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VITRUVIUS HIBERNICUS

AN COIMISIÚN PLEANÁLA
LDG- 087446-26
ACP-
01 MAY 2026
Fee: € 50 Type: CHQ
Time: 9:15 By: RGC POST

An Coimisiún Pleanála,
64 Marlborough Street,
DUBLIN 1
D01 V902

21 April 2026

ACP ref : PCX19. 324161

re: Proposed wind farm of 15 wind turbines, a permanent 220kV on-site substation and associated infrastructure.
Applicant : Lemanaghan Wind Farm DAC

Dear Sir/Madam,

I am retained by Séamus Corcoran, Leamonaghan, Ballycomber, Co. Offaly R35 DN40 who makes third party submission/observation in this SID application PXC19. 324161
Attached is the third party submission/observation fee €50-00.
Set out below are my client's comments.

Yours faithfully,

Liam Madden,
Convent Road,
LONGFORD
N39 EE72

vitruvius.hibernicus @ hotmail.com Tel. 00353-43-33 41151

OVERVIEW

(1)
This SID application PCX19.324161 is consequent on the PCX19.310844 decision that a wind farm at this location of between 13 and 17 turbines and associated site works is a Strategic Infrastructure Development [SID].
PCX19.310844 was lodged on 15 July 2021, just short of five years ago and the decision issued on 27 Feb. 2026.

(2)
Although well presented, the application papers have significant *lacunae*.

(3)
I have been charged with finding scientific gaps or *lacunae* in the submitted studies.
The EIAR and NIS must reach the standard equilavent to a High Court Affidavit.
Typographical or directory errors aside, they must be 'bullet-proof', so to speak.
The contents must be complete, precise and definitive.

(4)
The applicable standard of proofs are those decided in CJEU and HC cases :

C-258/11 para. 44
So far as concerns the assesment carried out under Article 6(3) of the Habitats Directive, it should be pointed out that it cannot have *lacunae* and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to effects of the works proposed on the protected site concerned.

C-164/17 (Attachment No. 1)

C-461/17 Holohan v An Bord Pleanala.
An Appropriate Assessment must examine the implications of a proposed project, not just for the species within a European site but also the significant *ex situ* implications for the habitat types and species found beyond the defined boundaries of a European site.

C-461/13
Article 4(1)(a)(i) to (iii) of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy must be interpreted as meaning that the member States are required – unless a derogation is granted – to refuse authorisation for an individual project where it may cause a deterioration of the status of a body of surface water or where it jeopardises the attainment of good water status or of good ecological potential and good surface water chemical status laid down by the directive.

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[2018] IESC 31 Connelly v An Bord Pleanala

The decision maker has a duty to both provide reasons for reaching the relevant conclusion and "to make complete, precise and specific scientific findings" which justify that conclusion.

(5)

In civil legal cases the standard of proof is the balance of probability.
In criminal cases, the standard is beyond all reasonable doubt.
In EU Habitats Directive (NIS) the proof must be beyond all reasonable scientific doubt.
This is the 'Sweetman' standard of proof : there can be no scientific *lacunae*.
Moreover the proposed development must be assessed for compliance with the requirements of the Water Frameworks Directive (2006/60/EC)
I argue that the applicant has provided insufficient reference to the Directive and/or compliance with its provisions : witness the total absence of sewage treatment works.

(6)

I submit that ACP must fulfil its strict obligations under Article 6(2) of the Habitats Directive :

> *2. Member States shall take appropriate steps to avopid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designtated, in so far as such disturbance could be significant in relation to the objectives of this Directive.*

(7)

I argue that there are scientfiic *lacunae*.
Therefore, I submit, ACP has no legal option but to refuse to grant planning permission.

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LACUNA (1) **(procedural)**

1.1 The written consent of 2 no. land owners or parties with control of lands is included :
(i) the application site itself and
(ii) a 'triangular' site at Kennedy's Cross which is needed to to permt delivery of the turbines to the application site.
However the necessary written consent of other third parties is missing.
The application is incomplete.

1.2 I refer to Volume 3 EIAR Appendix 4-7 Abnormal Individual Load Road Survey.

Para. 3.3
"Bord na Mona requested that the study be completed from the M6 through to the proposed site entrance via the following route : etc. "
Attachment No. 2 (i) Map
Attachment No. 2 (ii) Para. 4 Summary

This raises the comments :
(i) how do the turbines get to the M6 in the first place ?
(ii) This is only a half-route.
(iii) Bord na Mona – not Consultant Pell Freishmann [PF] - selected the route.
(iv) only a half- route is being considered/assessed

Para. 3.6 Third Party Land & Land Ownership and rights.
Attachment No. 2 (ii) and (iii)
Consultants Pell Frischmann declare :
"A review of third party land should be undertaken by the client to ensure no additional lands rights are required to enable deliveries or mitigatin works.
PF accepts no responsibility for the accuracy of land ownership assumptions, all of which should be confirmed across the ***entire*** *access route by a qualified land agent."*

On-line review of a single Land Registry Tailte Eireann Folio takes about 60 seconds. What has been presented is a half-route from the M6 and the half-route folio title has not been checked. Hugely significant is the attached Pell Frischmann page 14 :
"Additional third-party land uptake is required in multiple locations along the route to enable delivery of the loads."

1.3 There is little point in seeking Permission for a Wind Farm if the turbines can't be lawfully brought onto the site. Without access across third party land, turbines cannot be brought along the route shown in Appendix 4-7.
The only third party lands consent is rhe triangular site at Kennedy's Cross.

1.4 Importantly EIAR Appendix 4-7 does not map alternative routes - or half-routes.
The failure to consider alternatives is a fatal *lacuna.*

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LACUNA (2) Waters

2.1 General comments :
Renewable energy sources, though well advanced, are still evolving.

For comparison, means of transport has evolved.
The velocipede > the penny-farthing > the horseless carriage > the Model T Ford > the KdF Peoples Car > VW Beetle > the 2CV > the modern petrol BMW-Mercedes-Porsche etc., > the PV roof-panelled lightweight car > the battery powered electric prototype > the now ubiquitous electric family car > and now even the driverless car.

2.2 Roof mounted PV Photo Voltaic panels are everywhere.
Small PV panels are on parking ticket vending machines and outdoor security cameras.
I refer to this energy type as 'trickle-feed'.
Roughly, one gets c. 0.5 kW from a 2 sq.m. roof panel. The return per sq.m. is modest.
Large arrays in open fields gobble up huge areas of land

PV panels work.
They can be bought off-the-shelf on Amazon. They're cheap.
They are easier to fix than a Velux Roof Window.
There is one drawback – battery inverters.
Domestic batteries must be mounted outside.
They must be wired into the fuseboard circuit breaker properly by a competent electician. (There is a case of an improperly wired system in Longford which burned the circuit breaker-fuseboard to a cinder ....)

2.3 Battery storage
No part of the EIAR and/or NIS makes reference to battery storage coumpound.
This is most important as Fire Fighting at an exploding battery compound relies solely on water and the ramifications for contaminated polluted fire water run-offs is not mentioned in the EIA and/or NIS.
If battery storage is not part of this proposal then well and good.
If battery storage it is proposed, this oversight- *lacuna* should be addressed by way of a further detailed study.

cf. Attachment No. 3 : ACP ref. 5000085 Foigha Solar Farm F.I.

2.4 WATER FRAMEWORK DIRECTIVE.
Appendix 4.2.1 Construction pollution is assessed and mitigation proposed at 4.3
Run-off contaminated polluted fre fighting water is not considered at all.

Toilets are shown on the submitted drawings but no foul drainage, septic tank or percolation is shown, specified or detailed or referred to in passing in text.
This application isn't for OUTLINE planning permission : it's for FULL planning permission.

Full Planning Permission may not legally issue for a scheme which is not even drawn.
These comments should be read in the context of the Flood Risk Assessment also.

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LACUNA (3) (Sound – Noise) This should read in conjunction with **Lacuna (4)**

3.1 Preliminary comment.
The applicant equates the word Sound with Noise.
The technical definition of 'noise' is simply 'unwanted sound'.

Beethoven's 9th can be 'noise' and an unwelcome intrusion if it's played in a silent library. Elsewhere, it's not 'noise'.

3.2 cf. Vol. 3 EIAR
Appendix 12-4 (Grid Contour map) Appendix 12-5 Attachment No. 4
Appendix 5-1 Wind Farm Health Literature Attachment No. 5 (i) & (ii)

Figure A12-1 Grid Contour Map is a very useful.
The c. 200 dwellings lie in the GREEN <30dB and YELLOW 30-40dB areas.
(The dB levels are contested by the Vesta 150 spec. which recite 105 dB optimised.)
Attachment No. 5(iii)
90% of pipistrelle Bats are within the RED areas.

