S. 37

File With _____

SECTION 131 FORM

Appeal NO: ABP 314485-22

Defer Re O/H ☐

Having considered the contents of the submission dated/ received 12/12/2023 from Colm and Sandra Barry 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 issues

E.O.: Pat B Date: 15/12/2023

For further consideration by SEO/SAO

Section 131 not to be invoked at this stage. ☐

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

S.E.O.: _____ Date: _____

S.A.O: _____ Date: _____

M _____

Please prepare BP _____ - Section 131 notice enclosing a copy of the attached submission

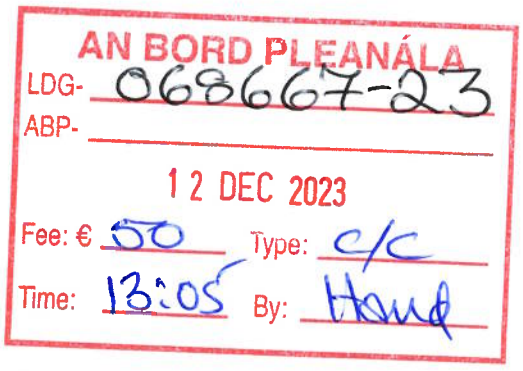
to: _____ Task No: _____

Allow 2/3/4weeks – BP _____

EO: _____ Date: _____

AA: _____ Date: _____

An Bord Pleanala
64 Marlborough Street
Dublin 1
D01 V902



Colm and Sandra Barry
Shallon Lane
The Ward
Co. Dublin
D11 XH51

11/12/2023

Re: Your Case Number ABP-314485-22, Planning Authority Reference Number : F20A/0668
A proposed development comprising the taking of a "relevant action" only within the meaning of section 34C of the Planning and Development Act 2000 as amended, which relates to the night time use of the runway system at Dublin Airport, Dublin Airport, Co. Dublin.

Dear Sir/Madam

Further to your Newspaper Notice of Significant Additional Information being submitted by DAA in relation to the above Planning Appeal, we note that we submitted a submission to ANCA ref FIN-C338-ANCA-1308 as per record attached at Appendix A. However as we did NOT receive any notice from ANCA or An Bord Pleanala that we could make a submission free of charge we have paid €50.00 to ABP to ensure this submission is validated and taken into account by the Bord.

1.0 Introduction

We Colm and Sandra Barry bought our home in 2017 from Sandra's mothers' family |(Farrells) which was constructed on her grandfathers' farm (Liam Farrell) in or around 1998.

When the North Runway opened for use in August 2022 we experienced a horrific onslaught of noise and disruption that was never communicated to us during any of the public meetings we had attended previously in St Margarets with reference to the new North Runway at Dublin Airport. We had previously viewed the noise contours that had been produced as part of the planning submission for the North Runway and noted that the house was not on a flight path, was not inside a noise contour that required sound insulation and therefore would not be affected by the operation

of the North Runway. We note that there is a revised EIAR Supplement submitted with the Significant Additional Information by DAA which explains that there are NOW revised flight paths which appear to be the major reason for this horrific change in our Environment which were not the subject of assessment of the 2007 permission nor are they consistent with the original EIAR submitted to Fingal County Council for this relevant action which again had indicated different flight paths from those of 2007 and those that are now being flown.

We note that the current flight paths being flown off the North runway take aircraft straight over our house and because they are turning on take off they are extremely low and noisy.

From the opening of the runway in August 2022 we knew there was something really wrong with the assessments previously given to the public and we therefore set about engaging experts in the field of acoustics to monitor the ACTUAL noise at our premises at:

1. Both inside and outside our house prior to the north runway becoming operational on August 10th and 11th 2022 by iAcoustics. (Refer to Appendix E of this submission)
2. Outside our house in December 2022 when the North Runway was in use but not for the full 16 hour day by Wave Dynamics. (Refer to Appendix G of this submission)
3. We also obtained noise monitoring results over the 92 day Summer of 2023 from the residence of Pearse and Evelyn Sutton at Ballystrahan , St. Margarets, Co. Dublin and Teresa Sweeney at Newpark, The Ward, Co. Dublin. (refer to Appoendix F and I)
4. We also had the experience of night time flights operating off the North Runway for at least 3 periods of nights when the South Runway was closed for maintenance.

The reports on these noise monitoring events are included within this submission.

We note at this stage that ALL of this submission related to the changes submitted in the Significant Additional Information by DAA and all of the information is pertinent to this information.

2.0 FLIGHT PATHS

The following is our knowledge of the planning submitted in 2004 and from research we carried out with Sandras father and mother Pearse and Evelyn Sutton who live a few fields away at Ballystrahan, St Margarets, Co. Dublin.

The North Runway at Dublin Airport received a Grant of Planning permission in August 2007 by An Bord Pleanala Ref PL 06F.217429 Planning Reg Ref F04A/1755.

In order to comply with conditions 6,7 and 9 a report "Dublin Airport – North Runway Option 7B Forecast Contours Conditions 6,7 & 9 by Bickerdike Allen Partners (BAP) on behalf of DAA was submitted to Fingal County Council in December 2016 (Extract attached at Appendix C). Fingal County Council issued correspondence to DAA in December 2016 informing them that the compliance submission was deemed by Fingal County Council to comply with conditions 6,7 &9.Refer to Appendix C.

At p4 of the Report BAP confirm that they have produced noise contours on the forecast (2022 High Growth Forecast for a typical busy day produced in August 2015) for the daytime period with the same runway usage assumptions as Option 7b as submitted to ABP during the planning process.

At p7 under section 2.4 "Route Utilisation" it is noted that the proposed routes are still being developed with IAA and that those from the Dublin Airport optimization exercise undertaken in 2011 have been re-used. As per the documentation submitted for planning approval it is noted that "For the parallel runways initial departure routes have been prepared based on the existing published routes for the south runway with those for the North runway in effect replicating them. Again, in accordance with the documentation submitted for planning approval and which were the only routes assessed within the Environmental Impact Statement submitted to Fingal County Council and An Bord Pleanala for the 2007 permission. The reference to "Still being Developed with the IAA" is taken to mean that these routes which were Environmentally Assessed during the planning process and presented to the public indicating the Environmental issues concerned as relating to these routes were being ratified with the IAA to meet the planning granted as submitted. At p.23 of 102 of the ABP Inspectors Report for the 2007 Grant of Planning submission (extract attached at Appendix C) it is clearly stated that "The Irish Aviation Authority in a letter dated 24/01/04 ((sic) – possibly dated incorrectly) states that the Authority has been consulted by the applicants on the development during the design stages and the proposal conforms with its requirements".

These routes indicated on Fig 1 (A9843-R03-Rev3-02) result in the noise contours as per Fig 2(A9843-R03-Rev3-01) as presented in the BAP report are similar to the contours presented as additional information to ABP in 2006/2007 and as indicated on Fig3(Figure 4.6.1 Noise Option 7b 2025 Appendix 1 Applicants response 12-8-06) Refer to Appendix C.

It is crystal clear from the above that the flight paths that produce the assessed noise contours is straight out and are NOT DIVERGENT flight paths and not now as indicated on all of the Relevant Action noise contours provided which clearly indicate divergent Noise contours to the North at the end of the runway.

In the EIS submitted in 2004 it states at section 16.1.3,4 (extract attached at Appendix C) "The flight tracks associated with the existing 10/28 runway, the existing 16/34 runway and the existing 11/29 runway are in accordance with AIP Ireland as published by the Irish Aviation Authority. For the proposed runway it was assumed that the aircraft would join up with the tracks used for the existing 10/28 runway which was agreed with the Irish Aviation Authority to be a reasonable assumption at this stage. Appendix G3 shows the track data used. (Refer to Appendix C) The routes as per G3 are attached and again, these tracks are straight out. In Appendix G9 of the original EIS from 2004 (extract attached at Appendix C)) it is stated that "on the new 10/28 runway it is assumed that aircraft using this will follow similar flight tracks to those for the existing runway. Therefore, the tracks of the new runway have been sensibly joined up to the existing tracks. These agreed flight paths/tracks with DAA and the Irish Aviation Authority are those that were assessed in the EIS submitted with the planning application for the North Runway and which was granted permission by ABP in 2007. Condition 1 of that Grant of planning (extract attached at Appendix C)) states that "The development shall be carried out in accordance with the plans and particulars and the Environmental Impact Statement lodged with the application etc".

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Issues with Significant Additional Information submission by DAA.

3.0 PUBLIC NOTICE

We refer to the public notice as published in a National Newspaper copy attached at Appendix D. It is noted that an Environmental Impact Assessment Report Supplement was received. No where in the notice does it identify that there are to be changes to the Flight Paths from the original Grant of Planning in 2007 OR that there are proposed changes to the flight paths that were submitted with the original Relevant Action Planning Submission to Fingal County Council on which they adjudicated on. Therefore, the Public Notice FAILS to notify the Public at large of modifications to the Planning Submission that could have Very Significant effects on them, their health and their wellbeing. In actual fact the Public Notice states that the Significant Additional Information is in relation to a request for additional information from An Bord Pleanala who in fact did not request a change to flight paths. We refer to section 1.2.1 of the EIAR Supplement (copy attached at Appendix D) which clearly states" The Applicant has identified a number of changes that have taken place since September 2021 that could affect the findings of the environmental assessments presented in the September 2021 EIAR. These changes include:

a. Actual flight paths from North Runway upon commencement differing from assumed flightpaths used for modelling/assessment purposes in the 2021 EIAR;
b. Updated air traffic forecast data;
c. Earlier fleet modernisation; (WE note that there is no solid evidence that this will happen)
d. The north runway becoming operational in August 2022; and
e. Other passage of time changes that include changes to the environmental baseline conditions and changes to relevant aviation, planning and environmental legislation, policy, guidance and best practice.

None of these items are contained within the new Public Notice or the Original Public Notice submitted in December 2020 and which ALL are of MAJOR importance to the public affected by the operation of the Dublin Airport North Runway. The Public Notice reads as if DAA only want to change condition 3(d) and condition 5 and replace them with alternatives. IT does not ALERT the public to the other major changes from the permission granted in 2007. We the public as the Bord were shocked beyond belief when the North Runway opened (and again we confirm it is operational and the planning conditions of ABP decision in 2007 do apply) as the flight paths were completely different from those environmentally assessed during the 2007 planning process. Clearly from Section 1.2 of the EIAR Supplement the DAA are aware of the requirement to notify the Bord of major issues that affect the previous environmental assessments but also, they are obliged to inform the public and provide

consultation on these matters so that the public are made aware of these issues and can make submissions and observations as provided under all current legislation. As set out by DAA we see this as an attempt to regularise retention of unauthorised use of the runway for which they have not informed the public nor carried out the process as required by current legislation requirements. In order to demonstrate this we point to p168 and p169 of the Planners Report from Fingal County Council (Copy attached at Appendix D). Under the heading of Flight Paths "The proposal under consideration in the Relevant Action as subject to the Regulatory Decision has no impact on nor consents any changes to flightpaths. It is outlined in the EIAR there will be no new flight paths in the proposed scenario." So, Fingal Planning Department were misled and understood that there are no new flight paths within the planning application and as per our correspondence on 2.0 "Flight Paths" above it is crystal clear that the flight paths have been altered significantly in this Relevant Action application. Given this fact and it is clear at section 1.2 of the EIAR supplement that there are indeed changes to flight paths and that unauthorised flight paths are being currently operated a new planning submission for retention must be provided by DAA and this application cannot be considered any further.

Furthermore, the Public Notice for the Significant Additional states" Conditions 3(d) and 5 have not yet come into effect or operation, as the construction of the North Runway on foot of the North Runway Planning Permission is ongoing". This is not correct. The North Runway opened in August 2022 and is in operation for in excess of one year now. Conditions 3(d) and 5 are very much in effect NOW. This error has major implications. Firstly, as noted it has misled the public. Secondly the runway since opening has been operated by the DAA in contravention of condition 5 and as a result Fingal County Council have issued enforcement proceedings against DAA. Therefore, this Significant Additional Information is for RETENTION of an unauthorised development. The DAA also exceed the 32mppa cap as provided in planning conditions relating to Terminal 1 and 2, in 2019. However, in accordance with the amended Section 34 (12) of the Planning and Development Act because an AA nor EIAR was submitted for the use of the runway in breach of the planning granted, the planning Bord must refuse to deal with this application. We therefore request An Bord Pleanala to rectify the above wrong doings and inform the Public that the Public Notice is wrong so that they can contribute their concerns to this application. Many members of the local communities were not aware that the modifications as noted above were included in the proposed Relevant Action and took it on face value. They missed out on providing observations to these modifications that were unknown to them and

are forced now to pay to contribute observations to ABP. And missed out on providing observations to Fingal County Council.

4.0 AIRCRAFT NOISE (DUBLIN AIRPORT) REGULATIONS ACT 2019.

We draw the Bords attention to section 37R of the Act (Extract at Appendix H) "Supplementary provisions relating to decisions on applications referred to in sections 34B(1) or 34C(1) which were not refused by virtue of section 34B(5) or 34C(5). At 37R 1(a) of the Act it states "This section applies in addition to section 37 in the case of an appeal under section 37 against a decision of the planning authority under section 34 where, pursuant to section 34B(15) or 34C(16) that decision incorporates a regulatory decision of the competent authority under section 34B(13)(a) or 34C(14)(a) as the case may be" Therefore this applies to this case.

At 37R(2) it states" For the purposes of a relevant appeal the reference in section 37(1) to any person who made submissions or observations in writing in relation to the planning application to the planning authority includes any person who made submissions or observations in writing referred to in section 34B(11)(c) or 34C(12)(c) to the competent authority in relation to the draft regulatory decision or related report referred to in 34B(9) or (10) as the case may be, or section 34C(10) or (11) as the case may be" They were over 1300 submissions made by the public to the competent authority on their draft regulatory decision. HOWEVER, having checked with a number of these people NONE of them have been written to by the competent authority or the Bord to inform them that they are entitled to make an observation or submission to this Significant Additional Information and are entitled to do so at no cost. We are one of these people but in the absence of not being contacted on this matter we have paid €50.00 to ABP to ensure our submission is taken into account. We know others that because of Christmas etc could not afford the €50.00 and because they were not notified as above they did not make a submission. This is not what the public notice states nor does it inform those members of the public of their entitlements under the Aircraft Noise (Dublin Airport) Regulation ACT 2019

EIAR Supplement.

5.0 Aircraft Noise and vibrations

A completely new revised chapter on Aircraft Noise and Vibration is included within the EIAR Supplement at Chapter 13.0. This was not requested by ABP. At Section 1.2 it is noted that the changes are required due to actual flightpaths from North Runway upon commencement differing from assumed flightpaths used for modelling/assessment purposes in the 2021 EIAR, together with a number of other changes as per above. However, the relevant planning application never identified that the flightpaths as granted permission in 2007 were the proposed subject of change when the Relevant Action was submitted to Fingal County Council in December 2020 and the public were not informed within the Public Notices that the flight paths were proposed to be changed. Neither of the flight paths that were flown in August 2022 and February 2023 were included in the 2020 relevant Action submission and now DAA are proposing a 4th change to flight paths (i.e. original flight paths assessed in 2007, relevant action submission flight paths of December 2020, Actual flight paths flown in August 2022 and now the current flight paths being flown since February 2023) all of which are different and which affect a different community population in different ways. We are amazed that the largest piece of infrastructure in Irish Aviation history which obtained planning consent in 2007, over 15 years ago, was constructed without taking into account the planning conditions associated with the development for the development of the flight paths that were assessed and furthermore that no revised application for the flight paths to be used has been made UNTIL the Supplementary EIAR recently submitted to ABP.

6.0 Legislation and Planning Policy Context.

We note the various legislation is set out in section 13.2 of the EIAR Supplement. However, we note that the glaring omission and is only given a passive reference and that is Directive 2011/92/EU as amended by Directive 2014/52/EU which does not replace the earlier Directive with respect to Environmental Impact assessment. We note and are fully aware that an EIA in itself does not dictate the outcome of the development consent decision of the authority but is an IMPORTANT AND ESSENTIAL consideration in decision making procedures and the achievement of high quality, sustainable development. The fact that such a major change to the proposed relevant action is now only being introduced by the DAA and the fact that we are only being given 5 weeks to review the consequences of this proposal is far from being considerate of the affected communities and is very poor practice as far as public consultation is concerned. We note that numerous requests for DAA to attend at a public meeting to discuss the proposals with the local communities has been turned down by the DAA and it has been left to community groups to hold public meetings in order to help community members understand the large amount of technical documentation that has been

submitted with this application. We would note that the current planning permission granted for the development of the North Runway is the Grant of Permission in 2007 by ABP and which clearly states at condition 1 that the permission be carried out in accordance with the EIS submitted for that application. Unfortunately, due to the change in flight paths being used presently on the North Runway the use of the runway is unauthorised development and which is causing severe environmental and health effects on us and the use of our home as the flight paths are now departing over our home as opposed to going out straight as those submitted in the 2007 EIS and which was granted permission.

The current flight paths are being operated since February 2023. The EIAR Supplement assessing these flight paths was submitted in late September 2023. So the EIAR Supplement is now being submitted as a fait accompli after the event. So the DAA are doing what they want to do changing planning conditions and retrospectively submitting an EIAR in an attempt to ratify what they are doing. This is completely wrong and we urge the Bord to call out the DAA on this fact. They should have applied for a new planning permission or a retention permission.

We carried out noise monitoring at our house both before the North Runway opened for use and after the opening of the North Runway. The noise monitoring before the runway was opened was carried out by iAcoustics experts in the field of acoustics. We carried out noise monitoring after the runway opened in December 2022 which was carried out by Wave Dynamics. Sandra's farther and mother who live approximately 800 meters further South East from our house but closer to the runway on the flight paths carried out monitoring over the 92 day summer period of 2023 and who gave us these monitoring results carried out by Wave Dynamics. (Refer to Appendix F) We also obtained the results of noise monitoring from Teresa Sweeney who live at Newpark The Ward, Co. Dublin and are approximately 800m further South West of our house again under the flight paths currently being flown. (Refer to Appendix I). These noise measurements were taken over the 92 day Summer period of 2023.

At section 8.5.7 of the Fingal Development Plan , National Policy Objective 65 is stated as "Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the environmental Noise regulations through national planning guidance and noise action plans" In order to achieve this Fingal development plan has incorporated a noise zoning system with the overarching objective to balance the potential impact of

aircraft noise from Dublin Airport on both EXTERNAL and INTERNAL amenity. Guidance and standards are included in the Development Plan and ProPG planning & Noise – New Residential Development, May 2017 and British Standard BS8233:2014 Guidance on sound insulation and noise reduction for buildings, are specifically noted.

Table 8.1 notes the Aircraft Noise Zones and it specifically states that "Good Acoustic Design means following the principles of assessment and design as described in ProPG: Planning & Noise – New Residential Development, May 2017"(extracts attached at Appendix H)

At Section 2.28 of the ProPG Guidance the recommended internal noise guidelines are stated as being described in Figure 2 and that these guidelines reflect and extend current practice contained in BS 8233:2014. The recommended LAmax between the hours of 23:00 – 07:00 is listed at 45 dB Sleeping in a bedroom location and at note 4 it is noted "Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmaxF, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dBLAmaxF , more than 10 times a night. However where this is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A of the ProPG document) Also Note 5 states "Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design etc.(extracts attached at Appendix D).

With reference to the iAcoustic report and the indoor noise readings in the bedroom when the North Runway was in use in December 2022 , the average reduction in noise monitored between outdoors and indoors is approximately 22 dB.. Note that the runway was not operational for the full 7am to 11pm period at that time. The monitored LAFmax levels were in the order of 84 to 90 dB and therefore applying the 22 dB reduction the result is 62 to 68dB. The DAA insulation scheme will only produce a 5dB to 7 dB reduction which will give a value of 55dB to 61dB. Therefore, if night flights are allowed on the North runway then the "Good Acoustic Design" criteria as set out in Fingals Development plan of 45 dB cannot be achieved. Also, we can testify that at present we are awoken just after 7am every morning when aircraft commence departures on the North runway and that we cannot go to bed before 11pm as the noise from aircraft does not allow me to fall asleep as the noise within the

bedroom is too high. We also have a 6 month old bay daughter who also awakens when aircraft are flying and this has severely disrupted her day time sleep.

The DAA in recent months have approached us and informed us that due to the change in flight paths they want to provide our house with Sound Insulation in accordance with their existing sound insulation programme. They have obviously noticed that the noise intensity at our house is not what they produced for planning compliance due to the change in flight paths and are now trying to cover their tracks by giving us noise insulation at this late stage. We have accepted this on the basis that it may help with our indoor enjoyment of the house and to protect our health and safety from the harmful effects of aircraft noise at least when we are indoors but we are not convinced given the readings we are obtaining for outside noise intensity. The sound insulation has not been provided. Therefore the DAA have informed us that the noise situation that they obtained for planning compliance with condition 7 of the 2007 planning permission is wrong due to the change in flight paths.

From the 92 day Summer period results we obtained we note that at Pearse & Evelyn Suttons house that the LAeq 16hour value exceeds 69dBA and goes as high as 70dB(A) some days and that Teresa Sweeneys residence reaches 67 dB(A) some days also. The average at Pearse and Evelyn Sutton is 68 dB(A) and that at Teresa Sweeney is 65dBA. Given our location and based on the 2 sets of results the average noise level of 66-69dB as per section 3.2 of the Wave Dynamics December 2022 report is very accurate.

Please refer to the SEL results of the Wave Dynamics noise monitoring and note the significant variation in levels monitored and those predicted by DAA. The exceedances are in the order of a massive 7dB(A) with ranges been experienced between 93-99 dB(A). This clearly indicates that all predictions of noise at our residence by DAA are wrong by a considerable amount and are actually way higher than their predictions.

7.0 Significance Criteria

The Lden at our house is measured at approx. 66 to 69 dB. From the iAcoustics report BEFORE the runway was operational the Lden was measured at 44dB outdoors which is an increase of 22dB.

Table 13-2 of the EIAR sets out the Air noise Impact Criteria (absolute) – residential. The scale description of our property is High as per this table.

Table 13-3 Air Noise Impact Criteria indicates that for a change in noise level greater than 9 dB the scale description is Very High.

Table 13-4 gives a Summary of Magnitude of effect – air noise which results in a "Profound"

The definition of "Profound Effects" as per the EPA EIAR Guidelines 2022 is "An effect which obliterates sensitive characteristics" and Figure 3.4 is a chart showing typical classifications of the significance of effects .(Refer to Appendix D for extracts). Our property is at the extreme top of the scale as being of PROFOUND SIGNIFICANCE.

Section 13.7 sets out the Assessment of Effects and Significance. We firstly note that there is continuous reference to "Permitted Scenarios". In our opinion none of these are permitted as the flight paths as proposed are considerably different from those assessed and presented in the EIS of the granted permission in 2007. We note at table 13-34 Air Noise (Lden) People by Magnitude of effect – 2025 Proposed vs Permitted that the number of people with an adverse effect with a Magnitude of effect of Very significant or Profound is 0 and at Section 13.7.13 it is stated that "Going from the 2025 Permitted Scenario" to the 2025 Proposed Scenario, 7060 people are assessed as having a significant beneficial effect and 119 people are assessed as having a significant adverse effect using the criteria detailed in Table 13-4. NO PEOPLE ARE ASSESSED AS HAVING THE HIGHEST EFFECT LEVELS i.e VERY SIGNIFICANT AMD PROFOUND". This statement on its own is totally misleading and wrong. As demonstrated above our house Significance Criteria by their own criteria is PROFOUND and it would appear that DAA are really saying that because the house will be insulated in accordance with their sound insulation program that this some how mitigates the impact completely. This is totally incorrect as our house was never included in the home insulation scheme and is not insulated. This is totally untrue and we urge the board to recognise the attempts by DAA to camouflage the real facts. No other mitigation measure is proposed by DAA within their EIAR Supplement and therefore the EIAR is deficient. I would point out to the board that we are not the only residence where DAA are attempting to compare apples with oranges due to change in flight paths and consequent changes to noise exposure with SIGNIFICANT PROFOUND EFFECTS. This as can be seen from the evidence of monitoring by noise experts is totally wrong. There is absolutely no way that the significance of the magnitude of effect is going to decrease from Profound to significant within the space of 12 months from now

and particularly with a proposed increase in nightime flights and as we have been informed increased day time flights above the proposed 32mppa cap. Section 13.7.13 states that "No people are assessed as having the highest effect levels i.e. very significant and profound" If it is the case that DAA are arguing here that if a household had a magnitude of significance rating of profound in the so called "permitted" scenario and still has a profound rating in the proposed scenario then there is no difference from one to the other and therefore there is no increase in effect, then this is extremely misleading and of course wrong. It appears that the mitigation measure is simply noise insulation and monitoring. As can be seen from the above noise insulation does not adequately deal with the noise at our home internally as the recommended targets as set out by Fingal county Council cannot be achieved and more particularly the level of day time noise is unbearable from the point of view of being able to enjoy the outdoors without being exposed to the very harmful health effects of aircraft noise as set out in the Fingal development plan and Noise guidance from ProPG and WHO. From the DAA own assessment the Significance of the effect of what they propose (and are currently doing) is of PROFOUND SIGNIFICANCE at our home and as pointed out by ALL EIAR guidance cannot be allowed without appropriate mitigation which of course House Sound Insulation is not in any form or fashion an appropriate mitigation measure due to the significance of the effect. DAA do not propose any other remedial measure for our house and therefore have failed to adequately deal with the Environmental Impact in accordance with Statutory Legislation. To have an effect of "Profound", an effect which obliterates sensitive characteristics of a residential home is not acceptable and the proposed minimalistic house insulation that forces you to be a prisoner in your own home AND subject to such a degree of noise internally that your health is profoundly affected is not an acceptable mitigation measure. And all of the above is WITHOUT looking at the significance rating of proposed nighttime flights which from table 13-39 there is a large increase in those to be profoundly affected and very significantly affected.

With respect to the "permitted" scenario we note that on p 39 of 102 of the ABP Inspectors planning report for the 2007(extract at Appendix D to this submission) permission it states "However of great import at this juncture is Mr. Thornly – Taylors view that as the noise section of the EIS fails to describe the likely "significant" effects of the project it therefore fails to meet the requirements of the regulations. Undoubtedly noise is a material issue arising in the case and I note that the matter of significance was discussed at the oral hearing with further details sought by way of a section 132 notice consequent to same. Notwithstanding same Mr Thornly Taylors interpretation of the regulations in terms of the requirements of the EIS document appear to be correct and the failure to deal with same is certainly a notable omission." Therefore, significance was not dealt with in the "permitted"

scenario and any attempt to try and retrospectively make the case on the basis of the granted permission with all the conditions and reference to the submitted EIS at the time cannot now be submitted some 16 years later and represented as "permitted" under that permission. It clearly is not and should not be accepted as such by the Board. Again DAA have failed to deal with the issue of Significance in terms of Environmental Impact on the local Communities and have failed to deal adequately with, Profound, Very significant and Significant Effects. They just act as if there is nothing to see here. I can assure the board that the effects are Profound and devastating in terms of enjoyment of our home. We would like to extend an invitation for the Board and its experts to visit our home and experience the level of noise and the devastating effect. If the board do not deem this appropriate to visit a private home then the ST Margarets GAA complex is immediately adjacent to our home and which is accessible to the public where an appreciation of such devastation can also be experienced.

Fingal County Councils Noise Zone A has a restriction that no residential development shall be allowed other than active farming families. The reason for this is stated that residents would be exposed to harmful aircraft noise levels. However, as a result people in this noise zone A with existing houses are being subjected to similar new noise levels due to flight path changes and therefore their health are now at risk from the harmful health risks associated with aircraft noise that Fingal obviously are aware of by their actions. We also refer to the Health warnings submitted by the HSE and Fingal Environmental Health that were submitted with respect to this application. . It follows that the only mitigation measure open to DAA is to revert back to the flight paths which they received permission for or to submit a retention application which includes realistic mitigation measures which deal with those profoundly and significantly effected by the imposition of predominantly excruciating high levels of aircraft noise to be imposed by DAA.

Prior to 2005 there were no restrictions for local community members applying for permission to build housing in the area based on Noise Zones. Despite DAA continually stating that they restricted residential development in the area around the airport they did nothing to prevent local development. There was never any warning that the flight paths would change from those assessed in the EIAR of 2007. If DAA insist on these changes then they must properly assess the Significance of these changes and propose realistic alternative mitigation measures should they wish to proceed.

We have used the time since the North Runway opened to carry out Actual Noise monitoring in Real time. DAA had been given the opportunity by a time extension to do the same but yet have chosen

to use predicted noise models. The reasons are now quite obvious as the ACTUAL noise levels we have monitored are considerably greater than their predicted noise levels. We extended invitations to DAA to publicly attend meetings to discuss this matter but they have refused time and time again. We have shown that the DAA noise predictions are wrong and that the ACTUAL noise levels are far higher than those predicted. The DAA own the lands adjacent to a number of houses at Ballystrahan and had ample opportunity to put noise monitors in these locations but chose not to. They are playing the card that they will reassess the noise situation over a two year period and if there are issues found then they may do something then. This is not acceptable. The Noise is now, the Profound Significance on our Amenity and Environment is Now and therefore appropriate mitigation and protection of our health is required Now. The Chairman and CEO of DAA have written to the Taoiseach and Planners asking them to encourage ABP to adjudicate in favour of the DAA on this application as a matter of urgency BECAUSE if they don't the Irish Economy will lose an opportunity to make more Millions of Euro from Dublin Airport. However the same people show complete contempt with respect to our health and our constitutional right to enjoy a healthy Environment and our natural amenity without the imposition of Profound Significant effects which obliterates all environmental characteristics by their proposed development by them.

8.0 Public Safety Zones.

The current runways have included inner and outer public safety zones as advised by Environmental Resources Management Ireland Ltd. On behalf of The Department of Transport and Department of Environment heritage and Local government and which was published on 30th September 2003. The inner public safety zone is based on an accident occurring at 1 in 100,00 per annum. ERM point out that whilst the UK allow existing residential developments to remain in place the Dutch are removing all existing houses located within the inner PSZ for residents' health and safety reasons. Note that the inner PSZ for the new North Runway based on the submitted flight paths of straight out is 378m wide at the end of the runway and 3050m long. However, given the fact that departures are now diverging and have a large spread between actual paths flown these public safety zones must be changed to suit the proposed new flight paths. We note that all houses within the inner PSZ to the west of the new north Runway are included in the Voluntary Purchase scheme to ensure that all residents are protected from aircraft accidents on take-off and landing.

We note that this particular health and safety risk has not been assessed nor has the significance rating been applied to houses such as ours which are within the parameters for the PSZ due to the change

in flight paths. We are advised by pilots that the divergence of 30 degrees on take-off has a significant effect on rate of climb and the risk of engine failure on turning has an increased risk of accident should this happen on take-off. Whilst the Irish Aviation Authority are responsible for aircraft safety in the air and have produced SIDs for departures it would appear that no one has taken the responsibility for risk analysis and allocation of revised Public Safety Zones associated with the proposed revised flight paths. We are obviously very concerned for our safety given the safety concerns taken on board by the Dutch authorities in ensuring the safety of residents adjacent and along flight paths at the end of runways. The previous PSZ for when flights were to depart straight out are still as indicated on the current Fingal Development Plan and revisions have not been made for the revised flight paths. So there is nobody looking at this serious issue with respect to the revised flight paths and we are extremely concerned given the sudden 30 degree divergence should anything go wrong we are in the flight path for potential plane crashes which is not acceptablke. Note as per the flight paths being currently flown as per Appendix B of this submission obviously the Public Safety Zones must align with the flight paths.

9.0 AWAKENINGS.

We note the report submitted by Dr Penzel regarding awakenings. Again we note our continual correspondence and discussions that the current level of noise due to the current flight paths is unbearable and profound. Despite the statement that tests and surveying of effected populations are required to determine awakenings we can both clearly state that it is a fact that we cannot go to sleep before 11pm and awake at the first flight after 7am when flights are departing off the North Runway. Also when maintenance was being carried out on the South runway and flights took off at night from the North Runway. We were awakened in the middle of the night and at most times could not get to sleep as a result. Our infant daughter is also severely affected by the noise and awakens regularly during the day from aircraft noise.

Both our house and neighbours are and would be available to carry out any test or survey to prove this fact beyond doubt and we must question why given the amount of complaints regarding noise why did DAA not carry out such tests. Instead they report that such tests would be difficult to carry out and therefore can draw no conclusions on the matter. Well we can and do so every night as a result of the changed flight paths and night time flights.

10.0 SUMMARY

Our home has gone from a noise exposure of 44dB Lden to between 66 to 69 dB Lden following the opening of the North runway. The documentation submitted by DAA have not identified this fact NOR have the DAA carried out sufficient on-site noise monitoring to determine the ACTUAL noise levels despite the fact that the North Runway is in use since August 2022. We note that the DAA own lands in the area adjacent to the runway and existing housing and could have carried out ACTUAL noise monitoring there.

On departures from the North Runway the noise levels at our house are in excess of 69dB LAeq 16 hours.

The noise insulation proposed to be provided by DAA will not meet the requirements of "Good Acoustic Design" as set out by Fingal County Council Development Plan and therefore is totally inadequate at our home given the intensity of the external noise from aircraft, as demonstrated above.

The magnitude of significance under the criteria put forward by DAA at our house is "Profound" i.e. an effect that obliterates sensitive characteristics and yet no workable mitigation measures are provided by DAA. If left the way it is our health is in serious risk of immediate deterioration and the use of our family home is severely restricted to that of a prison like environment.

The additional information contains significant changes to the original planning submission and NOW includes proposed changes to flight paths which were not brought to the attention of the public at large. None of this information was requested by ABP but now DAA want to bulldoze their way through the planning procedures in order to get their way by using the POTENTIAL of losses by the Irish Economy of not increasing night flights and changing flight paths so that they and airlines can achieve even higher profits without adequately dealing with the Environmental Impacts that will Profoundly effect members of the local community such as us. This is precisely why Environmental Impact Assessment Legislation was put in place to protect and mitigate the public from profound adverse environmental impacts.

DAA saw fit to operate the North Runway using the current flight paths and then months later submit an EIAR to justify what they are doing. This is totally contrary to planning legislation and should not be

allowed. Proper planning and sustainable development including planning legislation must be adhered to.

The North Runway is being operated as an unauthorised development as the DAA have exceeded the 65 flight per night cap and changed flight paths without obtaining planning permission. This application is therefore a retention permission and as such does not meet the correct procedures as per the European Directives and Irish Legislation.

Only one flight path is proposed within the EIAR supplement with no explanation as to why DAA and IAA changed their position from the planning granted in 2007 for straight out flight paths. The IAA have confirmed through correspondence with the Minister for Transport that they "briefly" considered alternatives but dismissed them WITHOUT having detailed discussions with the other stakeholders such as Air Corps, Weston Airport etc. So they made a conscience decision to go against the planning conditions knowing that they were breaching legislation. No other options were investigated despite it being a requirement of an effective EIAR nor were these assessed or presented within the EIAR.

Due to the significant changes in the noise environment submitted in the EIAR supplement and in order to mitigate the dangerous and serious effects of aircraft noise on current households within Noise Zone A as recognised by Fingal County Council in their Development Plan the only realistic mitigation measure that the DAA revert to the flight paths for which they obtained planning permission for in 2007 or provide realistic mitigation measures against the Profound effects being proposed at residents within St Margarets The Ward Community through a new retention permission application.

Nobody has reviewed the consequences of the public safety zone changes due to the revised flight paths and this has not been environmentally assessed and we are of the opinion that it subjects us to a major health and safety risk.

Signed

Colm Barry

Sandra Barry

Appendix A

EXPORT TO EXCEL

FIN-C338-ANCA-1308 (/en/submission/fin-c338-anca-1308)

Objection to changes to conditions of Planning Application to allow night flights from Dublin Airport (/en/submission/fin-c338-anca-1308)
28 Feb, 2022 - 11:00am

Author: *Colm Barry*
Location: The Ward

Objection to changes to conditions of Planning Application to allow night flights from Dublin Airport

Chapter: Draft Regulatory Decision and related Report (/en/consultation/aircraft-noise-consultation/chapter/draft-regulatory-decision-and-related-report)

Objection to changes to conditions of Planning Application to allow night flights from Dublin Airport

1

Displaying 1 - 1 of 1

Contact

CONTACT US(/EN/CONTACT)

More

MODERATION POLICY(/EN/CONTENT/MODERATION-POLICY)

PRIVACY POLICY(/EN/CONTENT/PRIVACY-STATEMENT)

COOKIE POLICY(/EN/CONTENT/COOKIE-POLICY)

TERMS AND CONDITIONS(/EN/CONTENT/TERMS-AND-CONDITIONS)

Appendix B

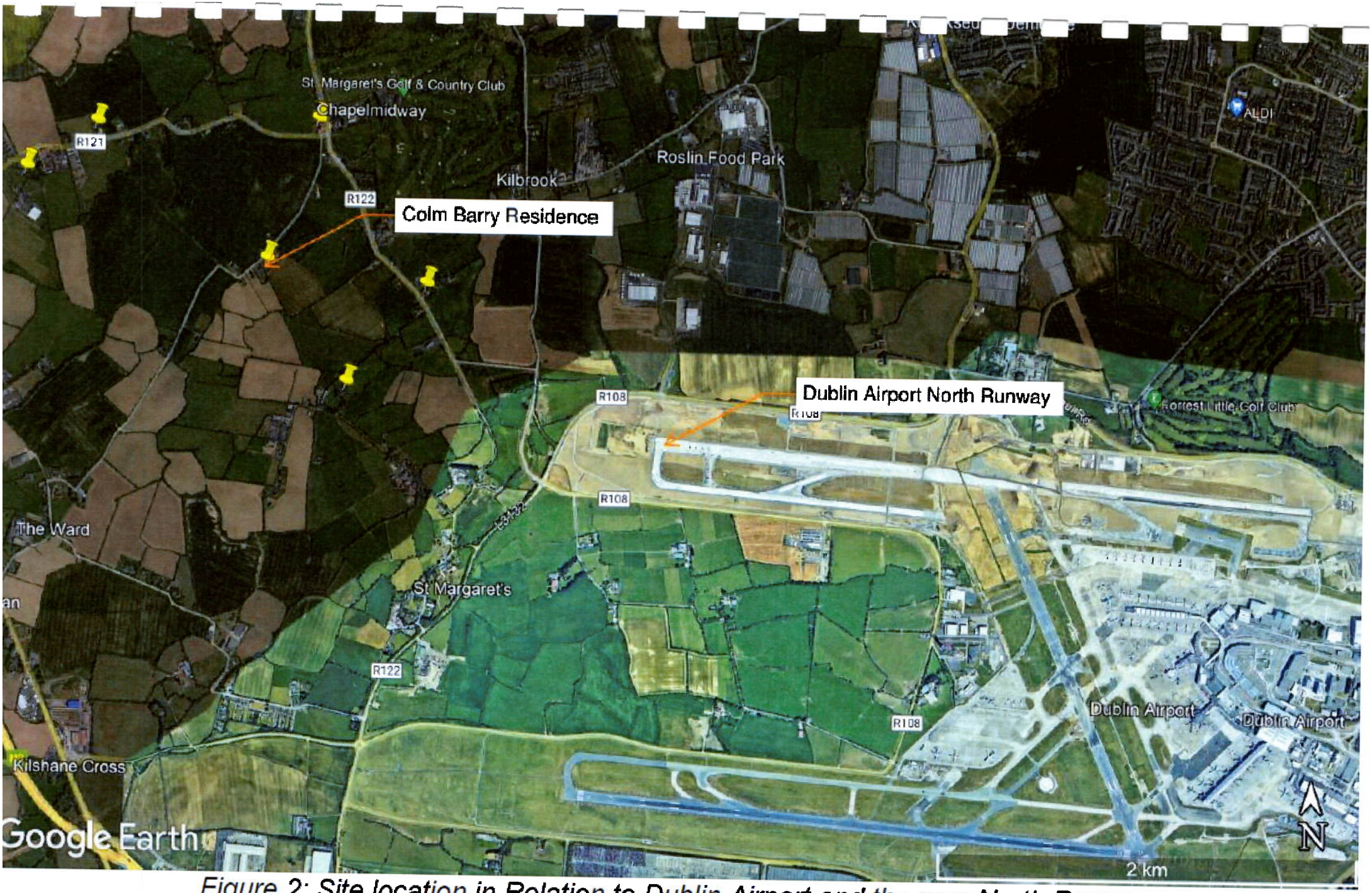
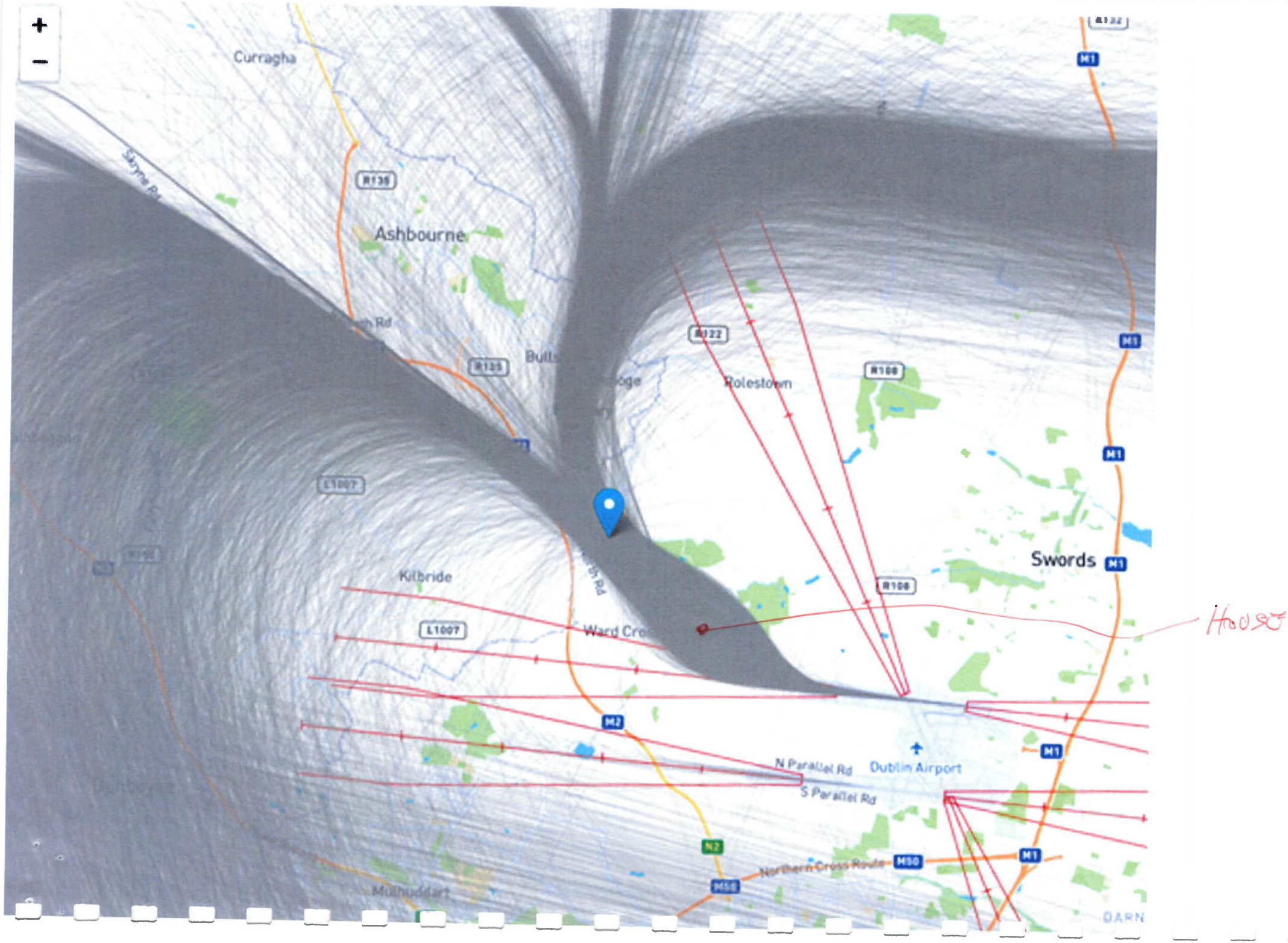


Figure 2: Site location in Relation to Dublin Airport and the new North Runway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R135
Ashbourne
R135
Bull
R122
Rolestown
R108
M1
L1007
Kilbride
L1007
Ward Cro
R108
Swords
M1
House
M2
N Parallel Rd
Dublin Airport
S Parallel Rd
M1
N2
M50
Northern Cross Route
M1
M50
Mulhuddart
DARN

Appendix C

Bickerdike Allen Partners

DUBLIN AIRPORT – NORTH RUNWAY

OPTION 7B FORECAST CONTOURS

CONDITIONS 6, 7 & 9

Report to

Martin Doherty
Environmental Lead
North Runway Project
Dublin Airport Authority

A9843-R03-Rev3-NW
26 October 2016

Bickerdike
Allen
Partners

Bickerdike Allen Partners LLP is an integrated practice of Architects, Acousticians, and Construction Technologists, celebrating over 50 years of continuous practice.

Architects: Design and project management services which cover all stages of design, from feasibility and planning through to construction on site and completion.

Acoustic Consultants: Expertise in planning and noise, the control of noise and vibration and the sound insulation and acoustic treatment of buildings.

Construction Technology Consultants: Expertise in building cladding, technical appraisals and defect investigation and provision of construction expert witness services.

Sustainability Consultants: Energy Conservation and Environmental Specialists and registered assessors for the Code for Sustainable Homes.

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Contents

1.0 INTRODUCTION

The EIS Addendum[1] (2004-2007) for the permitted north parallel runway introduced Option 7B when considering the noise in 2025, which was subsequently considered as the main option at the Oral Hearing. In effect Option 7B assumed the airport would operate in almost a segregated mode during the daytime with limited flights over the Portmarnock area. Comparable night-time contours were not previously produced, the assumption being that the north runway would not be used at night (23:00 – 07:00).

As part of the conditions accompanying the permission, voluntary noise insulation schemes are required to be operated, using the 60, 63 and 69 dB $L_{Aeq,16h}$ daytime noise contours as eligibility criteria for schools insulation, dwellings insulation and property purchase respectively. The specific requirements are given in Conditions 6, 7 and 9.

Bickerdike Allen Partners LLP (BAP) have been provided with a 2022 High Growth forecast, for a typical busy day[2], produced in August 2015. Contours have been produced on the basis of this forecast for the daytime period with the same runway usage assumptions as Option 7B. This report details BAP's methodology of the contour production in addition to the resulting contours.

A glossary of acoustic and aviation terms is given in Appendix 1. Conditions 6, 7 & 9 are reproduced in full in Appendix 2.

This report has been updated to include additional information requested by AMEC, the environmental consultants working on behalf of Fingal County Council, following their initial review and subsequent discussions.

[1] *Dublin Airport Northern Parallel Runway EIS Addendum*, Section 16, dated 08/08/2005
[2] The typical busy day will overestimate traffic when compared to that within the average summer day used in more conventional $L_{Aeq,16h}$ noise contours for impact and sound insulation eligibility purposes.

2.0 CONTOUR PRODUCTION

2.1 Software

The contours were produced using the Integrated Noise Model (INM) software, version 7.0d. This has been used with the inclusion of terrain, and with a validation for the common existing aircraft types based on measured results in 2014 at the fixed noise monitors, further details of which are given in Section 2.6. The INM default meteorological parameters have been used, which are given in Table 1 below.

Parameter	Value
Temperature	14.5° C
Pressure	759.97 mm-Hg
Headwind	14.8 km/h
Modify NPD Curves	No
Lateral Attenuation	All Soft Ground

Table 1: Meteorological Modelling Parameters

2.2 Runway Configuration

The existing runways, denoted 10/28 and 16/34 have been utilised. The new north runway has been located based on drawings provided to BAP by DAA. The runway ends are given in Table 2 below.

Runway		Latitude (N)	Longitude (W)
Existing South Runway	28L	53.420261	-6.250579
	10R	53.422429	-6.290075
Proposed North Runway	28R	53.434830	-6.238222
	10L	53.437394	-6.284811
Existing Crosswind Runway	16	53.436990	-6.261977
	34	53.419906	-6.249595

Table 2: Modelled Runway Ends

No displaced thresholds have been assumed on the existing runways. On the north runway, displaced arrival thresholds of 280 m for runway 10 and 450 m for runway 28 have been assumed, with no displaced departure thresholds. A 3° glideslope has been assumed for all arrivals. These assumptions are identical to those made in the EIS (2004-2007).

2.3 Runway Utilisation

BAP have used the same assumptions as were used in the EIS (2004-2007) Addendum for consistency. These are repeated below:

- Parallel runways to be used in preference to cross runway, resulting in cross runway usage only when necessary due to strong crosswinds. This has been assumed to be 2% of the total aircraft movements. Of this 2%, 75% has been allocated to runway 16 and the remaining 25% to runway 34.
- During westerly operations, runway 28L will be preferred for arrivals, with no preference for departures.
- During easterly operations, runway 10R will be preferred for departures, with no preference for arrivals.
- It has been assumed that 8% of the time, the non-preferred runway will need to be used due to the preferred runway undergoing maintenance.
- It has been assumed that the easterly runways (10L and 10R) will be used 25% of the time, and the westerly runways (28L and 28R) the remaining 73% of the time during the 92-day summer period.

These assumptions lead to the percentages given in Table 3 below. These percentages have been applied equally to each aircraft movement in the forecast.

Runway		Runway Usage	
		Departures	Arrivals
Existing South Runway	28L	12.2%	67.0%
	10R	23.0%	4.0%
Proposed North Runway	28R	60.8%	6.0%
	10L	2.0%	21.0%
Existing Crosswind Runway	16	1.5%	1.5%
	34	0.5%	0.5%

Table 3: Modelled Daytime Runway Usage

Table 4 presents a comparison of the assumptions used with recent history. As the EIS (2004-2007) assumption is for the cross runway (16/34) to be used less than now, the relevant comparison is to look at the relative usage of runways 10 and 28. This has been done for the last 5 years.

Runway Direction	Year					
	EIS (2004-2007) Assumption	2012	2013	2014	2015	2016
10	26%	30%	28%	40%	27%	16%
28	74%	70%	72%	60%	73%	84%

Table 4: Historical Summer Period Daytime Runway Usage (16 Jun – 15 Sep inclusive)

As can be seen from the above table, there is no obvious trend, although the potential variation for a single summer is large, with the percentage of movements using runway 10 ranging from 16% to 40% over the 5 years. On average of the 5 years, 28% of aircraft movements have used runway 10 rather than runway 28, which is very close to the EIS (2004-2007) assumption of 26%.

The Conditions require that contours be produced every 2 years and eligibility re-assessed. The contours that will be produced every 2 years will be based on actual runway utilisation, aircraft mix and all other operational factors in place for that modelling year.

While the new north runway is longer than the existing runway, there are no aircraft forecast to be operating in 2022 that are larger than those operating currently. Therefore, all aircraft have been assumed to use both runways with no preference.

2.4 Route Utilisation

As the proposed routes are still being developed with the IAA, those from the Dublin Airport optimization exercise undertaken in 2011 have been re-used. Flight routes for the existing runway were used and assumptions for future routes from the north runway were made based on available information.

Straight arrival routes have been assumed for all runways. For the crosswind runway, straight departure routes have also been assumed.

For the parallel runways, initial departure routes have been prepared based on the existing published routes for the south runway, with those for the north runway in effect replicating them. There are four initial departure routes for each runway end, heading approximately north, south, east and west.

For category A & B aircraft, the initial turns are modelled as occurring shortly after the end of the runway. For category C & D aircraft, the aircraft are modelled as flying straight for 5 nm before turning. These C & D routes have been supplemented for departures to the west by routes that turn earlier. This assumption arises from a previous study of radar data which found that approximately 75% of the category C & D aircraft on runway 28 actually perform

their initial turn earlier than described by the SIDs. This is because they have reached an altitude of 3,000 ft or greater and are permitted to exit the environmental corridor at this altitude if cleared by Air Traffic Control. Two additional 'Early Turn' routes per runway were therefore created for large aircraft, one with an initial turn to the north which subsequently headed east, to the LIFFY beacon, and one with an initial turn to the south which remained heading south, to the NEPOD beacon.

For the parallel runways the departure route used by each aircraft in the forecast has been decided on the basis of its destination. The resulting route usage for each of the parallel runways is shown in Table 5 below.

Route (Direction after initial turn)	Percentage
ERUDA (North)	12%
INKUR (West)	12%
LIFFY (East)	45%
NEPOD (South)	32%

Table 5: Departure Route Usage

Figure A9843-R03-Rev3-02 shows the initial modelled departure routes for category C & D aircraft, overlaid on top of the noise contours. This clearly shows that the exact location of the routes has very little effect on the shape of the noise contours at the L_{Aeq} values shown.

Track dispersion was not used in this modelling exercise, with the exception of the "early turn" versions of some routes as described above. Including dispersion would have the effect of making the contours shorter and wider, however the effect on the noise contours would be very limited, in particular for those values presented in the previous report, as they do not extend a large distance from the airport.

2.5 Forecast Movements

BAP have been provided with a 2022 High Growth forecast, for a typical busy day, produced in August 2015. This forecast gives details of aircraft type, operation, time, and origin/destination airport.

