the court.

Defendant's criticisms of Mr. Stigwood and Ms. Large

552. Mr. Stigwood is an acoustician who has no metrological, scientific or statistical qualifications. The defendant criticises him for giving evidence touching upon these issues. However, such evidence was not advanced in a vacuum. Rather, the vast majority of such evidence was advanced either by reference to the contents of established guidance and standards which were themselves the subject of extensive comment by both parties (such as ETSU, the IOA AM report, draft WEDG 2019 etc) or by reference to relevant guidance on the assessment of nuisance (such as the Defra Guidance and EPA NG 4). At other times the views

expressed - e.g. that the plaintiffs' residences were in a wind shadow or that the position of T2 on a height would increase the impact of windshear- was uncontested and /or was common sense. This criticism is not therefore merited.

553. The defendant criticises Ms. Large's first report for citing legal authority. However, it is evident that the primary purpose of these passages is to place the expert evidence in context and to draw attention to the factors which are viewed by the court as relevant to the assessment of noise nuisance. In any event, the factors discussed[58] either have their genesis in the Defra Guidance on assessing statutory nuisance or they are so self-evidently relevant to a noise nuisance assessment as to be uncontroversial. Detailing these factors does not imply a failure to understand an expert's duty to the court.

554. Nor do I view the evidence of either Ms. Large or Mr. Stigwood assessing the Ballyduff WTN as against these factors as anything other than relevant, helpful and thorough. Rather, I agree that Mr. Carr's failure to substantively engage with these factors is regrettable. As a result, Mr. Carr did not assist the court on matters which are demonstrably relevant and within his field of expertise.

555. The defendant also criticises the plaintiffs' experts for citing various publications and expressing their opinion in relation to the functioning of the human brain and aspects of neuroscience. In so far as concerns Ms. Large, this criticism is entirely ill founded. This is a case about noise annoyance and factors likely to decrease or increase noise annoyance are of obvious relevance. Ms. Large's written and oral evidence, whilst containing some limited commentary on one's physiological response to noise – in each case, citing appropriate publications – did not in my view stretch the limits of her expertise as an acoustician. Much of this evidence - for example in relation to the enhanced impact of low frequency noise – was in the field of (or intersected with) acoustics. Other considerations discussed by Ms. Large- e.g. that unpredictable, unexpected noise is more annoying than steady, monotonous noise - are common sense.

556. I agree that, at times, particularly under cross-examination, Mr. Stigwood's answers strayed over the line of his expertise into matters of physiology. I have rejected such evidence

[58] Essentially the Defra criteria.

where appropriate - e.g. Mr. Stigwood's view that one's appreciation of background noise levels should be calibrated by reference to periods of low windspeeds rather than by reference to increasing background noise levels at increasing windspeeds.[59] However, over the course of extremely lengthy testimony, this was a rare occurrence and does not overall undermine his evidence.

557. The defendant also criticises Ms. Large and Mr. Stigwood for expressing the opinion that the data collected by MAS "*corroborates*" the evidence of the plaintiffs. I accept that it is not the function of an expert to express views as to whether one piece of evidence corroborates another. This is clearly a matter for the court. On the other hand, context is everything. This opinion was offered as part of the presentation of the audio recordings of the WTN at the plaintiffs' homes (and the associated time domain graphs). In this context, the plaintiffs' experts presented the features of the WTN – high AM values, thump AM etc- to demonstrate correlation with the plaintiffs' complaints about those self-same features of the WTN. I do not view this as an illegitimate exercise.

558. The defendant submits that the court should attach diminished weight to Mr. Stigwood's evidence because he acted as a partisan advocate throughout the trial. Although there were times when this might have been so, I do not in general accept this characterisation. Much of Mr. Stigwood's dogged perseverance can be explained by the fact that for many years he has argued through his research and publications that the standard ETSU approach does not protect windfarm neighbours against excessive AM. In this, he has been largely proved by contemporary science to be correct. His views are therefore held, and expressed, with vigour, as one would expect in the circumstances. Further, it would be hard to escape the impression that Mr. Stigwood, and indeed, Ms. Large have considered the impact of AM - both in general and at Ballyduff in particular - at far greater length and in far greater depth than Mr. Carr, who did not even attempt to address or assess its impact.

559. Having said that, Mr. Stigwood was at times overly defensive, occasionally refusing to make legitimate concessions even when on somewhat thin ice. For example, I find little merit in his argument that it is legitimate to assess exceedance over background noise by comparing windy periods affected by WTN with still periods which are not. Likewise, Mr. Stigwood gave

[59] See para 518 below.

evidence as to likely sleep impacts by reference to the WHO 2009 to the unwarranted exclusion of the more recent WHO ENGER. As will be apparent from my analysis above, I do not accept Mr. Stigwood's views in these two respects. In addition, I accept that at times, Mr. Stigwood's use of language appeared somewhat extreme. For example, in presenting the audio recordings to the court, he tended to refer to the WTN as a *"roar*" even when - albeit intrusive and dominant - it could not fairly be so described. Emotive language such as this is unhelpful.

Plaintiffs' criticisms of Mr. Carr

560. The defendant correctly submits that it is a matter for the court to determine whether nuisance has been made out or not on the evidence. Indeed, the defendant appears to have approached the case on the basis that the expert witnesses ought not to offer an opinion on this matter at all.[60] Mr. Carr therefore offered no real commentary on the aspects of the Ballyduff WTN which the plaintiffs and their experts say are demonstrated by the audio recordings (and associated graphs) and which are said to amount to nuisance.

561. However, this rather overlooks the fact that in order to assess whether or not this particular windfarm poses a nuisance, the court must engage with the plaintiffs' complaints and attempt to assess the nature and impact of the WTN at the plaintiffs' homes. In so doing, it is appropriate for the court to be guided by the evidence of experts as to what features of the WTN might be relevant to the noise nuisance assessment, as to the presence or absence of such features in the Ballyduff WTN and as to the extent to which, if present, such features are known or recognised to increase annoyance or can otherwise be characterised as adverse or unreasonable. Contrary to the view apparently held by the defendant and its experts, an informed qualitative commentary on such features is of assistance to the court.

562. Furthermore, in a case in which the defendant relies so heavily on the fact that there is planning permission for the wind turbines, one would expect that Mr. Carr would assist the court in assessing whether the features of the WTN complained of by the plaintiffs and highlighted by the evidence of MAS, are conventional features of WTN or are, as MAS

[60] The defendant's written legal submissions argue that it is not appropriate for expert witnesses to express a view on matters of law which are for the Court to determine and that the Court should accordingly disregard entirely the assertions which have been made by MAS to the effect that nuisance has been proven on the evidence.

contends excessive, out of the ordinary[61] or otherwise non-conventional for WTN? However, Mr. Carr's evidence did not illuminate the court at all on this issue.

563. This is unfortunate not least because this court has no expertise in distinguishing between conventional and non-conventional WTN. By contrast the experts on both sides have vast experience in his area. There is nothing improper therefore in the plaintiffs' experts expressing the view that the particular features of this WTN render it non-conventional and far more intrusive than would usually be the case.

564. Like Mr. Stigwood, there were times when Mr. Carr pushed his argument too far. For example, I was surprised by his insistence that compliance with the planning permission (and with WEDG 2006) defines the parameters of nuisance. This inevitably entailed a refusal to acknowledge that the science has changed since WEDG 2006. In fact, Mr. Carr appeared to view that the primary innovation of draft WEDG 2019 was the promotion of consistency in measurement methodologies and the reinforcement of the GPG and the IOA RM. It seems that the proposed introduction of a penalty for "excessive" AM barely merited a mention. Yet the theory behind draft WEDG 2019 (and indeed behind the IOA AM report, the Phase 2 Report and the ETSU Review) can only be seen as a significant departure from the "decibel limit only" approach to planning practice espoused by Mr. Carr. Furthermore, Mr. Carr's casual assertion that the WTN would comply with the recommended limits in draft WEDG 2019 regardless of any potential AM penalty was not only unsupported by the evidence but, in my view, displayed a partisan approach.

565. I was also struck by Mr. Carr's apparent dismissal of Mr. Stigwood's view that AM is often worse at night-time due to stable atmospheric conditions, However, the relevance of stable atmospheric conditions to the enhancement of WTN AM has been clear in this jurisdiction since at least 2011. Thus NG 3 notes that features which were thought to enhance AM included stable atmospheric conditions[62] particularly at night and topography leading to

[61] Note that my reference to "out of the ordinary" or "non-conventional" WTN should not be read as a reference to a principle of the United Kingdom law of private nuisance that even where the defendant's activity substantially interferes with the ordinary use and enjoyment of the claimant's land, it will not give rise to liability if the activity is itself no more than an ordinary use of the defendant's own land. This is not a feature of the Irish law private nuisance. My use of the words "out of the ordinary" is simply to denote particularly intrusive characteristics that are not thought to be a commonly occurring feature of WTN (such as high AM values and thump AM).

