S.37

File With

SECTION 131 FORM

Appeal No: ABP-322787

Defer Re O/H:

Having considered the contents of the submission dated/received 15/7/25 from William McSweeney I recommend that section 131 of the Planning and Development Act, 2000 be/~~not be~~ invoked at this stage for the following reason(s):

no new material information

Section 131 not to be invoked at this stage. ☑

Section 131 to be invoked — allow 2/4 weeks for reply. ☐

Signed: Dawn Lit ack — Date: 06/08/25

EO

Signed: — Date:

SEO/SAO

M

Please prepare BP — Section 131 notice enclosing a copy of the attached submission.

To: — Task No: — Allow 2/3/4 weeks: BP

Signed: — Date:

EO

Signed: — Date:

AA

Digital BP 40 23/7 Daire

An Coimisiún Pleanála

Planning Appeal Online Observation

Online Reference
NPA-OBS-004840

LDG-081459-25

Online Observation Details

Contact Name
WILLIAM MCSWEENEY

Lodgement Date
15/07/2025 14:52:24

Case Number / Description
322787

Payment Details

Payment Method
Online Payment

Cardholder Name
William McSweeney

Payment Amount
€50.00

Processing Section

S.131 Consideration Required

☑ Yes — See attached 131 Form ☐ N/A — Invalid

Signed

EO

Date
22/7/25

Fee Refund Requisition

Please Arrange a Refund of Fee of
€

Lodgement No
LDG—

Reason for Refund

Documents Returned to Observer
☐ Yes ☐ No

Request Emailed to Senior Executive Officer for Approval
☐ Yes ☐ No

Signed

EO

Date

Finance Section

Payment Reference
ch_3RI9HQB1CW0EN5FC0gbMewuX

Checked Against Fee Income Online

EO/AA (Accounts Section)

Amount
€

Refund Date

Authorised By (1)

SEO (Finance)

Authorised By (2)

Chief Officer/Director of Corporate Affairs/SAO/Board Member

Date

Date

Obs('ation by William McSweeney, B.Eng, M.Eng, MVB
Ard na Greine, Ballyclough, Mallow, Co. Cork P51 V308

An Coimisiún Pleanála Case reference: PL04.322787
Planning Authority Case Reference: 245503

Polnareagha, Ardskeagh, Tullacondra, Croughta, Kilmaclenine, Ballyclogh, Knockaunavaddreen, , Copestown, Ballybeg, Baltydaniel East, Twopothouse, Caurraghakerry, Co. Cork

Description

Construction and decommissioning of 9 wind turbines and all associated site works. The Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) was submitted to the Planning Authority with the application.

Case type

Planning Appeal

Parties

Tullacondra Green Energy Limited
Joseph Cott
Eoin & Michelle Sheahan
Willie Aherne
Morna McDowall
Michael Healy & Patrick Healy Jnr
Arthur O Grady
Daniel & Tara Crowley
Donal & Shelia Gayer
Blanaid Sheahan
Fergal Sheahan
Aisling Brattle
Eavan Long (3rd Party Appellant) (Active)
Tullacondra Turbine Awareness Committee

It is hard not to draw the conclusion that Cork County Council (CCC) in their grant of planning for Tullacondra wind farm, dismissed out of hand, the concerns and very serious issues raised in submissions made by Tullacondra Turbine Awareness Committee and the people living in the locality. By so doing, CCC failed, I believe, in its statutory duty to properly consider and weigh the evidence placed before it, instead reducing a key step in the planning process to a mere perfunctory action; a waving through of the application if you will. The Online Law dictionary[1] defines "to consider" as meaning *to think about, or to ponder or study and to examine carefully*. The Webster's online dictionary[2] definition of "to consider" is *"to think about carefully."* Certainly, regarding my own submission, it seems clear CCC failed to consider the critical points I raised along with the supporting evidence produced, instead, finding it easier and more expedient to accept the applicant's complacent assurances, many of which are unsubstantiated or just plain wrong. In granting permission, CCC and the developer are taking grave risks. But, should things go wrong, CCC and the developer will likely suffer little, the local community will be the ones bearing the brunt of any serious adverse impacts. An Coimisiún Pleanála's task now is to do what CCC failed to do, namely, to properly consider the merits of the application, to properly *"study and to examine carefully"* the very real risks being taken here. If An Coimisiún Pleanála does this, I believe, the only credible decision it can reach will be to overturn CCC's grant of planning.

I objected to the proposed development when the developer first applied to CCC for planning permission because careful scrutiny led me to believe that the project carries far too much risk of very serious or even profound adverse impact to meet the threshold of what could be deemed good, sustainable & sound planning. Nothing in the subsequent RFI documentation or CCC commissioned expert reports have changed my mind. The serious risks I highlighted were roundly ignored in both the RFI and the expert reports and no meaningful workable mitigation strategies that might have alleviated the risks were put forward. In fact, it is hard not to conclude that the said expert reports, which added little in the way of new evidence or detail, were commissioned merely to provide cover for CCC's decision.

The valid points I made in my objection[3] to CCC (which they chose to ignore) included

- the terminology used to downplay very significant and profound effects
- the inappropriateness of the proposed location
- the adverse impact the development will have on the unique landscape character and visual quality of the area

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[1] https://thelawdictionary.org
[2] https://www.merriam-webster.com/
[3] Full copy of my objection made to Cork County Council along with a copy of my payment receipt from same are in Appendix 1 & Appendix 3

- The extremely tight wind farm layout
- the likelihood of serious adverse noise impact and the lack of any meaningful mitigation
- the inadequate community engagement undertaken by the applicant

These points are covered in substantial detail in my original objection to CCC, so I don't propose to repeat myself here regarding most of them. However, I must further expand here on the wind farm layout and the very significant & profound noise impact that will likely ensue from this development.

Excess amplitude modulation is now seen as a likely feature of modern wind farms. **AM is no longer viewed as a rare occurrence**. Mr. Dick Bowdler, a long-time member of the Institute of Acoustics (IOA), IOA Medal recipient in recognition of outstanding contributions to acoustics research and wind farm noise expert is on the record as stating that *"the possibility of AM is significant in any modern windfarm."*

Feed-In air turbulence and wake effects from up-wind turbines are now widely recognised as significant factors in the occurrence of excessive amplitude modulation. In their relatively recent 2023 report[4] commissioned by the UK's Department of Business, Energy & Industrial Strategy, consultants WSP state that research indicates the likely mechanisms and factors contributing to non-TEDCAR-AM[5] include *"inflow turbulence variation"* and *"turbine wake effects."* As detailed in my objection to CCC, Industry best practice for turbine spacing typically ranges anywhere from 5 to 10 rotor diameters in the prevailing wind direction. The Irish Wind Energy in their best practice guidelines[6] recommend

> *"a minimum of 4 rotor diameters"* before adding the caveat that *"this can be reduced for very small developments, depending on the orientation of the turbines with respect to the prevailing wind direction."*

The average spacing between turbines in Tullacondra's final design is a mere 2.6 rotor diameters in the prevailing wind direction. This is a significant deviation from international wind industry best practice and considerably below the Irish wind industry's own best practice guidelines. And Tullacondra is an extremely large development and not a very small development the Irish industry guidelines say could allow for some relaxation to the 4 rotor diameter minimum they recommend. This extremely tight layout of just 2.6 rotor diameters is precisely the type of layout that will certainly cause inflow turbulence and turbine

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[4] Department for Business, Energy & Industrial Strategy: A REVIEW OF NOISE GUIDANCE FOR ONSHORE WIND TURBINES September 2023

[5] Non-TEDCAR-AM → Non trailing edge directivity and convective amplification-related AM. EAM (Excessive AM) or OAM (Other AM) are terms also used for this type of Amplitude Modulation

[6] Best Practice Guidelines for the Irish Wind Energy Industry 2012

wake effects on downwind turbines, in turn very likely leading to noise issues including AM related intrusion.

Expert evidence given in the recent **Byrne and Moorhead v ABO Energy Ireland Ltd and others** legal case clearly outlined how, in that wind farm (Gibbett Hill WF), "*a potentially turbulent set of air conditions*" were causing "*additional noise problems*". Here the tightest spacing between turbines is ~4 rotor diameters in the prevailing wind direction, with an average spacing amongst the relevant cluster of four turbines[7] of ~5 rotor diameters Again, Ms. Justice Egan in her judgment (**Webster and Rollo, and Shorten and Carty v Meenacloghspar Wind Ltd**) involving alleged noise nuisance against Ballyduff WF, having carefully considered expert evidence held that the factors contributing to the noise characteristics (wind turbine noise with frequent AM including thump AM) likely included "*inflow turbulence from T1* [into T2, as well as] *unanticipated wake effects*". And in this troubled wind farm[8], the spacing between T1 & T2 is 3.8 rotor diameters, less than but still close to Irish wind energy guidance but much greater than the spacing proposed at Tullacondra.

Table 1, below compares Tullacondra's proposed layout design with a list of wind farms with known serious noise and amplitude modulation issues, some resulting in homes being permanently vacated by residents as a result (eircodes provided in table). As one can clearly see, the average and minimum turbine spacings proposed at Tullacondra are by some distance lower than the spacings of all the noise troubled wind farms on the list. Their average turbine spacing, in contrast, is either close to or above the Irish Wind Energy turbine spacing guidelines. It is obvious, therefore, that the Tullcondra turbine spacing is much too tight, patently flouting recommended best practice as it does. Tullacondra is a clear outlier and Table 1 should set alarm bells ringing loudly at An Coimisiún Pleanála.

[7] Gibbet Hill WF is built in two distinct clusters of four turbines and a separate cluster of two turbines. The legal case taken was in relation to the cluster of four turbines.

[8] Ballyduff Wind farm consisting of two Enercon E82 turbines of rotor diameter 82metres

Wind Farm	No of Turbines	Turbine Rotor Diameter (metres)	Average Turbine Spacing in prevailing wind direction (rotor diameters)	Minimum Turbine Spacing in prevailing wind direction (rotor diameters)	Adverse Noise Impact	Legal Case	Legal Result	Homes vacated due to Noise Impact	Vacated Home - Eircodes
Tullacondra	9	150	2.6	2.5	Likely	?	?	?	?
Ballyduff	2	82	3.8	3.8	Yes (including AM)	Yes	Nuisance Proved	0	
Grouselodge	6	90	3.9	3.2	Yes (including AM)	Yes	Case Ongoing	1	V42 KT18
Scartaglen	13	101	4.3	2.9	Yes (including AM)	Yes	Case Settled	1	V93 VK24
Carraigcannon	10	70	4.5	4.1	Yes	Yes	Nusiance Admitted	7	P51 XWF6, P51 C7P4, P51 H309, P51 D710, P51 YK00, P51 A9X5, P51 V079
Gibbett Hill	6*	90	5	3.9	Yes (including AM)	Yes	Nuisance Admitted	0	
Boggeragh II	26^	90	5.3	4.9	Yes (including AM)	Yes	Case Settled	3	P32 HX49, P32 XW98, P32 FK24
Esk	8#	90(100)	8	4.7	Yes (including AM)	No	na	1	P51 N5V6

Note: * Gibbett Hill WF consists of two separate clusters of four and two turbines respectively. Min and average spacing quoted above relate to the cluster of four turbines only
Note: ^ Boggeragh II WF consists of separate clusters of turbines. Min and average spacing quoted above relate to a cluster of thirteen turbines immediately to the west/north west of listed eircodes
Note: # Esk WF consists of a cluster of six turbines with two further turbines situated singly and further away. Min and average spacing quoted above relate to the cluster of six turbines only

Table 1. (Tullacondra versus other noise troubled wind farms)

Turning now to turbine noise levels predicted/expected at nearby properties, it seemed to have totally escaped CCC's notice, just how incredibly quiet the local environment is. EIAR noise monitoring reveals background noise levels of ~16dB average and probably lower, given the noise monitors used cannot measure below ~16dB. Into this exceptionally quiet environment, the applicant is proposing to pump, unremittingly and almost in perpetuity, industrial noise of the order of 10 decibels or more above background, even up to 16 decimals under certain conditions. These noise levels set in the context of so quiet an area will simply be disastrous, causing widespread complaints and severe difficulties for residents.

If we add to this already very significant intrusion by considering the occurrence of excess AM (made probable by the exceptionally tight spacing), then the potential noise impact will be measurably worse. I quantify the likely impact in my objection to CCC (I urge you to carefully study tables in Appendix B of that objection), where I apply a +6dB penalty as per the BS4142 noise standard where impulsivity is clearly perceptible. This exercise shows exceedances of >20dB being quite possible at very many residences. This level of potential noise intrusion will not constitute a significant or even very significant negative impact. It will constitute a profound negative impact.

The EIAR tries to offer a modicum of reassurance by way of possible mitigation measures. In terms of dealing with noise levels, the proposed mitigation will result in a 0.6dB noise reduction which, as I say in my objection to CCC, is as farcical as it is meaningless. It may result in compliance on paper but in reality, will make zero

difference. This is because the noise limits being proposed are simply too high for such a quiet area to begin with.

When it comes to mitigating for potential noise character issues, principally AM, there is no mitigation at all proposed. Clinging to the false narrative that AM is rare, the developer justifies their position by then claiming that because AM cannot be predicted in advance of operation, this somehow absolve them from needing an AM mitigation plan. Firstly, as wind turbine noise expert Mr. Bowdler confirms, "*the possibility of AM is significant in any modern windfarm,*" meaning it is quite likely to occur. Secondly, with this development, given the degree of turbulent airflow that will certainly feed into downwind turbines, the possibility of AM occurring at Tullacondra is even greater still. The developer's approach with CCC's tacit approval to this very real risk is essentially to wing it; to blithely suggest figuring out how to deal with AM when it happens. That is akin to sitting down to draft an evacuation plan when the flames are already round your ankles.

In short, for this scale of development and given the real risk of AM being a serious issue, An Coimisiún Pleanála should demand that a credible AM mitigation plan is in place. One only needs to look at the recent **Byrne and Moorhead** judgement to see what can happen when there is no plan; a developer/wind farm operator without a clue of how deal with the situation, spending months and even years faffing about and all the while, affected residents have the suffer the intolerable intrusion in their homes. Proper planning should mean a proper mitigation plan is a prerequisite to the grant of planning. Webster's online dictionary definition of "To wind it" is "*to do or try to do something without much practice or preparation.*" Winging it, is simply not good enough and An Coimisiún Pleanála, unlike CCC, should not tolerate such an approach.

In granting planning CCC include what can best be described as an ill-conceived condition in relation to AM. Planning conditions 22 & 26 state that

> *"The rating level of noise emissions from the combined effects of the wind turbines (including the application of any tonal penalty and amplitude modulation (AM) penalty), when determined in accordance with the Institute of Acoustics Wind Turbine Guidance Notes, shall not exceed the daytime and night-time criterion values for the relevant integer wind speed set out in or derived from Table 13.16 as amended by 13.22 for receptor 17 of Chapter 13, EIAR Volume 2 when measured at any specified noise sensitive location during the daytime and night-time.."*

While I agree with the imposition of a condition relating to tonal and/or AM, I do not believe it is enforceable where AM is concerned. I say this because if the guidance

note(eferred to are the Institute of Acoustics (IOA) Good Practice Guide (GPG) published in 2013 with additional supplementary guidance notes published in 2014, then these explicitly do NOT deal with the issue of AM. In a note on their website dated December 2014, the IOA state that

> *"AM was not considered in the GPG as at the time of its production no 'good practice' could be found on how to deal with it."*

While a further IOA note dated Dec 2024, states that "*An IOA endorsed metric* [for AM] *was published in 2016"* and in the same note says that *"A sample planning condition was proposed by IOA members which was published in the IOA bulletin (November-December 2017 issue)," neither* this AM metric nor the sample planning condition have been officially endorsed by the IOA or the UK government. Instead, as the 2024 IOA note clearly states, it is the GPG published in 2013, with additional supplementary guidance notes published in 2014 that *"remains current guidance endorsed for use until such time as an updated version is published".*

A planning condition is absolutely needed to control for tonal and AM noise, but it needs to be explicitly detailed in the condition to make it enforceable. The CCC noise condition is exactly the opposite, lacking in detail and crucially reliant on guidance notes the IOA explicitly say do not consider AM. It is ill-conceived and very likely unenforceable given that it proposes a rating level of noise emissions (including the application of any tonal penalty and amplitude modulation (AM) penalty), referencing Institute of Acoustics Wind Turbine Guidance Notes, that do NOT consider AM at all.

It is clear that drastic action needs to be taken by all countries across the globe including Ireland if climate change is to be tackled. However, this should not give wind developers a license to shoehorn wind farms in wherever they feel like and for authorities to stand idly by and watch them. Put simply, while we need as much renewable energy as possible, sustainable planning must be observed and local communities should not be expected to carry the can when good and sound planning norms are set aside, as is the case with this development.

I urge An Coimisiún Pleanála to consider my earlier objection to CCC carefully along with this observation because of the numerous very serious issues I have highlighted that warrant the grant of planning to be overturned. Chief amongst these being

- the especially tight turbine layout very likely leading to increased noise problems including AM
- the proposed noise limits being much too high for such an exceptionally quiet environment

- proposed noise mitigation being ineffectual or in the case of AM totally a(ent
- a noise planning condition which is likely unenforceable, depending as it does on guidance that explicitly do NOT deal with or consider noise features contained in the condition

In terms of noise in particular, I believe very serious noise intrusion and nuisance is virtually inevitable with this development. But for an ordinary family, what does serious noise intrusion look like? Serious noise nuisance, what damage can it cause? I urge you to read Pauline McSweeney's objection to CCC (Appendix 3) and details clearly the negative repercussions that can flow from bad planning decisions.

For the all the reasons I detail in this submission and in my objection to CCC, I urge An Coimisiún Pleanála to overturn the grant of permission delivered by CCC

APPENDIX 1

Submission by William McSweeney, B. Eng (Elec), M. Eng (Comp Sys), MVB
Ard na Greine, Ballyclough, Mallow, Co. Cork P51 V308

Cork County Council Planning Application: 245503

Applicant: Tullacondra Green Energy Limited

Description: Permission for the construction, operation and decommissioning of a wind energy development including 9 wind turbines each with a blade tip height of 175 metres, rotor diameter of 150 metres, hub height of 100 metres and a rated output of 4.5 megawatts

I wish to object to the above proposed planning application.

In doing so I believe my engineering background and life experience give me a unique perspective on what is being proposed. In 2011, my family together with six other households, were forced to take a high court challenge[9] against Carraigcannon Wind Farm because of intrusive noise, the defendants eventually admitting full liability to noise nuisance at distances of over 1km. From a noise perspective in particular, I know the severe consequences that can arise should a poorly designed and badly sited wind farm be given planning.

Allied to this, I also possess a range of relevant engineering skills including amongst others, electrical/electronic expertise, project management, data analytics, quality & risk management and electrical/electronic regulatory compliance.

Bringing this life experience and engineering expertise to bear, I object to this planning application on the following grounds:

1. EIAR Terminology
2. Inappropriate location
3. Visual Impact
4. Landscape Character
5. Wind Farm Layout
6. Noise
7. Inadequate community engagement

1. <u>EIAR Terminology</u>

[9] High Court cases 2011 9852 P, 2011 9893 P, 2011 9854 P, 2011 9954 P, 2011 9955 P, 2011 9956 P, 2011 10137 P

In the EIAR report[10], the applicant classifies a Moderate effect on the environment as **Not Significant** and further classifies Significant, Very Significant and Profound effects all under the term **Significant.**

Justification for doing so is based on a dubious interpretation of EPA EIAR Guidelines 2002 and EU Directive 2014/52/EU. This reclassification which runs right through the entire EIAR documentation results in any Moderate effects being dismissed and Very Significant and Profound findings being considered as Significant only.

I do not believe this is good practice and in particular, results in Very Significant and Profound impacts being downplayed. It risks what should be red flag issues being overlooked. It also risks misleading the planning authority and the public regarding the true impact of the proposed development.

In short, the EIAR terminology used is misleading and in my opinion, compromises the integrity of the EIAR documents themselves.

2. <u>Inappropriate Location</u>

The proposed location for this wind farm is inappropriate because, even though the area is rural, it is well populated and vibrant. This can be seen visually if one examines population maps from the 2022 census. Figures 1 & 2 below clearly illustrate that the proposed location is not some sparsely populated remote area with a few isolated houses but rather a well populated locality. In figure 2, when one zooms in so to speak, it becomes particularly clear visually that in the immediate vicinity of the wind farm, the population density is significant. This is reflected in the applicant's own EIAR document where it identifies 48 occupied/planned dwellings within a 1Km radius and a total of 154 occupied/planned dwellings plus a primary school within a mere 2Km of the proposed wind farm.

Put simply, the applicant is trying to shoehorn a very large, industrial wind farm into a well populated vibrant if rural community; imposing a very extensive industrial activity into a quiet residential area when sound planning dictates that every effort should be made to keep these competing objectives separate. 154 households and a school will be very significantly affected, some profoundly during the construction phase and for decades to come during the operational phase. 154 households and a school are big numbers. That is an awful lot of residential amenity and an awful lot of family and community life that will be adversely compromised over a very long time period. In my view, the proposal is asking too much of the community and too much of 154 households that will be profoundly affected if this development goes ahead.

[10] 6.3.4 Assessment of effects EIAR Volume II Main Report

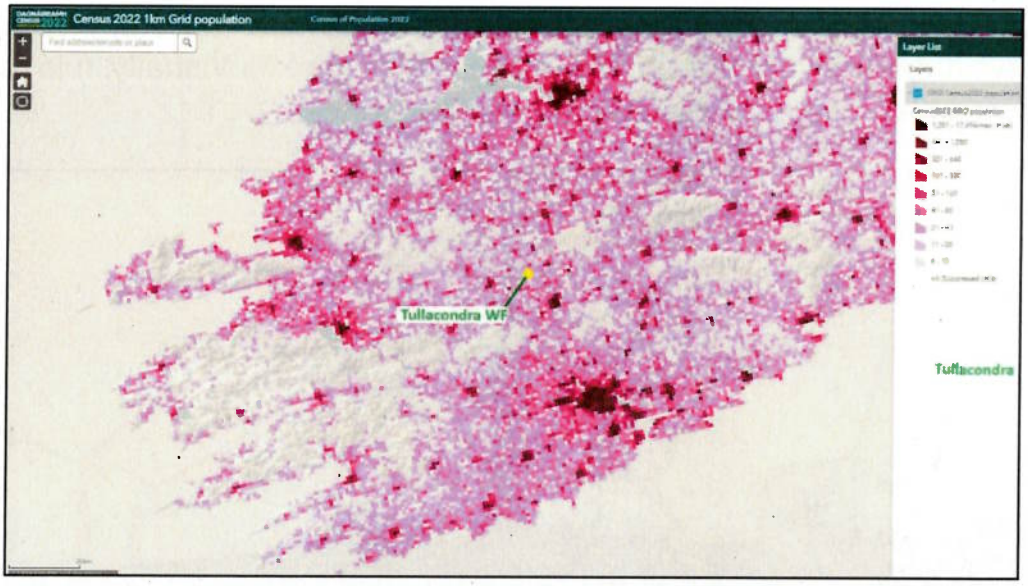

Figure. 1 - Census 2022 1Km Grid population

Figure 2 - Census 2022 1Km Grid population – closeup of local area

3. Visual Impact

The nine industrial wind turbines being proposed are gargantuan by any measure. With a tip height of 175 metres, they will stand ~2.5 times the height of the 18-story Elysian in Cork city, currently the tallest building in Ireland. The individual blade length of 75 metres will be nearly double the side profile of the Elysian tower (approx. 40 metres), the blade diameters being nearly four times this figure. The swept area of each turbine at ~17670 square metres is roughly 2.5 times greater than the playing surface of the Aviva stadium.

Unlike the single one-off Elysian tower, nine of these behemoths will stand on a relatively flat plateau in an open plain or as described by the Cork Area Planner, a "*fertile plain with moorland ridge*[11]." The development will be visible for miles and because of the proposed tight layout in double/triple rows, from many aspects a

[11] Planner's Primary Report for Planning Application 2304900

tangled view of spinning blades will be presented, with little visual relief due the relative flatness of the terrain (figure 3 through figure 7). Visually, this rural area will take on a heavy industrial incongruous appearance.

Figure 3
Viewpoint 3 East of Kilmaclenine Crossroads showing tangled visual effect of tightly packed turbines

Figure 4 - Viewpoint 6 Kilgilky area

Figure 5 - Viewpoint 11 Kilbrin graveyard showing vista of entangled turbine blades with little visual relief

Figure 6 - Viewpoint 13 Knockcloona area

Figure 7 - Viewpoint 8 R580 Ease of Curraglass

The planning location proposed, per the Cork County Development Plan 202 (CCDP), while in an area deemed Open to Consideration to wind energy projects, is classified as an important landscape (see figure 8 below). ET 13-7 of the CCDP states that

> *"Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on... [v]isual quality of the landscape and the degree to which impacts are highly visible over wider areas."*

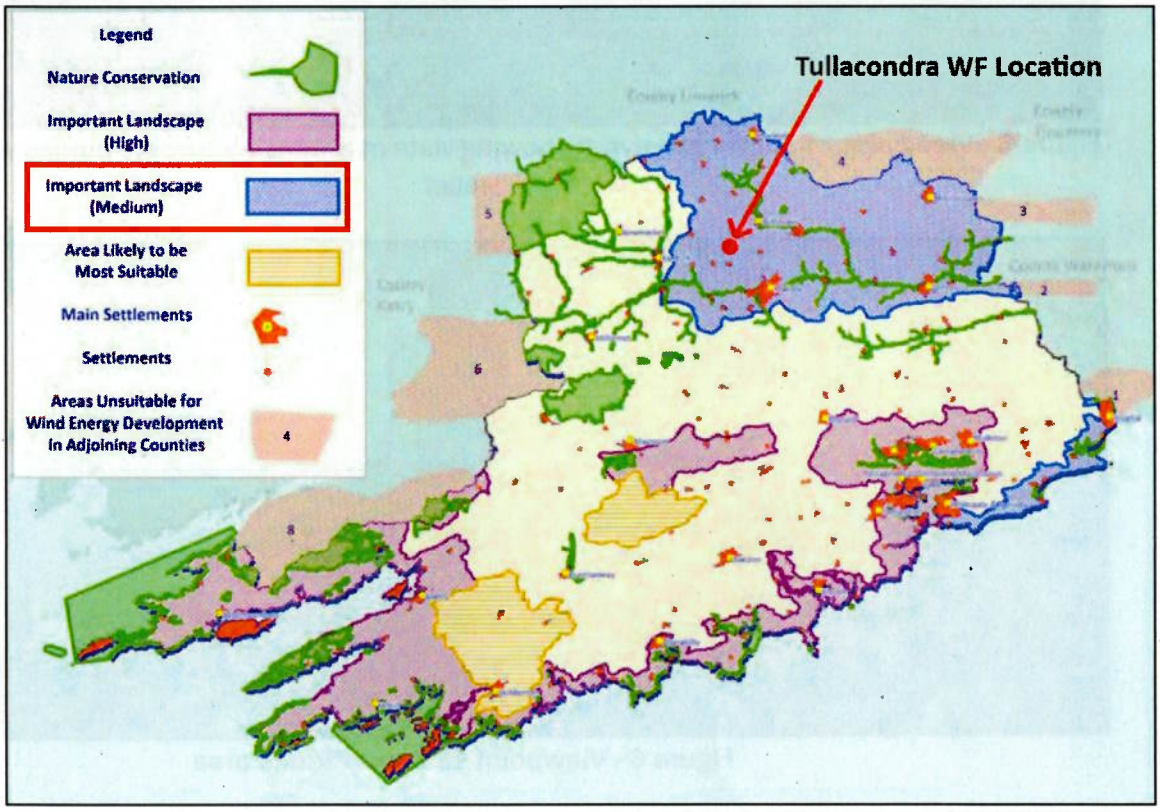

Figure 8 - from Cork County Development Plan 2022 with approximate location of Tullacondra WF added

Clearly this application should it go ahead, will significantly and negatively impact the visual quality of what is classified in the CCDP as an important landscape and will, for reasons already stated, be highly visible over wide areas.