It is likely that by 2022 "modernised" versions of some aircraft will be in service, e.g. the Airbus A320neo and Boeing 737-800max will likely have replaced some of the Airbus A320 and Boeing 737-800 aircraft in the forecast. BAP have taken a simplistic worst-case assumption that this will not have occurred by 2022. In addition to using a High Growth forecast for a typical busy day, these assumptions are conservative, that is the actual contours in 2022 are unlikely to be larger than those produced here.

The movements in the forecasts are summarised in Table 6 below, where they are compared with the corresponding movements for 2016. The movements used in the modelling work for the EIS (2004-2007) are given in Appendix 3.

Helicopter movements have not been modelled as this is consistent with previous work and they represent less than 1% of total movements. They are not included in the totals presented below.

Aircraft Type	No. Daily Aircraft Movements[1]	
	2016 Summer	2022 High Growth
Airbus A300	2	2
Airbus A319	13	17
Airbus A320	135	162
Airbus A321	18	25
Airbus A330	28	25
Airbus A350	0	12
ATR-43	11	16
ATR-72	56	48
Avro RJ85	21	0
Boeing 737-700	10	8
Boeing 737-800	199	266
Boeing 757	13	1
Boeing 767	5	10
Boeing 777	5	6
Boeing 787	1	24
Dash 8 Q400	9	11
Embraer E190/195	8	19
Sukhoi Superjet 100	3	26
Other	58	48
Total	569	726

[1] Values have been rounded to nearest whole number. Totals are based on unrounded values.

Table 6: Forecast Aircraft Movements - Daily

2.6 INM Substitutions and Validation Exercise

BAP have carried out a validation exercise, which involved comparing the measured average SEL at the noise monitors with the INM predicted SEL for that aircraft. Where necessary, adjustments were made to some aircraft by factoring the number of movements to change the noise level. For example, if it was found that the measured results for an aircraft type were consistently 3 dB(A) higher than the INM prediction at all noise monitors, then the movement numbers for that aircraft type would be increased by a multiplier of 2. A full list of the validation adjustments and other INM aircraft types used in the model is given in Table 7 below. The "aircraft code" in the table is that used by the airport. Where these were not clear, BAP have verified with the airport which aircraft they represent. The INM aircraft types used in the EIS (2004-2007) are given for information in Appendix 3. It is noted that this was using an earlier version of the INM software, so not all aircraft types are comparable.

Aircraft Code	Modelled INM Aircraft Type	Arrivals Multiplier	Departures Multiplier
319[1]	A319-131	0.7	1.9
320[1]	A320-211	1	0.9
321[1]	A321-232	1	1.7
32A[1]	A320-211	1	0.9
330[1]	A330-301	1	1
332[1]	A330-301	0.8	1
343	A340-211	1	1
359[2]	A330-301	1.1	0.38
733	737300	1	1
734	737400	1	1
736	737500	1	1
738	737800	1	1
73G	737700	1	1
73H[1]	B738	0.7	1
73J	737800	1	1
73P	737400	1	1
73W	737700	1	1

Aircraft Code	Modelled INM Aircraft Type	Arrivals Multiplier	Departures Multiplier
747	747400	1	1
75W	757RR	1	1
764	767400	1	1
76W	767300	1	1
76X	767CF6	1	1
772	777200	1	1
77L	7773ER	1	1
77W	777300	1	1
788	7878R	1	1
ABY	A300-622R	1	1
AT4[1]	DO328	1	1
AT7[1]	DHC6 (arrivals) DO328 (departures)	0.5	1
ATP	DO328	1	1
CCJ	CL600	1	1
CCX	CNA750	1	1
CR2	CL601	1	1
CRK	CRJ9-ER	1	1
DA2	CL600	1	1
DF2	FAL20	1	1
DH4[3]	SD330 (arrivals) DHC6 (departures)	1	1
E70	EMB170	1	1
E90	EMB190	1	1
E95	EMB195	1	1
GS4	GIV	1	1
GS5	GV	1	1
H25	LEAR35	1	1

Aircraft Code	Modelled INM Aircraft Type	Arrivals Multiplier	Departures Multiplier
L35	LEAR35	1	1
L45	LEAR35	1	1
PA2	PA28	1	1
PL2	CNA208	1	1
Q00	CNA510	1	1
Q12	CNA510	1	1
Q83	CNA441	1	1
Q84[3]	SD330 (arrivals) DHC6 (departures)	1	1
S20	HS748A	1	1
S92	Helicopter – Not modelled		
SSJ[2]	A319-131	1	1
X13	F10062	1	1

[1] Validation carried out on this aircraft type

[2] Aircraft type was not in service when INM v7.0d was released, therefore modelling is based on an existing INM aircraft type, with modifications where appropriate

[3] BAP default adjustment for Dash 8-Q400 based on experience at other airports

Table 7: Modelled INM Aircraft Types and Validation Adjustments

3.0 NOISE CONTOURS

The 2022 forecast daytime noise contours are presented in Figure A9843-R03-Rev3-01 at 60, 63 and 69 dB $L_{Aeq,16h}$.

The Option 7B 2025 contours presented during the initial application are larger than those now predicted for 2022. We understand that this is largely because the forecasts that the earlier contours for 2025 were based on were prepared before the latest recession took effect and therefore were more optimistic than now.

The contour areas are given in Table 8 below:

Contour Value (dB $L_{Aeq,16h}$)	Contour Area (km^2) - Daytime
60	27.2
63	15.4
69	4.9

Table 8: Daytime Contour Areas

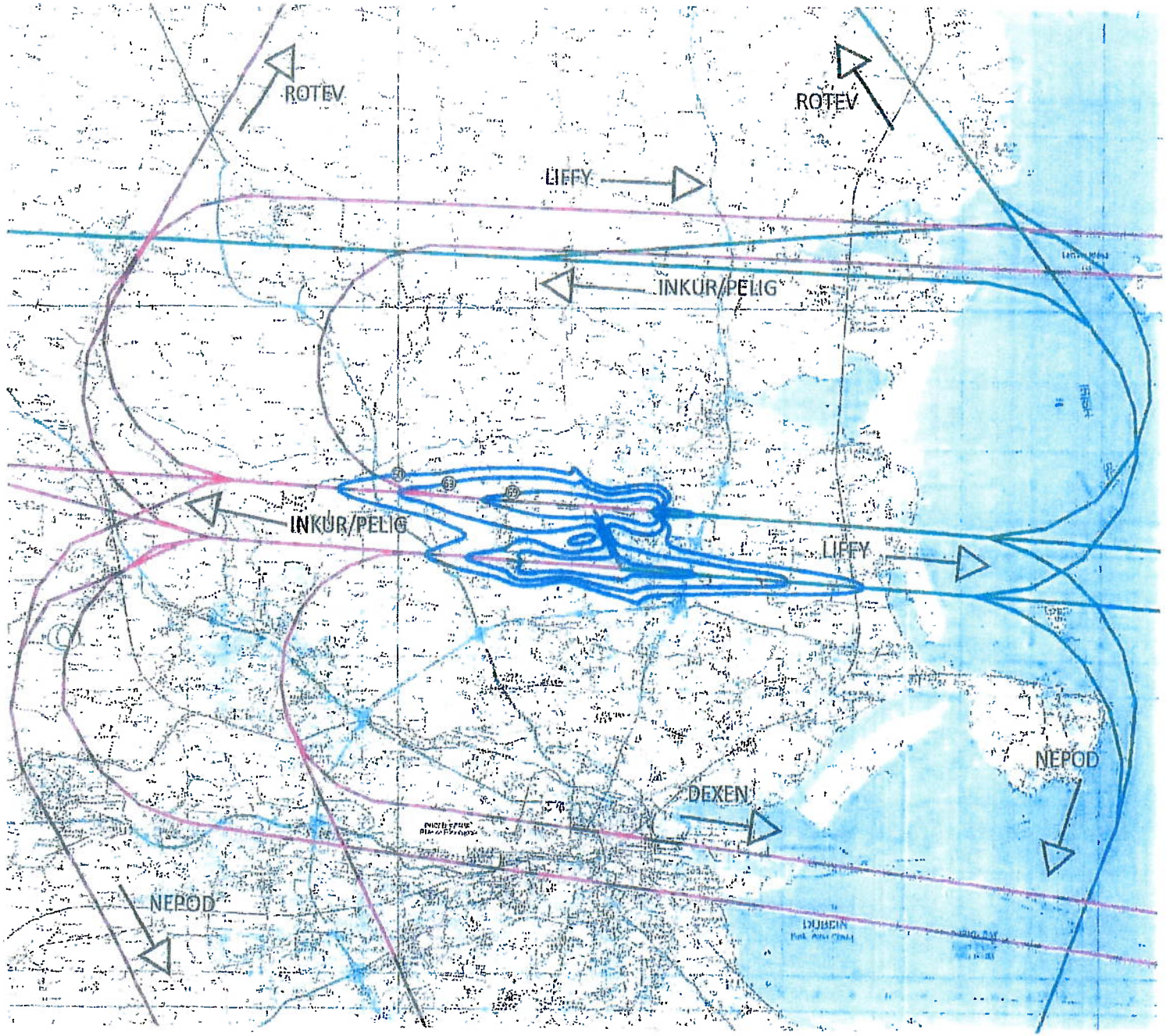
Nick Williams
for Bickerdike Allen Partners LLP

Peter Henson
Partner

6. *Prior to commencement of development, a scheme for the voluntary noise insulation of schools shall be submitted to and agreed in writing by the planning authority (in consultation with the Department of Education and Science). The scheme shall include all schools and registered pre-schools predicted to fall within the contour of 60 dB LAeq 16 hours within twelve months of the planned opening of the runway to use and, in any event, shall include Saint Margaret's School, Portmarnock Community School, Saint Nicholas of Myra, River Meade and Malahide Road schools. The scheme shall be designed and provided so as to ensure that maximum noise limits within the classrooms and school buildings generally shall not exceed 45 dB LAeq 8 hours (a typical school day). A system monitoring the effectiveness of the operation of the scheme for each school shall be agreed with the planning authority and the results of such monitoring shall be made available to the public by the planning authority.*

7. *Prior to commencement of development, a scheme for the voluntary noise insulation of existing dwellings shall be submitted to and agreed in writing by the planning authority. The scheme shall include all dwellings predicted to fall within the contour of 63 dB LAeq 16 hours within 12 months of the planned opening of the runway for use. The scheme shall include for a review every two years of the dwellings eligible for insulation.*

9. *Prior to commencement of development, a scheme for the voluntary purchase of dwellings shall be submitted to and agreed in writing by the planning authority. The scheme shall include all dwellings predicted to fall within the contour of 69 dB LAeq 16 hours within twelve months of the planned opening of the runway for use. Prior to the commencement of operation of the runway, an offer of purchase in accordance with the agreed scheme shall have been made to all dwellings coming within the scope of the scheme and such offer shall remain open for a period of 12 months from the commencement of use of the runway.*



LEGEND:

Noise Contours,
60, 63 and 69 dB $L_{Aeq,16h}$

Initial Departure Routes, Westerly

Initial Departure Routes, Easterly

REVISIONS

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Architecture
Acoustics
Technology

Dublin Airport
North Runway

Airborne Aircraft Noise Contour
2022 HG Typical Busy Day Option 7B
and Initial Departure Routes

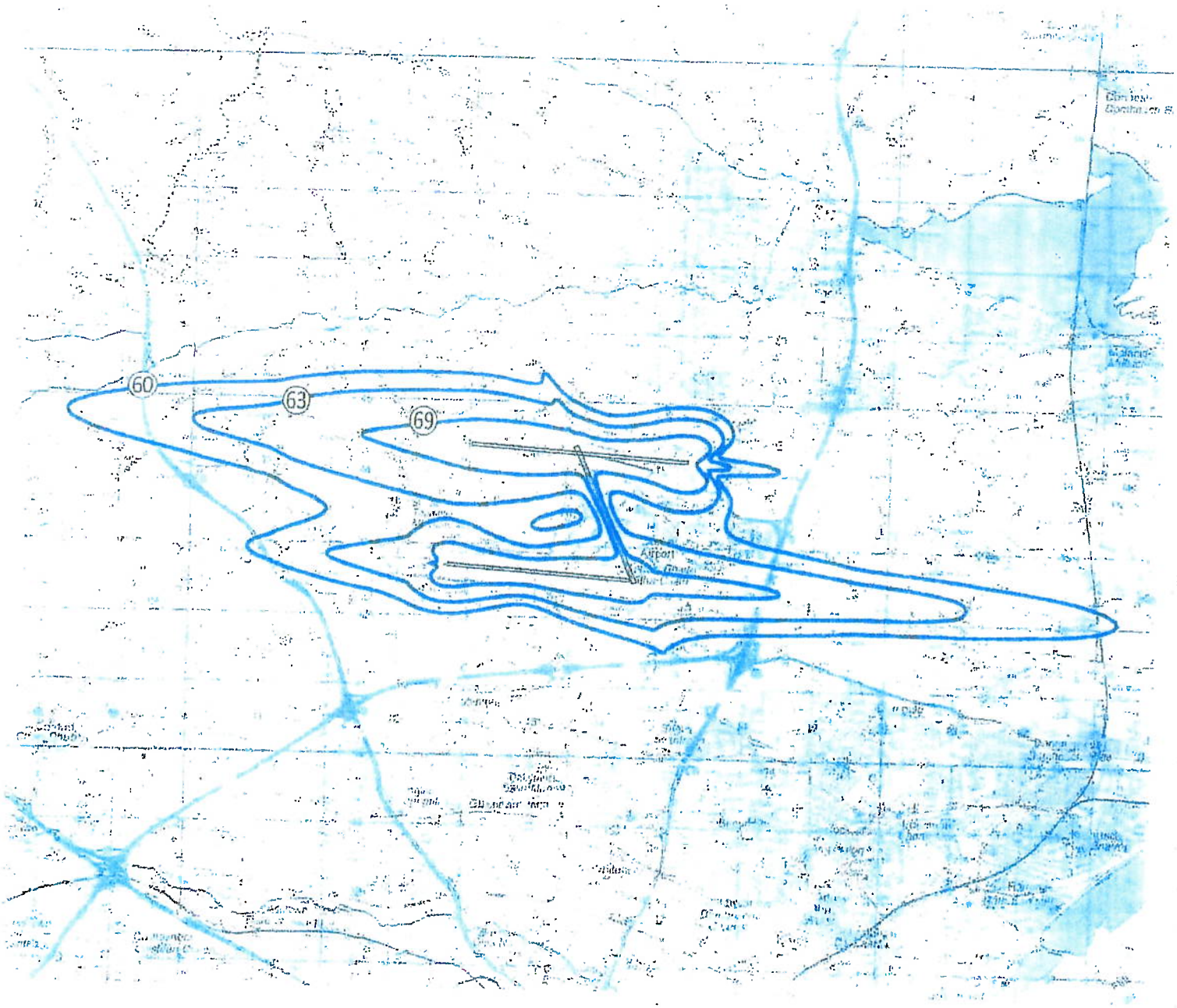
DRAWN: NW CHECKED: DC

DATE: October 2016 SCALE: 1:150000@A4

FIGURE No:

A9843-R03-Rev3-02

Fig 1



LEGEND:

Noise Contours,
60, 63 and 69 dB $L_{Aeq,16h}$

Modelled Runway Locations

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Acoustics
Technology

Dublin Airport
North Runway

Airborne Aircraft Noise Contours
2022 High Growth Typical Busy Day
Option 7B

DRAWN: NW CHECKED: DC

DATE: October 2016 SCALE: 1:75000@A4

FIGURE No:

A9843-R03-Rev3-01

FIG 2.

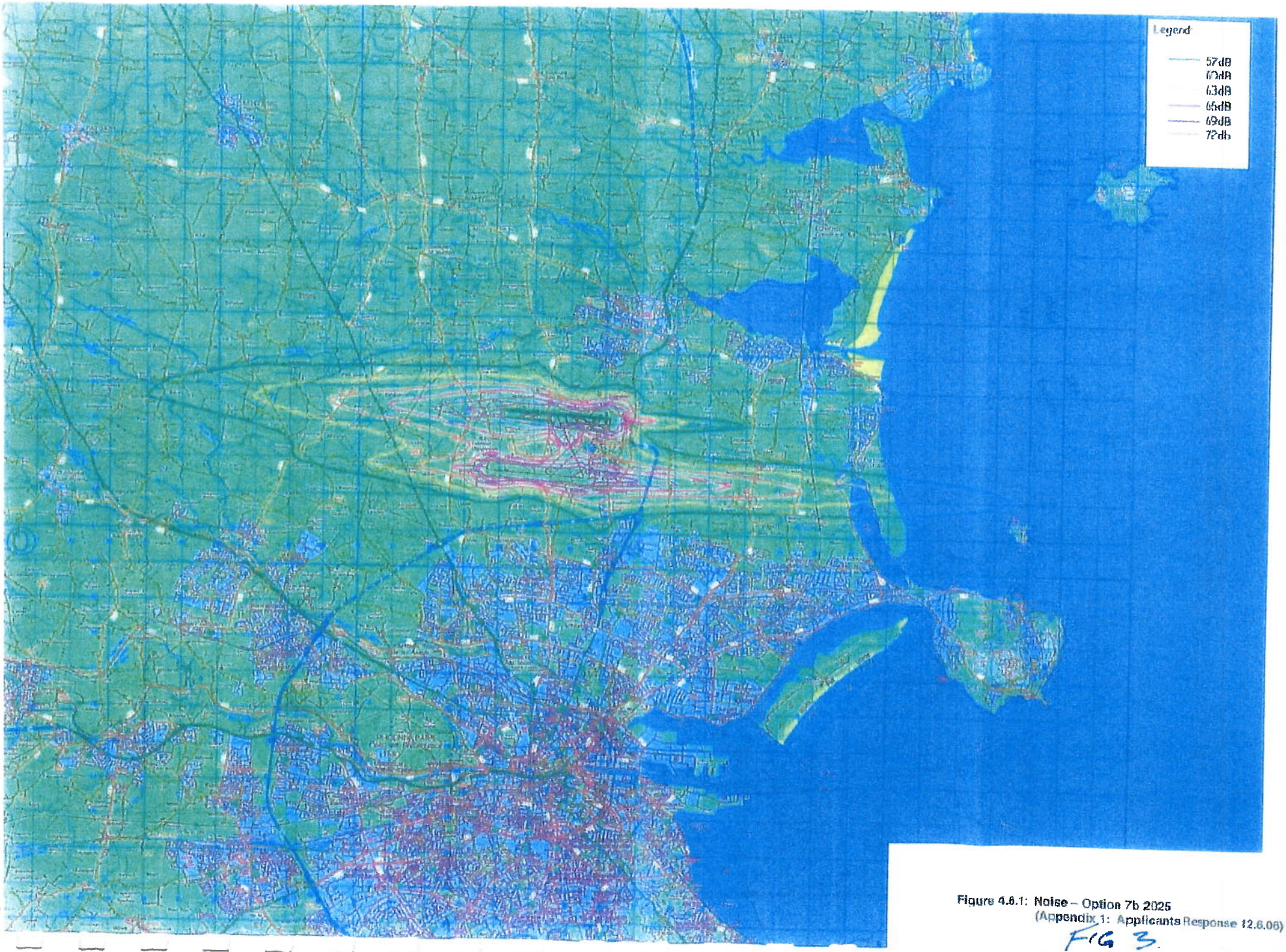

Figure 4.6.1: Noise – Option 7b 2025
(Appendix 1: Applicants Response 12.6.06)

FIG 3.

[Type text]

Comhairle Contae Fhine Gall
Fingal County Council

An Roinn um Pleanáil agus Infrastruchtúr Straitéiseach
Planning and Strategic Infrastructure Department

Bernard Dee,
Head of Planning
North Runway Project
Cargo 1 Terminal
Dublin Airport

15December,2016

Reg. Ref. F04A/1755/C16

Location Dublin Airport, Co. Dublin

Applicant Dublin Airport Authority Plc,Head Office

Bosca 174, Áras an Chontae, Sord, Fine Gall, Co. Bhaile Átha Cliath / P.O. Box 174, County Hall, Swords, Fingal, Co. Dublin
Swords Office t: Compliance Section: 890 5518/ 5744 f: (01) 890 6779
e: planning@fingal.ie www.fingal.ie

Bóthar an Gharráin, Baile Bhlainséir, Átha Cliath 15 / Grove Road, Blanchardstown, Dublin 15
Blanchardstown Office t: (01) 870 8436 f: (01) 890 5832 e: blanch.planning@fingal.ie

Reg.. Ref.: F04A/1755/C16

Proposal To construct on airport lands, a runway, 3110m in length and 75m in width. The permission sought to include all associated taxiways, associated road works including internal road network, substations, navigational equipment, equipment enclosures, security fencing, drainage, ducting, lighting, services diversions, landscaping and all associated site development works including the demolition of an existing derelict house and associated outbuildings; the relocation of the Forrest Tavern monument; the removal of a halting site including the demolition of any structure whether temporary or permanent on that site which is currently leased from the applicant. The road works include the realignment of an 800m section of the Forrest Little Road; the rerouting of a 700m section of the Naul Road (R108) and a 200m section of Dunbro Lane and replacement of these latter roads with a new 2km long road (7.5m wide carriageway) running in an east-west direction connecting to the St. Margaret's Bypass at a new junction. The proposed duration of this permission is 10 years.
the development is located on lands of approximately 261 hectares in the Townlands of Millhead, Kingstown, Dunbro, Barberstown, Pickardstown, Forrest Great, Forrest Little, Cloghran, Collinstown, Corballis, Rock, and Huntstown, north and north-west of the Airport Terminal building.
An Environmental Impact Statement will be submitted with the planning application.

Dear Sir / Madam,

I wish to inform you that the compliance submission lodged on 18 November, as amended and clarified by the submission on the 22 November and by Addendums lodged on the 2 December and 9 December 2016 is deemed to comply with Condition 7.

Yours faithfully,

L Lee

for Senior Executive Officer

Comhairle Contae Fhine Gall
Fingal County Council

An Roinn um Pleanáil agus Infrastruchtúr Straitéiseach
Planning and Strategic Infrastructure Department

Bernard Dee, North Runway Project
Cargo Terminal 1
Second Floor
Dublin Airport
Dublin

14December,2016

Reg. Ref. F04A/1755/C17

Location Dublin Airport, Co. Dublin

Applicant Dublin Airport Authority Plc,Head Office

Bosca 174, Áras an Chontae, Sord, Fine Gall, Co. Bhaile Átha Cliath / P.O. Box 174, County Hall, Swords, Fingal, Co. Dublin
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Blanchardstown Office t: (01) 870 8436 f: (01) 890 5832 e: blanch.planning@fingal.ie

Reg.. Ref.: F04A/1755/C17

Proposal To construct on airport lands, a runway, 3110m in length and 75m in width. The permission sought to include all associated taxiways, associated road works including internal road network, substations, navigational equipment, equipment enclosures, security fencing, drainage, ducting, lighting, services diversions, landscaping and all associated site development works including the demolition of an existing derelict house and associated outbuildings; the relocation of the Forrest Tavern monument; the removal of a halting site including the demolition of any structure whether temporary or permanent on that site which is currently leased from the applicant. The road works include the realignment of an 800m section of the Forrest Little Road; the rerouting of a 700m section of the Naul Road (R108) and a 200m section of Dunbro Lane and replacement of these latter roads with a new 2km long road (7.5m wide carriageway) running in an east-west direction connecting to the St. Margaret's Bypass at a new junction. The proposed duration of this permission is 10 years.
the development is located on lands of approximately 261 hectares in the Townlands of Millhead, Kingstown, Dunbro, Barberstown, Pickardstown, Forrest Great, Forrest Little, Cloghran, Collinstown, Corballis, Rock, and Huntstown, north and north-west of the Airport Terminal building.
An Environmental Impact Statement will be submitted with the planning application.

Dear Sir / Madam,

I wish to inform you that the compliance submission lodged on 2 December [as amended and clarified by the Addendums lodged on 6 December; 12 December and 13 December 2016] is deemed to comply with Condition 9.

Yours faithfully,

L Lee

for Senior Executive Officer

FINGAL COUNTY COUNCIL

18-12-2020F 20A 0608
FINGAL COCO PL DEPT

SITE NOTICE

daa plc intends to apply for permission for a proposed development comprising the taking of a 'relevant action' only within the meaning of Section 34C of the Planning and Development Act 2000, as amended, at Dublin Airport, Co. Dublin, in the townlands of Collinstown, Toberbunny, Commons, Cloghran, Corballis, Coultry, Portmellick, Harristown, Shanganhill, Sandyhill, Huntstown, Pickardstown, Dunbro, Millhead, Kingstown, Barberstown, Forrest Great, Forrest Little and Rock on a site of c. 580 ha.

The proposed relevant action relates to the night-time use of the runway system at Dublin Airport. It involves the amendment of the operating restriction set out in condition no. 3(d) and the replacement of the operating restriction in condition no. 5 of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No.: PL06F.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19), as well as proposing new noise mitigation measures. Conditions no. 3(d) and 5 have not yet come into effect or operation, as the construction of the North Runway on foot of the North Runway Planning Permission is ongoing.

The proposed relevant action, if permitted, would be to remove the numerical cap on the number of flights permitted between the hours of 11pm and 7am daily that is due to come into effect in accordance with the North Runway Planning Permission and to replace it with an annual night-time noise quota between the hours of 11.30pm and 6am and also to allow flights to take off from and/or land on the North Runway (Runway 10L 28R) for an additional 2 hours i.e. 2300 hrs to 2400hrs and 0600 hrs to 0700 hrs. Overall, this would allow for an increase in the number of flights taking off and/or landing at Dublin Airport between 2300 hrs and 0700 hrs over and above the number stipulated in condition no. 5 of the North Runway Planning Permission, in accordance with the annual night time noise quota.

The relevant action pursuant to Section 34C (1) (a) is:

To amend condition no. 3(d) of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No.: PL06F.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19). Condition 3(d) and the exceptions at the end of Condition 3 state the following:

"3(d). Runway 10L-28R shall not be used for take-off or landing between 2300 hours and 0700 hours.

except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports."

Permission is being sought to amend the above condition so that it reads:

"Runway 10L-28R shall not be used for take-off or landing between 0000 hours and 0559 hours

except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports or where Runway 10L-28R length is required for a specific aircraft type."

The net effect of the proposed change, if permitted, would change the normal operating hours of the North Runway from the 0700hrs to 2300 hrs to 0600 hrs to 0000 hrs.

The relevant action also is:

To replace condition no. 5 of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No.: PL06F.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19) which provides as follows:

5. *On completion of construction of the runway hereby permitted, the average number of night time aircraft movements at the airport shall not exceed 65/night (between 2300 hours and 0700 hours) when measured over the 92 day modelling period as set out in the reply to the further information request received by An Bord Pleanala on the 5th day of March, 2007.*

Reason: *To control the frequency of night flights at the airport so as to protect residential amenity having regard to the information submitted concerning future night time use of the existing parallel runway."*

With the following:

A noise quota system is proposed for night time noise at the airport. The airport shall be subject to an annual noise quota of 7990 between the hours of 2330hrs and 0600hrs.

In addition to the proposed night time noise quota, the relevant action also proposes the following noise mitigation measures:

- A noise insulation grant scheme for eligible dwellings within specific night noise contours
- A detailed Noise Monitoring Framework to monitor the noise performance with results to be reported annually to the Aircraft Noise Competent Authority (ANCA), in compliance with the Aircraft Noise (Dublin Airport) Regulation Act 2019.

The proposed relevant action does not seek any amendment of conditions of the North Runway Planning Permission governing the general operation of the runway system (i.e., conditions which are not specific to nighttime use, namely conditions no. 3 (a), 3(b), 3(c) and 4 of the North Runway Planning Permission) or any amendment of permitted annual passenger capacity of the Terminals at Dublin Airport. Condition no. 3 of the Terminal 2 Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No. PL06F.220670) and condition no. 2 of the Terminal 1 Extension Planning Permission (Fingal County Council Reg. Ref. No. F06A/1843; ABP Ref. No. PL06F.223469) provide that the combined capacity of Terminal 1 and Terminal 2 together shall not exceed 32 million passengers per annum.

The planning application will be subject to an assessment by the Aircraft Noise Competent Authority in accordance with the Aircraft Noise (Dublin Airport) Regulations Act 2019 and Regulation (EU) No 598/2014. The planning application is accompanied by information provided for the purposes of such assessment.

An Environmental Impact Assessment Report will be submitted with the planning application. The planning application and Environmental Impact Assessment Report may be inspected or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours of 9.30 - 16.30 (Monday – Friday) at Fingal County Council, Fingal County Hall, Main Street, Swords, Fingal, Co. Dublin. A submission or observation in relation to the Application may be made in writing to the Planning Authority on payment of a fee of €20, within the period of 5 weeks, beginning on the date of receipt by Fingal County Council of the Application and such submissions or observations will be considered by the Planning Authority in making a decision on the application. The Planning Authority may grant permission subject to or without conditions, or may refuse to grant permission.

Signed: _____
Agent: Gavin Lawlor - Tom Phillips + Associates, 80 Harcourt Street, Dublin 2, D02 F449 Date of erection of site notice: 16th December 2020

Planning and Development, Maritime and Valuation (Amendment) Act 2022

Amendment of section 34 of Principal Act

12. Section 34 of the Principal Act is amended—

(a) by the insertion of the following subsection after subsection (4):

"(4A) Notwithstanding subsection (1), where a planning authority grants permission for a development on foot of an application accompanied by an opinion provided by the planning authority under section 32I(2) the permission shall include a condition in respect of any detail of the development that was not confirmed at the time of the application requiring—

(a) the actual detail of the development to fall within specified options, parameters or a combination of options and parameters, and

(b) the applicant to notify the planning authority in writing, by such date prior to the commencement of the development, or prior to the commencement of the part of the development to which the detail relates, as the Minister may prescribe, of the actual detail of the development.",

(b) by the substitution of the following subsection for subsection (12):

"(12) A planning authority shall refuse to consider an application to retain unauthorised development of land where it decides that either or both of the following was required or is required in respect of the development:

(a) an environmental impact assessment;

(b) an appropriate assessment.",

and

(c) in subsection (12A), by the substitution of "an application in respect of the following development shall be deemed not to have required, and not to require, a determination as to whether an environmental impact assessment is required" for "if an application for permission had been made in respect of the following development before it was commenced, the application shall be deemed not to have required a determination referred to at subsection (12)(b)".

modelling of the proposed development. The report details the deficiencies in the traffic modelling undertaken in the EIS.

The direct impacts of the proposal to be assessed in this particular application relate to realignment of Forrest Little Road, rerouting of the R108, proposed viewing area, fencing and construction traffic impact.

The report recommends:
- A revised junction layout for the proposed junctions on the R108 realignment and Forrest Little Road
- Improvement works to be completed prior to commencement of construction on the runway.
- Assurance that the proposed Western Airport Access Road will not be prejudiced by the proposal and that the applicant will, if necessary, cede any lands in their ownership required to complete the road.
- Layout and access arrangements to viewing areas to be submitted including alternative locations.
- Appropriate perimeter fencing to be erected.
- Road Safety Audit to be submitted prior to commencement of development.
- Detailed construction impact assessment to be submitted to include, among other things, volume of construction traffic, destination of trips and proposed route to be identified prior to construction commencing.
- The junction improvements at Corballis should not go ahead as proposed as the proposed development of the runway will have no material effect on the operation of these junctions.

4.3 Reports from Notified Bodies

Following notification by the planning authority the following submissions were received.

The **Irish Aviation Authority** in a letter dated **24/01/04** ((sic) – possibly dated incorrectly) states that the Authority has been consulted by the applicants on the development during the design stages and the proposal conforms with its requirements.

The **Health and Safety Authority** in a letter dated **30/12/04** does not advise against a grant of permission in the context of Major Accident Hazards.

The **Department of the Environment, Heritage and Local Government** in a letter dated **07/01/05** relating to archaeology and cultural heritage recommends pre-development testing, monitoring and reporting by way of condition should permission be granted.

The **Eastern Regional Fisheries Board** in a letter dated **21/01/05** notes that the existing airport development has impacted negatively on the local watercourses and that the current practice is unsustainable and should not continue. Surface water from all impervious areas should be treated before final discharge to watercourses preferably to sewer. As the Ward River is an extremely important salmonid system the Board is opposed to the drainage of any surface water from impervious areas to

16.1.3.3 The following input data influence the shape and size of the contour:

(a) Tracks

16.1.3.4 The flight tracks associated with the existing 10/28 runway, the existing 16/34 runway and the existing 11/29 runway are in accordance with AIP Ireland as published by the Irish Aviation Authority. For the proposed runway, it was assumed that the aircraft would join up with the tracks used for the existing 10/28 runway which was agreed with the Irish Aviation Authority to be a reasonable assumption at this stage. Appendix G3 shows the track data used.

16.1.3.5 It should be noted that the absolutely precise route that an aircraft will adopt is very dependent on factors such as aircraft performance, weather, instrumentation accuracy and pilot skill. Therefore the tracks shown in Appendix G3 cannot be considered to be definitive. However the logarithmic nature by which sound is described, and the averaging process of the assessment procedure, means that the resultant inaccuracies are relatively small.

16.1.3.6 Note that Dublin split aircraft into four categories, A to D. There are different tracks for A + B aircraft and C + D aircraft. The category of each aircraft type is given in Appendix G2, with the tracks appropriately labelled in Appendix G3.

(b) Flight Profiles

16.1.3.7 For arrivals, a 3.0° glide slope has been adopted.

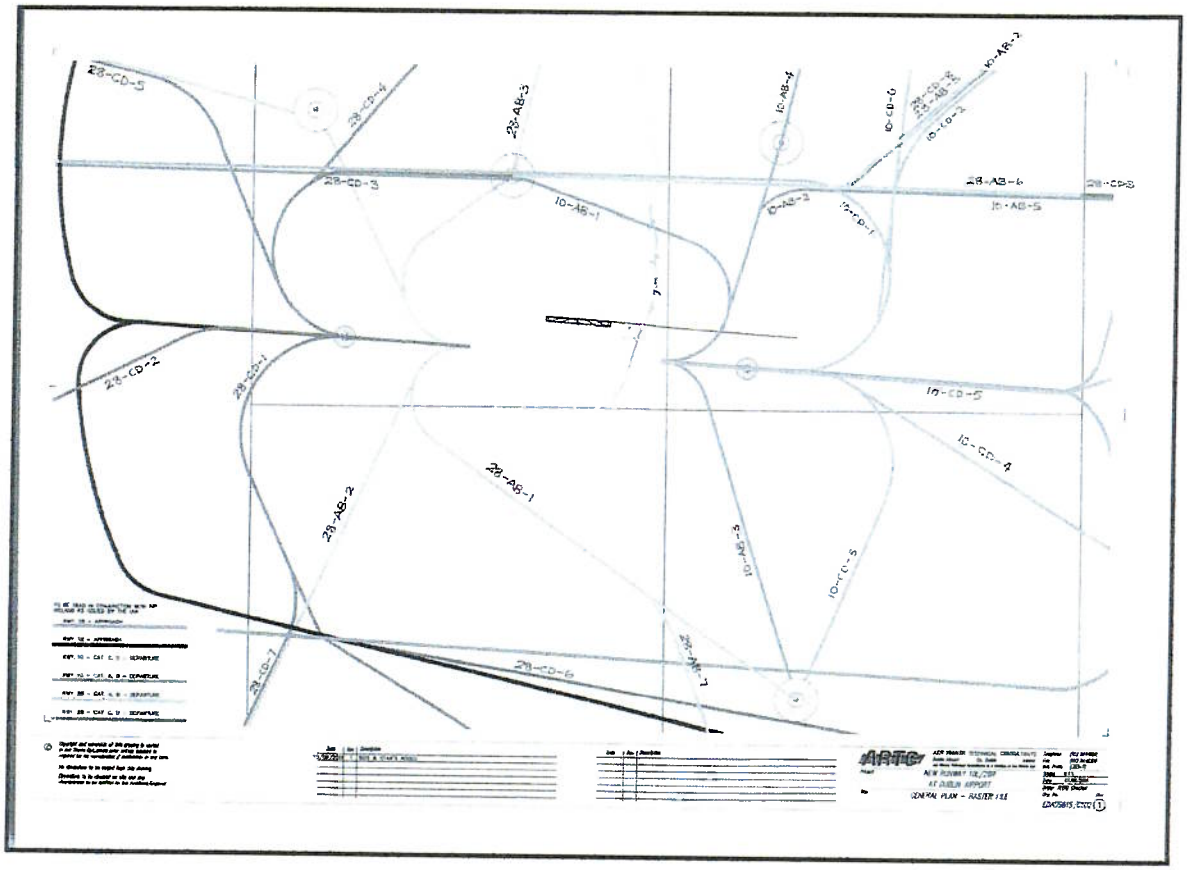
16.1.3.8 When considering a departure profile, the further the aircraft's destination, generally the greater the fuel load and therefore the greater the thrust required for take-off. Therefore there is a direct relationship between the trip length that the particular aircraft is making and its noise level. INM caters for this variable by requiring that each aircraft departure is allocated a "stage" number relating to the length of the flight the aircraft is making. The stages are defined as follows, in terms of nautical miles (nmi):

Stage 1:	0-500 nmi
Stage 2:	500-100 nmi
Stage 3:	1000-1500 nmi
Stage 4:	1500-2500 nmi
Stage 5:	2500-3500 nmi
Stage 6:	3500-4500 nmi
Stage 7:	4500 nmi and over

16.1.3.9 The information on flight movements supplied by Dublin Airport has destination information specified for each movement in the form of the internationally recognised ICAO four letter code. This allows the destination to be located and the journey length established. Therefore the movements can be classified in terms of the above stages for each aircraft type.

16.1.3.10 The INM input data given in Appendix G4 shows the destinations used and their allocated stage relative to Dublin Airport.

APPENDIX G3
Flight Tracks



APPENDIX G9
Summary of Assumptions

Assumptions made for Dublin Airport assessment:

- Where INM does not hold records for an aircraft type, an equivalent aircraft with similar engines and range has been substituted.
- The aircraft types have been allocated a category A, B, C or D in accordance with procedure at Dublin.
- Departure flights were allocated to tracks on the basis of the SIDs (Standard Instrument Departures) and destinations as determined in discussion with the Irish Aviation Authority.
- Runway 11/29 has been assumed to have straight approach and straight departure tracks.
- Runway 16/34 and existing Runway 10/28 have approach and departure tracks in accordance with AIP Ireland as published by the Irish Aviation Authority.
- For the new 10/28 runway it is assumed that aircraft using this will follow similar flight tracks to those for the existing runway. Therefore the tracks of the new runway have been sensibly joined up to the existing tracks.
- For future movements, it was decided to use the same mix of aircraft types, arrivals, departures and destinations. Year 2010 and Year 2025 have been plotted for the future years.
- Some cargo aircraft types have been deemed to disappear by 2010 and the movement was allocated to another aircraft type (information supplied by Dublin Airport Authority) and the INM model was changed accordingly.
- For "Mixed Mode" operations - all left hand turn departure tracks use the left hand runway and vice versa (strategy given as operationally sensible).

CONDITIONS

1. The development shall be carried out in accordance with the plans and particulars and the Environmental Impact Statement lodged with the application as amended by the further plans and particulars received by the planning authority on the 9th day of August, 2005, including the Environmental Impact Statement Addendum, and the 3rd day of March, 2006 and received by An Bord Pleanála on the 30th day of August, 2006, the 5th day of March, 2007 and in the oral hearing, except as may otherwise be required in order to comply with the following conditions.

   Reason: In the interest of clarity.

2. This permission is for a period of 10 years from the date of this order.

   Reason: In the interest of clarity.

3. On completion of construction of the runway hereby permitted, the runways at the airport shall be operated in accordance with the mode of operation – Option 7b – as detailed in the Environmental Impact Statement Addendum, Section 16 as received by the planning authority on the 9th day of August, 2005 and shall provide that -

   (a) the parallel runways (10R-28L and 10L-28R) shall be used in preference to the cross runway, 16-34,

   (b) when winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control,

   (c) when winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft, and

   (d) Runway 10L-28R shall not be used for take-off or landing between 2300 hours and 0700 hours,

   except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports.

   Reason: In the interest of clarity and to ensure the operation of the runways in accordance with the mitigation measures set out in the Environmental Impact Statement in the interest of the protection of the amenities of the surrounding area.

Appendix D

The pace of change has to increase at the IHRB if public scepticism is to ease

Brian O'Connor
Odds and Sods

Regulator's failure to present evidence in Hogan case appears slipshod

Since it has been a private club for more than two centuries it probably shouldn't surprise if the instincts of Irish racing's regulator have leaned towards keeping problems in-house. Discretion is prized in any closed shop. But it's an expensive impulse the sport can't afford any more.

There is recognition within the Irish Horseracing Regulatory Board (IHRB) that it must change to survive. History is all well and good but €11.4 million of public funding for 2023 in the here and now means ambitions towards accountability and transparency need to be more than just corporate jargon.

Effective acknowledgment of a chronic deficit in both were underlined last year by the appointment of a new chief executive whose claims to the regulatory helm were helped by knowing nothing about racing. Ignorance is rarely an employment plus, but public scepticism meant Darragh O'Loughlin's apparent agenda-free status outweighed his lack of knowledge.

That was just one step in attempting to slowly crank integrity governance into a 21st century gear where outside opinion counts. There have been others too, but the IHRB's unfortunate accuracy when it comes to shooting itself in the foot keeps forcing several more steps backward.

Patience wearing thin

Even in an as inherently conservative sector as racing, with its default setting for circling wagons, patience appears to be increasingly wearing thin about a body having to play so much reputational catch-up.

Few things can undermine confidence quite like a smell of financial impropriety and the whiff of O'Loughlin's "bombshell" revelation to the Oireachtas Public Accounts Committee last summer in relation to a still unspecified financial matter of grave concern still lingers.

An independent report is in the pipeline which, presumably, will eventually clear up speculation as to whether, or not, it might be connected to an apparent discrepancy in money provided to various funds administered by the IHRB that support injured riders.

Pre-emptive attempts to downplay the matter as some harmless accounting technique come up against the gravity of the language employed by O'Loughlin. There is credit due for both going public originally and a commitment to publish any report. But inevitably, as everyone waits, speculation rushes into the information vacuum.

Such vacuums used to feel like useful stock in trade for a regulatory system seemingly designed to simply ride out any storms. Miserly rations of public information helped feed into that impression and fitted into what essentially has been oversight by a private body. But that can't cut it any more.

It's why the IHRB's shock announcement last week that it had no evidence to present after a marathon three-and-a-half-year examination of a controversial claiming race at Dundalk in March of 2020 resonated of another time and attitude. The saga of how the Denis Hogan-trained pair Tony The Gent and Yuften finished first and second at Dundalk, prompting an investigation that included looking at betting patterns, has been another bad smell hanging over the game for far longer than is reasonable.

Abject failure

For the regulator to try to flex its muscles, pledge to have it all progressed as soon as practicable and then a week before a planned referrals hearing suddenly announce it had no evidence because of documentation submitted by Hogan the month before looks dispiriting-ly slipshod.

An inability to get something over the line is one thing, but this has looked like abject failure. That the IHRB has blamed Hogan for not submitting this expert evidence long before might have some justification. But it also came across as adding a petulant tone to an embarrassing shambles that smacks of a real lack of seriousness all round.

There have been much-needed structural changes to racing's regulation in recent years. Embarrassments thrown up in the process have, at times, been considerable and public, but can't be allowed prevent further necessary reforms being carried out to improve the policing of a vital €2.5 billion sector.

Some within the IHRB argue that a relatively new regime is being criticised for past failings. But it's not like the Hogan case is some complete anomaly from history. Nor is it the case that changing the head of an organisation magically changes either its culture or its reputation.

At the very least, the pace of change at the IHRB needs to be upped significantly. Even then, there's a sizeable undercurrent of opinion convinced that structural reform will ultimately have to take place at the most fundamental level.

That's because Irish racing is an outlier in having separate bodies covering administration and integrity. Most other jurisdictions rub along with just the one. If the IHRB keeps giving itself reputational black eyes, the question will increasingly be asked as to why can't the same apply here. Spending public money demands accountability. Regulation here used to be little more than a private playpen with all the usual intrigues inevitable to such anatomies. But for the outlay going into it now, it is reasonable to expect more impressive performances than have transpired recently.

FINGAL COUNTY COUNCIL

18-12-2020F 20A 0668
FINGAL COCO PL DEPT

SITE NOTICE

daa plc intends to apply for permission for a proposed development comprising the taking of a 'relevant action' only within the meaning of Section 34C of the Planning and Development Act 2000, as amended, at Dublin Airport, Co. Dublin, in the townlands of Collinstown, Toberbunny, Commons, Cloghran, Corballis, Coultry, Portmellick, Harristown, Shanganhill, Sandyhill, Huntstown, Pickardstown, Dunbro, Millhead, Kingstown, Barberstown, Forrest Great, Forrest Little and Rock on a site of c. 580 ha.

The proposed relevant action relates to the night-time use of the runway system at Dublin Airport. It involves the amendment of the operating restriction set out in condition no. 3(d) and the replacement of the operating restriction in condition no. 5 of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No.: PL06F.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19), as well as proposing new noise mitigation measures. Conditions no. 3(d) and 5 have not yet come into effect or operation, as the construction of the North Runway on foot of the North Runway Planning Permission is ongoing.

The proposed relevant action, if permitted, would be to remove the numerical cap on the number of flights permitted between the hours of 11pm and 7am daily that is due to come into effect in accordance with the North Runway Planning Permission and to replace it with an annual night-time noise quota between the hours of 11.30pm and 6am and also to allow flights to take off from and/or land on the North Runway (Runway 10L 28R) for an additional 2 hours i.e. 2300 hrs to 2400hrs and 0600 hrs to 0700 hrs. Overall, this would allow for an increase in the number of flights taking off and/or landing at Dublin Airport between 2300 hrs and 0700 hrs over and above the number stipulated in condition no. 5 of the North Runway Planning Permission, in accordance with the annual night time noise quota.

The relevant action pursuant to Section 34C (1) (a) is:

To amend condition no. 3(d) of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No.: PL06F.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19). Condition 3(d) and the exceptions at the end of Condition 3 state the following:

'3(d). Runway 10L-28R shall not be used for take-off or landing between 2300 hours and 0700 hours.

except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports.'

Permission is being sought to amend the above condition so that it reads:

'Runway 10L-28R shall not be used for take-off or landing between 0000 hours and 0559 hours

except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports or where Runway 10L-28R length is required for a specific aircraft type.'

The net effect of the proposed change, if permitted, would change the normal operating hours of the North Runway from the 0700hrs to 2300 hrs to 0600 hrs to 0000 hrs.

The relevant action also is:

To replace condition no. 5 of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No.: PL06F.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19) which provides as follows:

5. *On completion of construction of the runway hereby permitted, the average number of night time aircraft movements at the airport shall not exceed 65/night (between 2300 hours and 0700 hours) when measured over the 92 day modelling period as set out in the reply to the further information request received by An Bord Pleanála on the 5th day of March, 2007.*

Reason: *To control the frequency of night flights at the airport so as to protect residential amenity having regard to the information submitted concerning future night time use of the existing parallel runway."*

With the following:

A noise quota system is proposed for night time noise at the airport. The airport shall be subject to an annual noise quota of 7990 between the hours of 2330hrs and 0600hrs.

In addition to the proposed night time noise quota, the relevant action also proposes the following noise mitigation measures:

- A noise insulation grant scheme for eligible dwellings within specific night noise contours
- A detailed Noise Monitoring Framework to monitor the noise performance with results to be reported annually to the Aircraft Noise Competent Authority (ANCA), in compliance with the Aircraft Noise (Dublin Airport) Regulation Act 2019.

The proposed relevant action does not seek any amendment of conditions of the North Runway Planning Permission governing the general operation of the runway system (i.e., conditions which are not specific to nighttime use, namely conditions no. 3 (a), 3(b), 3(c) and 4 of the North Runway Planning Permission) or any amendment of permitted annual passenger capacity of the Terminals at Dublin Airport. Condition no. 3 of the Terminal 2 Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No. PL06F.220670) and condition no. 2 of the Terminal 1 Extension Planning Permission (Fingal County Council Reg. Ref. No. F06A/1843; ABP Ref. No. PL06F.223469) provide that the combined capacity of Terminal 1 and Terminal 2 together shall not exceed 32 million passengers per annum.

The planning application will be subject to an assessment by the Aircraft Noise Competent Authority in accordance with the Aircraft Noise (Dublin Airport) Regulations Act 2019 and Regulation (EU) No 598/2014. The planning application is accompanied by information provided for the purposes of such assessment.

An Environmental Impact Assessment Report will be submitted with the planning application. The planning application and Environmental Impact Assessment Report may be inspected or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours of 9.30 - 16.30 (Monday – Friday) at Fingal County Council, Fingal County Hall, Main Street, Swords, Fingal, Co. Dublin. A submission or observation in relation to the Application may be made in writing to the Planning Authority on payment of a fee of €20, within the period of 5 weeks, beginning on the date of receipt by Fingal County Council of the Application, and such submissions or observations will be considered by the Planning Authority in making a decision on the application. The Planning Authority may grant permission subject to or without conditions, or may refuse to grant permission.

Signed: _____
Agent: Gavin Lawlor - Tom Phillips + Associates, 80 Harcourt Street, Dublin 2, D02 F449 Date of erection of site notice: 16th December 2020

1. Introduction

1.1 The purpose of this EIAR Supplement

1.1.1 This document has been prepared on behalf daa plc hereafter referred to as 'the Applicant') as a supplement to the Environmental Impact Assessment Report (EIAR) submitted to Fingal County Council (FCC) in September 2021. An earlier version of the EIAR accompanied the application for a proposed development comprising the taking of a 'relevant action' only within the meaning of Section 34C of the Planning and Development Act 2000, as amended (the "PDA") submitted to Fingal County Council (FCC) in December 2020 (F20A/0668). By letter dated 19th February 2021, FCC requested further information in respect of the proposed Relevant Action (the "Request for Further Information"). Item 1 in the Request for Further Information sought the provision of various clarifications and additional information, to be presented in a revised EIAR, which was the EIAR subsequently submitted in September 2021 and to which this document is a supplement.

1.1.2 On 08 Aug 2022, a decision to grant permission was made by FCC. An appeal (ABP-314485-22) was subsequently lodged on 24 Aug 2022 and is now under consideration by An Bord Pleanála (ABP). Since the EIAR was submitted in September 2021 there have been a number of changes or evolutions in operations at Dublin Airport, or in the baseline environment or legal or policy framework, that could potentially affect the assessment outcomes reported in the September 2021 EIAR. To ensure that ABP has the most up to date information when determining the appeal, the Applicant has decided to submit this EIAR Supplement. The changes that are reflected in this EIAR Supplement are described in Section 1.2.

1.2 Changes addressed by this EIAR Supplement

1.2.1 The Applicant has identified a number of changes that have taken place since September 2021 that could affect the findings of the environmental assessments presented in the September 2021 EIAR. These changes include:

- actual flightpaths from North Runway upon commencement differing from assumed flightpaths used for modelling/assessment purposes in the 2021 EIAR;
- updated air traffic forecast data;
- earlier fleet modernisation;
- the North Runway becoming operational in August 2022; and
- other 'passage of time changes' that include changes to the environmental baseline conditions and changes to relevant aviation, planning and environmental legislation, policy, guidance and best practice.

1.2.2 These changes are described further in the following sections.

Flightpath changes

1.2.3 On commencement of North Runway operations in August 2022, an issue regarding departure flightpaths was identified which resulted in some local communities being unexpectedly overflown. The Applicant immediately started a review with the aim of satisfactorily resolving the issue as soon as possible. The review process involved engagement and coordination with the relevant stakeholders, and it identified that some of the Instrument Flight Procedures[1] (IFPs) were not aligned to modelling assumptions included in the Applicant's planning submissions. The outcome of the review, in consultation with the Irish Aviation Authority (IAA), proposed updates to the affected IFPs, specifically the current Standard Instrument Departures[2] (SIDs), which will result in flightpaths aligning more closely with the information previously communicated by the Applicant. The revised SIDs were required to go

[1] Instrument Flight Procedures (IFPs) are published procedure used by aircraft flying in accordance with instrument flight rules which is designed to achieve and maintain an acceptable level of safety in operations.
[2] Standard Instrument Departure (SIDs) are published instrument flight procedures to be followed by an aircraft on a flight plan immediately after take-off, which ensure the safe and efficient operation of aircraft en route to their destination.

It is acknowledged, as set out in the submitted EIAR that *the proposed Relevant Action would have an overall residual negative effect on human health and well-being*. The review of the revised EIAR for the proposed development carried out by Brady Shipman Martin, has identified potentially significant adverse and residual environmental impacts on human health and well-being as a result of noise, on amenity and local communities as a result of noise.

Mitigation measures are proposed in the EIAR to address the identified negative effects and these have been given careful consideration in undertaking the EIA. Mitigation includes for a noise insulation scheme.

Monitoring measures set out within the RD by way of planning condition are in addition to the provisions of section 21 which sets out the monitoring obligations of the Aircraft Noise (Dublin airport) Regulation Act 2019. The monitoring regime as prescribed in the RD is therefore considered to address the concerns set out in the submissions received from Meath and South Dublin County Council in response to the FI received for the RA.