The dB levels are also contested as Bats hearing range differs from human range and the air turbulance from rotating turbine blade was not assessed.
Moreover the human range was assessed against 10 degrees C and 70% Relative Humidity. What about other temperatures and RHs ?

3.3 App. 12-6 Noise Complaint Management Protocol.
This Protocol is a nonsense as it applies solely to Humans.
Protocol advises Human complaint to be logged, date/time, location, description etc.
Collaboration with the Turbine manufacturer is recommended.
Attachment No. 6
Great ... who do Bats telephone ?

3.4 Appendix 6-1 Bat Survey report
4.6 Appendix 7.1.4
Blade feathering is mentioned. Feathering is an ancient term from the days of Dutch windmills. When the winds increased to hurricane strength, the canvas covered arms 'feathered' a a safety measure.
In other words the blades didn't to go faster and faster till then spun off.
Instead they feathered to a standstill.

The three pipestrelle Bat species are particularly vulnerable.
This is an acknowldgement that the Protected Species will be decimated.
This is all the more worrying as T1, T2, and T9, T11, T12 and T13 surround the Bat concentrations and transect routes.

Blade feathering is mentioned at para. 7.1.4 which suggests that rotations below 2 per minute [56.5 km/hr. at the blade tip] can reduce bat fatalities by up to 50%.
Elsewhere the applicant recites rotations of 8.45 and 11.4/min.
i.e between 238 and 322 km/hr. at the blade tip.
Attachment No. 7 (i), (ii), (iii), (iv) & (v)

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3.6 para 6.1.1.2 OHLs
"Currently there are no national studies or guidance specifically addressing bat collisions with OHLs ..."
The absence of proofs is insufficent for a compliant Appropriate Assessment.

3.7 Increased Bat Buffers are discussed at para. 7.1.3.
"... however, there is no scientific evidence to support these increased distances in Ireland or the UK." Attachment No. 8

In the absence of proofs the Conclusion 6.4 : *"The Habitats on site will remain suitable for bats and no significant displacement of individuals or populations is anticipated"* is without merit.

On the contrary, there is ample evidence and proof that Wind Turbines create a hostile and dangerous environment for the Bat Protected Species.

3.8 In the absence of complete, precise and definitive proofs, ACP must refuse permission.

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LACUNA (4) Bird Monitoring – Collision Impact App. 6-1 et al.

The comments below fall into a number of applicant's Appendices & Chapters.
The comments are also directly related to Lacuna (3)
Vol. 3 EIAR :
Appendix 3-1,
Appendix 12-2,
Appendix 12-3,
Appendix 12-4 Grid Contour map,
Appendix 12-5,
Appendix 12-6 Noise Complaint,
Appendix 5-1 Wind Farm Health Literature.

4.1
The applicant's Noise/Sound study indicates max. 45dB(A).
Based on the 45dB(A) the EIA/NIS concludes there will be no Potential Human Health Impacts at 12.3.2.8
The attached Vesta 150 Spec. declares the optimised sound level to be 105.0 dB(A)
The 105dB(A) and 45dB(A) are in conflict.
The conflict undermines the Noise-Sound Study and, therefore, the Conclusions arrived at.

At c. 1.0 m a whispered conversation measures 20 to 30 dB and a car horn 110 dB.
This is the amplitude of a sound.

Sound pitch or frequency is measured in cycles per second or Hz.
The Human range is 20 Hz to 20,000 Hz.
The Bat range, depending on species, ranges from 700 Hz to 200,000 Hz.
Infrasound has been mentioned by the applicant but only in passing. Ultrasound has not.
Ultrasound Hz are above 20,000 Hz – above human detection but within bat detection range.
This has not been assessed. Attachments No. 9 (i) & (ii)

While Bats can see, they rely heavily on echolocation or sonar navigation.
Sound travels on fluctations in air movements.
Wind turbines cause air movement or turbulence.
Many of the proposed turbines are situate right in the centre of the Bat concentrations
This phenomenon has not been assessed and therefore any conclusions drawn are not grounded on real measureable data.
The Buffer diagram at 7.1.3 is a scientific nonsense and, as the applicant admits, there are no increased Buffer zone applicable formulae in Ireland or UK.
This is a scientific gap or *Lacuna*.
The studies are incomplete, imprecise and not definitive.

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LACUNA (4) Bird Monitoring – Collision Impact App. 6-1 et al.

The comments below fall into a number of applicant's Appendices & Chapters.
The comments are also directly related to Lacuna (3)
Vol. 3 EIAR :
Appendix 3-1,
Appendix 12-2,
Appendix 12-3,
Appendix 12-4 Grid Contour map,
Appendix 12-5,
Appendix 12-6 Noise Complaint,
Appendix 5-1 Wind Farm Health Literature.

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The studies are incomplete, imprecise and not definitive.

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4.6 App.5-1 purports to review Wind Farm Health Literature
Critics of Wind Farm are singled out on p.15 :
"The first conclusion is very imprecise and sweeping and ripe for being megaphoned by anti-wind farm interests groups as if it actually meant something."
Attachment No. 5 (ii)
Indeed !

The entire 18 pages of App. 5-1 refers ONLY to possible health effects on HUMANS.
Nowhere in the entire application, Chapters or Appendices is the heath effect on Bats even mentioned, let alone assessed.
All that's assessed is the (confirmed) mortality rate from rotating turbine blades.

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LACUNA (5) Structure

5.1 First I refer to EIAR Vol. 3 App. 8-1.
The applicant confirms there was nearby a *'flow slide failure'* 1821.
This was a 'horiozontal' slide, so to speak, meaning that these lands are more or less level. The topmost tecton slid across the lower strata ..... like a lava flow.

5.2 The unparalleled and notorious 2003 landslide disaster at Derrybrien Co. Galway arose, it is confirmed, because no proper environmental impact study had been carried out or indeed sought by the planning authorities.
23 years on and multi millions of Irish taxpayers' monies on, EU fines etc..
Enforcement eventually followed. Everything was to be removed ... except the foundations. ESB developers finally declared : *"It would not be possible to remove turbine foundations without risk to ground stability"*.
So much for Galway County Council, the ESB and, importantly, decommissioning.

In 2003 there was a bog slide in the Shetlands, Scotland.
Page 12 @ Para. 3.(6)(c) speaks of a *"recent peat landslide"* but only in passing and is silent on this matter thereafter. This is not a complete study.

5.3 Second I focus on the most fundamental element of structure – the foundations.
The submitted drawings and specifications declare the Pile foundations will be *"at detailed design stage"*.
In other words what has been submitted is an Outline Design.

WRONG - THIS IS THE DETAILED DESIGN STAGE.

ACP cannot legally grant Outline Planning Permission (OPP) as OPP cannot legally be sought or granted where an EIAR and/or NIS is required.
Moreoever, retention permission cannot be sought or granted where an EIAR/NIS is required : witness the Derrybrien 2003 and on-going debacle.

5.4 Before final detailed foundations design, the ground conditions must be established.
The applicant states *"18m long piles"* will be used.
Yet the Trial Hole Depths are only between 4.0m and 4.8m.
At variance with this are the Bore Hole depths in the 722 no. holes/probes
In addition, the ground sub-strata in Trial Hole and Bore Holes differ.
EIAR Vol. 3 App. 8-1 informs us that the peat depth varies between 0.1 and 4.2m with an average depth 1.6m. Yet the design specifies 18m long piles.

The *"18m long piles"* will be *"gravity **or** piled foundations."* (cf. page 33)
[The important word is **"or"**.] Make your mind up - which is it ?
The design recomendation in 11.2 speaks of foundation design :
" during the design and construction stage".

Section 5 Ground Investigation refers to 28 trial pits (2021), 19 no. (2022) and a further 10 rotary boreholes and 16 trial pits (2024).
Para. 5.1 speaks of 0.2 to 4.9m peat in trial pits and 4.1 to 7.1m in the boreholes.
Section 6.4 says the peat depth varies from 0.1 to >7.1m

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5.5 I refer to :
App. 8 1 : Summary p.37 *et seq.*
Calculated FoS (Factor of Safety) for peat slopes and lateral hydrological pressure (i.e. sideways push)
App. 9-1 Geotechnical Peat Stability Risk Assessment. p.7 of 40
The above purport to assess in detail the potential sideways movement over turbine piles : put simply, would a horiozontal bog slide tilt the turbine piles over ?
(Note: this is the ESB excuse for not removing the illegal Derrybrien foundations.)

The EIAR Vol. 2 Photomontage Booklets are are a quite magnificent distortion of the actual visual impact. The true height and scale are gargantuan.
Look at attached image from the Vesta Brochure
See the two men on top of the rotor ? This like a scene from Star Wars.

Attachment No. 10

I invite ACP to search Youtube for video footage of collapsing and exploding wind turbines. Structural strength and stability is a very real concern.