Planning application 2304900 sheds further light on the nature and character of the site of this proposed wind farm development. This application in an adjoining townland for a one-off house to Tullacondra (NOTE: a mere 380 metres from the nearest proposed turbine location) drew the following comment from the Area & Senior Executive Planners[12] that this proposed one-off dwelling

- *"would militate against the preservation of the rural environment and amenities and it would detract from the character and visual amenities of the rural area,"*

[12] Planner's Primary Report for Planning Application 2304900

"on lands forming part of a High Value Landscape as defined in the Cork County Development Plan 2022...would be likely to seriously injure the amenities of the receiving environment."

Clearly, if a standard dwelling house at virtually the same location is deemed unsuitable from a visual impact perspective, then a wind farm multiple orders of magnitude greater must also be deemed unsuitable and runs contrary to both objective 13-7 of the CCDP 2022 and the classification of the area as a "High Value Landscape." Clearly if one one-off house would *"on lands forming part of a High Value Landscape...be likely to seriously injure the amenities of the receiving environment,"* it must be patently obvious that nine colossal structures twenty times higher will have a profound negative impact and will cause very great damage indeed to the visual quality of the surrounding landscape as shown in figures 3 through 7.

4. Landscape Character

A brief study of the landscape around the proposed site, reveals a unique countryside having undergone minimal change in the past two hundred years. In particular, the field boundaries are unusual and taken together with the presence of Fulacht Fia and circular enclosures, it is clear the area has been inhabited through the millennia. What is especially noteworthy, is how little change there has been over the last two centuries with field boundaries in particular largely remaining intact. This is unusual given the bias until recently toward ever bigger fields especially from the 1970s onwards. If we compare a recent satellite image (figure 9) with its 1830's equivalent map (figure 10), the unique field pattern and how relatively intact it has remained is striking.

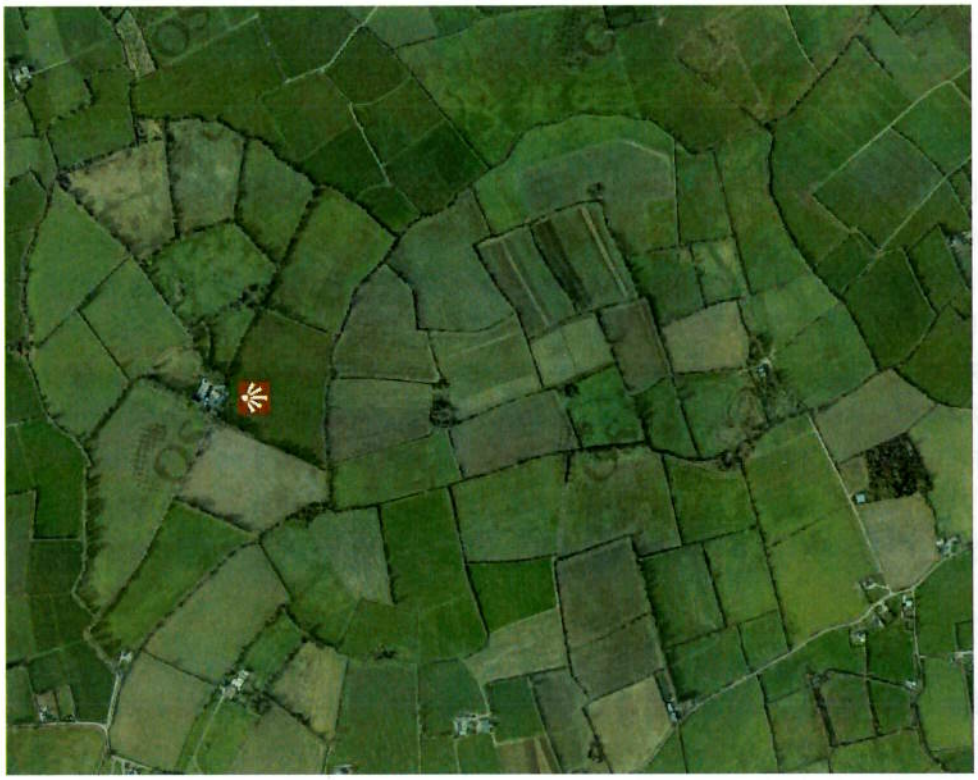

Figure 9
2013-2018 MapGenie Image- with viewpoint referred to in figure 11 added

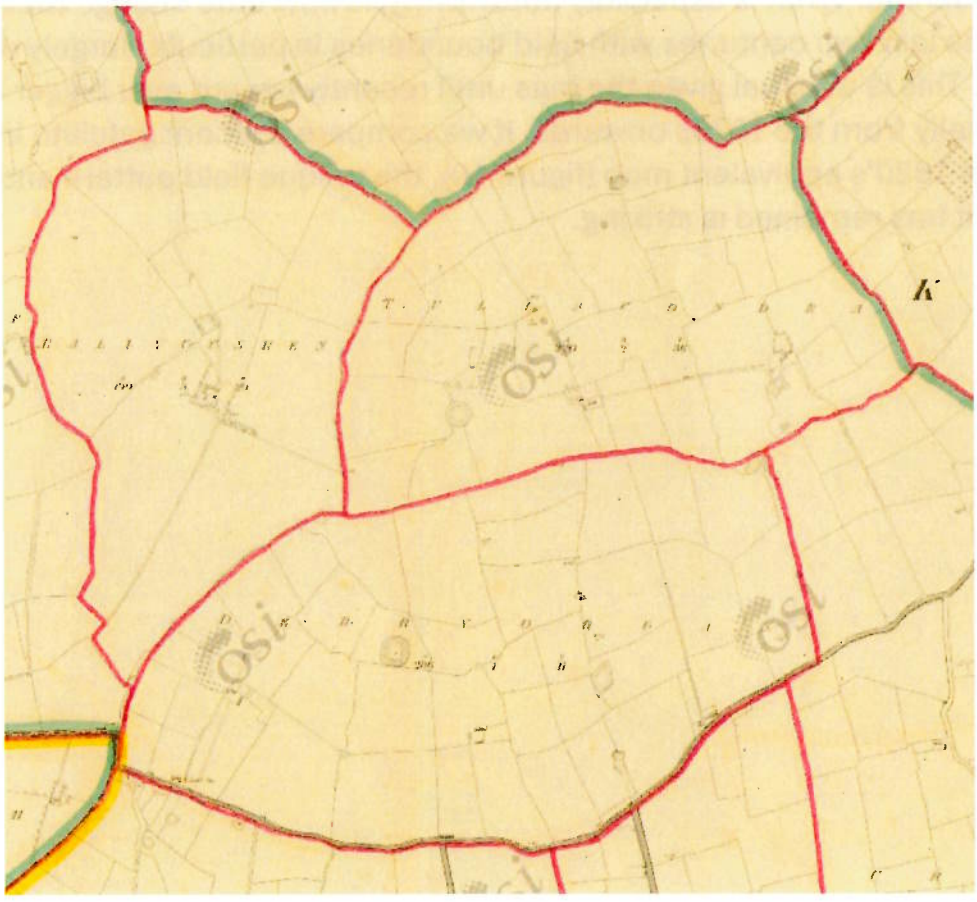

Figure 10
1829- 1841 Tailte Eireann 6 Inch Map

St ding at the viewing point indicated in figure 9, the rich undulating lowland vista is striking, clearly helped by the aforementioned field pattern, dense hedgerows and well-aged native tree species (figure 11). It is immediately evident why this rural landscape has been designated as high value.

Figure 11
View from Ballycushen looking east toward proposed turbine locations T7, T8 & T9

Given the unrelenting encroachment of modern infrastructure and industry, there are fewer and fewer settings that retain their traditional appearance and character, especially a lowland setting that is relatively well populated. This is one such locality and quite frankly, despoiling it with gigantic turbines towering over a landscape that cannot possibly absorb them makes little sense. If we let this rural area fall to major industrialisation as is being proposed, we will lose something unique, begging the question...why are we willing to sacrifice our high value landscapes? If they are deemed high value, as this location clearly is, then we need to protect them. If we follow a policy of suddenly landing enormous industrial developments into these areas, we will have no high value landscapes left because once heavily industrialised, the distinctive appearance and character that make them high value is lost for good.

5. Proposed Wind Farm Layout

It is clear from even a cursory examination of the wind farm layout that the site is much too tight for the number and size of turbines being proposed. It is also clear from the EIAR that maximising power output from the proposed site was the sole focus during the wind farm design phase.

> *The working footprint of the wind farm was finalised with involved landowners and the footprint was optimised to maximise the power output while increasing the setback distances from houses to 700m.*[13]

[13] EIAR Table 4.5: Evolution of project design EIAR: Chapter 4 – Project Need and Alternatives Considered

Taking a closer look at the evolution of the design, iteration no. 1 consisted of ten turbines with a 650 metres setback buffer to houses and a maximum wind farm capacity of 45MW.[13]

Iteration no. 2 followed which per the EIAR, *"aimed to provide fewer turbines with a greater tip height and rotor diameter,"* while at the same time optimising power output and *"increasing the setback distances from houses to 700m".*[13] The EIAR is clear that this re-design reduced the maximum capacity of the site from 45MW to 40.5MW due to the loss of one turbine, but through the use of turbines with a greater tip-height and rotor diameter, power output was optimised and the setback buffer to houses increased from 650 metres to 700 metres (presumably because of the turbine height increase).

What the EIAR fails to point out is that iteration no. 2 resulted in the spacing between the remaining turbines being significantly reduced. The net result, in terms of inter-turbine spacing from iteration no. 1, the initial design, with smaller turbines to the final design with bigger turbines is a significant reduction in turbine spacing, a spacing that was already tight to begin with. Table 1 clearly shows that in the prevailing wind direction, the spacing between turbines in the initial design was on average 425 metres but this average spacing shrunk to 387 metres in the final design. In rotor diameter terms the reduction is about 0.26 but this is likely an underestimate.[14]

Key (downwind) Seperation Distances between Turbines	Design Iteration No. 1 Seperation in Metres (approx as exact loaction not stated in EIA)	Design Iteration No. 1 Seperation in Rotor Diameters (150M assumed but EIA suggests smaller rotor diameter)	Final Design Iteration Seperation in Metres (exact loactions used from EIA)	Fiinal Design Iteration Speration in Rotor Diameters (150M rotor diamter used per EIA)	Reduction in Seperation in Metres (Interation no. 1 to Final Design)	Reduction in Seperation in Rotor Diameters (Interation no. 1 to Final Design)
T1-T2	435	2.90	381	2.54	-54	-0.36
T3-T4	432	2.88	402	2.68	-30	-0.20
T4-T5	429	2.86	387	2.58	-42	-0.28
T5-T6	399	2.66	386	2.57	-13	-0.09
T7-T8	456	3.04	375	2.50	-81	-0.54
T8-T9	399	2.66	388	2.59	-11	-0.07
Average	425	2.83	387	2.58	-38.5	-0.26

Table 1 – Turbine separation distances in prevailing wind direction

Renewables First, a UK consultancy firm, specialising in designing and building, amongst other things, wind power advises that turbines *"need to be around '5 rotor diameters' apart so that they don't affect each other with turbulence."*[15] Lichao et al[16] state that,

> *"High turbulence intensity induced by the wake effect in wind farms is of great significance to the fatigue life of wind turbines"* and that *"spacing between wind turbines in a wind farm is about 6–10 turbine diameters in the prevailing wind*

[14] Calculation for Iteration no. 1 uses a rotor diameter of 150 metres as the smaller rotor diameter alluded to in the EIAR for Iteration no. 1 of the layout is not given in the EIAR

[15] https://renewablesfirst.co.uk/renewable-energy-technologies/windpower/community-windpower/location-size-no-of-wind-turbines/

[16] Applied Energy Volume 323 (Oct 2022) Wind farm layout optimization to minimize the wake induced turbulence effect on wind turbines

irection, which is not sufficient for the full recovery of the turbine wake, leading to a strong wake effect."

The draft Wind Energy Development Guidelines 2019[17] state that

> *"to ensure optimal performance and to account for turbulence and wake effects, the minimum distances between wind turbines will generally be three times the rotor diameter (=3d) in the crosswind direction and seven times the rotor diameter (=7d) in the prevailing downwind direction."*

It is clear therefore, that in wind farm terms, the proposed footprint is very tight and the proposed turbine spacing, particularly in the prevailing wind direction is less than what is typically recommended and crucially, is far less than what is required to account for air flow turbulence and wake effects from upwind turbines. This latter point will be discussed further in the noise section of this submission.

Furthermore, when I compare the proposed wind farm layout with Carraigcannon wind farm (~17km to the southwest), the layouts are surprisingly similar (see figure 12 below). Both wind farms have extremely tight footprints with turbines partially arranged in double rows in the prevailing wind direction. The Carraigcannon turbines are smaller however being (100metres to the tip with a rotor diameter of 70 metres). In rotor diameter terms Carraigcannon turbine spacing in the prevailing wind direction on average is ~4.5 rotor diameters (compared to ~2.6 for Tullacondra)

I draw comparison with Carraigcannon wind farm because its tight footprint and double row layout is quite similar to what is proposed for Tullacondra. And the council should be aware that Carraigcannon Wind Farm led to seven homes being abandoned due to noise with an admission of full liability to noise nuisance at ~1km in the Irish High Court[18].

Clearly, the Tullacondra wind farm has a very similar extremely tight footprint with turbines which are too many, too large and spaced too tightly together. This has very significant negative effects in terms of both visual impact (an entangled clustering effect) and in terms of noise impact, (which I will address in more detail later).

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[17] Section 4.9.6 Windtake Draft Revised Wind Energy Development Guidelines December 2019

[18] High Court cases 2011 9852 P, 2011 9893 P, 2011 9854 P, 2011 9954 P, 2011 9955 P, 2011 9956 P, 2011 10137 P

Figure 12
(Prosposed Tullacondra WF layout above
versus Carraigcannon WF layout below at the same scale)

In addition to the extremely tight layout, the proposed siting of the permanent met mast is particularly poor. The applicant's own wind monitoring survey[19] shows the predominant prevailing wind direction is ~north westerly, roughly ~280° to ~325°, (figure 13). But directly upwind from the proposed met mast siting in that very direction, T4 is positioned a mere ~230 metres away with T3, also in that exact

[19] EIAR Figure 13.7: Distribution of wind speed and direction during survey 28 Jun – 27 July 2022 EIAR Chapter 13 – Noise & Vibration

direction, only ~400 metres behind T4. This means the met mast will experience a double wake effect from both T4 and T3 in the predominant prevailing wind direction with T4 only ~ 1.5 rotor diameters away. I strongly contend that due to significant turbulence and inherent loss of energy in the oncoming wind in the immediate wake of two turbines, met mast measurements from this crucial wind direction will not be reliable.

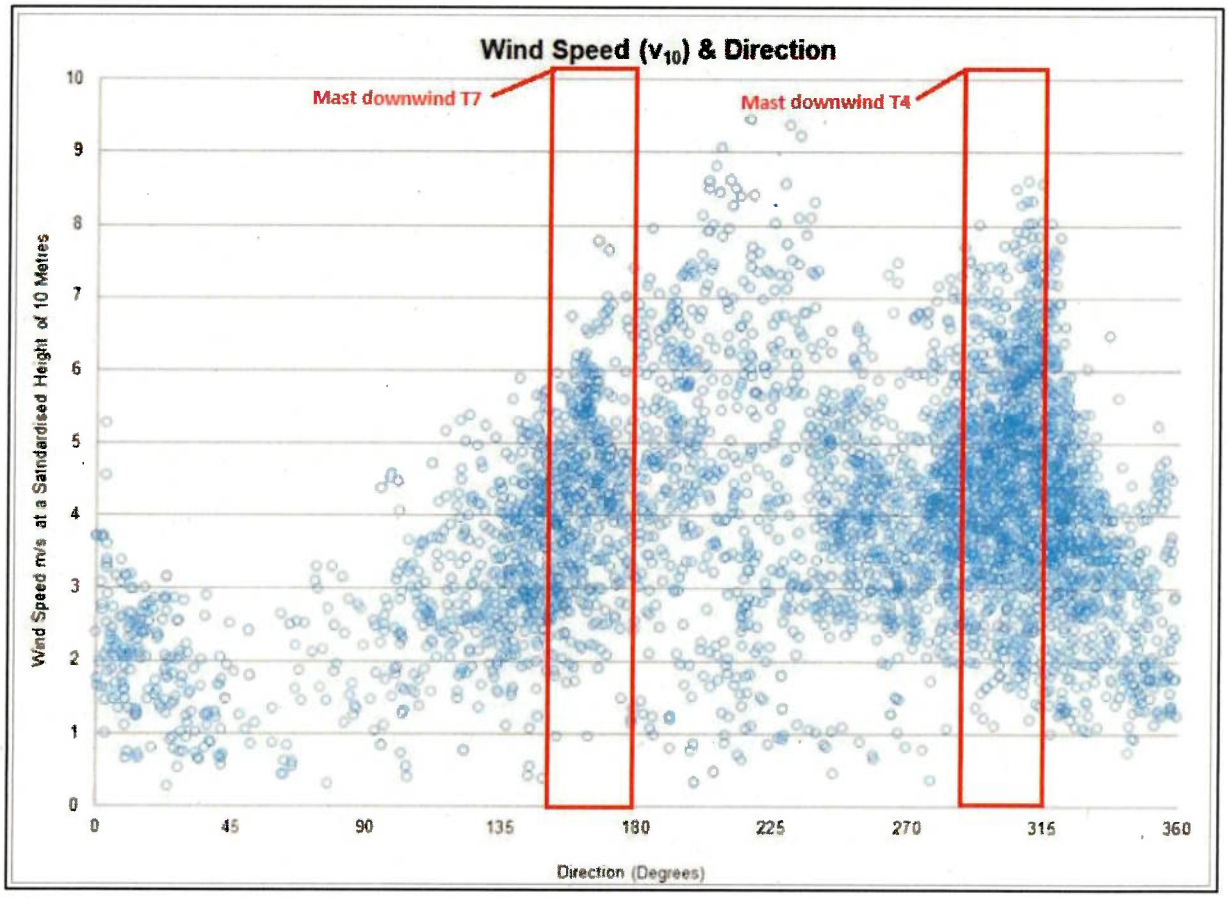

Figure 13

EIAR wind speed and direction graph showing Mast directly downwind of T4 in predominant NW wind direction and Mast directly downwind T7 in significant S-SE wind direction

Another significant wind direction highlighted by the applicant's own wind monitoring data is from a south to south-easterly direction (roughly ~130° to 180°). Here again, when the wind comes from this direction, the met mast will find itself downwind of T7, being only ~290 metres (or just ~2 rotor diameters) away. Again, a significant wake effect on the mast will occur.

So, for whatever reason, one of the worst possible places to site the mast is the location chosen by the applicants. I will deal with the knock-on implications of this poor siting later when I discuss the applicant's proposed noise mitigation plan.

To summarise, it is obvious for the proposed footprint, that the intended turbines are much too large, are too many in number and are packed in far too tightly together. In addition, the siting of the met mast could not be any worse.

6. <u>Noise</u>

I firmly believe, given my own personal experiences, that this development will have a profound negative impact in terms of the surrounding soundscape both in terms of proposed noise levels and noise character. I will discuss the noise aspects of the proposed project under the following sub headings

6.1 Noise – Monitoring Setup and Background Noise Results
6.2 Noise – Predicted Turbine Noise v Background Noise
6.3 Noise – Proposed Noise Limits
6.4 Noise – Proposed Noise Level Mitigation
6.5 Noise – Amplitude Modulation
6.6 Noise – Amplitude Modulation and absence of any proposed mitigation

6.1 Noise – Monitoring Setup and Background Noise Results

The EIAR lacks clarity and is missing key details about monitoring setups and how the results were obtained.

a. There is a photo of noise monitoring location BN1, but the picture provided gives very limited information regarding the placement of the monitor. From figure 13.2 of the EIAR, it seems the monitor was placed close to a dwelling but there is no dwelling visible in the picture provided. Hence, one cannot judge whether the monitor placement meets best practice in terms of representing an amenity area, whether it is sufficiently distant from reflective surfaces, from noise sources such as boilers, from bushes too close etc. This being the case it is not possible to be certain that the noise results obtained for BN1 are representative of the houses the EIAR associates with this monitoring location.

b. The EIAR provides no pictures for the BN3 monitoring setup and therefore, once again, no judgment can be made as to whether the siting and setup of that monitor was appropriate and meets best practice. Again, we cannot therefore say if the results obtained are valid, are representative and can be relied upon.

c. The EIAR details of the monitoring equipment used is incomplete. At every location a Brüel and Kjaer 2250 sound monitor was used but no details are provided in terms of the microphones or wind shields used. Neither are there any details of sound meter calibration. This is important because, the results across the four monitoring locations are not consistent. The noise floor[20] of the Brüel and Kjaer 2250 sound meter is around ~16dB and the nighttime results for BN2 & BN3 reach this value (as figure 14 shows for BN3). What is inconsistent is the noise floor for nighttime noise at BN1 at around 20dB and in particular, BN4, higher again at ~22dB (figure 15 which

[20] Definition of Noise Floor: The self-generated noise of a sound level meter, usually due to the microphone or pre-amplifier. This is therefore the level below which the meter cannot read https://pulsarinstruments.com/

shows the nighttime results for BN4) even though the sound monitors used were the same at all locations. When the two graphs are overlaid with each other the noise floor difference of ~6dB is striking (figure 16 showing nighttime results for BN4 with BN3 results overlaid).

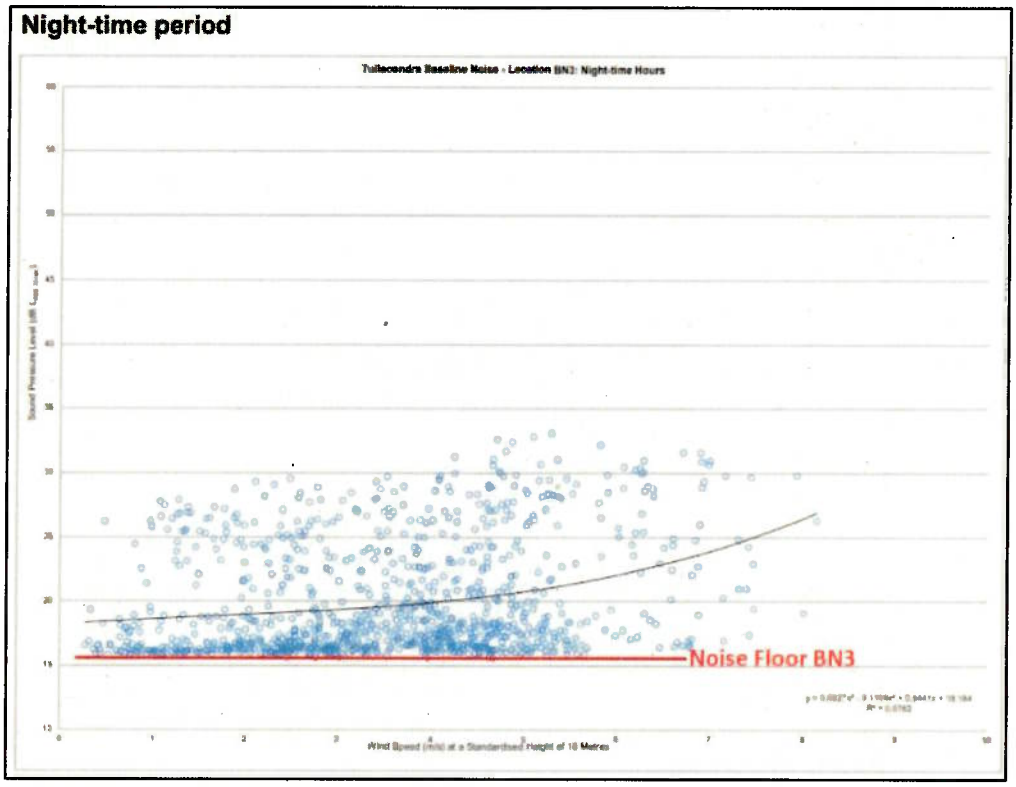

Figure 14
(EIAR figure 13. 13: BN3 Night-time periods
with Noise Floor at ~16dB added as red line)

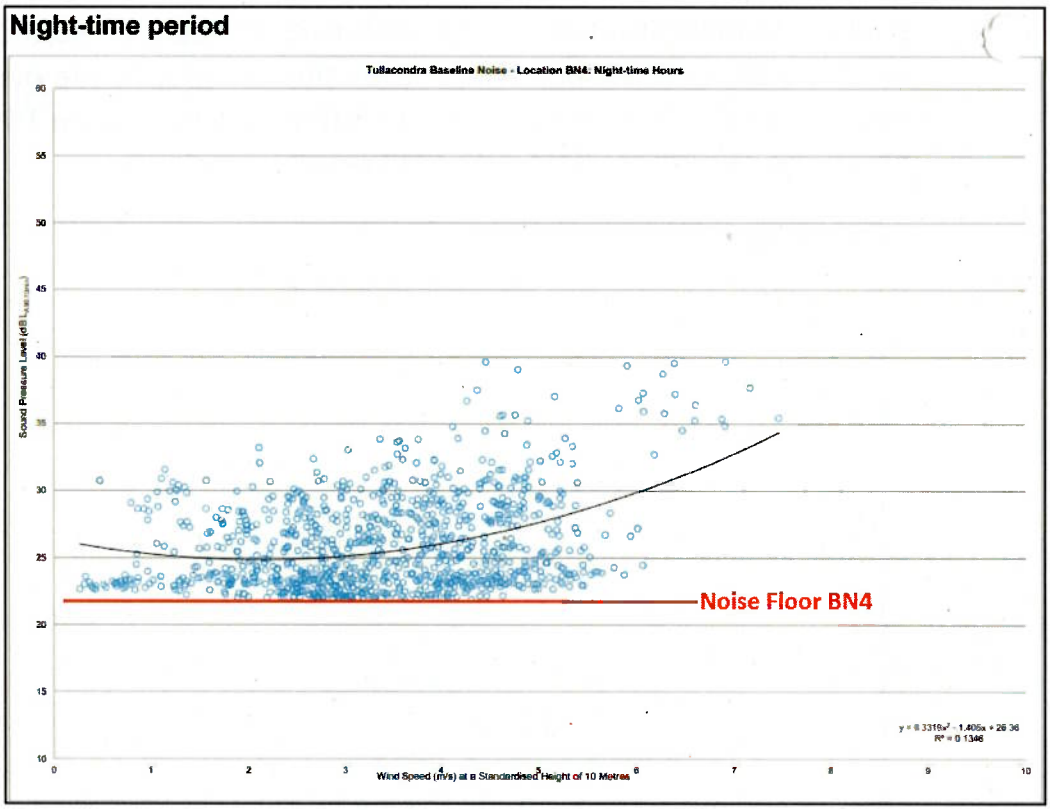

Figure 15
(EIAR figure 13. 15: BN4 Night-time periods
with Noise Floor at ~22dB added as red line)

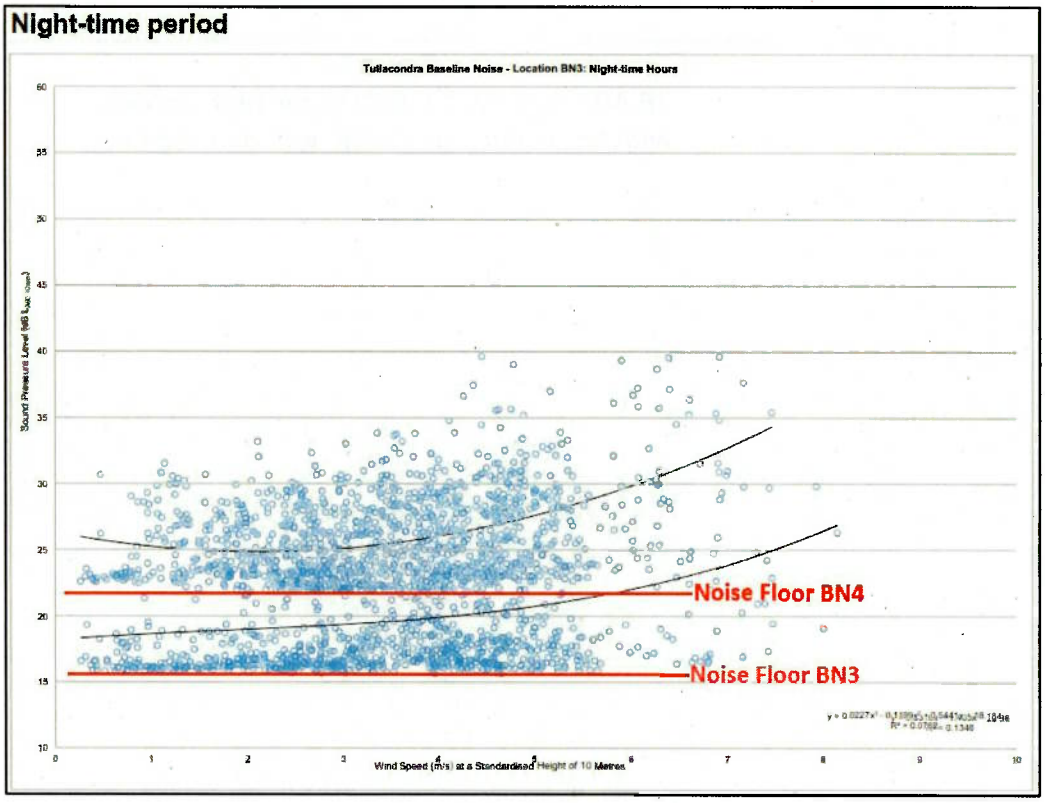

Figure 16
(EIAR figure 13. 13 & figure 13:15 overlaid with each other with
Noise Floor added for BN3 ~16dB and BN4 ~22dB as red lines)

Because of the EIAR's general lack of detail around such items as the wind shields and microphones used, their calibration details and the poor photographs provided, it is difficult to reconcile these monitoring inconsistencies. It could, of course be that BN4 is a noisier location than BN2 or BN3 but the latter are nearer busier roads and from my local knowledge I would expect the noise results for all four locations to be broadly similar. And this is not the case with BN4 especially looking like an outlier.