7.1.4 Third party submissions and observations to the RA

The Planning Officer has had regard to the substantive planning considerations raised in the third party submissions and observations throughout the assessment of the original relevant action application, the assessment of the response to further information and in the consideration of the RA as subject to the RD.

Substantive considerations were raised in relation to the impacts of the RA on the environment and to the impact of noise on human health and quality of life. The application is accompanied by an EIAR, the consent is subject to EIA and this substantive issue is addressed therein. It is acknowledged there will be impacts on human health and that mitigation is proposed. The EIAR is considered to be in accordance with S.172 of the PDA and as such is considered to identify and describe adequately the direct and indirect significant effects on the environment of the proposed development.

Substantive issues raised outside of the key areas of assessment set out elsewhere in this report include the following

Flight paths

Concerns have been expressed in relation to the introduction of flight paths. Concerns are raised regarding divergence in flight paths when runways are operating in mixed mode. It is stated that the route has not been included in the contour modelling. It is also stated noise contours cannot be relied upon given metrics used.

The proposal under consideration in the Relevant Action as subject to the Regulatory Decision has no impact on nor consents any changes to flightpaths. It is outlined in the EIAR there will be no new flight paths in the proposed scenario.

Flight paths have been included in the modelling. ANCA has undertaken their own modelling and metrics in analysing and these have been taken into account in the Regulatory Decision consent. ANCA in SEA report outline the assessment of impacts of flight paths and departure procedures of *Dublin Airport's operation is a matter for daa and the competent authorities for airspace management and design.*

Appropriate Assessment of relevant permission.

It is stated in a submission that, in carrying out its functions in relation to Environmental Impact Assessment and Appropriate Assessment, that the Planning Authority must conduct its assessments in relation to what is referred to as 'the entirety of the development subject to the original planning, extension of planning and now the amendment of planning'.

The original permission dates from 2007 and the 'extension of planning' dates from 2017 and it is noted that those permissions have never been deemed to be other than valid by reference to the requirements of the EIA Directive or of the Habitats' Directive. The original permission is the 'Relevant Permission' within the meaning of Section 34C. As regards the reference to certain examples/projects involving 'extension of time', it is noted that what is applied for under the application before the planning authority is not an application for a permission for an 'extension of time' to determine if the project the subject of the original permission can proceed. Rather, the application relates to, specifically, a 'relevant action', being a proposed variation to two of the conditions attached to a permission that has been implemented. In respect of that variation it is noted that the application was accompanied by an EIAR as well as, for the purpose of the Habitats Directive, a

32I, were not completed within the time referred to in the sections concerned.

Offence of taking payment, etc. in connection with section 32H procedure

32L. A member or official of a planning authority who takes or seeks any favour, benefit or payment, direct or indirect (on his or her own behalf or on behalf of any other person or body), in connection with the provision of an opinion or notification under section 32I commits an offence.".

Amendment of section 34 of Principal Act

12. Section 34 of the Principal Act is amended—

(a) by the insertion of the following subsection after subsection (4):

"(4A) Notwithstanding subsection (1), where a planning authority grants permission for a development on foot of an application accompanied by an opinion provided by the planning authority under section 32I(2) the permission shall include a condition in respect of any detail of the development that was not confirmed at the time of the application requiring—

(a) the actual detail of the development to fall within specified options, parameters or a combination of options and parameters, and

(b) the applicant to notify the planning authority in writing, by such date prior to the commencement of the development, or prior to the commencement of the part of the development to which the detail relates, as the Minister may prescribe, of the actual detail of the development.",

(b) by the substitution of the following subsection for subsection (12):

"(12) A planning authority shall refuse to consider an application to retain unauthorised development of land where it decides that either or both of the following was required or is required in respect of the development:

(a) an environmental impact assessment;

(b) an appropriate assessment.",

and

(c) in subsection (12A), by the substitution of "an application in respect of the following development shall be deemed not to have required, and not to require, a determination as to whether an environmental impact assessment is required" for "if an application for permission had been made in respect of the following development before it was commenced, the application shall be deemed not to have required a determination referred to at subsection (12)(b)".

"Supplementary provisions relating to decisions on applications referred to in section 34B(1) or 34C(1) which were not refused by virtue of section 34B(5) or 34C(5)

37R. (1)(a) This section applies in addition to section 37 in the case of an appeal under section 37 against a decision of the planning authority under section 34 where, pursuant to section 34B(15) or 34C(16), that decision incorporates a regulatory decision of the competent authority under section 34B(13)(a) or 34C(14)(a), as the case may be.

(b) The competent authority shall be a party to the appeal notwithstanding section 34B(15)(b) or 34C(16)(b).

(2) For the purposes of a relevant appeal, the reference in section 37(1) to 'any person who made submissions or observations in writing in relation to the planning application to the planning authority' includes any person who made submissions or observations in writing referred to in section 34B(11)(c) or 34C(12)(c) to the competent authority in relation to the draft regulatory decision or related report referred to in section 34B(9) or (10), as the case may be, or section 34C(10) or (11), as the case may be.

(3) (a) *Subsections (1)* to *(3)* of *section 9* of the *Aircraft Noise (Dublin Airport) Regulation Act 2019* shall, with all necessary modifications, apply to the Board's consideration of the relevant appeal as if any reference to the competent authority in those subsections were a reference to the Board.

(b) *Subsections (4)* to *(7)* of *section 9* of the *Aircraft Noise (Dublin Airport) Regulation Act 2019* shall, with all necessary modifications, apply to measures and restrictions forming part of the Board's consideration of the relevant appeal as those subsections apply to measures and restrictions referred to in those subsections.

(c) The Board may, in its decision on the relevant appeal and its related report (subsection (7)(a)), accept or reject all or any part of either or both—

(i) the relevant regulatory decision the subject of the appeal, or

(ii) the report prepared under section 34B(10) and revised under section 34B(13)(b), or prepared under section 34C(11) and revised under section 34C(14)(b), as appropriate, which relates to such relevant regulatory decision.

(4) (a) Paragraphs (b) and (c) apply where the Board is considering, in its determination of the relevant appeal in so far as the appeal relates to the relevant regulatory decision, adopting noise mitigation measures or operating restrictions (if any), or a combination

Appendix E

iAcoustics
INTEGRATED ACOUSTIC SOLUTIONS

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Air Traffic Noise Monitoring

iAcoustics

Report Issued: 12/10/2022

Project:	Colm Barry
Author:	Eoghan Tyrrell
Title:	Air Traffic Noise Monitoring
Reference Code:	J1950
Version Number:	1

Revision Tracker

Version	Date issued	Revision by	Reviewed by	Section(s) affected
V.1	12/10/2022	E. Tyrrell	G. Plunkett	-

Table of Contents

Glossary of Terms

A-weighted	Measurements that correlate well with the perceived noise level.
Background Noise (L90):	The in-situ, or ambient level of noise in the environment
Competent Person:	Someone with appropriate training, qualifications, experience, and skill. The person will normally have a diploma or degree in acoustics or a related subject.
Decibel (dB):	The decibel is used as a measure of acoustic units.
dB(A):	A single-figure rating to a sound, which represents the human-ear frequency response.
Frequency (Hz):	The number of sound waves to pass a point in one second. Correlated to the perceived pitch of a sound.
LAeq:	Commonly regarded as the A-weighted "average" noise level over a period of time.
LAFmax:	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak.
Lday:	The A-weighted, Leq (equivalent noise level), over the 16-hour day period (07:00-23:00), also known as the day noise indicator.
Ldn:	The day-night noise level, the LAeq (equivalent noise level) over a 24 hour period, also known as the day night indicator.
Leq:	The linear (not A-weighted) equivalent continuous sound pressure level.
Lnight	The A-weighted, Leq (equivalent noise level) over the 8 hour night period of 23:00 to 07:00 hours, also known as the night noise indicator.
Noise intrusion:	Noise from external noise sources.
Octave bands:	A convenient division of the frequency scale, identified by their centre frequency. Typically, 63, 125, 250, 500, 1000, 2000, 4000, 8000 Hz.

1. Introduction

iAcoustics were engaged to carry out noise monitoring for the measurement of air traffic noise at the home of Colm Barry, Ballystrahan, Co. Dublin, D11 XH51. This dwelling location in relation to Dublin Airport is indicated in Figure 1 with a yellow dot. There is an approximate distance of 2 kilometers between the dwelling and the closest runway.

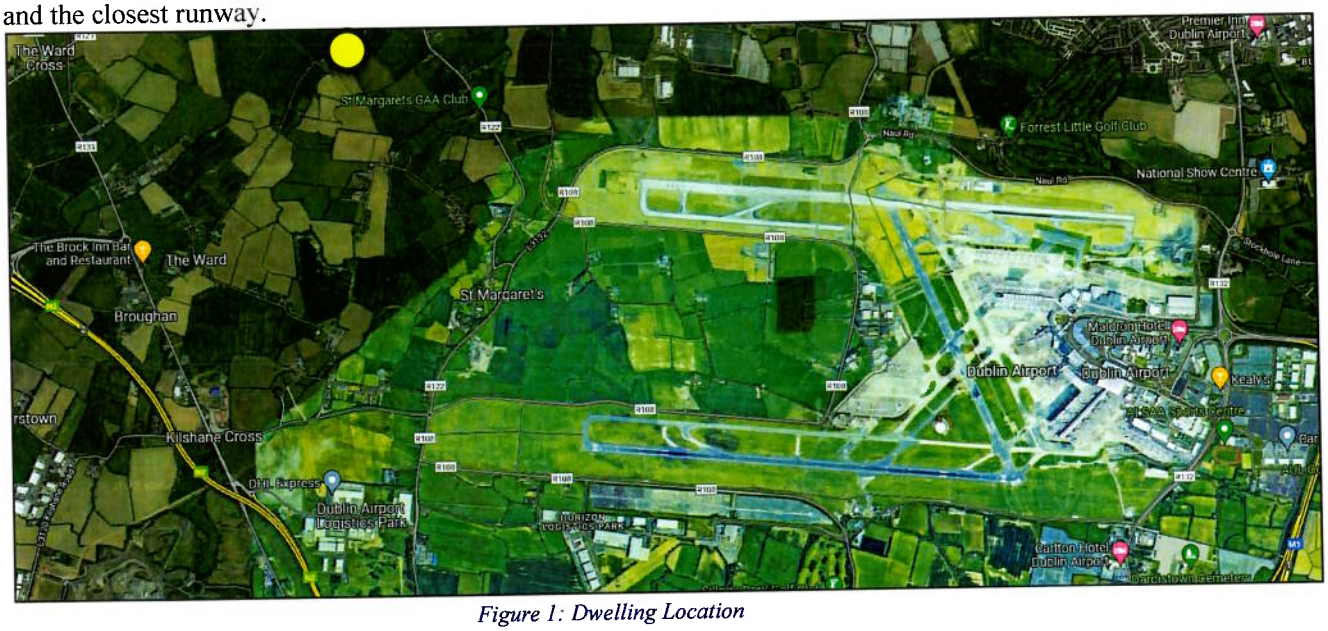

Figure 1: Dwelling Location

Unattended noise monitoring was carried out for approximately 24 hours, between 15:30 on 10th August 2022 and 15:30 on 11th August 2022. The survey was carried out prior to the launch and operation of the new North Runway (10L/28R) at Dublin Airport. Following a review of the audio recordings captured during the survey, air traffic was observed to be the dominant noise source.

1.1 Professional Competency

This report, including the noise survey element, has been undertaken and drafted by Eoghan Tyrrell, an Associate Member of the Institute of Acoustics (AMIOA), an accreditation gained through the completion of the Post-Graduate Diploma in Acoustics & Noise Control and MSc in Applied Acoustics. These qualifications comply with the requirements of a 'competent tester' under the EPA Guidance NG-4.

2. Instrumentation and Measurement Procedure

Measurements were captured through daytime and nighttime periods. All measurements were taken with calibrated precision grade, Type Approved (Class 1) sound level meters as per *IEC 61672-1:2013*. All equipment has calibration certificates traceable to the relevant standard. Measurements were captured in line with *ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures*.

Table 1: Measurement Equipment

Type	Make & Model	Serial No.
Sound Level Meter Outdoors	NTI XL2	A2A-06528-E0
Sound Level Meter Indoors	NTI XL2	A2A-12398-E0
Microphone / Preamp Outdoors	NTI M2230 / MA220	A22043 / 6471
Microphone / Preamp Indoors	NTI M2230 / MA220	A14300 / 6337
Calibrator	01dB CAL 01	11756

Two monitors were deployed for the survey period – one monitor outdoors and the other indoors.

The outdoor monitor was positioned on grass, 2 meters above ground, away from any reflective surfaces. The topography and surrounding areas were predominantly flat. An all-weather kit was employed on the monitor to ensure the wind did not interfere with the accuracy of the measurement microphone.

The indoor monitor was positioned in a bedroom on the first floor. All windows were closed. The façade-located wall vent was open to provide normal levels of ventilation. The indoor monitor was positioned 1.5 meters above the floor in the centre of the room.

Photographs of each monitor are presented in the appendix of this report. The meters were calibrated before and after the survey to ensure no drift in the measurement accuracy. Weather conditions were calm for the duration of the survey. On the morning of the survey at the dwelling location, with a hand-held Pro Anemometer (HP-866B), temperatures were measured at 25 degrees Celsius. Wind speeds were measured to be less than 1.5 meters per second. There was relatively little cloud cover. According to the Met Eireann data from the Casement weather station, temperatures ranged from 11.1 degrees Celsius to 27.4 degrees Celsius over the survey period. Wind speeds ranged from 2 knots (1 m/s) to 8 knots (4 m/s) over the survey period. The predominant wind direction was 220 degrees (Southwest). No precipitation fell during the survey period.

Figure 1 indicates the meter positions. The red circle indicates the outdoor monitoring position. The blue circle is positioned over the bedroom in which the indoor monitor was located.

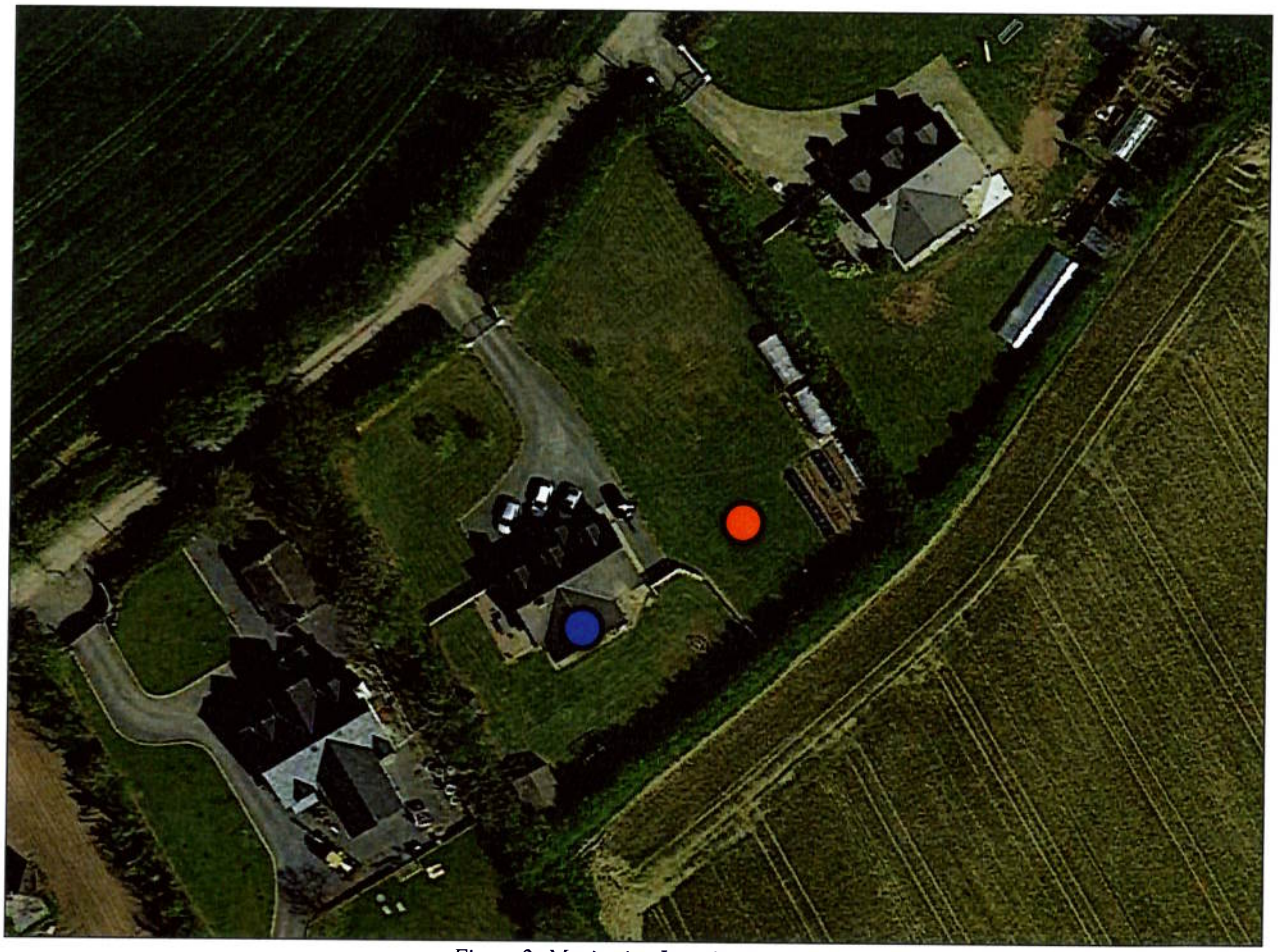

Figure 2: Monitoring Locations

Both meters were set to report on spectral data in one-third octaves at one-minute intervals. Each meter also logged noise levels every second. Audio recordings were captured so air traffic noise events could be identified, and the air traffic measurements dissociated from other potential noise occurrences.

3. Measurement Results

The daytime and nighttime equivalent noise levels are presented in Table 2 and Table 3. All detected air traffic noise events and associated levels are presented in Table 4 and Table 5. Each individual event from Table 4 and Table 5 were auditioned and verified as air traffic noise.

Table 2: Outdoor Day Night Levels

Outdoors	
Period	Result
Daytime	44-47 dB Lday
Nighttime	45 dB Lnight
Day-Night	44 dB Ldn

Table 3: Indoor Day Night Levels

Indoors	
Period	Result
Daytime	24 dB Lday
Nighttime	23 dB Lnight
Day-Night	23 dB Ldn

Table 4: Individual Identified Air Traffic Noise Events and Associated Levels

Individual Air Traffic Noise Event Levels, Outdoors			
Time	Duration	LAeq	LAFmax
2022-08-10 17:41:30	0:00:39	46.8	52.0
2022-08-10 18:17:20	0:00:11	47.7	53.3
2022-08-10 19:10:20	0:00:14	45.6	51.3
2022-08-10 19:11:08	0:00:11	45.3	49.4
2022-08-10 19:13:42	0:00:12	46.9	52.7
2022-08-10 19:14:02	0:00:29	44.3	49.6
2022-08-10 19:16:16	0:00:07	45.2	51.7
2022-08-10 19:16:40	0:00:08	46.4	50.5
2022-08-10 19:19:03	0:00:08	48.1	51.3
2022-08-10 19:31:15	0:00:27	46.6	56.4
2022-08-10 19:33:54	0:00:22	47.0	51.5
2022-08-10 19:36:06	0:00:11	51.1	58.3
2022-08-10 19:42:12	0:00:16	50.0	55.2
2022-08-10 19:43:50	0:00:16	48.5	56.3
2022-08-10 19:44:58	0:00:16	50.2	57.8
2022-08-10 19:48:50	0:00:16	51.4	58.2
2022-08-10 19:49:52	0:00:12	49.5	54.3
2022-08-10 19:50:35	0:00:19	49.6	54.4
2022-08-10 20:04:37	0:00:36	52.1	61.7
2022-08-10 20:06:35	0:00:30	45.9	51.0

2022-08-10 20:08:18	0:00:23	54.2	62.6
2022-08-10 20:10:01	0:00:33	58.7	66.4
2022-08-10 20:13:42	0:00:32	51.6	57.6
2022-08-10 20:16:50	0:00:24	54.2	62.3
2022-08-10 20:20:46	0:00:33	55.5	64.2
2022-08-10 20:23:35	0:00:25	52.5	60.5
2022-08-10 20:26:46	0:00:31	52.0	60.9
2022-08-10 20:29:51	0:00:24	52.7	58.5
2022-08-10 20:33:00	0:00:21	56.7	65.7
2022-08-10 20:39:48	0:00:10	53.9	57.9
2022-08-10 20:42:59	0:00:21	52.3	58.4
2022-08-10 20:45:28	0:00:36	52.2	59.5
2022-08-10 20:47:46	0:00:11	50.7	56.0
2022-08-10 20:50:36	0:00:44	49.9	56.2
2022-08-10 20:53:33	0:00:15	50.8	54.6
2022-08-10 20:57:47	0:00:29	51.2	56.6
2022-08-10 21:25:41	0:00:13	53.6	57.5
2022-08-10 21:28:05	0:00:41	47.6	51.7
2022-08-10 21:29:51	0:00:24	49.8	53.6
2022-08-10 21:31:36	0:00:29	49.3	53.1
2022-08-10 21:35:21	0:00:34	51.2	58.5
2022-08-10 21:42:18	0:00:37	46.7	55.2
2022-08-10 21:47:18	0:00:31	44.7	51.6
2022-08-10 21:56:02	0:00:34	43.2	48.0
2022-08-10 22:10:03	0:00:32	45.8	52.2
2022-08-10 22:11:56	0:00:18	42.1	45.9
2022-08-10 22:12:59	0:00:32	47.5	55.3
2022-08-10 22:16:58	0:00:13	42.6	48.3
2022-08-10 22:18:01	0:00:36	43.6	49.5
2022-08-10 22:54:49	0:00:38	46.5	51.5
2022-08-10 23:23:28	0:00:38	45.0	50.1
2022-08-10 23:44:49	0:01:23	53.3	62.3
2022-08-10 23:53:22	0:00:32	44.8	53.5
2022-08-10 23:56:10	0:00:09	42.7	50.7
2022-08-11 00:04:04	0:00:44	40.3	47.8
2022-08-11 00:17:34	0:00:22	38.2	41.9
2022-08-11 00:18:52	0:00:17	38.9	43.8
2022-08-11 00:21:02	0:00:24	38.7	41.4
2022-08-11 00:28:12	0:00:32	45.3	50.6
2022-08-11 01:23:27	0:00:23	35.5	41.0
2022-08-11 02:28:36	0:00:15	37.2	41.0
2022-08-11 04:14:46	0:00:16	46.1	53.3
2022-08-11 04:38:02	0:00:24	40.8	45.5
2022-08-11 04:41:49	0:00:19	44.4	50.7
2022-08-11 04:51:46	0:00:14	47.3	50.8
2022-08-11 05:31:26	0:01:16	51.3	60.3
2022-08-11 05:34:59	0:00:18	54.9	61.5

2022-08-11 05:45:46	0:01:29	53.0	59.9
2022-08-11 05:54:51	0:01:13	53.5	60.1
2022-08-11 05:57:18	0:01:20	52.8	60.4
2022-08-11 05:58:55	0:00:14	51.5	57.0
2022-08-11 06:00:37	0:01:12	52.1	58.6
2022-08-11 06:02:23	0:01:06	52.1	59.7
2022-08-11 06:08:30	0:01:11	48.7	57.3
2022-08-11 06:10:30	0:01:41	52.8	60.0
2022-08-11 06:19:41	0:01:02	54.3	58.1
2022-08-11 06:21:07	0:00:57	53.6	59.6
2022-08-11 06:23:32	0:01:12	54.9	61.0
2022-08-11 06:25:06	0:00:47	50.4	55.1
2022-08-11 06:26:38	0:01:00	54.7	60.9
2022-08-11 06:28:12	0:01:06	55.8	64.1
2022-08-11 06:29:52	0:00:21	52.8	57.9
2022-08-11 06:30:21	0:00:50	51.3	56.0
2022-08-11 06:31:44	0:00:59	56.8	61.1
2022-08-11 06:32:51	0:00:57	59.3	66.2
2022-08-11 06:35:08	0:01:04	55.5	60.6
2022-08-11 06:36:37	0:01:07	54.2	62.0
2022-08-11 06:38:02	0:00:59	54.8	59.2
2022-08-11 06:39:29	0:01:27	55.3	61.8
2022-08-11 06:42:08	0:00:18	55.9	59.1
2022-08-11 06:42:42	0:00:35	56.3	60.9
2022-08-11 06:43:35	0:00:27	55.4	59.4
2022-08-11 06:44:09	0:00:37	54.5	58.6
2022-08-11 06:45:04	0:01:11	56.1	62.2
2022-08-11 06:46:30	0:01:00	58.3	67.4
2022-08-11 06:48:43	0:01:56	55.5	61.4
2022-08-11 06:50:54	0:01:04	53.4	58.6
2022-08-11 06:52:27	0:01:54	54.4	59.3
2022-08-11 06:54:29	0:01:10	52.7	58.1
2022-08-11 06:55:47	0:02:19	53.5	58.0
2022-08-11 06:58:23	0:00:21	53.0	57.7
2022-08-11 07:00:08	0:00:33	50.3	52.7
2022-08-11 07:00:50	0:00:21	62.1	68.1
2022-08-11 07:02:03	0:11:27	52.9	62.9
2022-08-11 07:13:47	0:00:53	61.2	69.4
2022-08-11 07:14:45	0:01:07	54.9	60.4
2022-08-11 07:15:59	0:00:59	57.0	63.7
2022-08-11 07:19:59	0:01:59	53.9	59.4
2022-08-11 07:22:04	0:01:11	55.4	64.1
2022-08-11 07:23:24	0:00:42	49.9	54.9
2022-08-11 07:24:21	0:01:07	53.6	61.0
2022-08-11 07:25:51	0:00:52	53.6	61.6
2022-08-11 07:27:30	0:01:23	51.4	56.5
2022-08-11 07:31:57	0:00:49	53.5	60.5

2022-08-11 07:34:04	0:01:12	47.5	52.5
2022-08-11 07:35:44	0:00:53	53.8	60.2
2022-08-11 07:37:16	0:00:57	53.0	58.0
2022-08-11 07:41:04	0:00:53	54.0	61.9
2022-08-11 07:42:26	0:00:52	53.9	60.2
2022-08-11 07:43:32	0:00:47	49.3	54.8
2022-08-11 07:48:00	0:00:52	49.4	55.1
2022-08-11 07:53:02	0:01:01	52.6	59.6
2022-08-11 07:56:23	0:00:57	54.5	62.0
2022-08-11 07:57:47	0:00:51	54.7	61.7
2022-08-11 08:00:22	0:00:45	53.3	60.8
2022-08-11 08:01:44	0:00:57	54.9	62.6
2022-08-11 08:04:32	0:00:58	48.5	56.3
2022-08-11 08:06:02	0:00:45	53.9	60.9
2022-08-11 08:08:33	0:00:53	54.1	61.8
2022-08-11 08:09:59	0:00:37	56.5	66.8
2022-08-11 08:11:27	0:00:46	55.1	59.8
2022-08-11 08:12:48	0:00:41	51.3	56.4
2022-08-11 08:14:13	0:00:53	54.8	62.2
2022-08-11 08:15:34	0:00:58	55.3	63.6
2022-08-11 08:17:02	0:00:56	57.5	65.1
2022-08-11 08:20:35	0:00:59	53.5	60.2
2022-08-11 08:22:02	0:01:00	53.1	59.6
2022-08-11 08:24:59	0:01:05	56.4	65.7
2022-08-11 08:27:37	0:00:56	54.7	64.6
2022-08-11 08:30:29	0:01:02	53.2	61.4
2022-08-11 08:32:03	0:00:54	52.3	59.3
2022-08-11 08:41:11	0:00:54	53.8	61.7
2022-08-11 08:43:56	0:02:24	49.2	59.1
2022-08-11 08:47:14	0:01:10	48.6	56.0
2022-08-11 08:54:03	0:01:06	51.5	60.8
2022-08-11 08:56:58	0:01:16	52.1	60.7
2022-08-11 09:00:27	0:01:02	51.7	61.1
2022-08-11 09:03:15	0:00:49	49.9	58.5
2022-08-11 09:06:09	0:01:02	49.9	59.4
2022-08-11 09:08:39	0:01:01	52.3	60.4
2022-08-11 09:17:00	0:00:54	48.2	58.4
2022-08-11 09:19:40	0:01:12	50.5	58.7
2022-08-11 09:24:05	0:00:53	50.9	58.8
2022-08-11 09:28:28	0:01:11	46.6	57.5
2022-08-11 09:31:48	0:01:00	39.4	46.9
2022-08-11 09:35:24	0:01:03	51.4	60.1
2022-08-11 09:37:49	0:00:49	55.2	67.0
2022-08-11 09:38:45	0:01:05	43.9	50.6
2022-08-11 09:40:55	0:00:46	49.8	58.3
2022-08-11 09:45:15	0:00:40	50.4	56.1
2022-08-11 09:49:44	0:00:43	55.9	64.2

2022-08-11 10:00:27	0:01:21	51.9	61.1
2022-08-11 10:03:34	0:01:29	49.9	62.5
2022-08-11 10:05:31	0:00:56	53.7	62.9
2022-08-11 10:07:04	0:00:13	44.4	52.3
2022-08-11 10:11:37	0:01:12	50.9	61.8
2022-08-11 10:15:15	0:01:17	43.8	52.0
2022-08-11 10:19:47	0:01:02	46.4	56.3
2022-08-11 10:22:32	0:01:05	52.7	62.5
2022-08-11 10:29:46	0:01:01	51.7	62.8
2022-08-11 10:32:32	0:00:57	44.6	54.9
2022-08-11 10:34:59	0:01:05	48.4	56.2
2022-08-11 10:37:41	0:00:57	49.6	60.3
2022-08-11 10:39:47	0:01:17	51.4	64.7
2022-08-11 10:42:03	0:01:14	51.2	64.6
2022-08-11 10:44:58	0:01:12	49.6	61.4
2022-08-11 10:47:22	0:01:00	51.2	61.6
2022-08-11 10:49:13	0:01:09	52.2	61.6
2022-08-11 10:51:47	0:01:05	51.9	62.3
2022-08-11 10:54:07	0:00:45	48.1	59.1
2022-08-11 10:54:55	0:01:10	46.3	53.3
2022-08-11 10:56:16	0:01:09	48.4	60.0
2022-08-11 10:57:49	0:00:45	45.9	54.0
2022-08-11 10:59:05	0:01:24	40.0	46.8
2022-08-11 11:02:09	0:01:44	49.4	64.5
2022-08-11 11:05:28	0:01:44	41.8	55.0
2022-08-11 11:12:21	0:01:22	49.6	61.6
2022-08-11 11:15:06	0:00:46	52.2	62.9
2022-08-11 11:18:38	0:00:47	42.8	54.6
2022-08-11 12:06:41	0:00:28	44.4	51.9
2022-08-11 12:08:09	0:00:27	45.0	50.4
2022-08-11 12:22:04	0:00:45	46.4	52.6
2022-08-11 12:30:38	0:00:35	44.6	51.4
2022-08-11 12:51:18	0:00:28	43.4	49.4
2022-08-11 13:04:05	0:01:55	46.6	54.6
2022-08-11 13:11:42	0:00:25	45.4	52.1
2022-08-11 13:30:59	0:00:28	48.4	54.9
2022-08-11 13:44:05	0:00:33	42.1	46.4
2022-08-11 14:45:50	0:00:41	45.3	51.7

Table 5: Individual Air Traffic Noise Event Levels, Indoors

Individual Air Traffic Noise Event Levels, Indoors			
Time	Duration	LAeq	LAFmax
2022-08-10 17:41:30	0:00:39	22.5	28.0
2022-08-10 18:17:20	0:00:11	27.5	32.8
2022-08-10 19:10:20	0:00:14	26.8	33.3
2022-08-10 19:11:08	0:00:11	23.5	26.2
2022-08-10 19:13:42	0:00:12	25.6	31.2
2022-08-10 19:14:02	0:00:29	24.1	29.7
2022-08-10 19:16:16	0:00:07	25.4	30.2
2022-08-10 19:16:40	0:00:08	24.0	27.0
2022-08-10 19:19:03	0:00:08	24.9	27.4
2022-08-10 19:31:15	0:00:27	24.2	29.5
2022-08-10 19:33:54	0:00:22	24.1	29.5
2022-08-10 19:36:06	0:00:11	31.0	39.7
2022-08-10 19:42:12	0:00:16	28.6	33.8
2022-08-10 19:43:50	0:00:16	28.6	36.1
2022-08-10 19:44:58	0:00:16	30.8	38.5
2022-08-10 19:48:50	0:00:16	31.1	38.3
2022-08-10 19:49:52	0:00:12	25.4	33.3
2022-08-10 19:50:35	0:00:19	28.0	36.0
2022-08-10 20:04:37	0:00:36	31.1	39.3
2022-08-10 20:06:35	0:00:30	23.6	30.3
2022-08-10 20:08:18	0:00:23	35.9	44.8
2022-08-10 20:10:01	0:00:33	40.3	49.9
2022-08-10 20:13:42	0:00:32	32.0	40.6
2022-08-10 20:16:50	0:00:24	34.2	42.8
2022-08-10 20:20:46	0:00:33	34.3	44.0
2022-08-10 20:23:35	0:00:25	31.9	37.6
2022-08-10 20:26:46	0:00:31	31.1	38.3
2022-08-10 20:29:51	0:00:24	33.9	40.6
2022-08-10 20:33:00	0:00:21	35.8	44.3
2022-08-10 20:39:48	0:00:41	30.5	37.3
2022-08-10 20:42:59	0:00:21	31.4	36.1
2022-08-10 20:45:28	0:00:36	31.9	39.8
2022-08-10 20:47:25	0:00:32	28.7	34.8
2022-08-10 20:50:36	0:00:44	30.7	38.9
2022-08-10 20:53:33	0:00:15	29.0	34.3
2022-08-10 20:57:47	0:00:29	32.1	40.3
2022-08-10 21:25:41	0:00:13	32.2	35.9
2022-08-10 21:28:05	0:00:41	27.2	31.4
2022-08-10 21:29:51	0:00:24	30.6	35.7
2022-08-10 21:31:36	0:00:29	27.2	32.5
2022-08-10 21:35:21	0:00:34	31.9	39.5
2022-08-10 21:42:18	0:00:37	28.9	36.7
2022-08-10 21:47:18	0:00:31	24.9	31.7
2022-08-10 21:56:02	0:00:34	25.5	33.9

2022-08-10 22:10:03	0:00:32	26.7	34.9
2022-08-10 22:11:56	0:00:18	22.0	25.6
2022-08-10 22:12:59	0:00:32	27.1	33.4
2022-08-10 22:16:58	0:00:13	22.5	25.8
2022-08-10 22:18:01	0:00:36	25.5	32.6
2022-08-10 22:54:49	0:00:38	26.6	33.5
2022-08-10 23:23:28	0:00:38	25.0	30.3
2022-08-10 23:44:49	0:01:23	26.8	36.5
2022-08-10 23:53:22	0:00:32	24.0	31.9
2022-08-10 23:56:10	0:00:09	22.6	28.2
2022-08-11 00:04:04	0:00:44	19.8	22.7
2022-08-11 00:17:34	0:00:22	19.4	23.1
2022-08-11 00:18:52	0:00:17	21.1	28.2
2022-08-11 00:21:02	0:00:24	19.8	24.8
2022-08-11 00:28:12	0:00:32	24.8	30.1
2022-08-11 01:23:27	0:00:23	18.6	19.2
2022-08-11 02:28:36	0:00:15	18.8	19.5
2022-08-11 04:14:46	0:00:16	23.6	29.3
2022-08-11 04:38:02	0:00:24	24.3	27.8
2022-08-11 04:41:49	0:00:19	22.8	26.6
2022-08-11 04:51:46	0:00:14	25.0	28.1
2022-08-11 05:31:26	0:01:16	25.2	31.8
2022-08-11 05:34:59	0:00:18	34.4	41.9
2022-08-11 05:45:46	0:01:29	28.8	35.7
2022-08-11 05:54:51	0:01:13	29.6	35.1
2022-08-11 05:57:18	0:01:20	28.3	36.2
2022-08-11 05:58:55	0:00:14	29.3	34.8
2022-08-11 06:00:37	0:01:12	28.6	36.1
2022-08-11 06:02:23	0:01:06	28.8	37.7
2022-08-11 06:08:30	0:01:11	25.7	32.0
2022-08-11 06:10:30	0:01:41	28.9	38.0
2022-08-11 06:19:41	0:01:02	29.5	34.1
2022-08-11 06:21:07	0:00:57	29.4	35.5
2022-08-11 06:23:32	0:01:12	30.3	38.7
2022-08-11 06:25:06	0:00:47	26.8	36.3
2022-08-11 06:26:38	0:01:00	30.5	36.8
2022-08-11 06:28:12	0:01:06	31.4	40.4
2022-08-11 06:29:52	0:00:21	29.5	34.2
2022-08-11 06:30:21	0:00:50	25.6	30.6
2022-08-11 06:31:44	0:00:59	33.8	44.6
2022-08-11 06:32:51	0:00:57	36.1	44.4
2022-08-11 06:35:08	0:01:04	31.1	37.5
2022-08-11 06:36:37	0:01:07	29.8	37.1
2022-08-11 06:38:02	0:00:59	30.4	35.4
2022-08-11 06:39:29	0:01:27	31.0	38.9
2022-08-11 06:42:08	0:00:18	32.7	37.7
2022-08-11 06:42:42	0:00:35	30.7	34.8

2022-08-11 06:43:35	0:00:27	32.9	38.0
2022-08-11 06:44:09	0:00:37	29.9	34.6
2022-08-11 06:45:04	0:01:11	32.2	37.9
2022-08-11 06:46:30	0:01:00	34.9	41.8
2022-08-11 06:48:43	0:01:56	32.2	38.6
2022-08-11 06:50:54	0:01:04	28.8	35.0
2022-08-11 06:52:27	0:01:54	30.1	36.0
2022-08-11 06:54:29	0:01:10	30.8	42.8
2022-08-11 06:55:47	0:02:19	29.9	36.6
2022-08-11 06:58:23	0:00:21	31.0	36.1
2022-08-11 07:00:08	0:00:33	28.9	31.6
2022-08-11 07:00:50	0:00:21	39.5	45.8
2022-08-11 07:02:03	0:11:27	29.2	38.0
2022-08-11 07:13:47	0:00:53	33.0	40.5
2022-08-11 07:14:45	0:01:07	31.2	34.8
2022-08-11 07:15:59	0:00:59	33.2	43.4
2022-08-11 07:19:59	0:01:59	30.6	36.4
2022-08-11 07:22:04	0:01:11	31.1	40.7
2022-08-11 07:23:24	0:00:42	26.1	31.8
2022-08-11 07:24:21	0:01:07	28.9	35.2
2022-08-11 07:25:51	0:00:52	28.5	36.1
2022-08-11 07:27:30	0:01:23	26.5	30.9
2022-08-11 07:31:57	0:00:49	28.7	36.2
2022-08-11 07:34:04	0:01:12	23.4	27.3
2022-08-11 07:35:44	0:00:53	28.9	35.1
2022-08-11 07:37:16	0:00:57	29.1	40.5
2022-08-11 07:41:04	0:00:53	29.3	36.7
2022-08-11 07:42:26	0:00:52	28.5	33.7
2022-08-11 07:43:32	0:00:47	25.5	30.6
2022-08-11 07:48:00	0:00:52	25.2	30.9
2022-08-11 07:53:02	0:01:01	27.8	35.9
2022-08-11 07:56:23	0:00:57	30.0	37.5
2022-08-11 07:57:47	0:00:51	29.9	39.1
2022-08-11 08:00:22	0:00:45	28.9	37.3
2022-08-11 08:01:44	0:00:57	29.9	37.9
2022-08-11 08:04:32	0:00:58	24.3	32.5
2022-08-11 08:06:02	0:00:45	28.8	34.3
2022-08-11 08:08:33	0:00:53	28.8	33.6
2022-08-11 08:09:59	0:00:37	31.4	37.9
2022-08-11 08:11:27	0:00:46	31.5	50.3
2022-08-11 08:12:48	0:00:41	26.9	32.4
2022-08-11 08:14:13	0:00:53	29.8	35.6
2022-08-11 08:15:34	0:00:58	30.5	38.2
2022-08-11 08:17:02	0:00:56	32.5	40.0
2022-08-11 08:20:35	0:00:59	28.8	35.6
2022-08-11 08:22:02	0:01:00	28.5	36.2
2022-08-11 08:24:59	0:01:05	31.1	38.9

2022-08-11 08:27:37	0:00:56	29.9	38.4
2022-08-11 08:30:29	0:01:02	28.5	37.3
2022-08-11 08:32:03	0:00:54	28.0	34.6
2022-08-11 08:41:11	0:00:54	29.0	36.5
2022-08-11 08:43:56	0:02:24	24.0	34.0
2022-08-11 08:47:14	0:01:10	20.8	25.7
2022-08-11 08:54:03	0:01:06	26.6	32.2
2022-08-11 08:56:58	0:01:16	27.7	38.1
2022-08-11 09:00:27	0:01:02	27.1	35.7
2022-08-11 09:03:15	0:00:49	28.7	41.6
2022-08-11 09:06:09	0:01:02	26.7	39.0
2022-08-11 09:08:39	0:01:01	28.0	36.4
2022-08-11 09:17:00	0:00:54	24.3	31.4
2022-08-11 09:19:40	0:01:12	26.1	33.8
2022-08-11 09:24:05	0:00:53	26.6	37.4
2022-08-11 09:28:28	0:01:11	23.9	34.6
2022-08-11 09:31:48	0:01:00	18.8	21.8
2022-08-11 09:35:24	0:01:03	27.1	36.2
2022-08-11 09:37:49	0:00:49	30.2	38.8
2022-08-11 09:38:45	0:01:05	19.6	21.4
2022-08-11 09:40:55	0:00:46	25.7	33.7
2022-08-11 09:45:15	0:00:40	25.8	30.2
2022-08-11 09:49:44	0:00:43	31.9	43.2
2022-08-11 10:00:27	0:01:21	27.7	37.3
2022-08-11 10:03:34	0:01:29	24.6	34.9
2022-08-11 10:05:31	0:00:56	29.4	43.7
2022-08-11 10:07:04	0:00:13	19.7	22.1
2022-08-11 10:11:37	0:01:12	27.2	41.0
2022-08-11 10:15:15	0:01:17	19.5	22.7
2022-08-11 10:19:47	0:01:02	23.4	31.8
2022-08-11 10:22:32	0:01:05	28.4	37.9
2022-08-11 10:29:46	0:01:01	27.5	38.3
2022-08-11 10:32:32	0:00:57	21.4	29.7
2022-08-11 10:34:59	0:01:05	25.1	35.5
2022-08-11 10:37:41	0:00:57	26.6	40.9
2022-08-11 10:39:47	0:01:17	28.7	40.7
2022-08-11 10:44:58	0:01:12	25.7	37.1
2022-08-11 10:47:22	0:01:00	26.9	38.2
2022-08-11 10:49:13	0:01:09	28.5	42.9
2022-08-11 10:51:47	0:01:05	28.5	37.9
2022-08-11 10:54:07	0:00:45	24.5	32.7
2022-08-11 10:54:55	0:01:10	20.8	25.4
2022-08-11 10:56:16	0:01:09	25.1	35.7
2022-08-11 10:57:49	0:00:45	22.3	30.8
2022-08-11 10:59:05	0:01:24	19.1	24.0
2022-08-11 11:02:09	0:01:44	25.7	36.9
2022-08-11 11:05:28	0:01:44	21.5	33.2

2022-08-11 11:12:21	0:01:22	25.5	35.1
2022-08-11 11:15:06	0:00:46	27.0	34.8
2022-08-11 11:18:38	0:00:47	19.4	28.9
2022-08-11 12:06:41	0:00:28	25.2	31.1
2022-08-11 12:08:09	0:00:27	24.5	32.2
2022-08-11 12:22:04	0:00:45	22.5	27.1
2022-08-11 12:30:38	0:00:35	22.4	30.8
2022-08-11 12:51:18	0:00:28	24.4	30.6
2022-08-11 13:04:05	0:01:55	23.5	33.6
2022-08-11 13:11:42	0:00:25	26.5	33.5
2022-08-11 13:30:59	0:00:28	27.3	34.9
2022-08-11 13:44:05	0:00:33	20.9	26.2
2022-08-11 14:45:50	0:00:41	24.9	29.7

The entire survey data is too large to append to this report. However, the full survey data set can be downloaded at the following link: https://www.iacoustics.net/house6_noisedata/

4. Appendix I – Equipment Calibration Certificates

4.1 Outdoor Meter

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	26 November 2021	CERTIFICATE NUMBER	2021-1139
DATE OF CALIBRATION	25 November 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 1	

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TEST ENGINEER
Jamie Bishop

APPROVING SIGNATORY
Greg Rice

Equipment **NTi XL2, s/n: a2a-06528-e0**
Description Acoustic Analyser, NTi Audio

Customer iAcoustics
Unit A16, Kingswood Business Park, Clondalkin, Dublin, D22 A990

Standards
BS EN 61672

Conditions

Atmospheric Pressure	101.0 kPa
Temperature	22.0 °C
Relative Humidity	34.5 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	06-Aug-20	HP 34401	3146A16728	30-Mar-21
Vaisala HMP23	S2430007	03-Aug-20			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.

Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972
Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.

4.2 Indoor Meter

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	19 February 2021	CERTIFICATE NUMBER	2021-0302
DATE OF CALIBRATION	19 February 2021		
CALIBRATION INTERVAL	24 months		PAGE 1 OF 1

Gracey & Associates
Barn Court Shelton Road
Upper Dean PE28 0NQ
Tel: 01234 708835
Fax: 01234 252332
www.gracey.com

TEST ENGINEER	APPROVING SIGNATORY
Greg Rice	Greg Rice

Equipment	**NTi XL2, s/n: a2a-12398-e0**
Description	Hand Held Acoustic Analyser - Class 1, NTi Audio
Customer	iAcoustics Unit A16, Kingswood Business Park, Clondalkin, D22 A990

Standards
IEC 61672 Class 1

Conditions

Atmospheric Pressure	99.9 kPa
Temperature	24.8 °C
Relative Humidity	34.6 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	06-Aug-20	HP 34401	3146A29376	11-Feb-20
Vaisala HMP23	S2430007	03-Aug-20			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection. The uncertainties are for a confidence probability of not less than 95%.

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4.3 Outdoor Microphone / Preamplifier

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230** **Measurement Microphone**
  consisting of
  PreAmp Serial Number: **6471**
  Capsule Serial Number: **A22043**

- Customer: **Integrated Acoustic Solution**
  Kingwood Business Park
  Baldonell, Dublin
  Ireland

- Date of Calibration: **08 March 2022**

- Certificate Number: **44628-A22043-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: B.Dohmen

Signature:

Stamp: NTi Audio GmbH Frielingsdorfweg 4 45239 Essen info@nti-audio.de +49 (0)201 6470 1900

NTi Audio GmbH • Frielingsdorfweg 4 • 45239 Essen • Tel: +49 (0)201 6470 1900
www.nti-audio.de • info@nti-audio.de

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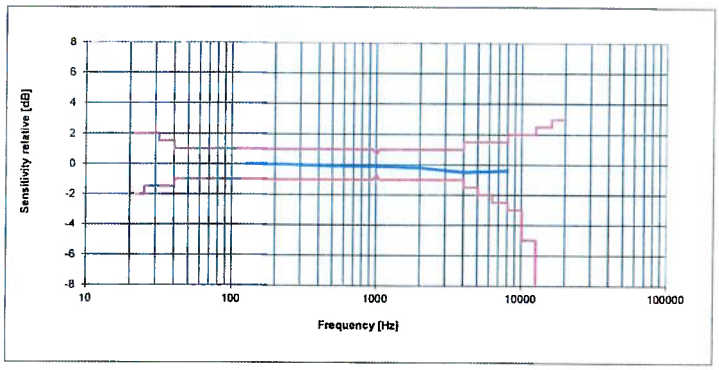
Date: 08 March 2022
Calibration of: M2230 consisting of
PreAmp Serial Number: 6471
Capsule Serial Number: A22043

- Peformance on receipt: **defect**
- Detailed Calibration Test Results:

System calibration	before	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	41,4 mv/Pa	**45,2 mV/Pa**	±2.85%
Frequency response	Class 1	acc. IEC 61672	



- Test Conditions:

Temperature:	**23,9 °C**	±0.5 °C
Relative Humidity:	**27,4%**	±2%
Air Pressure:	**1008,9 hPa**	±0.25 kPa

- Calibration Equipment Used:
  - MTG Sound Calibrator, Type 4000, S/No. 32519
    Last Calibration: 09.09.2021, Next Calibration: 09.09.2022
    Kalibrierschein D-K-15008-01-00 2021-09
  - NTi Audio Microphone M2230, S/No. 10485
    Last Calibration: 21.12.2021, Next Calibration: 21.12.2022
    Calibrated by NTi Audio meeting product specifications
  - NTi Audio Flexus FX 100, SN 11347
    Last Calibration: 03.09.2021, Next Calibration: 03.09.2022
    Calibrated by NTi Audio meeting product specifications
  - NTi Audio XL2, S/No. A2A-14907-E0

[1] The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

NTi Audio GmbH • Frielingsdorfweg 4 • 45239 Essen • Tel: +49 (0)201 6470 1900
www.nti-audio.de • info@nti-audio.de

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4.4 Indoor Microphone / Preamplifier

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	19 February 2021	CERTIFICATE NUMBER	2021-0303
DATE OF CALIBRATION	19 February 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 2	

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Barn Court Shelton Road
Upper Dean PE28 0NQ
Tel: 01234 708835
Fax: 01234 252332
www.gracey.com

TEST ENGINEER	APPROVING SIGNATORY
Greg Rice	Greg Rice

Equipment	**NTi MC230, s/n: A14300**
Description	Microphone - 1/2" FF 48V, NTi Audio
Customer	iAcoustics
	Unit A16, Kingswood Business Park, Clondalkin, D22 A990

Standards
BS EN 61672 Class 1

Conditions

Atmospheric Pressure	99.9 kPa
Temperature	24.8 °C
Relative Humidity	34.6 %

Calibration Data

Sensitivity -27.44 dB

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
B&K 4134 L	1675305	14-Jul-20	Druck DPI 141	479	06-Aug-20
HP 34401	3146A29376	11-Feb-20	Nor 1253	20848	14-Jul-20
Stanford DS36	33213	17-Aug-20	Vaisala HMP23	S2430007	03-Aug-20

Notes
We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.

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CERTIFICATE OF CONFORMANCE

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	19 February 2021	CERTIFICATE NUMBER	2021-0304
DATE OF CALIBRATION	19 February 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 1	

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Barn Court Shelton Road
Upper Dean PE28 0NQ
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Fax: 01234 252332
www.gracey.com

TEST ENGINEER	APPROVING SIGNATORY
Greg Rice	Greg Rice

Equipment	**NTi MA220, s/n: 6337**
Description	Preamplifier - XL2, NTi Audio
Customer	iAcoustics Unit A16, Kingswood Business Park, Clondalkin, D22 A990

Standards
Manufacturer's Original Specifications

Conditions

Atmospheric Pressure	99.9 kPa
Temperature	24.8 °C
Relative Humidity	34.6 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	06-Aug-20	HP 34401	3146A29376	11-Feb-20
Vaisala HMP23	S2430007	03-Aug-20			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.

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Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.

4.5 Calibrator

Unit 2, Goldenbridge Industrial Estate, Tyrconnell Rd, Inchicore, Dublin, D08 YY38
www.sonitussystems.com Email: info@sonitussystems.com

SONITUS SYSTEMS

Calibration Report

Equipment Information

Model: CAL01
Serial Number: 11756

Ambient Conditions

Measurement conditions were within the tolerances defined in BS EN 60942.