[62] Stable atmospheric conditions are conditions under which mixing of layers in the atmosphere is minimised. This leads to a much greater increase in windspeed with height.

different wind directions being seen by the blades at different points in their rotation. This view is also recently confirmed by the ETSU Review. It is difficult to understand how Mr. Carr, a highly expert witness operating in the field of acoustics, could depict Mr. Stigwood's views on this issue as somewhat exotic.

566. Overall, it is hard to disagree with the plaintiffs' submission that Mr. Carr displayed a stark failure to engage with the complaint actually made or with the evidence illustrating such complaint. There is force in the plaintiffs' argument that Mr. Carr's refusal to engage with any material which was inconsistent with his central thesis means that he brought only part of his expertise to the court.

Conclusion on issue 8

567. I should emphasise that my reservations as just outlined do not go nearly far enough to justify a finding that either Mr. Stigwood or Mr. Carr failed to discharge their duties as experts to the court. It is however the case that their evidence had less of a sense of balance than I would have expected, which inevitably impacts to some degree upon its weight. Particularly in the case of Mr. Carr, there was little sense that the propositions being put to him were being carefully considered. Rather, he repeatedly restated his central thesis.

568. By contrast, Ms. Large, gave the impression, through her evidence, of a witness who was trying to be helpful to the court and who did not in any way oversell the cogency of her argument. She conceded points where appropriate and answered all questions put with logic, thoroughness and diligence. I do not see how any complaint of partisanship or incompleteness could credibly be levelled at Ms. Large's evidence. Therefore, in adjudicating upon this complex case I have placed considerable weight upon her evidence.

Issue 9: What on the balance of probabilities are the characteristics of the Ballyduff WTN

569. I find on the balance of probabilities that the evidence supports the plaintiffs' account as to the characterises of the noise. I also find on the balance of probabilities that such characteristics occur commonly and on a sustained basis.

570. I am fortified in these conclusions by the following inter-related observations:

571. First, the descriptions given by all four plaintiffs of the particular characteristics of the WTN – (e.g. dominance, erraticism, impulsivity, excessive AM values and thump AM) - were mutually consistent and were not shaken in cross-examination. The Webster-Rollo's who gave detailed and extensive evidence about this were subject to exacting cross-examination over the course of 4 days. Mr. Shorten who gave similarly detailed and extensive evidence on the WTN was not cross-examined in relation to his experience of WTN and Ms. Carty, who did likewise, was not cross-examined at all.

572. Second, the experience of living with the WTN as described by Ms. Webster and Mr. Rollo in their evidence to the court is chronicled in daily diary entries going back over three years. As I observe above, the reliability of these diary entries was thoroughly tested in cross-examination and passed muster.

573. Importantly, Ms. Large's report correlated the description of the WTN in key parts of the 2020-diary entries with the contemporaneous audio recordings (and the associated graphs) to ascertain whether the plaintiffs' descriptions were borne out. Her report confirmed consistency between the two. Mr. Stigwood performed the same exercise in relation to key parts of the 2021 noise diaries. This is of significance as Ms. Webster and Mr. Rollo could not have known when making the diary entries what the audio recordings (and the associated graphs) would show.

574. The Webster-Rollo diary entries, Ms. Large's report and the full suite of audio recordings (and the associated graphs) have long since been furnished to the defendant. The defendant could have challenged the reliability of either the plaintiffs' diary entries or of Ms. Large's descriptions of the relevant data by contending for example that excessive AM or thump AM etc was not present on the recordings. It did not do so. This all suggests that the diary entries can be seen as a valid contemporaneous account of the plaintiffs' experience of the WTN.

575. None of this means of course that all of the features described in the diary entries (or indeed all of the features demonstrated by the MAS 2017 and the MAS 2021 data) were present on a constant basis over these years or even that all of the features described were continuously present throughout the individual days and nights represented by the relevant entries. However, the preponderance of the evidence is that these features were present on a common and

sustained basis - albeit not continuously – during the periods recorded in the diaries. Furthermore, there is no reason whatsoever to conclude that the nature of the WTN has changed since 2017 and 2021 and I accept the opinion of MAS that it has not.

576. Third, the plaintiffs' descriptions of these characteristics of the WTN were consistent with the personal on site observations of both Ms. Large and Mr. Stigwood on which neither expert was convincingly challenged. Ms. Large, spent an extended period of time at both NF and HH and gave evidence that the WTN at both sites was the worst case of WTN nuisance which she had ever experienced.

577. Fourth, the court is also informed by its own appreciation of the noise as it appears on the audio recordings presented by the plaintiffs' experts. On any fair assessment the audio recordings support the plaintiffs' evidence that the WTN disturbs their peace and disrupts their sleep. I find that the evidence comprised by the audio recordings (and the associated graphs) is consistent with the plaintiffs' description of the characteristics of the WTN.

578. Fifth, the observations of the plaintiffs' experts-- based on the audio recordings (and the associated graphs) – as to the characteristics of the WTN was consistent with the plaintiffs' own descriptions of same and further strongly supports the plaintiffs' evidence of significant adverse impact. This is important because the observations of the plaintiffs' experts (to the effect that the audio recordings and associated graphs demonstrated erratic, impulsive AM together with high AM values and thump AM) was scarcely challenged in cross-examination or in the defendant's experts' evidence. Thus, although Mr. Carr did contend that AM values should not be derived from the time domain graphs, he did not dispute that the graphs themselves, which correctly captured the noise at the microphone locations at HH and NF showed that high AM values were present over the periods depicted in the graphs. The defendant's primary response to much of the above was that the sound levels were "low" which has not been demonstrated and which furthermore misses the heart of the argument. As I explain above, WTN levels are generally "low". The point however is that, even if the decibel level of the Ballyduff WTN is roughly as one might generally expect, it is its other features thereof which render it objectively unreasonable and, indeed, dominant.

Findings of fact in relation to the characterises of the WTN

579. On the basis of all of the above, the following are my findings of fact:

580. Generally, T1 is barely audible from the plaintiffs' homes and, when audible is not intrusive.

581. By contrast, when it is turning, T2 is audible at all times in the gardens and recreational area outside the plaintiffs' properties. When T2 is turning, even slowly, WTN is also audible from inside the plaintiffs' homes with the windows only slightly ajar. Whether the WTN is audible with the windows closed will depend upon the speed of rotation of the rotors and on other ambient noise. Likewise, whether at any given time audible WTN - and associated vibration - causes an unreasonable interference externally or internally- will also vary with the speed of rotation of the rotors, with other ambient noise and with metrological conditions.

582. I find that there are frequent and sustained periods during which AM values are conservatively in excess of 5 or 6 dBA. I also find that there are regular periods during which the AM values are considerably in excess of 6 dBA, in the order of 10 dBA or more. I find that such high AM values exacerbate the other intrusive features of the AM such as its erraticism, impulsivity and intermittency. I find that although noise levels will be lower when the windows are fully closed, high AM values remain. I find that there is a significant audible lower frequency component to the WTN. This produces clear whomping, thumping and whacking sounds. These whoomphing and thumping sounds are themselves highly variable and unpredictable. In addition to being heard, this lower frequency WTN is felt as a vibration or a sense of pressure. The WTN is audible and "felt" both outside and inside NF and HH, including in the master bedrooms at both properties. I find that, when even with the windows are entirely shut this lower frequency noise is clearly audible throughout both houses and that thump AM can be felt as a vibration in the structure of NF and in particular HH. I am satisfied that this thump AM is commonly present over sustained periods.

583. I find that when the turbine is turning slowly- as exemplified at the time of the court's visit – it is not particularly intrusive. However, I also find that at higher speeds of rotation as a result of the characteristics outlined above, the WTN dominates the plaintiffs' sound environment both externally and internally. I find that at moderate to high speeds of rotation

the impact of the WTN far exceeds masking levels; it is the primary noise that is experienced in the plaintiffs' sound environment.

584. I further find that although internal noise levels are lower in both houses when the windows are shut, at higher speeds of rotation the WTN is nonetheless dominant particularly due to the sense of vibration associated with thump AM.