Graphing the monitoring results of derived background noise levels taken from Table 13.9 in the EIAR (titled Summary of baseline background sound levels, dB), it can be seen in figures 17 & 18 that there is reasonable correlation between BN2 & BN3 and to a lesser extent between them and BN1. However, BN4, which as explained earlier has the highest noise floor gives consistently higher derived results, always ~5dB to ~6dB greater than the other monitors. The analysis, strongly suggests that the BN4 derived results are out of line, are artificially high and may not be accurate.

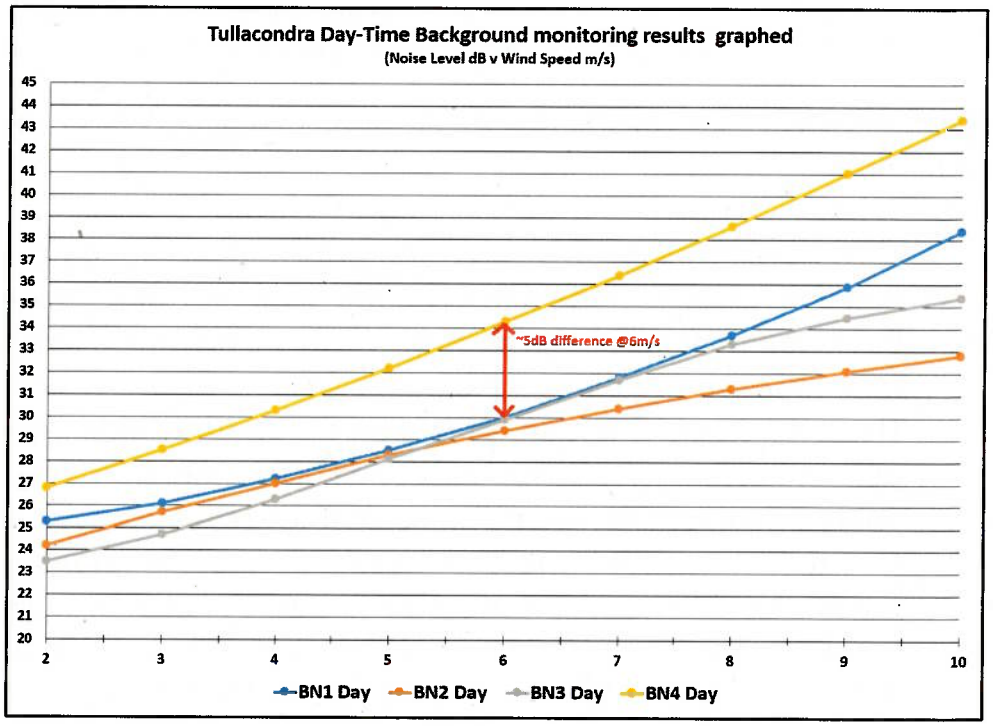

Figure 17
EIAR derived daytime background noise results graphed

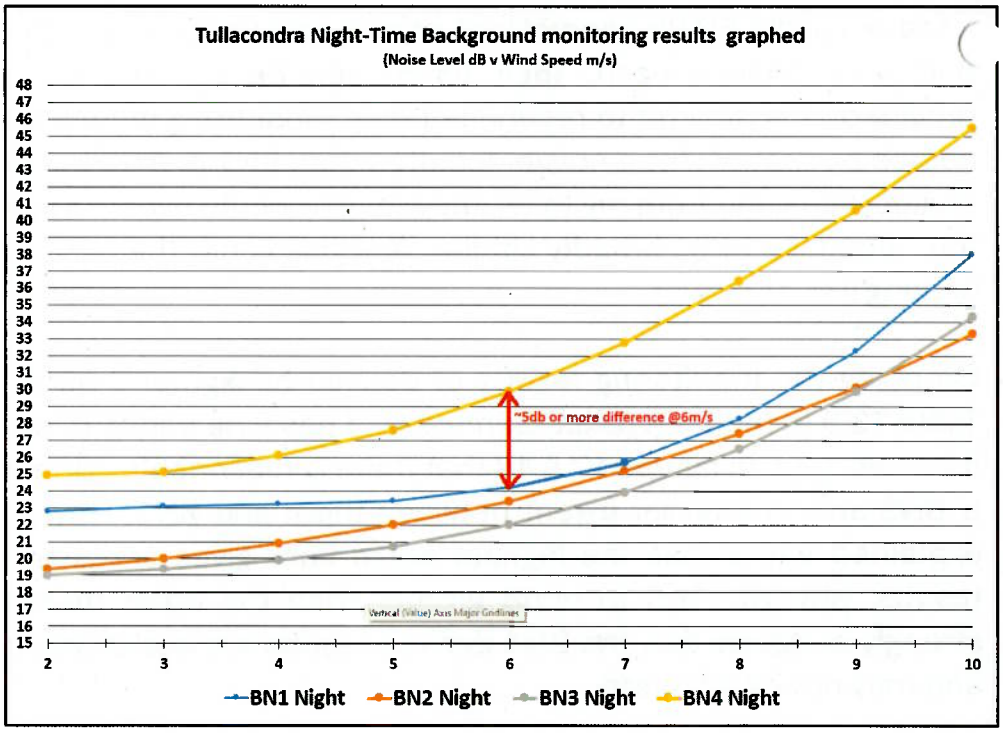

Figure 18
EIAR derived nighttime background noise results graphed

There could be several reasons for these inconsistencies in the noise floor of the monitoring setups

i. The microphone used at BN1 and in particular at BN4 may well have had a noise floor higher than that of the monitors and much higher than the background noise of the locality. For very quiet areas like this one, low noise microphones should be considered.
ii. There may have been an issue with the wind shields used at BN1 and BN4 preventing the meter measuring to its noise floor of ~16dB.
iii. There may have been some noise source in the vicinity of BN4 in particular or within the monitoring setup itself causing the measured results to be artificially elevated. But this noise source was ever present during the monitoring period because not one night-time sample at BN4 throughout the more than four-week monitoring period fell below 22dB at BN4, more suggestive of an issue with the monitoring setup itself.

The real possibility of the monitoring equipment itself influencing the noise results at BN4 and to a lesser degree at BN1 is briefly discussed in the 2013 SEAI commissioned Marshall Day Report[21] into the significance of noise in relation to onshore wind farms, where the report advises that

> *"[w]hile unattended measurement methods are well documented in a number of jurisdictions, the robustness and accuracy of results can be*

[21] Marshall Day Acoustics EXAMINATION OF THE SIGNIFICANCE OF NOISE IN RELATION TO ONSHORE WIND FARMS Commissioned by Sustainable Energy Authority of Ireland (SEAI) 2013

influenced by many factors such as equipment noise floor and wind screen performance."

I believe this is what may be at issue with the results obtained at BN4 in particular and unfortunately, the EIAR, severely lacking in detail, provides little insight as to what that issue might be. The results for the remaining monitoring stations may indeed accurately measure the background noise level but due to a serious lack of detail in terms of monitoring setups including a lack of proper photographic evidence, we cannot say this with certainty.

6.2 Noise – Predicted Turbine Noise v Background Noise

From the EIAR monitoring results, during nighttime hours, background noise levels are seen to drop to ~16dB and possibly even lower given that the monitors used can only measure down to around ~16dB. Even at a 10-metre standardised wind speed of 6m/s, the daytime background noise average is about ~30dB with nighttime levels averaging just ~23dB across three of the four noise monitors[22]. At 7m/s, these three monitors average just ~31dB by day and 25dB at night. To put these extremely low figures in context the United States Federal Aviation Administration[23] considers a quiet rural environment to be around 40dB (figure 19). Daytime averages for Tullacondra and its surrounds are much lower with nighttime values far lower again. It is clear therefore, that this is an exceptionally quiet area.

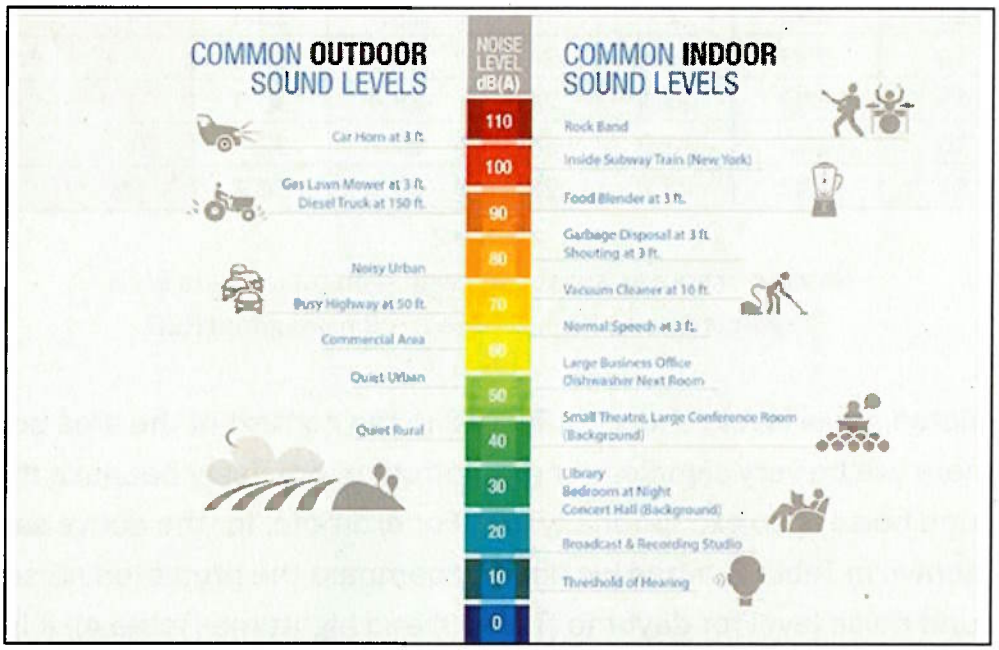

Figure 19
(US Federal Aviation Administration – Fundamentals of Noise)

[22] As explained in section 6.1, BN4 noise results may not be reliable
[23] https://www.faa.gov/regulations_policies/policy_guidance/noise Fundamentals of Noise

The surprisingly low background levels at 6 & 7 m/s 10-metre standardised wind speeds are especially important because at these wind speeds the proposed turbines will reach maximum power and sound output. For example, Table 2 below shows the higher predicted noise levels at 10-meter standardised windspeeds at 6m/s & 7 m/s for a sample of houses associated with monitoring location BN3.

Predicted Noise Levels at Receptors							
House Number	Monitor	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s
2	BN3	27.3	28.3	31.8	36.7	40.5	41.2
3	BN3	27.4	28.4	31.8	36.8	40.5	41.2
4	BN3	24.2	25.2	28.7	33.6	37.4	38.1
5	BN3	24	25	28.4	33.4	37.1	37.8
6	BN3	23.7	24.7	28.1	33.1	36.8	37.5
7	BN3	23	24	27.4	32.4	36.1	36.8
8	BN3	22.6	23.6	27	32	35.7	36.4
9	BN3	23.1	24.1	27.6	32.6	36.3	37
10	BN3	23.2	24.2	27.6	32.6	36.3	37
11	BN3	23.3	24.3	27.7	32.7	36.4	37.1
12	BN3	23.6	24.6	28	33	36.7	37.4
13	BN3	24	25	28.4	33.4	37.1	37.8
14	BN3	23.5	24.5	27.9	32.9	36.6	37.3
15	BN3	23.9	24.9	28.4	33.3	37.1	37.8
16	BN3	23.3	24.3	27.7	32.7	36.4	37.1
17	BN3	24.9	25.9	29.3	34.3	38	38.7

Table 2
Sample of houses associated with monitor location BN3.
Predicted noise levels above 35dB highlighted RED

The predicted noise levels shown in Table 2 in the context of the area being so quiet shows there will be very significant noise intrusion precisely because the background noise is so exceptionally low. For example, for the above sample of houses shown in Table 2, when we directly compare the predicted noise to the background noise level for daytime (Table 3) and nighttime (Table 4), it is immediately clear that turbine noise will dominate the soundscape, especially during nighttime hours as highlighted as shown in figure 22[24].

[24] For complete tables of Predicted Noise Levels for all houses versus Background see Appendix B

Predicted Noise levels above Daytime Background(BG)									
Day	23.5	24.7	26.3	28.1	29.9	31.7	33.3	34.5	35.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	3.8	3.6	5.5	8.6	10.6	9.5	7.9	6.7	5.8
3	3.9	3.7	5.5	8.7	10.6	9.5	7.9	6.7	5.8
4	0.7	0.5	2.4	5.5	7.5	6.4	4.8	3.6	2.7
5	0.5	0.3	2.1	5.3	7.2	6.1	4.5	3.3	2.4
6	0.2	0	1.8	5	6.9	5.8	4.2	3	2.1
7	-0.5	-0.7	1.1	4.3	6.2	5.1	3.5	2.3	1.4
8	-0.9	-1.1	0.7	3.9	5.8	4.7	3.1	1.9	1
9	-0.4	-0.6	1.3	4.5	6.4	5.3	3.7	2.5	1.6
10	-0.3	-0.5	1.3	4.5	6.4	5.3	3.7	2.5	1.6
11	-0.2	-0.4	1.4	4.6	6.5	5.4	3.8	2.6	1.7
12	0.1	-0.1	1.7	4.9	6.8	5.7	4.1	2.9	2
13	0.5	0.3	2.1	5.3	7.2	6.1	4.5	3.3	2.4
14	0	-0.2	1.6	4.8	6.7	5.6	4	2.8	1.9
15	0.4	0.2	2.1	5.2	7.2	6.1	4.5	3.3	2.4
16	-0.2	-0.4	1.4	4.6	6.5	5.4	3.8	2.6	1.7
17	1.4	1.2	3	6.2	8.1	7	5.4	4.2	3.3

Table 3 – Sample of houses associated with monitor location BN3
Predicted noise levels above Daytime Background level
Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB above BG

Predicted Noise levels above Nighttime Background(BG)									
Night	19	19.4	19.9	20.7	22	23.9	26.5	29.9	34.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	8.3	8.9	11.9	16	18.5	17.3	14.7	11.3	6.9
3	8.4	9	11.9	16.1	18.5	17.3	14.7	11.3	6.9
4	5.2	5.8	8.8	12.9	15.4	14.2	11.6	8.2	3.8
5	5	5.6	8.5	12.7	15.1	13.9	11.3	7.9	3.5
6	4.7	5.3	8.2	12.4	14.8	13.6	11	7.6	3.2
7	4	4.6	7.5	11.7	14.1	12.9	10.3	6.9	2.5
8	3.6	4.2	7.1	11.3	13.7	12.5	9.9	6.5	2.1
9	4.1	4.7	7.7	11.9	14.3	13.1	10.5	7.1	2.7
10	4.2	4.8	7.7	11.9	14.3	13.1	10.5	7.1	2.7
11	4.3	4.9	7.8	12	14.4	13.2	10.6	7.2	2.8
12	4.6	5.2	8.1	12.3	14.7	13.5	10.9	7.5	3.1
13	5	5.6	8.5	12.7	15.1	13.9	11.3	7.9	3.5
14	4.5	5.1	8	12.2	14.6	13.4	10.8	7.4	3
15	4.9	5.5	8.5	12.6	15.1	13.9	11.3	7.9	3.5
16	4.3	4.9	7.8	12	14.4	13.2	10.6	7.2	2.8
17	5.9	6.5	9.4	13.6	16	14.8	12.2	8.8	4.4

Table 4 – Sample of houses associated with monitor location BN3
Predicted noise levels above Nighttime Background level

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

The EIAR claims the noise level impact will not be significant[25] because the levels will be under noise limits they propose with reference to the out-of-date 2006 Wind Energy Guidelines. Relying on such out-of-date guidelines is unsafe and in doing so the EIAR is both misguided and misleading. In their 2023 report[26] commissioned by the UK's Department of Business, Energy & Industrial Strategy, consultants WSP note that ETSU-R-97 (and by extension the out-of-date Irish 2006 guidelines since they are largely based on ETSU) allows a nighttime minimum noise limit that is less stringent than the daytime and this is unique to the UK and Ireland compared to other jurisdictions.

In contrast to the EIAR's claims, I believe the predicted turbine noise will have a serious negative adverse noise impact. To try and quantify this impact, the British Noise Standard BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound is worth consulting. It is a noise standard that is continually being reviewed and updated (the latest version being BS 4142:2014+A1:2019) unlike the 2006 Wind Energy Guidelines which have never been updated following initial publication and are now widely viewed as not fit for purpose. This context-based guidance assesses the likely consequences when applied to the emergence of the noise above background and there is nothing precluding its use in Irish planning[27]. The standard concludes for noise relative to background that:

- *A difference of around +10dB or more is likely to be an indication of a **significant adverse impact**, depending on the context.*
- *A difference of around +5dB or more is likely to be an indication of an adverse impact, depending on the context.*

If we apply these criteria to the predicted noise levels at the sample of homes in Table 2 - Predicted noise levels above Daytime Background, BS 4142 indicates adverse impact at all homes in the sample with significant adverse impact at houses 2, 3 and 17.

The picture is much worse during nighttime hours. Here, looking at Table 4 - Predicted noise levels above Nighttime Background, BS 4142 indicates significant

[25] Apart from Receptor 17 which the EIAR says can be dealt with by way of Noise Mitigation
[26] Department for Business, Energy & Industrial Strategy: A REVIEW OF NOISE GUIDANCE FOR ONSHORE WIND TURBINES September 2023
[27] In fact, BS 4142:2014 was used in the assessment of possible tonal noise at a number of wind farms including Knocknalour Wind Farm for Wexford County Council by leading acoustics consultants RPS Group in 2017

adverse impact at every house in the sample where dB noise level exceedance will be in the mid-teens.

In layman's terms, the EIAR predicted noise data, if compared directly against the EIAR's background noise results, clearly indicates that during daytime hours, turbine noise will often dominate the soundscape, during nighttime hours it will frequently overwhelm it, with as many as 74 homes associated with BN1, BN2 & BN3 very significantly or profoundly affected[28]. This should not come as a surprise as the monitoring data shows this to be a very quiet area with BS 4142, a robust context-based standard, indicating unequivocally that noise complaints are virtually certain to occur. And this from a standard which is maintained and updated unlike the 2006 Wind Energy guidelines which are not.

6.3 Noise – Proposed Noise Limits

The EIAR implies the noise level impact will not be significant because noise will be under the noise limits it proposes with reference to the 2006 Wind Energy Guidelines. Cork County Council must realise that it is no longer credible for wind developers to give such assurances based on noise limits recommended by guidelines that are woefully out of date and have been proved repeatedly that they truly are not fit for purpose. While the guidelines advise that

> *"[a]n appropriate balance must be achieved between power generation and noise impact,"*

it is irrefutable given the widespread noise complaints and court cases that have ensued, that these guidelines fail dismally to achieve this balance. Chief reason for this is the fact that turbine size has almost tripled since the guidelines were drafted. One major consequence arising is the increasing influence of wind shear (or wind speed gradient) as turbine heights increase. With excessively tall turbines, sufficient wind at turbine hub height enables the turbines to operate and reach maximum output, while there is little or no wind and hence little masking at ground level. This issue is immediately apparent with this application, where for example at 6m/s standardised wind speed the predicted turbine noise can be ~38dB while average background is only around 22dB. That is a ~16dB increase over the soundscape or a threefold increase in perceived noise. It is only logical then, in such a quiet rural area, totally submerged by dominant industrial noise three times louder than background, that distress and complaints will follow. The proposed limits will allow this to happen and therefore, I say they will abjectly fail in striking that balance between power output and noise impact. In fact, all the proposed noise limits do,

[28] I did not consider homes associated with BN4 as background noise results here may not be reliable.

when one compares background levels with the noise the limits and by extension the 2006 guidelines will allow, is to highlight once again how out of date and misguided those guidelines truly are.

6.4 Noise – Proposed Noise Level Mitigation

The EIAR identifies just one home/receptor (H17) as potentially affected by noise exceedance (at 38.0dB, the noise will be 0.5dB above proposed daytime limit) which the EIAR classifies as a

> *"Significant, adverse, long-term effect...calculated to occur at one receptor (H17), during daytime hours (07:00 to 23:00hrs), at 6m/s (v10) wind speed, and when the wind is blowing 220 to 340 degrees from north (i.e., broadly westerly winds)."*

The proposed mitigation, deploying noise reduced mode LO2 on T6, T8 & T9 will reduce the noise level at H17 from 38.0dB to 37.4dB at 6m/s and will the EIAR asserts render the Significant, adverse long-term effect on H17 to Not Significant which is clarified as

> *"an effect which causes noticeable changes in the character of the environment but without significant consequences."*

The EIAR categorises 38.0dB at 6m/s as a significant, adverse, long-term effect and then declares that a 0.6dB reduction will somehow fix the problem. But earlier, when advocating for a daytime noise limit of 37.5dB instead of a lower 35dB limit, the EIAR states that *"a difference of 2.5dB...is small and would be typically imperceptible."*

So, we have the EIAR claiming that a 0.6dB reduction will address a *"[s]ignificant, adverse, long-term effect"*, while at the same time saying that four times 0.6dB or 2.5dB difference is *"typically imperceptible"*. Clearly, the proposed noise level mitigation is a farce and a mere paper exercise which cannot be given any credence. The reality for H17, is the noise above background will be significant during the day and profound during nighttime hours where perceived noise will be a threefold increase above background. As stated previously, leaving aside the properties associated with noise monitoring location BN4, there are 74 homes which will be very significantly impacted by turbine noise and a mitigation strategy of 0.6dB, which is indeed imperceptible will not make one iota of difference. It is meaningless mitigation.

Besides, any mitigation measures will presumably use the onsite met mast to try to co-ordinate the operating mode switch of T6, T8, T9 to LO2 mode when the wind is supposedly at 6m/s. But as shown earlier the poor positioning of the met mast and the wind farm layout will result in significant wake effect turbulence at the met mast and through downwind turbines, rendering the proposed mitigation, worthless and all as it is, unimplementable because the met mast measurements themselves will not be reliable and the actual wind speed at the turbine hubs will be turbulent and everchanging.

6.5 Noise – Amplitude Modulation

The RenewableUK 2013 study concluded that the fundamental cause of Other Amplitude Modulation (OAM) was transient stall conditions occurring as the blades rotate, giving rise to the periodic thumping at the blade passing frequency.[29] Renewable UK commissioned further research into the mechanisms and causes of OAM and this research[30] found that

- significant wind shear and wind turbulence can cause changes in the angle at which a wind turbine blade comes into contact with the wind (the angle of attack of turbine blades) as they rotate through each 360-degree cycle;
- in more extreme cases, these changes can push the blades into partial stall over part of their rotation;
- in such conditions of partial blade stall, OAM can occur;

In their 2023 report[31] commissioned by the UK's Department of Business, Energy & Industrial Strategy, consultants WSP confirm that

> *"research evidence suggest that wind turbine wakes, especially in stable atmospheric conditions, can enhance wind turbine sound propagation and the potential for AM."*

As well as transient blade stall and turbine wake effects, the WSP report also identifies "*inflow turbulence variation*" as a potential cause of OAM[32]. So clearly, all the more recent research affirm to wind shear, wake effects and inflow turbulence

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[29] IOA Noise Working Group (Wind Turbine Noise) Amplitude Modulation Working Group Discussion Document Methods for Rating Amplitude Modulation in Wind Turbine Noise 2015

[30] RenewableUk Wind Turbine Amplitude Modulation: Research to Improve Understanding as to its Cause and Effect December 2013

[31] Department for Business, Energy & Industrial Strategy: A REVIEW OF NOISE GUIDANCE FOR ONSHORE WIND TURBINES September 2023

[32] The WSP report refers to OAM as non-TEDCAR-AM (non-trailing edge directivity and convective amplification-related AM)

as significant contributors to the likely occurrence of OAM (all three factors being present in this wind farm due to the turbine size and tight layout being proposed).

The EIAR argues that the occurrence of OAM is rare, cannot be foreseen at the planning stage and should complaints of OAM occur, can be dealt with through measurement and mitigation. The EIAR concedes however that when OAM does occur it can

> *"persist for several hours."*[33]

The EIAR describes Normal AM (NAM) as blade swish (which it is) while OAM includes other periodic variations of whoomph or thump type noise where

> *"the fundamental difference is that there is a low to mid frequency component (125 to 250Hz) to the AM in thump which does not occur in swish."*[34]

Hence AM can be extremely intrusive, in fact devastating for those affected, both due to its attention-grabbing ability and its Low Frequency Noise (LFN) content especially when it penetrates indoors and for long periods.

The EIAR bases much of its claims on the results of the Salford report (2007) that concluded OAM is a relatively rare phenomenon and when it does occur, happens only between 7% to 15 % of the time.