Barometric Pressure: 1030 hPa
Temperature: 21.0 °C
Relative Humidity: 49 %

Results

Calibrator Setting	Measured Parameter	Measured Value	Tolerance +/-	Uncertainty +/-
94 dB, 1kHz	Sound pressure level (dB)	94.26	0.4 dB	0.14 dB
	Frequency (Hz)	1000.06	10 Hz	0.25 Hz
	Distortion (%)	0.20	3.0 %	0.3 %
114 dB, 1kHz	Sound pressure level (dB)	114.20	0.4 dB	0.14 dB
	Frequency (Hz)	1000.06	10 Hz	0.25 Hz
	Distortion (%)	0.35	3.0 %	0.3 %

RESULT: PASS

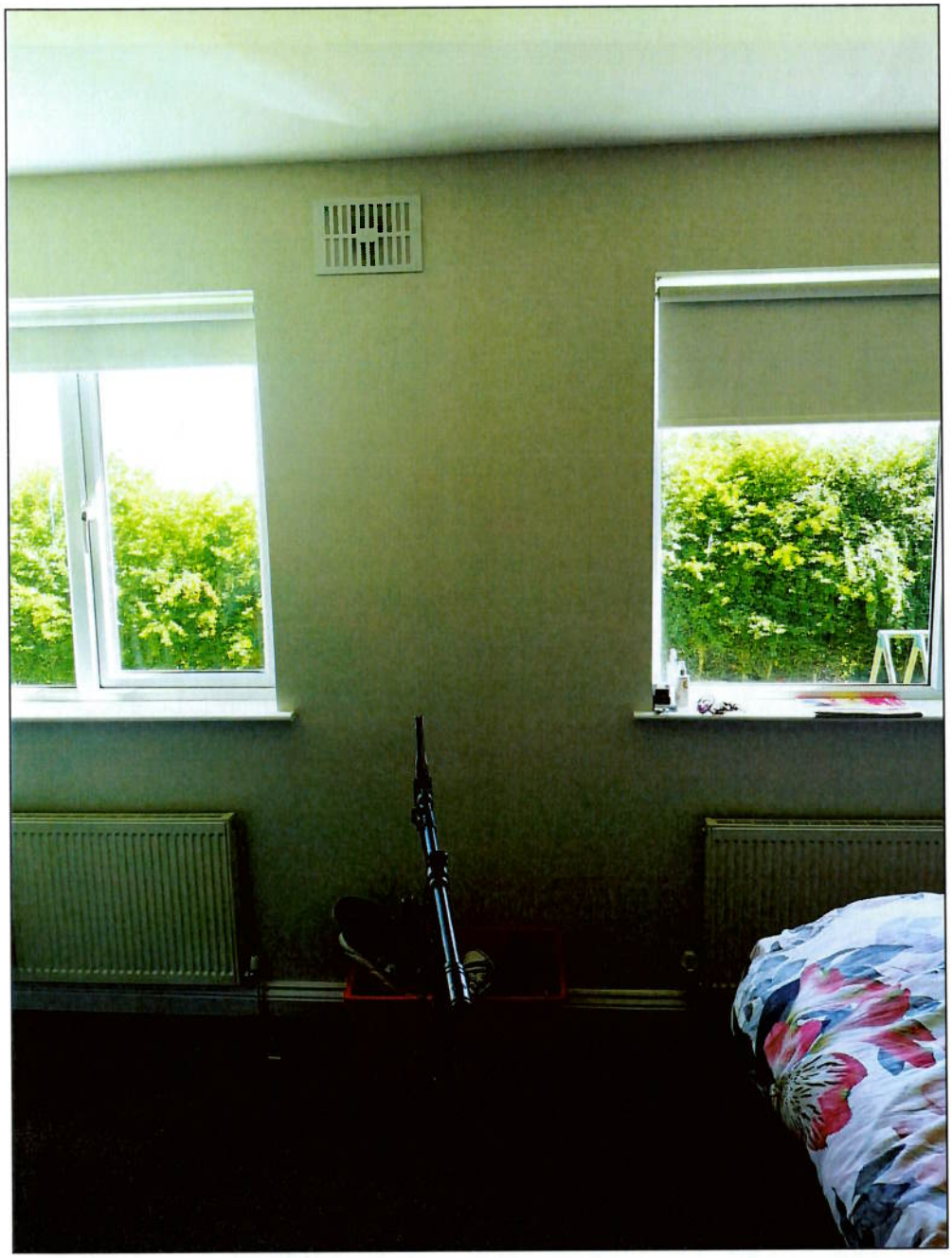
As public evidence was available, from a testing organization responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003

The manufacturers guidelines concerning free-field correction should be obvserved when using the calibrator.

Notes
1. All measurements were made with the half-inch configuration of the calibrator in place.
2. The measurement uncertainty is reported as a standard uncertainty multiplied by a coverage factor k=2 which, for a normal probabbility distribution, corresponds to a coverage probability of approximately 95%.
3. The given uncertainty corresponds to measured values only and does not relate to the long term stability of the device under test.
4. The user manual for the device under test was obtained from the manufacturer's website.

DA315.2 Acoustic Calibrator Calibration Certificate 2

5. Appendix II – Noise Monitor Photographs



Appendix F

WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Technical Note

Project:	Ballystrahan, Saint Margarets, Dublin	**Title:**	Noise Assessment
Job Number:	WDA230104	**Prepared By:**	Wil Oshoke
Date:	11/12/2023	**Reviewed By:**	Sean Rocks
Reference:	WDA230104TN_13_B_01	**Client:**	Pearse Sutton

1 Introduction

Following the commencement of operations of the new Dublin Airport North Runway, Wave Dynamics were engaged by Pearse Sutton to assess the noise levels from aircraft flyovers using long-term (92 Day) noise monitoring at Ballystrahan, Saint Margarets, Dublin, K67 KN88.

The objective of the assessment was to quantify the existing noise environment and the current noise levels from aircraft noise during the operation of the North Runway. The measured noise levels have been compared with the predicted noise levels from the DAA noise contours and industry criteria.

1.1 Statement of Competence

This assessment and report were completed by Wil Oshoke, Principal Consultant with Wave Dynamics, who has extensive experience assessing noise impact. His qualifications include a PhD in Acoustics (Dublin City University – School of Electronic Engineering). Wil is a member of Engineers Ireland (MIEI), a Corporate member of the Institute of Acoustics (MIOA), and a Chartered Engineer (CEng) with the UK Engineering Council Via the Institute of Acoustics.

The assessment and report were peer-reviewed by Sean Rocks, Director | Senior Consultant; Sean has experience with aircraft noise, particularly for planning and complaints investigation. Sean's qualifications include a BEng (Hons) in Mechanical and Manufacturing Engineering, a Diploma in Acoustics and Noise Control (Institute of Acoustics), an IOA Certificate of Competence in Environmental Noise Measurement and SITRI certified sound insulation tester. Sean is a member of both Engineers Ireland and the Institute of Acoustics.

This project was led by James Cousins, Managing Director | Principal Consultant with Wave Dynamics who has extensive experience in assessing noise and vibration from road and rail infrastructure on commercial and residential developments. James is an experienced consultant. His qualifications include; BSc (Hons) in Construction Management and Engineering, Pg Cert in Construction Law and Diploma in Acoustics and Noise Control (Institute of Acoustics) and an IOA Competence Cert in Building Acoustic Measurements. James is a member of both Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA) and is the current SITRI Chairman.

2 Baseline Noise Survey

Attended and unattended noise surveys were undertaken to quantify the noise levels from aircraft flyovers at the residence of Pearse Sutton K67 KN88. The attended noise measurements were conducted from 16:55hrs to 19:35hrs on the 12th of September 2023 and 12:50hrs to 13:50hrs on the 14th of September 2023. The unattended noise measurements were taken continuously from 00:00hrs on the 14th of June 2023 to 20:00hrs on 17/09/2023. Sound exposure level measurements were taken for aircraft flyovers during the attended survey.

2.1.1 Site Description and Measurement Locations

The site is on the R122 in Ballystrahan, Saint Margarets, Dublin, as shown in Figure 1 below. The area is mainly agricultural, with sporadic residential dwellings and commercial properties. Dublin Airport is located to the residence's southeast, approximately 1.2 km from the edge of the new North Runway.

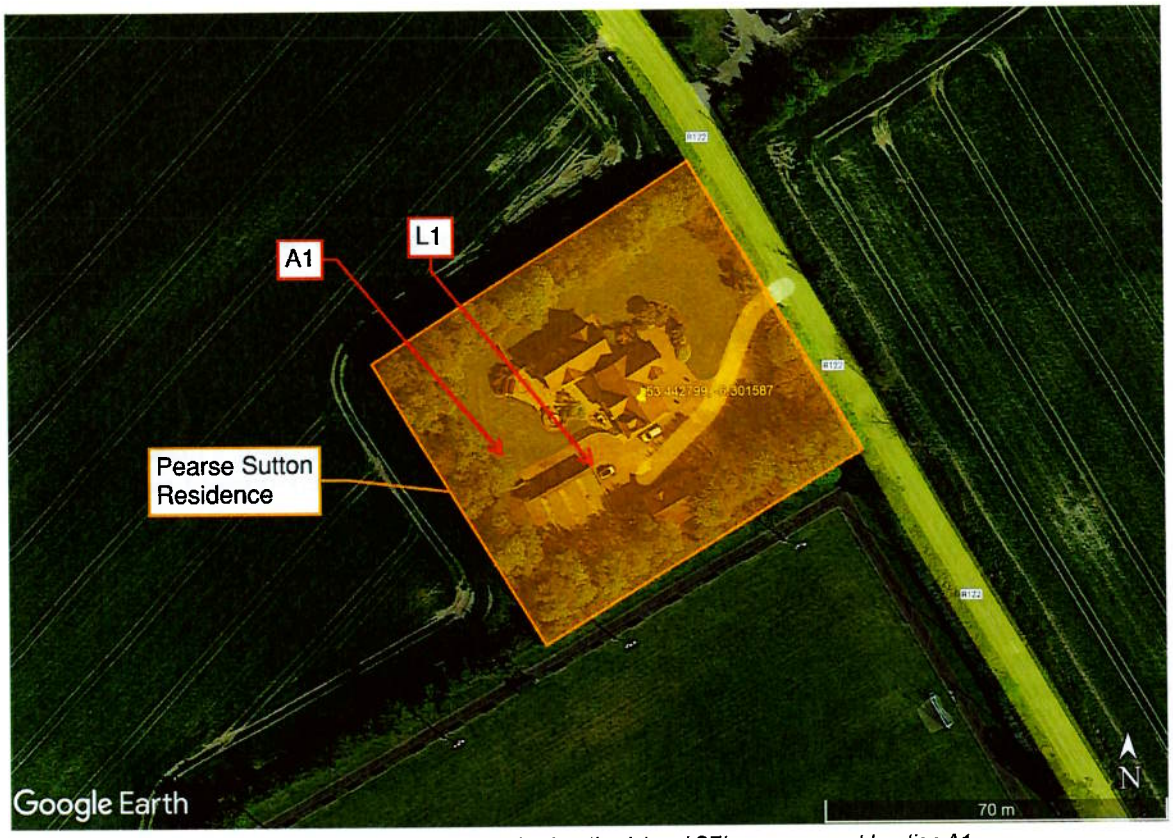


Figure 1: Site location and monitoring location L1 and SEL measurement location A1.

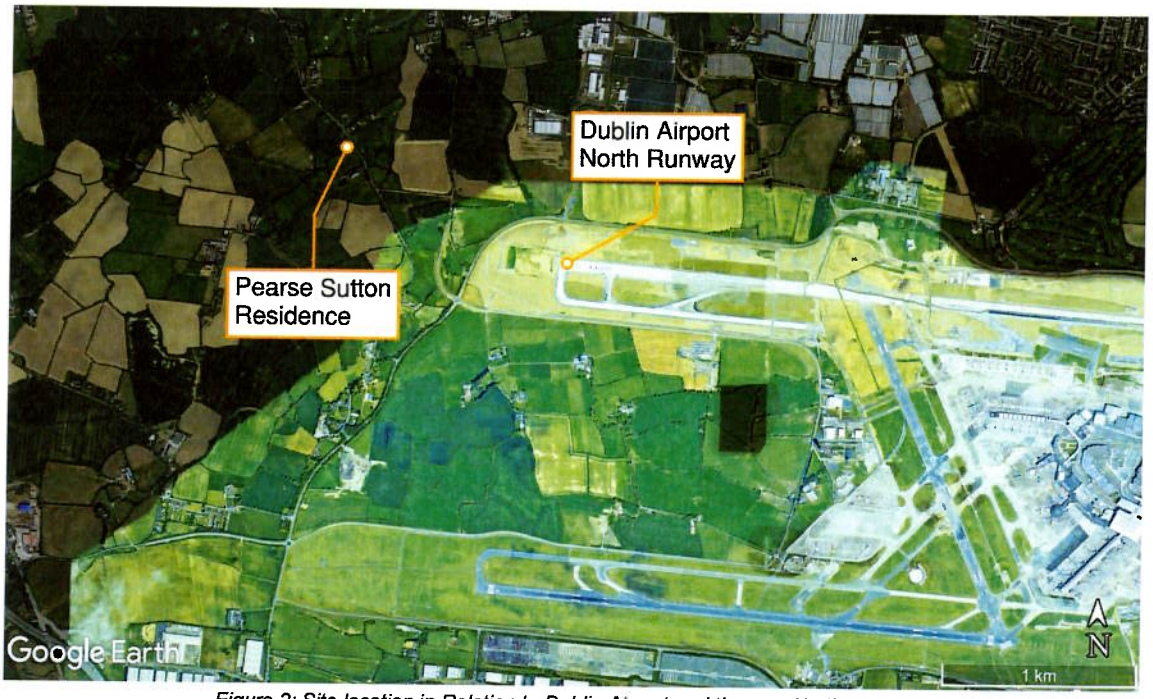


Figure 2: Site location in Relation to Dublin Airport and the new North Runway.

Unattended Noise Measurements

An unattended noise logger was deployed in location L1, as per Figure 1, to the rear garden of the residence. The logger was calibrated before and after the measurements, and no significant drift was noted. The logger was deployed at a height of approximately 4 m above the ground.

On review of the measurement data by WDA, days of unsuitable weather conditions had a negligible effect on the daily $L_{Aeq,16hour}$ values and $L_{Asmax,1min}$ measurements. It should be noted that the monitor stopped recording from 16:12hrs on 25 June to 22:03hrs on 26th June 2023. One night (night starting 18th of August) was affected by extraneous noise which has been filtered.

Figure 3: Noise Logger Setup

2.1.2 Survey Period

Based on the data review, the measurements commenced at 00:00hrs on Wednesday, the 14th of June 2023 and finished at 20:00hrs on Sunday, the 17th of September 2023. The measurement duration was set to 1-minute intervals. It is understood that the North Runway was operational throughout the measurement period, initially between 09:00hrs and 20:00hrs until 4 July 2023, after which the operating hours of the North Runway were 07:00hrs to 23:00hrs.

The measurement period was set in line with Dublin Airport's busiest 92-day period, 16th of June to 15th of September, around which the DAA contour maps are developed. Many of the Dublin Airport planning conditions have been set based on the predictions of noise levels over this 92-day period such as the home insulation scheme. The unattended noise monitoring undertaken allows for direct comparison of the measured noise levels to the DAA noise contour maps.

2.1.3 Noise Measurement Equipment

A Class 1 sound level meter/noise logger, in general accordance with IEC 61672-1:2013, was used for the attended measurements. Table 1 below summarises the measurement equipment used.

Table 1: Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM4	Nti XL2-TA	A2A-23316-E1	UK-23-100	01/09/2025
Calibrator	CAL1	Nor 1251	31056	AC230226	16/10/2024
Noise Monitor	-	EM2030-AO	01639	2201639	16/02/2024
Calibrator	Cal 2	Cirrus	99866	183284	16/11/2023

2.1.4 Subjective Noise Environment

Based on the information provided during the attended noise survey and logger deployment, the following noise sources were identified:

- Aircraft Noise from Aircraft Fly Overs.
- Road noise from the R122
- Birdsong
- Occasional activity from residents (cars arriving/departing, voices, etc.)

2.2 Noise Measurement Results

This section outlines the results of the attended noise survey.

Unattended Monitoring Results

Table 4 in Appendix C of this report outlines the results of the noise levels recorded at the noise monitoring location L1 over the full monitoring period averaged over the following periods:

- $L_{Aeq,16hour}$ 07:00 – 23:00
- $L_{Aeq,8hour}$ 23:00 – 07:00

Figure 4 below highlights each of the daytime $L_{Aeq,16hour}$ values and the number of times they occur over the full 92-day monitoring period. The graph indicates a significant modal value of 70 dBA with a total of 24 occurrences, with the next highest value at 69 dBA (23 occurrences).

Based on the daily $L_{Aeq,16hour}$ measurements undertaken at the Pearse Sutton residence as shown in Figure 4, the logarithmically averaged $L_{Aeq,16hour}$ for the full 92-day period is 68dBA.

A full breakdown of all the unattended measurement results is available on request.

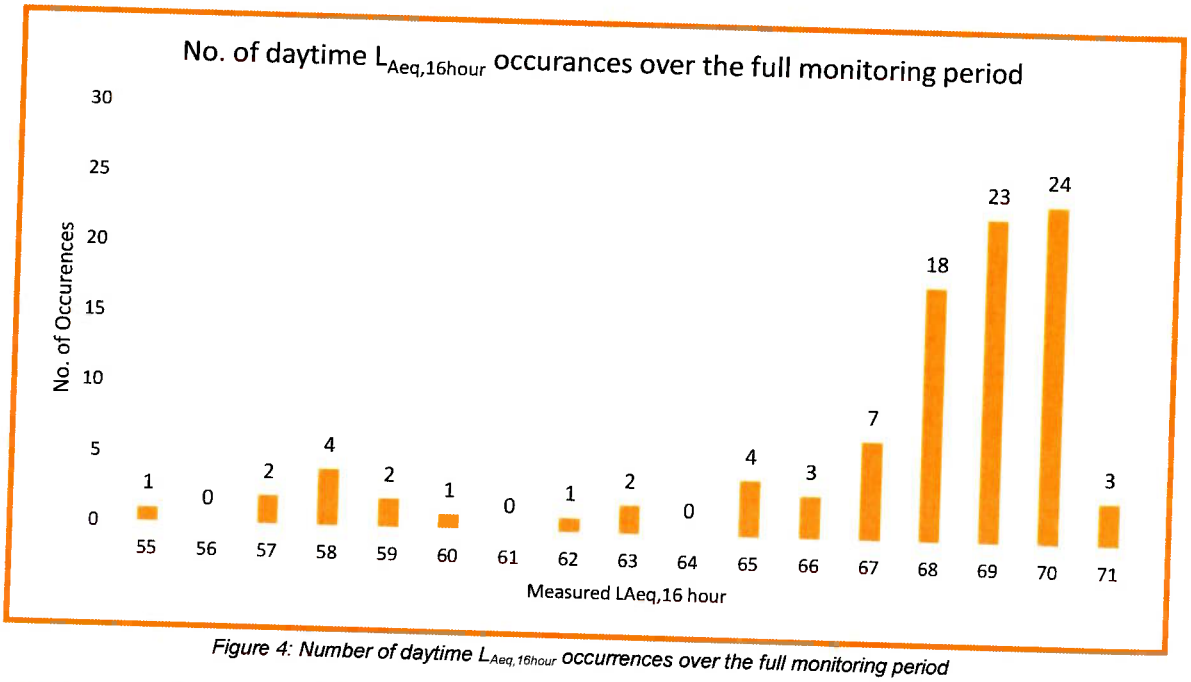


Figure 4: Number of daytime $L_{Aeq,16hour}$ occurrences over the full monitoring period

Attended Monitoring Results

Table 2 outlines the results of the attended measurements for aircraft flyover noise levels at location A1. The flyover sound exposure levels have been calculated from the measured L_{Aeq} levels.

The sound exposure level (SEL) from aircraft flyovers has been calculated using the following equation to allow direct comparison of the measured levels with the DAA predicted SEL contour maps:

$$L_{AX} = LAeq + 10*\log_{10}(d1/d2) - 10*\log_{10}(N) + 10*\log_{10}(T)$$

Where:

L_{Ax} measured SEL
N number of vehicle movements
T time (seconds)
d1 distance from the source to the receiver
d2 distance from the source to the measurement

Table 2: Aircraft Flyover Noise Levels

Measurement				Aircraft Type	Measured Noise Levels		Sound Exposure Level
Location	Date	Time (hrs)	Duration (sec)		L_{Aeq} dB	L_{AFmax} dB	L_{Ax} dB
A1	12/09/2023	17:00	32	Airbus A330-302	84	92	99
A1	12/09/2023	17:02	24	Embraer E190SR	75	81	88
A1	12/09/2023	17:04	26	Boeing 737-8AS	76	84	91

WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Measurement				Aircraft Type	Measured Noise Levels		Sound Exposure Level
Location	Date	Time (hrs)	Duration (sec)		L_{Aeq} dB	L_{AFmax} dB	L_{Ax} dB
A1	12/09/2023	17:08	25	Airbus A320-232	73	78	86
A1	12/09/2023	17:10	34	Airbus A330-302	78	86	93
A1	12/09/2023	17:12	27	Airbus A330-302	83	91	97
A1	12/09/2023	17:18	31	Airbus A320-214	78	86	92
A1	12/09/2023	17:19	26	Boeing 737 MAX 8-200	73	79	87
A1	12/09/2023	17:23	31	Mitsubishi CRS-2COER	65	72	80
A1	12/09/2023	17:25	36	Boeing 737-8AS	76	83	92
A1	12/09/2023	17:26	24	Airbus A321	74	79	88
A1	12/09/2023	17:28	29	Airbus A320-214	76	83	91
A1	12/09/2023	17:33	31	Airbus A320-214	78	84	93
A1	12/09/2023	17:34	30	Airbus A320-214	77	83	92
A1	12/09/2023	17:36	30	ATR 72-600	65	72	80
A1	12/09/2023	17:38	26	Boeing 737 MAX 8-200	71	77	85
A1	12/09/2023	18:45	28	Airbus A320-231	77	83	91
A1	12/09/2023	18:46	32	Boeing 767	75	80	90
A1	12/09/2023	18:59	31	Boeing 737-800	75	82	90
A1	12/09/2023	19:02	25	Boeing 737-8200	70	76	84
A1	12/09/2023	19:04	40	Boeing 737-8AS	76	83	92
A1	12/09/2023	19:05	33	Airbus A320	77	83	92
A1	12/09/2023	19:07	29	Aerospotiale	64	68	79
A1	12/09/2023	19:08	33	Airbus A320	78	83	93
A1	12/09/2023	19:11	43	Boeing 737-8AS	76	83	92
A1	12/09/2023	19:13	32	Aerospotiale	65	70	80
A1	12/09/2023	19:14	42	Airbus A320	75	82	91
A1	12/09/2023	19:19	35	Airbus A320-214	77	82	92
A1	12/09/2023	19:23	43	Embraer 190-100IR	74	82	90
A1	12/09/2023	19:27	31	Boeing 737-8	69	77	84

Measurement				Aircraft Type	Measured Noise Levels		Sound Exposure Level
Location	Date	Time (hrs)	Duration (sec)		L_{Aeq} dB	L_{AFmax} dB	L_{Ax} dB
A1	12/09/2023	19:31	33	Embraer 190	75	82	90
A1	14/09/2023	19:34	31	Boeing 737-8AS	78	86	93
A1	14/09/2023	12:54	34	Boeing 737-8AS	77	84	92
A1	14/09/2023	12:56	30	ATR 72-600	66	73	81
A1	14/09/2023	12:59	32	Airbus A220-300	71	79	86
A1	14/09/2023	13:00	30	Airbus A220-214	77	84	92
A1	14/09/2023	13:02	29	Airbus A220-300	74	83	88
A1	14/09/2023	13:04	32	Boeing 737 MAX 8-200	72	79	87
A1	14/09/2023	13:06	34	Airbus A320-214	75	83	90
A1	14/09/2023	13:08	33	Airbus A321-253NX	74	81	90
A1	14/09/2023	13:10	22	Airbus A320-232	76	82	90
A1	14/09/2023	13:12	22	Boeing 737 MAX 8-200	73	78	86
A1	14/09/2023	13:16	35	Golfstream G550	74	83	89
A1	14/09/2023	13:17	32	Boeing 737 MAX 8-200	70	76	85
A1	14/09/2023	13:20	27	Boeing 737 MAX 8-200	71	78	85
A1	14/09/2023	13:22	33	Dassault Falcon 2000 EK	74	82	89
A1	14/09/2023	13:23	34	ATR 72-600	66	72	81
A1	14/09/2023	13:35	36	Airbus A320-214	76	84	91
A1	14/09/2023	13:37	40	Airbus A320-214	77	86	93
A1	14/09/2023	13:39	33	Airbus A321-27INK	75	83	90
A1	14/09/2023	13:40	40	Boeing 767-332(ER)	79	87	95

1. SELs calculated on the rounded L_{Aeq} values measured.

3 Analysis of Results

3.1 $L_{Aeq,16hr}$ Noise Levels

The most recently predicted noise contours for the North Runway operation as per the 2007 planning permission are the compliance contours submitted to Fingal County Council in 2016. Here, the predicted $L_{Aeq,16hour}$ (07:00hrs to 23:00 hrs) noise contours for Dublin Airport with the North Runway operational can be seen in Figure 5. The noise contours are developed by DAA based on the busiest 92-day period of the year for the airport, 16th June to 15th September.

Based on the DAA contour maps, Pearse Sutton's residence is on the 63dB predicted contour. From the results of the unattended noise monitoring outlined in Table 4 (see Appendix C), the corresponding $L_{Aeq,16hour}$ averaged over the same 92-day period as the DAA contour maps are 68dB with a modal value of 70dBA. This demonstrates that the measured levels at the residence exceed the predicted levels by 5dB when compared to the 92-day monitoring period on which the contours are based.

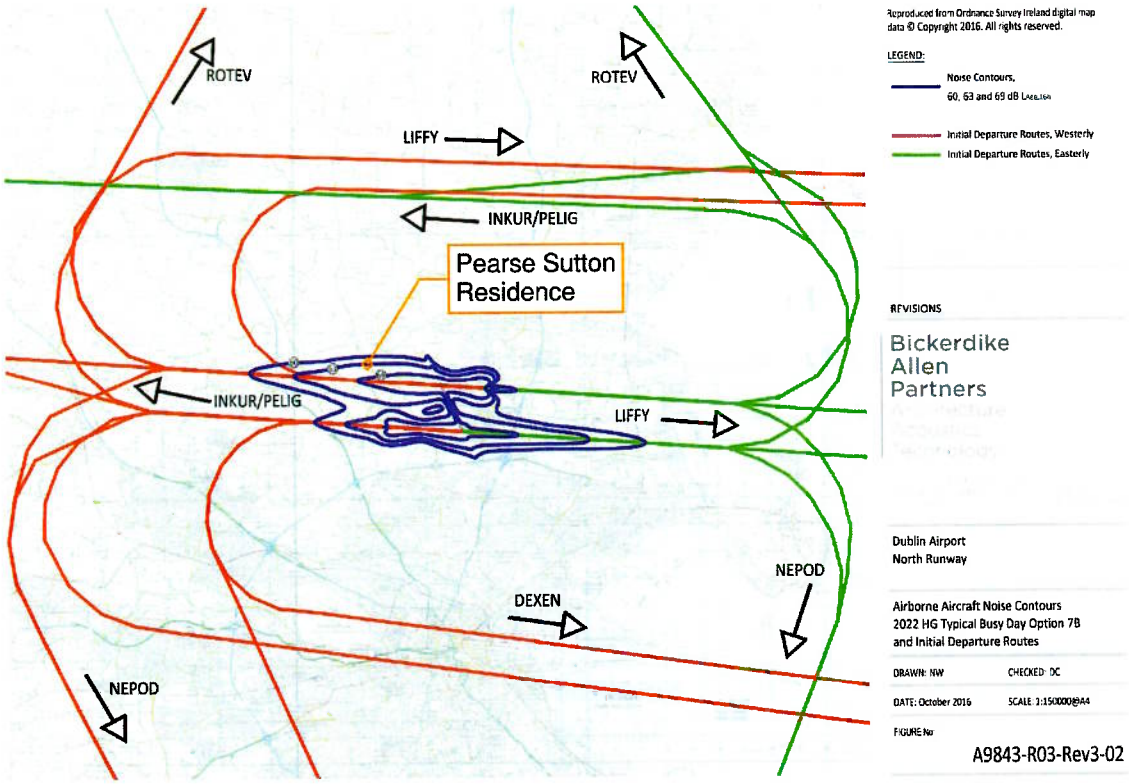


Figure 5: Predicted $L_{Aeq,16hour}$ (07:00 – 23:00) airport noise contours with North Runway in operation.

Noise contour maps presented in the most recently submitted EIAR supplement by DAA provided to ABP place Pearse Sutton's dwelling in the 63-65dB $L_{Aeq,16hr}$ contour for the 2025-year scenario. Given that the measurements during the summer of 2023 find noise levels are 68dB $L_{Aeq,16hr}$ it would indicate that the predicted noise contours from the aircraft flyovers do not match the actual measured values. This would place doubts on the accuracy of the predicted DAA contours when compared to real live measured data.

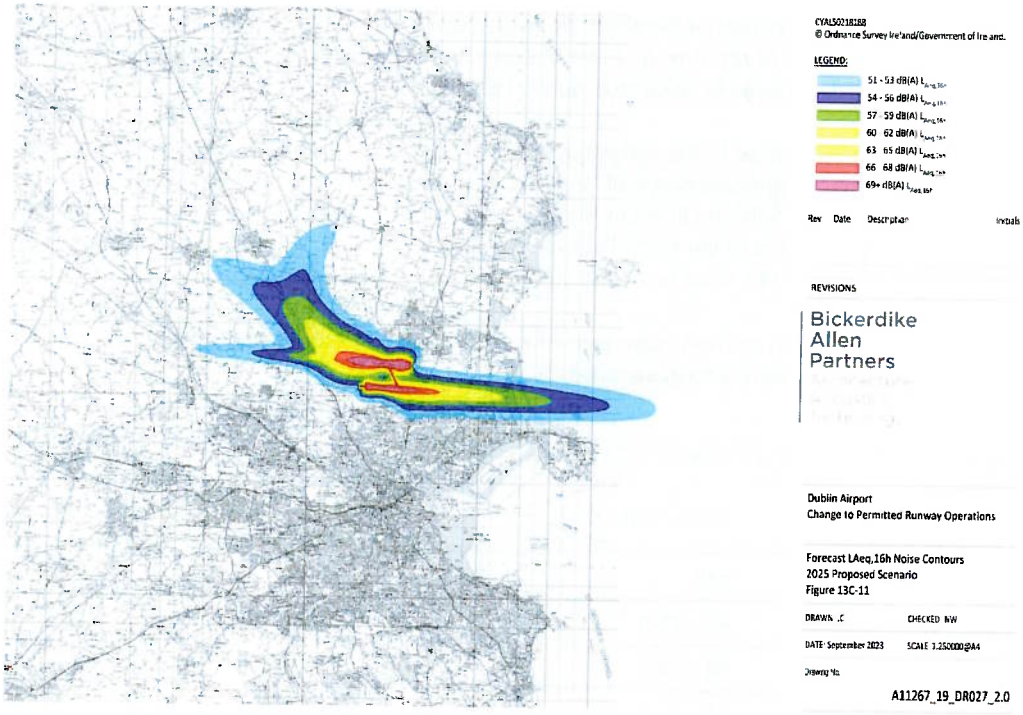


Figure 6: DAA predicted LAeq,16hour (07:00 - 23:00) airport noise contours for 2025.

3.2 L_{night} Noise Levels

As discussed the measured L_{night} noise levels at Pearse Sutton's property is relatively low often in the range of 47 to 50dB L_{night}. The proposed Relevant Action application will see an increase in night noise at the property. In the year 2025 the L_{night} noise levels with the proposed development in place will result in noise levels increasing to be of the order of 60 to 64dB L_{night}.

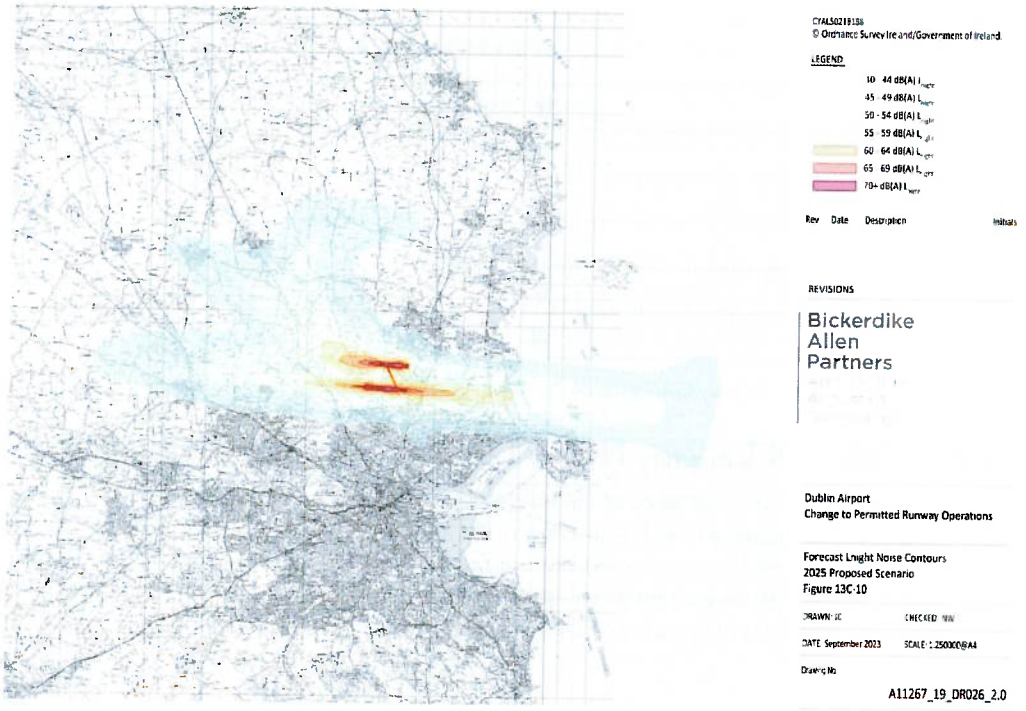


Figure 7: DAA predicted L_{night} airport noise contours for 2025.

To establish the aircraft noise impact of the North Runway, Tables 13-2 and 13-3 (shown below in Figure 8 and Figure 9) of the *Dublin Airport North Runway EIAR Volume 2 – Main Report* can be used to determine both the absolute noise level and the change in noise level due to the North Runway operations.

Based on the predicted L_{night} noise at the residence with the proposed development in place, as outlined in this section, an air noise impact scale description of "Very High" is appropriate for L_{night}. Pairing this with a change in the noise level of greater than 9dB due to North Runway operations to give a relative noise impact scale of "Very High" the magnitude of the effect of the North Runway can be described as "Profound" as per Table 13-4 of the *Dublin Airport North Runway EIAR Volume 2 – Main Report*.

Given the discrepancy between daytime noise levels measured versus contours predicted by DAA it is likely that the L_{night} noise impact here is being underestimated.

Table 13-2: Air Noise Impact Criteria (absolute) – residential

Scale Description	Annual dB Lden	Annual dB Lnight
Negligible	<45	<40
Very Low	45 – 49.9	40 – 44.9
Low	50 – 54.9	45 – 49.9
Medium	55 – 64.9	50 – 54.9
High	65 – 69.9	55 – 59.9
Very High	≥70	≥60

Figure 8: Dublin Airport North Runway EIAR Volume 2 – Main Report Table 13-2: Air Noise Impact Criteria (absolute).

Table 13-3: Air Noise Impact Criteria (relative)

Scale Description	Change in noise level, dB(A)
Negligible	0 – 0.9
Very Low	1 – 1-9
Low	2 – 2.9
Medium	3 – 5.9
High	6 – 8.9
Very High	≥9

Figure 9: Dublin Airport North Runway EIAR Volume 2 – Main Report Table 13-3: Air Noise Impact Criteria (relative).

3.3 Calculation of $L_{Aeq,16hr}$ Noise Levels from SEL Measurements

Based on the SEL measurements undertaken at the residence in combination with the information submitted by DAA to ANCA as part of the response to ANCA's review of the 2022 airport noise emission outlining the number of flights per aircraft type (included in Appendix B) the $L_{Aeq,16hr}$ noise levels at the residence can be calculated to be compared with the unattended measurement results to confirm validity. The noise level for each aircraft type can be calculated using the following formula and then logarithmically added to predict the daily $L_{Aeq,16hour}$ level as follows:

$$LAeq = L_{AX} - 10*\log_{10}(d1/d2) + 10*\log_{10}(N) - 10*\log_{10}(T)$$

Where:

L_{Ax} measured SEL
N number of vehicle movements
T time (seconds)
d1 distance from the source to the receiver
d2 distance from the source to the measurement

A correction was then applied to the results to account for days of Easterly winds which totalled 12 days over the 92-day duration. Based on the above calculation and the recorded SEL for each aircraft type outlined in Table 2 the predicted $L_{Aeq,16hour}$ during the 92-day summer period in 2023 is 67dB(A).

This shows good agreement with the typical $L_{Aeq,16hour}$ measured over the full 92-day period of 68dB(A). Both the predicted $L_{Aeq,16hour}$ calculated from the attended measurements and the measured $L_{Aeq,16hour}$ exceed the DAA predicted 92-day contour map level at the residence which predicted that Pearse Sutton's residence was on the 63 dBA $L_{Aeq,16hour}$ contour for aircraft noise exposure.

3.4 Comparison of SEL Noise Levels

Sound exposure level (SEL) contours have been predicted by the DAA and their acoustic consultants Bickerdike Allen in relation to the noise abatement departure procedures (NADP) for the North Runway for the most common aircraft types:

- Boeing 737-800
- Airbus A320
- Airbus A330

The predicted SEL contours are shown for the above-referenced plane types in Figure 10, Figure 11 and Figure 12 below, respectively.

For the DAA predicted SEL contours for the Boeing 737-800, as shown in Figure 10 below, Pearse Sutton's residence currently lies outside the 90dB(A) contour. Based on the recorded noise levels at the residence and calculated SELs as outlined in Table 2, the sound exposure level ranged from 84 – 93 dB(A) for the Boeing 737-8AS with a logarithmical average SEL of 91dB(A) and 84 – 90 dB(A) for the Boeing 737-8200. This highlights a exceedance of the predicted SEL noise levels for the Boeing 8AS.

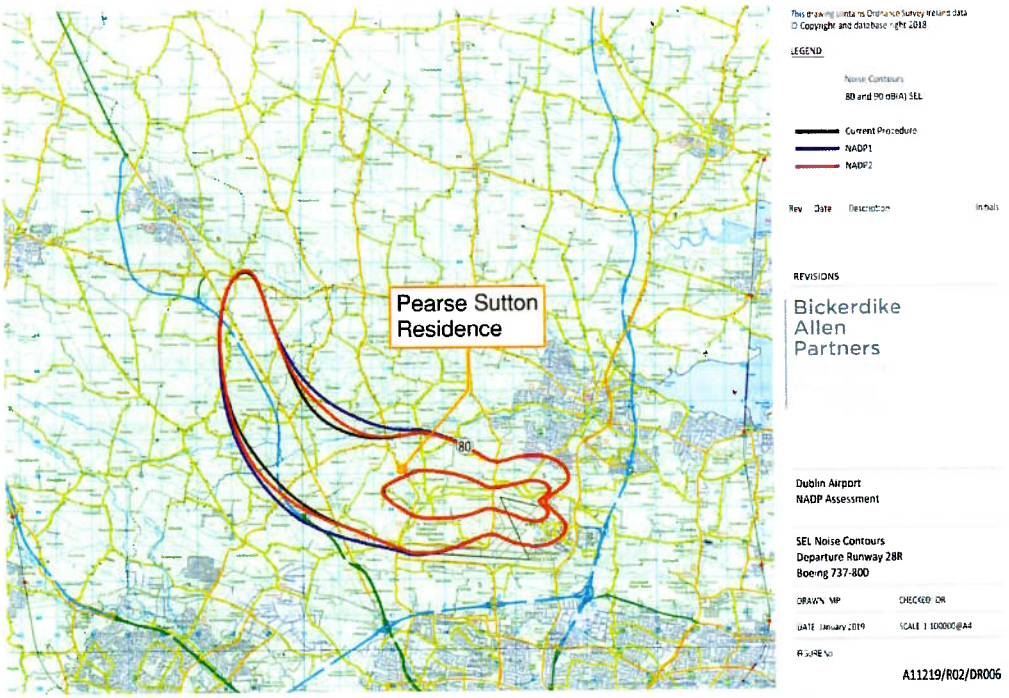


Figure 10: Predicted Sound Exposure Level noise contours for Airbus A320 for North Runway operation.

For the DAA predicted SEL contours for the Airbus A320, as shown in Figure 11 below, Pearse Sutton's residence currently inside the 80dB(A) contour for all departure procedures. Based on the recorded noise levels at the residence and calculated SELs as outlined in Table 2, the sound exposure level ranged from 86 – 93 dB(A) for the Airbus A320 with a logarithmical average SEL of 92dB(A). This highlights a significant exceedance of the predicted SEL noise levels approximately 7dB(A).

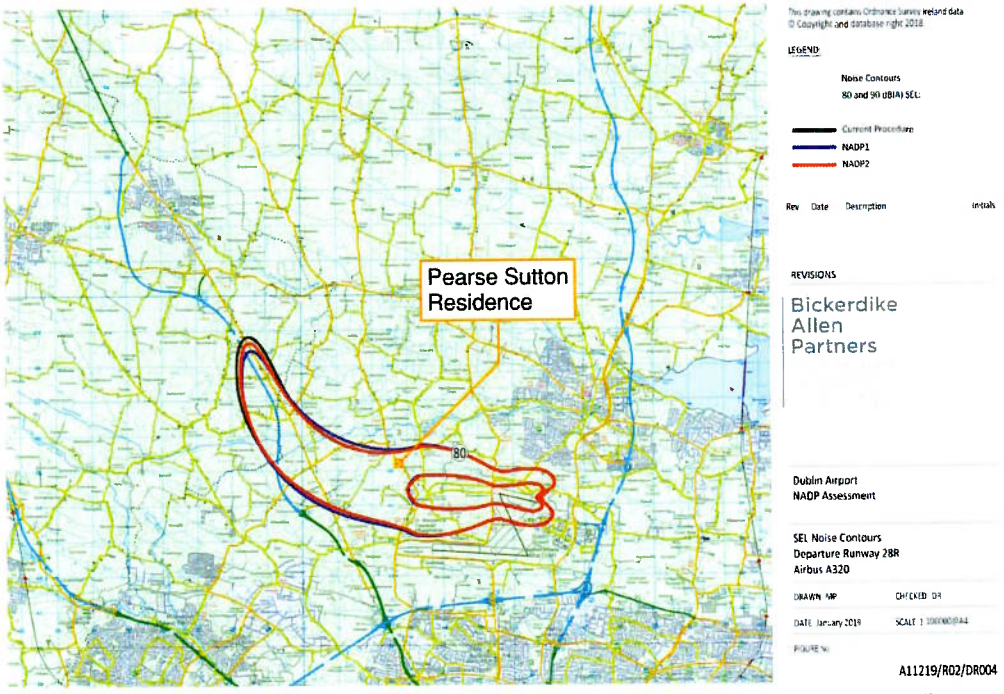


Figure 11: Predicted Sound Exposure Level airport noise contours with North Runway in operation.

For the DAA predicted SEL contours for the Airbus A330, as shown in Figure 12 below, Pearse Sutton's residence currently lies just outside the 90dB(A) contour for all departure procedures. Based on the recorded noise levels at the residence and calculated SELs as outlined in Table 2, the sound exposure level ranged from 93 – 99 dB(A) for the Airbus A320 with a logarithmical average SEL of 97dB(A). This highlights a significant exceedance of the predicted SEL noise levels by 7dB(A).

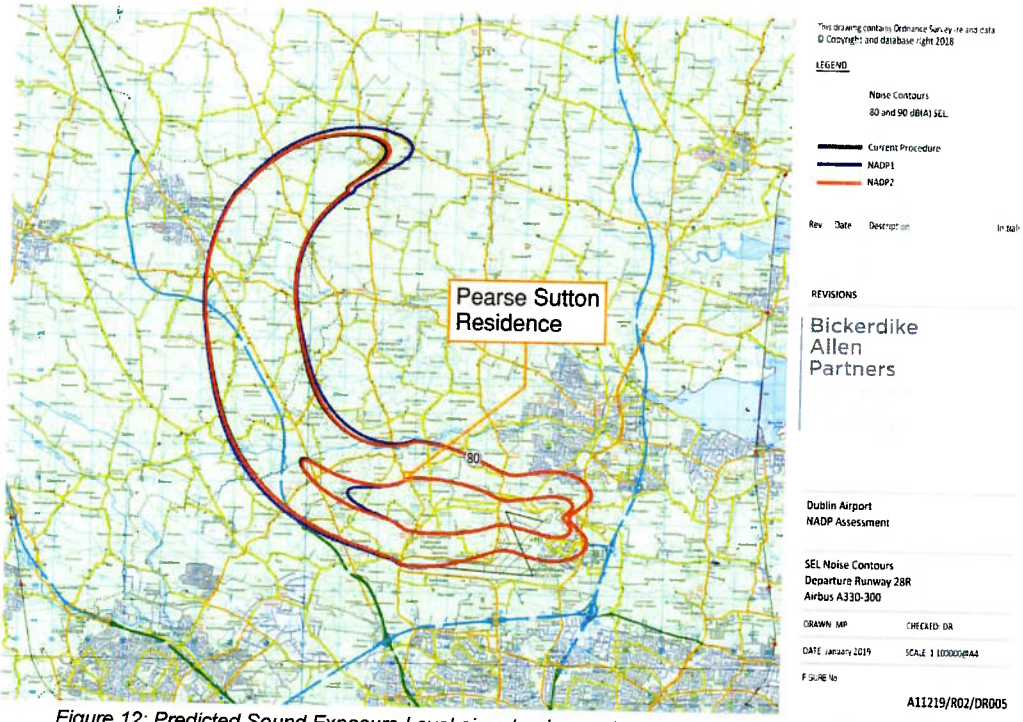


Figure 12: Predicted Sound Exposure Level airport noise contours with North Runway in operation.

3.5 L_{Amax} Noise Levels

Based on the unattended measurement results, the $L_{ASmax,1min}$ measurement data has been correlated to the aircraft type for each take-off over the monitoring period. This section outlines a comparison of the DAA predicted L_{Amax} noise levels with the measured L_{ASmax} noise levels recorded at the Breffni Conaty residence for the four most common aircraft types.

- Boeing 737-800
- Boeing 737max
- Airbus A320
- Airbus A330

Boeing 737

Figure 13 below outlines the number of L_{ASmax} occurrences for Boeing 737 aircraft over the full 92-day period at the monitoring location. The DAA predicted L_{Amax} noise levels for the Boeing 737-800 are shown further below in Figure 14 which places Pearse Sutton's residence outside the 80dB contour for all departure procedures. A comparison of the DAA predicted maximum noise levels with the measured levels shows an increase at the residence due to aircraft take-offs. The modal L_{ASmax} value recorded at the residence for Boeing 737 aircraft was 83dB, with 712 occurrences. This is an increase over the DAA predicted maximum noise levels by more than 3dB.

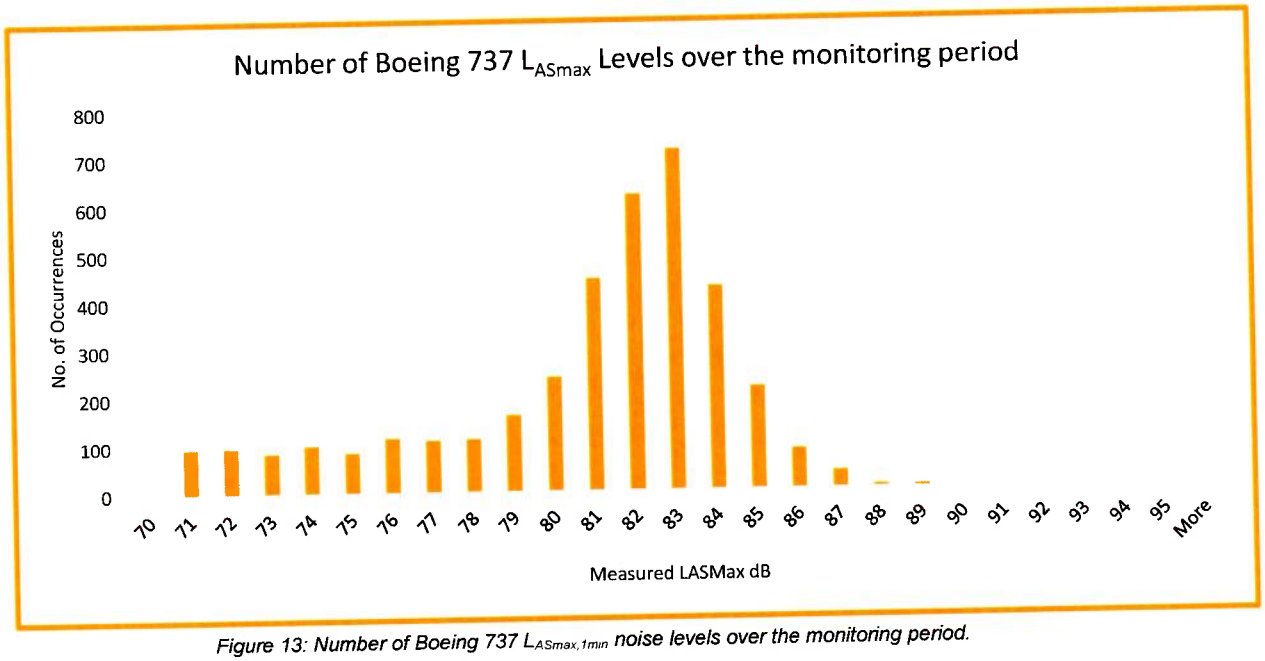


Figure 13: Number of Boeing 737 $L_{ASmax,1min}$ noise levels over the monitoring period.

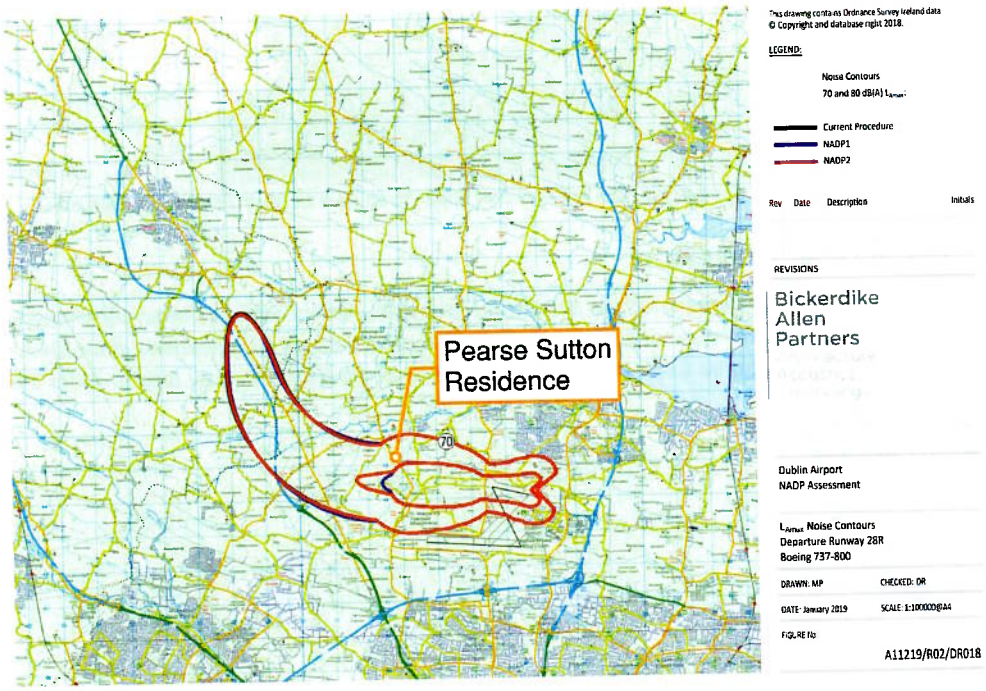


Figure 14: DAA predicted LAmax noise contours for Boeing 737-800.

In addition, the recorded L_{ASmax} noise levels for the Boeing 737-max aircraft have been plotted as shown in Figure 15 below which shows a modal L_{ASmax} of 77dB with 278 occurrences.

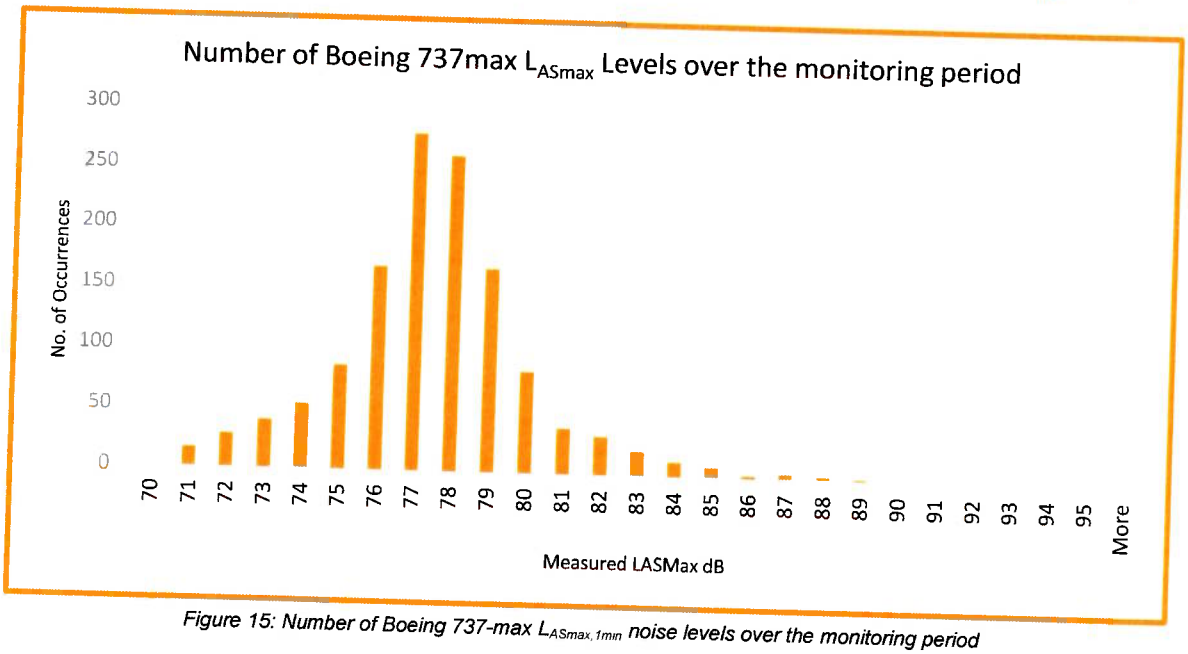


Figure 15: Number of Boeing 737-max $L_{ASmax,1min}$ noise levels over the monitoring period

Airbus A320

Figure 16 below outlines the number of L_{ASmax} occurrences for Airbus A320 aircraft over the full 92-day period at the monitoring location. The DAA predicted L_{Amax} noise levels for the Airbus A320 are shown further below in Figure 17 which places Pearse Sutton's residence between the 70dB(A) and 80dB(A) contour for all departure procedures. A comparison of the DAA predicted maximum noise levels with the measured levels show a significant exceedance at the residence due to aircraft take-offs. The modal L_{ASmax} value recorded at the residence for Airbus A320 aircraft was 83dB, with 646 occurrences. This is an exceedance of the DAA predicted maximum noise levels by approximately 8dB.

