SECTION 131 FORM

File With S.

Appeal NO: ABP 314485

TO: SEO

Defer Re O/H ☐

Having considered the contents of the submission dated/ received 23/12/24

from Stephen Smyth 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 issues

E.O.: _____ Date: 2/1/25

To EO: _____

Section 131 not to be invoked at this stage. ☐

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

S.E.O.: _____

S.A.O: _____ Date: _____

Date: _____

M _____

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

o: _____

llow 2/3/4weeks – BP _____

O: _____

A: _____ Date: _____

Date: _____

S. 37

File With _____

CORRESPONDENCE FORM

eal No: ABP 314485

ase treat correspo ndence received on 23/12/24 as follows:

Update database with new agent for Appli cant/Appellant _____

Acknowledge with BP 23

. Keep copy of Board's Letter ☐

1. RETURN TO SENDER with BP _____

2. Keep Envelope: ☐

3. Keep Copy of Board's letter ☐

Amendments/Comments

Resp Recd

4. Attach to file

(a) R/S ☐

(b) GIS Processing ☒

(c) Processing ☑

(d) Screening ☐

(e) Inspectorate ☐

RETURN TO EO ☐

	Plans Date Stamped ☐ Date Stamped Filled in ☐
EO:	AA: F. Whelehan
Date: 2/1/25	Date: 2/1/25

David Behan

From: Steve Smyth <steve.s.smyth@gmail.com>
Sent: Monday 23 December 2024 08:53
To: Appeals2
Subject: Case Ref ABP-314485-22
Attachments: Observation-on-a-Planning-Appeal-Form-North_Runway - Dec 2024 Stephen Smyth.pdf

Please find attached my submission on the draft decision for case number 314485 under public consultation.

Regards

Stephen

An Bord Pleanála

Observation on a Planning Appeal: Form.

Your details

1. Observer's details (person making the observation)

If you are making the observation, write your full name and address.

If you are an agent completing the observation for someone else, write the observer's details:

Your full details:

(a)	Name	Stephen Smyth
(b)	Address	Newpark, The Ward, Co. Dublin, D11EF2R

Agent's details

2. Agent's details

If you are an agent and are acting for someone else **on this observation**, please **also** write your details below.

If you are not using an agent, please write "Not applicable" below.

(a)	Agent's name	Not applicable
(b)	Agent's address	Not applicable

Postal address for letters

3. During the appeal process we will post information and items to you **or** to your agent. For this observation, who should we write to? (Please tick ✓ one box only.)

You (the observer) at the address in Part 1	✓	**The agent at the address in Part 2**	☐

Details about the proposed development

4. Please provide details about the appeal you wish to make an observation on. If you want, you can include a copy of the planning authority's decision as the observation details.

(a) Planning authority

(for example: Ballytown City Council)

Fingal County Council

(b) An Bord Pleanála appeal case number (if available)

(for example: ABP-300000-19)

PL06F.314485

(c) Planning authority register reference number

(for example: 18/0123)

F20A/0668

(d) Location of proposed development

(for example: 1 Main Street, Baile Fearainn, Co Abhaile)

Dublin Airport, Co Dublin

Observation details

5. Please describe the grounds of your observation (planning reasons and arguments). You can type or write them in the space below or you can attach them separately.

I am submitting this observation following a receipt of notification from An Bord Pleanala of a draft decision to grant permission for the Relevant Action. Please note that as a person that has contributed an observation on this case previously and already paid the €50 fee no new fees are required. My observation is contained on the following pages.

1.0 NECESSITY OF A MOVEMENT LIMIT

In my previous submission I raised the inadequacy of daa's approach to the noise impact assessment in the EIAR focusing only on average metrics such as L_{den}, $L_{Aeq,16hr}$, L_{night}, %HA and %HSD. I welcome the decision of the inspector and her expert to agree with this fact and focus on the significance of Additional Awakenings (AA) which are linked to the instant L_{AMax} noise level rather than averages.

The Inspector notes that "Using the AA method, one additional awakening is rated as a significant effect, rather than the %HSD, where the relative change in ATMs would be predicted to have a nil to minor effect on sleep" (Paragraph 13.10.6). This significance rating is clear, more than one additional awakening due to aircraft noise is a significant impact.