The EIAR is wrong on a number of counts

- OAM in the far field occurs far more commonly than the EIAR contends and is more likely to occur at the proposed wind farm due to the turbine size and tight footprint as explained earlier.
- On wind farms where OAM does occur, it can occur frequently and is not easily mitigated.
- Proposing a wait and see approach with no proper mitigation proposal for such a serious issue is simply no longer good enough and should not be entertained by Cork County Council

6.5.1 OAM – Likelihood of Occurrence

MAS Environmental Ltd conducted much field research into the occurrence of AM at distance, compiling a list of over 30 wind farms across the UK generating OAM.[35] Many of these were not included in the 2007 Salford report, meaning the Salford

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[33] Amplitude Modulation (AM) EIAR Chapter 13: Noise & Vibration. Appendix 13.2
[34] Why Turbine Noise Annoys – Bowdler (2011)
[35] https://www.masenv.co.uk/operational-wind-farms (2015)

report grossly underestimates the occurrence of OAM. Further research by MAS Environmental over several years at Cotton Wind Farm, Graveley, Cambridgeshire established that when a wind farm exhibits the problem of OAM it can occur frequently.[36] Specifically, MAS Environmental found at Cotton Wind Farm

> *"during a 10-month period 54% of nights were significantly affected by periods of AM with modulation depth (MD) of +5dBA. A focused study of 2 months of data found:*
>
> - *82% of nights MD+5dBA (46 nights)*
> - *30% nights classed severe AM (17 nights)*
> - *10% nights classed borderline MD+5dBA (6*
> - *nights)*
> - *18% nights little or no MD+5dBA (10 nights)*
> - *4 continuous nights of severe MD+5dBA"*

There is further evidence that OAM occurs frequently when we again consider the noise nuisance case mentioned on the MAS Environmental website.[37] Noise graphs are presented for three different properties over a period spanning more than four years (Jan'12 to Aug'16) and OAM is a recurring feature in all graphs and across all seasons. Clearly at this wind farm where nuisance was admitted, OAM occurred frequently and like Cotton wind farm, any mitigation measures if tried must have failed.

Thus, AM/OAM is a common phenomenon associated with wind farm operation, a fact even the wind industry finally accepted (though it continues to claim it is rare in planning applications), given the admission of Dr. Jeremy Bass at the Bryn Llewelyn Wind Farm appeal in October 2013. Dr. Bass who was at the time in-house acoustician at the major UK wind developer, Renewable Energy Systems Ltd (RES), said

> *"foolishly ... we went along the industry line that amplitude modulation is rare.... I think that argument (dealing with AM by way of statutory nuisance law) is completely exploded by the weight of evidence.... we are in a difficult position now ... the landscape has changed and I suspect .... **in the future developers will no longer try the argument that AM is rare**".*

Furthermore, acoustician Mr. Dick Bowdler a long-time member of Institute of Acoustics (IOA) who was awarded the IOA Medal in recognition of outstanding

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[36] Cotton Farm Wind Farm – Long term community noise monitoring project – 2 years on. – Stigwood, Large Stigwood (2015)

[37] Case Study - Wind Farm Noise Nuisance - MAS Environmental Ltd

contributions to research and developments in the field of engineering acoustics and whose speciality is wind farm noise, also agrees OAM is not rare. In February 2021[38,39] in a submission to An Bord Pleanala planning PL04 .308885 where the Salford report was also relied upon, Mr. Bowdler states that

> *"...the Salford study referred to is, as the footnote states, dated 2007. The suggestion that 4 out of 133 windfarms might have AM is far too old to be of any value. The turbines surveyed, for example, had an average height to blade tip of about 70m. It is now recognised that the possibility of AM is significant in any modern windfarm."*

My own personal experience also leads me to believe that OAM is NOT an infrequent occurrence. I have personally verified OAM at distance at the following wind farms

- Boggeragh Wind Farm, North Cork – numerous occasions, OAM clearly audible
- Boggeragh II Wind Farm, North Cork – numerous occasions, OAM clearly audible
- Scartaglin Wind Farm, North Kerry – Two visits and OAM clearly audible on both occasions
- Grouselodge Wind Farm, West Limerick - Two visits and OAM clearly audible on one occasion
- Rathnacally Wind Farm, North Cork – One visit and OAM clearly audible
- Taurbeg Wind Farm, North Cork – One visit and OAM clearly audible
- Esk Wind Farm, North Cork – Three visits and OAM clearly audible on two occasions

These seven wind farms are in the North Cork/North Kerry/West Limerick area and all seven exhibit OAM, so it is not a rare occurrence. It should also be noted that a number of these wind farms, Boggeragh II[40] and Scartaglin[41] resulted in legal cases, a key complaint in both being the suffering caused by frequent and incessant OAM. These cases were settled through mediation, not through noise mitigation.

Clearly, the EIAR is utterly wrong, when trying to argue that OAM is rare. Either it is out of touch with developments in the wind turbine noise debate or it is deliberately trying to mislead by relying on an outdated report dealing with turbines of only ~70 metres, a report one of the leading wind farm noise experts has said *"is far too old to be of any value."*

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[38] Dick Bowdler Note on Amplitude Modulation (AM) submitted to An Bord Pleanala Case reference: PL04 .308885
[39] See Appendix A for Dick Bowdler Note on AM in full
[40] 2017 4762 P KELLEHER & ANOR -V- GREEN ENERGY SUPPLY LIMITED & ANOR (case involved three separate homes)
[41] 2019 9091 P COOKE & ANOR -V- SCART ENERGY DAC

Finally, when we consider the tight layout of this proposed wind farm, the WSP report to the UK government mentioned earlier, concludes that the turbine wake effects and inflow turbulence do contribute to OAM occurrence, indicating once again, that, if built as proposed, there is a substantial risk of OAM occurring at this wind farm.

6.5.2 OAM – Likely Noise Impact should OAM occur

OAM is increasingly being taken much more seriously because the noise impact when it occurs is extremely intrusive. This is apparent if we look to the recent Wexford High Court where nuisance due to wind turbine noise and OAM in particular was established. In her judgment[42] Ms. Justice Emily Egan was satisfied that there were

> *"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"*

which together with thump AM, rendered the wind turbine noise *"the dominant noise in the .... sound environment."* She unequivocally states that these features

> *"[i]n combination, I find that this is WTN[43] which reasonable people would find it impossible to habituate to."*

What the judge is manifestly saying is that when OAM occurs over frequent and sustained periods (thump AM being a feature of OAM), it will cause a high degree of annoyance and is impossible to habituate to.

I believe I have proved given the turbine size and tight layout of the wind farm, that there is a significant risk of OAM occurring and even the EIAR itself agrees that such occurrences *"can persist for several hours."* Therefore, should OAM occur, the impact will likely be very significant.

We now need to turn again to British Standard BS4142 to try and quantify what OAM impact will mean for Tullacondra should it arise. Analysis of the noise recordings gathered as part of the Wexford case found the AM displayed considerable impulsivity (sudden changes in sound level). Where impulsivity is present in the noise, BS4142 advises the addition of a penalty.

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[42] MARGARET WEBSTER AND KEITH ROLLO AND MEENACLOGHSPAR (WIND) LIMITED ROSS SHORTEN AND JOAN CARTY AND MEENACLOGHSPAR (WIND) LIMITED JUDGMENT of Ms. Justice Emily Egan delivered on the 8th day of March 2024

[43] WTN = wind turbine noise

"of 3dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

If we assume impulsive OAM is <u>just</u> perceptible and apply a +3dB penalty to the Tables 3 & 4, we get the following for day and nighttime predicted noise levels (Tables 5 & 6). Clearly, what BS4142 tells us in Tables 5 & 6, is that if just perceptible OAM occurs and assuming it lasts for several hours which the EIAR agrees can happen, the overall noise impact across a wide range of wind speeds will be such as to lead to widespread complaints as the resulting noise above background with the +3dB penalty added is frequently around +10dB by day and substantially above that level during nighttime hours.

Predicted Noise levels above Background Daytime (BS4142 secton 9.2: +3dB penalty for just perceptable impulsivity)									
Day	23.5	24.7	26.3	28.1	29.9	31.7	33.3	34.5	35.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	6.8	6.6	8.5	11.6	13.6	12.5	10.9	9.7	8.8
3	6.9	6.7	8.5	11.7	13.6	12.5	10.9	9.7	8.8
4	3.7	3.5	5.4	8.5	10.5	9.4	7.8	6.6	5.7
5	3.5	3.3	5.1	8.3	10.2	9.1	7.5	6.3	5.4
6	3.2	3	4.8	8	9.9	8.8	7.2	6	5.1
7	2.5	2.3	4.1	7.3	9.2	8.1	6.5	5.3	4.4
8	2.1	1.9	3.7	6.9	8.8	7.7	6.1	4.9	4
9	2.6	2.4	4.3	7.5	9.4	8.3	6.7	5.5	4.6
10	2.7	2.5	4.3	7.5	9.4	8.3	6.7	5.5	4.6
11	2.8	2.6	4.4	7.6	9.5	8.4	6.8	5.6	4.7
12	3.1	2.9	4.7	7.9	9.8	8.7	7.1	5.9	5
13	3.5	3.3	5.1	8.3	10.2	9.1	7.5	6.3	5.4
14	3	2.8	4.6	7.8	9.7	8.6	7	5.8	4.9
15	3.4	3.2	5.1	8.2	10.2	9.1	7.5	6.3	5.4
16	2.8	2.6	4.4	7.6	9.5	8.4	6.8	5.6	4.7
17	4.4	4.2	6	9.2	11.1	10	8.4	7.2	6.3

Table 5

Sample of houses associated with monitor location BN3
Predicted noise levels above <u>Daytime</u> Background level with
+3dB penalty applied for presence of just perceptible impulsive OAM
Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB above BG
Highlighted Purple greater than 12dB above BG

Predicted Noise levels above Background Nighttime (+3dB penalty for just perceptable impulsivity)									
Night	19	19.4	19.9	20.7	22	23.9	26.5	29.9	34.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	11.3	11.9	14.9	19	21.5	20.3	17.7	14.3	9.9
3	11.4	12	14.9	19.1	21.5	20.3	17.7	14.3	9.9
4	8.2	8.8	11.8	15.9	18.4	17.2	14.6	11.2	6.8
5	8	8.6	11.5	15.7	18.1	16.9	14.3	10.9	6.5
6	7.7	8.3	11.2	15.4	17.8	16.6	14	10.6	6.2
7	7	7.6	10.5	14.7	17.1	15.9	13.3	9.9	5.5
8	6.6	7.2	10.1	14.3	16.7	15.5	12.9	9.5	5.1
9	7.1	7.7	10.7	14.9	17.3	16.1	13.5	10.1	5.7
10	7.2	7.8	10.7	14.9	17.3	16.1	13.5	10.1	5.7
11	7.3	7.9	10.8	15	17.4	16.2	13.6	10.2	5.8
12	7.6	8.2	11.1	15.3	17.7	16.5	13.9	10.5	6.1
13	8	8.6	11.5	15.7	18.1	16.9	14.3	10.9	6.5
14	7.5	8.1	11	15.2	17.6	16.4	13.8	10.4	6
15	7.9	8.5	11.5	15.6	18.1	16.9	14.3	10.9	6.5
16	7.3	7.9	10.8	15	17.4	16.2	13.6	10.2	5.8
17	8.9	9.5	12.4	16.6	19	17.8	15.2	11.8	7.4

Table 6

Sample of houses associated with monitor location BN3
Predicted noise levels above Nighttime Background level with
+3dB penalty applied for presence of just perceptible impulsive OAM
Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

If we now assume impulsive OAM is clearly perceptible and apply a +6dB penalty as BS4142 advises, to Tables 3 & 4, we get day and nighttime predicted noise levels shown in Tables 7 & 8. Here BS4142 shows that if clearly perceptible OAM occurs and assuming it lasts for several hours, the noise impact will be horrific, across nearly all wind speeds, leading to widespread complaints during day and night.

Predicted Noise levels above Background Daytime (+6dB penalty for clearly perceptable impulsivity)									
Day	23.5	24.7	26.3	28.1	29.9	31.7	33.3	34.5	35.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	9.8	9.6	11.5	14.6	16.6	15.5	13.9	12.7	11.8
3	9.9	9.7	11.5	14.7	16.6	15.5	13.9	12.7	11.8
4	6.7	6.5	8.4	11.5	13.5	12.4	10.8	9.6	8.7
5	6.5	6.3	8.1	11.3	13.2	12.1	10.5	9.3	8.4
6	6.2	6	7.8	11	12.9	11.8	10.2	9	8.1
7	5.5	5.3	7.1	10.3	12.2	11.1	9.5	8.3	7.4
8	5.1	4.9	6.7	9.9	11.8	10.7	9.1	7.9	7
9	5.6	5.4	7.3	10.5	12.4	11.3	9.7	8.5	7.6
10	5.7	5.5	7.3	10.5	12.4	11.3	9.7	8.5	7.6
11	5.8	5.6	7.4	10.6	12.5	11.4	9.8	8.6	7.7
12	6.1	5.9	7.7	10.9	12.8	11.7	10.1	8.9	8
13	6.5	6.3	8.1	11.3	13.2	12.1	10.5	9.3	8.4
14	6	5.8	7.6	10.8	12.7	11.6	10	8.8	7.9
15	6.4	6.2	8.1	11.2	13.2	12.1	10.5	9.3	8.4
16	5.8	5.6	7.4	10.6	12.5	11.4	9.8	8.6	7.7
17	7.4	7.2	9	12.2	14.1	13	11.4	10.2	9.3

Table 7

Sample of houses associated with monitor location BN3

Predicted noise levels above Daytime Background level with

+6dB penalty applied for presence of clearly perceptible impulsive OAM

Highlighted Orange greater than 5dB & less than 8dB above BG

Highlighted Red greater than 8dB above BG

Highlighted Purple greater than 12dB above BG

Predicted Noise levels above Background Nighttime (+6dB penalty for clearly perceptable impulsivity)									
Night	19	19.4	19.9	20.7	22	23.9	26.5	29.9	34.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	14.3	14.9	17.9	22	24.5	23.3	20.7	17.3	12.9
3	14.4	15	17.9	22.1	24.5	23.3	20.7	17.3	12.9
4	11.2	11.8	14.8	18.9	21.4	20.2	17.6	14.2	9.8
5	11	11.6	14.5	18.7	21.1	19.9	17.3	13.9	9.5
6	10.7	11.3	14.2	18.4	20.8	19.6	17	13.6	9.2
7	10	10.6	13.5	17.7	20.1	18.9	16.3	12.9	8.5
8	9.6	10.2	13.1	17.3	19.7	18.5	15.9	12.5	8.1
9	10.1	10.7	13.7	17.9	20.3	19.1	16.5	13.1	8.7
10	10.2	10.8	13.7	17.9	20.3	19.1	16.5	13.1	8.7
11	10.3	10.9	13.8	18	20.4	19.2	16.6	13.2	8.8
12	10.6	11.2	14.1	18.3	20.7	19.5	16.9	13.5	9.1
13	11	11.6	14.5	18.7	21.1	19.9	17.3	13.9	9.5
14	10.5	11.1	14	18.2	20.6	19.4	16.8	13.4	9
15	10.9	11.5	14.5	18.6	21.1	19.9	17.3	13.9	9.5
16	10.3	10.9	13.8	18	20.4	19.2	16.6	13.2	8.8
17	11.9	12.5	15.4	19.6	22	20.8	18.2	14.8	10.4

Table 8

Sample of houses associated with monitor location BN3

Predicted noise levels above Nighttime Background level with
+6dB penalty applied for presence of clearly perceptible impulsive OAM
Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

It should, therefore, be abundantly clear from the above discussion, that if OAM occurs at Tullacondra and persists for sustained periods, the noise impact will be profoundly negative for the local community and will lead to widespread complaints.

6.6 Noise – Amplitude Modulation and absence of any proposed mitigation

To summarise succinctly the EIAR position on AM, it opines that

- OAM occurrence cannot be foreseen, it occurs infrequently/rarely
- Standard practice is to investigate only when there are complaints post construction and put mitigation measures in place at that stage if complaints are upheld

This totally reactive indifferent approach taken by the applicant to the risk of OAM occurring is diametrically opposite to the focused proactive best practice approach epitomised by a commonly used engineering and business methodology to analyse and manage risk & potential failure effectively and proactively called FMEA. It is a methodology I am personally familiar with and I introduce it here to highlight the absurdity of the applicant's approach to AM/OAM. FMEA is an abbreviation for Failure Mode and Effects Analysis (FMEA), defined by the American Society for Quality (ASQ) as

> *"a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service.[44]"*

The US federal Agency CMS describes FMEA as

> *"a structured way to identify and address potential problems, or failures and their resulting effects on the system or process before an adverse event occurs"[45].*

As stated by the ASQ, FMEA is a tool used commonly where

[44] https://asq.org/quality-resources/fmea Failure Mode and Effects Analysis (FMEA),
[45] https://www.cms.gov/medicare/provider-enrollment-and-certification/qapi/downloads/guidanceforfmea.pdf

- *"Failure modes" means the ways, or modes, in which something might fail. Failures are any errors or defects, especially ones that affect the customer, and can be potential or actual.*
- *"Effects analysis" refers to studying the consequences of those failures.*

FMEA involves classifying or scoring the risk of a failure or negative event occurring, assigning a score from 1 to 10 based on the likelihood of occurrence, 1 being very unlikely and 10 being almost inevitable. The severity or seriousness of the event is also classified from 1 to 10, 1 being no discernible effect while 10 affects safe operation or involves government/regulatory non-conformance. A score of 7 or 8 does not affect safe operation or involves government/regulatory non-conformance but may cause disruption of change to subsequent processes. Finally, a detection score, that is the likelihood of detecting the event occurrence is also required, 1 meaning the event is almost certain to be detected with 10 meaning the event is almost impossible to detect. These three classification scores, (O)ccurence, (S)everity, (D)etection, are multiplied together to get an overall RPN or Risk Priority Number which is a numerical assessment of the risk assigned to a failure mode

$$O \times S \times D = RPN$$

Let us now apply the FMEA methodology to the risk of OAM occurring at Tullacondra Wind Farm to see what a proper, proactive and credible approach looks like.

Occurrence Score O – For Tullacondra I would suggest a score of 7 which equates to the event occurring roughly once per month. This would more than align with Mr. Dick Bowlder's views and would be an underestimate of MAS Environmental's findings at Cotton Farm. Personally, I believe the risk of OAM occurring at Tullacondra warrants a higher score in particular because the wind farm layout will make OAM occurrence more likely but let's be conservative and say 7.

Severity Score S – Here a score of 9 could easily be justified. This score is warranted as persistent OAM with high modulation depth will likely cause regulatory non-conformance as happened recently in the Wexford High Court case[46] where noise nuisance due to persistent OAM was established. Taking a more conservative approach, a score of 7 reflects a state of affairs where there is a high degree of dissatisfaction expressed which I believe reasonably equates to a high level of complaints received but where regulatory non-conformance is not occurring.

Detection Score D – Here I suggest a score of about 6. In some respects, a score of 10 could be argued given that the applicant admits there will be no detection method in place, the applicant instead relying on complaints arising. But again,

[46] Webster et al v Meenacloghspar Wind Ltd 2018 8457 P

taking a conservative approach a score of 6 equates to post event detection scheme where detection rate is deemed low.

If we multiply these scores together

$$7 \times 7 \times 6 = 294$$

we arrive at a RPN number of 294, which would be deemed high requiring immediate corrective action even though we scored it conservatively. In short, the score warrants a detailed strategy to bring the RPN number down below an acceptable limit either by reducing the risk of occurrence, the severity of the event or by improving the likelihood of detection with a view to immediate mitigation measures being implemented.

In contrast, the applicant's strategy, if it can be called that, is a Let's Do-Nothing approach. If it occurs, we'll then investigate and then decide on how it might be mitigated.

The Council should also be aware that there is no record of OAM mitigation being successfully deployed anywhere so how can the applicant be confident it can be mitigated successfully. Van den Berg (2023)[47] could identify only two studies into AM mitigation, one by Cand & Bullmore and the second by Mackowski & Carolus. The latter dealt with NAM or Normal AM which occurs nearer the turbine so that leaves just one study into OAM. Cand & Bullmore employed two methods, one involving a kit installed on the turbine blades with the second method involving a change to the blade pitch angle. While results were positive in terms of a reduction in prevalence using the kit and in modulation depth where blade pitch was used, I personally know their method of changing blade pitch achieved only mixed results.

The applicant, therefore, is proposing OAM mitigation, where only one study was ever undertaken (which did not eliminate the issue) and where there is no subsequent record of successful deployment at any wind farm.

Persistent highly intrusive OAM occurred over a period of months and even years in some cases at Boggeragh II, Scartaglin, Grouselodge, Esk & Meenacloghspar wind farms and not at one of these was OAM mitigation successfully deployed. So why would anyone give credence to the applicant's assertion that should OAM occur, mitigation will be successfully deployed at Tullacondra? I assert that the EIAR is indulging once again in another instance of meaningless mitigation for the sake of appearance.

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[47] The Relevance of AM Mitigation: Frits van den Berg – Forum Acusticum 2023

It is far more likely that should OAM occur, the applicant will do very little unless complainants are brave enough and have the financial resources, to plead their case in court where eventually, the applicant will likely opt for property buyout rather than OAM mitigation. Boggeragh II and Scartaglin fall into this category. Esk resulted in property buyout without the need for court proceedings. A case against Grouselodge is still proceeding through the courts, while noise nuisance was established against Meenacloghspar with the issue of damages still being dealt with. The key point being, that in all above cases where OAM was a key ingredient of the intrusive noise, mitigation was either tried and failed or was never tried at all.

Therefore, given there are reasonable grounds to expect that OAM will likely occur at this proposed wind farm (due to the turbine size, blade length and tight layout as explained earlier), I believe the application should be refused because the applicant has no credible means of addressing OAM when it will occur.

Ms. Justice Egan in her Wexford case judgment, highlights a "*lacunae in the* [planning] *permission*" when it comes to the "*consideration, assessment or regulation of this feature* [AM] *of WTN.*" This omission then around AM, given that planning was granted in 2004, is understandable but it cannot be allowed to occur in 2024, knowing what we now know about AM/OAM and what I have clearly demonstrated. That is that the risk of OAM occurring at this proposed wind farm is real and should it occur will have extremely serious consequences.

The lacunae where AM/OAM is concerned still persists in planning guidance today, the out-of-date 2006 Wind Energy guidelines not even discussing the issue and because of this omission, fails in its key objective to achieve a balance between power generation and noise impact.

In recommending refusal in a recent wind farm application, the An Bord Pleanala inspector, acknowledges AM as an important issue and refers to the planning deficit when he states in his report[48]

> "*that* [wind turbine] *noise (and amplitude modulation in particular) is an important issue on which there is a significant and distinct lack of clarity...it could also reasonably include a ... reason for refusal as follows:*
>
> *Having regard to:*
>
> *(a) The acceptance of potential adverse noise impacts from the proposed development resulting from amplitude modulation,*
>
> *(b) The lack of any guidance in the Wind Energy Development Guidelines:*

[48] An Bord Pleanala Inspector's Addendum Report ABP-315656-23

Guidelines for Planning Authorities (June, 2006) on amplitude modulation,
and
(c) The lack of any proposed measures to mitigate impacts from amplitude
modulation,

the Board is not satisfied that the proposed wind farm, in itself and cumulatively with other wind energy development in the vicinity, would not seriously injure the amenities of residential property in the vicinity by way of adverse noise effects."

Ms. Justice Egan and the ABP planner highlight the same deficit in planning and that same deficit exists in the applicant's EIAR documents which seriously mislead in relation to OAM's likely occurrence and proposes nothing whatsoever by way of meaningful mitigation.

7. Inadequate Community Engagement

The applicant details in Table 3.3 EIAR Volume II Main Report what, at first glance, seems an impressive list of community engagement activities. However, this aspect of the project was nothing more than a tick the box exercise, the chief goal being to minimise as much as possible any true meaningful interaction with the community.

A government advisory document on the subject, titled Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement[49] is worth reading to understand what constitutes effective and well managed community engagement. Some key points include:

- Early engagement with the local community *"throughout each stage of the project, e.g., feasibility, design, EIAR and planning, tender, construction, and operation."*
- The need of project promotors *"to ensure the widest possible consultation with individuals and communities from the commencement of the project. Project promoters should make every effort to identify those to engage with and should be flexible and facilitative in the way they approach this engagement including, for example, in relation to the timing and venues for engagement."*

[49] Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement https://assets.gov.ie/109110/b419a104-e6df-4a3e-a7ef-172166932bee.pdf

In short proper community engagement involves engagement at a very early stage and sharing as much detail as possible with as many people as possible within the community. In my view, the applicant failed to come anywhere close to meeting these government guidelines and here is why:

- According to the EIAR[50], the earliest engagement with the local community was in early January 2023, when local elected representatives were notified, and a letter and brochure were posted to each household within a 2km radius of the proposed project. If the applicant was serious about proper engagement, then
    - Why are so many local residents living within 2km complaining until very recently that they had heard nothing about the proposed project?
    - Why limit the correspondence to 2km? As stated earlier this is a gargantuan development which will massively disrupt and alter the local environment, the construction period alone will run for 18 months involving major road re-alignment, well over four and a half thousand large load deliveries according to the EIAR with cabling laying along 13.5km of local roads.
- It then appears that over three days in late January 2023, door to door visits took place within a 1km radius where the applicant managed to engage with 20 residents and deliver a note/leaflet to 22 residents.
    - Again, given the size and scale of the development, why only call to those within 1km???
    - This means the applicant successfully met a person from less than 50% of households within 1km or from just ~14% of households within 2km distance. And that assumes everyone they met was from a different household which may not even be the case. Assuming it is, in three days going door to door, the applicant managed NOT to meet ~86% of households within a 2km radius.
    - And what about the two nearest settlements, Lisgriffin and Ballyclough, which are only ~2km and ~3km from the nearest turbine respectively. Why were there no door to door calls in these villages? Why no public notices? If the applicant really wanted to "engage" surely these villages should have been canvassed. As a Ballyclough resident, I only heard about the proposed wind farm accidently because I happen to walk my dog along L5302 near the proposed site entrance and met a resident who brought the subject up. Otherwise, I'd have been none the wiser.
- The one and only public meeting was held on Wednesday, February 8th 2023 in the late afternoon/early evening ending at about 8pm. Typically at this time, people are at work, picking up children from school, coming home from work, getting food prepared, milking cows etc. It was poorly

[50] EIAR Table 3.3 EIAR Volume II Chapter 3: Scoping, Consultations, Community Engagement and key issues

advertised, the date and time chosen to ensure minimum participation I believe.

- Finally, it is clear from careful reading of the EIAR, that the project feasibility, wind farm design & layout and much of the EIAR groundwork had all been completed by the time the local community was approached. The photomontage files carry a date stamp of September 2022, meaning the turbine number, size and windfarm layout were decided well in advance of any community engagement. Ornithological field surveys of the wind farm site first commenced in 2020 according to Ornithology Baseline Report[51]

Little of the above comes even remotely close to meeting the Government's Code of Practice. Community engagement commenced two to three years after project feasibility commenced with the project design phase being completed well before engagement started. Engagement in reality meant nothing more than presenting the community with a fait acompli, which when I consult a dictionary means a thing that has already happened or been decided before those affected know, leaving them with little option but to accept it.

It must surely be clear that the community engagement aspect of this application was perfunctory at best and at worst deliberately disingenuous. I believe Cork County Council need to take this sharp practice into account during their deliberations.

Final Summary

I wish to object to the proposed planning application because

- My own personal experiences of exposure to intrusive wind turbine noise at distances of over 1km tells me that there is a very real risk of the same thing happening to a large number of homes if this planning is approved.

- The EIAR terminology used risks misleading the planning authority and the public regarding the true impact of the proposed development.

- Community engagement was grossly inadequate, coming nowhere near to meeting the Government's Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement.

- The proposed development runs contrary to both objective 13-7 of the CCDP 2022 and the classification of the area as a "High Value Landscape and will have a profound negative impact on the visual quality of the surrounding

[51] Section 2.2 Field survey overview EIAR Appendix 8.1 – Ornithology Baseline Report Tullacondra Windfarm Project

landscape.

- This lowland high value landscape has managed to retain much of its traditional appearance and rural character. We need to protect these remaining areas, in particular this one, given its high value status and the fact that it is rather unique in largely escaping up until now the encroachment of large scale infrastructure and industry.

- The wind farm layout is much too tight, with turbines that are much too large, are too many in number and are packed much too closely together. In addition, the siting of the met mast is especially poor. This poor layout, as explained has serious negative consequences in terms of visual impact, and especially noise impact & noise mitigation.