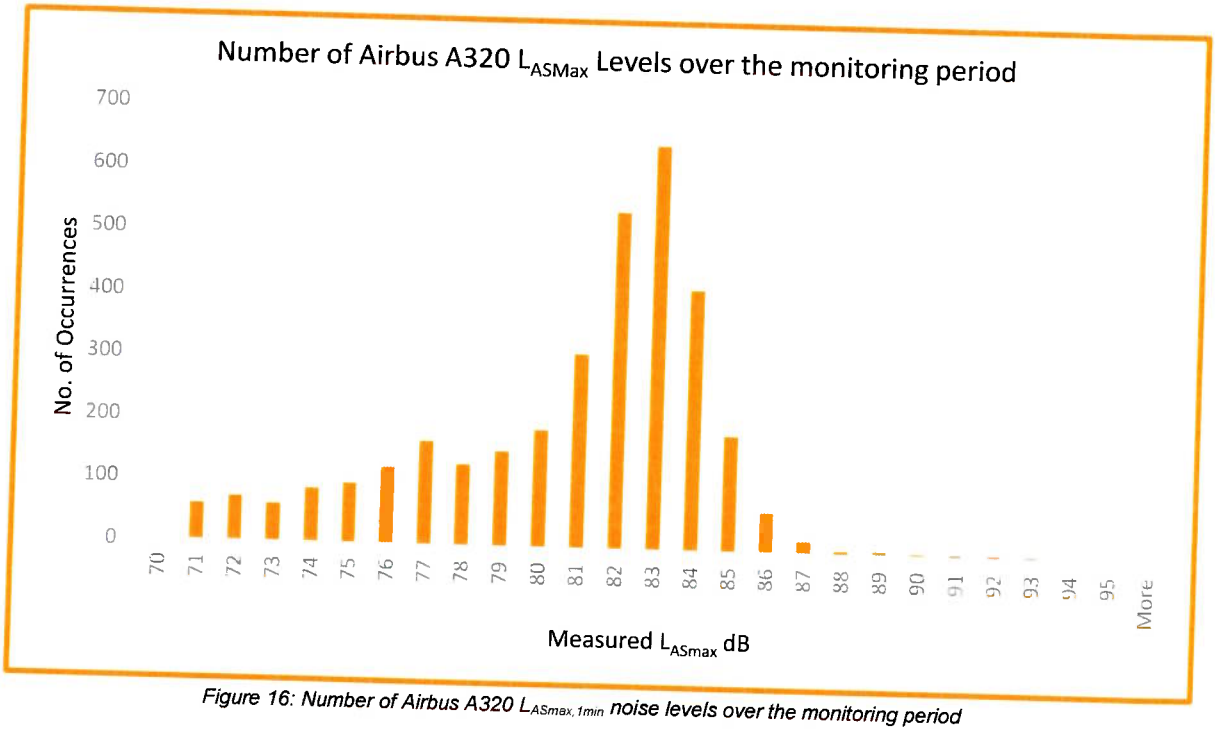


Figure 16: Number of Airbus A320 $L_{ASmax,1min}$ noise levels over the monitoring period

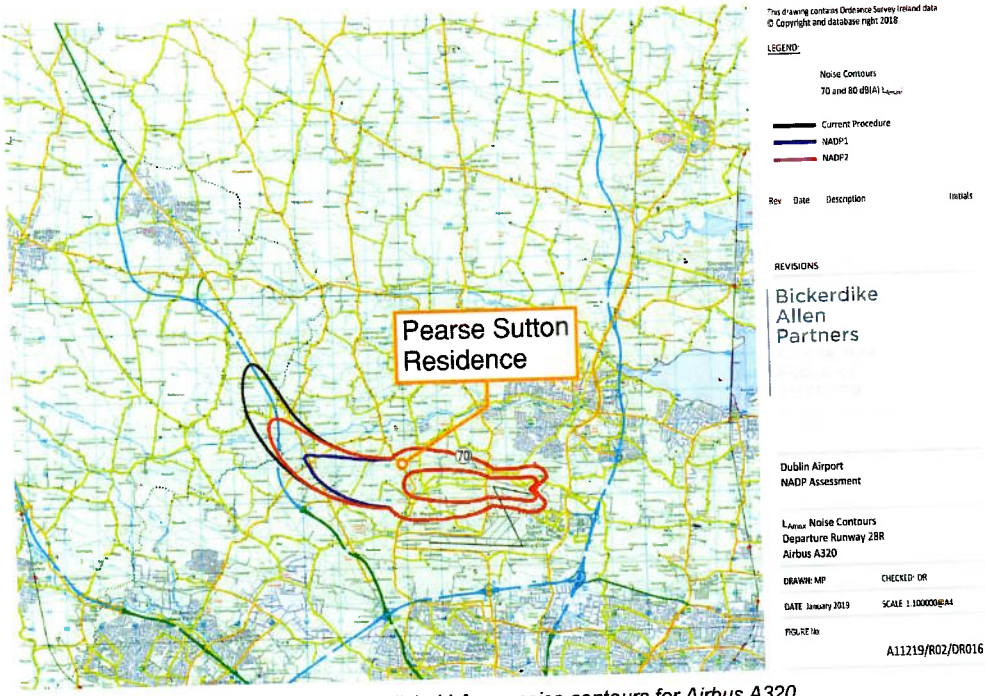


Figure 17: DAA predicted LAmax noise contours for Airbus A320

Airbus A330

Figure 18 below outlines the number of L_{ASmax} occurrences for Airbus A330 aircraft over the full 92-day period at the monitoring location. The DAA predicted L_{Amax} noise levels for the Airbus A330 are shown further below in Figure 19 which place Pearse Sutton's residence between the 70dB(A) and 80dB(A) contour for all departure procedures. A comparison of the DAA predicted maximum noise levels with the measured levels show a significant exceedance at the residence due to aircraft take-offs. The modal L_{ASmax} value recorded at the residence for Airbus A330 aircraft was 88dB, with 74 occurrences. This is an exceedance of the DAA predicted maximum noise levels by a minimum of 8dB, in addition to many recorded levels higher than 88dB.

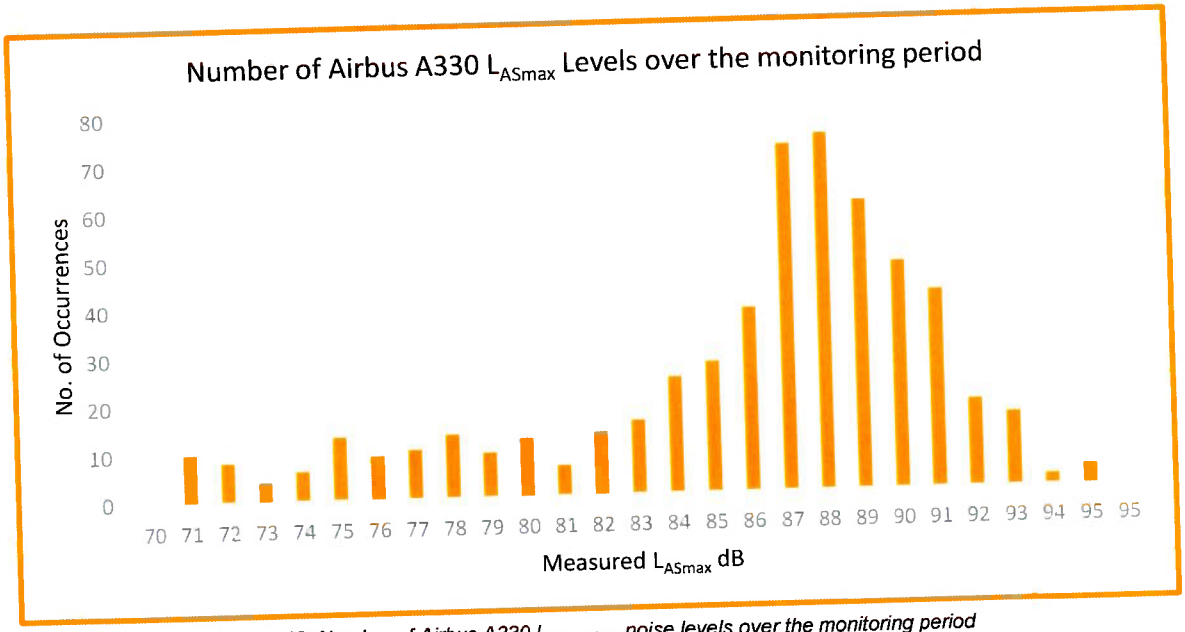


Figure 18: Number of Airbus A330 $L_{ASmax,1min}$ noise levels over the monitoring period

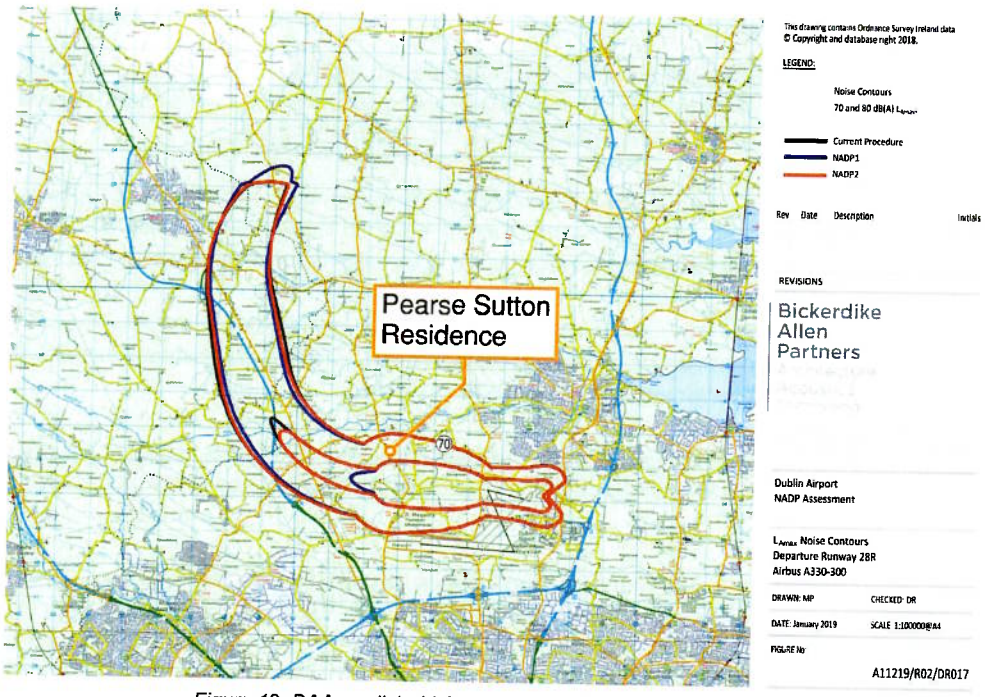


Figure 19: DAA predicted LAmax noise contours for Airbus A330

3.6 External Amenity Spaces

To consider the noise impact of aircraft noise on the residence, the recorded noise levels have been compared to the industry criteria for the external amenity spaces. ProPG 2017 and BS8233:2014 provide the following guidance in relation to external amenity spaces which state that:

> "*the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$*".

Based on the noise monitoring results where the prevailing wind was easterly and therefore aircraft were taking off to the east from the South Runway, it can be determined that the $L_{Aeq,16hour}$ noise levels at the residence were typically in the range of 55 – 58dB(A), slightly above the ProPG 2017 and BS8233 criteria for external amenity noise levels.

As outlined in Section 3.1, the average daytime noise levels at the residence rose to 68dB(A) when averaged over the full 92-day period and had a modal value of 70dB(A). This is an increase of approximately 10-13dB due to North Runway operations and is an exceedance of the industry criteria for external amenity noise levels based on the measured noise levels without aircraft.

4 Conclusion

Following the commencement of operations of the new Dublin Airport North Runway, Wave Dynamics were engaged by Pearse Sutton to review the 92-day unattended noise monitoring results and undertake sound exposure level measurements at Ballystrahan, Saint Margarets, Dublin, K67 KN88.

The objective of the assessment was to quantify the existing noise environment and the current noise levels from aircraft noise following the commencement of the operation of the North Runway. The measured noise levels have been compared with the predicted noise levels from the DAA noise contours and industry criteria.

Based on the results of the unattended noise monitoring at the residence, a 92-day average $L_{Aeq,16hour}$ of 68 dB(A) was recorded which shows an exceedance of the DAA predicted contour maps which show Pearse Sutton's residence to be on the 66dB(A) contour as per the same 92-day period.

Sound exposure level measurements have also been taken at the residence and thus used to calculate the 92-day average $L_{Aeq,16hour}$ based on the number of aircraft types over the 92-day period which predicted an $L_{Aeq,16hour}$ of 67 dB(A).

Both the predicted $L_{Aeq,16hour}$ calculated from the attended measurements and the measured $L_{Aeq,16hour}$ exceed the DAA predicted 92-day contour map level at the residence which predicts 63 dBA for aircraft noise exposure. In addition these have been compared to the DAA 2025 predicted noise contours which are 63-65dBA at the dwelling. The measurements undertaken in 2023 do not correlate with the most recent DAA noise contours this places doubts over the accuracy of the DAA contours when compared to actual measured data from the same period.

The DAA predicted L_{night} contours have been compared to the existing nighttime noise levels at the dwelling. Based on the *Dublin Airport North Runway EIAR Volume 2 – Main Report* it is likely that commencement of night time flights will have a "Profound" impact on the noise levels at the residence.

Sound exposure level measurements for the three most common aircraft types were also compared to the DAA predicted noise contours for the same aircraft types which showed exceedances for all three aircraft types of up to 7dB(A).

L_{ASmax} values over the full 92-day monitoring period for the three most common aircraft types were compared to the DAA-predicted noise contours for the same aircraft types. All three aircraft types showed exceedances over the predicted maximum noise levels with the worst case aircraft having a modal L_{ASmax} value of 8dBA in excess of the predicted noise levels.

Appendix A- Glossary of Terms

dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L_{A90}	A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L_{Aeq}	A-weighted, equivalent continuous sound level.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak

Appendix B – Volume of Flights per Aircraft Type

The volume of flights per aircraft type have been submitted to DAA by ANCA and are outlined below in Table 3.

Table 3: Volume of each aircraft type over the entire year and over summer period

Aircraft Type	2023						
	Annual Average				Summers Period		
	Annual Day	Annual Eve	Annual Night	Annual 24hr	Summer Day 16hr	Summer Night	Summer 24hr
Airbus A300	0	0	0	0	0	0	0
Airbus A306	595	298	298	1190	262	87	350
Airbus A319	2083	0	0	2083	612	0	612
Airbus A320	38379	10115	4165	52659	14246	1224	15470
Airbus A320neo	3273	1488	298	5058	1398	87	1486
Airbus A321	1785	893	595	3273	787	175	961
Airbus A321neo	5355	0	595	5950	1573	175	1748
Airbus A330	8628	0	893	9520	2535	262	2797
Airbus A330neo	0	0	0	0	0	0	0
Airbus A350	0	0	0	0	0	0	0
ATR 42	0	0	0	0	0	0	0
ATR 72	9223	2083	0	11305	3321	0	3321
BAe 146/Avro RJ	0	0	0	0	0	0	0
Boeing 737-400	595	1190	595	2380	524	175	699
Boeing 737-500	0	0	0	0	0	0	0
Boeing 737-700	0	0	0	0	0	0	0
Boeing 737-800	38974	10710	4463	54147	14596	1311	15907
Boeing 737 MAX	17553	6545	2975	27073	7079	874	7953
Boeing 757	2380	298	298	2975	787	87	874
Boeing 767	1190	1190	595	2975	699	175	874
Boeing 777	1190	0	595	1785	350	175	524
Boeing 777X	0	0	0	0	0	0	0
Boeing 787	3570	0	595	4165	1049	175	1224
Bombardier CS300	1190	595	0	1785	524	0	524
Bombardier Dash 8	595	0	0	595	175	0	175
Convair 580	0	0	0	0	0	0	0
Embraer E190/195	4165	1785	298	6248	1748	87	1835
Embraer E190-E2	595	0	0	595	175	0	175
HS748A	0	0	0	0	0	0	0
Lockheed C130	0	0	0	0	0	0	0
McDonnell Douglas	0	0	0	0	0	0	0
MD83	0	0	0	0	0	0	0
Piper PA34	0	0	0	0	0	0	0
Shorts SD330/360	0	0	0	0	0	0	0

Aircraft Type	2023						
	Annual Average				Summers Period		
	Annual Day	Annual Eve	Annual Night	Annual 24hr	Summer Day 16hr	Summer Night	Summer 24hr
Other	1488	298	0	1785	524	0	524
Total	**142804**	**37486**	**17255**	**197546**	**52964**	**5069**	**58034**

Appendix C - Unattended Noise Monitoring Results

Table 4 below outlines the noise levels recorded at location L1 over the period 14th of June 2023 to 17th of September 2023. The results are averaged over the following periods:

- $L_{Aeq,16hour}$ 07:00 – 23:00
- $L_{Aeq,8hour}$ 23:00 – 07:00

Table 4: Unattended Measurement Results

Date	Start Time	End Time	Average $L_{Aeq,T}$
14/06/2023	07:00	23:00	55
14/06/2023	23:00	07:00	49
15/06/2023	07:00	23:00	57
15/06/2023	23:00	07:00	49
16/06/2023	07:00	23:00	59
16/06/2023	23:00	07:00	51
17/06/2023	07:00	23:00	59
17/06/2023	23:00	07:00	46
18/06/2023	07:00	23:00	58
18/06/2023	23:00	07:00	48
19/06/2023	07:00	23:00	67
19/06/2023	23:00	07:00	49
20/06/2023	07:00	23:00	63
20/06/2023	23:00	07:00	49
21/06/2023	07:00	23:00	67
21/06/2023	23:00	07:00	50
22/06/2023	07:00	23:00	58
22/06/2023	23:00	07:00	49
23/06/2023	07:00	23:00	68
23/06/2023	23:00	07:00	49
24/06/2023	07:00	23:00	67
24/06/2023	23:00	07:00	48
25/06/2023	07:00	23:00	68
25/06/2023	23:00	07:00	-
26/06/2023	07:00	23:00	-
26/06/2023	23:00	07:00	48
27/06/2023	07:00	23:00	68
27/06/2023	23:00	07:00	48
28/06/2023	07:00	23:00	68
28/06/2023	23:00	07:00	49
29/06/2023	07:00	23:00	68
29/06/2023	23:00	07:00	51
30/06/2023	07:00	23:00	68
30/06/2023	23:00	07:00	50
01/07/2023	07:00	23:00	68
01/07/2023	23:00	07:00	48
02/07/2023	07:00	23:00	68
02/07/2023	23:00	07:00	60
03/07/2023	07:00	23:00	68
03/07/2023	23:00	07:00	49
04/07/2023	07:00	23:00	70

Date	Start Time	End Time	Average $L_{Aeq,T}$
04/07/2023	23:00	07:00	49
05/07/2023	07:00	23:00	70
05/07/2023	23:00	07:00	49
06/07/2023	07:00	23:00	66
06/07/2023	23:00	07:00	50
07/07/2023	07:00	23:00	60
07/07/2023	23:00	07:00	51
08/07/2023	07:00	23:00	68
08/07/2023	23:00	07:00	49
09/07/2023	07:00	23:00	68
09/07/2023	23:00	07:00	47
10/07/2023	07:00	23:00	66
10/07/2023	23:00	07:00	59
11/07/2023	07:00	23:00	68
11/07/2023	23:00	07:00	56
12/07/2023	07:00	23:00	69
12/07/2023	23:00	07:00	48
13/07/2023	07:00	23:00	69
13/07/2023	23:00	07:00	48
14/07/2023	07:00	23:00	63
14/07/2023	23:00	07:00	50
15/07/2023	07:00	23:00	70
15/07/2023	23:00	07:00	51
16/07/2023	07:00	23:00	70
16/07/2023	23:00	07:00	48
17/07/2023	07:00	23:00	69
17/07/2023	23:00	07:00	49
18/07/2023	07:00	23:00	65
18/07/2023	23:00	07:00	48
19/07/2023	07:00	23:00	69
19/07/2023	23:00	07:00	53
20/07/2023	07:00	23:00	69
20/07/2023	23:00	07:00	54
21/07/2023	07:00	23:00	70
21/07/2023	23:00	07:00	50
22/07/2023	07:00	23:00	69
22/07/2023	23:00	07:00	48
23/07/2023	07:00	23:00	65
23/07/2023	23:00	07:00	45
24/07/2023	07:00	23:00	69
24/07/2023	23:00	07:00	48
25/07/2023	07:00	23:00	69
25/07/2023	23:00	07:00	48
26/07/2023	07:00	23:00	67
26/07/2023	23:00	07:00	49
27/07/2023	07:00	23:00	69
27/07/2023	23:00	07:00	49
28/07/2023	07:00	23:00	70
28/07/2023	23:00	07:00	49
29/07/2023	07:00	23:00	70
29/07/2023	23:00	07:00	49
30/07/2023	07:00	23:00	71

WAVE DYNAMICS
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Date	Start Time	End Time	Average $L_{Aeq,T}$
30/07/2023	23:00	07:00	49
31/07/2023	07:00	23:00	70
31/07/2023	23:00	07:00	50
01/08/2023	07:00	23:00	68
01/08/2023	23:00	07:00	50
02/08/2023	07:00	23:00	67
02/08/2023	23:00	07:00	47
03/08/2023	07:00	23:00	69
03/08/2023	23:00	07:00	48
04/08/2023	07:00	23:00	69
04/08/2023	23:00	07:00	55
05/08/2023	07:00	23:00	68
05/08/2023	23:00	07:00	47
06/08/2023	07:00	23:00	69
06/08/2023	23:00	07:00	48
07/08/2023	07:00	23:00	69
07/08/2023	23:00	07:00	48
08/08/2023	07:00	23:00	69
08/08/2023	23:00	07:00	49
09/08/2023	07:00	23:00	69
09/08/2023	23:00	07:00	50
10/08/2023	07:00	23:00	57
10/08/2023	23:00	07:00	49
11/08/2023	07:00	23:00	70
11/08/2023	23:00	07:00	49
12/08/2023	07:00	23:00	70
12/08/2023	23:00	07:00	48
13/08/2023	07:00	23:00	70
13/08/2023	23:00	07:00	48
14/08/2023	07:00	23:00	69
14/08/2023	23:00	07:00	47
15/08/2023	07:00	23:00	69
15/08/2023	23:00	07:00	50
16/08/2023	07:00	23:00	65
16/08/2023	23:00	07:00	48
17/08/2023	07:00	23:00	58
17/08/2023	23:00	07:00	50
18/08/2023	07:00	23:00	58
18/08/2023	23:00	07:00	-
19/08/2023	07:00	23:00	70
19/08/2023	23:00	07:00	57
20/08/2023	07:00	23:00	70
20/08/2023	23:00	07:00	49
21/08/2023	07:00	23:00	70
21/08/2023	23:00	07:00	50
22/08/2023	07:00	23:00	70
22/08/2023	23:00	07:00	47
23/08/2023	07:00	23:00	70
23/08/2023	23:00	07:00	47
24/08/2023	07:00	23:00	70
24/08/2023	23:00	07:00	48
25/08/2023	07:00	23:00	71

Date	Start Time	End Time	Average $L_{Aeq,T}$
25/08/2023	23:00	07:00	47
26/08/2023	07:00	23:00	69
26/08/2023	23:00	07:00	46
27/08/2023	07:00	23:00	70
27/08/2023	23:00	07:00	47
28/08/2023	07:00	23:00	69
28/08/2023	23:00	07:00	48
29/08/2023	07:00	23:00	71
29/08/2023	23:00	07:00	48
30/08/2023	07:00	23:00	70
30/08/2023	23:00	07:00	47
31/08/2023	07:00	23:00	68
31/08/2023	23:00	07:00	46
01/09/2023	07:00	23:00	69
01/09/2023	23:00	07:00	47
02/09/2023	07:00	23:00	68
02/09/2023	23:00	07:00	46
03/09/2023	07:00	23:00	69
03/09/2023	23:00	07:00	48
04/09/2023	07:00	23:00	67
04/09/2023	23:00	07:00	56
05/09/2023	07:00	23:00	62
05/09/2023	23:00	07:00	54
06/09/2023	07:00	23:00	67
06/09/2023	23:00	07:00	55
07/09/2023	07:00	23:00	65
07/09/2023	23:00	07:00	54
08/09/2023	07:00	23:00	70
08/09/2023	23:00	07:00	47
09/09/2023	07:00	23:00	69
09/09/2023	23:00	07:00	49
10/09/2023	07:00	23:00	68
10/09/2023	23:00	07:00	47
11/09/2023	07:00	23:00	66
11/09/2023	23:00	07:00	46
12/09/2023	07:00	23:00	70
12/09/2023	23:00	07:00	49
13/09/2023	07:00	23:00	70
13/09/2023	23:00	07:00	49
14/09/2023	07:00	23:00	70
14/09/2023	23:00	07:00	48
15/09/2023	07:00	23:00	70
15/09/2023	23:00	07:00	47
16/09/2023	07:00	23:00	69
16/09/2023	23:00	07:00	48
17/09/2023	07:00	23:00	68

Appendix G

WAVE DYNAMICS
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Technical Note

Project:	Shallon, The Ward Dublin	**Title:**	Noise Assessment
Job Number:	WDA230104	**Prepared By:**	James Cousins
Date:	07/04/2023	**Reviewed By:**	Sean Rocks
Reference:	WDA230104TN_5_A_01	**Client:**	Colm Barry

1 Introduction

Following the commencement of operations of the new Dublin Airport North Runway, Wave Dynamics were engaged by Colm Barry, to review the noise measurements from the baseline noise survey undertaken at Shallon, The Ward, Co. Dublin, D11 XH51.

The objective of the assessment was to quantify the existing noise environment and the current noise levels from aircraft noise following the commencement of the operation of the North Runway. The measured noise levels have been compared with the predicted noise levels from the DAA noise contours and industry criteria.

1.1 Statement of Competence

This assessment and report were completed by James Cousins, Managing Director | Principal Consultant with Wave Dynamics who has extensive experience in assessing noise impact. His qualifications include BSc (Hons) in Construction Management and Engineering, Pg Cert in Construction Law and Diploma in Acoustics and Noise Control (Institute of Acoustics) and an IOA Competence Cert in Building Acoustic Measurements. James is a member of both Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA) and is the current SITRI Chairman.

The assessment and report were peer reviewed by Sean Rocks, Director | Senior Consultant, Sean has experience of aircraft noise particularly for planning and complaints investigation. Sean's qualifications include BEng (Hons) in Mechanical and Manufacturing Engineering, Diploma in Acoustics and Noise Control (Institute of Acoustics), IOA Certificate of Competence in Environmental Noise Measurement and SITRI certified sound insulation tester. Sean is a member of both Engineers Ireland and the Institute of Acoustics.

2 Baseline Noise Survey

An unattended noise survey was undertaken to quantify the existing noise environment and current noise levels experienced. On review of the data the measurements commenced at 11:58am on Wednesday the 28th of December 2022 and finished at 14:00pm on Saturday the 31st of December 2022. The measurement duration was set to 1-minute intervals.

2.1.1 Site Description and Measurement Locations

The site is located off the R121 and R122 in The Ward, Dublin. The area is mainly agricultural with sporadic residential dwellings and commercial properties. Dublin Airport is located to the Southeast of the residence approximately 2km from the edge of the new North Runway.

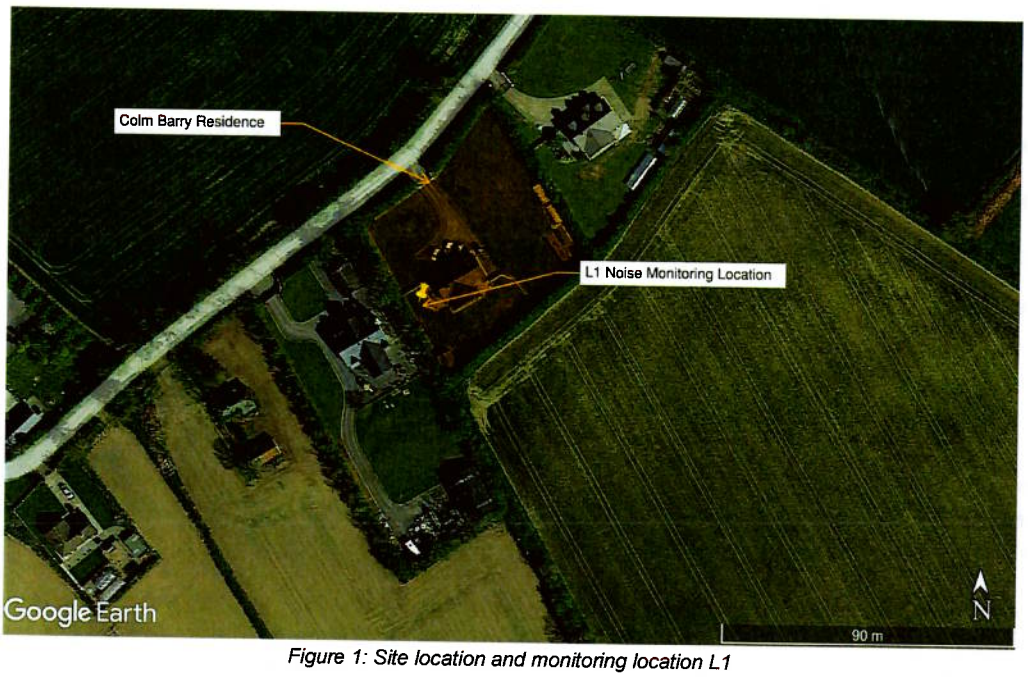

Figure 1: Site location and monitoring location L1

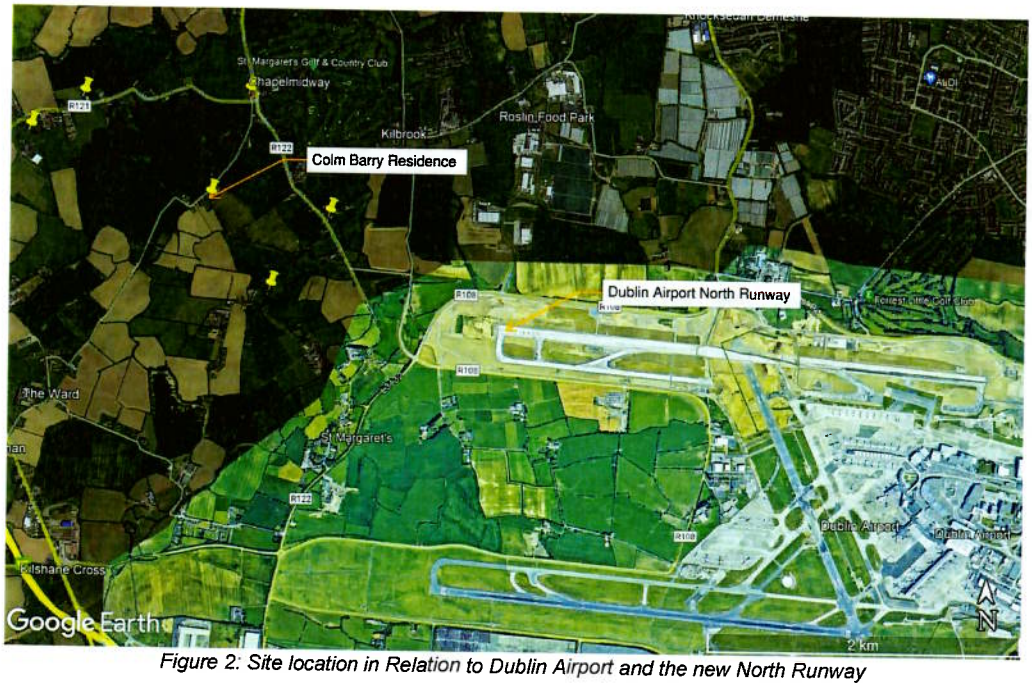

Figure 2: Site location in Relation to Dublin Airport and the new North Runway

Unattended Noise Measurements

An unattended noise logger was deployed in location L1 as per Figure 1 to the rear garden of the residence. The logger was calibrated before and after the measurements and no significant drift was noted. The logger was deployed at a height of approximately 1.5m above the ground.

On review of the measurement data by WDA it was filtered for periods of unsuitable weather conditions where required.

Figure 3: Noise Logger Setup

2.1.2 Survey Period

Based on our review of the data, the measurements commenced at 11:58am on Wednesday the 28th of December 2022 and finished at 14:00pm on Saturday the 31st of December 2022. The measurement duration was set to 1minute intervals. It is understood that flights were operational from the North Runway from 9am to 6pm throughout the measurement period.

2.1.3 Noise Measurement Equipment

A Class 1 sound level meter/noise logger in general accordance with IEC 61672-1:2013 was used for the attended measurements. Table 1 below summarises the measurement equipment used.

Table 1: Noise Measurement Equipment

Description	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Calibrator	B&K Type 4231	2205805	UCRT22/1592	03/05/2023
Sound Level Meter	Rion NL-52	764925	UCRT21/2107	09/09/2023

2.1.4 Subjective Noise Environment

Based on the information provided during the attended noise survey and logger deployment the following noise sources were identified:

- Aircraft Noise from Aircraft Fly Overs.
- Road noise from the R121 and R122
- Birdsong
- Occasional activity from residents (cars arriving/departing, voices etc)

2.2 Noise Measurement Results

This section outlines the results of the unattended noise survey.

Unattended Monitoring Results

Based on the data provided, Table 2 outlines the results of the noise measurements at the unattended monitoring location L1. A full breakdown of all the unattended measurement results is available on request.

Table 2: Unattended Measurement Results

Start Date	$L_{Aeq,16hour}$ dB (07:00 - 23:00)	L_{Aeq} dB ($L_{Aeq,9hour}$ 09:00 - 18:00)	L_{Aeq} dB ($L_{Aeq,7hour}$ 07:00 - 09:00, 18:00 - 23:00)	L_{night} dB ($L_{Aeq,8hour}$ 23:00 - 07:00)	10th highest night-time L_{AFmax}[8]
28/12/2022	66[2]	69[2]	53[2]	49	71
29/12/2022	64	66	54	53	68
30/12/2022	63	66	55	45	65
31/12/2022	67[2]	69[2]	55[2]	N/A	N/A

(1) Where night-time period is referred to the date is the date the measurement commenced on at 23:00hrs and finished at 07:00hrs on the following calendar day.

(2) Shortened Measurement Duration

2.2.1 L_{AFmax} Noise Levels

The frequency of L_{AFmax} noise events for the four most common aircraft types over the monitoring period are shown below. The number of occurrences for these aircraft types are as follows:

- Airbus A330: 32 flights
- Airbus A320: 113 flights
- Boeing 737: 158 flights
- Boeing 737-8200: 24 flights

Information regarding aircraft types and flight times have been adapted from the following online flight tracker: https://sbeaney.com/track/v2/dublin_flights.html.

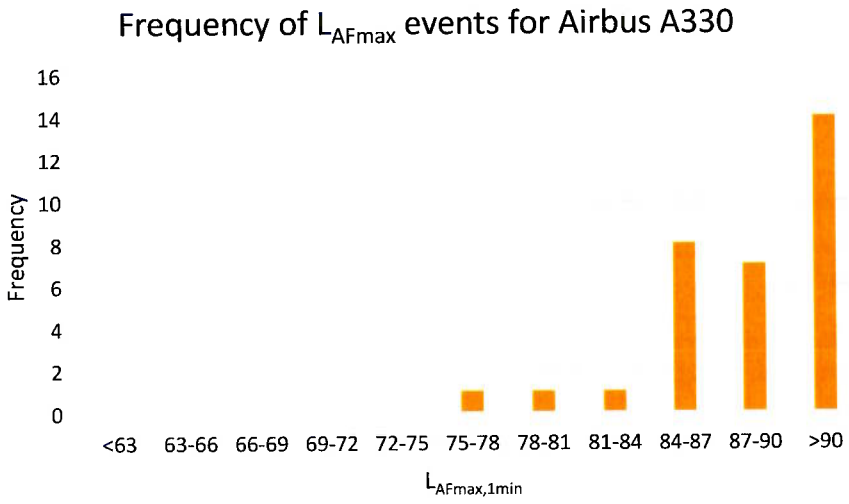

Figure 4: L_{AFmax} noise events for Airbus A330

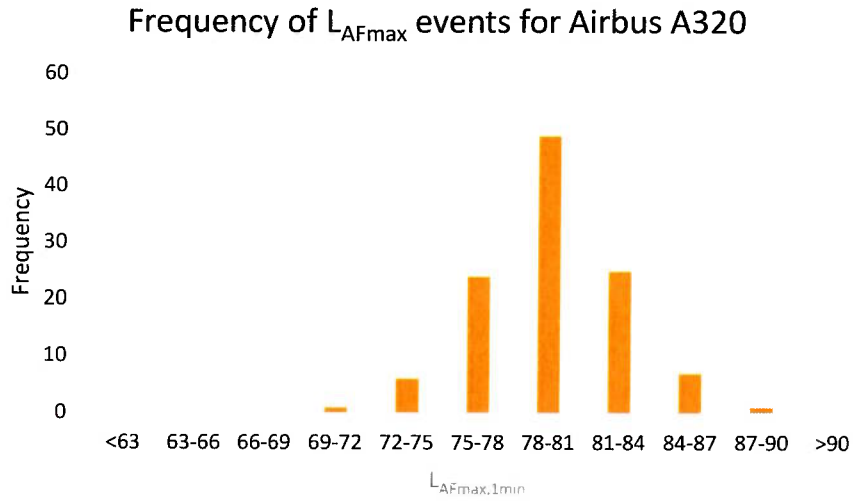

Figure 5: L_{AFmax} noise events for Airbus A320

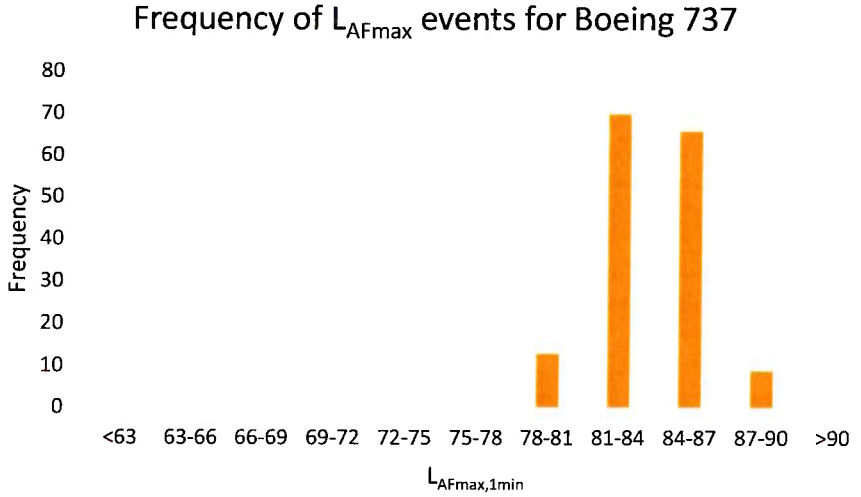

Figure 6: L_{AFmax} noise events for Boeing 737

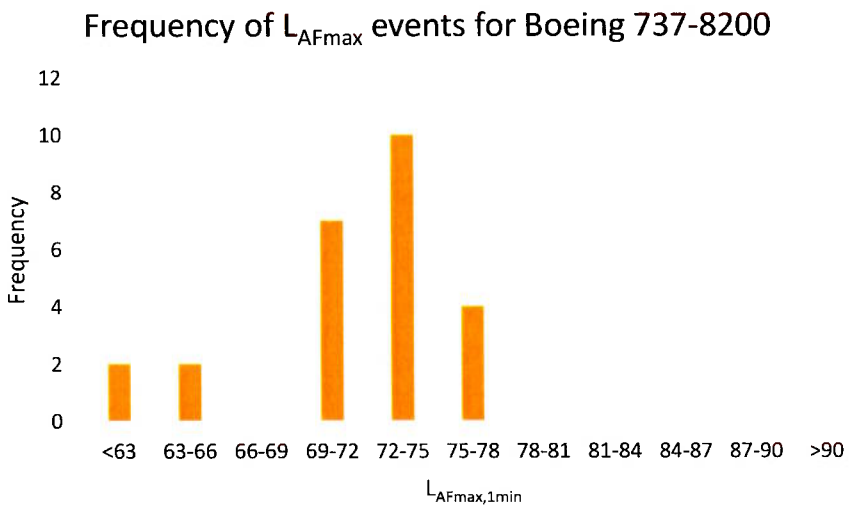

Figure 7: L_{AFmax} noise events for Boeing 737-8200

3 Analysis of Results

3.1 External Amenity Spaces

To consider the noise impact of the aircraft noise on the residence, the recorded noise levels have been compared to the industry criteria for the external amenity spaces. ProPG 2017 and BS8233:2014 provide the following guidance in relation to external amenity spaces which state that:

> "*the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$*".

It was not possible to assess the full 16hour range without contribution of the North Runway at this location. Instead, consideration was given to the noise levels during the daytime periods outside of the North Runway operational time (07:00 – 09:00 and 18:00 – 23:00), for these periods the measured L_{Aeq} typically measured 53-55 dBA. Given the location of the residence and its proximity to local noise sources and consideration of the night-time data, the external amenity spaces would be expected to achieve noise levels in line with the ProPG guidance without the effect of the North Runway operations.

3.2 L_{Aeq} Noise Levels

The most recently predicted noise contours for the North Runway operation as per the 2007 planning permission is the compliance contours submitted to Fingal County Council in 2016. Here predicted daytime noise contours (07:00 – 23:00) for Dublin Airport with the North Runway operational can be seen below in Figure 8. From the predictions it can be seen that Colm Barry's residence is located between the predicted contours of 60dB $L_{Aeq,16hour}$ and 63dB $L_{Aeq,16hour}$. From the results of the noise measurements outlined in Table 2 above, the corresponding $L_{Aeq,16hour}$ measured at the residence was typically 63-64dB, however this includes a period of 7 hours when the North Runway was not operational. The average noise level rises to 66-69dB for the North Runway operational hours (09:00 – 18:00). This indicates an exceedance of the predicted operational noise levels at the Colm Barry residence.

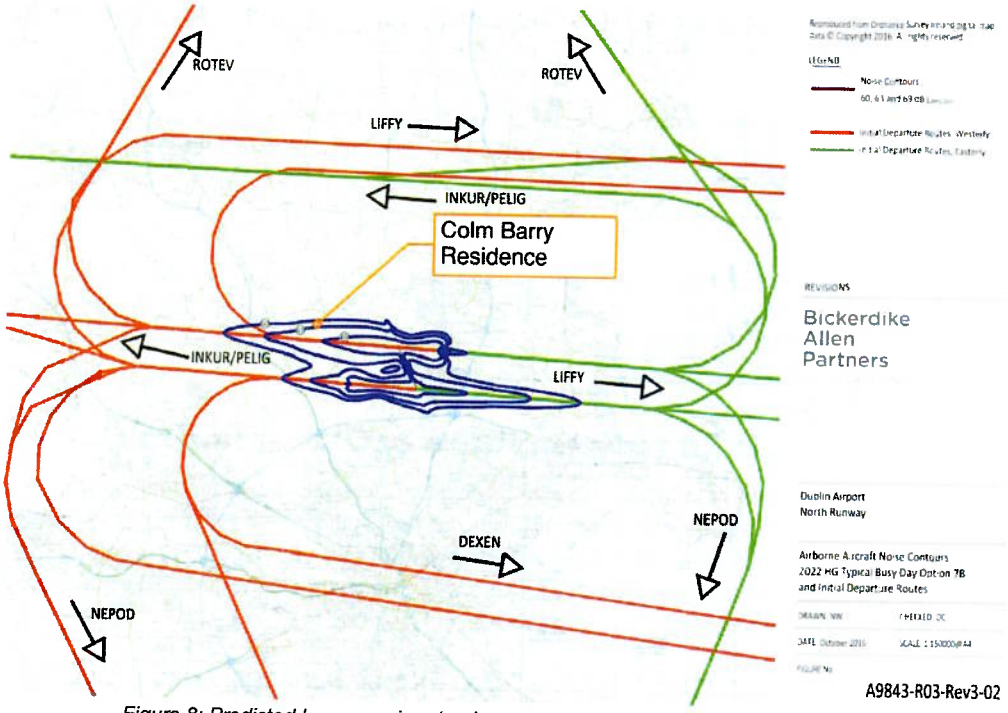

Figure 8: Predicted $L_{Aeq,16hour}$ airport noise contours with North Runway in operation.

3.3 L_{AFmax} Noise Levels

Table 3 below outlines the predicted L_{Amax} noise at intervals from the western-most point of the North Runway. The data has been extracted from Bickerdike Allen Partners report "A11219-NO1-DR" dated 29th August 2018.

Colm Barry's residence is located 2km from the western-most point of the North Runway. A comparison of the recorded L_{AFmax} noise with those predicted in Table 3 below indicate that the predicted noise levels were exceeded.

Table 3: Predicted L_{Amax} noise levels at longitudinal distance from North Runway (most western point)

Operation	Aircraft Type	Noise Level, dB L_{Amax}							
		0.5km	1km	1.5km	2km	2.5km	2km	3.5km	4km
Departure	Airbus A320	86	83	78	78	77	77	76	76
	Airbus A330-300	91	90	89	88	87	83	82	81
	Airbus A380	89	88	87	86	85	84	83	83
	Boeing 737 Max8	87	84	81	79	78	77	77	76
	Boeing 737-800	90	87	83	81	80	80	79	79
	Boeing 737-200	96	94	93	92	90	87	86	85
Arrival	Airbus A320	94	90	87	85	83	81	80	79
	Airbus A330-300	97	93	90	87	86	84	83	82
	Airbus A380	95	91	89	87	85	83	82	81
	Boeing 737 Max8	94	90	87	85	83	81	80	79
	Boeing 737-800	94	90	87	85	83	81	80	79
	Boeing 737-200	84	90	88	86	84	82	81	80

The Airbus A320 is predicted to have an L_{Amax} of 78dB at 2km from the North Runway for departures. There was a total of 79 flight departures from the A320 over monitoring period which exceeded the predicted noise level.

This figure corresponds to 70% of all Airbus A320 flights recorded over the monitoring period exceeding the L_{Amax} predicted noise levels.

The Airbus A330 is predicted to have an L_{Amax} of 88dB at 2km from the North Runway for departures. There was a total of 19 flight departures from the A330 over monitoring period which exceeded the predicted noise level. This figure corresponds to 59% of all Airbus A330 flights recorded over the monitoring period exceeding the L_{Amax} predicted noise levels.

For the Boeing 737 flights the predicted L_{Amax} at 2km from the North Runway for departures is predicted to range from 79-81dB for Boeing 737 Max8 and 737-800, up to 92dB for 737-200. The total number of flights for Boeing 737 exceeding 81 dBA was 145. This figure corresponds to 92% of all Boeing 737 flights recorded over the monitoring period exceeding the 76-79dBA predicted noise levels.

3.4 Noise Levels Prior to North Runway Operation

Noise measurements were undertaken by iAcoustics at Colm Barry's residence both internally and externally prior to the commencement of operation at the North Runway in August 2022. The report has been attached in Appendix B of this report. A comparison of the outdoor noise levels measured at the site on August 10th and 11th 2022 (prior to operation of the North Runway) with the noise levels measured at the site post commencement of the North Runway operations show a significant increase in the noise levels.

The daytime measured noise levels (07:00 – 23:00) on 10th and 11th of August 2022 recorded 44dBA and 47dBA $L_{Aeq,16hour}$ respectively and individual event maximum daytime noise levels typically ranging from 51 – 65dBA L_{AFmax}. The August 2022 levels are lower than the current noise levels measured at the Colm Barry residence of 63-64dBA $L_{Aeq,16hour}$ and maximum daytime noise levels exceeding 85dBA L_{AFmax} with the North Runway in operation. The daytime individual air traffic noise event levels have been extracted from iAcoustics report and are shown in Figure 9 below:

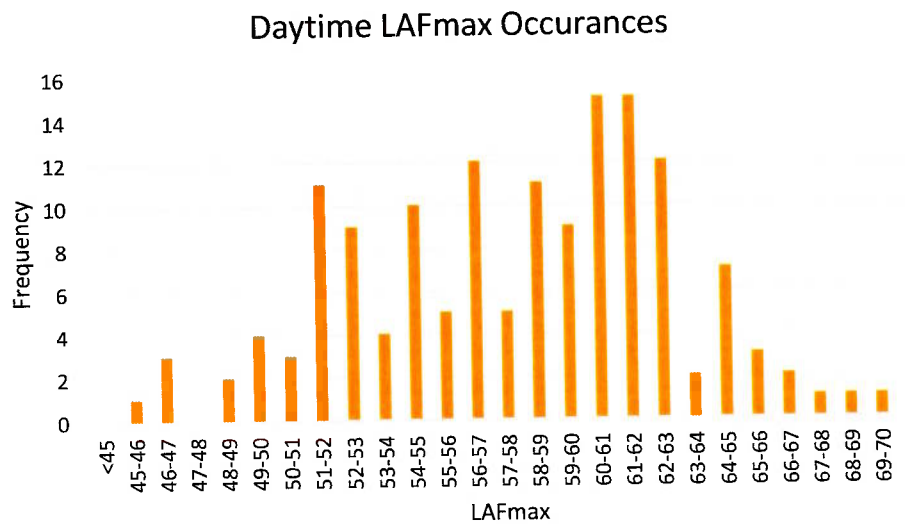

Figure 9: Daytime LAFmax noise events recorded at Colm Barry's dwelling in August 2022.

4 Conclusion

Following the commencement of operations of the new Dublin Airport North Runway, Wave Dynamics were engaged by Colm Barry, to review the noise measurements from the baseline survey undertaken at Shallon, The Ward, Co. Dublin, D11 XH51.

The objective of the assessment was to quantify the existing noise environment and the current noise levels from aircraft noise following the commencement of the operation of the North Runway. The measured noise levels have been compared with the predicted noise levels from the DAA noise contours and industry criteria.

From the baseline noise survey, it is evident that the noise levels at the residence are significantly impacted by the operation of the new North Runway.

A comparison of the daytime predicted noise levels and the measured noise levels indicate that the predicted L_{Aeq} noise levels at the Colm Barry residence are exceeded with the North Runway in operation.

When comparing the recorded maximum noise levels and predicted L_{Amax} noise contours it was noted that the measured noise levels exceed the predicted maximum noise levels with the North Runway in operation for a number of passbys.

For the purpose of the assessment and data review WDA have relied on the accuracy and data provided.

Appendix A- Glossary of Terms

dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L_{A90}	A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L_{Aeq}	A-weighted, equivalent continuous sound level.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak

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Appendix B- iAcoustics Noise Monitoring Report

iAcoustics
INTEGRATED ACOUSTIC SOLUTIONS

Unit A1,
Kingswood Business Park,
Baldonnel, Dublin 22, Ireland

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info@iacoustics.net
www.iacoustics.net

Air Traffic Noise Monitoring

iAcoustics

Report Issued: 12/10/2022

Project:	Colm Barry
Author:	Eoghan Tyrrell
Title:	Air Traffic Noise Monitoring
Reference Code:	J1950
Version Number:	1

Revision Tracker

Version	Date issued	Revision by	Reviewed by	Section(s) affected
V.1	12/10/2022	E. Tyrrell	G. Plunkett	-

Table of Contents

Glossary of Terms

A-weighted	Measurements that correlate well with the perceived noise level.
Background Noise (L90):	The in-situ, or ambient level of noise in the environment
Competent Person:	Someone with appropriate training, qualifications, experience, and skill. The person will normally have a diploma or degree in acoustics or a related subject.
Decibel (dB):	The decibel is used as a measure of acoustic units.
dB(A):	A single-figure rating to a sound, which represents the human-ear frequency response.
Frequency (Hz):	The number of sound waves to pass a point in one second. Correlated to the perceived pitch of a sound.
LAeq:	Commonly regarded as the A-weighted "average" noise level over a period of time.
LAFmax:	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak.
Lday:	The A-weighted, Leq (equivalent noise level), over the 16-hour day period (07:00-23:00), also known as the day noise indicator.
Ldn:	The day-night noise level, the LAeq (equivalent noise level) over a 24 hour period, also known as the day night indicator.
Leq:	The linear (not A-weighted) equivalent continuous sound pressure level.
Lnight	The A-weighted, Leq (equivalent noise level) over the 8 hour night period of 23:00 to 07:00 hours, also known as the night noise indicator.
Noise intrusion:	Noise from external noise sources.
Octave bands:	A convenient division of the frequency scale, identified by their centre frequency. Typically, 63, 125, 250, 500, 1000, 2000, 4000, 8000 Hz.