585. I further find the WTN AM is more prevalent during the night, early morning and evening periods than during the daytime. This is in all likelihood due to the atmospheric and situational conditions that prevail at these times, contributing to increased AM occurrence, and potentially enhanced sound propagation.

586. As I explain above,[63] bearing in mind current scientific uncertainty on this issue, the most that the various guidelines (such as the WHO guidance variously relied upon by both parties' experts) can do is illustrate the likely sound level at which sleep impacts are anticipated. As in *Hanrahan* such evidence cannot dethrone the factual evidence of the plaintiffs that the combined characteristics of the WTN are such as to regularly disturb their sleep. I accept that the WTN is such as to cause sleep disturbance at both NF and HH with the windows open and with the windows closed. I accept the evidence of all four plaintiffs as to the sleep difficulties experienced as a result of the WTN. I accept that Ms. Webster continues to do all that she can to mask the noise but nonetheless continues to experience serious sleep disturbance. In Mr. Rollo's case I accept that the impact of the sleep disturbance was profound and unremitting. I accept that this sleep deprivation was ultimately instrumental in causing Mr. Rollo to suffer a psychiatric injury.

587. I accept that during spring and autumn the turbines intermittently cause shadow flicker, albeit that I am not satisfied that this pertains for more than 30 minutes per day such as to exceed WEDG 2006.

[63] See para 536 above.

Issue 10: Does the court accept the plaintiffs' evidence that the characteristics of the noise amounts to an unreasonable interference with the plaintiffs' enjoyment of their property? Is liability in nuisance established?

588. As will be apparent from all of the forgoing, the answer to this question is a resounding affirmative.

589. The Ballyduff planning permission does not delineate the parameters of noise nuisance in this case principally because it does not assess or regulate the aspect of the WTN complained of, which is AM. Even if the planning permission did delineate the parameters of noise nuisance, total operational noise at both NF and HH is above the applicable 40 dBA leq limit for windspeeds above 7 and 6ms/ respectively. Although, the absence of a formal background noise assessment means that planning non-compliance has not been demonstrated on the balance of probabilities, nor can the defendant make out the defence advanced.

590. I find that two features in particular of the WTN AM render the WTN an unreasonable interference. First, there are frequent and sustained periods during which the AM manifests typical AM values at a level widely acknowledged to be associated with high levels of annoyance. Second, this WTN displays periods of thump AM. The oral evidence of all four plaintiffs and the Webster-Rollo diary entries all suggest that thump AM, together with its association vibration, is the most intrusive quality of the WTN. This thump AM vastly adds to the nuisance posed by the wind farm. In combination, I find that this is WTN which reasonable people would find it impossible to habituate to.

591. Regular and sustained AM values of this order and thump AM combine to produce WTN which is a world away from the usual noise that one would associate with wind turbines – viz. reasonably regular and monotonous swish AM. Mr. Lawlor, the defendant's planner, stated that the understanding of planners is that blade swish is "*normal AM*". He stated that whoomphing or thumping AM is called "*adverse AM*" or "*other AM".* As the ETSU Review notes it is also commonly described as *"abnormal AM"* or *"enhanced"* AM. Mr. Lawlor acknowledged that whoomphing or thumping AM, "*is likely to cause adverse reaction in the community".* Although he stated that this form of AM is thought to occur only for short durations of time at very specific meteorological conditions, I am satisfied that the evidence

establishes that it is a common and sustained feature of the Ballyduff WTN, particularly at night, in the early morning and in the evening.

592. I am satisfied that these two features combine to render the WTN the dominant noise in the plaintiffs' sound environment. These are the features of WTN that one hears and feels both outside and inside HH and NF with the windows open and closed. Such an intrusion of noise and vibration into the plaintiffs' homes could not be an objectively reasonable impact of a windfarm located in a quiet rural environment such as this, albeit one which includes permission for a windfarm.

593. I accept the evidence of the plaintiffs' and their expert witnesses that the noise impact demonstrated on the audio recordings and graphs occurs commonly and for sustained periods. To expand on this somewhat, I do not find that high AM values and thump AM occur constantly in the Ballyduff WTN. Their level and presence fluctuates. However, I accept that these features occur commonly albeit at irregular intervals. These irregular intervals are frequent and can occur on repeated occasions in a 24 hour period. Sometimes these intervals are sufficiently frequent and sustained in duration as to define the relevant day or night from the perspective of those experiencing it. On such occasions, the overriding impression will be of adverse impact punctuated by periods of more acceptable WTN; e.g. when it is more steady and monotonous with AM of the swish variety. On other occasions the opposite might be the case and the adverse intervals will be infrequent or of short duration meaning that the overriding impression will be of acceptable WTN punctuated by periods of adverse impact.

594. This provides context to Ms. Webster's broad estimation that the WTN unreasonably intrudes on her comfort and enjoyment up to 80% of time. Objectively speaking, it is unlikely that these adverse intervals persist for 80% of the time overall. Such periods of adverse impact are of their nature likely to be intermittent. However, I am equally satisfied that there are few 24 hour periods that escape substantial intervals of sustained adverse impact. Even if not present for the majority of a given 24 hour period, a substantial number of intervals of sustained adverse impact means that the day/night in question cannot fairly be characterised as a period of respite. Crucially, the unpredictability of occurrence and the plaintiffs' lack of control over when and for how long these unacceptable impacts manifest increases the level of nuisance overall. Although therefore adverse impact comes and goes, the annoyance occasioned thereby largely persists. My strong sense is that if the overall intensity or prevalence of these adverse

intervals were mitigated, then the perception of overall nuisance would reduce considerably and probably exponentially.

595. For all the reasons set out above, the plaintiffs' complaints of nuisance are objectively justified. The WTN interferes to a substantial extent with the ordinary comfort and enjoyment of their homes. I am satisfied and find, on the balance of probabilities, that nuisance is established.

596. As appears from the audio recordings, the plaintiffs' evidence and that of their experts, T1 does not cause a nuisance to the plaintiffs. However, I hold that T2 causes a nuisance to Ms. Webster and Mr. Rollo and also caused a nuisance to the Carty-Shortens while they lived at NF.

597. While the WTN is liable to annoy during the working day, it does not substantially interfere with the plaintiffs' enjoyment of their property. This is because, although there will still be some intrusion, AM is likely to be less prevalent due to meteorological conditions and further it is reasonable to expect that during this time the occupants of NF and HH would be working and further that ambient noise will assist in masking the WTN. Although this is a narrow judgment call, I therefore find that the noise can reasonably be tolerated and/or masked during working hours.

598. On the other hand, I find that the noise from the turbine poses a nuisance to the plaintiffs in the evenings and indeed at weekends (in other words during quiet waking hours) when one could expect to be enjoying recreation in the garden and/or peace in one's dwelling. Although one is more likely to be spending time outside during the summer months, one should also be able to do so during the winter months.

599. Equally, I have no hesitation whatsoever in finding that the WTN poses a nuisance at night (in other words during night hours) when a quiet environment is at a premium. Although it is more likely that windows will be closed in winter one should, if one chooses to be, able to open windows for ventilation at night. It is unreasonable to expect occupants of a house to have to sleep with windows shut in an attempt to mitigate unreasonable WTN. In any event, as a result of its characteristics, the WTN-and associated vibrations-is an unreasonable inference even when the windows are shut.

600. I also find that in spring and autumn the shadow flicker caused by the turbines is intrusive and unpleasant. Whilst this is not in and of itself sufficient to constitute nuisance, this shadow flicker is wholly avoidable with inexpensive mitigation measures. Such mitigation should long since have been put in place and ought now to be actioned.

601. As such, the plaintiffs are entitled to damages for unreasonable interference with the enjoyment of their properties (but not to damages for personal injuries, as to which see below). The measure of such damages is accepted by both parties as being for module 2. The plaintiffs argue that nuisance has been established and that the defendant has not suggested any mitigation measures. As such the plaintiffs argue that they are entitled to a permanent injunction as of right to restrain the nuisance. However, I accept the defendant's argument that whether an injunction ought to be granted and if so the terms of such injunction is for module 2. Likewise, the issue of whether the plaintiffs ought to be confined to damages in lieu of an injunction is for module 2.

Issue 11: Does the court accept the defendant's submission that the evidence of Ms. McGinn means that nuisance is not made out in this case?

602. I considered Ms. McGinn's testimony as part of my overall assessment of the evidence in the case. However, in light of the reliance placed by the defendants on Ms. McGinn's evidence, it is convenient to separately explain here my approach to her testimony.