- Noise monitoring details are either missing or inadequate and no calibration details are provided

- Noise monitoring results for BN4 may not be reliable.

- The area being exceptionally quiet, as shown by the EIAR background readings, means predicted turbine noise levels will cause significant adverse impact by day and a profound negative impact at night, potentially overwhelming the soundscape.

- The noise level limits proposed with reference to guidelines long out of date will allow up to a threefold increase in perceived noise level, submerging the area in dominant industrial which will certainly lead to noise complaints and distress.

- The proposed noise level mitigation is meaningless, will have no effect and in any case will not be implementable due to the poor positioning of the met mast.

- The EIAR seriously misleads in terms of the likelihood of OAM occurrence. I believe there is a significant risk, in particular because of the proposed turbine size and wind farm layout. Should OAM occur, the impact will be profound and extremely damaging.

- Given the seriousness of the issue and the likelihood of occurrence, the indifferent shrug of the shoulders approach to AM/OAM taken by the applicant is totally unacceptable. There seems to be little grasp or awareness by the applicant of how serious the issues will be for local residents should OAM manifest itself.

- The EIAR has no credible mitigation strategy should OAM arise, proposing a wait and see position where mitigation will then be explored even though there is no record anywhere of successful mitigation deployment for OAM.

- As pointed out by Ms. Justice Egan in the recent Wexford nuisance case, there is a significant gap in planning when it comes to AM/OAM and has been for twenty years. It is inconceivable that this proposal would receive approval when this very serious deficit in planning which had resulted in numerous noise nuisance cases and severe distress for many homes and families is known. The time for ignoring the issue and hiding behind patently outdated guidelines (as the applicant tries to do) must surely be over, especially in light of Justice Egan's views.

APPENDIX A

COOM GREEN ENERGY PARK

NOTE ON AMPLITUDE MODULATION (AM)

Section 7.2.3 of the EIAR discusses AM (or "blade swish"). I would like to clarify a few of the points in this section because, although nothing is incorrect, the overall impression given, that it is not a significant issue, is not consistent with the facts.

The first paragraph says in part "'*The Assessment and Rating of Noise from Wind Farms' (1996), which states that '... modulation of blade noise may result in variation of the overall A-Weighted noise level by as much as 3 dB(A) (peak to trough) when measured close to a wind turbine... 'and that at distances further from the turbine where there are'... more than two hard, reflective surfaces, then the increase in modulation depth may be as much as 6 dB(A) (peak to trough)'. It concludes that 'the noise levels (i.e. limits) recommended in this report take into account the character of noise described ... as blade swish'*"

This is a quote from Chapter 6 of ETSU-R-97. The quote in the last sentence of the paragraph above has 3 words missing. The full sentence is "*The noise levels recommended in this report take into account the character of noise described in Chapter 3 as blade swish.*" It does not refer to the text in Chapter 6. Chapter 3 describes blade swish that is taken into account in the limits in some detail and it needs to be read in full, but in summary it says blade swish is 2-3dB near the turbine falling off with distance. So, for example the noise limits in ETSU-R-97 do not take account of a 6dB blade swish where there are more than two reflective surfaces.

The second point I make is that the Salford study referred to is, as the footnote states, dated 2007. The suggestion that 4 out of 133 windfarms might have AM is far too old to be of any value. The turbines surveyed, for example, had an average height to blade tip of about 70m.

It is now recognised that the possibility of AM is significant in any modern windfarm. Penalty systems have been devised in the UK and proposed in 2019 Draft. The IEC, that publishes the IEC61400 standards for wind turbines is drafting a new standard for wind turbine noise at receptor positions which includes AM.

Dick Bowdler

6th February 2021

APPENDIX B

BN1: Predicted Noise Levels at Receptors (>35dB highlighted RED)

House Number	Monitor	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s
27	BN1	26.8	27.8	31.2	36.2	40	40.7
28	BN1	23.2	24.2	27.6	32.6	36.3	37
29	BN1	25.7	26.7	30.2	35.1	38.9	39.6
110	BN1	22.1	23.1	26.5	31.5	35.2	35.9
111	BN1	21.3	22.4	25.8	30.8	34.5	35.2
112	BN1	21.3	22.3	25.8	30.7	34.4	35.1
113	BN1	21.4	22.4	25.8	30.8	34.5	35.2
114	BN1	21.4	22.4	25.8	30.8	34.5	35.2
127	BN1	21.7	22.8	26.2	31.2	34.9	35.6
128	BN1	20.8	21.8	25.3	30.2	33.9	34.6
129	BN1	22.2	23.2	26.6	31.6	35.3	36
130	BN1	19.9	20.9	24.3	29.3	33	33.7
131	BN1	20.2	21.2	24.6	29.6	33.3	34
132	BN1	20	21	24.4	29.4	33.1	33.8
133	BN1	19.6	20.6	24	29	32.7	33.4
136	BN1	21.6	22.6	26	31	34.7	35.4
137	BN1	20.1	21.1	24.6	29.5	33.2	33.9
138	BN1	19.8	20.8	24.2	29.2	32.9	33.6
139	BN1	19.1	20.2	23.6	28.6	32.3	33
140	BN1	18.1	19.1	22.5	27.5	31.2	31.9
141	BN1	18.1	19.1	22.5	27.5	31.2	31.9
142	BN1	18.1	19.1	22.5	27.5	31.2	31.9
143	BN1	18.7	19.7	23.2	28.1	31.8	32.5
144	BN1	16.4	17.4	20.8	25.8	29.5	30.2
145	BN1	16.2	17.2	20.7	25.6	29.3	30
146	BN1	20.5	21.5	24.9	29.9	33.6	34.3
147	BN1	20.7	21.7	25.1	30.1	33.8	34.5
148	BN1	20.9	21.9	25.3	30.3	34	34.7
149	BN1	16.3	17.4	20.8	25.8	29.5	30.2
27A	BN1	26.8	27.8	31.2	36.2	39.9	40.6

BN2: Predicted Noise Levels at Receptors (>35dB highlighted RED)

House Number	Monitor	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s
1	BN2	24.2	25.2	28.6	33.6	37.3	38
31	BN2	21.3	22.3	25.8	30.7	34.5	35.2
33	BN2	20.5	21.5	24.9	29.9	33.6	34.3
34	BN2	21.4	22.4	25.8	30.8	34.5	35.2
35	BN2	23.3	24.3	27.8	32.7	36.5	37.2
36	BN2	21.3	22.3	25.7	30.7	34.4	35.1
37	BN2	21.3	22.3	25.7	30.7	34.4	35.1
38	BN2	21.6	22.6	26	31	34.7	35.4
39	BN2	22.4	23.4	26.8	31.8	35.5	36.2
40	BN2	22.6	23.6	27	32	35.7	36.4
41	BN2	22.6	23.6	27	32	35.7	36.4
42	BN2	22.3	23.3	26.7	31.7	35.4	36.1
43	BN2	20.7	21.7	25.2	30.1	33.8	34.5
44	BN2	17	18	21.4	26.4	30.1	30.8
45	BN2	16.2	17.2	20.6	25.6	29.3	30
46	BN2	16.1	17.1	20.5	25.5	29.2	29.9
47	BN2	15.7	16.8	20.2	25.2	28.9	29.6
150	BN2	19.9	20.9	24.3	29.3	33	33.7
151	BN2	15	16	19.4	24.4	28.1	28.8
152	BN2	16.6	17.6	21	26	29.7	30.4
153	BN2	16.9	17.9	21.3	26.3	30	30.7
154	BN2	17.1	18.1	21.6	26.5	30.2	30.9
155	BN2	18.7	19.8	23.2	28.2	31.9	32.6
156	BN2	19.3	20.3	23.8	28.7	32.4	33.1
157	BN2	15.8	16.8	20.3	25.2	28.9	29.6
158	BN2	14.7	15.8	19.2	24.1	27.9	28.6
159	BN2	20.3	21.3	24.7	29.7	33.4	34.1
157A	BN2	15.7	16.7	20.1	25.1	28.8	29.5
31A	BN2	21	22	25.4	30.4	34.1	34.8
37A	BN2	21.5	22.5	26	30.9	34.7	35.4

BN3: Predicted Noise Levels at Receptors (>35dB highlighted RED)

House Number	Monitor	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s
2	BN3	27.3	28.3	31.8	36.7	40.5	41.2
3	BN3	27.4	28.4	31.8	36.8	40.5	41.2
4	BN3	24.2	25.2	28.7	33.6	37.4	38.1
5	BN3	24	25	28.4	33.4	37.1	37.8
6	BN3	23.7	24.7	28.1	33.1	36.8	37.5
7	BN3	23	24	27.4	32.4	36.1	36.8
8	BN3	22.6	23.6	27	32	35.7	36.4
9	BN3	23.1	24.1	27.6	32.6	36.3	37
10	BN3	23.2	24.2	27.6	32.6	36.3	37
11	BN3	23.3	24.3	27.7	32.7	36.4	37.1
12	BN3	23.6	24.6	28	33	36.7	37.4
13	BN3	24	25	28.4	33.4	37.1	37.8
14	BN3	23.5	24.5	27.9	32.9	36.6	37.3
15	BN3	23.9	24.9	28.4	33.3	37.1	37.8
16	BN3	23.3	24.3	27.7	32.7	36.4	37.1
17	BN3	24.9	25.9	29.3	34.3	38	38.7
54	BN3	15.9	16.9	20.3	25.3	29	29.7
55	BN3	16.2	17.2	20.6	25.6	29.3	30
56	BN3	16	17.1	20.5	25.5	29.2	29.9
57	BN3	16.1	17.1	20.6	25.5	29.2	29.9
58	BN3	16.4	17.4	20.8	25.8	29.5	30.2
59	BN3	16.5	17.6	21	26	29.7	30.4
60	BN3	16.7	17.7	21.1	26.1	29.8	30.5
61	BN3	16.8	17.8	21.2	26.2	29.9	30.6
62	BN3	16.9	17.9	21.3	26.3	30	30.7
63	BN3	16.9	18	21.4	26.3	30.1	30.8
64	BN3	17	18	21.4	26.4	30.1	30.8
65	BN3	18.7	19.7	23.2	28.1	31.8	32.5
66	BN3	19.2	20.2	23.6	28.6	32.3	33
67	BN3	19.6	20.6	24	29	32.7	33.4
68	BN3	19.8	20.8	24.3	29.2	32.9	33.6
69	BN3	19.9	20.9	24.3	29.3	33	33.7
70	BN3	20.5	21.5	24.9	29.9	33.6	34.3
71	BN3	21	22	25.4	30.4	34.1	34.8
72	BN3	23.4	24.4	27.8	32.8	36.5	37.2
73	BN3	22	23	26.4	31.4	35.1	35.8
74	BN3	20.3	21.3	24.7	29.7	33.4	34.1
75	BN3	19.8	20.9	24.3	29.3	33	33.7
77	BN3	17.4	18.5	21.9	26.8	30.5	31.2
78	BN3	16.7	17.8	21.2	26.1	29.9	30.6
79	BN3	16.5	17.6	21	25.9	29.7	30.4
80	BN3	16.4	17.5	20.9	25.8	29.6	30.3
81	BN3	15.9	16.9	20.3	25.3	29	29.7
82	BN3	16	17	20.4	25.4	29.1	29.8
83	BN3	15.8	16.8	20.2	25.2	28.9	29.6
84	BN3	16.2	17.2	20.6	25.6	29.3	30
85	BN3	15	16.1	19.5	24.5	28.2	28.9
55A	BN3	16.3	17.3	20.7	25.7	29.4	30.1
7A	BN3	23.1	24.1	27.5	32.5	36.2	36.9

BN4: Predicted Noise Levels at Receptors (>35dB highlighted RED)

House Number	Monitor	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s
18	BN4	22.8	23.8	27.2	32.2	35.9	36.6
19	BN4	23.3	24.3	27.7	32.7	36.4	37.1
20	BN4	23	24	27.5	32.4	36.2	36.9
21	BN4	25.1	26.1	29.5	34.5	38.2	38.9
22	BN4	24.4	25.3	28.8	33.8	37.5	38.2
23	BN4	25.7	26.7	30.2	35.1	38.9	39.6
24	BN4	24.8	25.8	29.2	34.2	37.9	38.6
25	BN4	24.7	25.7	29.1	34.1	37.9	38.6
26	BN4	22.7	23.7	27.1	32.1	35.8	36.5
86	BN4	16.4	17.4	20.8	25.8	29.5	30.2
87	BN4	17.4	18.4	21.8	26.8	30.5	31.2
88	BN4	17.8	18.8	22.2	27.2	30.9	31.6
89	BN4	18	19	22.4	27.4	31.1	31.8
90	BN4	18.5	19.6	23	27.9	31.7	32.4
91	BN4	20.5	21.5	24.9	29.9	33.6	34.3
92	BN4	20.8	21.8	25.2	30.2	33.9	34.6
93	BN4	20.9	22	25.4	30.4	34.1	34.8
94	BN4	17	18	21.4	26.4	30.1	30.8
95	BN4	16.7	17.7	21.2	26.1	29.8	30.5
97	BN4	15.7	16.8	20.2	25.1	28.9	29.6
98	BN4	15.5	16.6	20	25	28.7	29.4
99	BN4	15	16	19.5	24.4	28.1	28.8
100	BN4	15.6	16.7	20.1	25	28.8	29.5
101	BN4	15.6	16.6	20	25	28.7	29.4
102	BN4	15.8	16.9	20.3	25.3	29	29.7
103	BN4	15.4	16.4	19.8	24.8	28.5	29.2
104	BN4	15.7	16.7	20.1	25.1	28.8	29.5
106	BN4	16.5	17.5	20.9	25.9	29.6	30.3
107	BN4	16.8	17.8	21.2	26.2	29.9	30.6
108	BN4	20.8	21.8	25.2	30.2	33.9	34.6
109	BN4	22.2	23.2	26.6	31.6	35.3	36
115	BN4	16.6	17.7	21.1	26	29.8	30.5
116	BN4	16.5	17.6	21	25.9	29.7	30.4
117	BN4	16.9	17.9	21.3	26.3	30	30.7
118	BN4	16.5	17.5	20.9	25.9	29.6	30.3
119	BN4	16.4	17.4	20.8	25.8	29.5	30.2
120	BN4	16.3	17.4	20.8	25.7	29.5	30.2
121	BN4	16.6	17.6	21	26	29.7	30.4
122	BN4	16.5	17.5	20.9	25.9	29.6	30.3
123	BN4	16.3	17.3	20.7	25.7	29.4	30.1
124	BN4	16.1	17.1	20.6	25.5	29.2	29.9
116A	BN4	16.5	17.6	21	26	29.7	30.4
121A	BN4	16.6	17.6	21.1	26	29.7	30.4
21A	BN4	24.7	25.7	29.2	34.2	37.9	38.6
24A	BN4	24.4	25.4	28.8	33.8	37.5	38.2
25A	BN4	24.7	25.7	29.1	34.1	37.8	38.5
87A	BN4	17.7	18.7	22.1	27.1	30.8	31.5
93A	BN4	20.6	21.6	25.1	30	33.7	34.4

Predicted Noise levels above Background Daytime

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	25.3	26.1	27.2	28.5	30	31.8	33.7	35.9	38.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	1.5	1.7	4	7.7	[illegible]	[illegible]	7	4.8	2.3
28	-2.1	-1.9	0.4	4.1	6.3	5.2	3.3	1.1	-1.4
29	0.4	0.6	3	6.6	[illegible]	7.8	5.9	3.7	1.2
110	-3.2	-3	-0.7	3	5.2	4.1	2.2	0	-2.5
111	-4	-3.7	-1.4	2.3	4.5	3.4	1.5	-0.7	-3.2
112	-4	-3.8	-1.4	2.2	4.4	3.3	1.4	-0.8	-3.3
113	-3.9	-3.7	-1.4	2.3	4.5	3.4	1.5	-0.7	-3.2
114	-3.9	-3.7	-1.4	2.3	4.5	3.4	1.5	-0.7	-3.2
127	-3.6	-3.3	-1	2.7	4.9	3.8	1.9	-0.3	-2.8
128	-4.5	-4.3	-1.9	1.7	3.9	2.8	0.9	-1.3	-3.8
129	-3.1	-2.9	-0.6	3.1	5.3	4.2	2.3	0.1	-2.4
130	-5.4	-5.2	-2.9	0.8	3	1.9	0	-2.2	-4.7
131	-5.1	-4.9	-2.6	1.1	3.3	2.2	0.3	-1.9	-4.4
132	-5.3	-5.1	-2.8	0.9	3.1	2	0.1	-2.1	-4.6
133	-5.7	-5.5	-3.2	0.5	2.7	1.6	-0.3	-2.5	-5
136	-3.7	-3.5	-1.2	2.5	4.7	3.6	1.7	-0.5	-3
137	-5.2	-5	-2.6	1	3.2	2.1	0.2	-2	-4.5
138	-5.5	-5.3	-3	0.7	2.9	1.8	-0.1	-2.3	-4.8
139	-6.2	-5.9	-3.6	0.1	2.3	1.2	-0.7	-2.9	-5.4
140	-7.2	-7	-4.7	-1	1.2	0.1	-1.8	-4	-6.5
141	-7.2	-7	-4.7	-1	1.2	0.1	-1.8	-4	-6.5
142	-7.2	-7	-4.7	-1	1.2	0.1	-1.8	-4	-6.5
143	-6.6	-6.4	-4	-0.4	1.8	0.7	-1.2	-3.4	-5.9
144	-8.9	-8.7	-6.4	-2.7	-0.5	-1.6	-3.5	-5.7	-8.2
145	-9.1	-8.9	-6.5	-2.9	-0.7	-1.8	-3.7	-5.9	-8.4
146	-4.8	-4.6	-2.3	1.4	3.6	2.5	0.6	-1.6	-4.1
147	-4.6	-4.4	-2.1	1.6	3.8	2.7	0.8	-1.4	-3.9
148	-4.4	-4.2	-1.9	1.8	4	2.9	1	-1.2	-3.7
149	-9	-8.7	-6.4	-2.7	-0.5	-1.6	-3.5	-5.7	-8.2
27A	1.5	1.7	4	7.7	[illegible]	[illegible]	6.9	4.7	2.2

BN1: Predicted Noise levels above Background Nighttime

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	22.8	23.1	23.2	23.4	24.2	25.7	28.3	32.3	38
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	4	4.7	[illegible]	12.8	15.8	15	12.4	[illegible]	2.7
28	0.4	1.1	4.4	[illegible]	12.1	[illegible]	[illegible]	4.7	-1
29	2.9	3.6	7	[illegible]	14.7	13.9	[illegible]	7.3	1.6
110	-0.7	0	3.3	[illegible]	[illegible]	[illegible]	7.6	3.6	-2.1
111	-1.5	-0.7	2.6	7.4	[illegible]	[illegible]	6.9	2.9	-2.8
112	-1.5	-0.8	2.6	7.3	[illegible]	[illegible]	6.8	2.8	-2.9
113	-1.4	-0.7	2.6	7.4	[illegible]	[illegible]	6.9	2.9	-2.8
114	-1.4	-0.7	2.6	7.4	[illegible]	[illegible]	6.9	2.9	-2.8
127	-1.1	-0.3	3	7.8	[illegible]	[illegible]	7.3	3.3	-2.4
128	-2	-1.3	2.1	6.8	[illegible]	[illegible]	6.3	2.3	-3.4
129	-0.6	0.1	3.4	[illegible]	[illegible]	[illegible]	7.7	3.7	-2
130	-2.9	-2.2	1.1	5.9	[illegible]	[illegible]	5.4	1.4	-4.3
131	-2.6	-1.9	1.4	6.2	[illegible]	[illegible]	5.7	1.7	-4
132	-2.8	-2.1	1.2	6	[illegible]	[illegible]	5.5	1.5	-4.2
133	-3.2	-2.5	0.8	5.6	[illegible]	7.7	5.1	1.1	-4.6
136	-1.2	-0.5	2.8	7.6	[illegible]	[illegible]	7.1	3.1	-2.6
137	-2.7	-2	1.4	6.1	[illegible]	[illegible]	5.6	1.6	-4.1
138	-3	-2.3	1	5.8	[illegible]	7.9	5.3	1.3	-4.4
139	-3.7	-2.9	0.4	5.2	[illegible]	7.3	4.7	0.7	-5
140	-4.7	-4	-0.7	4.1	7	6.2	3.6	-0.4	-6.1
141	-4.7	-4	-0.7	4.1	7	6.2	3.6	-0.4	-6.1
142	-4.7	-4	-0.7	4.1	7	6.2	3.6	-0.4	-6.1
143	-4.1	-3.4	0	4.7	7.6	6.8	4.2	0.2	-5.5
144	-6.4	-5.7	-2.4	2.4	5.3	4.5	1.9	-2.1	-7.8
145	-6.6	-5.9	-2.5	2.2	5.1	4.3	1.7	-2.3	-8
146	-2.3	-1.6	1.7	6.5	[illegible]	[illegible]	6	2	-3.7
147	-2.1	-1.4	1.9	6.7	[illegible]	[illegible]	6.2	2.2	-3.5
148	-1.9	-1.2	2.1	6.9	[illegible]	[illegible]	6.4	2.4	-3.3
149	-6.5	-5.7	-2.4	2.4	5.3	4.5	1.9	-2.1	-7.8
27A	4	4.7	[illegible]	12.8	15.7	14.9	12.3	[illegible]	2.6

BN1: Predicted Noise levels above Background Daytime (+3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	25.3	26.1	27.2	28.5	30	31.8	33.7	35.9	38.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	4.5	4.7	7	[illegible]	13	[illegible]	[illegible]	7.8	5.3
28	0.9	1.1	3.4	7.1	[illegible]	[illegible]	6.3	4.1	1.6
29	3.4	3.6	6	[illegible]	[illegible]	[illegible]	[illegible]	6.7	4.2
110	-0.2	0	2.3	6	[illegible]	7.1	5.2	3	0.5
111	-1	-0.7	1.6	5.3	7.5	6.4	4.5	2.3	-0.2
112	-1	-0.8	1.6	5.2	7.4	6.3	4.4	2.2	-0.3
113	-0.9	-0.7	1.6	5.3	7.5	6.4	4.5	2.3	-0.2
114	-0.9	-0.7	1.6	5.3	7.5	6.4	4.5	2.3	-0.2
127	-0.6	-0.3	2	5.7	7.9	6.8	4.9	2.7	0.2
128	-1.5	-1.3	1.1	4.7	6.9	5.8	3.9	1.7	-0.8
129	-0.1	0.1	2.4	6.1	[illegible]	7.2	5.3	3.1	0.6
130	-2.4	-2.2	0.1	3.8	6	4.9	3	0.8	-1.7
131	-2.1	-1.9	0.4	4.1	6.3	5.2	3.3	1.1	-1.4
132	-2.3	-2.1	0.2	3.9	6.1	5	3.1	0.9	-1.6
133	-2.7	-2.5	-0.2	3.5	5.7	4.6	2.7	0.5	-2
136	-0.7	-0.5	1.8	5.5	7.7	6.6	4.7	2.5	0
137	-2.2	-2	0.4	4	6.2	5.1	3.2	1	-1.5
138	-2.5	-2.3	0	3.7	5.9	4.8	2.9	0.7	-1.8
139	-3.2	-2.9	-0.6	3.1	5.3	4.2	2.3	0.1	-2.4
140	-4.2	-4	-1.7	2	4.2	3.1	1.2	-1	-3.5
141	-4.2	-4	-1.7	2	4.2	3.1	1.2	-1	-3.5
142	-4.2	-4	-1.7	2	4.2	3.1	1.2	-1	-3.5
143	-3.6	-3.4	-1	2.6	4.8	3.7	1.8	-0.4	-2.9
144	-5.9	-5.7	-3.4	0.3	2.5	1.4	-0.5	-2.7	-5.2
145	-6.1	-5.9	-3.5	0.1	2.3	1.2	-0.7	-2.9	-5.4
146	-1.8	-1.6	0.7	4.4	6.6	5.5	3.6	1.4	-1.1
147	-1.6	-1.4	0.9	4.6	6.8	5.7	3.8	1.6	-0.9
148	-1.4	-1.2	1.1	4.8	7	5.9	4	1.8	-0.7
149	-6	-5.7	-3.4	0.3	2.5	1.4	-0.5	-2.7	-5.2
27A	4.5	4.7	7	[illegible]	12.9	[illegible]	[illegible]	7.7	5.2

BN1: Predicted Noise levels above Background Nighttime (+3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	22.8	23.1	23.2	23.4	24.2	25.7	28.3	32.3	38
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	7	7.7	[illegible]	15.8	18.8	18	15.4	[illegible]	5.7
28	3.4	4.1	7.4	12.2	15.1	14.3	[illegible]	7.7	2
29	5.9	6.6	[illegible]	14.7	17.7	16.9	14.3	[illegible]	4.6
110	2.3	3	6.3	[illegible]	14	13.2	[illegible]	6.6	0.9
111	1.5	2.3	5.6	[illegible]	13.3	12.5	[illegible]	5.9	0.2
112	1.5	2.2	5.6	[illegible]	13.2	12.4	[illegible]	5.8	0.1
113	1.6	2.3	5.6	[illegible]	13.3	12.5	[illegible]	5.9	0.2
114	1.6	2.3	5.6	[illegible]	13.3	12.5	[illegible]	5.9	0.2
127	1.9	2.7	6	[illegible]	13.7	12.9	[illegible]	6.3	0.6
128	1	1.7	5.1	[illegible]	12.7	[illegible]	[illegible]	5.3	-0.4
129	2.4	3.1	6.4	[illegible]	14.1	13.3	[illegible]	6.7	1
130	0.1	0.8	4.1	[illegible]	[illegible]	[illegible]	[illegible]	4.4	-1.3
131	0.4	1.1	4.4	[illegible]	12.1	[illegible]	[illegible]	4.7	-1
132	0.2	0.9	4.2	[illegible]	[illegible]	[illegible]	[illegible]	4.5	-1.2
133	-0.2	0.5	3.8	[illegible]	[illegible]	[illegible]	[illegible]	4.1	-1.6
136	1.8	2.5	5.8	[illegible]	13.5	12.7	[illegible]	6.1	0.4
137	0.3	1	4.4	[illegible]	[illegible]	[illegible]	[illegible]	4.6	-1.1
138	0	0.7	4	[illegible]	[illegible]	[illegible]	[illegible]	4.3	-1.4
139	-0.7	0.1	3.4	[illegible]	[illegible]	[illegible]	7.7	3.7	-2
140	-1.7	-1	2.3	7.1	[illegible]	[illegible]	6.6	2.6	-3.1
141	-1.7	-1	2.3	7.1	[illegible]	[illegible]	6.6	2.6	-3.1
142	-1.7	-1	2.3	7.1	[illegible]	[illegible]	6.6	2.6	-3.1
143	-1.1	-0.4	3	7.7	[illegible]	[illegible]	7.2	3.2	-2.5
144	-3.4	-2.7	0.6	5.4	[illegible]	7.5	4.9	0.9	-4.8
145	-3.6	-2.9	0.5	5.2	[illegible]	7.3	4.7	0.7	-5
146	0.7	1.4	4.7	[illegible]	12.4	[illegible]	[illegible]	5	-0.7
147	0.9	1.6	4.9	[illegible]	12.6	[illegible]	[illegible]	5.2	-0.5
148	1.1	1.8	5.1	[illegible]	12.8	[illegible]	[illegible]	5.4	-0.3
149	-3.5	-2.7	0.6	5.4	[illegible]	7.5	4.9	0.9	-4.8
27A	7	7.7	[illegible]	15.8	18.7	17.9	15.3	[illegible]	5.6