1. Introduction

iAcoustics were engaged to carry out noise monitoring for the measurement of air traffic noise at the home of Colm Barry, Ballystrahan, Co. Dublin, D11 XH51. This dwelling location in relation to Dublin Airport is indicated in Figure 1 with a yellow dot. There is an approximate distance of 2 kilometers between the dwelling and the closest runway.

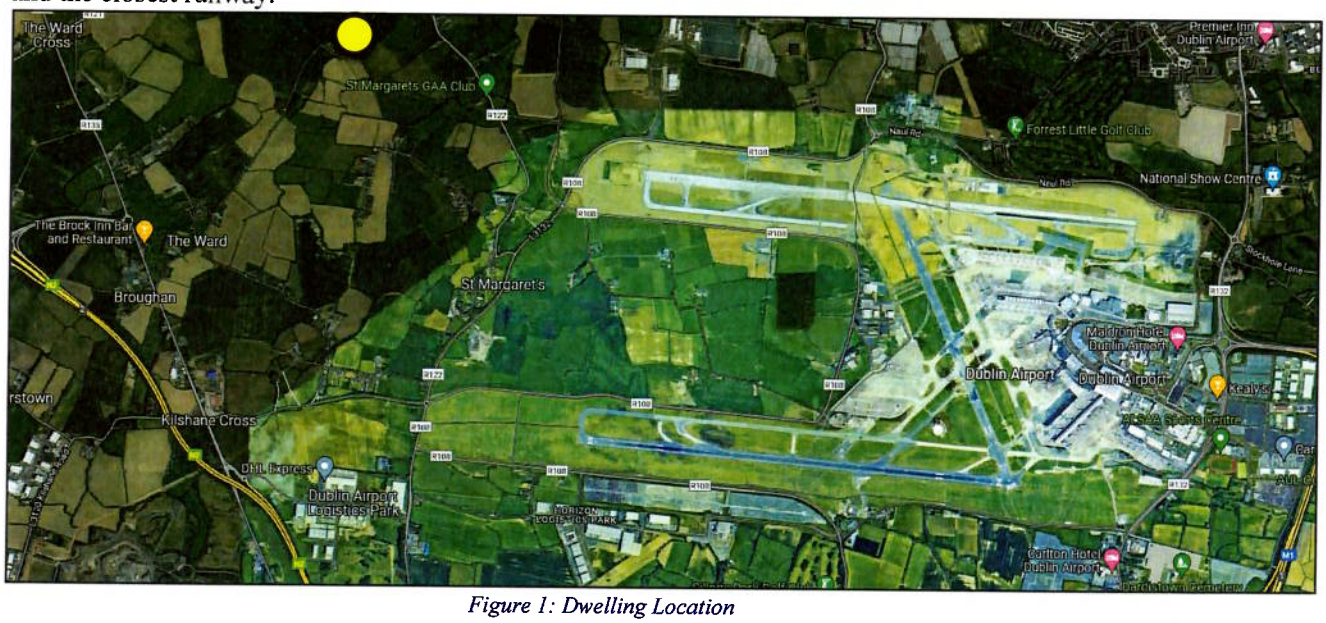

Figure 1: Dwelling Location

Unattended noise monitoring was carried out for approximately 24 hours, between 15:30 on 10th August 2022 and 15:30 on 11th August 2022. The survey was carried out prior to the launch and operation of the new North Runway (10L/28R) at Dublin Airport. Following a review of the audio recordings captured during the survey, air traffic was observed to be the dominant noise source.

1.1 Professional Competency

This report, including the noise survey element, has been undertaken and drafted by Eoghan Tyrrell, an Associate Member of the Institute of Acoustics (AMIOA), an accreditation gained through the completion of the Post-Graduate Diploma in Acoustics & Noise Control and MSc in Applied Acoustics. These qualifications comply with the requirements of a 'competent tester' under the EPA Guidance NG-4.

2. Instrumentation and Measurement Procedure

Measurements were captured through daytime and nighttime periods. All measurements were taken with calibrated precision grade, Type Approved (Class 1) sound level meters as per *IEC 61672-1:2013*. All equipment has calibration certificates traceable to the relevant standard. Measurements were captured in line with *ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures*.

Table 1: Measurement Equipment

Type	Make & Model	Serial No.
Sound Level Meter Outdoors	NTI XL2	A2A-06528-E0
Sound Level Meter Indoors	NTI XL2	A2A-12398-E0
Microphone / Preamp Outdoors	NTI M2230 / MA220	A22043 / 6471
Microphone / Preamp Indoors	NTI M2230 / MA220	A14300 / 6337
Calibrator	01dB CAL 01	11756

Two monitors were deployed for the survey period – one monitor outdoors and the other indoors.

The outdoor monitor was positioned on grass, 2 meters above ground, away from any reflective surfaces. The topography and surrounding areas were predominantly flat. An all-weather kit was employed on the monitor to ensure the wind did not interfere with the accuracy of the measurement microphone.

The indoor monitor was positioned in a bedroom on the first floor. All windows were closed. The façade-located wall vent was open to provide normal levels of ventilation. The indoor monitor was positioned 1.5 meters above the floor in the centre of the room.

Photographs of each monitor are presented in the appendix of this report. The meters were calibrated before and after the survey to ensure no drift in the measurement accuracy. Weather conditions were calm for the duration of the survey. On the morning of the survey at the dwelling location, with a hand-held Pro Anemometer (HP-866B), temperatures were measured at 25 degrees Celsius. Wind speeds were measured to be less than 1.5 meters per second. There was relatively little cloud cover. According to the Met Eireann data from the Casement weather station, temperatures ranged from 11.1 degrees Celsius to 27.4 degrees Celsius over the survey period. Wind speeds ranged from 2 knots (1 m/s) to 8 knots (4 m/s) over the survey period. The predominant wind direction was 220 degrees (Southwest). No precipitation fell during the survey period.

Figure 1 indicates the meter positions. The red circle indicates the outdoor monitoring position. The blue circle is positioned over the bedroom in which the indoor monitor was located.

Figure 2: Monitoring Locations

Both meters were set to report on spectral data in one-third octaves at one-minute intervals. Each meter also logged noise levels every second. Audio recordings were captured so air traffic noise events could be identified, and the air traffic measurements dissociated from other potential noise occurrences.

3. Measurement Results

The daytime and nighttime equivalent noise levels are presented in Table 2 and Table 3. All detected air traffic noise events and associated levels are presented in Table 4 and Table 5. Each individual event from Table 4 and Table 5 were auditioned and verified as air traffic noise.

Table 2: Outdoor Day Night Levels

Outdoors	
Period	Result
Daytime	44-47 dB Lday
Nighttime	45 dB Lnight
Day-Night	44 dB Ldn

Table 3: Indoor Day Night Levels

Indoors	
Period	Result
Daytime	24 dB Lday
Nighttime	23 dB Lnight
Day-Night	23 dB Ldn

Table 4: Individual Identified Air Traffic Noise Events and Associated Levels

Individual Air Traffic Noise Event Levels, Outdoors			
Time	Duration	LAeq	LAFmax
2022-08-10 17:41:30	0:00:39	46.8	52.0
2022-08-10 18:17:20	0:00:11	47.7	53.3
2022-08-10 19:10:20	0:00:14	45.6	51.3
2022-08-10 19:11:08	0:00:11	45.3	49.4
2022-08-10 19:13:42	0:00:12	46.9	52.7
2022-08-10 19:14:02	0:00:29	44.3	49.6
2022-08-10 19:16:16	0:00:07	45.2	51.7
2022-08-10 19:16:40	0:00:08	46.4	50.5
2022-08-10 19:19:03	0:00:08	48.1	51.3
2022-08-10 19:31:15	0:00:27	46.6	56.4
2022-08-10 19:33:54	0:00:22	47.0	51.5
2022-08-10 19:36:06	0:00:11	51.1	58.3
2022-08-10 19:42:12	0:00:16	50.0	55.2
2022-08-10 19:43:50	0:00:16	48.5	56.3
2022-08-10 19:44:58	0:00:16	50.2	57.8
2022-08-10 19:48:50	0:00:16	51.4	58.2
2022-08-10 19:49:52	0:00:12	49.5	54.3
2022-08-10 19:50:35	0:00:19	49.6	54.4
2022-08-10 20:04:37	0:00:36	52.1	61.7
2022-08-10 20:06:35	0:00:30	45.9	51.0

2022-08-10 20:08:18	0:00:23	54.2	62.6
2022-08-10 20:10:01	0:00:33	58.7	66.4
2022-08-10 20:13:42	0:00:32	51.6	57.6
2022-08-10 20:16:50	0:00:24	54.2	62.3
2022-08-10 20:20:46	0:00:33	55.5	64.2
2022-08-10 20:23:35	0:00:25	52.5	60.5
2022-08-10 20:26:46	0:00:31	52.0	60.9
2022-08-10 20:29:51	0:00:24	52.7	58.5
2022-08-10 20:33:00	0:00:21	56.7	65.7
2022-08-10 20:39:48	0:00:10	53.9	57.9
2022-08-10 20:42:59	0:00:21	52.3	58.4
2022-08-10 20:45:28	0:00:36	52.2	59.5
2022-08-10 20:47:46	0:00:11	50.7	56.0
2022-08-10 20:50:36	0:00:44	49.9	56.2
2022-08-10 20:53:33	0:00:15	50.8	54.6
2022-08-10 20:57:47	0:00:29	51.2	56.6
2022-08-10 21:25:41	0:00:13	53.6	57.5
2022-08-10 21:28:05	0:00:41	47.6	51.7
2022-08-10 21:29:51	0:00:24	49.8	53.6
2022-08-10 21:31:36	0:00:29	49.3	53.1
2022-08-10 21:35:21	0:00:34	51.2	58.5
2022-08-10 21:42:18	0:00:37	46.7	55.2
2022-08-10 21:47:18	0:00:31	44.7	51.6
2022-08-10 21:56:02	0:00:34	43.2	48.0
2022-08-10 22:10:03	0:00:32	45.8	52.2
2022-08-10 22:11:56	0:00:18	42.1	45.9
2022-08-10 22:12:59	0:00:32	47.5	55.3
2022-08-10 22:16:58	0:00:13	42.6	48.3
2022-08-10 22:18:01	0:00:36	43.6	49.5
2022-08-10 22:54:49	0:00:38	46.5	51.5
2022-08-10 23:23:28	0:00:38	45.0	50.1
2022-08-10 23:44:49	0:01:23	53.3	62.3
2022-08-10 23:53:22	0:00:32	44.8	53.5
2022-08-10 23:56:10	0:00:09	42.7	50.7
2022-08-11 00:04:04	0:00:44	40.3	47.8
2022-08-11 00:17:34	0:00:22	38.2	41.9
2022-08-11 00:18:52	0:00:17	38.9	43.8
2022-08-11 00:21:02	0:00:24	38.7	41.4
2022-08-11 00:28:12	0:00:32	45.3	50.6
2022-08-11 01:23:27	0:00:23	35.5	41.0
2022-08-11 02:28:36	0:00:15	37.2	41.0
2022-08-11 04:14:46	0:00:16	46.1	53.3
2022-08-11 04:38:02	0:00:24	40.8	45.5
2022-08-11 04:41:49	0:00:19	44.4	50.7
2022-08-11 04:51:46	0:00:14	47.3	50.8
2022-08-11 05:31:26	0:01:16	51.3	60.3
2022-08-11 05:34:59	0:00:18	54.9	61.5

2022-08-11 05:45:46	0:01:29	53.0	59.9
2022-08-11 05:54:51	0:01:13	53.5	60.1
2022-08-11 05:57:18	0:01:20	52.8	60.4
2022-08-11 05:58:55	0:00:14	51.5	57.0
2022-08-11 06:00:37	0:01:12	52.1	58.6
2022-08-11 06:02:23	0:01:06	52.1	59.7
2022-08-11 06:08:30	0:01:11	48.7	57.3
2022-08-11 06:10:30	0:01:41	52.8	60.0
2022-08-11 06:19:41	0:01:02	54.3	58.1
2022-08-11 06:21:07	0:00:57	53.6	59.6
2022-08-11 06:23:32	0:01:12	54.9	61.0
2022-08-11 06:25:06	0:00:47	50.4	55.1
2022-08-11 06:26:38	0:01:00	54.7	60.9
2022-08-11 06:28:12	0:01:06	55.8	64.1
2022-08-11 06:29:52	0:00:21	52.8	57.9
2022-08-11 06:30:21	0:00:50	51.3	56.0
2022-08-11 06:31:44	0:00:59	56.8	61.1
2022-08-11 06:32:51	0:00:57	59.3	66.2
2022-08-11 06:35:08	0:01:04	55.5	60.6
2022-08-11 06:36:37	0:01:07	54.2	62.0
2022-08-11 06:38:02	0:00:59	54.8	59.2
2022-08-11 06:39:29	0:01:27	55.3	61.8
2022-08-11 06:42:08	0:00:18	55.9	59.1
2022-08-11 06:42:42	0:00:35	56.3	60.9
2022-08-11 06:43:35	0:00:27	55.4	59.4
2022-08-11 06:44:09	0:00:37	54.5	58.6
2022-08-11 06:45:04	0:01:11	56.1	62.2
2022-08-11 06:46:30	0:01:00	58.3	67.4
2022-08-11 06:48:43	0:01:56	55.5	61.4
2022-08-11 06:50:54	0:01:04	53.4	58.6
2022-08-11 06:52:27	0:01:54	54.4	59.3
2022-08-11 06:54:29	0:01:10	52.7	58.1
2022-08-11 06:55:47	0:02:19	53.5	58.0
2022-08-11 06:58:23	0:00:21	53.0	57.7
2022-08-11 07:00:08	0:00:33	50.3	52.7
2022-08-11 07:00:50	0:00:21	62.1	68.1
2022-08-11 07:02:03	0:11:27	52.9	62.9
2022-08-11 07:13:47	0:00:53	61.2	69.4
2022-08-11 07:14:45	0:01:07	54.9	60.4
2022-08-11 07:15:59	0:00:59	57.0	63.7
2022-08-11 07:19:59	0:01:59	53.9	59.4
2022-08-11 07:22:04	0:01:11	55.4	64.1
2022-08-11 07:23:24	0:00:42	49.9	54.9
2022-08-11 07:24:21	0:01:07	53.6	61.0
2022-08-11 07:25:51	0:00:52	53.6	61.6
2022-08-11 07:27:30	0:01:23	51.4	56.5
2022-08-11 07:31:57	0:00:49	53.5	60.5

2022-08-11 07:34:04	0:01:12	47.5	52.5
2022-08-11 07:35:44	0:00:53	53.8	60.2
2022-08-11 07:37:16	0:00:57	53.0	58.0
2022-08-11 07:41:04	0:00:53	54.0	61.9
2022-08-11 07:42:26	0:00:52	53.9	60.2
2022-08-11 07:43:32	0:00:47	49.3	54.8
2022-08-11 07:48:00	0:00:52	49.4	55.1
2022-08-11 07:53:02	0:01:01	52.6	59.6
2022-08-11 07:56:23	0:00:57	54.5	62.0
2022-08-11 07:57:47	0:00:51	54.7	61.7
2022-08-11 08:00:22	0:00:45	53.3	60.8
2022-08-11 08:01:44	0:00:57	54.9	62.6
2022-08-11 08:04:32	0:00:58	48.5	56.3
2022-08-11 08:06:02	0:00:45	53.9	60.9
2022-08-11 08:08:33	0:00:53	54.1	61.8
2022-08-11 08:09:59	0:00:37	56.5	66.8
2022-08-11 08:11:27	0:00:46	55.1	59.8
2022-08-11 08:12:48	0:00:41	51.3	56.4
2022-08-11 08:14:13	0:00:53	54.8	62.2
2022-08-11 08:15:34	0:00:58	55.3	63.6
2022-08-11 08:17:02	0:00:56	57.5	65.1
2022-08-11 08:20:35	0:00:59	53.5	60.2
2022-08-11 08:22:02	0:01:00	53.1	59.6
2022-08-11 08:24:59	0:01:05	56.4	65.7
2022-08-11 08:27:37	0:00:56	54.7	64.6
2022-08-11 08:30:29	0:01:02	53.2	61.4
2022-08-11 08:32:03	0:00:54	52.3	59.3
2022-08-11 08:41:11	0:00:54	53.8	61.7
2022-08-11 08:43:56	0:02:24	49.2	59.1
2022-08-11 08:47:14	0:01:10	48.6	56.0
2022-08-11 08:54:03	0:01:06	51.5	60.8
2022-08-11 08:56:58	0:01:16	52.1	60.7
2022-08-11 09:00:27	0:01:02	51.7	61.1
2022-08-11 09:03:15	0:00:49	49.9	58.5
2022-08-11 09:06:09	0:01:02	49.9	59.4
2022-08-11 09:08:39	0:01:01	52.3	60.4
2022-08-11 09:17:00	0:00:54	48.2	58.4
2022-08-11 09:19:40	0:01:12	50.5	58.7
2022-08-11 09:24:05	0:00:53	50.9	58.8
2022-08-11 09:28:28	0:01:11	46.6	57.5
2022-08-11 09:31:48	0:01:00	39.4	46.9
2022-08-11 09:35:24	0:01:03	51.4	60.1
2022-08-11 09:37:49	0:00:49	55.2	67.0
2022-08-11 09:38:45	0:01:05	43.9	50.6
2022-08-11 09:40:55	0:00:46	49.8	58.3
2022-08-11 09:45:15	0:00:40	50.4	56.1
2022-08-11 09:49:44	0:00:43	55.9	64.2

2022-08-11 10:00:27	0:01:21	51.9	61.1
2022-08-11 10:03:34	0:01:29	49.9	62.5
2022-08-11 10:05:31	0:00:56	53.7	62.9
2022-08-11 10:07:04	0:00:13	44.4	52.3
2022-08-11 10:11:37	0:01:12	50.9	61.8
2022-08-11 10:15:15	0:01:17	43.8	52.0
2022-08-11 10:19:47	0:01:02	46.4	56.3
2022-08-11 10:22:32	0:01:05	52.7	62.5
2022-08-11 10:29:46	0:01:01	51.7	62.8
2022-08-11 10:32:32	0:00:57	44.6	54.9
2022-08-11 10:34:59	0:01:05	48.4	56.2
2022-08-11 10:37:41	0:00:57	49.6	60.3
2022-08-11 10:39:47	0:01:17	51.4	64.7
2022-08-11 10:42:03	0:01:14	51.2	64.6
2022-08-11 10:44:58	0:01:12	49.6	61.4
2022-08-11 10:47:22	0:01:00	51.2	61.6
2022-08-11 10:49:13	0:01:09	52.2	61.6
2022-08-11 10:51:47	0:01:05	51.9	62.3
2022-08-11 10:54:07	0:00:45	48.1	59.1
2022-08-11 10:54:55	0:01:10	46.3	53.3
2022-08-11 10:56:16	0:01:09	48.4	60.0
2022-08-11 10:57:49	0:00:45	45.9	54.0
2022-08-11 10:59:05	0:01:24	40.0	46.8
2022-08-11 11:02:09	0:01:44	49.4	64.5
2022-08-11 11:05:28	0:01:44	41.8	55.0
2022-08-11 11:12:21	0:01:22	49.6	61.6
2022-08-11 11:15:06	0:00:46	52.2	62.9
2022-08-11 11:18:38	0:00:47	42.8	54.6
2022-08-11 12:06:41	0:00:28	44.4	51.9
2022-08-11 12:08:09	0:00:27	45.0	50.4
2022-08-11 12:22:04	0:00:45	46.4	52.6
2022-08-11 12:30:38	0:00:35	44.6	51.4
2022-08-11 12:51:18	0:00:28	43.4	49.4
2022-08-11 13:04:05	0:01:55	46.6	54.6
2022-08-11 13:11:42	0:00:25	45.4	52.1
2022-08-11 13:30:59	0:00:28	48.4	54.9
2022-08-11 13:44:05	0:00:33	42.1	46.4
2022-08-11 14:45:50	0:00:41	45.3	51.7

Table 5: Individual Air Traffic Noise Event Levels, Indoors

Individual Air Traffic Noise Event Levels, Indoors			
Time	Duration	LAeq	LAFmax
2022-08-10 17:41:30	0:00:39	22.5	28.0
2022-08-10 18:17:20	0:00:11	27.5	32.8
2022-08-10 19:10:20	0:00:14	26.8	33.3
2022-08-10 19:11:08	0:00:11	23.5	26.2
2022-08-10 19:13:42	0:00:12	25.6	31.2
2022-08-10 19:14:02	0:00:29	24.1	29.7
2022-08-10 19:16:16	0:00:07	25.4	30.2
2022-08-10 19:16:40	0:00:08	24.0	27.0
2022-08-10 19:19:03	0:00:08	24.9	27.4
2022-08-10 19:31:15	0:00:27	24.2	29.5
2022-08-10 19:33:54	0:00:22	24.1	29.5
2022-08-10 19:36:06	0:00:11	31.0	39.7
2022-08-10 19:42:12	0:00:16	28.6	33.8
2022-08-10 19:43:50	0:00:16	28.6	36.1
2022-08-10 19:44:58	0:00:16	30.8	38.5
2022-08-10 19:48:50	0:00:16	31.1	38.3
2022-08-10 19:49:52	0:00:12	25.4	33.3
2022-08-10 19:50:35	0:00:19	28.0	36.0
2022-08-10 20:04:37	0:00:36	31.1	39.3
2022-08-10 20:06:35	0:00:30	23.6	30.3
2022-08-10 20:08:18	0:00:23	35.9	44.8
2022-08-10 20:10:01	0:00:33	40.3	49.9
2022-08-10 20:13:42	0:00:32	32.0	40.6
2022-08-10 20:16:50	0:00:24	34.2	42.8
2022-08-10 20:20:46	0:00:33	34.3	44.0
2022-08-10 20:23:35	0:00:25	31.9	37.6
2022-08-10 20:26:46	0:00:31	31.1	38.3
2022-08-10 20:29:51	0:00:24	33.9	40.6
2022-08-10 20:33:00	0:00:21	35.8	44.3
2022-08-10 20:39:48	0:00:41	30.5	37.3
2022-08-10 20:42:59	0:00:21	31.4	36.1
2022-08-10 20:45:28	0:00:36	31.9	39.8
2022-08-10 20:47:25	0:00:32	28.7	34.8
2022-08-10 20:50:36	0:00:44	30.7	38.9
2022-08-10 20:53:33	0:00:15	29.0	34.3
2022-08-10 20:57:47	0:00:29	32.1	40.3
2022-08-10 21:25:41	0:00:13	32.2	35.9
2022-08-10 21:28:05	0:00:41	27.2	31.4
2022-08-10 21:29:51	0:00:24	30.6	35.7
2022-08-10 21:31:36	0:00:29	27.2	32.5
2022-08-10 21:35:21	0:00:34	31.9	39.5
2022-08-10 21:42:18	0:00:37	28.9	36.7
2022-08-10 21:47:18	0:00:31	24.9	31.7
2022-08-10 21:56:02	0:00:34	25.5	33.9

2022-08-10 22:10:03	0:00:32	26.7	34.9
2022-08-10 22:11:56	0:00:18	22.0	25.6
2022-08-10 22:12:59	0:00:32	27.1	33.4
2022-08-10 22:16:58	0:00:13	22.5	25.8
2022-08-10 22:18:01	0:00:36	25.5	32.6
2022-08-10 22:54:49	0:00:38	26.6	33.5
2022-08-10 23:23:28	0:00:38	25.0	30.3
2022-08-10 23:44:49	0:01:23	26.8	36.5
2022-08-10 23:53:22	0:00:32	24.0	31.9
2022-08-10 23:56:10	0:00:09	22.6	28.2
2022-08-11 00:04:04	0:00:44	19.8	22.7
2022-08-11 00:17:34	0:00:22	19.4	23.1
2022-08-11 00:18:52	0:00:17	21.1	28.2
2022-08-11 00:21:02	0:00:24	19.8	24.8
2022-08-11 00:28:12	0:00:32	24.8	30.1
2022-08-11 01:23:27	0:00:23	18.6	19.2
2022-08-11 02:28:36	0:00:15	18.8	19.5
2022-08-11 04:14:46	0:00:16	23.6	29.3
2022-08-11 04:38:02	0:00:24	24.3	27.8
2022-08-11 04:41:49	0:00:19	22.8	26.6
2022-08-11 04:51:46	0:00:14	25.0	28.1
2022-08-11 05:31:26	0:01:16	25.2	31.8
2022-08-11 05:34:59	0:00:18	34.4	41.9
2022-08-11 05:45:46	0:01:29	28.8	35.7
2022-08-11 05:54:51	0:01:13	29.6	35.1
2022-08-11 05:57:18	0:01:20	28.3	36.2
2022-08-11 05:58:55	0:00:14	29.3	34.8
2022-08-11 06:00:37	0:01:12	28.6	36.1
2022-08-11 06:02:23	0:01:06	28.8	37.7
2022-08-11 06:08:30	0:01:11	25.7	32.0
2022-08-11 06:10:30	0:01:41	28.9	38.0
2022-08-11 06:19:41	0:01:02	29.5	34.1
2022-08-11 06:21:07	0:00:57	29.4	35.5
2022-08-11 06:23:32	0:01:12	30.3	38.7
2022-08-11 06:25:06	0:00:47	26.8	36.3
2022-08-11 06:26:38	0:01:00	30.5	36.8
2022-08-11 06:28:12	0:01:06	31.4	40.4
2022-08-11 06:29:52	0:00:21	29.5	34.2
2022-08-11 06:30:21	0:00:50	25.6	30.6
2022-08-11 06:31:44	0:00:59	33.8	44.6
2022-08-11 06:32:51	0:00:57	36.1	44.4
2022-08-11 06:35:08	0:01:04	31.1	37.5
2022-08-11 06:36:37	0:01:07	29.8	37.1
2022-08-11 06:38:02	0:00:59	30.4	35.4
2022-08-11 06:39:29	0:01:27	31.0	38.9
2022-08-11 06:42:08	0:00:18	32.7	37.7
2022-08-11 06:42:42	0:00:35	30.7	34.8

2022-08-11 06:43:35	0:00:27	32.9	38.0
2022-08-11 06:44:09	0:00:37	29.9	34.6
2022-08-11 06:45:04	0:01:11	32.2	37.9
2022-08-11 06:46:30	0:01:00	34.9	41.8
2022-08-11 06:48:43	0:01:56	32.2	38.6
2022-08-11 06:50:54	0:01:04	28.8	35.0
2022-08-11 06:52:27	0:01:54	30.1	36.0
2022-08-11 06:54:29	0:01:10	30.8	42.8
2022-08-11 06:55:47	0:02:19	29.9	36.6
2022-08-11 06:58:23	0:00:21	31.0	36.1
2022-08-11 07:00:08	0:00:33	28.9	31.6
2022-08-11 07:00:50	0:00:21	39.5	45.8
2022-08-11 07:02:03	0:11:27	29.2	38.0
2022-08-11 07:13:47	0:00:53	33.0	40.5
2022-08-11 07:14:45	0:01:07	31.2	34.8
2022-08-11 07:15:59	0:00:59	33.2	43.4
2022-08-11 07:19:59	0:01:59	30.6	36.4
2022-08-11 07:22:04	0:01:11	31.1	40.7
2022-08-11 07:23:24	0:00:42	26.1	31.8
2022-08-11 07:24:21	0:01:07	28.9	35.2
2022-08-11 07:25:51	0:00:52	28.5	36.1
2022-08-11 07:27:30	0:01:23	26.5	30.9
2022-08-11 07:31:57	0:00:49	28.7	36.2
2022-08-11 07:34:04	0:01:12	23.4	27.3
2022-08-11 07:35:44	0:00:53	28.9	35.1
2022-08-11 07:37:16	0:00:57	29.1	40.5
2022-08-11 07:41:04	0:00:53	29.3	36.7
2022-08-11 07:42:26	0:00:52	28.5	33.7
2022-08-11 07:43:32	0:00:47	25.5	30.6
2022-08-11 07:48:00	0:00:52	25.2	30.9
2022-08-11 07:53:02	0:01:01	27.8	35.9
2022-08-11 07:56:23	0:00:57	30.0	37.5
2022-08-11 07:57:47	0:00:51	29.9	39.1
2022-08-11 08:00:22	0:00:45	28.9	37.3
2022-08-11 08:01:44	0:00:57	29.9	37.9
2022-08-11 08:04:32	0:00:58	24.3	32.5
2022-08-11 08:06:02	0:00:45	28.8	34.3
2022-08-11 08:08:33	0:00:53	28.8	33.6
2022-08-11 08:09:59	0:00:37	31.4	37.9
2022-08-11 08:11:27	0:00:46	31.5	50.3
2022-08-11 08:12:48	0:00:41	26.9	32.4
2022-08-11 08:14:13	0:00:53	29.8	35.6
2022-08-11 08:15:34	0:00:58	30.5	38.2
2022-08-11 08:17:02	0:00:56	32.5	40.0
2022-08-11 08:20:35	0:00:59	28.8	35.6
2022-08-11 08:22:02	0:01:00	28.5	36.2
2022-08-11 08:24:59	0:01:05	31.1	38.9

2022-08-11 08:27:37	0:00:56	29.9	38.4
2022-08-11 08:30:29	0:01:02	28.5	37.3
2022-08-11 08:32:03	0:00:54	28.0	34.6
2022-08-11 08:41:11	0:00:54	29.0	36.5
2022-08-11 08:43:56	0:02:24	24.0	34.0
2022-08-11 08:47:14	0:01:10	20.8	25.7
2022-08-11 08:54:03	0:01:06	26.6	32.2
2022-08-11 08:56:58	0:01:16	27.7	38.1
2022-08-11 09:00:27	0:01:02	27.1	35.7
2022-08-11 09:03:15	0:00:49	28.7	41.6
2022-08-11 09:06:09	0:01:02	26.7	39.0
2022-08-11 09:08:39	0:01:01	28.0	36.4
2022-08-11 09:17:00	0:00:54	24.3	31.4
2022-08-11 09:19:40	0:01:12	26.1	33.8
2022-08-11 09:24:05	0:00:53	26.6	37.4
2022-08-11 09:28:28	0:01:11	23.9	34.6
2022-08-11 09:31:48	0:01:00	18.8	21.8
2022-08-11 09:35:24	0:01:03	27.1	36.2
2022-08-11 09:37:49	0:00:49	30.2	38.8
2022-08-11 09:38:45	0:01:05	19.6	21.4
2022-08-11 09:40:55	0:00:46	25.7	33.7
2022-08-11 09:45:15	0:00:40	25.8	30.2
2022-08-11 09:49:44	0:00:43	31.9	43.2
2022-08-11 10:00:27	0:01:21	27.7	37.3
2022-08-11 10:03:34	0:01:29	24.6	34.9
2022-08-11 10:05:31	0:00:56	29.4	43.7
2022-08-11 10:07:04	0:00:13	19.7	22.1
2022-08-11 10:11:37	0:01:12	27.2	41.0
2022-08-11 10:15:15	0:01:17	19.5	22.7
2022-08-11 10:19:47	0:01:02	23.4	31.8
2022-08-11 10:22:32	0:01:05	28.4	37.9
2022-08-11 10:29:46	0:01:01	27.5	38.3
2022-08-11 10:32:32	0:00:57	21.4	29.7
2022-08-11 10:34:59	0:01:05	25.1	35.5
2022-08-11 10:37:41	0:00:57	26.6	40.9
2022-08-11 10:39:47	0:01:17	28.7	40.7
2022-08-11 10:44:58	0:01:12	25.7	37.1
2022-08-11 10:47:22	0:01:00	26.9	38.2
2022-08-11 10:49:13	0:01:09	28.5	42.9
2022-08-11 10:51:47	0:01:05	28.5	37.9
2022-08-11 10:54:07	0:00:45	24.5	32.7
2022-08-11 10:54:55	0:01:10	20.8	25.4
2022-08-11 10:56:16	0:01:09	25.1	35.7
2022-08-11 10:57:49	0:00:45	22.3	30.8
2022-08-11 10:59:05	0:01:24	19.1	24.0
2022-08-11 11:02:09	0:01:44	25.7	36.9
2022-08-11 11:05:28	0:01:44	21.5	33.2

2022-08-11 11:12:21	0:01:22	25.5	35.1
2022-08-11 11:15:06	0:00:46	27.0	34.8
2022-08-11 11:18:38	0:00:47	19.4	28.9
2022-08-11 12:06:41	0:00:28	25.2	31.1
2022-08-11 12:08:09	0:00:27	24.5	32.2
2022-08-11 12:22:04	0:00:45	22.5	27.1
2022-08-11 12:30:38	0:00:35	22.4	30.8
2022-08-11 12:51:18	0:00:28	24.4	30.6
2022-08-11 13:04:05	0:01:55	23.5	33.6
2022-08-11 13:11:42	0:00:25	26.5	33.5
2022-08-11 13:30:59	0:00:28	27.3	34.9
2022-08-11 13:44:05	0:00:33	20.9	26.2
2022-08-11 14:45:50	0:00:41	24.9	29.7

The entire survey data is too large to append to this report. However, the full survey data set can be downloaded at the following link: https://www.iacoustics.net/house6_noisedata/

4. Appendix I – Equipment Calibration Certificates

4.1 Outdoor Meter

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	26 November 2021	CERTIFICATE NUMBER	2021-1139
DATE OF CALIBRATION	25 November 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 1	

Gracey & Associates
Barn Court Shelton Road
Upper Dean PE28 0NQ
Tel: 01234 708835
www.gracey.co.uk

TEST ENGINEER
Jamie Bishop

APPROVING SIGNATORY
Greg Rice

Equipment	**NTi XL2, s/n: a2a-06528-e0**
Description	Acoustic Analyser, NTi Audio
Customer	iAcoustics Unit A16, Kingswood Business Park, Clondalkin, Dublin, D22 A990

Standards
BS EN 61672

Conditions

Atmospheric Pressure	101.0 kPa
Temperature	22.0 °C
Relative Humidity	34.5 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	06-Aug-20	HP 34401	3146A16728	30-Mar-21
Vaisala HMP23	S2430007	03-Aug-20			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.

Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972
Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.

4.2 Indoor Meter

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	19 February 2021	CERTIFICATE NUMBER	2021-0302
DATE OF CALIBRATION	19 February 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 1	

Gracey & Associates
Barn Court Shelton Road
Upper Dean PE28 0NQ
Tel: 01234 708835
Fax: 01234 252332
www.gracey.com

TEST ENGINEER	APPROVING SIGNATORY
Greg Rice	Greg Rice

Equipment	**NTi XL2, s/n: a2a-12398-e0**
Description	Hand Held Acoustic Analyser - Class 1, NTi Audio
Customer	iAcoustics Unit A16, Kingswood Business Park, Clondalkin, D22 A990

Standards
IEC 61672 Class 1

Conditions

Atmospheric Pressure	99.9 kPa
Temperature	24.8 °C
Relative Humidity	34.6 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	06-Aug-20	HP 34401	3146A29376	11-Feb-20
Vaisala HMP23	S2430007	03-Aug-20			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.

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Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.

4.3 Outdoor Microphone / Preamplifier

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230** **Measurement Microphone**
  consisting of
  PreAmp Serial Number: **6471**
  Capsule Serial Number: **A22043**

- Customer: **Integrated Acoustic Solution**
  Kingwood Business Park
  Baldonell, Dublin
  Ireland

- Date of Calibration: **08 March 2022**

- Certificate Number: **44628-A22043-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: B.Dohmen

Signature:

Stamp: NTi Audio GmbH Frielingsdorfweg 4 45239 Essen info@nti-audio.de +49 (0)201 6470 1900 AUDIO

NTi Audio GmbH • Frielingsdorfweg 4 • 45239 Essen • Tel: +49 (0)201 6470 1900
www.nti-audio.de • info@nti-audio.de

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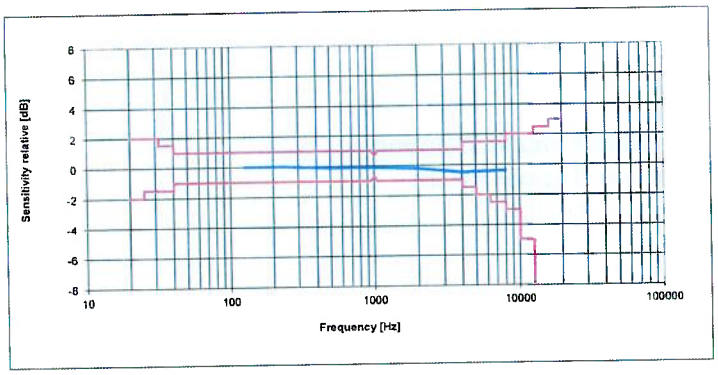
Date: 08 March 2022
Calibration of: M2230 consisting of
PreAmp Serial Number: 6471
Capsule Serial Number: A22043

- Peformance on receipt: **defect**

- Detailed Calibration Test Results:

	before		actual	calibration uncertainty[1]
System calibration				
Sensitivity @ 1 kHz, 114 dBSPL	41,4	mv/Pa	**45,2 mV/Pa**	±2.85%
Frequency response	Class 1		acc. IEC 61672	



- Test Conditions:

Temperature:	**23,9 °C**	±0.5 °C
Relative Humidity:	**27,4%**	±2%
Air Pressure:	**1008,9 hPa**	±0.25 kPa

- Calibration Equipment Used:

  - MTG Sound Calibrator, Type 4000, S/No. 32519
    Last Calibration: 09.09.2021, Next Calibration: 09.09.2022
    Kalibrierschein D-K-15008-01-00 2021-09

  - NTi Audio Microphone M2230, S/No. 10485
    Last Calibration: 21.12.2021, Next Calibration: 21.12.2022
    Calibrated by NTi Audio meeting product specifications

  - NTi Audio Flexus FX 100, SN 11347
    Last Calibration: 03.09.2021, Next Calibration: 03.09.2022
    Calibrated by NTi Audio meeting product specifications

  - NTi Audio XL2, S/No. A2A-14907-E0

[1] The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

NTi Audio GmbH • Frielingsdorfweg 4 • 45239 Essen • Tel: +49 (0)201 6470 1900
www.nti-audio.de • info@nti-audio.de

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4.4 Indoor Microphone / Preamplifier

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	19 February 2021	CERTIFICATE NUMBER	2021-0303
DATE OF CALIBRATION	19 February 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 2	

Gracey & Associates
Barn Court Shelton Road
Upper Dean PE28 0NQ
Tel: 01234 708835
Fax: 01234 252332
www.gracey.com

TEST ENGINEER	APPROVING SIGNATORY
Greg Rice	Greg Rice

Equipment	**NTi MC230, s/n: A14300**
Description	Microphone - 1/2" FF 48V, NTi Audio
Customer	iAcoustics Unit A16, Kingswood Business Park, Clondalkin, D22 A990

Standards
BS EN 61672 Class 1

Conditions

Atmospheric Pressure	99.9 kPa
Temperature	24.8 °C
Relative Humidity	34.6 %

Calibration Data

Sensitivity	-27.44 dB

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
B&K 4134 L	1675305	14-Jul-20	Druck DPI 141	479	06-Aug-20
HP 34401	3146A29376	11-Feb-20	Nor 1253	20848	14-Jul-20
Stanford DS36	33213	17-Aug-20	Vaisala HMP23	S2430007	03-Aug-20

Notes
We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.

Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972
Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.

CERTIFICATE OF CONFORMANCE

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	19 February 2021	CERTIFICATE NUMBER	2021-0304
DATE OF CALIBRATION	19 February 2021		
CALIBRATION INTERVAL	24 months	PAGE 1 OF 1	

Gracey & Associates
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www.gracey.com

TEST ENGINEER
Greg Rice

APPROVING SIGNATORY
Greg Rice

Equipment	**NTi MA220, s/n: 6337**
Description	Preamplifier - XL2, NTi Audio
Customer	iAcoustics
	Unit A16, Kingswood Business Park, Clondalkin, D22 A990

Standards
Manufacturer's Original Specifications

Conditions

Atmospheric Pressure	99.9 kPa
Temperature	24.8 °C
Relative Humidity	34.6 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	06-Aug-20	HP 34401	3146A29376	11-Feb-20
Vaisala HMP23	S2430007	03-Aug-20			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection. The uncertainties are for a confidence probability of not less than 95%.

Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972
Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.

4.5 Calibrator

Unit 2, Goldenbridge Industrial Estate, Tyrconnell Rd, Inchicore, Dublin, D08 YY38
www.sonitussystems.com Email: info@sonitussystems.com

SONITUS SYSTEMS

Calibration Report

Equipment Information

Model:	CAL01
Serial Number:	11756

Ambient Conditions

Measurement conditions were within the tolerances defined in BS EN 60942.

Barometric Pressure:	1030 hPa
Temperature:	21.0 °C
Relative Humidity:	49 %

Results

Calibrator Setting	Measured Parameter	Measured Value	Tolerance +/-	Uncertainty +/-
94 dB, 1kHz	Sound pressure level (dB)	94.26	0.4 dB	0.14 dB
	Frequency (Hz)	1000.06	10 Hz	0.25 Hz
	Distortion (%)	0.20	3.0 %	0.3 %
114 dB, 1kHz	Sound pressure level (dB)	114.20	0.4 dB	0.14 dB
	Frequency (Hz)	1000.06	10 Hz	0.25 Hz
	Distortion (%)	0.35	3.0 %	0.3 %

RESULT: PASS

As public evidence was available, from a testing organization responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003

The manufacturers guidelines concerning free-field correction should be obvserved when using the calibrator.

Notes

1. All measurements were made with the half-inch configuration of the calibrator in place.
2. The measurement uncertainty is reported as a standard uncertainty multiplied by a coverage factor k=2 which, for a normal probabbility distribution, corresponds to a coverage probability of approximately 95%.
3. The given uncertainty corresponds to measured values only and does not relate to the long term stability of the device under test.
4. The user manual for the device under test was obtained from the manufacturer's website.

DA315.2 Acoustic Calibrator Calibration Certificate 2

5. Appendix II – Noise Monitor Photographs

Appendix H

8.5.7 Ensuring Environmental Protection and Sustainability

An overriding theme of the Plan is the need to protect the environment throughout the County. In terms of Dublin Airport, the LAP considers the likely direct and indirect effects of the future development of Dublin Airport on the local environment, including the communities surrounding the Airport. Noise, flood risk management, sustainable urban drainage, foul drainage and water supply, surface water quality, ground water and air quality are dealt with in the LAP, each with its own specific objectives. In addition, the built and natural heritage including archaeology and architectural heritage are examined in the context of Dublin Airport, with specific objectives relating to the protection of same. The Plan supports the objectives relating the environmental issues, referred to above, as indicated in the Dublin Airport LAP.

Noise is discussed separately below as the noise zones were subject to Variation no. 1 of the Fingal Development Plan 2017–2023 and as such will be included in this Plan.

i. Airport Noise

Noise zones relating to Dublin Airport have been in place for many years to aid land use planning. Previous noise zones dated back to 2005 and as such it was considered appropriate to update the noise zones for Dublin Airport to allow for more effective land use planning for development within airport noise zones.

In addition, the *Noise Action Plan for Dublin Airport 2019–2023 (NAP)* was prepared under the Environmental Noise Regulations 2006 and was adopted in December 2018. The Noise Action Plan is designed to manage noise issues and effects associated with existing operations at Dublin Airport and sets out a number of actions to address such issues.

Fingal County Council has been designated as the Aircraft Noise 'Competent Authority' (ANCA) for the purposes of monitoring Aircraft Noise levels at Dublin Airport. As such, all planning applications at Dublin Airport are referred to the Competent Authority by the Planning Authority for assessment. In assessing a planning application, ANCA must determine whether the proposals have the potential to cause a noise problem. The assessment role includes an examination of planning applications by the Competent Authority to ascertain whether they could have aircraft noise implications which require mitigation.

The noise zones relating to Dublin Airport were updated in 2019 in order to allow for more effective land use planning for development within airport noise zones. The updated policies relating to development in noise zones are set out in Variation no. 1 of the *Fingal Development Plan 2017–2023* and these will apply in the Plan.

Noise Zones have been prepared in relation to aircraft noise associated with Dublin Airport as outlined in Table 8.1 below and supported by the following objectives. The approach taken in preparing these noise zones is considered to be supportive of National Policy Objective 65 set out in the Department of Housing Planning and Local Government (DHPLG) National Planning Framework 2040, February 2018, to:

"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans."

This approach also has regard for land use planning which is a component of the ICAO Balanced Approach to Aircraft Noise Management, as set out under EU Regulation 598/2014. This approach is therefore considered also to align with the key objective set out in the Dublin *Airport Noise Action Plan 2019*, which is:
"to avoid, prevent and reduce, where necessary, on a prioritised basis the effects due to long term exposure to aircraft noise, including health and quality of life through implementation of the International Civil Aviation Organisation's 'Balanced Approach' to the management of aircraft noise as set out under EU Regulation 598/2014".

There is a need to minimise the adverse impact of noise without placing unreasonable restrictions on development and to avoid future conflicts between the community and the operation of the Airport. Three noise zones are shown in the Development Plan maps, Zones B and C within which the Council will continue to restrict inappropriate development, and Zone A within which new provisions for residential development and other noise sensitive uses will be actively resisted. An additional assessment zone, Zone D exists to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment.

Table 8.1 presents the four aircraft noise zones and the associated objective of each zone along with an indication of the potential noise exposure from operations at Dublin Airport. The zones are based on potential noise exposure levels due to the Airport using either the new northern or existing southern runway for arrivals or departures.

The noise zoning system has been developed with the overarching objective to balance the potential impact of aircraft noise from the Airport on both external and internal noise amenity. This allows larger development which may be brought forward in the vicinity of the Airport's flight paths to be identified and considered as part of the planning process. The focus of the noise zones is to ensure compatibility of residential development and ensuring compatibility with pertinent standards and guidance in relation to planning and noise, namely:

- *National Planning Framework 2040, DHPLG, February 2018;*
- *ProPG: Planning & Noise – New Residential Development, May 2017;*
- British Standard BS8233:2014 *'Guidance on sound insulation and noise reduction for buildings'*; and
- *ICAO guidance on Land-use Planning and Management* in Annex 16, Volume I, Part IV and in the *ICAO Doc 9184, Airport Planning Manual*, Part 2 — Land Use and Environmental Control.

Where development includes other non-residential noise sensitive receptors, alternative design guidance will need to be considered by the developer. Non-residential buildings and uses which are viewed as being noise sensitive within the functional area of FCC include hospitals, residential care facilities and schools.

Table 8.1: Aircraft Noise Zones

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
D	≥ 50 and < 54 dB LAeq, 16hr and ≥ 40 and < 48 dB Lnight	To identify noise sensitive developments which could potentially be affected by aircraft noise and to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment. All noise sensitive development within this zone is likely to be acceptable from a noise perspective. An associated application would not normally be refused on noise grounds, however where the development is residential-led and comprises non-residential noise sensitive uses, or comprises 50 residential units or more, it may be necessary for the applicant to demonstrate that a good acoustic design has been followed. Applicants are advised to seek expert advice.
C	≥ 54 and < 63 dB LAeq, 16hr and ≥ 48 and < 55 dB Lnight	To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure, where appropriate, noise insulation is incorporated within the development Noise sensitive development in this zone is less suitable from a noise perspective than in Zone D. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed. The noise assessment must demonstrate that relevant internal noise guidelines will be met. This may require noise insulation measures. An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the development's design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels. Applicants are strongly advised to seek expert advice.
B	≥ 54 and < 63 dB LAeq, 16hr and ≥ 55 dB Lnight	To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure noise insulation is incorporated within the development. Noise sensitive development in this zone is less suitable from a noise perspective than in Zone C. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed. Appropriate well-designed noise insulation measures must be incorporated into the development in order to meet relevant internal noise guidelines. An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the developments design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels. Applicants must seek expert advice.
A	≥ 63 dB LAeq, 16hr and/or ≥ 55 dB Lnight	To resist new provision for residential development and other noise sensitive uses. All noise sensitive developments within this zone may potentially be exposed to high levels of aircraft noise, which may be harmful to health or otherwise unacceptable. The provision of new noise sensitive developments will be resisted.
Notes:	› 'Good Acoustic Design' means following the principles of assessment and design as described in ProPG: Planning & Noise – New Residential Development, May 2017; › Internal and External Amenity and the design of noise insulation measures should follow the guidance provided in British Standard BS8233:2014 *"Guidance on sound insulation and noise reduction for buildings"*	

The list of townlands to which Assessment Zone D applies are contained in Appendix 10.

Policy DAP5 – Noise

Support the actions contained within the *Noise Action Plan for Dublin Airport 2019–23*, or any subsequent plan or extension of same.

Policy DAP6 – Health of Residents and Aviation Noise

Protect the health of residents affected by aviation noise, particularly night-time noise.

Objective DAO11 – Requirement for Noise Insulation

Strictly control inappropriate development and require noise insulation where appropriate in accordance with Table 8.1 above within Noise Zone B and Noise Zone C and where necessary in Assessment Zone D, and actively resist new provision for residential development and other noise sensitive uses within Noise Zone A, as shown on the Development Plan maps, while recognising the housing needs of established families farming in the zone. To accept that time based operational restrictions on usage of the runways are not unreasonable to minimise the adverse impact of noise on existing housing within the inner and outer noise zone.

Objective DAO12 – Noise Zones and New Housing for Farming Families

Notwithstanding Objective DAO11, apply the provisions with regard to New Housing for Farming Families only, as set out in Chapter 3 Sustainable Placemaking and Quality Homes, within the Inner Noise Zone subject to the following restrictions:

- Under no circumstances shall any dwelling be permitted within the predicted 69 dB LAeq 16 hours noise contour,
- Comprehensive noise insulation shall be required for any house permitted under this objective,
- Any planning application shall be accompanied by a noise assessment report produced by a specialist in noise assessment which shall specify all proposed noise mitigation measures together with a declaration of acceptance of the applicant with regard to the result of the noise assessment report.

Objective DAO13 – Aircraft Operations and Noise

Ensure that aircraft-related development and operation procedures proposed and existing at the Airport consider the requirements of the Aircraft Noise Regulations, the Noise Abatement Objective (NAO) for Dublin Airport, the Noise Action Plan, Health Issues and all measures necessary to mitigate against the potential negative impact of noise from aircraft operations (such as engine testing, taxiing, taking off and landing), on existing established residential communities, while not placing unreasonable, but allowing reasonable restrictions on airport development to prevent detrimental effects on local communities, taking into account the EU Regulation 598/2014 (or any future superseding EU regulation applicable) having regard to the 'Balanced Approach' and the involvement of communities in ensuring a collaborative approach to mitigating against noise pollution.

Objective DAO14 – Aircraft Movements and Development

Restrict development which would give rise to conflicts with aircraft movements on environmental or safety grounds on lands in the vicinity of the Airport and on the main flight paths serving the Airport, and in particular restrict residential development in areas likely to be affected by levels of noise inappropriate to residential use.

Objective DAO15 – Ongoing Review of Operation of Noise Zones

Review the operation of the Noise Zones on an ongoing basis in line with the most up to date legislative frameworks in the area, the ongoing programme of noise monitoring in the vicinity of the Airport flight paths, and the availability of improved noise forecasts.

Objective DAO16 – Introduction of a Noise Quota System

To encourage and promote the introduction of a noise quota system at Dublin Airport to encourage Airlines to use quieter aircraft so as to prevent and reduce, where necessary, on a prioritised basis the effects due to long term exposure to aircraft noise.

Objective DAO17 – Crosswind Runway

Restrict the Crosswind Runway to essential occasional use on completion of the second east-west runway. 'Essential' use shall be interpreted as use when required by international regulations for safety reasons.

Policy DAP7 – Align with Local Area Plan Objectives

Ensure that all development within the Dublin Airport Local Area Plan lands will comply with the following Objectives of the *Dublin Airport Local Area Plan, 2020*, or any subsequent plan or extension of same. These include;

- Flood Risk Management Objectives
- Sustainable Urban Drainage Objectives
- Water Supply Objectives
- Surface Water Quality Objectives
- Ground Water Objectives
- Air Quality Objectives
- Archaeology Objectives
- Architectural Heritage Objectives
- Natural Heritage Objectives

ii. Safety

Dublin Airport's Public Safety Zones show an Inner Public Safety Zone and an Outer Public Safety Zone in accordance with the guidance set out in the Environmental Resources Management [ERM] Report 2005. Specifically, this ERM Report provides guidance on the potential use and scale of development that may be considered appropriate within these zones.

The Council will continue to follow the advice of the Irish Aviation Authority regarding the effects of proposed development on the safety of aircraft and the safe and efficient navigation thereof.

Objective DAO18 – Safety

Promote appropriate land use patterns in the vicinity of the flight paths serving the Airport, having regard to the precautionary principle, based on existing and anticipated environmental and safety impacts of aircraft movements.

Objective DAO19 – Review of Public Safety Zones

Support the review of Public Safety Zones associated with Dublin Airport and implement the policies to be determined by the Government in relation to these Public Safety Zones.