5.6 With all the copious assessments, surely the detailed foundation design could have been executed ? After all, it's five years since the applicant posed the SID question to ABP/ACP. This is the DETAILED DESIGN STAGE.
What is in the drawings and spec. is vague, nebulous and in places contradictory. Lack of detail and/or out-of-date detail is why Humphries R. in the High Court quashed the wind turbine planning permission for Killashee, Co. Longford.

The submitted documents are vague, contradictory, imprecise, incomplete and not definitive. A proposal with an EIAR/NIS must be complete, precise and definitive.

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LACUNA (6) Zoning

6.1 The most fundamental of all planning criteria is Zoning.
If an area is zoned residential, permission cannot lawfully issue for an Industrial Estate.
That's self-evident and long established planning law.

The Offaly County Development Plan provides for the proposed user.
Therefore the applicant-developer is safely across the first hurdle.

6.2 However, the proposal is for a 35 year life.
What happens at the end of the 35 year life ?

Vol. 3 EIAR Appendix 4.8 Decommissioning Plan refers.
The 40 page plan is a beautiful piece of utter waffle and obfuscation.

Para. 3.9.3 (attached) says :
"any structural elements that are not suitabel for recycling will be disposed of in an appropriate manner"
Attachment No. 11
No one knows what this entails, where it will be and/or how it will be achieved.

The 'Conclusion of no Significant Effects' is not grounded of a full complement of complete, precise and defintiive scientific data.
Also, the Cumulative Effects are based on incomplete, imprecise and not defintive information due the above mentioned Lacunae.

This is not precise, complete, and defintive.
Instead it is imprecise, incomplete and not definitive.

My client urges An Coimisiún Pleanála to refuse to grant planning permission.

Yours,

Liam Madden,
Convent Road,
LONGFORD
N39 EE72

C-164/17

and C-388/15, EU:C:2016:985, paragraph 69 and the case-law cited).

57 It follows that the answer to the question referred is that Article 6 of the Habitats Directive must be interpreted as meaning that, where it is intended to carry out a project on a site designated for the protection and conservation of certain species, of which the area suitable for providing for the needs of a protected species fluctuates over time, and the temporary or permanent effect of that project will be that some parts of the site will no longer be able to provide a suitable habitat for the species in question, the fact that the project includes measures to ensure that, after an appropriate assessment of the implications of the project has been carried out and throughout the lifetime of the project, the part of the site that is in fact likely to provide a suitable habitat will not be reduced and indeed may be enhanced may not be taken into account for the purpose of the assessment that must be carried out in accordance with Article 6(3) of the directive to ensure that the project in question will not adversely affect the integrity of the site concerned; that fact falls to be considered, if need be, under Article 6(4) of the directive.

ATTACHMENT No. 1

ATTACHMENT No. 2 (i)

3 Access Route Review

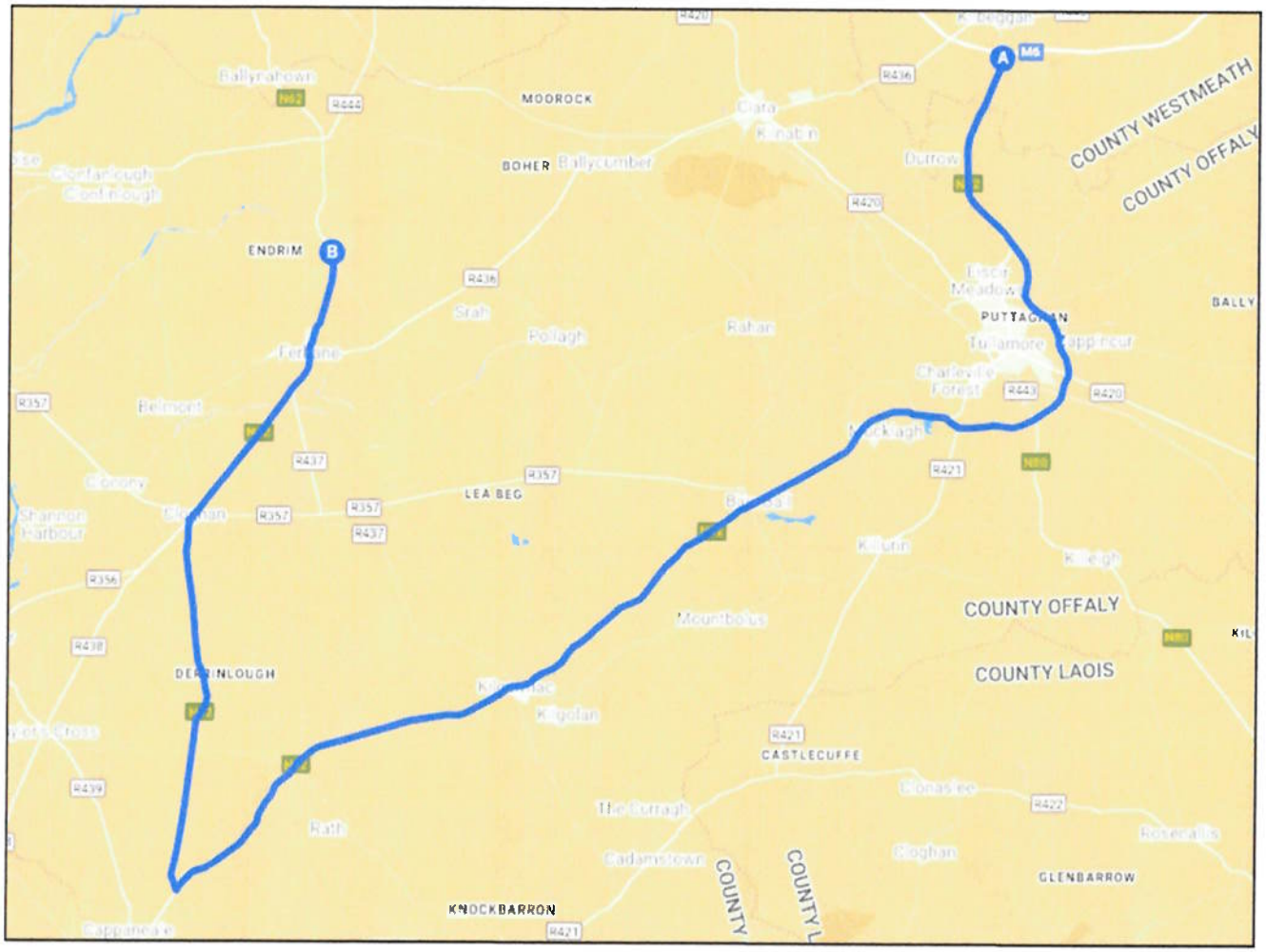
3.3 Proposed Access Route

Bord na Mona requested that the study be completed from the M6 through to the proposed site entrance via the following route;

- Exit the M6 at Junction 5 joining the southbound N52;
- Loads will continue on the N52 to the junction with the N62 where they will turn right; and
- Loads will continue north on the N62 to the proposed site entrance located south of Corbane.

The proposed access route is illustrated in Figure 3-1.

Figure 3-1: Proposed Access Route



ATTACHMENT No. 2 (ii)

4 Summary

4.1 Summary of Access Review

Pell Frischmann Consultants Ltd (PF) has been commissioned by Bord na Móna PowerGen (Bord na Móna) to undertake a partial Route Survey Review (RSR) to examine the issues associated with the transport of wind turbine Abnormal Indivisible Loads (AIL) associated with the construction and development of the proposed Lemanaghan Wind Farm, located to the north of Ferbane, County Offaly, Ireland.

This report identifies the key points and issues associated with the proposed routes and outlines the issues that will need to be considered for successful delivery of the components.

Additional third-party land uptake is required in multiple locations along the length of the route to enable delivery of the loads. Land searches and topographical surveys are recommended with the swept path assessments to be repeated following the surveys in order to confirm land uptake.

The report is presented to Bord na Móna for consideration. Various road modifications and interventions are required to successfully access the site. If these are assessed, approved and undertaken, access to the site is considered feasible.

4.2 Further Actions

The following actions are recommended to pursue the transport and access issues further:

- Prepare detailed mitigation design proposals to help inform the land option / consultee discussions;
- Obtain the necessary land options;
- Undertake discussion with the affected utility providers and roads agencies;
- Undertake topographical survey at the identified locations and repeat the swept path assessments to confirm mitigations measures;
- Obtain the necessary statutory licences to enable the mitigation measures; and
- Develop a detailed operational Transport Management Plan to assist in transporting the proposed loads.

ATTACHMENT No. 2 (iii)

3.5 Swept Path Assessment Results and Summary

The detailed swept path drawings for the locations assessed are provided in Appendix B for review. The drawings illustrate tracking undertaken for the worst-case loads at each location.