BN1: Predicted Noise levels above Background Daytime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	25.3	26.1	27.2	28.5	30	31.8	33.7	35.9	38.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	7.5	7.7	[illegible]	13.7	16	14.9	13	[illegible]	[illegible]
28	3.9	4.1	6.4	[illegible]	12.3	[illegible]	[illegible]	7.1	4.6
29	6.4	6.6	[illegible]	12.6	14.9	13.8	[illegible]	[illegible]	7.2
110	2.8	3	5.3	[illegible]	[illegible]	[illegible]	[illegible]	6	3.5
111	2	2.3	4.6	[illegible]	[illegible]	[illegible]	7.5	5.3	2.8
112	2	2.2	4.6	[illegible]	[illegible]	[illegible]	7.4	5.2	2.7
113	2.1	2.3	4.6	[illegible]	[illegible]	[illegible]	7.5	5.3	2.8
114	2.1	2.3	4.6	[illegible]	[illegible]	[illegible]	7.5	5.3	2.8
127	2.4	2.7	5	[illegible]	[illegible]	[illegible]	7.9	5.7	3.2
128	1.5	1.7	4.1	7.7	[illegible]	[illegible]	6.9	4.7	2.2
129	2.9	3.1	5.4	[illegible]	[illegible]	[illegible]	[illegible]	6.1	3.6
130	0.6	0.8	3.1	6.8	[illegible]	7.9	6	3.8	1.3
131	0.9	1.1	3.4	7.1	[illegible]	[illegible]	6.3	4.1	1.6
132	0.7	0.9	3.2	6.9	[illegible]	[illegible]	6.1	3.9	1.4
133	0.3	0.5	2.8	6.5	[illegible]	7.6	5.7	3.5	1
136	2.3	2.5	4.8	[illegible]	[illegible]	[illegible]	7.7	5.5	3
137	0.8	1	3.4	7	[illegible]	[illegible]	6.2	4	1.5
138	0.5	0.7	3	6.7	[illegible]	7.8	5.9	3.7	1.2
139	-0.2	0.1	2.4	6.1	[illegible]	7.2	5.3	3.1	0.6
140	-1.2	-1	1.3	5	7.2	6.1	4.2	2	-0.5
141	-1.2	-1	1.3	5	7.2	6.1	4.2	2	-0.5
142	-1.2	-1	1.3	5	7.2	6.1	4.2	2	-0.5
143	-0.6	-0.4	2	5.6	7.8	6.7	4.8	2.6	0.1
144	-2.9	-2.7	-0.4	3.3	5.5	4.4	2.5	0.3	-2.2
145	-3.1	-2.9	-0.5	3.1	5.3	4.2	2.3	0.1	-2.4
146	1.2	1.4	3.7	7.4	[illegible]	[illegible]	6.6	4.4	1.9
147	1.4	1.6	3.9	7.6	[illegible]	[illegible]	6.8	4.6	2.1
148	1.6	1.8	4.1	7.8	[illegible]	[illegible]	7	4.8	2.3
149	-3	-2.7	-0.4	3.3	5.5	4.4	2.5	0.3	-2.2
27A	7.5	7.7	[illegible]	13.7	15.9	14.8	12.9	[illegible]	[illegible]

BN1: Predicted Noise levels above Background Nighttime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	22.8	23.1	23.2	23.4	24.2	25.7	28.3	32.3	38
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	[illegible]	[illegible]	14	18.8	21.8	21	18.4	14.4	[illegible]
28	6.4	7.1	[illegible]	15.2	18.1	17.3	14.7	[illegible]	5
29	[illegible]	[illegible]	13	17.7	20.7	19.9	17.3	13.3	7.6
110	5.3	6	[illegible]	14.1	17	16.2	13.6	[illegible]	3.9
111	4.5	5.3	[illegible]	13.4	16.3	15.5	12.9	[illegible]	3.2
112	4.5	5.2	[illegible]	13.3	16.2	15.4	12.8	[illegible]	3.1
113	4.6	5.3	[illegible]	13.4	16.3	15.5	12.9	[illegible]	3.2
114	4.6	5.3	[illegible]	13.4	16.3	15.5	12.9	[illegible]	3.2
127	4.9	5.7	[illegible]	13.8	16.7	15.9	13.3	[illegible]	3.6
128	4	4.7	[illegible]	12.8	15.7	14.9	12.3	[illegible]	2.6
129	5.4	6.1	[illegible]	14.2	17.1	16.3	13.7	[illegible]	4
130	3.1	3.8	7.1	[illegible]	14.8	14	[illegible]	7.4	1.7
131	3.4	4.1	7.4	12.2	15.1	14.3	[illegible]	7.7	2
132	3.2	3.9	7.2	[illegible]	14.9	14.1	[illegible]	7.5	1.8
133	2.8	3.5	6.8	[illegible]	14.5	13.7	[illegible]	7.1	1.4
136	4.8	5.5	[illegible]	13.6	16.5	15.7	13.1	[illegible]	3.4
137	3.3	4	7.4	12.1	15	14.2	[illegible]	7.6	1.9
138	3	3.7	7	[illegible]	14.7	13.9	[illegible]	7.3	1.6
139	2.3	3.1	6.4	[illegible]	14.1	13.3	[illegible]	6.7	1
140	1.3	2	5.3	[illegible]	13	12.2	[illegible]	5.6	-0.1
141	1.3	2	5.3	[illegible]	13	12.2	[illegible]	5.6	-0.1
142	1.3	2	5.3	[illegible]	13	12.2	[illegible]	5.6	-0.1
143	1.9	2.6	6	[illegible]	13.6	12.8	[illegible]	6.2	0.5
144	-0.4	0.3	3.6	[illegible]	[illegible]	[illegible]	7.9	3.9	-1.8
145	-0.6	0.1	3.5	[illegible]	[illegible]	[illegible]	7.7	3.7	-2
146	3.7	4.4	7.7	12.5	15.4	14.6	[illegible]	[illegible]	2.3
147	3.9	4.6	7.9	12.7	15.6	14.8	12.2	[illegible]	2.5
148	4.1	4.8	[illegible]	12.9	15.8	15	12.4	[illegible]	2.7
149	-0.5	0.3	3.6	[illegible]	[illegible]	[illegible]	7.9	3.9	-1.8
27A	[illegible]	[illegible]	14	18.8	21.7	20.9	18.3	14.3	[illegible]

BN2: Predicted Noise levels above Background Daytime

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	24.2	25.7	27	28.3	29.4	30.4	31.3	32.1	32.8
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
1	0	-0.5	1.6	5.3	7.9	7.6	6.7	5.9	5.2
31	-2.9	-3.4	-1.2	2.4	5.1	4.8	3.9	3.1	2.4
33	-3.7	-4.2	-2.1	1.6	4.2	3.9	3	2.2	1.5
34	-2.8	-3.3	-1.2	2.5	5.1	4.8	3.9	3.1	2.4
35	-0.9	-1.4	0.8	4.4	7.1	6.8	5.9	5.1	4.4
36	-2.9	-3.4	-1.3	2.4	5	4.7	3.8	3	2.3
37	-2.9	-3.4	-1.3	2.4	5	4.7	3.8	3	2.3
38	-2.6	-3.1	-1	2.7	5.3	5	4.1	3.3	2.6
39	-1.8	-2.3	-0.2	3.5	6.1	5.8	4.9	4.1	3.4
40	-1.6	-2.1	0	3.7	6.3	6	5.1	4.3	3.6
41	-1.6	-2.1	0	3.7	6.3	6	5.1	4.3	3.6
42	-1.9	-2.4	-0.3	3.4	6	5.7	4.8	4	3.3
43	-3.5	-4	-1.8	1.8	4.4	4.1	3.2	2.4	1.7
44	-7.2	-7.7	-5.6	-1.9	0.7	0.4	-0.5	-1.3	-2
45	-8	-8.5	-6.4	-2.7	-0.1	-0.4	-1.3	-2.1	-2.8
46	-8.1	-8.6	-6.5	-2.8	-0.2	-0.5	-1.4	-2.2	-2.9
47	-8.5	-8.9	-6.8	-3.1	-0.5	-0.8	-1.7	-2.5	-3.2
150	-4.3	-4.8	-2.7	1	3.6	3.3	2.4	1.6	0.9
151	-9.2	-9.7	-7.6	-3.9	-1.3	-1.6	-2.5	-3.3	-4
152	-7.6	-8.1	-6	-2.3	0.3	0	-0.9	-1.7	-2.4
153	-7.3	-7.8	-5.7	-2	0.6	0.3	-0.6	-1.4	-2.1
154	-7.1	-7.6	-5.4	-1.8	0.8	0.5	-0.4	-1.2	-1.9
155	-5.5	-5.9	-3.8	-0.1	2.5	2.2	1.3	0.5	-0.2
156	-4.9	-5.4	-3.2	0.4	3	2.7	1.8	1	0.3
157	-8.4	-8.9	-6.7	-3.1	-0.5	-0.8	-1.7	-2.5	-3.2
158	-9.5	-9.9	-7.8	-4.2	-1.5	-1.8	-2.7	-3.5	-4.2
159	-3.9	-4.4	-2.3	1.4	4	3.7	2.8	2	1.3
157A	-8.5	-9	-6.9	-3.2	-0.6	-0.9	-1.8	-2.6	-3.3
31A	-3.2	-3.7	-1.6	2.1	4.7	4.4	3.5	2.7	2
37A	-2.7	-3.2	-1	2.6	5.3	5	4.1	3.3	2.6

BN2: Predicted Noise levels above Background NighttimeHighlighted Orange greater than 5dB & less than 8dB above BG

Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	19.4	20	20.9	22	23.4	25.2	27.4	30.1	33.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	4.8	5.2	7.7	[illegible]	13.9	12.8	[illegible]	7.9	4.7
28	1.9	2.3	4.9	[illegible]	[illegible]	[illegible]	7.8	5.1	1.9
29	1.1	1.5	4	7.9	[illegible]	[illegible]	6.9	4.2	1
110	2	2.4	4.9	[illegible]	[illegible]	[illegible]	7.8	5.1	1.9
111	3.9	4.3	6.9	[illegible]	13.1	[illegible]	[illegible]	7.1	3.9
112	1.9	2.3	4.8	[illegible]	[illegible]	[illegible]	7.7	5	1.8
113	1.9	2.3	4.8	[illegible]	[illegible]	[illegible]	7.7	5	1.8
114	2.2	2.6	5.1	[illegible]	[illegible]	[illegible]	[illegible]	5.3	2.1
127	3	3.4	5.9	[illegible]	12.1	[illegible]	[illegible]	6.1	2.9
128	3.2	3.6	6.1	[illegible]	12.3	[illegible]	[illegible]	6.3	3.1
129	3.2	3.6	6.1	[illegible]	12.3	[illegible]	[illegible]	6.3	3.1
130	2.9	3.3	5.8	[illegible]	[illegible]	[illegible]	[illegible]	6	2.8
131	1.3	1.7	4.3	[illegible]	[illegible]	[illegible]	7.1	4.4	1.2
132	-2.4	-2	0.5	4.4	6.7	5.6	3.4	0.7	-2.5
133	-3.2	-2.8	-0.3	3.6	5.9	4.8	2.6	-0.1	-3.3
136	-3.3	-2.9	-0.4	3.5	5.8	4.7	2.5	-0.2	-3.4
137	-3.7	-3.2	-0.7	3.2	5.5	4.4	2.2	-0.5	-3.7
138	0.5	0.9	3.4	7.3	[illegible]	[illegible]	6.3	3.6	0.4
139	-4.4	-4	-1.5	2.4	4.7	3.6	1.4	-1.3	-4.5
140	-2.8	-2.4	0.1	4	6.3	5.2	3	0.3	-2.9
141	-2.5	-2.1	0.4	4.3	6.6	5.5	3.3	0.6	-2.6
142	-2.3	-1.9	0.7	4.5	6.8	5.7	3.5	0.8	-2.4
143	-0.7	-0.2	2.3	6.2	[illegible]	7.4	5.2	2.5	-0.7
144	-0.1	0.3	2.9	6.7	[illegible]	7.9	5.7	3	-0.2
145	-3.6	-3.2	-0.6	3.2	5.5	4.4	2.2	-0.5	-3.7
146	-4.7	-4.2	-1.7	2.1	4.5	3.4	1.2	-1.5	-4.7
147	0.9	1.3	3.8	7.7	[illegible]	[illegible]	6.7	4	0.8
148	-3.7	-3.3	-0.8	3.1	5.4	4.3	2.1	-0.6	-3.8
149	1.6	2	4.5	[illegible]	[illegible]	[illegible]	7.4	4.7	1.5
27A	2.1	2.5	5.1	[illegible]	[illegible]	[illegible]	[illegible]	5.3	2.1

BN2: Predicted Noise levels above Background Daytime (+3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	24.2	25.7	27	28.3	29.4	30.4	31.3	32.1	32.8
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	3	2.5	4.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	0.1	-0.4	1.8	5.4	[illegible]	7.8	6.9	6.1	5.4
29	-0.7	-1.2	0.9	4.6	7.2	6.9	6	5.2	4.5
110	0.2	-0.3	1.8	5.5	[illegible]	7.8	6.9	6.1	5.4
111	2.1	1.6	3.8	7.4	[illegible]	[illegible]	[illegible]	[illegible]	7.4
112	0.1	-0.4	1.7	5.4	[illegible]	7.7	6.8	6	5.3
113	0.1	-0.4	1.7	5.4	[illegible]	7.7	6.8	6	5.3
114	0.4	-0.1	2	5.7	[illegible]	[illegible]	7.1	6.3	5.6
127	1.2	0.7	2.8	6.5	[illegible]	[illegible]	7.9	7.1	6.4
128	1.4	0.9	3	6.7	[illegible]	[illegible]	[illegible]	7.3	6.6
129	1.4	0.9	3	6.7	[illegible]	[illegible]	[illegible]	7.3	6.6
130	1.1	0.6	2.7	6.4	[illegible]	[illegible]	7.8	7	6.3
131	-0.5	-1	1.2	4.8	7.4	7.1	6.2	5.4	4.7
132	-4.2	-4.7	-2.6	1.1	3.7	3.4	2.5	1.7	1
133	-5	-5.5	-3.4	0.3	2.9	2.6	1.7	0.9	0.2
136	-5.1	-5.6	-3.5	0.2	2.8	2.5	1.6	0.8	0.1
137	-5.5	-5.9	-3.8	-0.1	2.5	2.2	1.3	0.5	-0.2
138	-1.3	-1.8	0.3	4	6.6	6.3	5.4	4.6	3.9
139	-6.2	-6.7	-4.6	-0.9	1.7	1.4	0.5	-0.3	-1
140	-4.6	-5.1	-3	0.7	3.3	3	2.1	1.3	0.6
141	-4.3	-4.8	-2.7	1	3.6	3.3	2.4	1.6	0.9
142	-4.1	-4.6	-2.4	1.2	3.8	3.5	2.6	1.8	1.1
143	-2.5	-2.9	-0.8	2.9	5.5	5.2	4.3	3.5	2.8
144	-1.9	-2.4	-0.2	3.4	6	5.7	4.8	4	3.3
145	-5.4	-5.9	-3.7	-0.1	2.5	2.2	1.3	0.5	-0.2
146	-6.5	-6.9	-4.8	-1.2	1.5	1.2	0.3	-0.5	-1.2
147	-0.9	-1.4	0.7	4.4	7	6.7	5.8	5	4.3
148	-5.5	-6	-3.9	-0.2	2.4	2.1	1.2	0.4	-0.3
149	-0.2	-0.7	1.4	5.1	7.7	7.4	6.5	5.7	5
27A	0.3	-0.2	2	5.6	[illegible]	[illegible]	7.1	6.3	5.6

BN2: Predicted Noise levels above Background Nighttime (+3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	19.4	20	20.9	22	23.4	25.2	27.4	30.1	33.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	7.8	[illegible]	[illegible]	14.6	16.9	15.8	13.6	[illegible]	7.7
28	4.9	5.3	7.9	[illegible]	14.1	13	[illegible]	[illegible]	4.9
29	4.1	4.5	7	[illegible]	13.2	12.1	[illegible]	7.2	4
110	5	5.4	7.9	[illegible]	14.1	13	[illegible]	[illegible]	4.9
111	6.9	7.3	[illegible]	13.7	16.1	15	12.8	[illegible]	6.9
112	4.9	5.3	7.8	[illegible]	14	12.9	[illegible]	[illegible]	4.8
113	4.9	5.3	7.8	[illegible]	14	12.9	[illegible]	[illegible]	4.8
114	5.2	5.6	[illegible]	[illegible]	14.3	13.2	[illegible]	[illegible]	5.1
127	6	6.4	[illegible]	12.8	15.1	14	[illegible]	[illegible]	5.9
128	6.2	6.6	[illegible]	13	15.3	14.2	[illegible]	[illegible]	6.1
129	6.2	6.6	[illegible]	13	15.3	14.2	[illegible]	[illegible]	6.1
130	5.9	6.3	[illegible]	12.7	15	13.9	[illegible]	[illegible]	5.8
131	4.3	4.7	7.3	[illegible]	13.4	12.3	[illegible]	7.4	4.2
132	0.6	1	3.5	7.4	[illegible]	[illegible]	6.4	3.7	0.5
133	-0.2	0.2	2.7	6.6	[illegible]	7.8	5.6	2.9	-0.3
136	-0.3	0.1	2.6	6.5	[illegible]	7.7	5.5	2.8	-0.4
137	-0.7	-0.2	2.3	6.2	[illegible]	7.4	5.2	2.5	-0.7
138	3.5	3.9	6.4	[illegible]	12.6	[illegible]	[illegible]	6.6	3.4
139	-1.4	-1	1.5	5.4	7.7	6.6	4.4	1.7	-1.5
140	0.2	0.6	3.1	7	[illegible]	[illegible]	6	3.3	0.1
141	0.5	0.9	3.4	7.3	[illegible]	[illegible]	6.3	3.6	0.4
142	0.7	1.1	3.7	7.5	[illegible]	[illegible]	6.5	3.8	0.6
143	2.3	2.8	5.3	[illegible]	[illegible]	[illegible]	[illegible]	5.5	2.3
144	2.9	3.3	5.9	[illegible]	[illegible]	[illegible]	[illegible]	6	2.8
145	-0.6	-0.2	2.4	6.2	[illegible]	7.4	5.2	2.5	-0.7
146	-1.7	-1.2	1.3	5.1	7.5	6.4	4.2	1.5	-1.7
147	3.9	4.3	6.8	[illegible]	13	[illegible]	[illegible]	7	3.8
148	-0.7	-0.3	2.2	6.1	[illegible]	7.3	5.1	2.4	-0.8
149	4.6	5	7.5	[illegible]	13.7	12.6	[illegible]	7.7	4.5
27A	5.1	5.5	[illegible]	[illegible]	14.3	13.2	[illegible]	[illegible]	5.1

BN2: Predicted Noise levels above Background Daytime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	24.2	25.7	27	28.3	29.4	30.4	31.3	32.1	32.8
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27	6	5.5	7.6		13.9	13.6	12.7		
28	3.1	2.6	4.8						
29	2.3	1.8	3.9	7.6					7.5
110	3.2	2.7	4.8						
111	5.1	4.6	6.8		13.1	12.8			
112	3.1	2.6	4.7						
113	3.1	2.6	4.7						
114	3.4	2.9	5						
127	4.2	3.7	5.8		12.1				
128	4.4	3.9	6		12.3				
129	4.4	3.9	6		12.3				
130	4.1	3.6	5.7						
131	2.5	2	4.2	7.8					7.7
132	-1.2	-1.7	0.4	4.1	6.7	6.4	5.5	4.7	4
133	-2	-2.5	-0.4	3.3	5.9	5.6	4.7	3.9	3.2
136	-2.1	-2.6	-0.5	3.2	5.8	5.5	4.6	3.8	3.1
137	-2.5	-2.9	-0.8	2.9	5.5	5.2	4.3	3.5	2.8
138	1.7	1.2	3.3	7				7.6	6.9
139	-3.2	-3.7	-1.6	2.1	4.7	4.4	3.5	2.7	2
140	-1.6	-2.1	0	3.7	6.3	6	5.1	4.3	3.6
141	-1.3	-1.8	0.3	4	6.6	6.3	5.4	4.6	3.9
142	-1.1	-1.6	0.6	4.2	6.8	6.5	5.6	4.8	4.1
143	0.5	0.1	2.2	5.9			7.3	6.5	5.8
144	1.1	0.6	2.8	6.4			7.8	7	6.3
145	-2.4	-2.9	-0.7	2.9	5.5	5.2	4.3	3.5	2.8
146	-3.5	-3.9	-1.8	1.8	4.5	4.2	3.3	2.5	1.8
147	2.1	1.6	3.7	7.4					7.3
148	-2.5	-3	-0.9	2.8	5.4	5.1	4.2	3.4	2.7
149	2.8	2.3	4.4						
27A	3.3	2.8	5						

BN2: Predicted Noise levels above Background Nighttime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	19.4	20	20.9	22	23.4	25.2	27.4	30.1	33.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
27			13.7	17.6	19.9	18.8	16.6	13.9	
28	7.9			14.7	17.1	16	13.8		7.9
29	7.1	7.5		13.9	16.2	15.1	12.9		7
110				14.8	17.1	16	13.8		7.9
111			12.9	16.7	19.1	18	15.8	13.1	
112	7.9			14.7	17	15.9	13.7		7.8
113	7.9			14.7	17	15.9	13.7		7.8
114				15	17.3	16.2	14		
127				15.8	18.1	17	14.8	12.1	
128			12.1	16	18.3	17.2	15	12.3	
129			12.1	16	18.3	17.2	15	12.3	
130				15.7	18	16.9	14.7		
131	7.3	7.7		14.1	16.4	15.3	13.1		7.2
132	3.6	4	6.5		12.7			6.7	3.5
133	2.8	3.2	5.7					5.9	2.7
136	2.7	3.1	5.6					5.8	2.6
137	2.3	2.8	5.3					5.5	2.3
138	6.5	6.9		13.3	15.6	14.5	12.3		6.4
139	1.6	2	4.5				7.4	4.7	1.5
140	3.2	3.6	6.1		12.3			6.3	3.1
141	3.5	3.9	6.4		12.6			6.6	3.4
142	3.7	4.1	6.7		12.8			6.8	3.6
143	5.3	5.8		12.2	14.5	13.4			5.3
144	5.9	6.3		12.7	15	13.9			5.8
145	2.4	2.8	5.4					5.5	2.3
146	1.3	1.8	4.3				7.2	4.5	1.3
147	6.9	7.3		13.7	16	14.9	12.7		6.8
148	2.3	2.7	5.2					5.4	2.2
149	7.6			14.4	16.7	15.6	13.4		7.5
27A				14.9	17.3	16.2	14		

BN Predicted Noise levels above Daytime Background(BG)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	23.5	24.7	26.3	28.1	29.9	31.7	33.3	34.5	35.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	3.8	3.6	5.5	[illegible]	[illegible]	[illegible]	7.9	6.7	5.8
3	3.9	3.7	5.5	[illegible]	[illegible]	[illegible]	7.9	6.7	5.8
4	0.7	0.5	2.4	5.5	7.5	6.4	4.8	3.6	2.7
5	0.5	0.3	2.1	5.3	7.2	6.1	4.5	3.3	2.4
6	0.2	0	1.8	5	6.9	5.8	4.2	3	2.1
7	-0.5	-0.7	1.1	4.3	6.2	5.1	3.5	2.3	1.4
8	-0.9	-1.1	0.7	3.9	5.8	4.7	3.1	1.9	1
9	-0.4	-0.6	1.3	4.5	6.4	5.3	3.7	2.5	1.6
10	-0.3	-0.5	1.3	4.5	6.4	5.3	3.7	2.5	1.6
11	-0.2	-0.4	1.4	4.6	6.5	5.4	3.8	2.6	1.7
12	0.1	-0.1	1.7	4.9	6.8	5.7	4.1	2.9	2
13	0.5	0.3	2.1	5.3	7.2	6.1	4.5	3.3	2.4
14	0	-0.2	1.6	4.8	6.7	5.6	4	2.8	1.9
15	0.4	0.2	2.1	5.2	7.2	6.1	4.5	3.3	2.4
16	-0.2	-0.4	1.4	4.6	6.5	5.4	3.8	2.6	1.7
17	1.4	1.2	3	6.2	[illegible]	7	5.4	4.2	3.3
54	-7.6	-7.8	-6	-2.8	-0.9	-2	-3.6	-4.8	-5.7
55	-7.3	-7.5	-5.7	-2.5	-0.6	-1.7	-3.3	-4.5	-5.4
56	-7.5	-7.6	-5.8	-2.6	-0.7	-1.8	-3.4	-4.6	-5.5
57	-7.4	-7.6	-5.7	-2.6	-0.7	-1.8	-3.4	-4.6	-5.5
58	-7.1	-7.3	-5.5	-2.3	-0.4	-1.5	-3.1	-4.3	-5.2
59	-7	-7.1	-5.3	-2.1	-0.2	-1.3	-2.9	-4.1	-5
60	-6.8	-7	-5.2	-2	-0.1	-1.2	-2.8	-4	-4.9
61	-6.7	-6.9	-5.1	-1.9	0	-1.1	-2.7	-3.9	-4.8
62	-6.6	-6.8	-5	-1.8	0.1	-1	-2.6	-3.8	-4.7
63	-6.6	-6.7	-4.9	-1.8	0.2	-0.9	-2.5	-3.7	-4.6
64	-6.5	-6.7	-4.9	-1.7	0.2	-0.9	-2.5	-3.7	-4.6
65	-4.8	-5	-3.1	0	1.9	0.8	-0.8	-2	-2.9
66	-4.3	-4.5	-2.7	0.5	2.4	1.3	-0.3	-1.5	-2.4
67	-3.9	-4.1	-2.3	0.9	2.8	1.7	0.1	-1.1	-2
68	-3.7	-3.9	-2	1.1	3	1.9	0.3	-0.9	-1.8
69	-3.6	-3.8	-2	1.2	3.1	2	0.4	-0.8	-1.7
70	-3	-3.2	-1.4	1.8	3.7	2.6	1	-0.2	-1.1
71	-2.5	-2.7	-0.9	2.3	4.2	3.1	1.5	0.3	-0.6
72	-0.1	-0.3	1.5	4.7	6.6	5.5	3.9	2.7	1.8
73	-1.5	-1.7	0.1	3.3	5.2	4.1	2.5	1.3	0.4
74	-3.2	-3.4	-1.6	1.6	3.5	2.4	0.8	-0.4	-1.3
75	-3.7	-3.8	-2	1.2	3.1	2	0.4	-0.8	-1.7
77	-6.1	-6.2	-4.4	-1.3	0.6	-0.5	-2.1	-3.3	-4.2
78	-6.8	-6.9	-5.1	-2	0	-1.1	-2.7	-3.9	-4.8
79	-7	-7.1	-5.3	-2.2	-0.2	-1.3	-2.9	-4.1	-5
80	-7.1	-7.2	-5.4	-2.3	-0.3	-1.4	-3	-4.2	-5.1
81	-7.6	-7.8	-6	-2.8	-0.9	-2	-3.6	-4.8	-5.7
82	-7.5	-7.7	-5.9	-2.7	-0.8	-1.9	-3.5	-4.7	-5.6
83	-7.7	-7.9	-6.1	-2.9	-1	-2.1	-3.7	-4.9	-5.8
84	-7.3	-7.5	-5.7	-2.5	-0.6	-1.7	-3.3	-4.5	-5.4
85	-8.5	-8.6	-6.8	-3.6	-1.7	-2.8	-4.4	-5.6	-6.5
55A	-7.2	-7.4	-5.6	-2.4	-0.5	-1.6	-3.2	-4.4	-5.3
7A	-0.4	-0.6	1.2	4.4	6.3	5.2	3.6	2.4	1.5