It stands to reason then that for locations where there may be a multiple of awakenings the impact is more than significant with the possibility of Very Significant and Profound effects occurring. However, there is no way in the applicants information or the Inspectors reports to determine where these impacts occur.

For my own situation I can confirm that I am woken every day at 7am from the first departure from the North Runway and I struggle to fall asleep until the last flight has departed at 11pm. My lived experience is that the noise from aircraft overhead at my location is so high that each and every flight would cause an awakening. I can therefore conclude that I will suffer more than one additional awakening and be subjected to Very Significant or Profound effects. Yet the Relevant Action application by the daa offers minimal mitigation in the form of a grant towards insulation.

I welcome the Inspectors conclusion that that is inadequate and that the only mechanism available to limit the significant impact is to apply a movement limit of 13000 flights annually at Dublin Airport at night. However, it is disappointing that the Inspector did not conclude if the daa application was so fundamentally flawed that it should have been rejected outright.

The final decision could still reject permission as there remains several significant issues that my community group St Margaret's The Ward have outlined in their submission. Any permission that is granted must retain the movement limit of 13000 as without that Dublin Airport will profoundly and negatively impact on 1000's of homes without any effective mitigation.

2.0 INADEQUDACY OF THE EIA PRODUCED

2.1 Mitigation & Significance

The Inspector has identified that the EIA report submitted had inadequate mitigation. At Paragraph 13.20 the inspector states,

13.20. **Reasoned Conclusion and Likely Significant Effects**

Having regard to the examination of environmental information contained above, and in particular to the EIAR and the submissions from the planning authorities and prescribed bodies in the course of the application, it is considered that the main significant direct and indirect effects of the proposed development on the environment have been identified throughout this report. In the absence of additional operational restrictions and mitigation measures it is considered that the proposed development would give rise to significant direct or indirect impacts of the population and human health, and the minor direct and indirect impacts on climate change as detailed below:

- Population and Human Health will be mainly impacted by the number of people Highly Annoyed, which will initially decrease in 2025 and then increase in 2035 in the Relevant Action when compared to the permitted scenario. The number of people Highly Sleep Disturbed will increase in both assessment years (i.e. 2025 and 2035). These figures are based on the average impact of the increased aircraft movements and do not reflect the full extent of the increased movement of aircraft during the additional two nighttime hours in the Relevant Action. The inclusion of additional mitigation measures and operating restrictions in the form of an aircraft movement limit can ensure additional awakenings are minimised and the impact on sleep disturbance is mitigated.

The inadequacy of the mitigation is a fundamental flaw of the EIAR submitted by daa. According to the EPA document from 2022 *Guidelines on the information to be contained in Environmental Impact Assessment Reports* an EIAR should include,

> *'A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.'*

The applicant has offered no mitigation options to avoid, prevent or offset the significant adverse impacts. Instead, the applicant proposes two noise mitigation measures in their application,

- A grant towards insulating bedrooms
- Noise monitoring framework

Taking the second measure first, a noise monitoring framework will not reduce the noise level and is therefore simply not a mitigation measure. It should be disregarded as it is ineffective.

The insulation scheme is also considered inadequate for several reasons as follows,

- It is not providing adequate mitigation to remove the significant adverse impact
- Insulation is simply not effective to reduce the night-noise impacts for the very significant and profoundly affected areas, such as my property
- Insulation requires that homes are permanently sealed from the outside world, no longer can people enjoy sleeping with the windows open on a summers night
- Insulation may be adequate for some areas exposed to lower levels of noise, however, it is a grant rather than paying fully for the required insulation, why should homes that find themselves exposed to night noise when for decades the understanding was there that the North Runway could not be used at night have to contribute anything towards insulation?

Furthermore, the inspector has correctly identified that a movement limit is also a necessary mitigation measure to ensure significant adverse effects are mitigated. The Applicant failed to even consider a movement limit. The EPA document states that,

> *"Significant adverse effects identified in the EIAR can also be used as reasons for a decision to refuse consent."*

This failure by the Applicant to consider a movement limit as part of mitigation demonstrates how the EIAR submitted fails to meet the requirements of the EIA directive and the applicant should be refused permission.