The colours illustrated on the swept paths are:

- Grey / Black – OS / Topographical Base Mapping;
- Green – Vehicle body outline (body swept path);
- Red – Tracked pathway of the wheels (wheel swept path); and
- Purple – The oversail tracked path of the load where it encroaches out with the trailer (load swept path).

Where mitigation works are required, the extents of the overrun and oversail areas are illustrated on the swept path drawings. Additional land areas to those indicated in the swept path assessment drawings may be required to facilitate the construction of the proposed physical mitigation measures depending on the site conditions and topography. The extent of any additional areas required to construct the mitigation works highlighted within this study and the detailed design of said mitigation works is beyond the scope of this study and should be confirmed on detailed topographical survey data.

Please note that where assessments have been undertaken using Ordnance Survey (OS) base mapping, CAD based aerial mapping and historic topographical data, there can be errors in these data sources.

Where provided by the client, topographical data has been utilised. Please note that PF cannot accept liability for errors on the data source, be that OS base mapping, aerial mapping, historic topographical surveys or client supplied data. Mapping has been augmented with aerial imagery for illustration only. The accuracy of this mapping cannot be confirmed by PF.

Please note that turbine supplier guidance suggests that the minimum road width for the safe transport of AIL components is 4.5 m. All public roads and onsite access tracks should comply with this standard unless a relaxation has been agreed with suppliers.

The need to widen public roads will require engagement with the relevant road authority and may constitute permanent or temporary surfacing.

3.6 Third Party Land & Land Ownership

A review of third-party land should be undertaken by the client to ensure that no additional land rights are required to enable deliveries or mitigation works. PF accepts no responsibility for the accuracy of land ownership assumptions, all of which should be confirmed across the entire access route by a qualified land agent.

The limits of road adoption can vary depending upon the location of the site and the history of the road agencies involved. The adopted area is generally defined as land contained within a defined boundary where the road agency holds the maintenance rights for the land. In urban areas, this is usually defined as the area from the edge of the footway across the road to the opposing footway back edge.

In rural areas, the area of adoption can be open to greater interpretation as defined boundaries may not be readily visible. In these locations, the general rule is that the area of adoption is between established field boundary lines or a maximum 3 m from the road edge. This can vary between area and location.

ATTACHMENT. No. 3

Our Case Number: PL-500085-LD

Planning Authority Reference Number: 2460325

Your Reference: Foigha Solar Farm Limited

An Coimisiún Pleanála

PLANNING SECTION
RECEIVED
- 2 MAR 2026
LONGFORD COUNTY COUNCIL

HW Planning
5 Joyce House
Barrack Square
Ballincollig
Co. Cork

Date: 27 February 2026

re: 10 Year Planning Permission for a solar farm and energy storage compound. A Natura Impact Statement (NIS) was submitted with this application. Cornacarta Doonacurry Foygh Kilcommock Glebe Ledwithstown and Tirlickeen (townlands), Keenagh and Ballymahon, County Longford.

Dear Sir / Madam,

I have been asked by An Coimisiún Pleanála to refer to the above-mentioned appeal.

The Commission has examined the appeal and is of the opinion that certain information is necessary for the purpose of enabling it to determine the appeal.

In accordance with section 132 of the Planning and Development Act, 2000, (as amended), you are required to submit, on or before the 26th August, 2026, the following information:

Battery Energy Storage Systems (BESS)

1. **The Commission notes that Battery Energy Storage Systems (BESS) are a relatively new technology and that emergency responders are learning from actual incidents that have occurred at both Lithium-ion and Lithium-iron battery storage facilities. The Commission further notes that water is the agent of choice in the event of an incident to extinguish fires and to control thermal runaway, and that BESS facilities may carry a risk of explosion. A key environmental consideration during a thermal runaway fire event is the run-off of fire water into surface and groundwater networks. The EPA's Guidance on Retention Requirements for Firewater Run-off defines "firewater" as the liquid that arises from water, foam, rainwater or other substances that have been used for firefighting purposes, and are therefore likely to contain polluting matter, particularly arising from them having come into contact with**

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(iii) Drainage proposals designed to manage rainfall runoff and fire water runoff, with associated calculations to be informed by the anticipated fire water requirements from the proposed development. Having regard to the location of the battery energy storage system proximate to the Kiltaffrey Stream to the east, and associated flood risk identified in the submitted site-specific flood risk assessment, and in this context, having regard to the need for large quantities of water in the event of a fire / thermal runaway event, drainage proposals shall include details to demonstrate that suitable catchment, containment and on-site treatment measures would be in place for firewater runoff and other potential firefighting substances (such as foam) and also details of any mitigation necessary to ensure that there will be no contamination of surface or groundwater, and that consideration has been given to potential downstream impacts.

d. Having regard to the plans and particulars prepared in respect of Item 1 (a) to (c) above you are required to submit a revised Appropriate Assessment Screening report and Natura Impact Assessment, which assess the potential adverse effects arising from the proposed development on European Sites located within the Zone of Influence.

e. All other documentation submitted with the application should be reviewed and updated, where required, to address any amendments to the proposal which might arise in response to this request.

f. Having regard to the need for large quantities of water in the event of a fire, you should liaise with Longford County Council and Uisce Eireann in relation to any proposed connection to the public water supply. The capacity of the public water supply to service the proposed development in line with FI request no.1 (c) above should be ascertained, and any resultant adverse impacts on public water supplies for nearby settlements should be assessed.

Archaeology

2. The documentation submitted to the planning authority, including results of geo-physical surveys submitted at further information stage, is noted. Whilst c. 78.8ha of the site was subject to a geophysical survey, by association, c. 51.2ha of site was not subject to a geo-physical survey including significant tracts of land located north of the canal and in the wider vicinity of the former church and graveyard. Having regard to the submissions received by the planning authority from the Department of Housing, Local Government and Heritage, dated 22nd January

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combustion products. The Guidelines also outline that firewater arising from a fire incident typically contains high concentrations of substances which are harmful to the aquatic environment, and if it is allowed to enter into soil, drains or watercourses in an uncontrolled manner, it has the potential to cause significant environmental damage.

In this regard, you are required to submit the following information:

a. The submitted Fire Safety Statement is noted however further detail is required in the form of a Fire Risk Management Plan (FRMP). The FRMP should be prepared by a suitably qualified technical expert / advisor and set out preventative measures for potential causes of fire hazard and evaluate the associated risk of same. It should also include specific measures to reduce the risk of a fire occurring onsite including, for example, the safe storage and maintenance of flammable substances and materials, the intended method(s) of extinguishment, and the installation of fire safety equipment and apparatus (fire alarms, detection systems, methods of suppression, etc.). The FRMP should explicitly demonstrate how the potential risk of a fire occurring on the site would be addressed and minimised.

b. Further detail is required in the form of an Emergency Response Plan (ERP). The ERP should be prepared by a suitably qualified technical expert / advisor. It should outline a reactive strategy with clear procedures to follow in the event of a fire, detailing the specific actions the facility operator must take to respond quickly and effectively in the event of fire or similar emergency.

c. Firefighting Water / Fire Water Storage

   (i) Details of the quantity and confirmation of how firefighting water will be sourced and/or retained within the proposed development site. This should be to the UK National Fire Chief's Council (NFCC) Grid Scale Battery Energy Storage System Planning – Guidance for the FRS (Fire & Rescue Services), which states that provision should be made for BESS units to provide 1,900 litres of water for 2 hours, as a minimum unless it can be demonstrated that another amount is appropriate. Revised drawings and necessary agreements be provided to demonstrate feasibility of same.

   (ii) You shall submit a detailed methodology for fire water storage management along with any proposed mitigation measures (e.g. Drainage systems, interceptors, bunded lagoons, etc). Such measures shall be included in the ERP, as referred to in Item 2 above.

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2025 and 8th September 2025, you are required to carry out archaeological investigations as follows:

a. You are required to engage the services of a suitably qualified archaeologist to carry out fieldwork-based archaeological impact assessment of the proposed development. No sub-surface work should be undertaken in the absence of the archaeologist without his/her express consent.

b. The assessment shall involve documentary and cartographic research, an examination of the proposed plans for development, a review of the completed geophysical surveys (Licence Numbers 25R0149, 25R0184 and 25R0185) and archaeological testing (licensed under the National Monuments Acts 1930- 2004). Test trenches shall be excavated at locations specified by the archaeologist within the proposed development area, having consulted the site plans, results of geophysical survey, including those conducted under Licence Numbers 25R0149, 25R0184 and 25R0185, and fieldwork, to determine the presence/absence of archaeological remains.

c. A written report on the above, including an archaeological impact statement shall be submitted.

If the information required is not received before the end of the specified period, the Commission will dismiss or otherwise determine the appeal without further notice to you in accordance with section 133 of the 2000 Act, (as amended). Your submission in response to this notice must be received by the Commission on or before the date specified above.