603. As stated above, I accept that the plaintiffs represent *"ordinary person/s with reasonable objective expectations".* Although I find that Mr. Rollo's reaction to the WTN ultimately became disproportionate by mid to late 2020, this was not the case for the vast majority of the time that he lived beside the turbines. Nor is there evidence that this was ever the case in respect of the other plaintiffs. Further, there was no suggestion that any of the plaintiffs are generally "bad sleepers*",* hypersensitive to noise or unusually intolerant.

604. The defendant submits that "*Ms McGinn represents an ordinary person with reasonable objective expectations, and, these expectations are not being exceeded by the Defendant herein".* The defendant argues that this rules out interference with the ordinary comfort and enjoyment of the property of the plaintiffs "*beyond what an objectively reasonable*

*person should have to put up with in the circumstances of the case" (*to quote Henchy J. in *Hanrahan).*

605. Liability in nuisance depends on whether the amenity *of the property* has been unreasonably interfered with. Would ordinary members of society - the putative reasonable person - consider that their amenity is unreasonably impacted by the WTN?

606. Although Ms. McGinn is a *"good sleeper",* there is no evidence that she is hypersensitive to noise. I fully accept that, in everyday parlance, Ms. McGinn is a reasonable person - indeed she struck me as such. However, the question is whether, in her response to the WTN, Ms. McGinn represents the putative objectively reasonable person, which as a legal construct, is a different issue.

607. The plaintiffs rely on aspects of Ms. McGinn's evidence which they contend demonstrate that, even from her perspective, the WTN interferes with her comfort and enjoyment of NF. The WTN is "*pretty obvious*". It makes a "*whoomph*" noise as the blades spin that can generally be heard all the time, both externally and internally. As a result of the WTN, Ms. McGinn takes longer to fall asleep. WTN wakes her from her sleep, albeit only occasionally. Ms. McGinn has made a conscious effort to ignore the WTN and is afraid that if she focussed on it, the noise would "*get in on [her] more".* All of this is indicative of some degree of "*interference with"* Ms. McGinn's "*ordinary comfort and enjoyment of the property*."

608. The defendant relies upon other aspects of Ms. McGinn's evidence. Although the WTN kept her awake on her first night in the house, this was the loudest night she experienced it. She likes the master bedroom in NF and is "*sticking with it*". Ms. McGinn gave evidence that she has either got used to the noise or ignores it and that she did not regret buying NF (albeit that her view is that she purchased NF for a lower price which reflected the presence of the turbines). The defendant places significant emphasis upon the following extract from Ms. McGinn's cross-examination:

> *Q. Yes. So you have effectively habituated to it, and it doesn't seem, just from what you have said, to be creating a terribly great problem for you in your enjoyment of the property?*
> *A. In general, no.*

609. Despite her answer to this particular question, in light of the general tenor of Ms. McGinn's evidence, the submission that the WTN "*does not adversely affect Ms McGinn's enjoyment of the property"* goes too far. Ms. McGinn has clearly made a conscious and deliberate effort to ignore the WTN and, to that extent, she has habituated to it. Such coping strategy is necessary because the WTN is audible both outside and inside her home. The very need for such a coping strategy suggests some level of interference with the comfort and enjoyment of NF. Despite this, Ms. McGinn is prepared to *"put up with*" the WTN.

610. However, as the defendant says, the test is objective. Whether or not interference by way of noise is beyond "*what an objectively reasonable person should have to put up with"* will depend on the objective nature of the noise. The individual experience of particular occupants of the relevant property - past or present - whilst relevant, is not determinative.

611. In so far as coping strategies are concerned, one must assess whether it is reasonable to expect occupants of a property to deploy such coping strategies, and of course whether, if reasonable, such coping strategies are likely to be effective or ineffective for the putative reasonable person. None of this can be determined solely from the individual perspective of either Ms. McGinn or the plaintiffs themselves.

612. Ms. McGinn is not a litigant in the case and her evidence is of course more impartial than that of the plaintiffs. She also lives in one of the affected properties unlike Ms. Doran (albeit that the latter lives in the locality). Ms. McGinn's evidence is therefore non-partisan and relevant. As part of the overall assessment, the court must therefore pay careful attention to her evidence.

613. Overall, although there are features of Ms. McGinn's evidence which can be said to support either party's case, in the round, her depiction of the WTN is undoubtedly less negative than the evidence of the plaintiffs. The point however is that such dichotomous thinking - in which only the evidence of Ms. McGinn or that of the plaintiffs can be accepted - is somewhat simplistic. Despite their superficial discordance, both sets of evidence can be and, to my mind are, simultaneously, true.

614. It is perfectly plausible that a reasonable person - in the lay sense of the term - would be prepared, for their own reasons, to put up with a particular noise even though it is objectively

unreasonable. Indeed, I imagine that this occurs reasonably regularly. I find that, for her own reasons, Ms. McGinn is prepared to put up with noise that, objectively speaking, she should not have to put up with. I find that, although she is a reasonable person (in everyday parlance), in her reactions to the turbine, Ms. McGinn does not represent the putative objectively reasonable person. I hold that the reaction of such an objectively reasonable person would be akin to that of the plaintiffs.

615. The assessment of whether the noise is an unreasonable interference with amenity is not a numbers game; it is an exercise in judgment in which the court must consider the totality of the evidence. This includes that of Ms. McGinn, Mr. Brazil and the defendant's acoustic, medical and planning experts. It also includes that of the plaintiffs, Ms. Doran and the plaintiffs' acoustic, medical and planning experts. Further, the court must consider the audio recordings of the noise on site (and the associated graphs) and the evidence gained on its site visit. The court must also consider guidance concerning the appropriate noise measurement techniques and the features of WTN thought to contribute to the annoyance levels. Ms. McGinn's reaction to the noise is undoubtedly of relevance to the issues in the case. But the court would be falling into error were it to conclude that the evidence that she is prepared to put up with from WTN outweighs the other evidence in the case which in my view established that, objectively speaking, the WTN is intolerable and unreasonable.

616. It is reasonable to expect people to be tolerant and to cope as best they can with the vicissitudes of living beside a turbine for which permission is granted. If, judged objectively, the noise can be ignored and effectively habituated to, then the noise in unlikely to be adjudged a nuisance. However, there will be circumstances in which, although some people will be prepared to deploy coping strategies to tolerate the noise, the fact remains that the character of noise is such that it is unrealistic to expect that such strategies will, in the main be effective or successful. Having regard to the totality of the evidence and to my above analysis of the WTN under the DEFRA criteria, I find that this point has been well passed in the present case. The WTN causes a serious adverse noise impact exceeding reasonable tolerability by a substantial margin.

Concluding remarks on nuisance

617. The Defra Guidance recognises that the emission and propagation of WTN is often strongly dependent on meteorological conditions, investigation of statutory noise complaints should therefore include detailed measurement and recording of the windspeed and direction,

rainfall, temperature and relative humidity simultaneously with any noise observations or measurements. The plaintiffs' experts did not adhere to this aspect of the Defra Guidance. Their view is that their data clearly establishes unreasonable noise impact and that it is for the defendant to investigate the cause of this and the possibility of mitigation measures.

618. I have some sympathy for the defendant's frustration at this failure to identify the prevailing conditions under which adverse impact arises. Presently, the court has data from the defendant correlating windspeeds with noise levels (at certain wind directions) and data from the plaintiffs illustrating the features of the WTN complained of. However, there is no correlation between the two.

619. My sympathy for the defendant is not unlimited. The defendant undertook several weeks of monitoring at both NF and HH in 2017 which Mr. O'Reilly used to populate the planning compliance graphs. In addition, the defendant has long since been furnished with all of MAS's audio recordings (and the associated graphs) detailing the noise impact complained of. If the defendant had wished to further analyse either set of data, as against IOA RM or otherwise, it could presumably have done so. It could also have used the SCADA data to correlate periods of adverse impact identified by the plaintiffs' experts with speed of rotation, blade pitch, windspeeds and other meteorological conditions.

620. The plaintiffs' experts do not control the operation of the turbine or have real time access to the SCADA data for simultaneous correlation with noise observations as required by the Defra Guidance. Nor could the plaintiffs' experts secure turbine shut down to ascertain potential exceedance of WTN over background noise at a range of winds speeds. Such constraints might explain why modern planning conditions require the wind turbine operator, and not the complainant, to carry out noise monitoring in response to a WTN complaint in order to identify the conditions under which the alleged nuisance presents and, more importantly to devise appropriate mitigation measures.

621. I am satisfied that it is not necessary for the plaintiffs to establish the precise conditions under which nuisance arises in order to succeed on liability. Rather, this will inform module 2 which will determine the appropriate remedy for nuisance.