BN3: Predicted Noise levels above Nighttime Background(BG)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	19	19.4	19.9	20.7	22	23.9	26.5	29.9	34.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	[illegible]	[illegible]	[illegible]	16	18.5	17.3	14.7	[illegible]	6.9
3	[illegible]	[illegible]	[illegible]	16.1	18.5	17.3	14.7	[illegible]	6.9
4	5.2	5.8	[illegible]	12.9	15.4	14.2	[illegible]	[illegible]	3.8
5	5	5.6	[illegible]	12.7	15.1	13.9	[illegible]	7.9	3.5
6	4.7	5.3	[illegible]	12.4	14.8	13.6	[illegible]	7.6	3.2
7	4	4.6	7.5	[illegible]	14.1	12.9	[illegible]	6.9	2.5
8	3.6	4.2	7.1	[illegible]	13.7	12.5	[illegible]	6.5	2.1
9	4.1	4.7	7.7	[illegible]	14.3	13.1	[illegible]	7.1	2.7
10	4.2	4.8	7.7	[illegible]	14.3	13.1	[illegible]	7.1	2.7
11	4.3	4.9	7.8	[illegible]	14.4	13.2	[illegible]	7.2	2.8
12	4.6	5.2	[illegible]	12.3	14.7	13.5	[illegible]	7.5	3.1
13	5	5.6	[illegible]	12.7	15.1	13.9	[illegible]	7.9	3.5
14	4.5	5.1	[illegible]	12.2	14.6	13.4	[illegible]	7.4	3
15	4.9	5.5	[illegible]	12.6	15.1	13.9	[illegible]	7.9	3.5
16	4.3	4.9	7.8	[illegible]	14.4	13.2	[illegible]	7.2	2.8
17	5.9	6.5	[illegible]	13.6	16	14.8	12.2	[illegible]	4.4
54	-3.1	-2.5	0.4	4.6	7	5.8	3.2	-0.2	-4.6
55	-2.8	-2.2	0.7	4.9	7.3	6.1	3.5	0.1	-4.3
56	-3	-2.3	0.6	4.8	7.2	6	3.4	0	-4.4
57	-2.9	-2.3	0.7	4.8	7.2	6	3.4	0	-4.4
58	-2.6	-2	0.9	5.1	7.5	6.3	3.7	0.3	-4.1
59	-2.5	-1.8	1.1	5.3	7.7	6.5	3.9	0.5	-3.9
60	-2.3	-1.7	1.2	5.4	7.8	6.6	4	0.6	-3.8
61	-2.2	-1.6	1.3	5.5	7.9	6.7	4.1	0.7	-3.7
62	-2.1	-1.5	1.4	5.6	[illegible]	6.8	4.2	0.8	-3.6
63	-2.1	-1.4	1.5	5.6	[illegible]	6.9	4.3	0.9	-3.5
64	-2	-1.4	1.5	5.7	[illegible]	6.9	4.3	0.9	-3.5
65	-0.3	0.3	3.3	7.4	[illegible]	[illegible]	6	2.6	-1.8
66	0.2	0.8	3.7	7.9	[illegible]	[illegible]	6.5	3.1	-1.3
67	0.6	1.2	4.1	[illegible]	[illegible]	[illegible]	6.9	3.5	-0.9
68	0.8	1.4	4.4	[illegible]	[illegible]	[illegible]	7.1	3.7	-0.7
69	0.9	1.5	4.4	[illegible]	[illegible]	[illegible]	7.2	3.8	-0.6
70	1.5	2.1	5	[illegible]	[illegible]	[illegible]	7.8	4.4	0
71	2	2.6	5.5	[illegible]	12.1	[illegible]	[illegible]	4.9	0.5
72	4.4	5	7.9	12.1	14.5	13.3	[illegible]	7.3	2.9
73	3	3.6	6.5	[illegible]	13.1	[illegible]	[illegible]	5.9	1.5
74	1.3	1.9	4.8	[illegible]	[illegible]	[illegible]	7.6	4.2	-0.2
75	0.8	1.5	4.4	[illegible]	[illegible]	[illegible]	7.2	3.8	-0.6
77	-1.6	-0.9	2	6.1	[illegible]	7.3	4.7	1.3	-3.1
78	-2.3	-1.6	1.3	5.4	7.9	6.7	4.1	0.7	-3.7
79	-2.5	-1.8	1.1	5.2	7.7	6.5	3.9	0.5	-3.9
80	-2.6	-1.9	1	5.1	7.6	6.4	3.8	0.4	-4
81	-3.1	-2.5	0.4	4.6	7	5.8	3.2	-0.2	-4.6
82	-3	-2.4	0.5	4.7	7.1	5.9	3.3	-0.1	-4.5
83	-3.2	-2.6	0.3	4.5	6.9	5.7	3.1	-0.3	-4.7
84	-2.8	-2.2	0.7	4.9	7.3	6.1	3.5	0.1	-4.3
85	-4	-3.3	-0.4	3.8	6.2	5	2.4	-1	-5.4
55A	-2.7	-2.1	0.8	5	7.4	6.2	3.6	0.2	-4.2
7A	4.1	4.7	7.6	[illegible]	14.2	13	[illegible]	7	2.6

BN3: Predicted Noise levels above Background Daytime (BS4142 secton 9.2: +3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	23.5	24.7	26.3	28.1	29.9	31.7	33.3	34.5	35.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	6.8	6.6			13.6	12.5			
3	6.9	6.7			13.6	12.5			
4	3.7	3.5	5.4				7.8	6.6	5.7
5	3.5	3.3	5.1				7.5	6.3	5.4
6	3.2	3	4.8				7.2	6	5.1
7	2.5	2.3	4.1	7.3			6.5	5.3	4.4
8	2.1	1.9	3.7	6.9		7.7	6.1	4.9	4
9	2.6	2.4	4.3	7.5			6.7	5.5	4.6
10	2.7	2.5	4.3	7.5			6.7	5.5	4.6
11	2.8	2.6	4.4	7.6			6.8	5.6	4.7
12	3.1	2.9	4.7	7.9			7.1	5.9	5
13	3.5	3.3	5.1				7.5	6.3	5.4
14	3	2.8	4.6	7.8			7	5.8	4.9
15	3.4	3.2	5.1				7.5	6.3	5.4
16	2.8	2.6	4.4	7.6			6.8	5.6	4.7
17	4.4	4.2	6					7.2	6.3
54	-4.6	-4.8	-3	0.2	2.1	1	-0.6	-1.8	-2.7
55	-4.3	-4.5	-2.7	0.5	2.4	1.3	-0.3	-1.5	-2.4
56	-4.5	-4.6	-2.8	0.4	2.3	1.2	-0.4	-1.6	-2.5
57	-4.4	-4.6	-2.7	0.4	2.3	1.2	-0.4	-1.6	-2.5
58	-4.1	-4.3	-2.5	0.7	2.6	1.5	-0.1	-1.3	-2.2
59	-4	-4.1	-2.3	0.9	2.8	1.7	0.1	-1.1	-2
60	-3.8	-4	-2.2	1	2.9	1.8	0.2	-1	-1.9
61	-3.7	-3.9	-2.1	1.1	3	1.9	0.3	-0.9	-1.8
62	-3.6	-3.8	-2	1.2	3.1	2	0.4	-0.8	-1.7
63	-3.6	-3.7	-1.9	1.2	3.2	2.1	0.5	-0.7	-1.6
64	-3.5	-3.7	-1.9	1.3	3.2	2.1	0.5	-0.7	-1.6
65	-1.8	-2	-0.1	3	4.9	3.8	2.2	1	0.1
66	-1.3	-1.5	0.3	3.5	5.4	4.3	2.7	1.5	0.6
67	-0.9	-1.1	0.7	3.9	5.8	4.7	3.1	1.9	1
68	-0.7	-0.9	1	4.1	6	4.9	3.3	2.1	1.2
69	-0.6	-0.8	1	4.2	6.1	5	3.4	2.2	1.3
70	0	-0.2	1.6	4.8	6.7	5.6	4	2.8	1.9
71	0.5	0.3	2.1	5.3	7.2	6.1	4.5	3.3	2.4
72	2.9	2.7	4.5	7.7			6.9	5.7	4.8
73	1.5	1.3	3.1	6.3		7.1	5.5	4.3	3.4
74	-0.2	-0.4	1.4	4.6	6.5	5.4	3.8	2.6	1.7
75	-0.7	-0.8	1	4.2	6.1	5	3.4	2.2	1.3
77	-3.1	-3.2	-1.4	1.7	3.6	2.5	0.9	-0.3	-1.2
78	-3.8	-3.9	-2.1	1	3	1.9	0.3	-0.9	-1.8
79	-4	-4.1	-2.3	0.8	2.8	1.7	0.1	-1.1	-2
80	-4.1	-4.2	-2.4	0.7	2.7	1.6	4E-15	-1.2	-2.1
81	-4.6	-4.8	-3	0.2	2.1	1	-0.6	-1.8	-2.7
82	-4.5	-4.7	-2.9	0.3	2.2	1.1	-0.5	-1.7	-2.6
83	-4.7	-4.9	-3.1	0.1	2	0.9	-0.7	-1.9	-2.8
84	-4.3	-4.5	-2.7	0.5	2.4	1.3	-0.3	-1.5	-2.4
85	-5.5	-5.6	-3.8	-0.6	1.3	0.2	-1.4	-2.6	-3.5
55A	-4.2	-4.4	-2.6	0.6	2.5	1.4	-0.2	-1.4	-2.3
7A	2.6	2.4	4.2	7.4			6.6	5.4	4.5

BN3: Predicted Noise levels above Background Night time (+3dB penalty for just perceptable impulsivit

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	19	19.4	19.9	20.7	22	23.9	26.5	29.9	34.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2			14.9	19	21.5	20.3	17.7	14.3	
3			14.9	19.1	21.5	20.3	17.7	14.3	
4				15.9	18.4	17.2	14.6		6.8
5				15.7	18.1	16.9	14.3		6.5
6	7.7			15.4	17.8	16.6	14		6.2
7	7	7.6		14.7	17.1	15.9	13.3		5.5
8	6.6	7.2		14.3	16.7	15.5	12.9		5.1
9	7.1	7.7		14.9	17.3	16.1	13.5		5.7
10	7.2	7.8		14.9	17.3	16.1	13.5		5.7
11	7.3	7.9		15	17.4	16.2	13.6		5.8
12	7.6			15.3	17.7	16.5	13.9		6.1
13				15.7	18.1	16.9	14.3		6.5
14	7.5			15.2	17.6	16.4	13.8		6
15	7.9			15.6	18.1	16.9	14.3		6.5
16	7.3	7.9		15	17.4	16.2	13.6		5.8
17			12.4	16.6	19	17.8	15.2		7.4
54	-0.1	0.5	3.4	7.6			6.2	2.8	-1.6
55	0.2	0.8	3.7	7.9			6.5	3.1	-1.3
56	0	0.7	3.6	7.8			6.4	3	-1.4
57	0.1	0.7	3.7	7.8			6.4	3	-1.4
58	0.4	1	3.9				6.7	3.3	-1.1
59	0.5	1.2	4.1				6.9	3.5	-0.9
60	0.7	1.3	4.2				7	3.6	-0.8
61	0.8	1.4	4.3				7.1	3.7	-0.7
62	0.9	1.5	4.4				7.2	3.8	-0.6
63	0.9	1.6	4.5				7.3	3.9	-0.5
64	1	1.6	4.5				7.3	3.9	-0.5
65	2.7	3.3	6.3		12.8			5.6	1.2
66	3.2	3.8	6.7		13.3	12.1		6.1	1.7
67	3.6	4.2	7.1		13.7	12.5		6.5	2.1
68	3.8	4.4	7.4		13.9	12.7		6.7	2.3
69	3.9	4.5	7.4		14	12.8		6.8	2.4
70	4.5	5.1		12.2	14.6	13.4		7.4	3
71	5	5.6		12.7	15.1	13.9		7.9	3.5
72	7.4			15.1	17.5	16.3	13.7		5.9
73	6	6.6		13.7	16.1	14.9	12.3		4.5
74	4.3	4.9	7.8		14.4	13.2		7.2	2.8
75	3.8	4.5	7.4		14	12.8		6.8	2.4
77	1.4	2.1	5				7.7	4.3	-0.1
78	0.7	1.4	4.3				7.1	3.7	-0.7
79	0.5	1.2	4.1				6.9	3.5	-0.9
80	0.4	1.1	4				6.8	3.4	-1
81	-0.1	0.5	3.4	7.6			6.2	2.8	-1.6
82	0	0.6	3.5	7.7			6.3	2.9	-1.5
83	-0.2	0.4	3.3	7.5			6.1	2.7	-1.7
84	0.2	0.8	3.7	7.9			6.5	3.1	-1.3
85	-1	-0.3	2.6	6.8			5.4	2	-2.4
55A	0.3	0.9	3.8				6.6	3.2	-1.2
7A	7.1	7.7		14.8	17.2	16	13.4		5.6

BN3: Predicted Noise levels above Background Daytime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	23.5	24.7	26.3	28.1	29.9	31.7	33.3	34.5	35.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2				14.6	16.6	15.5	13.9	12.7	
3				14.7	16.6	15.5	13.9	12.7	
4	6.7	6.5			13.5	12.4			
5	6.5	6.3			13.2	12.1			
6	6.2	6	7.8		12.9				
7	5.5	5.3	7.1		12.2				7.4
8	5.1	4.9	6.7					7.9	7
9	5.6	5.4	7.3		12.4				7.6
10	5.7	5.5	7.3		12.4				7.6
11	5.8	5.6	7.4		12.5				7.7
12	6.1	5.9	7.7		12.8				
13	6.5	6.3			13.2	12.1			
14	6	5.8	7.6		12.7				7.9
15	6.4	6.2			13.2	12.1			
16	5.8	5.6	7.4		12.5				7.7
17	7.4	7.2		12.2	14.1	13			
54	-1.6	-1.8	0	3.2	5.1	4	2.4	1.2	0.3
55	-1.3	-1.5	0.3	3.5	5.4	4.3	2.7	1.5	0.6
56	-1.5	-1.6	0.2	3.4	5.3	4.2	2.6	1.4	0.5
57	-1.4	-1.6	0.3	3.4	5.3	4.2	2.6	1.4	0.5
58	-1.1	-1.3	0.5	3.7	5.6	4.5	2.9	1.7	0.8
59	-1	-1.1	0.7	3.9	5.8	4.7	3.1	1.9	1
60	-0.8	-1	0.8	4	5.9	4.8	3.2	2	1.1
61	-0.7	-0.9	0.9	4.1	6	4.9	3.3	2.1	1.2
62	-0.6	-0.8	1	4.2	6.1	5	3.4	2.2	1.3
63	-0.6	-0.7	1.1	4.2	6.2	5.1	3.5	2.3	1.4
64	-0.5	-0.7	1.1	4.3	6.2	5.1	3.5	2.3	1.4
65	1.2	1	2.9	6	7.9	6.8	5.2	4	3.1
66	1.7	1.5	3.3	6.5		7.3	5.7	4.5	3.6
67	2.1	1.9	3.7	6.9		7.7	6.1	4.9	4
68	2.3	2.1	4	7.1		7.9	6.3	5.1	4.2
69	2.4	2.2	4	7.2			6.4	5.2	4.3
70	3	2.8	4.6	7.8			7	5.8	4.9
71	3.5	3.3	5.1				7.5	6.3	5.4
72	5.9	5.7	7.5		12.6				7.8
73	4.5	4.3	6.1					7.3	6.4
74	2.8	2.6	4.4	7.6			6.8	5.6	4.7
75	2.3	2.2	4	7.2			6.4	5.2	4.3
77	-0.1	-0.2	1.6	4.7	6.6	5.5	3.9	2.7	1.8
78	-0.8	-0.9	0.9	4	6	4.9	3.3	2.1	1.2
79	-1	-1.1	0.7	3.8	5.8	4.7	3.1	1.9	1
80	-1.1	-1.2	0.6	3.7	5.7	4.6	3	1.8	0.9
81	-1.6	-1.8	0	3.2	5.1	4	2.4	1.2	0.3
82	-1.5	-1.7	0.1	3.3	5.2	4.1	2.5	1.3	0.4
83	-1.7	-1.9	-0.1	3.1	5	3.9	2.3	1.1	0.2
84	-1.3	-1.5	0.3	3.5	5.4	4.3	2.7	1.5	0.6
85	-2.5	-2.6	-0.8	2.4	4.3	3.2	1.6	0.4	-0.5
55A	-1.2	-1.4	0.4	3.6	5.5	4.4	2.8	1.6	0.7
7A	5.6	5.4	7.2		12.3				7.5

BN3: Predicted Noise levels above Background Nighttime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	19	19.4	19.9	20.7	22	23.9	26.5	29.9	34.3
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
2	14.3	14.9	17.9	22	24.5	23.3	20.7	17.3	12.9
3	14.4	15	17.9	22.1	24.5	23.3	20.7	17.3	12.9
4			14.8	18.9	21.4	20.2	17.6	14.2	
5			14.5	18.7	21.1	19.9	17.3	13.9	
6			14.2	18.4	20.8	19.6	17	13.6	
7			13.5	17.7	20.1	18.9	16.3	12.9	
8			13.1	17.3	19.7	18.5	15.9	12.5	
9			13.7	17.9	20.3	19.1	16.5	13.1	
10			13.7	17.9	20.3	19.1	16.5	13.1	
11			13.8	18	20.4	19.2	16.6	13.2	
12			14.1	18.3	20.7	19.5	16.9	13.5	
13			14.5	18.7	21.1	19.9	17.3	13.9	
14			14	18.2	20.6	19.4	16.8	13.4	
15			14.5	18.6	21.1	19.9	17.3	13.9	
16			13.8	18	20.4	19.2	16.6	13.2	
17		12.5	15.4	19.6	22	20.8	18.2	14.8	
54	2.9	3.5	6.4		13			5.8	1.4
55	3.2	3.8	6.7		13.3	12.1		6.1	1.7
56	3	3.7	6.6		13.2			6	1.6
57	3.1	3.7	6.7		13.2			6	1.6
58	3.4	4	6.9		13.5	12.3		6.3	1.9
59	3.5	4.2	7.1		13.7	12.5		6.5	2.1
60	3.7	4.3	7.2		13.8	12.6		6.6	2.2
61	3.8	4.4	7.3		13.9	12.7		6.7	2.3
62	3.9	4.5	7.4		14	12.8		6.8	2.4
63	3.9	4.6	7.5		14.1	12.9		6.9	2.5
64	4	4.6	7.5		14.1	12.9		6.9	2.5
65	5.7	6.3		13.4	15.8	14.6			4.2
66	6.2	6.8		13.9	16.3	15.1	12.5		4.7
67	6.6	7.2		14.3	16.7	15.5	12.9		5.1
68	6.8	7.4		14.5	16.9	15.7	13.1		5.3
69	6.9	7.5		14.6	17	15.8	13.2		5.4
70	7.5			15.2	17.6	16.4	13.8		6
71				15.7	18.1	16.9	14.3		6.5
72			13.9	18.1	20.5	19.3	16.7	13.3	
73			12.5	16.7	19.1	17.9	15.3		7.5
74	7.3	7.9		15	17.4	16.2	13.6		5.8
75	6.8	7.5		14.6	17	15.8	13.2		5.4
77	4.4	5.1		12.1	14.5	13.3		7.3	2.9
78	3.7	4.4	7.3		13.9	12.7		6.7	2.3
79	3.5	4.2	7.1		13.7	12.5		6.5	2.1
80	3.4	4.1	7		13.6	12.4		6.4	2
81	2.9	3.5	6.4		13			5.8	1.4
82	3	3.6	6.5		13.1			5.9	1.5
83	2.8	3.4	6.3		12.9			5.7	1.3
84	3.2	3.8	6.7		13.3	12.1		6.1	1.7
85	2	2.7	5.6		12.2			5	0.6
55A	3.3	3.9	6.8		13.4	12.2		6.2	1.8
7A			13.6	17.8	20.2	19	16.4	13	

BN4: Predicted Noise levels above Background Daytime

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	26.8	28.5	30.3	32.2	34.3	36.4	38.6	41	43.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
18	-4	-4.7	-3.1	0	1.6	0.2	-2	-4.4	-6.8
19	-3.5	-4.2	-2.6	0.5	2.1	0.7	-1.5	-3.9	-6.3
20	-3.8	-4.5	-2.8	0.2	1.9	0.5	-1.7	-4.1	-6.5
21	-1.7	-2.4	-0.8	2.3	3.9	2.5	0.3	-2.1	-4.5
22	-2.4	-3.2	-1.5	1.6	3.2	1.8	-0.4	-2.8	-5.2
23	-1.1	-1.8	-0.1	2.9	4.6	3.2	1	-1.4	-3.8
24	-2	-2.7	-1.1	2	3.6	2.2	0	-2.4	-4.8
25	-2.1	-2.8	-1.2	1.9	3.6	2.2	0	-2.4	-4.8
26	-4.1	-4.8	-3.2	-0.1	1.5	0.1	-2.1	-4.5	-6.9
86	-10.4	-11.1	-9.5	-6.4	-4.8	-6.2	-8.4	-10.8	-13.2
87	-9.4	-10.1	-8.5	-5.4	-3.8	-5.2	-7.4	-9.8	-12.2
88	-9	-9.7	-8.1	-5	-3.4	-4.8	-7	-9.4	-11.8
89	-8.8	-9.5	-7.9	-4.8	-3.2	-4.6	-6.8	-9.2	-11.6
90	-8.3	-8.9	-7.3	-4.3	-2.6	-4	-6.2	-8.6	-11
91	-6.3	-7	-5.4	-2.3	-0.7	-2.1	-4.3	-6.7	-9.1
92	-6	-6.7	-5.1	-2	-0.4	-1.8	-4	-6.4	-8.8
93	-5.9	-6.5	-4.9	-1.8	-0.2	-1.6	-3.8	-6.2	-8.6
94	-9.8	-10.5	-8.9	-5.8	-4.2	-5.6	-7.8	-10.2	-12.6
95	-10.1	-10.8	-9.1	-6.1	-4.5	-5.9	-8.1	-10.5	-12.9
97	-11.1	-11.7	-10.1	-7.1	-5.4	-6.8	-9	-11.4	-13.8
98	-11.3	-11.9	-10.3	-7.2	-5.6	-7	-9.2	-11.6	-14
99	-11.8	-12.5	-10.8	-7.8	-6.2	-7.6	-9.8	-12.2	-14.6
100	-11.2	-11.8	-10.2	-7.2	-5.5	-6.9	-9.1	-11.5	-13.9
101	-11.2	-11.9	-10.3	-7.2	-5.6	-7	-9.2	-11.6	-14
102	-11	-11.6	-10	-6.9	-5.3	-6.7	-8.9	-11.3	-13.7
103	-11.4	-12.1	-10.5	-7.4	-5.8	-7.2	-9.4	-11.8	-14.2
104	-11.1	-11.8	-10.2	-7.1	-5.5	-6.9	-9.1	-11.5	-13.9
106	-10.3	-11	-9.4	-6.3	-4.7	-6.1	-8.3	-10.7	-13.1
107	-10	-10.7	-9.1	-6	-4.4	-5.8	-8	-10.4	-12.8
108	-6	-6.7	-5.1	-2	-0.4	-1.8	-4	-6.4	-8.8
109	-4.6	-5.3	-3.7	-0.6	1	-0.4	-2.6	-5	-7.4
115	-10.2	-10.8	-9.2	-6.2	-4.5	-5.9	-8.1	-10.5	-12.9
116	-10.3	-10.9	-9.3	-6.3	-4.6	-6	-8.2	-10.6	-13
117	-9.9	-10.6	-9	-5.9	-4.3	-5.7	-7.9	-10.3	-12.7
118	-10.3	-11	-9.4	-6.3	-4.7	-6.1	-8.3	-10.7	-13.1
119	-10.4	-11.1	-9.5	-6.4	-4.8	-6.2	-8.4	-10.8	-13.2
120	-10.5	-11.1	-9.5	-6.5	-4.8	-6.2	-8.4	-10.8	-13.2
121	-10.2	-10.9	-9.3	-6.2	-4.6	-6	-8.2	-10.6	-13
122	-10.3	-11	-9.4	-6.3	-4.7	-6.1	-8.3	-10.7	-13.1
123	-10.5	-11.2	-9.6	-6.5	-4.9	-6.3	-8.5	-10.9	-13.3
124	-10.7	-11.4	-9.7	-6.7	-5.1	-6.5	-8.7	-11.1	-13.5
116A	-10.3	-10.9	-9.3	-6.2	-4.6	-6	-8.2	-10.6	-13
121A	-10.2	-10.9	-9.2	-6.2	-4.6	-6	-8.2	-10.6	-13
21A	-2.1	-2.8	-1.1	2	3.6	2.2	0	-2.4	-4.8
24A	-2.4	-3.1	-1.5	1.6	3.2	1.8	-0.4	-2.8	-5.2
25A	-2.1	-2.8	-1.2	1.9	3.5	2.1	-0.1	-2.5	-4.9
87A	-9.1	-9.8	-8.2	-5.1	-3.5	-4.9	-7.1	-9.5	-11.9
93A	-6.2	-6.9	-5.2	-2.2	-0.6	-2	-4.2	-6.6	-9

BN4: Predicted Noise levels above Background N[illegible]time

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	24.9	25.1	26.1	27.6	29.9	32.8	36.4	40.6	45.5
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
18	-2.1	-1.3	1.1	4.6	6	3.8	0.2	-4	-8.9
19	-1.6	-0.8	1.6	5.1	6.5	4.3	0.7	-3.5	-8.4
20	-1.9	-1.1	1.4	4.8	6.3	4.1	0.5	-3.7	-8.6
21	0.2	1	3.4	6.9	[illegible]	6.1	2.5	-1.7	-6.6
22	-0.5	0.2	2.7	6.2	7.6	5.4	1.8	-2.4	-7.3
23	0.8	1.6	4.1	7.5	[illegible]	6.8	3.2	-1	-5.9
24	-0.1	0.7	3.1	6.6	[illegible]	5.8	2.2	-2	-6.9
25	-0.2	0.6	3	6.5	[illegible]	5.8	2.2	-2	-6.9
26	-2.2	-1.4	1	4.5	5.9	3.7	0.1	-4.1	-9
86	-8.5	-7.7	-5.3	-1.8	-0.4	-2.6	-6.2	-10.4	-15.3
87	-7.5	-6.7	-4.3	-0.8	0.6	-1.6	-5.2	-9.4	-14.3
88	-7.1	-6.3	-3.9	-0.4	1	-1.2	-4.8	-9	-13.9
89	-6.9	-6.1	-3.7	-0.2	1.2	-1	-4.6	-8.8	-13.7
90	-6.4	-5.5	-3.1	0.3	1.8	-0.4	-4	-8.2	-13.1
91	-4.4	-3.6	-1.2	2.3	3.7	1.5	-2.1	-6.3	-11.2
92	-4.1	-3.3	-0.9	2.6	4	1.8	-1.8	-6	-10.9
93	-4	-3.1	-0.7	2.8	4.2	2	-1.6	-5.8	-10.7
94	-7.9	-7.1	-4.7	-1.2	0.2	-2	-5.6	-9.8	-14.7
95	-8.2	-7.4	-4.9	-1.5	-0.1	-2.3	-5.9	-10.1	-15
97	-9.2	-8.3	-5.9	-2.5	-1	-3.2	-6.8	-11	-15.9
98	-9.4	-8.5	-6.1	-2.6	-1.2	-3.4	-7	-11.2	-16.1
99	-9.9	-9.1	-6.6	-3.2	-1.8	-4	-7.6	-11.8	-16.7
100	-9.3	-8.4	-6	-2.6	-1.1	-3.3	-6.9	-11.1	-16
101	-9.3	-8.5	-6.1	-2.6	-1.2	-3.4	-7	-11.2	-16.1
102	-9.1	-8.2	-5.8	-2.3	-0.9	-3.1	-6.7	-10.9	-15.8
103	-9.5	-8.7	-6.3	-2.8	-1.4	-3.6	-7.2	-11.4	-16.3
104	-9.2	-8.4	-6	-2.5	-1.1	-3.3	-6.9	-11.1	-16
106	-8.4	-7.6	-5.2	-1.7	-0.3	-2.5	-6.1	-10.3	-15.2
107	-8.1	-7.3	-4.9	-1.4	0	-2.2	-5.8	-10	-14.9
108	-4.1	-3.3	-0.9	2.6	4	1.8	-1.8	-6	-10.9
109	-2.7	-1.9	0.5	4	5.4	3.2	-0.4	-4.6	-9.5
115	-8.3	-7.4	-5	-1.6	-0.1	-2.3	-5.9	-10.1	-15
116	-8.4	-7.5	-5.1	-1.7	-0.2	-2.4	-6	-10.2	-15.1
117	-8	-7.2	-4.8	-1.3	0.1	-2.1	-5.7	-9.9	-14.8
118	-8.4	-7.6	-5.2	-1.7	-0.3	-2.5	-6.1	-10.3	-15.2
119	-8.5	-7.7	-5.3	-1.8	-0.4	-2.6	-6.2	-10.4	-15.3
120	-8.6	-7.7	-5.3	-1.9	-0.4	-2.6	-6.2	-10.4	-15.3
121	-8.3	-7.5	-5.1	-1.6	-0.2	-2.4	-6	-10.2	-15.1
122	-8.4	-7.6	-5.2	-1.7	-0.3	-2.5	-6.1	-10.3	-15.2
123	-8.6	-7.8	-5.4	-1.9	-0.5	-2.7	-6.3	-10.5	-15.4
124	-8.8	-8	-5.5	-2.1	-0.7	-2.9	-6.5	-10.7	-15.6
116A	-8.4	-7.5	-5.1	-1.6	-0.2	-2.4	-6	-10.2	-15.1
121A	-8.3	-7.5	-5	-1.6	-0.2	-2.4	-6	-10.2	-15.1
21A	-0.2	0.6	3.1	6.6	[illegible]	5.8	2.2	-2	-6.9
24A	-0.5	0.3	2.7	6.2	7.6	5.4	1.8	-2.4	-7.3
25A	-0.2	0.6	3	6.5	7.9	5.7	2.1	-2.1	-7
87A	-7.2	-6.4	-4	-0.5	0.9	-1.3	-4.9	-9.1	-14
93A	-4.3	-3.5	-1	2.4	3.8	1.6	-2	-6.2	-11.1