Please quote the above appeal reference number in any further correspondence.

If you have any queries in the meantime, please contact the undersigned officer of the Commission at appeals@pleanala.ie.

Yours faithfully,

John Cannon
Executive Officer
Direct Line: 01-8737157

BP71 Registered Post

PLANNING SECTION
RECEIVED
- 2 MAR 2026
LONGFORD COUNTY COUNCIL

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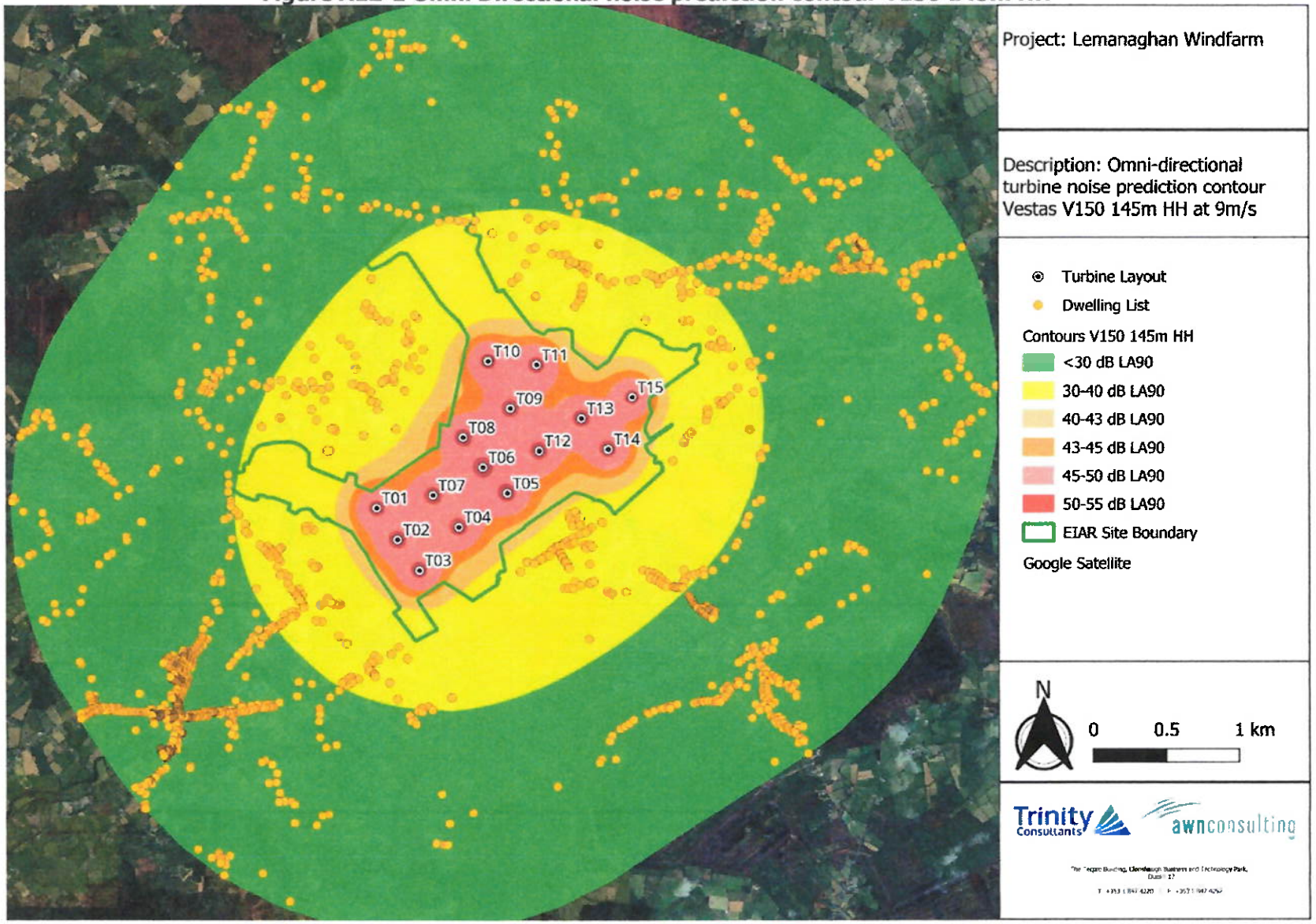
Figure A12-1 Omni Directional noise prediction contour V150 145m HH



ATTACHMENT No. 4

ATTACHMENT No. 5(i)

- "Noise produced by wind turbines generally is not a major concern for humans beyond a half mile or so because various measures to reduce noise have been implemented in the design of modern turbines."*Source: NRC 2007*
http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

- "Noise... levels from an onshore wind project are typically in the 35-45 dB(A) range at a distance of about 300 meters... These are relatively low noise or sound-pressure levels compared with other common sources such as a busy office (~60 dB(A)), and with nighttime ambient noise levels in the countryside (~20-40 dB(A))." *Source: NRC 2007*
http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

- "Complaints about low frequency noise come from a small number of people but the degree of distress can be quite high. There is no firm evidence that exposure to this type of sound causes damage to health, in the physical sense, but some people are certainly very sensitive to it." *Source: Ad Hoc Expert Group on Noise and Health*
http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- "... there is the theoretical possibility that annoyance may lead to stress responses and then to illness. If there is no annoyance then there can be no mechanism for any increase in stress hormones by this pathway... if stress-related adverse health effects are mediated solely through annoyance then any mitigation plan which reduces annoyance would be equally effective in reducing any consequent adverse health effects. It would make no difference whether annoyance reduction was achieved through actual reductions in sound levels, or by changes in attitude brought about by some other means." *Source: Ad Hoc Expert Group on Noise and Health*
http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

Infrasound

- "Infrasound is audible when the sound levels are high enough. The hearing threshold for infrasound is much higher than other frequencies. Infrasound from wind farms is at levels well below the hearing threshold and is therefore inaudible to neighbouring residents. There is no evidence that sound which is at inaudible levels can have a physiological effect on the human body . This is the case for sound at any frequency, including infrasound."
http://docs.health.vic.gov.au/docs/doc/5593AE74A5B486F2CA257B5E0014E33C/$FILE/Wind%20farms,%20sound%20and%20%20health%20-%20Technical%20information%20WEB.pdf

- "Claims that infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically... evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system."
http://www.mass.gov/dep/public/press/0112wind.htm
- "There is no evidence that infrasound ... [from wind turbines ... contributes to perceived annoyance or other health effects." *Source: Bolin et al 2011 Review*
http://iopscience.iop.org/1748-9326/6/3/035103/pdf/1748-9326_6_3_035103.pdf

ATTACHMENT No. 5(ii)

An association exists between wind turbines and distress in humans.

The existence of a dose-response relationship (between distance from wind turbines and distress) and the consistency of the association across studies .. argues for the credibility of this association.