622. One cannot presently know why this particular turbine is causing WTN nuisance. Counsel for the defendant emphasised that this Court should turn its face against any finding which suggests that all turbines within 500 metres of a residence are likely to cause nuisance. I make no such finding. It is clear that although planning guidance since WEDG 2006 has recommended a separation distance of at least 500m, this is primarily to combat visual intrusion and not noise intrusion. Although it is quite possible that proximity to the plaintiffs' homes is part of the problem here there are many other factors which may contribute to the particular characteristics of this WTN. I have in mind factors such as the relative height of T2 as compared to the plaintiffs' homes, the fact that these homes are in a sheltered location/wind shadow, the blade pitch of T2, inflow turbulence from T1, unanticipated wake effects and the many acoustic and meteorological factors associated with thump AM, which presently are not well understood.

623. On the other hand, as discussed above, it is reasonable to conclude that adverse impact occurs at windspeeds/speeds of rotation in excess of those which were prevalent at the time of the court's visit. Indeed, although absolute sound levels are not a reliable determinant of nuisance, there is a strong link between WTN sound levels, and the annoyance caused by other characteristics of the WTN. Even if high value AM is present on a fairly sustained basis, I believe that it is at higher speeds of rotation that this characteristic comes to the fore. This impression is endorsed by the ETSU Review which concludes that the interaction between absolute sound levels and AM value influences response. In other words, the louder the WTN, the more likely the AM is to annoy. Further, although thump AM is slightly different - in the sense that it is experienced, a vibration as well as heard- rapidly turning rotors is a common denominator in the plaintiffs' descriptions of its impact.

624. Albeit that this will potentially require to be re-visited in module 2, it is highly likely that the worst features of this WTN are associated with at least moderately higher speeds of rotation. It is also highly likely that features often coincide with the most noise sensitive periods of the day (early morning, evening and nighttime). However, it is not presently possible to be more specific than that.

625. Due to the complex range of interrelated causative factors, identifying the conditions under which unreasonable adverse impact presents and discerning mitigatory measures will be an iterative exercise. Such an exercise is uniquely unsuited to the adversarial arena. As Mr.

Carr states, mitigation of WTN nuisance is often a process of trial and error. This is best approached on site and not in a court room. A court order is an unsuitably blunt instrument with which to tailor a solution to address the WTN nuisance without unnecessarily inhibiting the operation of T2.

626. The defendant cannot rest its laurels on the proposition that the generation of renewable energy is a socially valuable activity which it is in the public interest to continue. There is not a binary choice to be made here between the generation of clean energy by the wind farm, and a good night's sleep for its neighbours. It should be possible to achieve both.

627. However, effective mitigation will require a far more constructive attitude than has thus far pertained in this case. In their insistence that planning compliance negates nuisance, the defendant has exhibited an unwarranted rigidity in its response to the plaintiffs' complaints. On the other hand, the plaintiffs must realise that, in light of its social utility, this court will be reluctant to order the shutdown of T2, even just at sensitive periods (early morning, evening and nighttime) if a more tailored solution can ameliorate the nuisance.

628. I set out the above as a prelude to the exercise of my inherent jurisdiction to direct the parties, in advance of module 2, to engage in mediation in relation to appropriate mitigation measures and with a view to resolving all outstanding issues between them. I am conscious that mediation has not thus far proved fruitful. However, with the benefit of this court's judgment, it is reasonable to expect that mutually acceptable mitigation measures are capable of being agreed.

Issue 12: Are Mr. Rollo and Ms. Webster entitled to an award of damages for personal injuries?

629. I am satisfied on the balance of probabilities that Mr. Rollo has suffered personal injury in the form of a recognisable psychiatric illness. I also find that this injury was caused by the sleeplessness caused by the WTN, and so caused by the nuisance in suit.

630. The following matters arise:-

- The impact of the Personal Injuries Assessment Board Act 2003 ("the 2003 Act") on the claim to damages for personal injuries

- The recoverability of damages for pure psychiatric injury unaccompanied by physical injury

Application of the Personal Injuries Assessment Board Act 2003

631. The defendant states that this aspect of the plaintiffs' claim is in breach of s. 12 of the 2003 Act and out be struck out.

Section 12 of the 2003 Act provides:-

> *"Unless and until an application is made to the* [Personal Injuries Assessment Board] *under section 11 in relation to the relevant claim and then only when the bringing of those proceedings is authorised…, no proceedings may be brought in respect of that claim."*

632. Section 3 applies the 2003 Act to civil actions which, in turn, are defined by s. 4 as *"an action intended to be pursued for the purpose of recovering damages, in respect of a wrong, for personal injuries, or for both such injuries and damage to property".*

633. As originally instituted, these proceedings sought both injunctive relief and damages for nuisance together with injunctive relief pursuant to s. 160 of the Planning and Development Act 2000 (as amended). No claim to damages for personal injuries was originally advanced. It is common case that at inception, the proceedings were not a civil action.

634. After Mr. Rollo's diagnosis with a major depressive disorder, the plaintiffs notified the defendant by letter dated 21st December, 2020 that they intended to include a claim for personal injuries. The plaintiffs took no step to amend the pleadings until very shortly prior to the trial.

635. The plaintiffs' application to amend the proceedings was objected to by the defendant, *inter alia*, on the basis that it infringed s. 12 of the 2003 Act. On the authority of *Clarke v. O'Gorman* [2014] 3 IR 340, I determined that s. 12 of the 2003 Act did not operate as a jurisdictional bar to the initiation of personal injury proceedings (or to the amendment to include such a claim). The application of the 2003 Act was rather a matter for the defendant to plead in its defence. Accordingly, I allowed the amendments sought and the defendant duly delivered an amended defence pleading, *inter alia*, that, as the necessary PIAB authorisation had not been obtained, the claim ought to be struck out.

636. Relying upon *Clarke v. O'Gorman*, the defendant maintains that, even if the claim to damages was based on nuisance, the term "civil action", as defined by s. 4(1) of the 2003 Act does not refer only to the particular cause of action pursued. It is a description of the type of damage suffered as a result of the facts giving rise to the cause of action. Civil actions for personal injury are, therefore, not limited to those wrongs in which proof of personal injury is a necessary element of the cause of action. As such an action in nuisance is still capable of being a civil action within the meaning of the 2003 Act where the remedy sought includes damages for personal injuries. Therefore, a claim to nuisance which, *inter alia*, advances a claim to damages for personal injuries cannot proceed without the relevant authorisation.

637. In response, the plaintiffs invoke the *caveat* set out at s.4(b)(i) of the 2003 Act which exempts an action intended to be pursued in which, in addition to damages for personal injuries, it is *bona fide* intended and not for the purpose of circumventing the operation of the Act to claim damages or other relief in respect of any other cause of action. The plaintiffs argue that the proceedings are intended to claim relief in respect of another cause of action, namely both the underlying nuisance claim and the claim to injunctive relief pursuant to s. 160.

638. If the plaintiffs' only cause of action - whether based in nuisance or otherwise - advanced a claim to damages for personal injuries, then there would be merit in the defendant's argument. However, this is not the case. Here the plaintiffs also pursue a s. 160 application. It has not been submitted that the plaintiffs' application for injunctive relief pursuant to s. 160 is advanced for the purposes of circumventing the operation of the 2003 Act. Indeed, both parties called extensive evidence on the issue of planning compliance. It is not, of course, necessary for this additional cause of action to succeed in order for the proceedings as a whole to benefit from s. 4(b)(i). Accordingly, I reject the defendant's submission that the claim to personal injuries must be struck out as being in breach of s. 12 of the 2003 Act.

May damages for personal injury may be sought in the context of a claim to nuisance?

639. The defendant argues that nuisance is a property-based tort which imposes liability in respect of a substantial interference in the enjoyment of land and that damages for personal injury may not be awarded.

640. This is established law in England and Wales. In *Hunter v. Canary Wharf*, [1997] AC 655 where a claim for nuisance was brought by residents who claimed that construction work had been interfering with their television signal strength, Lord Hoffman gave the leading judgment and stated :-

> *"In the case of nuisances "productive of sensible personal discomfort," the action is not for causing discomfort to the person but, as in the case of the first category, for causing injury to the land. True it is that the land has not suffered "sensible" injury, but its utility has been diminished by the existence of the nuisance. It is for an unlawful threat to the utility of his land that the possessor or occupier is entitled to an injunction, and it is for the diminution in such utility that he is entitled to compensation."*

641. Lord Hoffman suggested that any personal injury claim should be pursued through negligence, rather than through nuisance.