BN4: Predicted Noise levels above Background Daytime (+3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	26.8	28.5	30.3	32.2	34.3	36.4	38.6	41	43.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
18	-1	-1.7	-0.1	3	4.6	3.2	1	-1.4	-3.8
19	-0.5	-1.2	0.4	3.5	5.1	3.7	1.5	-0.9	-3.3
20	-0.8	-1.5	0.2	3.2	4.9	3.5	1.3	-1.1	-3.5
21	1.3	0.6	2.2	5.3	6.9	5.5	3.3	0.9	-1.5
22	0.6	-0.2	1.5	4.6	6.2	4.8	2.6	0.2	-2.2
23	1.9	1.2	2.9	5.9	7.6	6.2	4	1.6	-0.8
24	1	0.3	1.9	5	6.6	5.2	3	0.6	-1.8
25	0.9	0.2	1.8	4.9	6.6	5.2	3	0.6	-1.8
26	-1.1	-1.8	-0.2	2.9	4.5	3.1	0.9	-1.5	-3.9
86	-7.4	-8.1	-6.5	-3.4	-1.8	-3.2	-5.4	-7.8	-10.2
87	-6.4	-7.1	-5.5	-2.4	-0.8	-2.2	-4.4	-6.8	-9.2
88	-6	-6.7	-5.1	-2	-0.4	-1.8	-4	-6.4	-8.8
89	-5.8	-6.5	-4.9	-1.8	-0.2	-1.6	-3.8	-6.2	-8.6
90	-5.3	-5.9	-4.3	-1.3	0.4	-1	-3.2	-5.6	-8
91	-3.3	-4	-2.4	0.7	2.3	0.9	-1.3	-3.7	-6.1
92	-3	-3.7	-2.1	1	2.6	1.2	-1	-3.4	-5.8
93	-2.9	-3.5	-1.9	1.2	2.8	1.4	-0.8	-3.2	-5.6
94	-6.8	-7.5	-5.9	-2.8	-1.2	-2.6	-4.8	-7.2	-9.6
95	-7.1	-7.8	-6.1	-3.1	-1.5	-2.9	-5.1	-7.5	-9.9
97	-8.1	-8.7	-7.1	-4.1	-2.4	-3.8	-6	-8.4	-10.8
98	-8.3	-8.9	-7.3	-4.2	-2.6	-4	-6.2	-8.6	-11
99	-8.8	-9.5	-7.8	-4.8	-3.2	-4.6	-6.8	-9.2	-11.6
100	-8.2	-8.8	-7.2	-4.2	-2.5	-3.9	-6.1	-8.5	-10.9
101	-8.2	-8.9	-7.3	-4.2	-2.6	-4	-6.2	-8.6	-11
102	-8	-8.6	-7	-3.9	-2.3	-3.7	-5.9	-8.3	-10.7
103	-8.4	-9.1	-7.5	-4.4	-2.8	-4.2	-6.4	-8.8	-11.2
104	-8.1	-8.8	-7.2	-4.1	-2.5	-3.9	-6.1	-8.5	-10.9
106	-7.3	-8	-6.4	-3.3	-1.7	-3.1	-5.3	-7.7	-10.1
107	-7	-7.7	-6.1	-3	-1.4	-2.8	-5	-7.4	-9.8
108	-3	-3.7	-2.1	1	2.6	1.2	-1	-3.4	-5.8
109	-1.6	-2.3	-0.7	2.4	4	2.6	0.4	-2	-4.4
115	-7.2	-7.8	-6.2	-3.2	-1.5	-2.9	-5.1	-7.5	-9.9
116	-7.3	-7.9	-6.3	-3.3	-1.6	-3	-5.2	-7.6	-10
117	-6.9	-7.6	-6	-2.9	-1.3	-2.7	-4.9	-7.3	-9.7
118	-7.3	-8	-6.4	-3.3	-1.7	-3.1	-5.3	-7.7	-10.1
119	-7.4	-8.1	-6.5	-3.4	-1.8	-3.2	-5.4	-7.8	-10.2
120	-7.5	-8.1	-6.5	-3.5	-1.8	-3.2	-5.4	-7.8	-10.2
121	-7.2	-7.9	-6.3	-3.2	-1.6	-3	-5.2	-7.6	-10
122	-7.3	-8	-6.4	-3.3	-1.7	-3.1	-5.3	-7.7	-10.1
123	-7.5	-8.2	-6.6	-3.5	-1.9	-3.3	-5.5	-7.9	-10.3
124	-7.7	-8.4	-6.7	-3.7	-2.1	-3.5	-5.7	-8.1	-10.5
116A	-7.3	-7.9	-6.3	-3.2	-1.6	-3	-5.2	-7.6	-10
121A	-7.2	-7.9	-6.2	-3.2	-1.6	-3	-5.2	-7.6	-10
21A	0.9	0.2	1.9	5	6.6	5.2	3	0.6	-1.8
24A	0.6	-0.1	1.5	4.6	6.2	4.8	2.6	0.2	-2.2
25A	0.9	0.2	1.8	4.9	6.5	5.1	2.9	0.5	-1.9
87A	-6.1	-6.8	-5.2	-2.1	-0.5	-1.9	-4.1	-6.5	-8.9
93A	-3.2	-3.9	-2.2	0.8	2.4	1	-1.2	-3.6	-6

BN4: Predicted Noise levels above Background Nighttime (+3dB penalty for just perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	24.9	25.1	26.1	27.6	29.9	32.8	36.4	40.6	45.5
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
18	0.9	1.7	4.1	7.6	[illegible]	6.8	3.2	-1	-5.9
19	1.4	2.2	4.6	[illegible]	[illegible]	7.3	3.7	-0.5	-5.4
20	1.1	1.9	4.4	7.8	[illegible]	7.1	3.5	-0.7	-5.6
21	3.2	4	6.4	[illegible]	[illegible]	[illegible]	5.5	1.3	-3.6
22	2.5	3.2	5.7	[illegible]	[illegible]	[illegible]	4.8	0.6	-4.3
23	3.8	4.6	7.1	[illegible]	[illegible]	[illegible]	6.2	2	-2.9
24	2.9	3.7	6.1	[illegible]	[illegible]	[illegible]	5.2	1	-3.9
25	2.8	3.6	6	[illegible]	[illegible]	[illegible]	5.2	1	-3.9
26	0.8	1.6	4	7.5	[illegible]	6.7	3.1	-1.1	-6
86	-5.5	-4.7	-2.3	1.2	2.6	0.4	-3.2	-7.4	-12.3
87	-4.5	-3.7	-1.3	2.2	3.6	1.4	-2.2	-6.4	-11.3
88	-4.1	-3.3	-0.9	2.6	4	1.8	-1.8	-6	-10.9
89	-3.9	-3.1	-0.7	2.8	4.2	2	-1.6	-5.8	-10.7
90	-3.4	-2.5	-0.1	3.3	4.8	2.6	-1	-5.2	-10.1
91	-1.4	-0.6	1.8	5.3	6.7	4.5	0.9	-3.3	-8.2
92	-1.1	-0.3	2.1	5.6	7	4.8	1.2	-3	-7.9
93	-1	-0.1	2.3	5.8	7.2	5	1.4	-2.8	-7.7
94	-4.9	-4.1	-1.7	1.8	3.2	1	-2.6	-6.8	-11.7
95	-5.2	-4.4	-1.9	1.5	2.9	0.7	-2.9	-7.1	-12
97	-6.2	-5.3	-2.9	0.5	2	-0.2	-3.8	-8	-12.9
98	-6.4	-5.5	-3.1	0.4	1.8	-0.4	-4	-8.2	-13.1
99	-6.9	-6.1	-3.6	-0.2	1.2	-1	-4.6	-8.8	-13.7
100	-6.3	-5.4	-3	0.4	1.9	-0.3	-3.9	-8.1	-13
101	-6.3	-5.5	-3.1	0.4	1.8	-0.4	-4	-8.2	-13.1
102	-6.1	-5.2	-2.8	0.7	2.1	-0.1	-3.7	-7.9	-12.8
103	-6.5	-5.7	-3.3	0.2	1.6	-0.6	-4.2	-8.4	-13.3
104	-6.2	-5.4	-3	0.5	1.9	-0.3	-3.9	-8.1	-13
106	-5.4	-4.6	-2.2	1.3	2.7	0.5	-3.1	-7.3	-12.2
107	-5.1	-4.3	-1.9	1.6	3	0.8	-2.8	-7	-11.9
108	-1.1	-0.3	2.1	5.6	7	4.8	1.2	-3	-7.9
109	0.3	1.1	3.5	7	[illegible]	6.2	2.6	-1.6	-6.5
115	-5.3	-4.4	-2	1.4	2.9	0.7	-2.9	-7.1	-12
116	-5.4	-4.5	-2.1	1.3	2.8	0.6	-3	-7.2	-12.1
117	-5	-4.2	-1.8	1.7	3.1	0.9	-2.7	-6.9	-11.8
118	-5.4	-4.6	-2.2	1.3	2.7	0.5	-3.1	-7.3	-12.2
119	-5.5	-4.7	-2.3	1.2	2.6	0.4	-3.2	-7.4	-12.3
120	-5.6	-4.7	-2.3	1.1	2.6	0.4	-3.2	-7.4	-12.3
121	-5.3	-4.5	-2.1	1.4	2.8	0.6	-3	-7.2	-12.1
122	-5.4	-4.6	-2.2	1.3	2.7	0.5	-3.1	-7.3	-12.2
123	-5.6	-4.8	-2.4	1.1	2.5	0.3	-3.3	-7.5	-12.4
124	-5.8	-5	-2.5	0.9	2.3	0.1	-3.5	-7.7	-12.6
116A	-5.4	-4.5	-2.1	1.4	2.8	0.6	-3	-7.2	-12.1
121A	-5.3	-4.5	-2	1.4	2.8	0.6	-3	-7.2	-12.1
21A	2.8	3.6	6.1	[illegible]	[illegible]	[illegible]	5.2	1	-3.9
24A	2.5	3.3	5.7	[illegible]	[illegible]	[illegible]	4.8	0.6	-4.3
25A	2.8	3.6	6	[illegible]	[illegible]	[illegible]	5.1	0.9	-4
87A	-4.2	-3.4	-1	2.5	3.9	1.7	-1.9	-6.1	-11
93A	-1.3	-0.5	2	5.4	6.8	4.6	1	-3.2	-8.1

BN4: Predicted Noise levels above Background Daytime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Day	26.8	28.5	30.3	32.2	34.3	36.4	38.6	41	43.4
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
18	2	1.3	2.9	6	7.6	6.2	4	1.6	-0.8
19	2.5	1.8	3.4	6.5	8.1	6.7	4.5	2.1	-0.3
20	2.2	1.5	3.2	6.2	7.9	6.5	4.3	1.9	-0.5
21	4.3	3.6	5.2	8.2	9.9	8.5	6.3	3.9	1.5
22	3.6	2.8	4.5	7.6	9.2	7.8	5.6	3.2	0.8
23	4.9	4.2	5.9	8.9	10.4	9.1	7	4.6	2.2
24	4	3.3	4.9	8	9.6	8.1	6	3.6	1.2
25	3.9	3.2	4.8	7.9	9.5	8	6	3.6	1.2
26	1.9	1.2	2.8	5.9	7.5	6.1	3.9	1.5	-0.9
86	-4.4	-5.1	-3.5	-0.4	1.2	-0.2	-2.4	-4.8	-7.2
87	-3.4	-4.1	-2.5	0.6	2.2	0.8	-1.4	-3.8	-6.2
88	-3	-3.7	-2.1	1	2.6	1.2	-1	-3.4	-5.8
89	-2.8	-3.5	-1.9	1.2	2.8	1.4	-0.8	-3.2	-5.6
90	-2.3	-2.9	-1.3	1.7	3.4	2	-0.2	-2.6	-5
91	-0.3	-1	0.6	3.7	5.3	3.9	1.7	-0.7	-3.1
92	0	-0.7	0.9	4	5.6	4.2	2	-0.4	-2.8
93	0.1	-0.5	1.1	4.2	5.8	4.4	2.2	-0.2	-2.6
94	-3.8	-4.5	-2.9	0.2	1.8	0.4	-1.8	-4.2	-6.6
95	-4.1	-4.8	-3.1	-0.1	1.5	0.1	-2.1	-4.5	-6.9
97	-5.1	-5.7	-4.1	-1.1	0.6	-0.8	-3	-5.4	-7.8
98	-5.3	-5.9	-4.3	-1.2	0.4	-1	-3.2	-5.6	-8
99	-5.8	-6.5	-4.8	-1.8	-0.2	-1.6	-3.8	-6.2	-8.6
100	-5.2	-5.8	-4.2	-1.2	0.5	-0.9	-3.1	-5.5	-7.9
101	-5.2	-5.9	-4.3	-1.2	0.4	-1	-3.2	-5.6	-8
102	-5	-5.6	-4	-0.9	0.7	-0.7	-2.9	-5.3	-7.7
103	-5.4	-6.1	-4.5	-1.4	0.2	-1.2	-3.4	-5.8	-8.2
104	-5.1	-5.8	-4.2	-1.1	0.5	-0.9	-3.1	-5.5	-7.9
106	-4.3	-5	-3.4	-0.3	1.3	-0.1	-2.3	-4.7	-7.1
107	-4	-4.7	-3.1	-4E-15	1.6	0.2	-2	-4.4	-6.8
108	0	-0.7	0.9	4	5.6	4.2	2	-0.4	-2.8
109	1.4	0.7	2.3	5.4	7	5.6	3.4	1	-1.4
115	-4.2	-4.8	-3.2	-0.2	1.5	0.1	-2.1	-4.5	-6.9
116	-4.3	-4.9	-3.3	-0.3	1.4	0	-2.2	-4.6	-7
117	-3.9	-4.6	-3	0.1	1.7	0.3	-1.9	-4.3	-6.7
118	-4.3	-5	-3.4	-0.3	1.3	-0.1	-2.3	-4.7	-7.1
119	-4.4	-5.1	-3.5	-0.4	1.2	-0.2	-2.4	-4.8	-7.2
120	-4.5	-5.1	-3.5	-0.5	1.2	-0.2	-2.4	-4.8	-7.2
121	-4.2	-4.9	-3.3	-0.2	1.4	0	-2.2	-4.6	-7
122	-4.3	-5	-3.4	-0.3	1.3	-0.1	-2.3	-4.7	-7.1
123	-4.5	-5.2	-3.6	-0.5	1.1	-0.3	-2.5	-4.9	-7.3
124	-4.7	-5.4	-3.7	-0.7	0.9	-0.5	-2.7	-5.1	-7.5
116A	-4.3	-4.9	-3.3	-0.2	1.4	0	-2.2	-4.6	-7
121A	-4.2	-4.9	-3.2	-0.2	1.4	0	-2.2	-4.6	-7
21A	3.9	3.2	4.9	8	9.6	8.1	6	3.6	1.2
24A	3.6	2.9	4.5	7.6	9.2	7.8	5.6	3.2	0.8
25A	3.9	3.2	4.8	7.9	9.5	8.1	5.9	3.5	1.1
87A	-3.1	-3.8	-2.2	0.9	2.5	1.1	-1.1	-3.5	-5.9
93A	-0.2	-0.9	0.8	3.8	5.4	4	1.8	-0.6	-3

BN4: Predicted Noise levels above Background Nighttime (+6dB penalty for clearly perceptable impulsivity)

Highlighted Orange greater than 5dB & less than 8dB above BG
Highlighted Red greater than 8dB & less than 12dB above BG
Highlighted Purple greater than 12dB above BG

Night	24.9	25.1	26.1	27.6	29.9	32.8	36.4	40.6	45.5
House Number	2m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	10m/s
18	3.9	4.7	7.1	10.4	12	9.1	6.2	2	-2.9
19	4.4	5.2	7.6	11.1	12.5	10.3	6.7	2.5	-2.4
20	4.1	4.9	7.4	10.8	12.3	10.1	6.5	2.3	-2.6
21	6.2	7	9.4	12.9	14.3	12.1	8.5	4.3	-0.6
22	5.5	6.2	8.7	12.2	13.6	11.4	7.8	3.6	-1.3
23	6.8	7.6	10.1	13.5	15	12.8	9.1	5	0.1
24	5.9	6.7	9.1	12.6	14	11.9	8.1	4	-0.9
25	5.8	6.6	9	12.5	14	11.8	8	4	-0.9
26	3.8	4.6	7	10.4	11.9	9	6.1	1.9	-3
86	-2.5	-1.7	0.7	4.2	5.6	3.4	-0.2	-4.4	-9.3
87	-1.5	-0.7	1.7	5.2	6.6	4.4	0.8	-3.4	-8.3
88	-1.1	-0.3	2.1	5.6	7	4.8	1.2	-3	-7.9
89	-0.9	-0.1	2.3	5.8	7.2	5	1.4	-2.8	-7.7
90	-0.4	0.5	2.9	6.3	7.8	5.6	2	-2.2	-7.1
91	1.6	2.4	4.8	8.2	9.7	7.5	3.9	-0.3	-5.2
92	1.9	2.7	5.1	8.5	10	7.8	4.2	0	-4.9
93	2	2.9	5.3	8.6	10.2	8	4.4	0.2	-4.7
94	-1.9	-1.1	1.3	4.8	6.2	4	0.4	-3.8	-8.7
95	-2.2	-1.4	1.1	4.5	5.9	3.7	0.1	-4.1	-9
97	-3.2	-2.3	0.1	3.5	5	2.8	-0.8	-5	-9.9
98	-3.4	-2.5	-0.1	3.4	4.8	2.6	-1	-5.2	-10.1
99	-3.9	-3.1	-0.6	2.8	4.2	2	-1.6	-5.8	-10.7
100	-3.3	-2.4	0	3.4	4.9	2.7	-0.9	-5.1	-10
101	-3.3	-2.5	-0.1	3.4	4.8	2.6	-1	-5.2	-10.1
102	-3.1	-2.2	0.2	3.7	5.1	2.9	-0.7	-4.9	-9.8
103	-3.5	-2.7	-0.3	3.2	4.6	2.4	-1.2	-5.4	-10.3
104	-3.2	-2.4	0	3.5	4.9	2.7	-0.9	-5.1	-10
106	-2.4	-1.6	0.8	4.3	5.7	3.5	-0.1	-4.3	-9.2
107	-2.1	-1.3	1.1	4.6	6	3.8	0.2	-4	-8.9
108	1.9	2.7	5.1	8.5	10	7.8	4.2	0	-4.9
109	3.3	4.1	6.5	9.9	11.4	9.1	5.6	1.4	-3.5
115	-2.3	-1.4	1	4.4	5.9	3.7	0.1	-4.1	-9
116	-2.4	-1.5	0.9	4.3	5.8	3.6	0	-4.2	-9.1
117	-2	-1.2	1.2	4.7	6.1	3.9	0.3	-3.9	-8.8
118	-2.4	-1.6	0.8	4.3	5.7	3.5	-0.1	-4.3	-9.2
119	-2.5	-1.7	0.7	4.2	5.6	3.4	-0.2	-4.4	-9.3
120	-2.6	-1.7	0.7	4.1	5.6	3.4	-0.2	-4.4	-9.3
121	-2.3	-1.5	0.9	4.4	5.8	3.6	0	-4.2	-9.1
122	-2.4	-1.6	0.8	4.3	5.7	3.5	-0.1	-4.3	-9.2
123	-2.6	-1.8	0.6	4.1	5.5	3.3	-0.3	-4.5	-9.4
124	-2.8	-2	0.5	3.9	5.3	3.1	-0.5	-4.7	-9.6
116A	-2.4	-1.5	0.9	4.4	5.8	3.6	0	-4.2	-9.1
121A	-2.3	-1.5	1	4.4	5.8	3.6	0	-4.2	-9.1
21A	5.8	6.6	9	12.6	14	11.8	8.2	4	-0.9
24A	5.5	6.3	8.7	12.2	13.6	11.4	7.8	3.6	-1.3
25A	5.8	6.6	9	12.5	13.9	11.7	8.1	3.9	-1
87A	-1.2	-0.4	2	5.5	6.9	4.7	1.1	-3.1	-8
93A	1.7	2.5	5	8.4	9.8	7.6	4	-0.2	-5.1

APPENDIX 2

Submission to Proposed Windfarm Application

by
Pauline McSweeney
Ard na Greine,
Ballyclough,
Mallow, Co. Cork
P51 V308

Planning Application Number 24/5503

Applicant: Tullacondra Green Energy Limited

Description: Permission for the construction, operation and decommissioning of a wind energy development including 9 wind turbines each with a blade tip height of 175 metres, rotor diameter of 150 metres, hub height of 100 metres and a rated output of 4.5 megawatts

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I object to this proposed development as I have firsthand experience of living 1km on the prevailing wind side of 10 industrial wind turbines. My husband, myself and our 3 young teenagers did not know to be concerned when these turbines were under construction (2011). Within weeks of the turbines being commissioned (turning), we were greatly affected by the noise from the turbines. These 10 turbines were not visible from our home, but our home was on the prevailing (south/southwest) side of the industrial development of 10 turbines. These turbines were planted into a very quiet rural area and had devastating effects.

We took the desperate step to leave our family home. This was not a planned relocation but a very rushed response to the terrible situation we found ourselves in. We had to leave behind many of our belongings and furniture, the family pet cat and farm animals. We had to return every day to care for them, even though we now lived 8 miles away.

We lived in 5 different rental accommodations during subsequent years and it was extremely disruptive to our family life and sense of community. My children were unable to take the bus to school with their friends and I reduced my working hours to drop and collect them every day. Our children were unable to continue playing sport in their local area and were reluctant to join other teams of children who were not in their growing up friend groups. This was particularly hard on my son who loved playing football but subsequently gave up the sport entirely.

Psychologically it was very difficult as we were deeply involved in our community and it was extremely difficult to leave our friends and neighbours behind. We wrote letters of complaint to Cork County Council to no avail. Left with no option, we sought legal help and advice and a case was started and the work on same continued until 2016. It was a very tough time for us as a family and these years of moving from one rental house to another and the insecurity of it took its toll on us, coupled with the stress of trying to assist our legal team, and the numerous experts involved in building our case. The

case was taken along with 6 other households around the windfarm. The windfarm developer admitted full liability to 'noise nuisance' in this case[52].

> https://stopthesethings.com/2016/12/17/irish-high-court-finds-wind-turbine-maker-liable-for-noise-nuisance-7-irish-families-to-get-millions-in-punitive-damages/

We were delighted to finally move to this quiet locality of Ballyclough in 2019. We spent a lot of time trying to pick an area where we would be 'safe' from other future windfarm developments. From previously living in a rural area, we decided it was safer to live in a village location away from forestry or mountainous terrain. So, I am shocked to find that even with this effort we are once again under threat from industrial wind turbines. It is extremely worrying and frustrating to find that having been forced to move from our previous home due to wind turbine noise we now face the prospect of being exposed to it again.

I know from bitter experience that these industrial turbines should not be placed near to family homes. They need to be at least 2km away to ensure no noise impact occurs. I am strongly opposed to this proposed development in such a quiet rural area and I am very concerned about the effects it will have on the nighttime noise levels in particular and the subsequent health effects on surrounding families in the area.

[52] High Court cases 2011 9852 P, 2011 9893 P, 2011 9854 P, 2011 9954 P, 2011 9955 P, 2011 9956 P, 2011 10137 P

APPENDIX 3

Comhairle Chontae Chorcaí
Cork County Council

Head Office: County Hall, Cork

Form no. 3 Articles 28 and 35

ACKNOWLEDGEMENT OF RECEIPT OF SUBMISSION OR OBSERVATION ON A PLANNING APPLICATION

THIS IS AN IMPORTANT DOCUMENT

KEEP THIS DOCUMENT SAFELY. YOU WILL BE REQUIRED TO PRODUCE THIS ACKNOWLEDGEMENT TO AN BORD PLEANALA IF YOU WISH TO APPEAL THE DECISION OF THE PLANNING AUTHORITY. IT IS THE ONLY FORM OF EVIDENCE WHICH WILL BE ACCEPTED BY AN BORD PLEANALA THAT A SUBMISSION OR OBSERVATION HAS BEEN MADE TO THE PLANNING AUTHORITY ON THE PLANNING APPLICATION.

PLANNING AUTHORITY NAME **Cork County Council**

PLANNING APPLICATION REFERENCE NO. **24/5503**

A submission/observation, in writing, has been received via our online system, from:

William McSweeney
Ard na Greine
Ballyclough
Mallow
Co. Cork P51 V308

ON 10/09/2024 in relation to the above planning application.

The appropriate fee of €20.00 has been paid.

The submission/observation is in accordance with the appropriate provisions of the Planning and Development Regulations, 2001, as amended, and will be taken into account by the Planning Authority in its determination of the planning application.

County Hall, Carrigrohane Road,
Cork.

CORK COUNTY COUNCIL
PLANNING DEPARTMENT
ONLINE SUBMISSIONS SYSTEM

Date: **10/09/2024**

APPENDIX 4

Comhairle Chontae Chorcaí
Cork County Council

Head Office: County Hall, Cork

Form no. 3 Articles 28 and 35

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PLANNING AUTHORITY NAME **Cork County Council**

PLANNING APPLICATION REFERENCE NO. **24/5503**

A submission/observation, in writing, has been received via our online system, from:

Pauline McSweeney
Ard na Greine
Ballyclough
Mallow
Co. Cork P51 V308

ON 10/09/2024 in relation to the above planning application.

The appropriate fee of €20.00 has been paid.

The submission/observation is in accordance with the appropriate provisions of the Planning and Development Regulations, 2001, as amended, and will be taken into account by the Planning Authority in its determination of the planning application.

County Hall, Carrigrohane Road,
Cork.

CORK COUNTY COUNCIL
PLANNING DEPARTMENT
ONLINE SUBMISSIONS SYSTEM

Date: **10/09/2024**