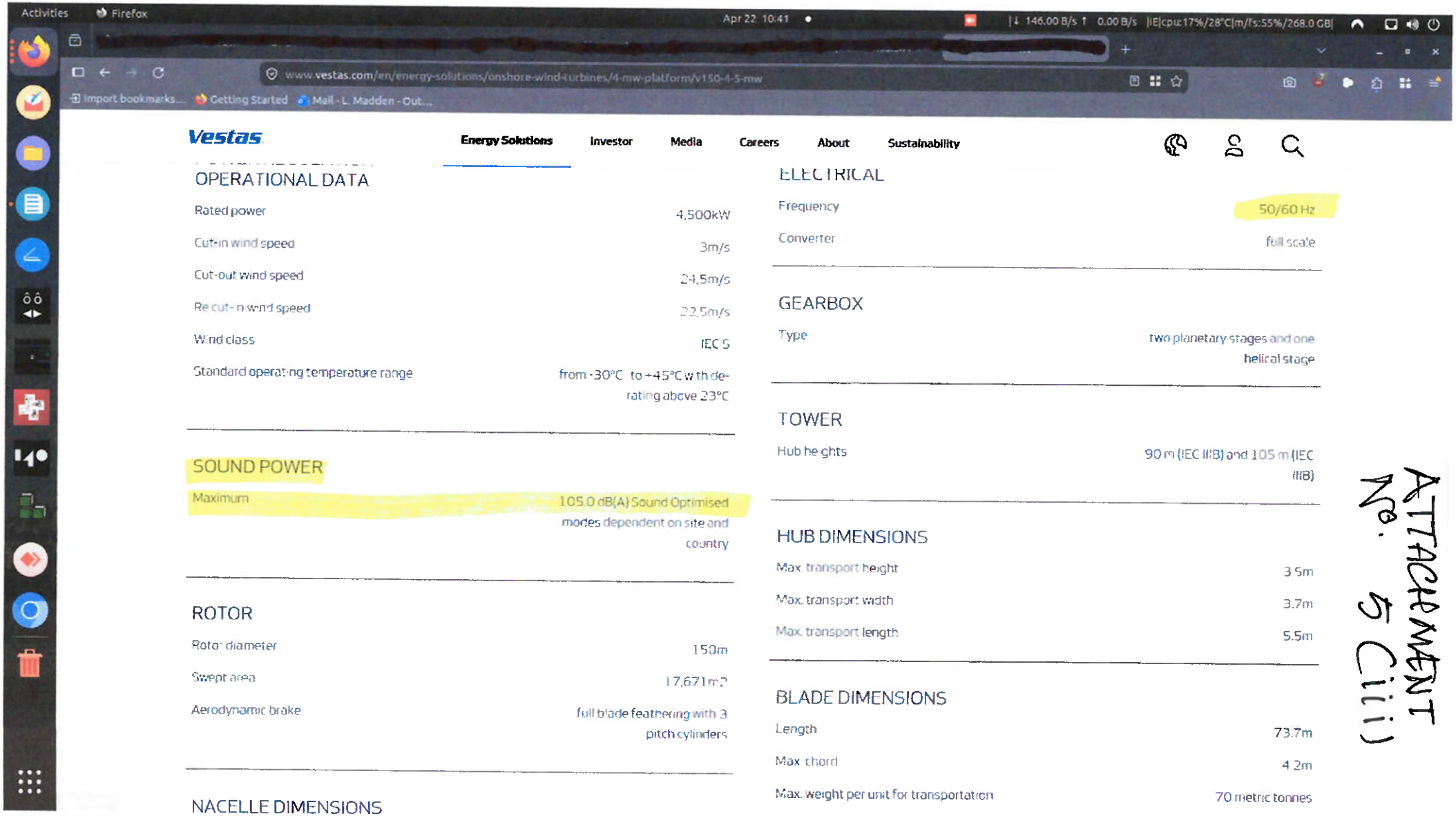
The first conclusion is very imprecise and sweeping and ripe for being megaphoned by anti-wind farm interest groups as if it actually meant something. One of the six original studies reviewed (Salt & Hullar) (8) should have never been included in this review – see below. The Nissenbaum et a study (9) is listed as of moderate quality with a low risk of bias. Yet all three authors and two out of three reviewers of that paper are members of Society for Wind Vigilance, an anti-wind organization. Nissenbaum has been raising health concerns in study areas for several years, potentially biasing collected data. Neither of these problems is mentioned in this review. Two critiques of this study were published in Noise and Health pointing out the very poor quality of the results, analysis and the overstatements of conclusions (10, 11).

The Shepherd et al study (12) which the authors rate as of "high" quality, failed to make any mention that the small wind farm community involved had for years been subjected to a local wind farm opposition group fomenting anxiety about health issues (13). Indeed, with one exception (14), the five studies referenced were performed in areas where complaints of annoyance were being raised. But such farms are unlikely to be representative of all wind farms. As our work shows, over nearly 65% of wind farms in Australia have never received a single complaint (15), and 73% of complainants in Australia are concentrated around just 6/51 farms. The failure of the authors to note this fundamental problem of study sample selection bias is another major problem.

Among the five "original" studies they considered satisfied their selection criteria was a paper by Salt & Hullar (8). This paper is not in any way a "study" of "the association between wind turbines and human distress." It reports no original empirical data and is essentially a backgrounder on infrasound and the "possibility" that wind turbine might create auditory distress. It is unfathomable why this paper was included in the data set.

Table 2 purports to be a meaningful summary of the findings of these six studies on the association between turbine exposure and "distress". I would defy anyone to make any sense of the Table, particularly the column headed "does [sic] response".

By way of comparison to the lack of detail provided by the authors of this review, it is instructive to look at the results from the Dutch study which formed the basis of the



OPERATIONAL DATA

Rated power	4,500kW
Cut-in wind speed	3m/s
Cut-out wind speed	24.5m/s
Re-cut-in wind speed	22.5m/s
Wind class	IEC S
Standard operating temperature range	from -30°C to +45°C with de-rating above 23°C

SOUND POWER

Maximum	105.0 dB(A) Sound Optimised modes dependent on site and country

ROTOR

Rotor diameter	150m
Swept area	17,671m²
Aerodynamic brake	full blade feathering with 3 pitch cylinders

NACELLE DIMENSIONS

ELECTRICAL

Frequency	50/60 Hz
Converter	full scale

GEARBOX

Type	two planetary stages and one helical stage

TOWER

Hub heights	90 m (IEC IIIB) and 105 m (IEC IIIB)

HUB DIMENSIONS

Max. transport height	3.5m
Max. transport width	3.7m
Max. transport length	5.5m

BLADE DIMENSIONS

Length	73.7m
Max. chord	4.2m
Max. weight per unit for transportation	70 metric tonnes

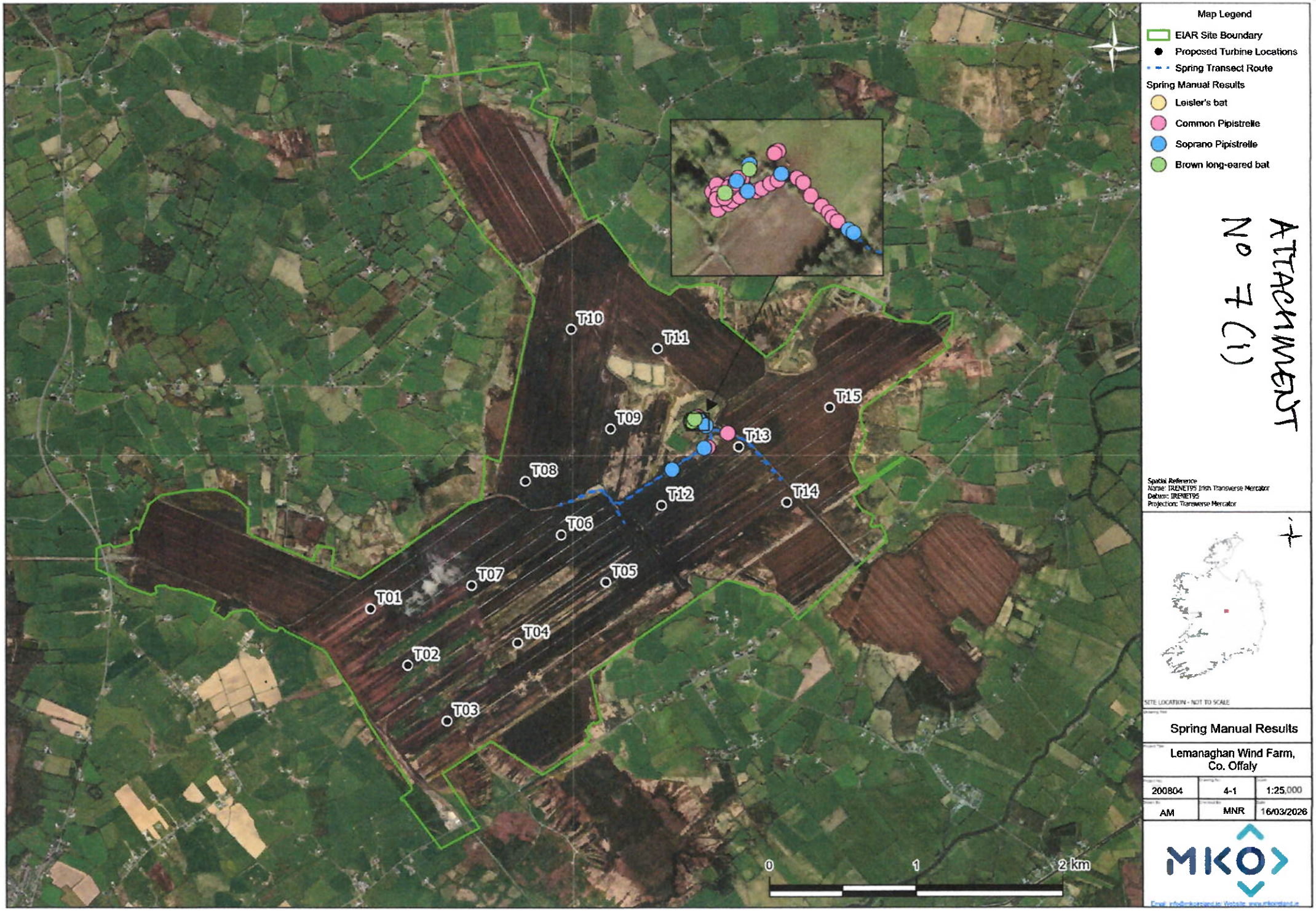
ATTACHMENT No. 5 (iii)

ATTACHMENT No. 6

APPENDIX A. DRAFT PROTOCOL FOR MANAGING COMPLAINTS RELATING TO AM AND TONALITY

This procedure applies where a noise complaint is associated with amplitude modulation (AM) and/or tonality arising from operation of the project. The operator will investigate complaints in collaboration with the turbine manufacturer. The following step provides an outline methodology that will be applied to noise complaint investigations.