Objective DAO20 – Irish Aviation Authority Publications

Take into account relevant publications issued by the Irish Aviation Authority in respect of the operations of and development in and around Dublin Airport.

Objective DAO21 – Irish Aviation Authority Advice

Continue to take account of the advice of the Irish Aviation Authority with regard to the effects of any development proposals on the safety of aircraft or the safe and efficient navigation thereof. To refer planning applications for any proposals that may be developed in the environs of the Airport to the Irish Aviation Authority and daa in accordance with the Obstacle Limitation Requirements of Regulation (EU) No 139 / 2014 (EASA Certification Specifications), previously required under ICAO Annex 14, and which are depicted on the aerodrome operator's map.

Objective DAO22 – Weston Aerodrome

Have regard to the safety and environmental impacts of aircraft movements associated with Weston Aerodrome in the assessment of any relevant development proposal.

8.5.8 Prioritising Community Engagement

There are extensive residential areas located in the wider areas surrounding the Airport and as the Airport continues to grow, it is important that the impact on these communities is appropriately considered. As such, the aim is to create a balance between the further development and operations of the Airport and the needs of neighbouring communities.

Formal engagement between Fingal County Council, Dublin Airport Authority (daa) and neighbouring airport communities occurs through a number of ongoing platforms such as the Dublin Airport Environmental Working Group [DAEWG] and Community Liaison Group [CLG]. The DAEWG provides focus on the matters relating to the monitoring of airport noise, flood risk, air quality and the growth of the Airport. The [CLG] is another important forum to further engagement specifically with the local community of St. Margaret's which is located immediately to the west of the Airport lands. This forum provides the opportunity for the Council, daa and the community of St. Margaret's to communicate in an open and transparent manner. The key focus is on creating an engaging and collaborative forum that discusses issues of relevance to the area, particularly in the context of Airport growth and operations.

Objective DA28 of the *Fingal Development Plan 2017-2023* required the preparation of a strategy for St. Margaret's Special Policy Area involving consultation between the existing community, Fingal County Council and daa. This has been prepared and is included in Appendix 1 of the *Dublin Airport Local Area Plan 2020*.

Fingal County Council will continue to engage with local communities that are likely to be affected by the growth of the Airport.

2.28 The recommended ProPG internal noise level guidelines are described in ***Figure 2***. These guidelines reflect and extend current practice contained in BS8233:2014. For clarity, blue italic font is used to highlight additions to the guidance contained in Table 4 of BS8233:2014. The dB values provided in the table for different activities are target levels. The table plus supporting notes are referred to as ProPG internal noise level guidelines.

2.29 External noise levels vary from day-to-day at most sites hence the internal L_{Aeq} target noise levels are annual averages (Note 3) and would normally represent typical conditions. Where there is significant variability in the noise exposure across the year and where annual average noise levels are not considered representative, then it may be more appropriate to average over a shorter time period. This situation may arise, for example, in the vicinity of airports that are likely to be busier in the summer months.

2.30 LPAs should initially seek to achieve the internal noise level guidelines in noise-sensitive rooms in new residential developments. However, national planning and noise policy does not require that those levels are always achieved, in particular, if to do so would disproportionately increase the cost of the development, or would lead to an outcome that does not meet the test of good acoustic design. Note 7 to BS8233:2014 provides advice on the possible relaxation of the internal target levels by up to 5 dB and Note 7 to ***Figure 2*** provides additional derived guidance on the circumstances when most people are likely to regard the internal L_{Aeq} noise levels as "unreasonable" or "unacceptable". The use of these two terms is intentional and they form an integral part of the choice of recommendations to the decision maker as described in ***Section 3***. Where internal levels are considered "unreasonable", applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Every effort should be made to avoid occupants of relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form ***(see Section 3D)***.

2.31 Note 4 to BS8233:2014 highlights the potential impact of noise events on sleep but does not provide any specific guidance. Note 4 to ***Figure 2*** has been expanded to provide recommended guidelines for the maximum internal level of noise from individual external noise events. In noise-sensitive rooms at night (e.g. bedrooms) individual noise events (from all sources) should not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night as this represents a threshold below which the effects of individual noise events on sleep can be regarded as negligible. ***Appendix A*** includes further discussion on the relationship between sleep and the maximum level of, and the number of, individual noise events. It is difficult, based on currently available evidence, to reach a clear conclusion on when the impact of individual noise events should be regarded as "unreasonable" or "unacceptable". It is therefore recommended that a more detailed site and scheme specific assessment of the potential impact on occupants should be undertaken where individual noise events are expected to exceed 45dB $L_{Amax,F}$ more than 10 times a night.

2.32 The recommended internal noise level guidelines are supported by advice contained in the WHO Community Noise Guidelines (2000). More recent advice from the WHO (e.g. Table 1 in the WHO Night Noise Guidelines for Europe), indicates that more stringent control of maximum event noise levels inside buildings can avoid all risk of any detectable physiological effect (NOEL – no observed effect level). However, controlling to these values is not currently required by planning or noise policy and there is

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	**Living room**	**35 dB $L_{Aeq,16\ hr}$**	-
Dining	**Dining room/area**	**40 dB $L_{Aeq,16\ hr}$**	-
Sleeping (daytime resting)	**Bedroom**	**35 dB $L_{Aeq,16\ hr}$**	**30 dB $L_{Aeq,8\ hr}$** **45 dB $L_{Amax,F}$** (Note 4)

NOTE 1 The Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the internal L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form **(see Section 3.D)**.

Figure 2. ProPG Internal Noise Level Guidelines (additions to BS8233:2014 shown in blue)

APPENDIX A. DEALING WITH NOISE EVENTS

A.1 The WHO Guidelines for Community Noise and the current edition of BS8233 recognise that assessing the impacts of noise on sleep only in terms of overall energy averaging metrics, such as the $L_{Aeq,T}$, can be insufficient to address all noise related sleep impacts. For example, research suggests that *"The equivalent noise level* [i.e. $L_{Aeq,T}$] *seems to be a suitable predictor for subjectively evaluated sleep quality but not for physiological disturbances of sleep"*[2]. Furthermore many studies[3] have shown clear exposure response relationships between the maximum level of individual noise events and impacts during sleep such as arousals, awakenings or body movements. Consequently, when assessing impacts of noise on sleep it is often appropriate to supplement the assessment of the overall noise levels at night measured using the $L_{Aeq,T}$ index by also considering the noise from individual noise events, typically described with the L_{Amax} or the SEL noise metrics.

A.2 Before going on to consider how to use L_{Amax} or the SEL metrics to assess the impacts of discrete noise events on sleep it is worthwhile considering how noise can effect sleep. Phrases like "sleep disturbance", "sleep interference" or 'sleep interruption' imply that the noise from individual noise events would fully awaken people who are asleep i.e. they would become completely conscious. However, the 'effects' of noise on sleep referred to in the WHO Guidelines and the vast majority of research and wider literature etc. cover many impacts during sleep, not solely being woken up. In order to understand the effects of these impacts it is important to recognise that sleep consists of a cycle of alternating stages which during a typical night repeats roughly every 90 minutes. This cycle consists of stages 1 and 2 of light non-rapid eye movement (NREM) sleep, a stage 3 of heavy sleep followed by a stage of rapid eye movement (REM) heavy sleep.

A.3 The noise level threshold for awakening is highest in the stage 3 and REM stages of heavy sleep, and is lower in the light sleep stages 1 and 2[4]. The awakening noise threshold also depends on the characteristics of the noise e.g. intermittent noises or rapid on-set[5] noise events have greater impact than continuous noise or slower onset noise events; as well as the connotation of the noise. For example, whispering the sleeper's name can awake the person more easily than a much louder but anonymous noise[6]. Similarly the noise of an alarm or warning will awaken a sleeper more easily than a noise of similar level without any particular meaning.

A.4 Noise effects on sleep increase arousal levels leading to a redistribution of time spent in the different stages of sleep, with typically an increase in the duration of the awake and light sleep stages 1 and 2 as these are more easily disturbed by noise; and a reduction of time in the heavy sleep stage 3 and REM parts of the cycle. Such sleep fragmentation has been shown to affect, among other effects, waking psychomotor function, next day performance, memory, creativity, risk-taking behaviour, mood, signal detection performance, daytime fatigue and

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2 B Griefahn, A Marks, C Kuenemund & M Basner, Awakenings by Road, rail and Air traffic noise, Forum Acusticum, 2005.

3 E.g. Basner M, Isermann U, Elmenhorst D et al. Effects of nocturnal aircraft noise (Vol1): executive summary. Deutsches Zentrum Fur Luft-und Ruamfarht (DLR) Cologne, Germany 2004:FB2004-07/E; Marks A, Griefahn B, Basner M, Event related awakenings caused by nocturnal transportation noise. Noise Control Eng J 2008; 31:569-77. and, Passchier-Vermeer, Vos H, Stenbeekeers J H M, Van der Ploeg FD, Groothuis-Oudshoorn K. Sleep disturbance and aircraft noise exposure effect relationships. TNO Neterlands 2002: Report 2002.027 1-245.

4 Muzet A. Re'activite' de l'Homme endormi. In: Benoit O, Foret J, editors. Le Sommeil humain. Bases experimentales physiologiques et physiopathologiques. Paris: Masson; 1992. p. 77–83.

5 The rate at which the instantaneous noise levels rise from around the ambient level to the maximum level during the noise event e.g. road vehicle or train pass by or aircraft over flight.

6 Oswald I, Taylor AM, Treisman M. Discriminative responses to stimulation during human sleep. Brain 1960; 83:440–53.

tiredness and to increase accident risks. The degree to which these effects occur varies at any particular sound level and the association with noise in some cases is not particularly strong.

A.5 Classification and determination of sleep states is best achieved using a polysomnograph (a multi-channel electronic device which records brainwave, heart, muscle and breathing data). An important general finding of sleep research is that the noise levels at which impacts occur in laboratory-based studies are lower, often by a substantial degree, than those found in field studies[7]. This is thought to be due to the unfamiliar nature of laboratory conditions compared to the circumstances in a test subject's own bedroom to which they have adapted/habituated over time. Consequently, field sleep studies in the subject's home are regarded as a more reliable means of testing the effects of noise on sleep than laboratory based experiments. Until relatively recently polysomnographs were large, complex and cumbersome items of equipment best used in controlled laboratory conditions rather than in a bedroom at home. However, modern sleep studies benefit from the availability of smaller and more convenient polysomnographs better suited to use in field studies than previous generations of equipment. Even so, there are currently only a small number of suitable polysomnography based field studies on the effects of noise on sleep[8]. Consequently other studies using different means of appraising noise effects on sleep also need to be considered e.g. motility and self-recording and reporting.

A.6 It is important to recognise that typically many awakening events are unrelated to noise and that normally the average person is subject to several spontaneous awakenings per night independent of any effects of noise. For example the WHO Community Noise Guidelines at section 3.4 advises that *"It is estimated that 80-90% of the reported cases of sleep disturbance in noisy environments are for reasons other than noise originating outdoors. For example, sanitary needs; indoor noises from other occupants; worries; illness; and climate (e.g. Reyner & Horne 1995)"*.

A.7 It is also important to understand what the word 'awakening' means. When the word is used colloquially, most regard it as meaning being fully awake to the degree that they can recall having been awakened the following morning. Some noise and sleep research has focussed on this type of awakening by requiring the subject to press a button to record their awakening (this is called a 'behavioural awakening'). However, the scientific meaning of the term awakening covers a wider range of responses, many of which do not involve awareness or recollection of being conscious. In order to understand the results of the research of the effects of noise on sleep it is therefore important to be able to distinguish between various kinds of awakening, for example:

- Behavioural awakening - equivalent to the everyday understanding of conscious 'awakening', when the subject is usually aware of being conscious at the time and can often recall being 'awake' the next day;

[7] See Section 3.4 in the WHO Community Noise Guidelines

[8] For example, M Basner and S McGuire. Update on the WHO's Community Noise Guidelines: Evidence review on the effects on sleep, Inter-Noise 2016 - identifies only 4 polysomnographic studies on air, road and rail sources suitable for consideration in the revision of the WHO guidance.

- Physiological awakening - defined by changes in sleep stages measured by a polysomnograph or an EEG, which the subject may not be aware of at the time or recall the next day; and

- The onset and degree of 'motility' i.e. body movements which the subject may not be aware of at the time or recall the next day – typically measured using wrist watch like actimeters.

A.8 Where research is in terms of physiological awakenings measured using polysomnography or an EEG, it should be noted that typically only around 1 in 12 awakenings is of sufficient duration to become a behavioural awakening. In addition it should be recognised that physiological awakenings are part of the normal architecture of sleep with on average 24 EEG awakenings occurring at night independent of any noise effects[9].

A.9 The above shows that at a physiological level sleep disturbance due to noise can occur, although behavioural awakening may not result. In other words, there are noise impacts on sleep that can be measured by examining changes in EEG patterns or a person's motility, but the person would not necessarily be aware of these impacts and they may not have adverse or significant adverse pathological effects. Therefore care should be taken to not ascribe significance to impacts on sleep detectable at a physiological level, that may occur or appear to occur as a result of noise impacts, as they may not reflect significant pathological effects or even the impact of noise (because they are part of normal sleep).

A.10 The distinction between detectable impacts and adverse and significant adverse effects of noise on sleep is highlighted in the Government's Planning Practice Guidance in the table summarising the noise exposure hierarchy where it states that:

- Noise with the "potential for some reported sleep disturbance" is an "Observed Adverse Effect" that should be mitigated and reduced to a minimum; and

- Noise with the "potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep" is a "Significant Observed Adverse Effect" that should be avoided; and

- Noise that causes "regular sleep deprivation/awakening" is a "Significant Observed Adverse Effect" that should be prevented.

A.11 The relationship between the maximum noise level of a noise event and the number of intermittent noise events and the effects upon sleep has been debated for many years. It is generally accepted, however, that the smaller the number of noise events, the higher the maximum levels that can be withstood without adverse effects on sleep[10] (up to an upper limit, and providing the overarching noise level during the overall sleep period e.g. $L_{Aeq,T}$ does not exceed a suitable threshold).

[9] Rechtschaffen A, Kales A, Berger R J et al. A manual of standardised terminology, techniques, and scoring system for sleep stages of human subjects. Public Health Service, US Government, Printing Offices, Washington DC 1968.

[10] B Grieffahn (1992). Noise control During the Night. Proposals for Continuous and Intermittent Noise. B Grieffahn. Acoustics Australia. Vol 20 No 2 43 -47.

A.12 Consequently, the L_{Amax} of noise events plus the number of events can be used as the basis of assessing impact; although this is subject to an upper limit. For example work[11] which informs the WHO community noise guidelines recommendation that peak noise in bedrooms should not exceed 45 dB L_{Amax} more than 10 to 15 times per night concluded that *"It will be noted in particular that the tolerance to noise in regard to sleep passes through a maximum value for an optimum number of 10 to 15 flights per night and that beyond 20 to 25 occurrences of noise per night the aircraft need to be very quiet or the dwellings provided with excellent sound proofing"*.

A.13 Separate work in the publication *"Public health impact of large airports"* by the Netherlands Health Council (Gezondheidsraad 1999), based on data from an evaluation of literature, concluded that a sound exposure level (SEL) of 50 dB (A) at the ear of a sleeping person is the onset point of awakenings. This value corresponds with a maximum noise level event of L_{Amax} around 43 dB, assuming that the time taken for the noise level to fall from its peak value to a level 10 dB lower is 10 seconds. In addition other work[12] has demonstrated that the number of tolerable night noise events ranges from 10 to 15 per night for indoor L_{Amax} noise levels of around 55 dB to 45 dB respectively. More recent work[13] has concluded that whilst *"given a certain equivalent noise level, additional information [i.e. L_{Amax} data] on the overall number of events does not improve the prediction of sleep quality. However, the number of events above L_{Amax} of 60 dB was related to an increase in mean motility, indicating lower sleep quality"*.

A.14 In a laboratory study on the effects of both intermittent and continuous road traffic noise, the noise of 50 lorry pass-bys of both 45 and 55 dB L_{Amax} was presented and EEG traces examined[14]. Changes in sleep stages were seen for the 45 dB L_{Amax} lorry pass-bys, but it required the 55 dB L_{Amax} pass-bys to induce EEG awakenings.

A.15 However, there is research that indicates impacts of individual noise events on sleep at relatively low maximum noise levels. For example studies[15] have found that *"the threshold of aircraft noise-induced motility during events is L_{max} indoor of 32dBA"*. At these levels the probability of increased motility associated with a noise event was found to increase just above the equivalent probability with no noise event taking place i.e. there appeared to be no observed effect below this level. This should be considered in the light of the finding in the same study that the probability of awakening at a L_{Amax} noise level at the ear of around 27 dB was 7.2% and rose to only 18.4% at around L_{Amax} 73 dB.

[11] Vallet M and Vernet I 1991 Night aircraft noise index and sleep research results. In A. Lawrence (ed.), Inter-Noise 91. The Cost of Noise, Vol. 1, pp. 207-210. Noise Control Foundation, Poughkeepsie, NY, USA.

[12] Spreng, M. (2002) Corticol excitation, cortisol excretion, and estimation of tolerable nightly overflights. Noise and health. (4) 39-46, and; Basner, M., Samel, A., Isermann, U. (2006) Aircraft noise effects on sleep: Application of the results of a large polysomnographic field study. J. Acoust. Soc. Am. (119) 2772-2784

[13] S.A. Janssen et al. The effect of the number of aircraft noise events on sleep quality. Applied Acoustics 84 (2014) 9–16

[14] Eberhardt JL et al. The influence of continuous and intermittent traffic noise on sleep. Eberhardt JL et al. Journal of Sound and Vibration 116(3) 1987

[15] Passchier-Vermeer W. et al. 2002. Sleep disturbance and aircraft noise exposure, Exposure effects relationships, TNO report 2002-027, and, Basner, M., et al. "Aircraft noise effects on sleep: final results of DLR laboratory and field studies of 2240 polysomnographically recorded subject nights." 33rd International Congress and Exposition on Noise Control Engineering (Internoise 2004), Prague/Czech Republic. 2004

A.16 Intermittent heavy vehicle noise has also been used as the basis for specific research on the importance of the number of noise events[16]. However, rather than physiologically-based measures of sleep depth, the quality of sleep was assessed using a questionnaire completed within 15 minutes of the subjects waking in the morning. The subjects were exposed to 4, 8, 16 and 64 heavy vehicle pass-bys at both 50 and 60 dB L_{Amax}. The results for the higher (60 dB L_{Amax}) noise level pass-bys showed decreases in the quality of sleep for both 16 and 64 events but there was only a marked deterioration in the reported quality of sleep when subjects were exposed to 64 of the lower noise events (50 dB L_{Amax}).

A.17 Various studies[17] have linked the L_{Amax} from individual noise events to behavioural awakenings. For example one study found that the *"Probability of sleep stage changes to wake/S1 from railway noise increased significantly from 6.5% at 35 dB(A) to 20.5% at 80 dB(A) $L_{Amax,F}$"*; whilst another study concluded that *"noise disturbance of sleep may be expected to become significant once the outdoor L_{Aeq} exceeds 55 dB provided peak noise levels do not exceed 75 to 80 dB. Higher L_{Aeq} values up to 60 dB may be allowed providing the peak levels do not exceed 85 dB, and the number of such events is less than about 20 per night"*. Based on these studies it can be concluded that at night (2300 - 0700 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building with partially open windows is above:

- 85 dB $L_{Amax,F}$ (where the number of events exceeding this value is ≤ 20); or
- 80 dB $L_{Amax,F}$ (where the number of events exceeding this value is > 20).

A.18 The main body of sleep research is consistent with a careful interpretation of the viewpoint set out in the World Health Organisation Guidelines which for the ordinary population is that:

- Impacts on sleep can be detected from relatively low level maximum noise events, however the degree of resulting harm may not be significant.
- 'Effects' on sleep (such as EEG awakenings and sleep stage changes) occur spontaneously in the general population many times per night regardless of any impacts due to noise.
- The smaller the number of noise events, the louder the maximum noise level that can be tolerated without adverse effects upon sleep; subject to an upper limit.
- At relatively low levels e.g. around 45 dB $L_{Amax,F}$ when sufficient number of such events take place during the night the adverse effects of individual noise events are likely to be limited to sleep disturbance in the form of changes in sleep state or perhaps some EEG awakenings.
- It normally requires noise levels higher than 45 dB $L_{Amax,F}$ before significant adverse effects such as behavioural awakenings, difficulty getting to sleep, premature awakening or difficulty

[16] Sleep disturbance by road traffic noise – a laboratory study on number of noise events. Ohstrom E and Rylander R. Journal of Sound and Vibration 143 (1) 1990.

[17] For example; E M. Elmenhorst, et al (2012), Examining nocturnal railway noise and aircraft noise in the field: sleep, psychomotor performance and annoyance. Science of the Total Environment, 424, and, M. Basner et al. (2011), Single and Combined Effects of Air, Road, and Rail Traffic Noise on Sleep and Recuperation. SLEEP 34(1); and, C.G. Rice and P.A. Morgan (1982). A synthesis of studies on noise induced sleep disturbance. ISVR Memorandum No. 623.

getting back to sleep generally occur (and the latest field research on rail and aircraft noise suggest that it requires internal L_{Amax} noise levels of around 65 dB before noise induced awakenings become distinguishable from spontaneous awakenings).

A.19 In the light of the above it is clear, as recognised by BS8233, that the effects of noise on sleep from individual noise events are an important consideration; and that the initial site noise risk assessment should include the consideration of the individual noise events when the external $L_{Amax,F}$ exceeds 60 dB. A site should not be regarded as negligible risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 60 dB more than 10 times a night. A site should be regarded as high risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 80 dB more than 20 times a night.

A.20 In the context of providing new residential accommodation good acoustic design can normally be used to avoid the potential significant adverse effects of individual noise events on sleep i.e. behavioural awakenings, and to appropriately mitigate and minimise the adverse effects of noise from individual noise events on sleep i.e. physiological impacts. Therefore, it is considered that if, in bedrooms at night, the $L_{Amax,F}$ from individual noise events (from all sources) would not normally exceed 45dB more than 10 times a night, then this represents a reasonable threshold below which the effects of individual noise events on sleep can be regarded as negligible.

A.21 In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.

A.22 In such a case it is recommended that a more detailed assessment should be undertaken using available dose-response relationships appropriate for the types of noise sources being considered, in line with the WHO Night Noise Guidelines publication and any other relevant research. This assessment should advise decision makers to what extent adverse effects from individual noise events on sleep will be mitigated and minimised, and report the likely residual effects on sleep of affected persons.

A.23 Further advice from the WHO (e.g. Table 1 in the WHO Night Noise Guidelines for Europe) and the relevant underlying studies indicates that more stringent control of maximum noise levels could eliminate all risk of any detectable physiological effect i.e. achieve NOEL – No Observed Effect Level. However, controlling to these values is not at present required by policy in England; or considered to be a realistic or achievable goal given there is substantial uncertainty regarding any resulting significant pathological effects at these lower maximum noise levels; and in the context of the current night time acoustic environment across most of urban England[18] which shows that such low values are likely to be exceeded in bedrooms with windows partially open in all but the most remote and quietest parts of the country.

[18] The National Noise Incidence Study 2000/2001 (United Kingdom): Volume 1 Noise Levels. Prepared by the Building Research Establishment for DEFRA, The National Assembly for Wales, the Scottish Executive and the Department of the Environment for Northern Ireland. February 2002.

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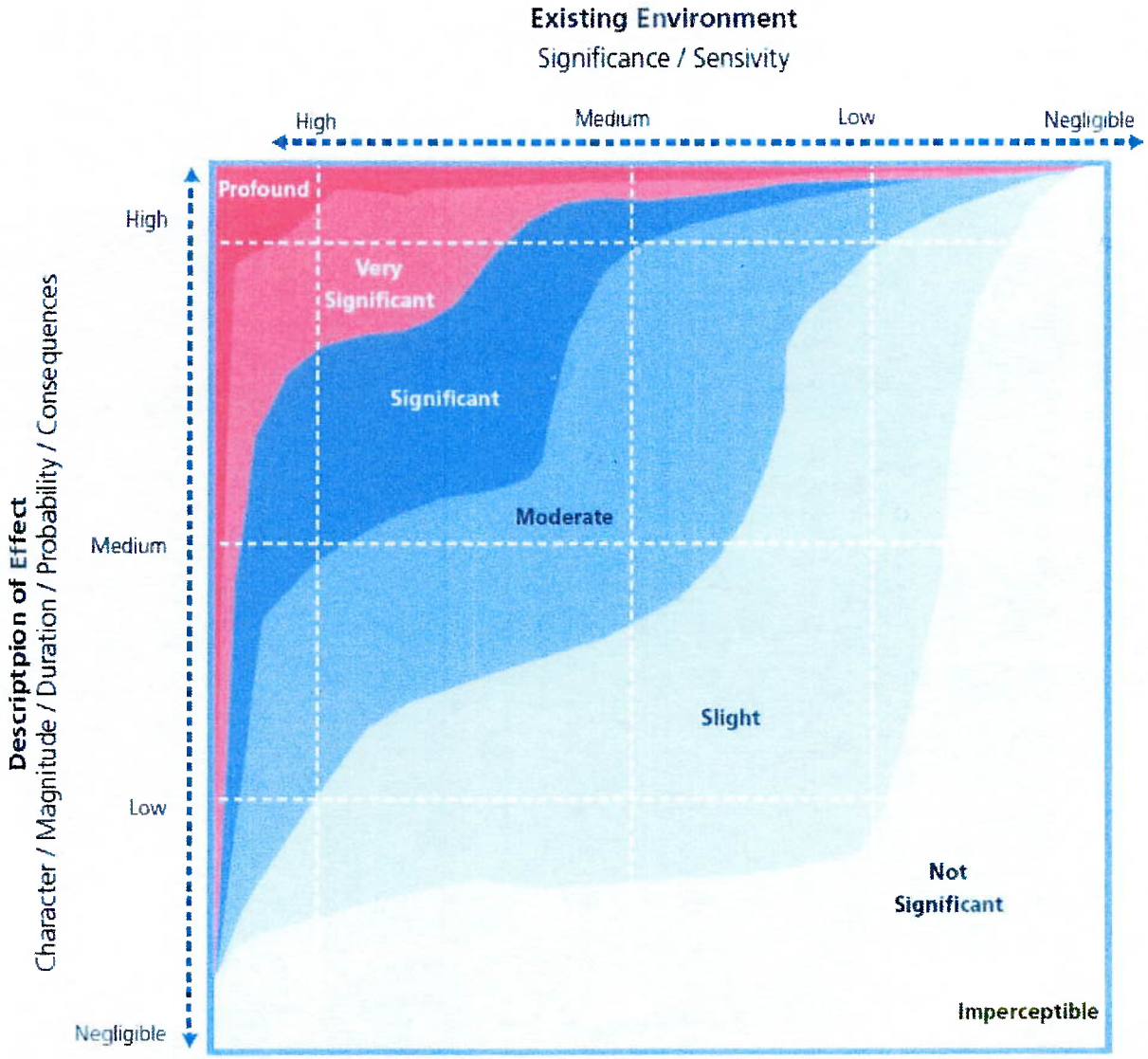

There are seven generalised degrees of effect significance that are commonly used in EIA. Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant and Profound. Generalised definitions of each of these are provided in Table 3.4. When more specific definitions exist within a specialised factor or topic, e.g. biodiversity, these should be used in preference to these generalised definitions. (ref. Advice Notes[68].)

also note Mr. Lumley's statement as to the unsatisfactory manner in which interactions have been addressed suggesting that it would be optimally addressed in a separate chapter. While noted, again the regulations do not dictate the actual manner in which the EIS is to be laid out.

A number of the appellants have detailed areas where they believe the EIS fails in terms of identifying the effects of the project. In the general context I would concur with the view expressed by Mr. O'Donnell that an EIS is not required to identify every likely effect of the proposal but the '*likely significant* effects'. In my opinion the word *significant* is of material importance. If every likely effect is required to be detailed the production of an EIS would be virtually impossible.

However of great import at this juncture is Mr. Thornely-Taylor's view that as the noise section of the EIS fails to describe the likely 'significant' effects of the project it therefore fails to meet the requirements of the regulations. Undoubtedly noise is a material issue arising in the case and I note that the matter of significance was discussed at the oral hearing with further details sought by way of a section 132 notice consequent to same. Notwithstanding same Mr. Thornely-Taylor's interpretation of the Regulations in terms of the requirements of the EIS document would appear to be correct and the failure to deal with same is certainly a notable omission. As to whether this omission would prejudice the validity of the document is open to question and, as suggested by Mr. Thornely-Taylor, the Board may wish to seek legal advice on this matter.

As to the adequacy of the actual information in the EIS it is my opinion that the Environmental Impact Statement effectively provides the starting point within the larger Environmental Impact Assessment process of which the Board is involved in. I would suggest that the statement should be seen as a contribution towards the process of making available to the relevant decision maker, in this case the Board, the information necessary to enable the decision to be made. The document before the Board was prepared and lodged to the planning authority in December 2004 and it is reasonable to infer that the information provided was relevant at the time of the drawing up of the document. It is also reasonable to expect that relevant information may change and evolve during the EIA and decision making process. In this case new and additional information has been submitted by way of further information, clarification of further information, at the Oral Hearing and by way of response to section 132 notices. I submit that it is reasonable that this information be taken into account by the Board in making its decision. In my opinion the substantive issue is whether the information now before the Board is sufficient to enable it to make a proper assessment of the current proposal and to adjudicate on the potential impacts of the proposed development. I propose that this issue of adequacy is best addressed under the relevant sections of this assessment.

APPENDIX I

Technical Note

Project:	Newpark, The Ward, Dublin	**Title:**	Noise Assessment
Job Number:	WDA230104	**Prepared By:**	Sean Rocks
Date:	08/12/2023	**Reviewed By:**	James Cousins
Reference:	WDA230104TN_1_A_02	**Client:**	Teresa Sweeney

1 Introduction

Following the commencement of operations of the new Dublin Airport North Runway, Wave Dynamics were engaged by Teresa Sweeney to assess the noise levels from aircraft flyovers using long term (92 Day) noise monitoring at Newpark, The Ward, Dublin, D11 EF2R.

The objective of the assessment was to quantify the existing noise environment and the current noise levels from aircraft noise from the operation of the new North Runway at Dublin Airport. The measured noise levels have been compared with the predicted noise levels from the DAA noise contours and industry criteria.

1.1 Statement of Competence

This assessment and report were completed by Wil Oshoke, Principal Consultant with Wave Dynamics, who has extensive experience assessing noise impact. His qualifications include a PhD in Acoustics (Dublin City University – School of Electronic Engineering). Wil is a member of Engineers Ireland (MIEI), a Corporate member of the Institute of Acoustics (MIOA), and a Chartered Engineer (CEng) with the UK Engineering Council Via the Institute of Acoustics.

The assessment and report were peer-reviewed by Sean Rocks, Director | Senior Consultant; Sean has experience with aircraft noise, particularly for planning and complaints investigation. Sean's qualifications include a BEng (Hons) in Mechanical and Manufacturing Engineering, a Diploma in Acoustics and Noise Control (Institute of Acoustics), an IOA Certificate of Competence in Environmental Noise Measurement and SITRI certified sound insulation tester. Sean is a member of both Engineers Ireland and the Institute of Acoustics.

This project was led by James Cousins, Managing Director | Principal Consultant with Wave Dynamics who has extensive experience in assessing noise and vibration from road and rail infrastructure on commercial and residential developments. James is an experienced consultant. His qualifications include; BSc (Hons) in Construction Management and Engineering, Pg Cert in Construction Law and Diploma in Acoustics and Noise Control (Institute of Acoustics) and an IOA Competence Cert in Building Acoustic Measurements. James is a member of both Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA) and is the current SITRI Chairman.

2 Baseline Noise Survey

Attended and unattended noise surveys were undertaken to quantify the noise levels from aircraft flyovers at the residence of Teresa Sweeney D11 EF2R. The attended noise measurements were conducted from 08:45hrs to 10:35hrs on 13th of September 2023 and from 12:00hrs to 14:00hrs on 19th October 2023. The unattended noise measurements were taken continuously from 00:00hrs on 14th of June 2023 to 20:00hrs on 17/09/2023. Sound exposure level measurements were also taken for aircraft flyovers during the attended noise survey.

2.1 Site Description and Measurement Locations

The site is on the R121 in Newpark, The Ward, Dublin as shown in Figure 1 below. The area is mainly agricultural, with sporadic residential dwellings and commercial properties. Dublin Airport is located to the residence's southeast, approximately 3 km from the edge of the new North Runway.

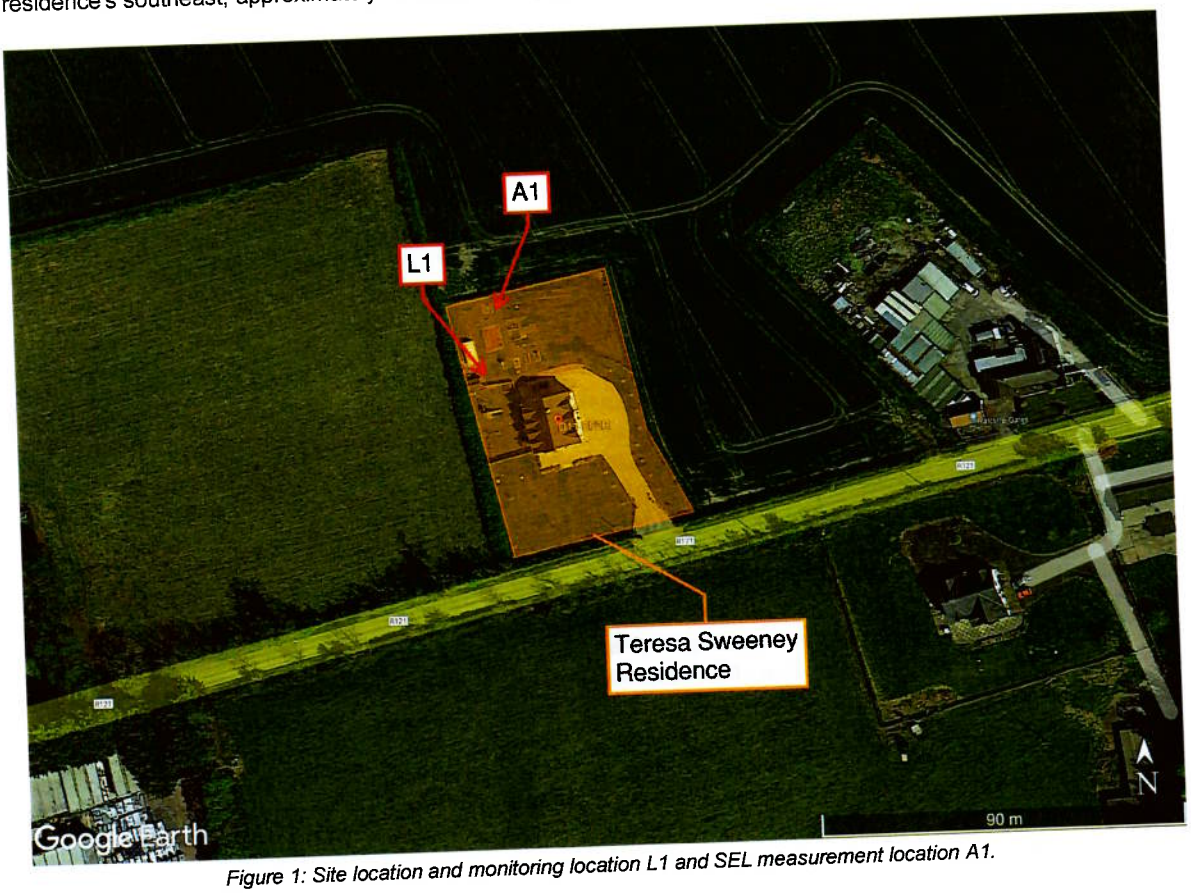

Figure 1: Site location and monitoring location L1 and SEL measurement location A1.

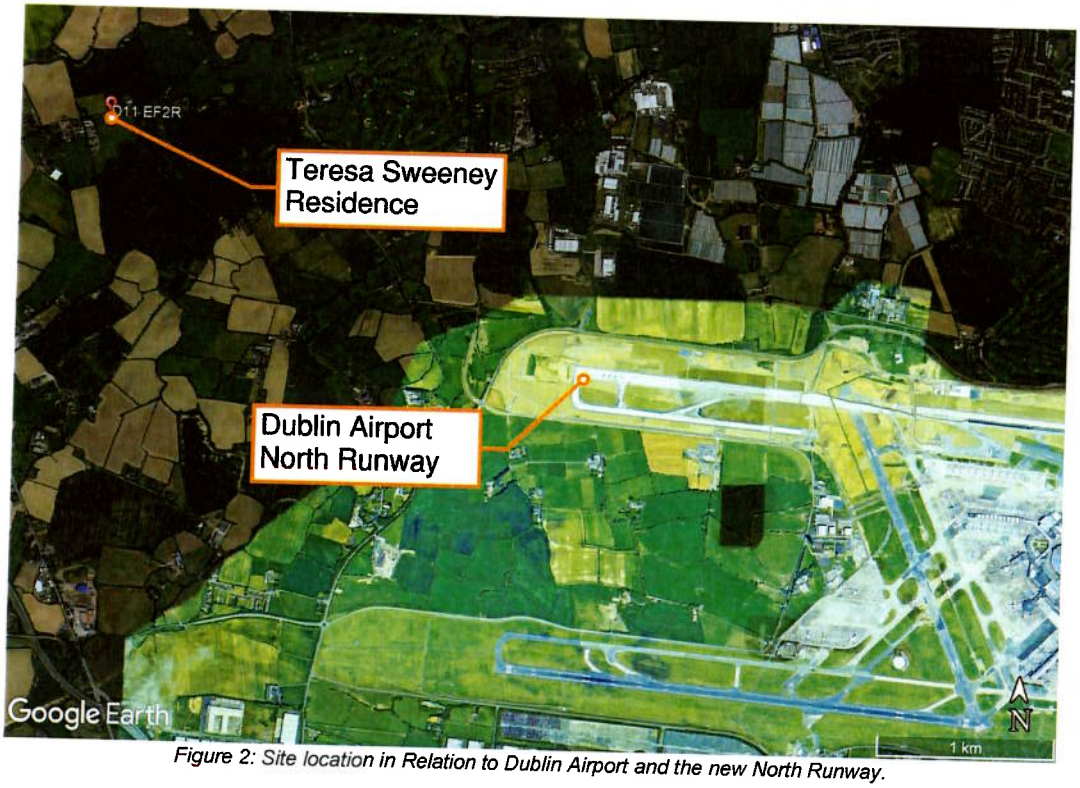

Figure 2: Site location in Relation to Dublin Airport and the new North Runway.

Unattended Noise Measurements

The unattended noise logger was deployed in location L1, as per Figure 1, to the rear garden of the residence. The logger was calibrated before and after the measurements, and no significant drift was noted. The logger was deployed at a height of approximately 4 m above the ground.

On review of the measurement data by WDA, days of unsuitable weather conditions had negligible effect on the daily $L_{Aeq,16hour}$ values and $L_{ASmax,1min}$ measurements. One night (night starting 18th of August) was affected by extraneous noise which has been filtered.

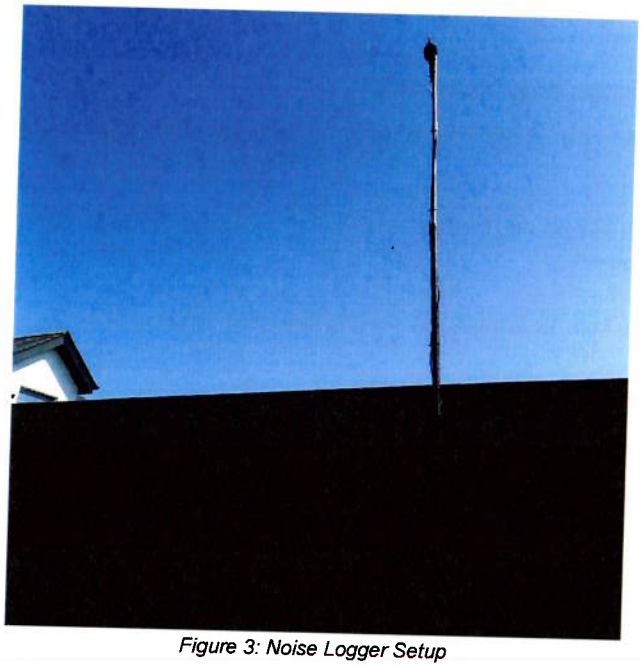

Figure 3: Noise Logger Setup

2.1.1 Survey Period

Based on the data review, the measurements commenced at 00:00hrs on Wednesday, the 14th of June 2023 and finished at 20:00hrs on Sunday, the 17th of September 2023. The measurement duration was set to 1-minute intervals. It is understood that the North Runway was operational throughout the measurement period, initially between 09:00hrs and 20:00hrs until 4 July 2023, after which the operating hours of the North Runway were expanded to 07:00hrs to 23:00hrs.

The measurement period was set in line with Dublin Airport's busiest 92 day period, 16th of June to 15th September, around which the DAA contour maps are developed. Many of the Dublin Airport planning conditions have been set based on the predictions of noise levels over this 92-day period such as the home insulation scheme. Therefore the unattended noise monitoring undertaken allows for direct comparison of the measured noise levels to the DAA noise contour maps.

2.1.2 Noise Measurement Equipment

A Class 1 sound level meter/noise logger, in general accordance with IEC 61672-1:2013, was used for the attended measurements. Table 1 below summarises the measurement equipment used.

Table 1: Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM4	NTI XL2-TA	A2A-23316-E1	UK-23-100	01/09/2025
Calibrator	CAL1	Nor 1251	31056	AC230226	16/10/2024
Noise Monitor	-	EM2030-AO	01593	2201593	24/06/2024
Calibrator	Cal 2	Cirrus	99866	183284	16/11/2023
Sound Level Meter	SLM1	Nor 140	1405554	U38505/U38506 /U38507/U44953	27/07/2025
Calibrator	CAL3	Nor 1251	32096	U44813	10/07/2024

2.1.3 Subjective Noise Environment

Based on the information provided during the attended noise survey and logger deployment, the following noise sources were identified:

- Aircraft Noise from Aircraft Fly Overs.
- Road noise from the R121
- Birdsong
- Occasional activity from residents (cars arriving/departing, voices, etc.)

2.2 Noise Measurement Results

This section outlines the results of the attended noise survey.

Unattended Monitoring Results

Table 4 in Appendix C of this report outlines the results of the noise levels recorded at the noise monitoring location L1 over the full monitoring period averaged over the following periods:

- $L_{Aeq,16hour}$ 07:00 – 23:00
- $L_{Aeq,8hour}$ 23:00 – 07:00

Figure 4 below highlights each of the daytime $L_{Aeq,16hour}$ values and number of times they occurs over the full 92 day monitoring period. The graph indicates a significant median value of 66dBA with a total of 41 occurrences. This is 30 more occurrences than the next highest value at 65dBA (11 occurrences).

Based on the daily $L_{Aeq,16hour}$ measurements undertaken at the Teresa Sweeney residence as shown in Figure 4, the logarithmically averaged $L_{Aeq,16hour}$ for the full 92 day period is 65dBA.

A full breakdown of all the unattended measurement results is available on request.

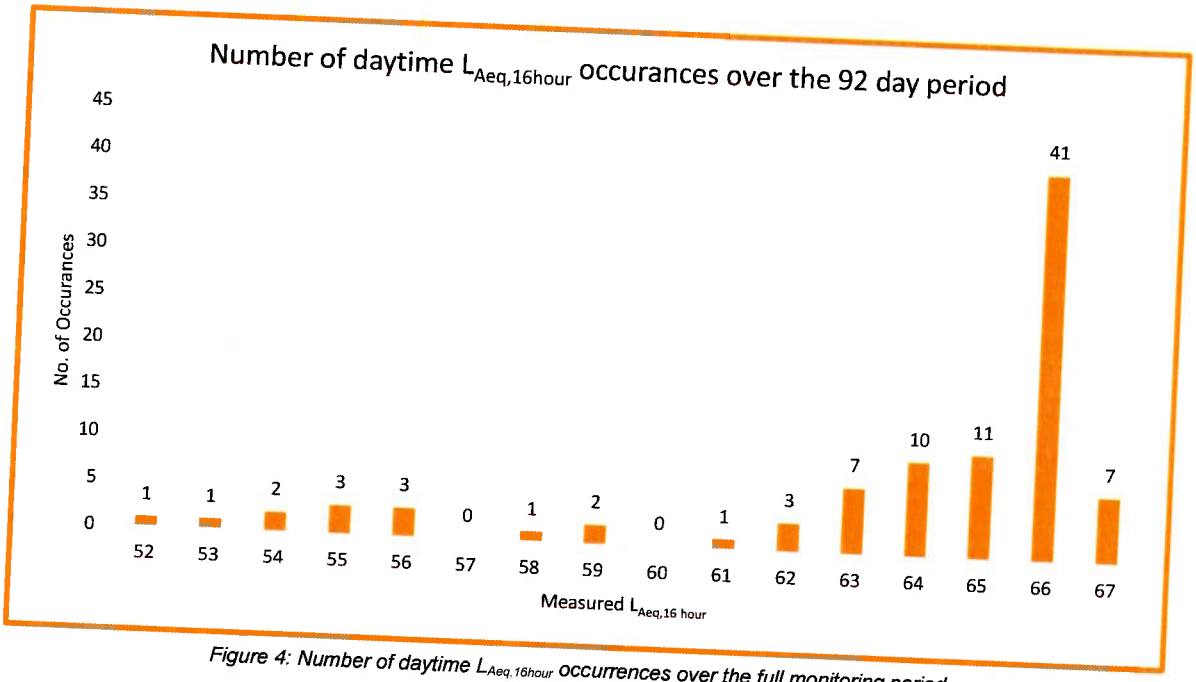

Figure 4: Number of daytime $L_{Aeq,16hour}$ occurrences over the full monitoring period

L_{night} values ranged from 43 to 54 dB with an average of 48dB L_{night}. An L_{den} level was also calculated for the 92 day period and was 65 dB L_{den}.

Attended Monitoring Results

Table 2 outlines the results of the attended measurements for aircraft flyover noise levels at location A1. The flyover sound exposure levels have been calculated from the measured L_{Aeq} levels.

The sound exposure level (SEL) from aircraft flyovers has been calculated using the following equation to allow direct comparison of the measured levels with the DAA predicted SEL contour maps:

$$L_{AX} = LAeq + 10*\log_{10}(d1/d2) - 10*\log_{10}(N) + 10*\log_{10}(T)$$

Where:

L_{Ax} measured SEL
N number of vehicle movements
T time (seconds)
d1 distance from the source to the receiver
d2 distance from the source to the measurement

Table 2: Aircraft Flyover Noise Levels

Measurement				**Aircraft Type**	**Measured Noise Levels**		**Sound Exposure Level**
Location	**Date**	**Time (hrs)**	**Duration (sec)**		**L_{Aeq} dB**	**L_{AFmax} dB**	**L_{Ax} dB**
A1	13/09/2023	08:45	43	Boeing 787-8	72	80	88
A1	13/09/2023	08:47	38	Boeing 737-8AS	74	80	90
A1	13/09/2023	08:49	36	Boeing 737-8AS	75	81	91
A1	13/09/2023	08:50	41	Boeing 737-8AS	74	81	90
A1	13/09/2023	09:00	29	Airbus A320-214	74	79	89
A1	13/09/2023	09:04	33	Airbus A320	66	73	81
A1	13/09/2023	09:08	32	Embraer EI80STD	73	80	88
A1	13/09/2023	09:10	44	Boeing 737-8AS	73	80	89
A1	13/09/2023	09:12	39	Embraer E190SR	72	79	88
A1	13/09/2023	09:15	41	Boeing 737-8AS	74	81	90
A1	13/09/2023	09:16	48	Boeing 737-8AS	72	81	89
A1	13/09/2023	09:18	41	Boeing 737 Max 8.200	69	79	85
A1	13/09/2023	09:20	39	Embraer EI80STD	72	82	88
A1	13/09/2023	09:24	39	ATR 72-600	64	71	80
A1	13/09/2023	09:33	46	Boeing 787-8 Dreamliner	70	78	87
A1	13/09/2023	09:37	53	Boeing 737-8AS	76	84	93
A1	13/09/2023	09:40	40	Embraer Practor 600	66	72	82
A1	13/09/2023	09:42	42	Boeing 737-8AS	72	80	88
A1	13/09/2023	09:47	52	Boeing 787-9 Dreamliner	68	76	85
A1	13/09/2023	09:50	36	Airbus A320-214	72	78	88
A1	13/09/2023	09:51	34	Boeing 737 Max 8.200	71	78	86
A1	13/09/2023	10:01	39	Boeing 737 Max 8.200	69	77	85
A1	13/09/2023	10:03	43	Airbus A321-251NX	67	75	83
A1	13/09/2023	10:10	40	Airbus A320-291N	64	70	80
A1	13/09/2023	10:12	36	Boeing 737-8AS	74	80	90
A1	13/09/2023	10:13	44	Boeing 737-8AS	74	83	90
A1	13/09/2023	10:17	42	Boeing 737-8AS	74	81	90

Measurement				Aircraft Type	Measured Noise Levels		Sound Exposure Level
Location	Date	Time (hrs)	Duration (sec)		L_{Aeq} dB	L_{AFmax} dB	L_{AX} dB
A1	13/09/2023	10:22	37	ATR 72-600	66	73	82
A1	13/09/2023	10:24	39	Airbus A321-211CP2F7	69	75	85
A1	13/09/2023	10:28	41	Boeing 787-8 Dreamliner	71	79	87
A1	13/09/2023	10:32	42	Airbus A320-214	70	77	86
A1	13/09/2023	10:34	38	Boeing 787-8 Dreamliner	71	80	87
A1	19/10/2023	12:13	41	Airbus A330	79	88	95
A1	19/10/2023	13:08	45	Airbus A330-302	78	87	95
A1	19/10/2023	13:34	44	Airbus A330-202	79	89	95

1. SELs calculated on the rounded L_{Aeq} values measured.

3 Analysis of Results

3.1 $L_{Aeq,16hr}$ Noise Levels

The most recently predicted noise contours for the North Runway operation as per the 2007 planning permission are the compliance contours submitted to Fingal County Council in 2016. Here, the predicted $L_{Aeq,16hour}$ (07:00hrs to 23:00 hrs) noise contours for Dublin Airport with the North Runway operational can be seen in Figure 5. The noise contours are developed by DAA based on the busiest 92 day period of the year for the airport, 16th June to 15th September.

Based on the DAA contour maps, Teresa Sweeney's residence is outside the lowest predicted contour therefore noise from aircraft flyovers would be expected to be below 60 dB $L_{Aeq,16hour}$. From the results of the unattended noise monitoring outlined in Table 4 (see Appendix C), the corresponding $L_{Aeq,16hour}$ averaged over the same 92 day period as the DAA contour maps are developed is 65dB with a median value of 66dB. This demonstrates that the measured levels at the residence exceed the predicted levels by a minimum of 5dB when compared to the 92 day monitoring period of which the contours are based on.

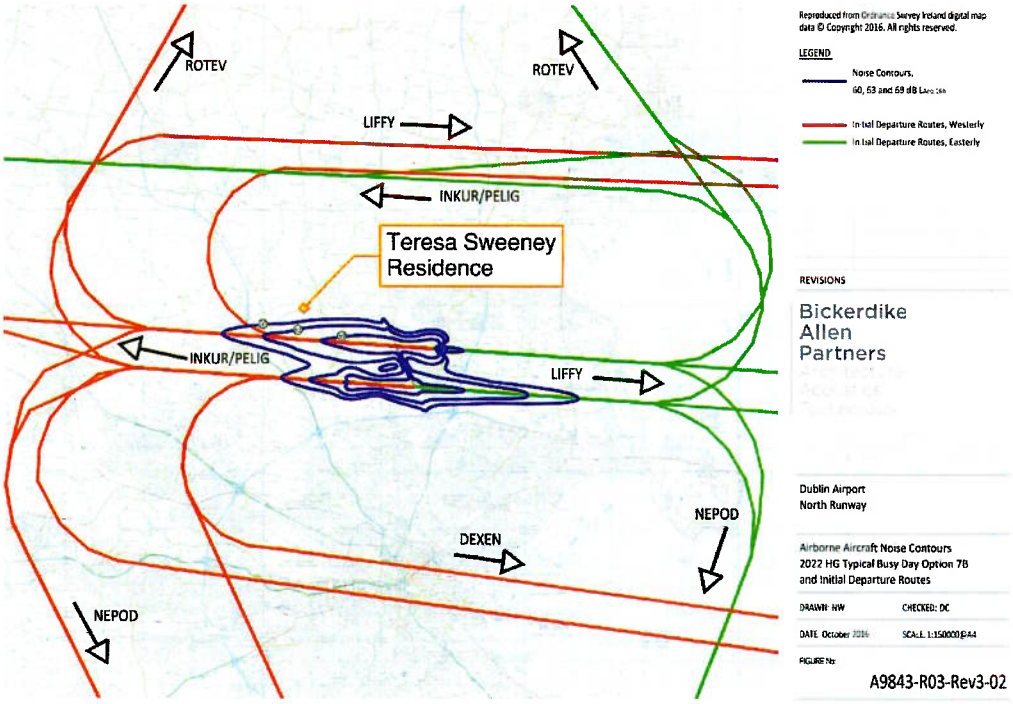

Figure 5: Predicted $L_{Aeq,16hour}$ (07:00 – 23:00) airport noise contours with North Runway in operation.