2.2 Alternatives

The EIA directive requires an EIAR to contain,

> *'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'*

In this instance I contend that the applicant has failed to consider the reasonable alternatives for how the airport could operate with parallel runways.

Firstly, the Applicant's Do Nothing or 'Permitted' scenario is flawed as it is based on flight paths that are different to those assessed as part of the original EIS in 2004 and no subsequent application has sought to alter those flight paths or assess the environmental impact of changing the flight paths. Flight paths

from a runway are fundamental to the runway operation and cannot be separated from the consented development in the way the applicant describes.

Secondly the Applicant's assessment of alternative modes of operation fails to consider the assessment of alternative flight paths, crucially failing to recognise the significance of how altering the flight paths used in the original EIS without any assessment of the environmental impact of that change is a serious flaw. The inspector has failed to request any submissions on this technical area from the national authorities on such matters, IAA and AirNav. Instead the inspector has taken at face value the daa assertion that there are no alternatives available that meet the safety requirements. This statement is known to be false with AirNav and IAA on the record to state that there are numerous alternatives to how dual runways could operate. In fact, IAA have stated repeatedly that one alternative is to operate Dublin Airport in Dependent Mode where arrivals on one runway and departures on another are staggered to avoid any conflict. That mode would allow the straight flight paths from the original EIS that was approved to be used.

Thirdly, the Applicant fails to consider reasonable alternative mitigation measures such as voluntary purchase, relocation etc for the worst affected locations.

Why has the inspector not challenged the daa on this mandatory and legal requirement to consider alternatives? The legal requirements of the EIA Directive relating to alternatives are as follows,

Box 28: Directive 2011/92/EU as amended by Directive 2014/52/EU

Article 5(1) states that the developer shall include at least:

- d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
- f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

Annex IV point 2 expands further:

2) A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

The failure to consider reasonable alternatives comprehensively is a failure to meet the requirements of the EIA directive and the applicant should be refused permission.

3.0 FLIGHT PATHS

The Inspector has acknowledged that the flight paths put forward in the Applicants documentation and those also currently in use by the daa for departures from the North Runway, are not the same as the flight paths used in the environmental studies when the North Runway was granted permission.

In fact, the Applicant has also acknowledged this in recent further information submissions to Fingal Co Co on the Infrastructure Application to expand passenger numbers to 40m, Fingal County Council Reg: Ref: F23A/0781 Part 1-B, Response to RFIs by Coakley O Neill. In this document it is acknowledged at page 58 when discussing the flight paths used for the 2007 grant of permission assessments that:

"The flight routes assumed that the North Runway tracks would replicate those on the South Runway. These assumed aircraft turned after a straight segment of around 5nm from the end of the runway."

Why is it then that the Inspector accepts the assertion from the Applicant that these different flights paths are 'Permitted'. By accepting that the Inspector is facilitating a grant of approval for different flight paths and different environmental impacts via the back door. This would allow the flight paths to be changed without any assessment of the noise impacts resulting from the change from the 2007 flight paths to now.

This is analogous to Irish Rail being granted permission for a new railway line between two cities but being permitted to put the tracks wherever they like during construction. That would never occur, why is it any different for flight paths?

Logic would therefore dictate that if a new EIAR is required for differences in flight paths since the Relevant Action was first submitted to Fingal County Council then a new EIAR is also required to assess the impact of changing the original 2007 EIS flight paths.

Clearly changing the 2007 EIS flight paths will result in a change to the noise contours being calculated using those flight paths. As a result, there are now areas being overflown by North Runway departures to the west which were never assessed in the original EIS.

There is no presentation of the significance of the noise increase as a result of these new flight paths. Instead, the applicant presents various "Permitted" scenarios in the EIAR which also use these new flight paths.

There is a fundamental error in the applicant's approach to determine the significance of the proposed development. They are comparing "Permitted" to "Proposed" scenarios that both use the new flight paths that are different to the paths used in the original EIS.