1. Record the complaint details (date/time, location, description) and request that the complainant completes a noise complaint log/diary covering periods when the noise occurs at the dwelling/residence.
2. Provide a complaint log template based on ISO/TS 15666:2021 *Acoustics — Assessment of noise annoyance by means of social and socio-acoustic surveys*, Section 9 of EPA document '*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities NG4 EPA, 2016*, or another equivalent/agreed template.
3. Review the complaint log entries and classify the reported character as follows:
   i. Potential tonality indicators: reports of "hum", "whine", "drone", or similar tonal character.
   ii. Potential AM indicators: reports of "thumping", "whoomphing", or similar periodically varying character.
4. In collaboration with the turbine manufacturer, review the complaint log alongside available records of turbine operational conditions and meteorological condition for the relevant periods to determine whether an operational correlation is identifiable.
5. If the log review and operational correlation are insufficient to identify the issue and/or to evaluate mitigation, determine whether noise measurements are necessary. Where required, undertake measurements at the complainant's location or a suitable agreed proxy location.
6. Conduct measurements in accordance with an agreed survey methodology, such as IOA A Good Practice Guide to the Application if ETSU-R-97 for the Assessment and rating of Wind Turbine Noise Supplementary Guidance Note 5: Post Completion Measurements (July 2014) (or equivalent agreed methodology).
7. Apply objective analysis methods appropriate to the complaint type:
   i. Analyse for tones using a robust objective approach, such as ISO 1996-2:2017, with modifications as set out in IEC TS 61400-11-2 (or equivalent agreed methodology).
   ii. Analyse for AM using a robust objective approach, such as the IOA Noise Working Group (Wind Turbine Noise) AMWG method set out in *A Method for Rating Amplitude Modulation in Wind Turbine Noise IOA, 2016*, or equivalent agreed methodology.
8. Where practicable, identify and implement mitigation measures appropriate to the cause/source identified through Steps 4–7. Mitigation will typically be applied at the turbine(s)) and may include:
   i. engineering modifications to mechanical and/or electrical components; and/or
   ii. software-based operational controls via the turbine control system (e.g., adjustments to operating mode, rotor speed and/or blade pitch).
9. On completion of the investigation, the Operator will prepare a technical report documenting the complaint, the investigation undertaken, the analysis performed (including any follow-up monitoring/analysis, where carried out), the findings, and any mitigation implemented or proposed. The report will be submitted to the Local Authority in accordance with the agreed NCMP. Where the investigation is protracted, the Operator will provide an interim update report at six-monthly intervals until the investigation is concluded.



ATTACHMENT No 7 (1)


Map Legend
EIAR Site Boundary
Proposed Turbine Locations
Summer Transect Route
Summer Manual Results
Myotis Species
Leisler's bat
Common Pipistrelle
Soprano Pipistrelle
Brown long-eared bat
ATTACHMENT No. 7 (ii)
Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator
SITE LOCATION - NOT TO SCALE
Summer Manual Results
Lemanaghan Wind Farm, Co. Offaly
200804
4-2
1:25,000
AM
MNR
16/03/2026
MKO
T01
T02
T03
T04
T05
T06
T07
T08
T09
T10
T11
T12
T13
T14
T15
0
1
2 km

No statistical outliers were identified in the dataset; therefore, no exclusions were necessary when calculating activity thresholds. The resulting site-specific activity categories were deemed appropriate for this assessment and are consistent with bat activity levels recorded by MKO at comparable wind farm sites. Table 3-7 presents activity ranges per species group identified.

Table 3-7 Site-specific Activity Level Categories based on Maximum Bat Passes per Hour (bpph)

Assessment Level	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species				
	***Pipistrellus* spp.**	***Pipistrellus nathusii***	***Nyctalus* spp.**	***Myotis* spp.**	**Other groups**
Low	<4.06	<0.23	<1.38	<0.73	<0.33
Medium	4.06-12.19	0.23-0.68	1.38-4.15	0.73-2.18	0.33 – 0.98
High	<12.19	<0.68	<4.15	<2.18	<0.98

35 Assessment of Collision Risk

35.1 Population Risk

NatureScot (2021) provides a generic assessment of bat collision risk for UK species, based on species behaviour and flight characteristics. In the guidelines, this measure of collision risk is used, in combination with relative abundance, to indicate the potential vulnerability of British bat populations. No such assessment is provided for Irish bat populations.

In Plate 3-2, an adapted assessment of vulnerability for Irish bat populations to collision with wind turbine blades is provided. This adaptation of NatureScot Guidance Table 2 was based on collision risk and species abundance of Irish bat populations. Species' collision risk follows those described in NatureScot (2021). Relative abundance for Irish species was determined in accordance with Wray *et al.* (2010) using population data available in the 2019 Article 17 reports (NPWS, 2019). Feeding and commuting behaviours, and habitat preferences for bat species in Ireland were also considered.

Relative Abundance	Low Collision Risk	Medium Collision Risk	High Collision Risk
Common species			Common pipistrelle Soprano pipistrelle
Rarer species	Daubenton's bat Brown long eared bat Lesser horseshoe bat		Leisler's bat
Rarest species	Natterer's bat Whiskered bat		Nathusius' pipistrelle
	Low Population Vulnerability	Medium Population Vulnerability	High Population Vulnerability

Plate 3-2 Population Vulnerability of Irish Bat Species (Adapted from NatureScot, 2021)

35.2 Site Risk

The likely impact of a proposed wind farm development on bats is related to site-based risk factors, including habitat and development features. The cross-tablature result of habitat risk and project size determines the site risk (i.e. Low, Medium or High) (Plate 3-3) i.e. Table 3a (NatureScot, 2021). Table 6-

1 in the results section describes the criteria and site-specific characteristics used to determine an indicative risk level for the proposed site. All site assessment levels, as per NatureScot (2021) are presented in **Appendix 3**.

		Project Size		
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5
		Low/Lowest Site Risk (1-2)	Medium Site Risk (3)	High/Highest Site Risk (4-5)

Plate 3-3 Site-risk Level Assessment Matrix (Table 3a, NatureScot, 2021)

3.5.3 Overall Risk Assessment

An overall assessment of risk was made by combining the site risk level (i.e. Low/Medium/High) and the population risk (i.e. Ecobat bat activity outputs), as shown in the overall risk assessment matrix table i.e. Table 3b (NatureScot, 2021) (Plate 3-4). The assessment was carried out for both median and maximum Ecobat activity categories in order to provide insight into typical bat activity (i.e. median values) and activity peaks (i.e. maximum values).

This exercise was carried out for each high collision risk species. Plate 3-2 above outlines high collision risk species. Overall risk assessments were also considered in the context of any potential impacts at the population level, particularly for species identified as having high population vulnerability (Plate 3-2).

	Ecobat Activity Category					
Site Risk Level	Nil (0)	Low (1)	Low Moderate (2)	Moderate (3)	Moderate High (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	16	20
Highest (5)	0	5	10	15	20	25
		Low Overall Risk (0-4)	Medium Overall Risk (5-12)	High Overall Risk (15-25)		

Plate 3-4 Overall Risk Assessment Matrix (Table 3b, NatureScot, 2021)

3.6 Limitations

A comprehensive suite of bat surveys has been undertaken at the Proposed Wind Farm in 2024. The surveys undertaken in 2024, in accordance with NatureScot, provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Proposed Wind Farm on bats receptors.

The information provided in this report accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely effects of the Proposed Wind Farm;

Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Static Detector Locations
- Spring Transect Route
- Summer Transect Route
- Autumn Transect Route

PRF Structures

- Struture 1 - Stone House
- Struture 2 - Stone Shed
- Struture 3 - Steel & Concrete Block Shed

ATTACHMENT No. 7 (v)

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

SITE LOCATION - NOT TO SCALE

Survey Effort

Lemanaghan Wind Farm, Co. Offaly

200804	3-1	1:22,500
AM	MNR	16/03/2026

MKO

7.1.4 Blade Feathering

NIEA Guidelines also recommend that, in addition to buffers applied to habitat features, all wind turbines are subject to 'feathering' of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021).

Blade feathering below the turbine cut-in speed is expected to be implemented automatically through the turbine control system. Feathering will be limited to periods and locations as follows:

- Seasonal Application:

Feathering will be applied during the main bat activity season (typically April–October) when bats are active and at potential increased risk of collision. Blade feathering will not be applied during winter months (November - March) when bats are largely inactive.