642. As an adjunct to the principle that damages for personal injuries were not payable, Lord Hoffman also found that damages are not increased by there being more than one occupier.

> *"I cannot therefore agree with Stephenson L.J. in* Bone v Seale [1976] 1 W.L.R. 797 *when he said that damages in an action for nuisance caused by smells from a pig farm should be fixed by analogy with damages for loss of amenity in an action for personal injury…*
> *There may of course be cases in which, in addition to damages for injury to his land, the owner or occupier is able to recover damages for consequential loss. He will, for example, be entitled to loss of profits which are the result of inability to use the land for the purposes of his business. Or if the land is flooded, he may also be able to recover damages for chattels or livestock lost as a result. But inconvenience, annoyance or even illness suffered by persons on land as a result of smells or dust are not damage consequential upon the injury to the land. It is rather the other way about: the injury to the amenity of the land consists in the fact that the persons upon it are liable to suffer inconvenience, annoyance or illness."*

643. It appears that this has not been the approach taken in jurisdiction. In *Patterson v. Murphy*, [1978] ILRM 85 *("Patterson*") blasting on the defendant's land caused physical harm to the plaintiffs' residence. The plaintiffs were awarded damages for the repair of the property, but it was also held that general damages were payable to each of the plaintiffs separately for annoyance, discomfort, inconvenience and mental distress.

644. More importantly, some of the discussion in *Hanrahan*, appears to run directly counter to the proposition that a personal injury claim should be pursued in negligence, rather than through nuisance. The Supreme Court, per Henchy J., noted that although originally advanced in both negligence and nuisance, the claim had centred on nuisance and would be determined accordingly. Having concluded that the defendant was liable in nuisance, the court then went on to hold that its environmental pollution has caused Mr. Hanrahan to suffer damage to his health - in the form of lung disease.

645. The question of whether, as a matter of principle, damages for personal injury were recoverable as a property based tort does not appear to have been argued in *Hanrahan*. Rather, the court's consideration focused upon causation. However, there is no suggestion that the Supreme Court viewed damages for personal injuries as restricted to negligence and in terms of outcome, the case was remitted to the High Court for the assessment of damages.

646. The plaintiffs submit that irrespective of whether the matter was argued in *Hanrahan*, I am bound to apply that authority if satisfied that the interference found to constitute the nuisance in this case is causative of personal injuries. In so far as concerns this *"property based tort"* ground of objection, I accept that this is so.

647. However, it seems to me that the present case is distinguishable from *Hanrahan* as Mr. Rollo does not allege personal injury in the form of damages to his physical health but rather personal injury comprising pure psychological injury. The entitlement to damages for pure psychological injury unaccompanied by physical injury has always been treated by the courts as somewhat *sui generis*. As the recoverability of damages for this type of injury was not in issue in *Hanrahan*, I must therefore consider separately whether different considerations might apply.

Does *Kelly v. Hennessy* apply to all claims for damages for pure psychiatric injury?

648. The defendant maintains that there is no basis for recovery of damages for purely psychiatric injury in this jurisdiction save when occasioned by a sudden calamitous event. The defendant relies upon *Warren Harford v. Electricity Supply Board* [2021] IECA 112. In that case, the Court of Appeal, per Noonan J., considered a claim brought by a network technician employed by the defendant for damages for posttraumatic stress disorder occasioned as a result

of his apprehension that he had narrowly missed being electrocuted and suffering death or very serious injury in the course of his work.

649. It is important to emphasise that the claim in *Harford* was not of course for the tort of nuisance but negligence. Specially, it was a claim for nervous shock. It was therefore common case that the plaintiff had to satisfy the 5 criteria set out in *Kelly v. Hennessy* [1995] 3 IR 253, in which, Hamilton C.J. in a judgment in which Egan J. concurred, held that:

> *"1. …a plaintiff must prove that he or she suffered a recognisable psychiatric illness…*
>
> *2. A plaintiff must establish that his or her recognisable psychiatric illness was 'shock-induced'…*
>
> *3. A plaintiff must prove that the nervous shock was caused by a defendant's act or omission…*
>
> *4. The nervous shock sustained by a plaintiff must be by reason of actual or apprehended physical injury to the plaintiff or a person other than the plaintiff.*
>
> *5. If a plaintiff wishes to recover damages for negligently inflicted nervous shock, he must show that the defendant owed him or her a duty of care not to cause him a reasonably foreseeable injury in the form of nervous shock.*
>
> *…It is not enough to show that there was a reasonably foreseeable risk of personal injury generally. Deane J. stated in Jaensch v. Coffey,*155 C.L.R. 540*:*
>
> > *'a duty of care will not arise unless risk of injury in that particular form (i.e. psychiatric injury unassociated with conventional physical injury) was reasonably foreseeable.'"*

650. In *Harford*, although, satisfied that the plaintiff had suffered a recognisable psychiatric illness, the court was not satisfied that he fulfilled either the second or fourth criteria in *Kelly v. Hennessy*. In particular, the Court of Appeal was not satisfied that the plaintiff's injury was *"shock induced"*.

651. The defendant accepts that Mr. Rollo's claim to damages for psychiatric injury is not a claim to nervous shock *per se*. However, it relies upon para. 34 of the judgment in *Harford* in which Noonan J. states *"Thus, psychiatric injury is not compensable, even though reasonably foreseeable, unless it is accompanied by physical injury or alternatively is the result of "shock"."*

652. The defendant therefore submits that, in this jurisdiction, damages for pure psychological injury can never be recovered outside the boundaries of a nervous shock claim.

Thus articulated, the defendant's submission overreaches. It is clear that damages for negligence causing a recognisable psychiatric illness have been awarded beyond the strict confines of nervous shock cases. For example, in the case of employer's liability, damages may be awarded for psychiatric injury occasioned as a result of workplace bullying or occupational stress.

653. However (although once again in the negligence context), it is undoubtedly the case that the courts have been extremely cautious in expanding the boundaries of cases in which damages will be awarded for pure psychiatric injury. In the negligence context, control mechanisms on the recovery of such damages have been developed over time to restrict both the limits of the duty of care and the limits of the types of damage recoverable. The second of these considerations – the limits of the types of damage recoverable - is in my view relevant here. In this respect, the issue of reasonable foreseeability has been key to the question of remoteness and to the consequent imposition of liability in cases of pure psychological injury. I will now consider the approach adopted to foreseeability of pure psychological injury in negligence before turning the question of foreseeability of both physical injury and pure psychological injury in nuisance.

The role of foreseeability

<u>The role of foreseeability of pure psychological injury in the tort of negligence</u>

654. In *Fletcher v. Commissioner for Public Works* [2003] 1 IR 465 the Supreme Court considered whether, and if so, to what extent and subject to what limitations an action may lie in negligence where the sole injury is a psychiatric condition resulting from fear of contracting an illness (in that case, asbestos related disease) in the future, as a consequence of the admitted negligent acts and omissions of the defendant.

655. Keane CJ. emphasised the requirement of foreseeability in an action in negligence in which the plaintiff claimed damages for pure psychological injury:

> *"The issue, accordingly, which this court has to resolve is whether the plaintiff was entitled to recover damages for the impairment of his "mental condition" which, according to the evidence of the psychiatrist, has resulted from his exposure to the risk of contracting mesothelioma, a risk which, it is beyond argument, was created by the failure of the defendants to take the precautions which a reasonable employer would have taken to ensure that he was not exposed to any such risk.*

> *That in turn depends, initially at least, on whether the consequences which have ensued for the plaintiff ought reasonably to have been foreseen by the defendants.*
> *It is unnecessary , in my view, to arrive at any conclusion as to whether this is so because, if the personal injury was not foreseeable, liability in negligence cannot arise or because, if it was not foreseeable, the damage was too remote. In either case, reasonable foreseeability is a precondition to liability. The question as to whether those consequences were reasonably foreseeable cannot, of course, be answered by assessing the state of knowledge of the defendants at the material time. The test is an objective one, i.e., as to whether a reasonable person would have foreseen that the consequences suffered by the plaintiff might be the result of the defendant's want of care."*(Emphasis added)

656. In his concurring judgment, Geoghegan J. noted that *Kelly v. Hennessy* did not govern the claim as it should only be taken to relate to "aftermath damages". Given that the courts in all common law jurisdictions show caution in relation to the circumstances in which damages for psychiatric injury could be recovered, Geoghegan J. stated that it was important to consider each kind of liability situation separately. Unless, therefore, one puts all psychiatric injury on an exact par with all physical injury, it makes little or no sense to regard a nervous shock case as being analogous to a fear of disease case. Therefore, in approaching the fear of disease case, Geoghegan J. regarded the court as being in virgin territory.