This underestimates the significance of the change in noise environment for all communities and dwellings under the new flight paths, including my own home.

4.0 ACCURACY

Accurate noise modelling is crucial in assessing environmental impacts, ensuring regulatory compliance, and addressing public concerns. However, recent analyses have highlighted significant discrepancies between modelled noise impacts and real-world monitoring results, particularly during the 92-day summer periods of 2023 and 2024. These inconsistencies raise serious questions about the reliability of noise models used by consultants engaged by the Dublin Airport Authority (daa).

These discrepancies were highlighted in my previous submission, however, the Inspector relies on the conclusions of Dani Fiumicelli, their noise expert, who dismissed the differences between measured and modelled noise levels.

This dismissal is very concerning to my family, especially when the difference between monitored noise and modelled noise is as much as 40%. How can the Board dismiss these concerns without any independent verification of the modelling done. Evidence has now been presented for significant errors in the daa noise model results. These errors cascade throughout the assessment presented to the Board and have implications for the quantitative analysis conducted on which the Board have based their decision.

The noise monitoring carried out at my property (see report attached to my previous submission) has found that the actual measured noise levels during the 92 day summer period in 2023 are significantly higher than the predicted 2025 contours in the supplementary EIAR. In my case the $L_{Aeq,16hr}$ value measured over the 92 days is 65dB with the most common noise level measured during the 92 day monitoring is 66dB $L_{Aeq,16hr}$. The supplementary EIAR assesses my property to be less than 63dB $L_{Aeq,16hr}$ in the 2025 scenario. Extract below from the monitoring report.

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.

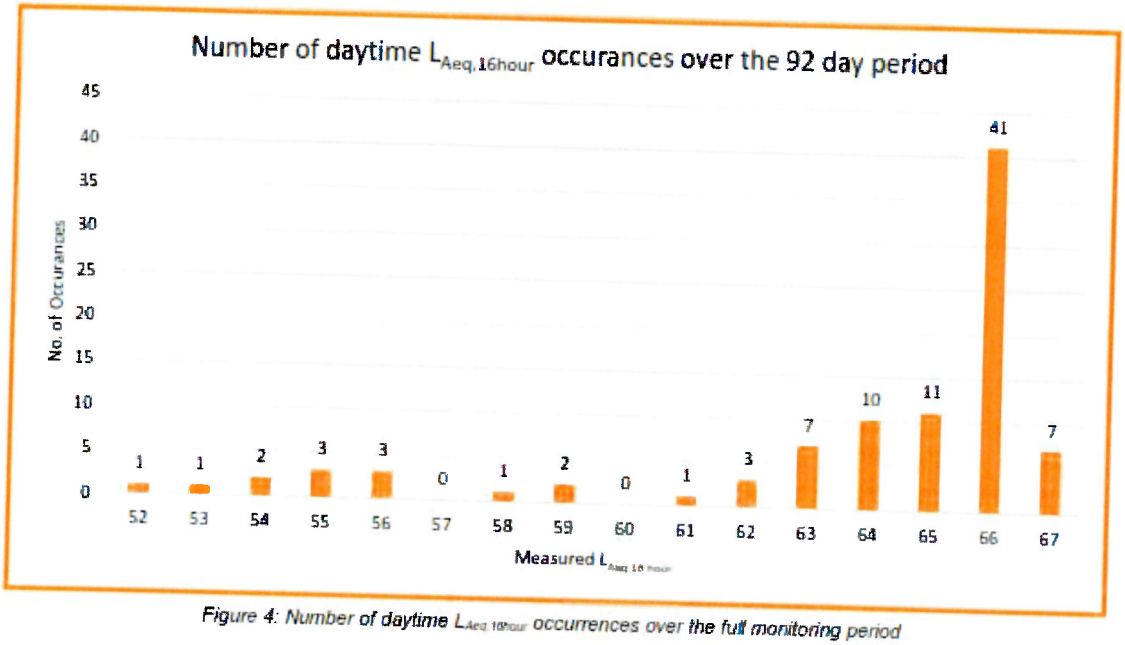


Figure 4: Number of daytime $L_{Aeq,16hour}$ occurrences over the full monitoring period