- Spatial Targeting:

Feathering will be implemented only at turbines located in areas of high bat activity, as identified through baseline surveys. Turbines positioned in habitats unsuitable for bats (e.g., extensive bare peat, exposed upland areas with no foraging or commuting value) will not require feathering at low wind speeds. Section 6.1.3 of this report outlines areas which recorded high bat activity for high collision risk bat species.

Should any variations in activity or risk levels be identified during post-construction monitoring, this will be adjusted accordingly as part of the mitigation and monitoring strategy

In the event that blade feathering is not available for the selected turbine model, an equivalent operational measure will be implemented to ensure that turbines do not rotate at low wind speeds when electricity generation is not occurring. This may include operational controls such as manual stop or stop-on-demand procedures during periods when turbines would otherwise idle below cut-in speed.

7.1.5 Biodiversity Management and Enhancement Plan

The Proposed Wind Farm and its associated infrastructure will require a total of 1.02 hectares of immature woodland and 0.64 hectares of scrub to be permanently removed to accommodate its construction. There are proposed native woodland and hedgerow planting measures recommended as biodiversity enhancement in line with best practice guidance (see Chapter 6 Appendix 6-5).

As a precautionary approach to offset the relatively small amount of habitat loss, it is recommended that 1.5 times the area lost is replanted. To offset habitat loss and provide biodiversity enhancement it is proposed to replant 7.8 hectares of native woodland and 6.5km of native hedgerow within the site. Woodland replanting will be planted with bog woodland species and wetland areas to create a wooded scrub and wetland mosaic. Within these proposed areas there will also be watercourse and marsh fritillary enhancement. Proposed habitat enhancement areas will provide quality commuting and foraging habitat for bats. Further details are outlined in the BMEP (Appendix 6-5).

7.2 Bat Monitoring Plan

Overall risk levels for high collision risk bat species were typically *Low* to *Medium*. This risk level is reflective of the nature of the Proposed Project site, which is cutover bog with low levels of bat activity recorded during the walked transects undertaken.

7.1.3 Bat Buffers

In accordance with NatureScot and NIEA Guidance, a minimum 50m buffer to all habitat features used by bats (e.g., hedgerows, tree lines etc.) should be applied to the siting of all wind turbines (See example provided in Plate 7-1 below). However, Eurobats No. 6 guidance and NIEA recommends increased buffers of 100m and 200m around woodland/forestry areas, however, there is no scientific evidence to support these increased buffer distances in Ireland or the UK.

NatureScot recommends that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features) is adequate mitigation. This 50m buffer will be implemented from the outset and monitored as per the post-construction monitoring. The success of the buffer mitigation will be assessed as part of post construction monitoring (outlined in Section 7.2 below) and updated where necessary.

The formula below is presented to provide appropriate mitigation in relation to bats, and the relevant input required from turbine parameters, is the combination of the blade length and hub height. The turbine model to be installed on the Proposed Project will have an overall ground-to-blade tip height of 220m, rotor diameter of 150m, and hub height of 145m.

It is necessary to calculate the distance between the edge of the habitat feature and the centre of the tower (b). Using the formula:

$$b = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

Where, bl =Blade length, hh = hub height, fh = feature height all in metres. E.g. (below) b = 69.3m (Plate 7-1). Based on the turbine parameters provided, the formula is not applicable to the proposed turbines due to the large hub height (145m). When the formula is applied with the above turbine parameters, the clearance distance from turbine blade to nearest habitat feature is sufficient without implementing vegetation removal. Therefore, a vegetation free buffer is not required. However, on a precautionary basis, a 50m vegetation free buffer area will be applied and maintained during the operational life of the Proposed Project.

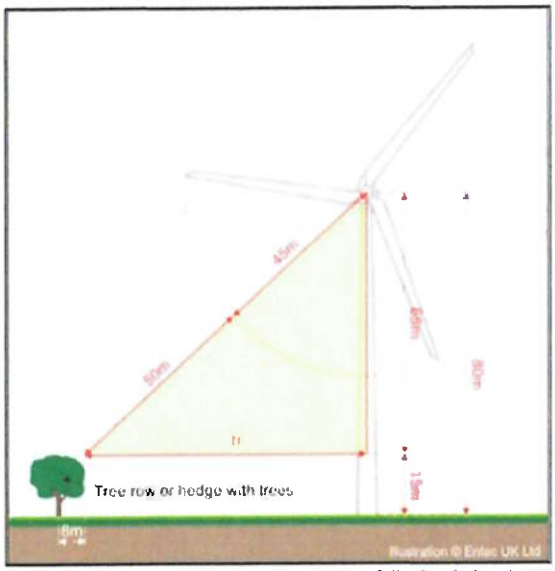
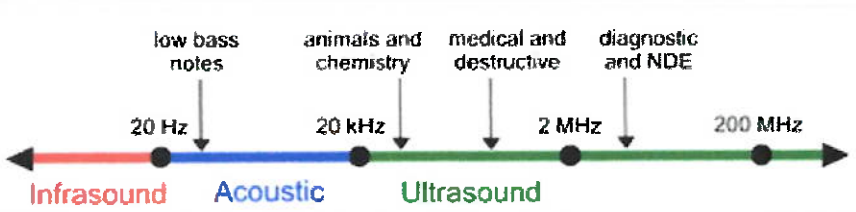


Plate 7-1 Calculate buffer distances (Natural England, 2014).

Definition [edit]

Ultrasound is defined by the American National Standards Institute as "sound at frequencies greater than 20 kHz". In air at atmospheric pressure, ultrasonic waves have wavelengths of 1.9 cm or less.



Approximate frequency ranges corresponding to ultrasound, with rough guide of some applications

Ultrasound can be generated at very high frequencies; ultrasound is used for sonochemistry at frequencies up to multiple hundreds of kilohertz.[6][7][8] Medical imaging equipment uses frequencies in the MHz range.[9] UHF ultrasound waves have been generated as high as the gigahertz range.[10][11][12][13]

Characterizing extremely high-frequency ultrasound poses challenges, as such rapid movement causes waveforms to steepen and form shock waves.[14]

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Animals [edit]

Bats use a variety of ultrasonic ranging (echolocation) techniques to detect their prey. They can detect frequencies beyond 100 kHz, possibly up to 200 kHz.[18]

Bats use ultrasounds to navigate in the darkness.

Many insects have good ultrasonic hearing, and most of these are nocturnal insects listening for echolocating bats. These include many groups of moths, beetles, praying mantises and lacewings. Upon hearing a bat, some insects will make evasive manoeuvres to escape being caught.[19] Ultrasonic frequencies trigger a reflex action in the noctuid moth that causes it to drop slightly in its flight to evade attack.[20] Tiger moths also emit clicks which may disturb bats' echolocation,[21][22] and in other cases may advertise the fact that they are poisonous by emitting sound.[23][24]

A dog whistle, which emits sound in the ultrasonic range, used to train dogs and other animals

Dogs and cats' hearing range extends into the ultrasound; the top end of a dog's hearing range is about 45 kHz, while a cat's is 64 kHz.[25][26] The wild ancestors of cats and dogs evolved this higher hearing range to hear high-frequency sounds made by their preferred prey, small rodents.[25] A dog whistle is a whistle that emits ultrasound, used for training and calling dogs. The frequency of most dog whistles is within the range of 23 to 54 kHz.[27]

Toothed whales, including dolphins, can hear ultrasound and use such sounds in their navigational system (biosonar) to orient and to capture prey.[28] Porpoises have the highest known upper hearing limit at around 160 kHz.[29] Several types of fish can detect ultrasound. In the order Clupeiformes, members of the subfamily Alosinae (shad) have been shown to be able to detect sounds up to 180 kHz, while the other subfamilies (e.g. herrings) can hear only up to 4 kHz.[30]

No bird species have been reported to be sensitive to ultrasound.[31]

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Vestas

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traffic volumes during the decommissioning phase, will be less than those anticipated and assessed for the construction phase.

The RWMP has been produced in line with the following guidance '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects*' (EPA, 2021)[1].

3.9.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing waste in the following order:

Prevention and Minimisation:

The primary aim of the RWMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are a number of established markets available for the beneficial use of construction waste such as using waste concrete as fill for new roads.

At all times during the implementation of the RWMP, disposal of waste to landfill will be considered only as a last resort.

3.9.3 Waste Arising from Decommissioning

The relevant components will be removed from the Proposed Wind Farm for re-use, recycling or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. All lubrication fluids will be drained down and put aside for appropriate collection, storage, transport and disposal. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

The waste types arising from the decommissioning of the Proposed Wind Farm are outlined in Table 3-1 below.

Table 3-1 Expected waste types arising during the Decommissioning Phase

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead and iron	17 04 07
Fibreglass	Turbine blade component	10 11 03

[1] *EPA, 2021. Best practice guidelines for the preparation of resource & waste management plans for construction and demolition projects. Available at:* https://www.epa.ie/publications/circular-economy/resources/CDWasteGuidelines.pdf