The role of foreseeability of (physical) personal injury in the tort of private nuisance

657. There has been no express consideration in this jurisdiction of the requirement of foreseeability of personal injury in a nuisance claim.

658. This may be because foreseeability has generally been analysed in a negligence context as being one of the components of the imposition of a duty of care. As liability in nuisance does not require want of care, it may at first blush be doubted that foreseeability is a necessary ingredient for recovery of damages for nuisance.

659. However, foreseeability has a role to play, not only in the imposition of a duty of care, but also more generally in tort in relation to remoteness of damages. The dual relevance of foreseeability was referenced by Keane CJ. in the extract quoted above: " *if the personal injury was not foreseeable, liability in negligence cannot arise or because, if it was not foreseeable, the damage was too remote.".* Whilst I fully appreciate that this consideration was in the context of negligence, foreseeability - in the sense of remoteness - is a more general ingredient in the law of tort.

660. Returning to *Hanrahan,* on the facts of that case, it is unsurprising that foreseeability was not separately analysed. The plaintiffs (and many others in the vicinity) had complained of the emissions for years. Once causation was held to have been established, damage to health may be seen as a wholly foreseeable impact of the particular nuisance in issue, i.e. toxic emissions. In a less stark case, foreseeability of personal injury is likely to require closer examination - even in the case of physical injury. However, it is not necessary to consider this further as this case does not involve physical injury of the kind considered in *Hanrahan* but pure psychological injury which, as I say, has always been treated as *sui generis.*

The role of foreseeability of pure psychological injury in the tort of private nuisance

661. It is clear that foreseeability of damages "*of that particular kind"* is an essential precondition to recovery of a claim for pure psychiatric injury arising from a defendant's negligence. However, in considering Mr. Rollo's claim to pure psychiatric injury arising from the defendant's noise nuisance, this court is in virgin territory unguided by any Irish precedent.

662. It is important at the outset to delineate the ingredients of nuisance from those of negligence. The former tort unlike the latter does not depend on the establishment of breach of duty of care. There is in my view no room for arguing that liability in nuisance (as opposed to negligence) turns upon foreseeability. In *Hanrahan,* Henchy J. stated:

> *It is sufficient if it is shown as a matter of probability that what they complain of was suffered by them as occupiers of their farm in consequence of the way the defendants ran their factory…*
> *In this case the plaintiffs' main complaints, namely that the emissions from the factory damaged their health and that of the livestock on the farm, are of so pronounced and serious a nature that no question of nicety of reaction arises. Either those complaints were caused by the emissions from the factory or they were not. If on the balance of probabilities they can be said to derive from factory emissions, then the case for nuisance has been made out.*

663. Therefore, foreseeability is not relevant to the establishment of liability in nuisance. However, as emphasised above, foreseeability plays a dual role and *Hanrahan* does not analyse its second iteration. This is that, whilst, foreseeability of the risk of harm may be irrelevant in establishing liability in nuisance, foreseeability of the type of harm suffered is nonetheless relevant in considering the issue of remoteness of a particular category of damages.

664. This accords with common sense. If a plaintiff in a negligence action may claim damages for pure psychological injury only where they can prove foreseeability of that particular kind of injury, it is difficult to see why a plaintiff should be in a stronger position to claim such damages for interference with the enjoyment of land which has occurred without any negligence or want of care?

665. As a matter of principle and practicality, I am of the view that, in the tort of nuisance, reasonable foreseeability of pure psychiatric injury is a precondition to the award of damages for such injury. The test is an objective one, i.e., as to whether a reasonable person would have foreseen that the consequences suffered by the plaintiff might be the result of the nuisance alleged.

666. In analysing whether this test of remoteness has been met one must distinguish between mental distress and psychological injury. Damages for mental distress may be awarded - as in *Patterson* - as an aspect of damages for loss of amenity. It is in my view, wholly foreseeable that constant and intrusive noise will lead to mental distress – annoyance, frustration and lack of calm. It is also foreseeable that it will lead to loss of sleep, irritability, loss of concentration etc. It is not however generally foreseeable that a recognisable psychiatric illness would ensue.

667. There is likely to be significant overlap as between the damages for loss of amenity and diminished enjoyment on the one hand, and any damages likely to be awarded to Mr. Rollo for pure psychiatric injury. The former includes damages to reflect inability to relax in the property and sleep disturbance. Although it may seem illogical to compensate the plaintiffs for mental distress but not for psychological injury, this is because the former can be accommodated in loss of amenity and the latter cannot.

668. Although this was not determined in *Hanrahan*, I would tend to the view that foreseeability is also relevant in a claim to damages for (physical) personal injury. However, even if I am wrong in this, the approach of the courts to pure psychological injury has always been to proceed with caution and, most particularly to insist on a form of supercharged foreseeability in which not just injury but psychological injury specifically must be foreseeable. To proceed otherwise in this case would not be in harmony with the courts' cautious approach to damages for pure psychological injury. In short, I believe that foreseeability is a separate ingredient in a claim for pure psychological injury caused by nuisance.

Conclusions on issue 12.

669. In summary, on this issue, the relevant questions and my answers are as follows:

1. **Should the claim to damages for psychiatric injuries be struck out as being in breach of the 2003 Act?**

   No.

2. **Is foreseeability necessary to establish liability in nuisance?**

   No. This was not expressly addressed in *Hanahan* but seems to me to have been impliedly excluded. As a matter of first principles and given that nuisance does not depend upon the establishment of a duty of care and its breach, foreseeability of the risk of harm is irrelevant in establishing liability in nuisance.

3. **Can general damages for personal injuries be recovered for nuisance given that same is a property based tort?**

   The question of whether damages for personal injury were recoverable for the tort of private nuisance does not appear to have been argued in *Hanrahan.* It will fall to the Supreme Court in an appropriate case to consider whether, as a matter of principle, damages for personal injuries should be awarded for a property based tort.

   However, one can say that the outcomes of *Hanrahan* and *Patterson* suggest that the answer to this question is in the affirmative. It seems that such general damages can include compensation for loss of amenity, property damage, damage to capital value, loss of rent, temporary relocation costs, damage to human, animal health and plant life, damages for diminution in enjoyment, (which can include e.g. sleeplessness, lack of ability to rest and enjoy the property and mental distress).

4. **Is foreseeability of the type of harm necessary to establish liability for general damages for personal injuries in nuisance?**

   In my view, yes. Although this issue was not the subject of argument or analysis in *Hanrahan,* I take the view that whilst foreseeability is generally irrelevant in determining whether liability for nuisance is established, foreseeability of the type of harm remains relevant in determining whether the type of injury claimed is too remote.

5. **Even if I am incorrect at 3 above, is foreseeability of the type of harm suffered nonetheless a prerequisite to recovery in the case of pure psychological injury?**

   Yes.

669. In this case, I am not satisfied that psychiatric injury was reasonably foreseeable. Therefore, echoing Noonan J. in *Harford,* imposing liability for such injury in this case would

involve an extension of the existing law in this jurisdiction of the circumstances in which an award is made for such injuries. This would ultimately be a matter for the Supreme Court.

Issue 13: is the defendant guilty of negligence?

670. The case in negligence was not in truth pressed with any real vigour and can be briefly dealt with.

671. It seems that the primary evidence relied upon to establish negligence is Mr. Mayer's opinion that the defendant ought to have recognised at the time of installation that there was a significant risk of unreasonable WTN impact.

672. As stated above, I am not satisfied as to Mr. Mayer's expertise to give this opinion evidence. In any event, this evidence provides far too vague a basis for a finding of breach of duty of care. The plaintiffs have not detailed the kinds of investigations which the defendant ought to have carried out prior to applying for or implementing the planning permission. No evidence has been given as to industry standards in this regard. For the avoidance of doubt, I wholly reject any suggestion that it can be considered negligent to locate a wind turbine within 500 meters of a residence or that in doing so, one ought to reasonably anticipate a noise nuisance.

673. Post implementation, I am of the view that the defendant adopted an inflexible and overly rigid attitude towards the plaintiffs' complaints. This however does not amount to a breach of duty of care.

674. Although the plaintiffs complained about the WTN in 2017, the defendant was not put on notice of the severe difficulties experienced by Mr. Rollo as a result of his sleep disturbance until this psychiatric condition had already emerged. There was no intervening occasion on which a duty of care could have arisen.