Noise contour maps presented in the most recently submitted EIAR supplement by DAA provided to ABP place Teresa Sweeney's dwelling outside the 63 dB $L_{Aeq,16hr}$ contour for the 2025 year scenario. Given that the measurements were undertaken during the summer of 2023 and they find noise levels are 65dB $L_{Aeq,16hr}$ it would indicate that the predicted noise contours from the aircraft flyovers do not match the actual measured values. This would place doubts on the accuracy of the predicted DAA contours when compared to real live measured data.

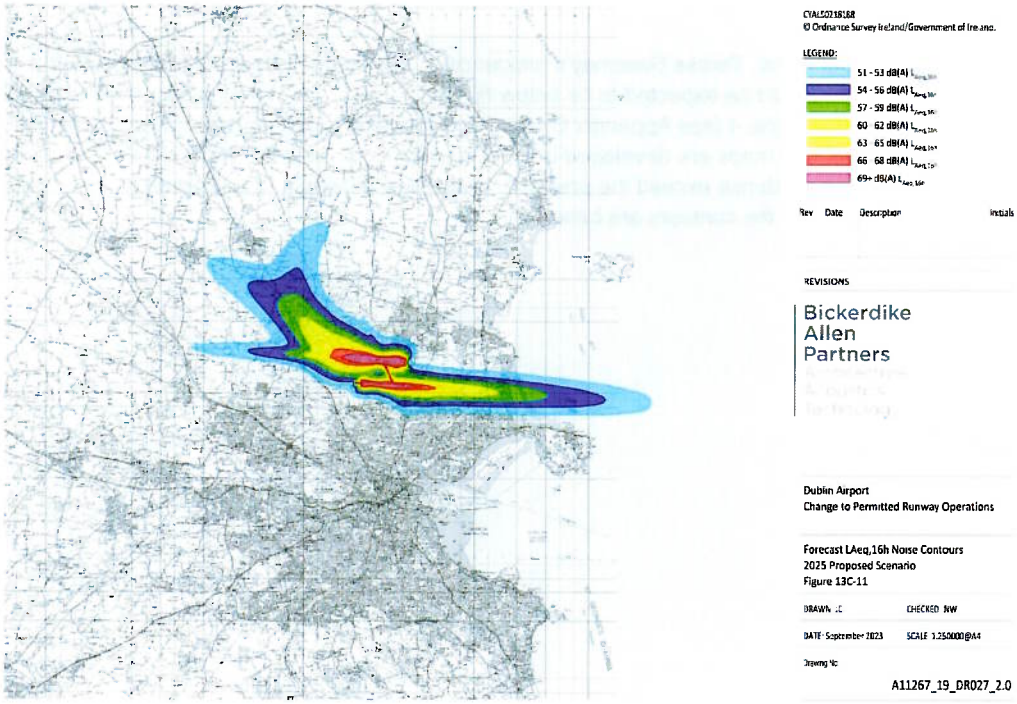

Figure 6: DAA predicted LAeq,16hour (07:00 - 23:00) airport noise contours for 2025.

An inward noise impact assessment was undertaken on the site previously as part of the planning application for the house which is outlined in AWN report JH/14/SSNR01 (Decision No. PF/1409/14 Reg Ref. F14A/0416). The assessment included a noise survey on the site. The survey was undertaken on 4th and 5th December 2014 prior to the commencement of the North Runway. The daytime recorded noise levels at the site (07:00hrs – 23:00hrs) were 52-53dBA for both days.

Comparing this to the current daytime noise levels at the site over the 92-monitoring period of 65dBA shows a significant increase in the onset noise levels at the dwelling from aircraft take offs on the North Runway. This equates to an increase of 12-13dBA of the onset noise levels on the site for the daytime period. A noise increase of that magnitude is very significant.

3.2 L_{night} Noise Levels

As discussed the measured L_{night} noise levels at Teresa Sweeney's property is relatively low often in the range of 43 to 45 dB L_{night}. The proposed Relevant Action application will see an increase in night noise at the property. In the year 2025, the L_{night} noise levels with the proposed development in place will result in noise levels increasing to be of the order of 55 to 59dB L_{night}. This is a significant increase on the existing onset noise levels from aircraft on the dwelling.

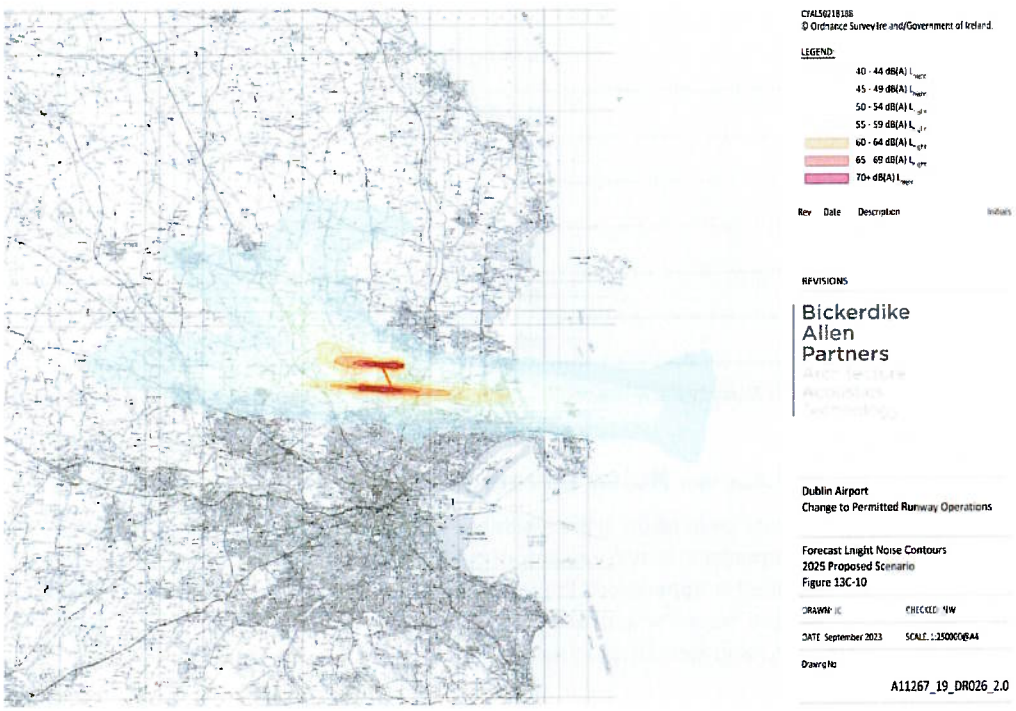

Figure 7: DAA predicted L_{night} airport noise contours for 2025.

To establish the aircraft noise impact of the North Runway, Tables 13-2 and 13-3 (shown below in Figure 8 and Figure 9) of the *Dublin Airport North Runway EIAR Volume 2 – Main Report* can be used to determine both the absolute noise level and the change in noise level due to the North Runway operations.

Based on the predicted L_{night} noise at the residence with the proposed development in place, as outlined in this section, an air noise impact scale description of "High" is appropriate for L_{night}. Pairing this with a change in noise level of greater than 9dB due to North Runway operations to give a relative noise impact scale of "Very High" the magnitude of the effect of the North Runway can be described as "Profound" as per Table 13-4 of the *Dublin Airport North Runway EIAR Volume 2 – Main Report.*

Given the discrepancy between daytime noise levels measured versus contours predicted by DAA it is likely that the L_{night} noise impact here is being underestimated.

Table 13-2: Air Noise Impact Criteria (absolute) – residential

Scale Description	Annual dB Lden	Annual dB Lnight
Negligible	<45	<40
Very Low	45 – 49.9	40 – 44.9
Low	50 – 54.9	45 – 49.9
Medium	55 – 64.9	50 – 54.9
High	65 – 69.9	55 – 59.9
Very High	≥70	≥60

Figure 8: Dublin Airport North Runway EIAR Volume 2 – Main Report Table 13-2: Air Noise Impact Criteria (absolute)

Table 13-3: Air Noise Impact Criteria (relative)

Scale Description	Change in noise level, dB(A)
Negligible	0 – 0.9
Very Low	1 – 1-9
Low	2 – 2.9
Medium	3 – 5.9
High	6 – 8.9
Very High	≥9

Figure 9: Dublin Airport North Runway EIAR Volume 2 – Main Report Table 13-3: Air Noise Impact Criteria (relative)

3.2.1 Calculation of $L_{Aeq,16hr}$ Noise Levels from SEL Measurements

Based on the SEL measurements undertaken at the residence in combination with the information submitted by DAA to ANCA as part of the response to ANCA's review of the 2022 airport noise emission outlining the number of flights per aircraft type (included in Appendix B) the $L_{Aeq,16hr}$ noise levels at the residence can be calculated to be compared with the unattended measurement results to confirm validity. The noise level for each aircraft type can be calculated using the following formula and then logarithmically added to predict the daily $L_{Aeq,16hour}$ level as follows:

$$LAeq = L_{AX} - 10*\log_{10}(d1/d2) + 10*\log_{10}(N) - 10*\log_{10}(T)$$

Where:

L_{Ax} measured SEL
N number of vehicle movements
T time (seconds)
d1 distance from the source to the receiver
d2 distance from the source to the measurement

A correction was then applied to the results to account for days of Easterly winds which totalled 12 days over the 92 day duration. Based on the above calculation and the recorded SEL for each aircraft type outlined in Table 2 the predicted $L_{Aeq,16hour}$ during the 92 day summer period in 2023 is 65dB(A).

This shows good agreement with the typical $L_{Aeq,16hour}$ measured over the full 92 day period of 65dB(A). Both the predicted $L_{Aeq,16hour}$ calculated from the attended measurements and the measured $L_{Aeq,16hour}$ exceed the DAA predicted 92 day contour map level at the residence which predicted less than 60 dBA for aircraft noise exposure.

3.3 Comparison of SEL Noise Levels

Sound exposure level (SEL) contours have been predicted by the DAA and their acoustic consultants Bickerdike Allen in relation to the noise abatement departure procedures (NADP) for the North Runway for the most common aircraft types:

- Boeing 737-800
- Airbus A320
- Airbus A330

The predicted SEL contours are shown for the above referenced aircraft type in Figure 10, Figure 11 and Figure 12 below, respectively.

For the DAA predicted SEL contours for the Boeing 737-800 as shown in Figure 10 below, Teresa Sweeney's residence currently lies just inside the 80dB(A) contour. Based on the recorded noise levels at the residence and calculated SELs as outlined in Table 2, the sound exposure level ranged 88 – 93 dB(A) for the Boeing 737-8AS with a logarithmical average SEL of 90dB(A), and 85 – 86 dB(A) for the Boeing 737-8200. This highlights a significant exceedance of the predicted SEL noise levels by up to 13dB(A).

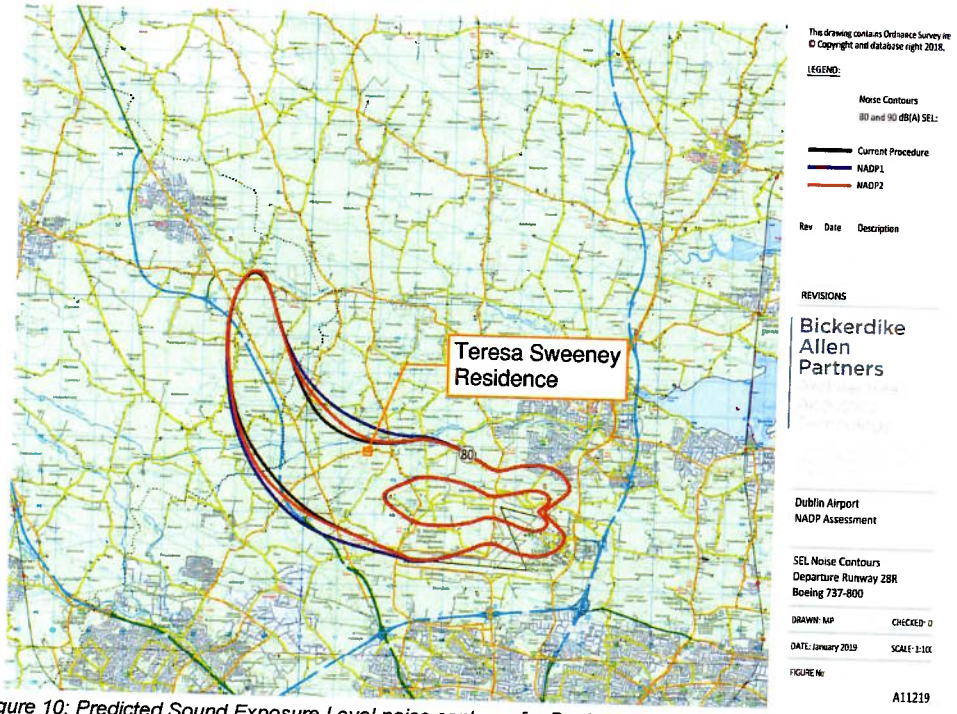

Figure 10: Predicted Sound Exposure Level noise contours for Boeing 737-800 for North Runway operation.

For the DAA predicted SEL contours for the Airbus A320 as shown in Figure 11 below, Teresa Sweeney's residence currently lies just outside the 80dB(A) contour for all departure procedures. Based on the recorded noise levels at the residence and calculated SELs as outlined in Table 2, the sound exposure level ranged 80 – 88 dB(A) for the Airbus A320 with a logarithmical average SEL of 86dB(A). This highlights a significant exceedance of the predicted SEL noise levels by up to 8dB(A).

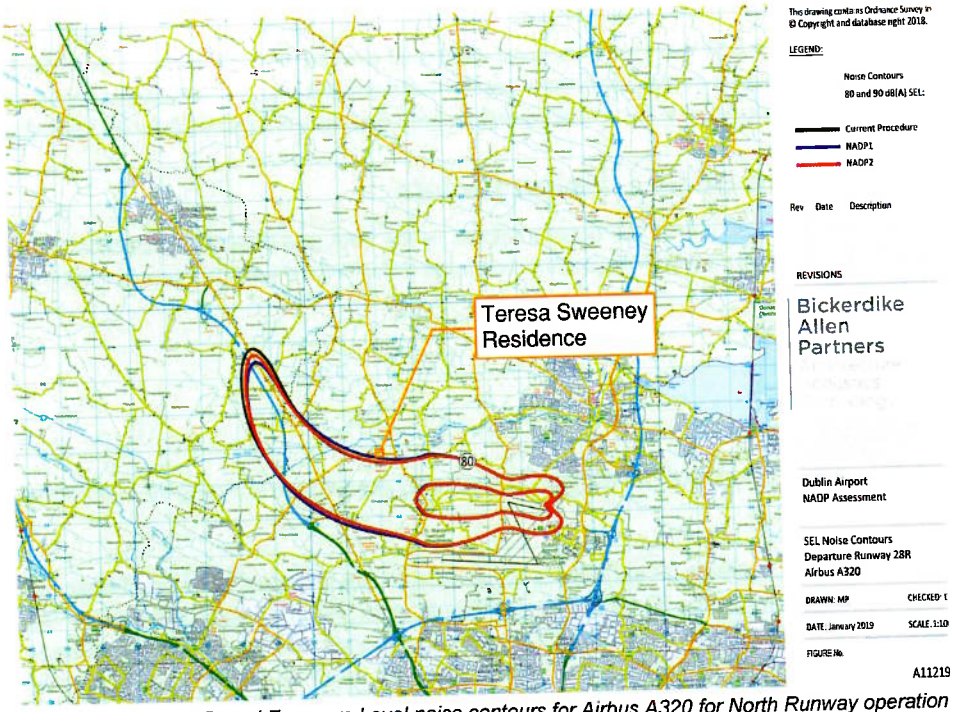

Figure 11: Predicted Sound Exposure Level noise contours for Airbus A320 for North Runway operation .

For the DAA predicted SEL contours for the Airbus A330 as shown in Figure 12 below, Teresa Sweeney's residence currently lies between the 80dB(A) and 90dB(A) contour all departure procedures. Based on the recorded noise levels at the residence and calculated SELs as outlined in Table 2, the sound exposure level was 95 dB(A) for the Airbus A330 for all measurements. This highlights a significant exceedance of the predicted SEL noise levels in excess of 5dB(A).

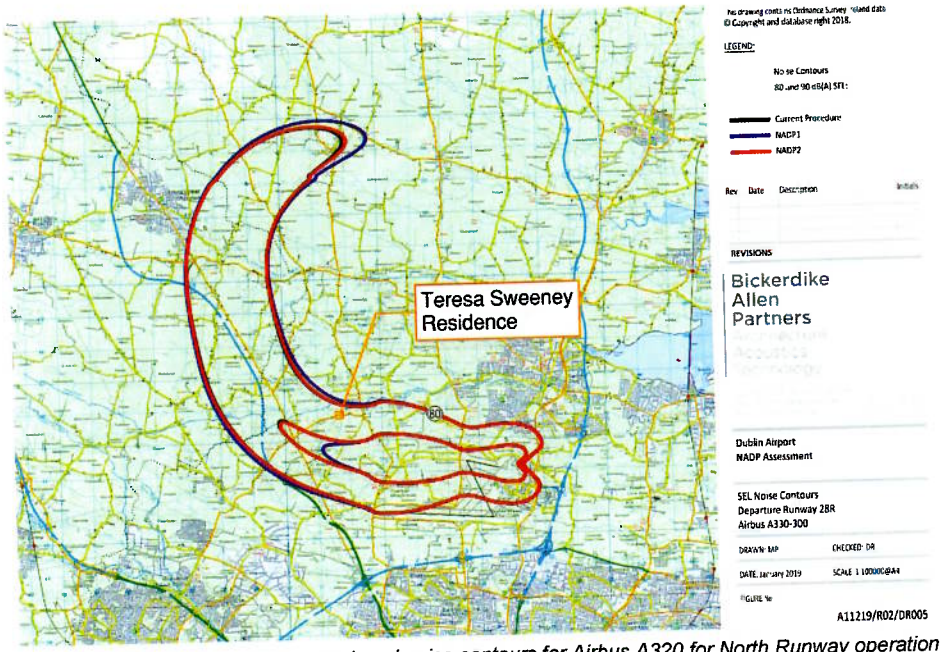

Figure 12: Predicted Sound Exposure Level noise contours for Airbus A320 for North Runway operation .

3.4 L_{Amax} Noise Levels

Based on the unattended measurement results, the $L_{ASmax,1min}$ measurement data has been correlated to the aircraft type for each takeoff over the monitoring period. This section outlines a comparison of the DAA predicted L_{Amax} noise levels with the measured L_{ASmax} noise levels recorded at the Teresa Sweeney residence for the four most common aircraft types.

- Boeing 737-800
- Boeing 737max
- Airbus A320
- Airbus A330

Boeing 737

Figure 13 below outlines the number of L_{ASmax} occurrences for Boeing 737 aircraft over the full 92 day period at the monitoring location. The DAA predicted L_{Amax} noise levels for the Boeing 737-800 are shown further below in Figure 14 which place Teresa Sweeney's residence on the edge of the 70dB contour for all departure procedures. A comparison of the DAA predicted maximum noise levels with the measured levels show a significant increase at the residence due to aircraft takeoffs. The modal L_{ASmax} value recorded at the residence for Boeing 737 aircraft was 80dB, with 691 occurrences. This is a significant increase over the DAA predicted maximum noise levels by 10dB.

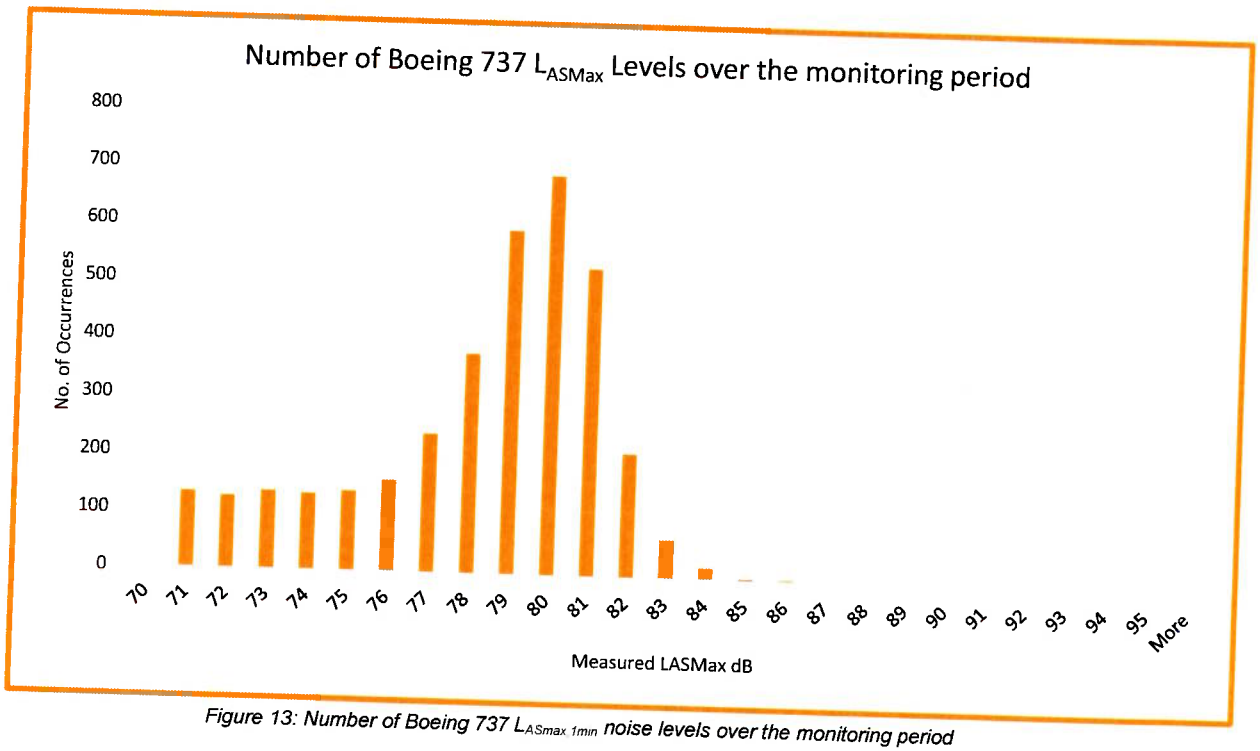

Figure 13: Number of Boeing 737 $L_{ASmax\ 1min}$ noise levels over the monitoring period

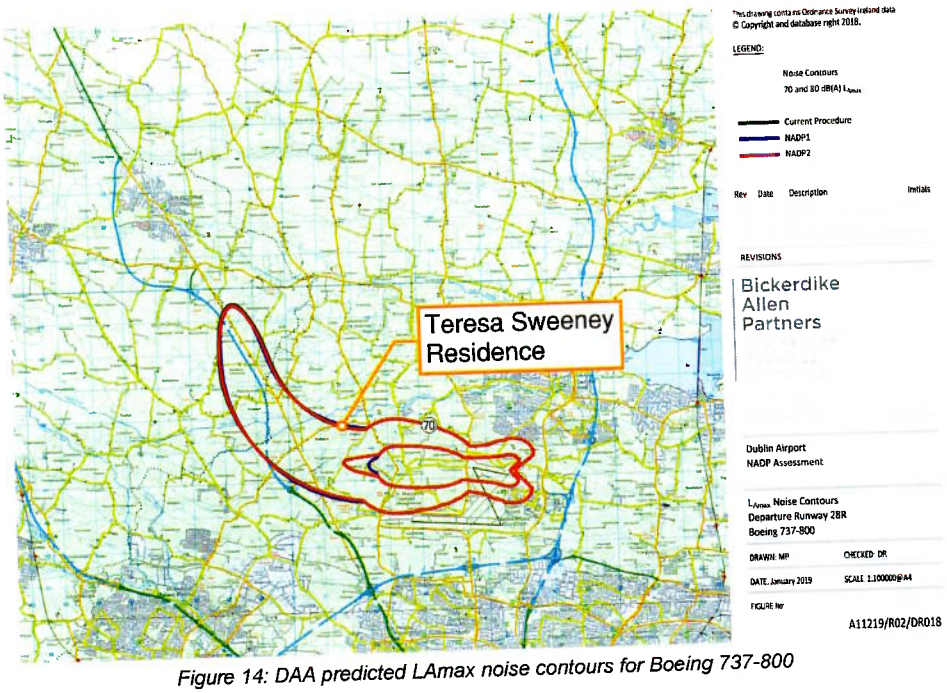

Figure 14: DAA predicted LAmax noise contours for Boeing 737-800

In addition, the recorded L_{ASmax} noise levels for the Boeing 737-max aircraft have been plotted as shown in Figure 15 below which shows a modal L_{ASmax} of 76dB with 283 occurrences. This shows an exceedance of 6dB over the DAA predicted maximum noise levels.

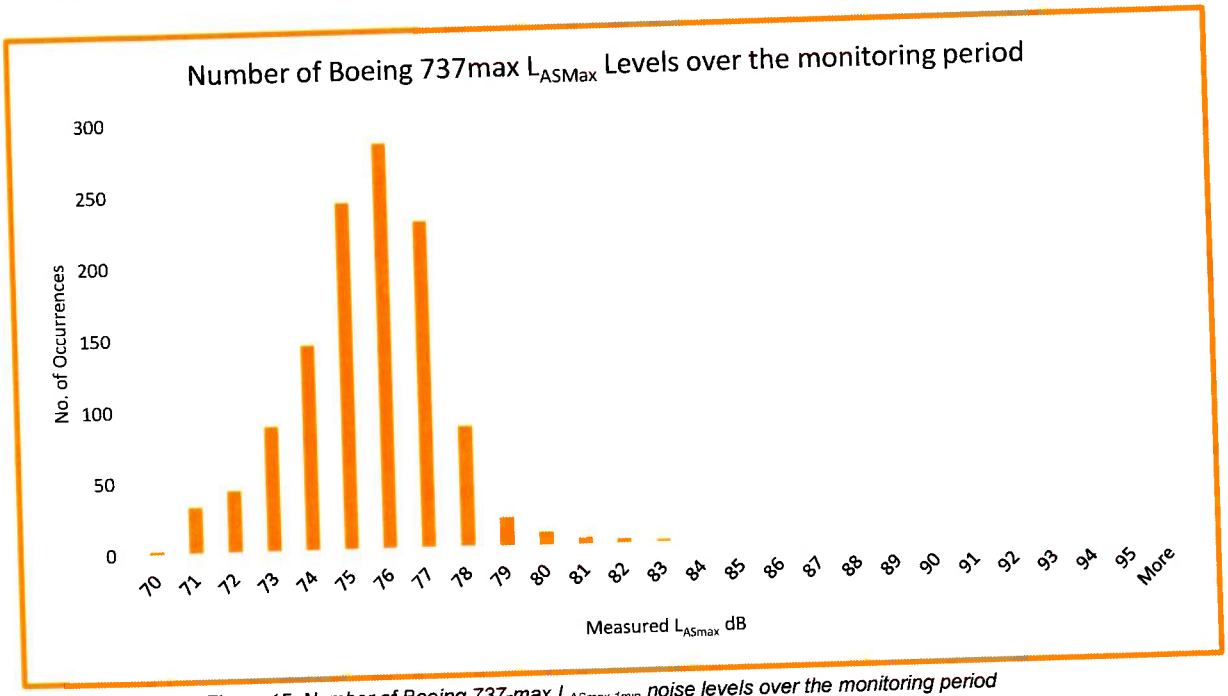

Figure 15: Number of Boeing 737-max $L_{ASmax,1min}$ noise levels over the monitoring period

Airbus A320

Figure 16 below outlines the number of L_{ASmax} occurrences for Airbus A320 aircraft over the full 92 day period at the monitoring location. The DAA predicted L_{Amax} noise levels for the Airbus A320 are shown further below in Figure 17 which place Teresa Sweeney's residence outside the 70dB contour for all departure procedures. A comparison of the DAA predicted maximum noise levels with the measured levels show a significant exceedance at the residence due to aircraft takeoffs. The modal L_{ASmax} value recorded at the residence for Airbus A320

aircraft was 78dB, with 677 occurrences. This is an exceedance of the DAA predicted maximum noise levels by a minimum of 8dB however in reality the exceedance is likely higher than this.

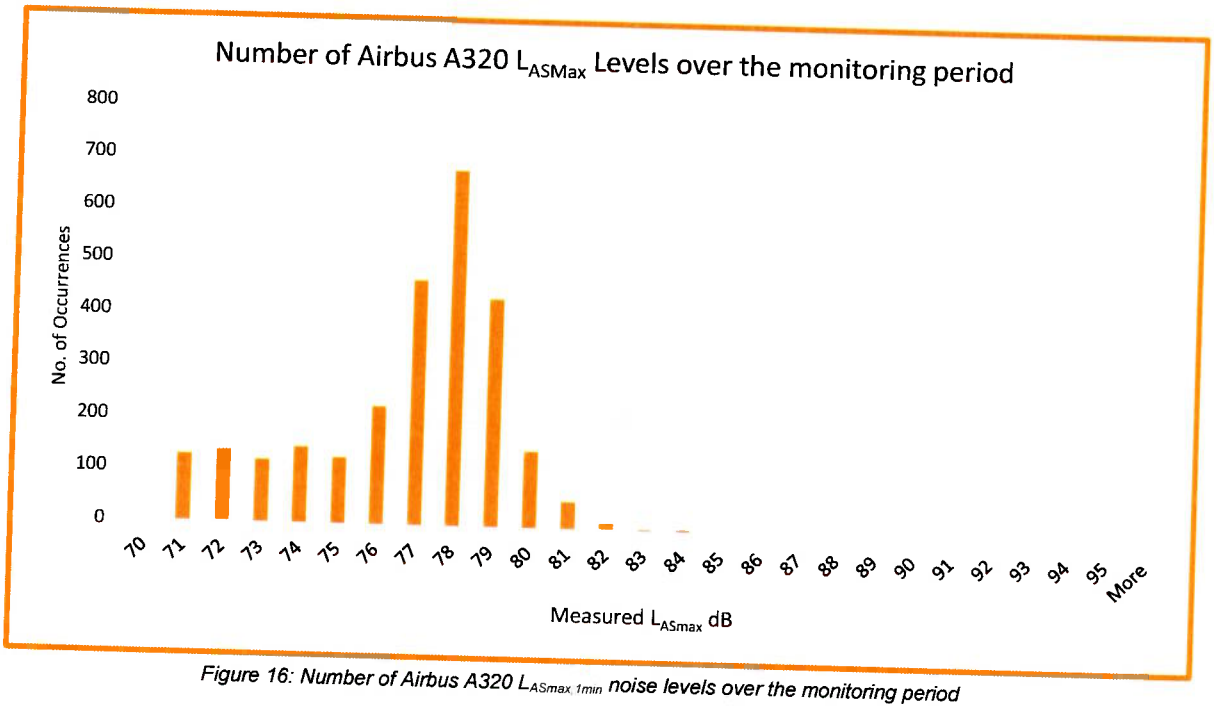

Figure 16: Number of Airbus A320 $L_{ASmax\ 1min}$ noise levels over the monitoring period

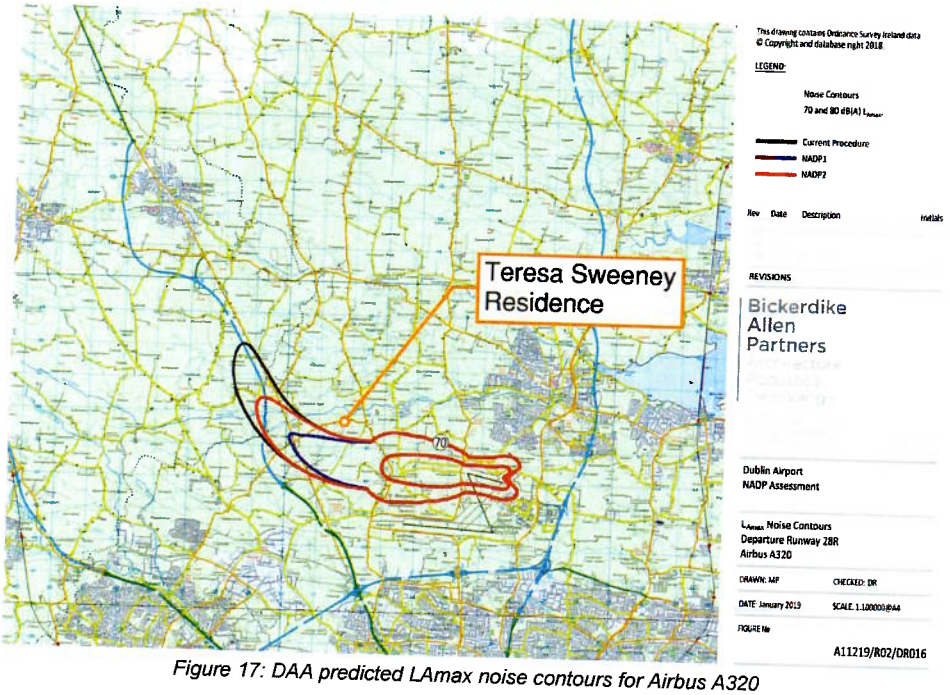

Figure 17: DAA predicted LAmax noise contours for Airbus A320

Airbus A330

Figure 18 below outlines the number of L_{ASmax} occurrences for Airbus A320 aircraft over the full 92 day period at the monitoring location. The DAA predicted L_{Amax} noise levels for the Airbus A320 are shown further below in Figure 19 which place Teresa Sweeney's residence on the edge of the 70dB contour for all departure procedures. A comparison of the DAA predicted maximum noise levels with the measured levels show a significant exceedance at the residence due to aircraft takeoffs. The modal L_{ASmax} value recorded at the

residence for Airbus A330 aircraft was 83dB, with 78 occurrences. This is an exceedance of the DAA predicted maximum noise levels by a minimum of 13dB, in addition to many recorded levels higher than 83dB.

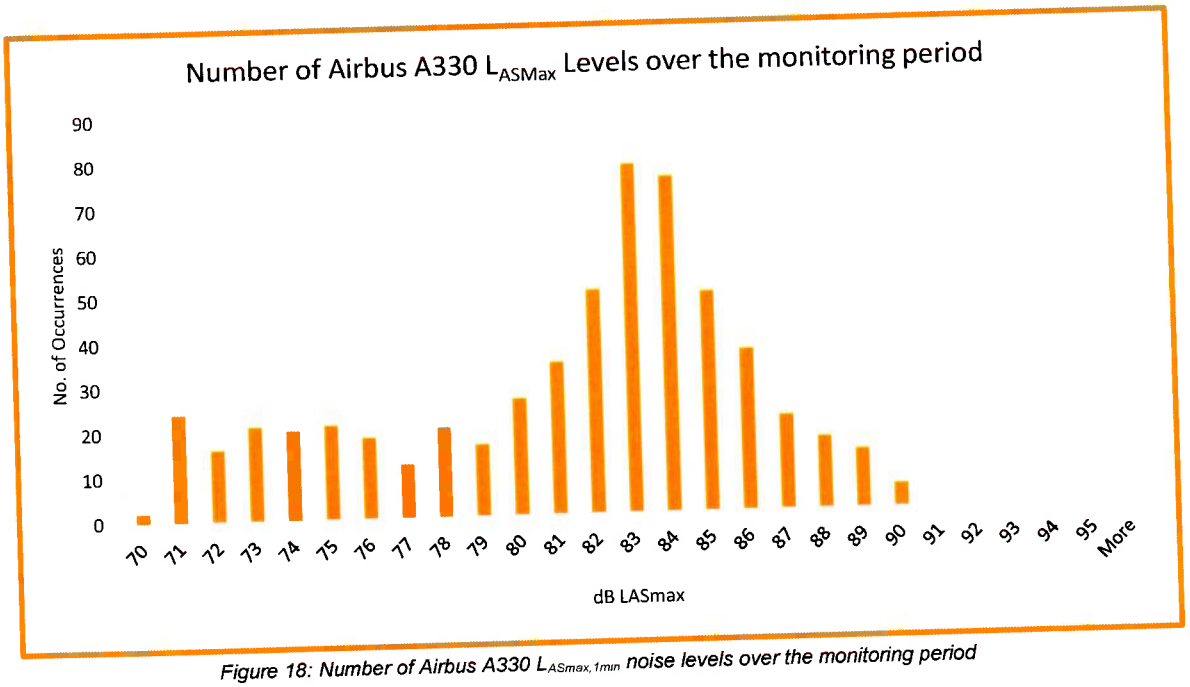

Figure 18: Number of Airbus A330 $L_{ASmax,1min}$ noise levels over the monitoring period

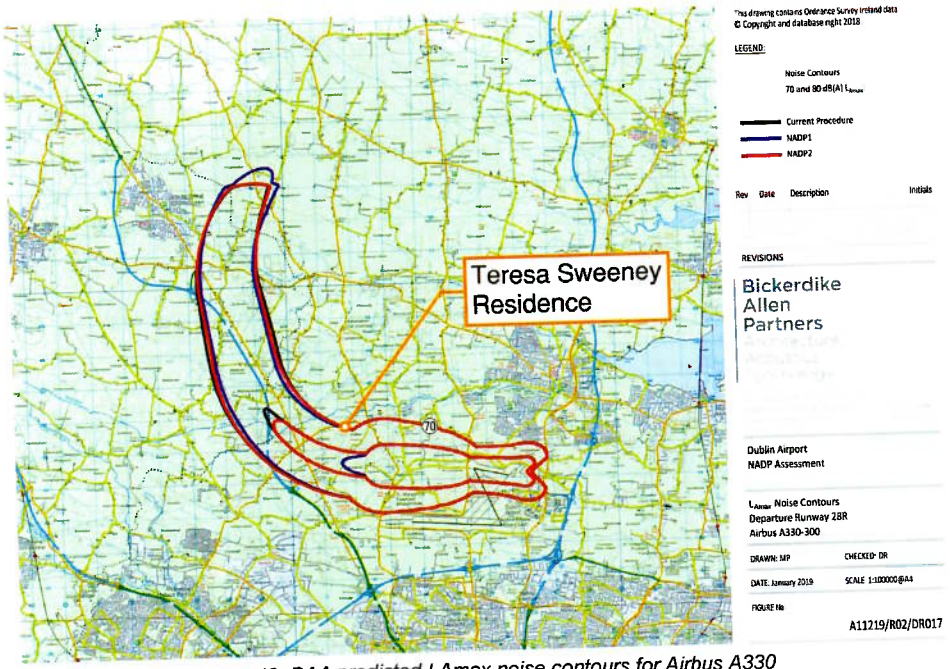

Figure 19: DAA predicted LAmax noise contours for Airbus A330

3.5 External Amenity Spaces

To consider the noise impact of aircraft noise on the residence, the recorded noise levels have been compared to the industry criteria for the external amenity spaces. ProPG 2017 and BS8233:2014 provide the following guidance in relation to external amenity spaces which state that:

"the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$".

Based on the noise monitoring results where the prevailing wind was easterly and therefore aircraft were taking off to the east from the South Runway, it can be determined that the $L_{Aeq,16hour}$ noise levels at the residence were typically in the range of 53 – 55dB(A). This is in line with the ProPG 2017 and BS8233 criteria for external amenity noise levels. The noise levels recorded during days of easterly winds indicate that the noise levels at the residence are so low such that the higher noise levels caused by aircraft take offs during westerly winds are not affected by any other non-aircraft noise sources.

As outlined in Section 3.1, the average daytime noise levels at the residence rose to 65dB(A) when averaged over the full 92 day period and had a median value of 66dB(A). This is an increase of approximately 10-12dB due to North Runway operations and is an exceedance of the industry criteria for external amenity noise levels based on the measured noise levels without aircraft. This is an increase of 12-13 dB when compared with the 2014 site survey.

4 Conclusion

Following the commencement of operations of the new Dublin Airport North Runway, Wave Dynamics were engaged by Teresa Sweeney to review the 92-day unattended noise monitoring results and undertake sound exposure level measurements at Newpark, The Ward, Dublin, D11 EF2R

The objective of the assessment was to quantify the existing noise environment and the current noise levels from aircraft noise following the commencement of the operation of the North Runway. The measured noise levels have been compared with the predicted noise levels from the DAA noise contours and industry criteria.

Based on the results of the unattended noise monitoring at the residence, a 92 day average $L_{Aeq,16hour}$ of 65dB(A) was recorded which shows a significant exceedance of the DAA predicted contour maps which predict a level of less than 60dB(A) over the same 92 day period.

Sound exposure level measurements have also been taken at the residence and thus used to calculate the 92 day average $L_{Aeq,16hour}$ based on the number of aircraft types over the 92 day period which predicted an $L_{Aeq,16hour}$ of 65dB(A).

Both the predicted $L_{Aeq,16hour}$ calculated from the attended measurements and the measured $L_{Aeq,16hour}$ exceed the DAA predicted 92 day contour map level at the residence which predicted less than 60 dBA for aircraft noise exposure. In addition these have been compared to the DAA 2025 predicted noise contours which are 63dBA at the dwelling. The measurements undertaken in 2023 do not correlate with the most recent DAA noise contours this places doubts over the accuracy of the DAA contours when compared to actual measured data from the same period.

The DAA predicted L_{night} contours have been compared to the existing nighttime noise levels at the dwelling. Based on the *Dublin Airport North Runway EIAR Volume 2 – Main Report* it is likely that commencement of nighttime flights will have a "Profound" impact on the noise levels at the residence.

Sound exposure level measurements for the three most common aircraft types were also compared to the DAA predicted noise contours for the same aircraft types which showed exceedances for all three aircraft types of up to 13dB(A).

L_{ASmax} values over the full 92 day monitoring period for the three most common aircraft types were compared to the DAA predicted noise contours for the same aircraft types. All three aircraft types showed exceedances over the predicted maximum noise levels with the worst case aircraft having a modal L_{ASmax} value of 13dBA in excess of the predicted noise levels.

Appendix A- Glossary of Terms

dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L_{A90}	A-weighted sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L_{Aeq}	A-weighted, equivalent continuous sound level.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak

Appendix B – Volume of Flights per Aircraft Type

The volume of flights per aircraft type have been submitted to DAA by ANCA and are outlined below in Table 3.

Table 3: Volume of each aircraft type over the entire year and over summer period

Aircraft Type	2023						
	Annual Average				Summers Period		
	Annual Day	Annual Eve	Annual Night	Annual 24hr	Summer Day 16hr	Summer Night	Summer 24hr
Airbus A300	0	0	0	0	0	0	0
Airbus A306	595	298	298	1190	262	87	350
Airbus A319	2083	0	0	2083	612	0	612
Airbus A320	38379	10115	4165	52659	14246	1224	15470
Airbus A320neo	3273	1488	298	5058	1398	87	1486
Airbus A321	1785	893	595	3273	787	175	961
Airbus A321neo	5355	0	595	5950	1573	175	1748
Airbus A330	8628	0	893	9520	2535	262	2797
Airbus A330neo	0	0	0	0	0	0	0
Airbus A350	0	0	0	0	0	0	0
ATR 42	0	0	0	0	0	0	0
ATR 72	9223	2083	0	11305	3321	0	3321
BAe 146/Avro RJ	0	0	0	0	0	0	0
Boeing 737-400	595	1190	595	2380	524	175	699
Boeing 737-500	0	0	0	0	0	0	0
Boeing 737-700	0	0	0	0	0	0	0
Boeing 737-800	38974	10710	4463	54147	14596	1311	15907
Boeing 737 MAX	17553	6545	2975	27073	7079	874	7953
Boeing 757	2380	298	298	2975	787	87	874
Boeing 767	1190	1190	595	2975	699	175	874
Boeing 777	1190	0	595	1785	350	175	524
Boeing 777X	0	0	0	0	0	0	0
Boeing 787	3570	0	595	4165	1049	175	1224
Bombardier CS300	1190	595	0	1785	524	0	524
Bombardier Dash 8	595	0	0	595	175	0	175
Convair 580	0	0	0	0	0	0	0
Embraer E190/195	4165	1785	298	6248	1748	87	1835
Embraer E190-E2	595	0	0	595	175	0	175
HS748A	0	0	0	0	0	0	0
Lockheed C130	0	0	0	0	0	0	0
McDonnell Douglas	0	0	0	0	0	0	0
MD83	0	0	0	0	0	0	0
Piper PA34	0	0	0	0	0	0	0
Shorts SD330/360	0	0	0	0	0	0	0

Aircraft Type	2023						
	Annual Average				Summers Period		
	Annual Day	Annual Eve	Annual Night	Annual 24hr	Summer Day 16hr	Summer Night	Summer 24hr
Other	1488	298	0	1785	524	0	524
Total	**142804**	**37486**	**17255**	**197546**	**52964**	**5069**	**58034**

Appendix C - Unattended Noise Monitoring Results

Table 4 below outlines the noise levels recorded at location L1 over the period 14th of June 2023 to 17th of September 2023. The results are averaged over the following periods:

- $L_{Aeq,16hour}$ 07:00 – 23:00
- $L_{Aeq,8hour}$ 23:00 – 07:00

Table 4: Unattended Measurement Results

Date	Start Time	End Time	Average $L^{Aeq,T}$
14/06/2023	07:00	23:00	53
14/06/2023	23:00	07:00	48
15/06/2023	07:00	23:00	54
15/06/2023	23:00	07:00	48
16/06/2023	07:00	23:00	58
16/06/2023	23:00	07:00	47
17/06/2023	07:00	23:00	53
17/06/2023	23:00	07:00	43
18/06/2023	07:00	23:00	52
18/06/2023	23:00	07:00	47
19/06/2023	07:00	23:00	64
19/06/2023	23:00	07:00	47
20/06/2023	07:00	23:00	59
20/06/2023	23:00	07:00	47
21/06/2023	07:00	23:00	64
21/06/2023	23:00	07:00	48
22/06/2023	07:00	23:00	56
22/06/2023	23:00	07:00	47
23/06/2023	07:00	23:00	65
23/06/2023	23:00	07:00	47
24/06/2023	07:00	23:00	64
24/06/2023	23:00	07:00	46
25/06/2023	07:00	23:00	65
25/06/2023	23:00	07:00	48
26/06/2023	07:00	23:00	65
26/06/2023	23:00	07:00	48
27/06/2023	07:00	23:00	64
27/06/2023	23:00	07:00	48
28/06/2023	07:00	23:00	65
28/06/2023	23:00	07:00	49
29/06/2023	07:00	23:00	64
29/06/2023	23:00	07:00	47
30/06/2023	07:00	23:00	64
30/06/2023	23:00	07:00	48
01/07/2023	07:00	23:00	64
01/07/2023	23:00	07:00	46
02/07/2023	07:00	23:00	65
02/07/2023	23:00	07:00	48
03/07/2023	07:00	23:00	64

Date	Start Time	End Time	Average $L^{Aeq,T}$
03/07/2023	23:00	07:00	49
04/07/2023	07:00	23:00	66
04/07/2023	23:00	07:00	49
05/07/2023	07:00	23:00	66
05/07/2023	23:00	07:00	48
06/07/2023	07:00	23:00	63
06/07/2023	23:00	07:00	49
07/07/2023	07:00	23:00	56
07/07/2023	23:00	07:00	49
08/07/2023	07:00	23:00	64
08/07/2023	23:00	07:00	45
09/07/2023	07:00	23:00	65
09/07/2023	23:00	07:00	46
10/07/2023	07:00	23:00	62
10/07/2023	23:00	07:00	55
11/07/2023	07:00	23:00	65
11/07/2023	23:00	07:00	53
12/07/2023	07:00	23:00	66
12/07/2023	23:00	07:00	48
13/07/2023	07:00	23:00	66
13/07/2023	23:00	07:00	46
14/07/2023	07:00	23:00	59
14/07/2023	23:00	07:00	48
15/07/2023	07:00	23:00	65
15/07/2023	23:00	07:00	49
16/07/2023	07:00	23:00	66
16/07/2023	23:00	07:00	49
17/07/2023	07:00	23:00	66
17/07/2023	23:00	07:00	46
18/07/2023	07:00	23:00	62
18/07/2023	23:00	07:00	46
19/07/2023	07:00	23:00	66
19/07/2023	23:00	07:00	51
20/07/2023	07:00	23:00	66
20/07/2023	23:00	07:00	51
21/07/2023	07:00	23:00	66
21/07/2023	23:00	07:00	47
22/07/2023	07:00	23:00	66
22/07/2023	23:00	07:00	45
23/07/2023	07:00	23:00	61
23/07/2023	23:00	07:00	45
24/07/2023	07:00	23:00	66
24/07/2023	23:00	07:00	47
25/07/2023	07:00	23:00	66
25/07/2023	23:00	07:00	48
26/07/2023	07:00	23:00	63
26/07/2023	23:00	07:00	47
27/07/2023	07:00	23:00	66
27/07/2023	23:00	07:00	47
28/07/2023	07:00	23:00	66

WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Date	Start Time	End Time	Average $L^{Aeq,T}$
28/07/2023	23:00	07:00	47
29/07/2023	07:00	23:00	66
29/07/2023	23:00	07:00	46
30/07/2023	07:00	23:00	67
30/07/2023	23:00	07:00	47
31/07/2023	07:00	23:00	65
31/07/2023	23:00	07:00	48
01/08/2023	07:00	23:00	66
01/08/2023	23:00	07:00	47
02/08/2023	07:00	23:00	64
02/08/2023	23:00	07:00	46
03/08/2023	07:00	23:00	66
03/08/2023	23:00	07:00	47
04/08/2023	07:00	23:00	66
04/08/2023	23:00	07:00	53
05/08/2023	07:00	23:00	65
05/08/2023	23:00	07:00	45
06/08/2023	07:00	23:00	66
06/08/2023	23:00	07:00	46
07/08/2023	07:00	23:00	66
07/08/2023	23:00	07:00	47
08/08/2023	07:00	23:00	66
08/08/2023	23:00	07:00	47
09/08/2023	07:00	23:00	66
09/08/2023	23:00	07:00	45
10/08/2023	07:00	23:00	54
10/08/2023	23:00	07:00	48
11/08/2023	07:00	23:00	66
11/08/2023	23:00	07:00	47
12/08/2023	07:00	23:00	66
12/08/2023	23:00	07:00	45
13/08/2023	07:00	23:00	66
13/08/2023	23:00	07:00	47
14/08/2023	07:00	23:00	66
14/08/2023	23:00	07:00	46
15/08/2023	07:00	23:00	66
15/08/2023	23:00	07:00	48
16/08/2023	07:00	23:00	63
16/08/2023	23:00	07:00	46
17/08/2023	07:00	23:00	55
17/08/2023	23:00	07:00	46
18/08/2023	07:00	23:00	56
18/08/2023	23:00	07:00	54
19/08/2023	07:00	23:00	66
19/08/2023	23:00	07:00	46
20/08/2023	07:00	23:00	67
20/08/2023	23:00	07:00	48
21/08/2023	07:00	23:00	66
21/08/2023	23:00	07:00	48
22/08/2023	07:00	23:00	66

Date	Start Time	End Time	Average $L^{Aeq,T}$
22/08/2023	23:00	07:00	48
23/08/2023	07:00	23:00	66
23/08/2023	23:00	07:00	47
24/08/2023	07:00	23:00	66
24/08/2023	23:00	07:00	48
25/08/2023	07:00	23:00	67
25/08/2023	23:00	07:00	46
26/08/2023	07:00	23:00	66
26/08/2023	23:00	07:00	45
27/08/2023	07:00	23:00	66
27/08/2023	23:00	07:00	47
28/08/2023	07:00	23:00	66
28/08/2023	23:00	07:00	48
29/08/2023	07:00	23:00	66
29/08/2023	23:00	07:00	48
30/08/2023	07:00	23:00	67
30/08/2023	23:00	07:00	46
31/08/2023	07:00	23:00	63
31/08/2023	23:00	07:00	46
01/09/2023	07:00	23:00	67
01/09/2023	23:00	07:00	45
02/09/2023	07:00	23:00	65
02/09/2023	23:00	07:00	45
03/09/2023	07:00	23:00	66
03/09/2023	23:00	07:00	46
04/09/2023	07:00	23:00	63
04/09/2023	23:00	07:00	50
05/09/2023	07:00	23:00	55
05/09/2023	23:00	07:00	49
06/09/2023	07:00	23:00	63
06/09/2023	23:00	07:00	50
07/09/2023	07:00	23:00	55
07/09/2023	23:00	07:00	49
08/09/2023	07:00	23:00	62
08/09/2023	23:00	07:00	46
09/09/2023	07:00	23:00	66
09/09/2023	23:00	07:00	44
10/09/2023	07:00	23:00	66
10/09/2023	23:00	07:00	46
11/09/2023	07:00	23:00	63
11/09/2023	23:00	07:00	46
12/09/2023	07:00	23:00	66
12/09/2023	23:00	07:00	48
13/09/2023	07:00	23:00	66
13/09/2023	23:00	07:00	48
14/09/2023	07:00	23:00	67
14/09/2023	23:00	07:00	47
15/09/2023	07:00	23:00	67
15/09/2023	23:00	07:00	44
16/09/2023	07:00	23:00	65

WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Date	Start Time	End Time	Average $L^{Aeq,T}$
16/09/2023	23:00	07:00	44
17/09/2023	07:00	23:00	66