675. As neither the parameters of any duty of care nor the specifics of any breach thereof have been identified, the plaintiffs cannot succeed in a claim for negligence.

Issue 14: Have the plaintiffs made out a case for relief under Section 160?

Alleged breaches of the planning permission

676. Arising from a report of Ms. Mulcrone, the plaintiffs' plead that the defendant has breached the terms of the planning permission and seeks an injunction pursuant to s. 160 of the 2000 Act. The defendant's response to this case was based on the evidence of Mr. Lawlor.

677. As I explain above, compliance with the planning permission is part of its defence to the nuisance action and, in that context, the defendant bears the onus of proving such compliance.

678. The position is arguably slightly different in the context of the s. 160 application. In such applications, the usual position is that the onus of proving compliance with the relevant planning permission would be on the developer. In the present case, I have concluded that total operational noise exceeds the condition 15 limits and further that the defendant has not demonstrated that this exceedance may be explained by background noise. In other words, the defendant has failed to discharge the onus of proving compliance with planning permission.

679. Does this mean that the plaintiffs can and should succeed in their application for a s. 160 injunction? I would answer this question in the negative.

680. There is generally no provision for exchange of pleadings in a s. 160 application. Notwithstanding this, in the present case, the plaintiffs fully pleaded each and every aspect in which they contended that the defendant had beached the planning permission (with each of which I deal below). No case was advanced in pleadings - or indeed in expert evidence - that the WTN exceeded the condition 15 permission limits. Likewise, as neither party had apparently directed their mind to the correct interpretation of condition 15 of the permission, it goes without saying that no case was advanced to the effect that the WTN exceeded the permission limits as interpreted above. Therefore, whilst it is not in general permissible for a defendant to pray in aid a pleading point as a ground for resisting a s.160 injunction, this case is an exception.

681. Granting a s.160 injunction at this stage for non-compliance with condition 15 would in my view perpetuate a significant unfairness upon the defendant. In the present case, the

defendant had no prior notice that the plaintiffs would allege breach of the condition 15 limits and prepared its case on that basis. In addition, because the correct interpretation of the permission only arose for the first time during the course of trial, the defendant also had no real opportunity to carry out appropriate background noise studies to demonstrate whether the exceedance of total operation noise over the permission limits - when correctly interpreted - may be attributed thereto. This also means that the court has not been able to properly weigh and apply many of the important discretionary factors which would usually influence the grant or withholding of relief pursuant to s. 160. For example, this court has no evidence as to the extent of any breach of the permission limits. Is the exceedance minor or technical; or is it significant? None of this is yet established or even argued as of yet.

682. For all of these reasons, I do not believe it is feasible for this court to presently attempt to adjudicate upon whether the exceedance of total operational noise over the permission limits is such as to merit an order pursuant to s.160. Furthermore, remedy is in any event for module 2.

683. I will therefore confine this analysis to the breaches advanced in the plaintiffs' pleadings and evidence.

684. Ms. Mulcrone contends that the defendant is in breach of conditions 1, 10 and 15.[64]

Condition 1

685. Condition 1 required *"the development to be carried out strictly in accordance with the plans and particulars lodged with the planning application except…. as otherwise required by the conditions of (the) permission".* The stated reason was "*to ensure that the proposed development strictly accords with the permission and that effective control is maintained".*

686. Ms. Mulcrone's view is that the defendant has breached condition 1 because the grid connection did not follow the indicative route set out in the planning application documents but was secured via a different substation (which at the time of the initial planning application was neither built nor permitted).

[64] Although breach of condition 9 was initially alleged, this was not proceeded with.

687. In my view, the indicative grid connection did not bind the defendant to comply rigidly therewith. It was made clear in the planning application that the proposed route was indicative only and that a firm grid connection offer had not yet been made by ESB networks.

Condition 10

688. It is common case that the laying of underground cables and the construction of overhead transmission lines for conducting electricity would usually be exempted development pursuant to Classes 26 and 27 of Schedule 2, Part 1 of the Planning and Development Regulations 2001 ("the Regulations"), as amended. However, Article 9 (1) of the Regulations de-exempts such development if same contravenes a condition attached to the grant of planning permission.

689. Condition 10 provides that *"prior to the commencement of the development, planning permission shall be obtained for the erection of power lines to facilitate the connection of the proposed wind turbines to the national grid".* The stated reason is "*in the interests of proper planning and development".*

690. The plaintiffs argue that the combined effects of Article 9 (1) and Condition 10 is to de-exempt the grid connection, which is therefore required planning permission. By contrast, the defendant maintains that condition 10 only applies to a grid connection facilitated by overhead powerlines and not to underground grid connection which is in issue here.

691. Ms. Mulcrone's view is that if the planning authority had wished to confine condition 10 to an overground route only, it would have stated this quite clearly. The Oxford dictionary defines *"erection"* as to "*establish or build*". The definition of "*development"* under the Planning Act comprises works in, on or under land and would therefore catch an underground connection route. Ms. Mulcrone contends that this is a pre-commencement condition, meaning that lawful implementation of the permission is predicated on a second permission for the grid connection, which has not been obtained. This, Ms. Mulcrone classified as a *"very serious breach of the planning code"* rendering the entire infrastructure unauthorised *ab initio*.

692. As pointed out by Mr. Lawlor, the indicative grid connection route in the permission application documents included both overhead and underground elements. In my view, the

reference to the *"erection of powerlines*" refers to the overground element only. The words "*erection of powerlines"* are more likely to be interpreted by the reasonable person having some knowledge of these matters as referring to overhead powerlines and not to an underground connection. As such, the condition only obliges the defendant to apply for permission in respect of an overground grid connection.

693. In support of her interpretation of condition 10, Ms. Mulcrone relies on four decisions of An Bord Pleanála on s. 5 references in respect of four other wind farms in the locality. In each case, the Bord determined that permission had been required for the relevant grid connection. However, these s. 5 references were determined against a different factual backdrop. Three of the relevant permissions required the developer to apply for permission for a grid connection *simpliciter* (with no reference to overhead or underground connection). Although the condition in the fourth permission also expressly referred to overhead lines, the grid connection for the wind farm in question was via a combination of underground and overground lines/cables. As such, the failure to apply for permission for that grid connection appeared to be in breach of the parent permission irrespective of whether or not same applied only to grid connection by overhead lines.

694. In short, I find that, because in this instance grid connection in this instance was completed wholly by way of underground cables, no enabling planning permission was required.

Condition 15

695. Ms. Mulcrone correctly observed that there is no evidence of assessment of likely noise impact in either the planning application or on the planning authority's file. The only reference to noise is in condition 15 which, after setting out the specific noise limits already discussed, states:*"…In the event that the reviews show that any turbine may have a detrimental impact, mitigating measures shall be proposed and submitted for the agreement of the Planning Authority."* The stated reason is "*In the interests of residential amenity and the proper planning and development."*

696. In Ms. Mulcrone's view, the two parts of condition 15 must be read disjunctively. The defendant must comply with the noise limits specified. In addition, even if the WTN complies

with the noise limits on the permission, *"reviews"* must be carried out to establish if detrimental impact is shown and, if so, the developer must propose mitigation measures to the planning authority for its agreement.

697. Mr. Lawlor accepts that the condition is poorly worded. Although it provides for "reviews" there is no express statement as to what triggers such review. Nor is there any indication by whom or how frequently such reviews may be requested and/or must be carried out. One would expect that a planning condition such as this would set out a methodology for post completion noise surveys and reporting together with a documented complaints handling process.

698. I cannot accept the plaintiffs' argument that condition 15 must be read disjunctively. This interpretation would render the condition so vague as to be unworkable. In my view, the requirement to carry out reviews and mitigation is triggered by WTN in excess of the condition 15 limits and not by a more general complaint of *"detrimental impact"*. Overall, therefore, I agree with the defendant that if the windfarm is operating in compliance with the noise limits set out in condition 15, the permission does not require the developer to carry out further review or mitigation.

699. In the present case, I have found that the defendant has not demonstrated that the windfarm is operating in compliance with the noise limits set out in condition 15. If non-compliance is born out, this could trigger the condition 15 requirement for reviews, assessment of detrimental impacts and potentially mitigation measures. However, in light of the considerations outlined at para 681 above, I do not view this potential non-compliance as having been fully investigated by the defendant. For that reason, I am not presently prepared to make any order under s. 160 in this regard.

Conclusion on issue 14

700. I am not satisfied that the plaintiffs have made out a case of breach of permission on any of the grounds pleaded. As such, the application pursuant to s.160 must fail.