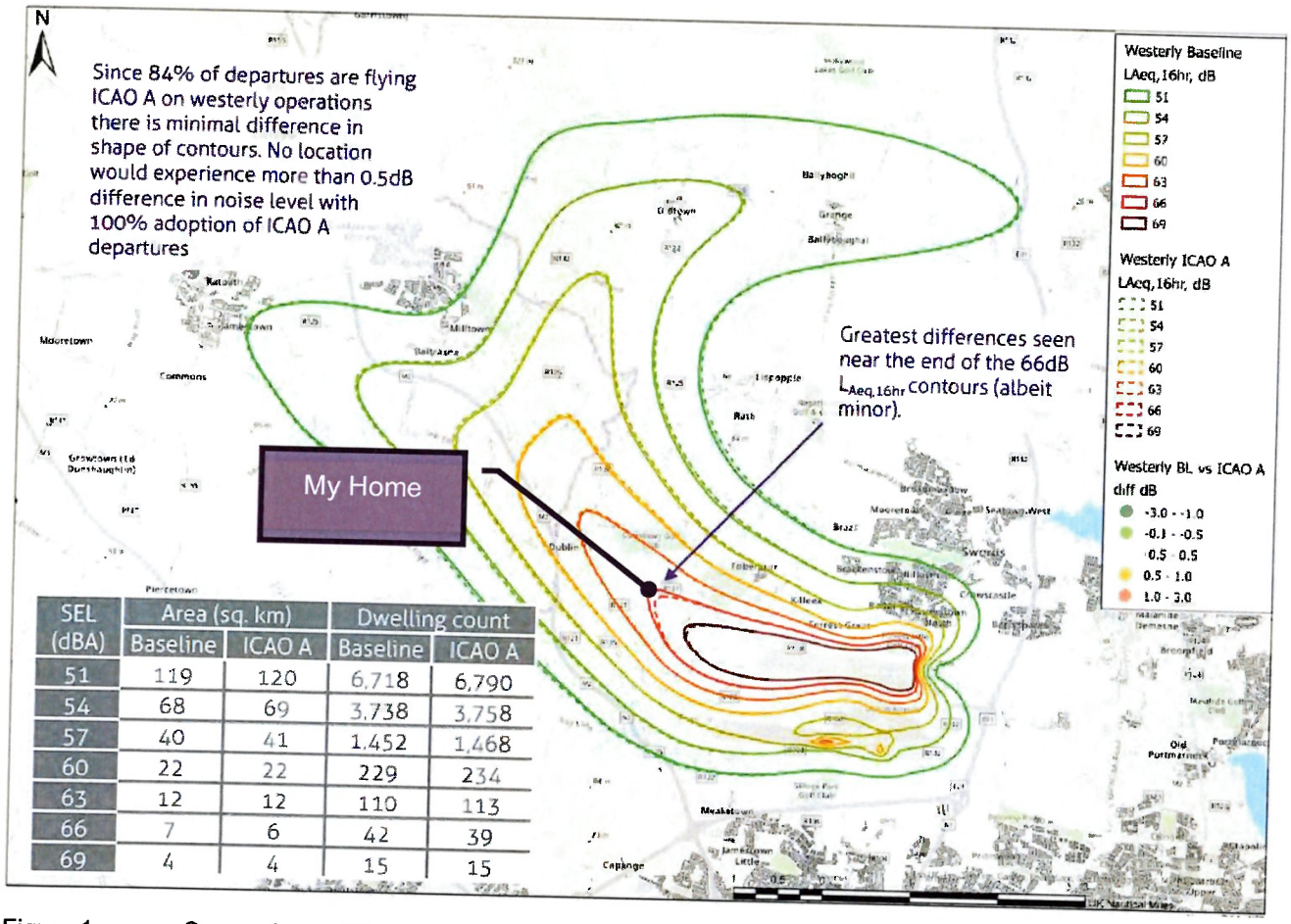
It is worth noting that the 2025 scenario is expected by the applicant to the worst-case year yet it is not as loud as the measured noise during summer 2023. A 2dB difference may seem small, however, due to the logarithmic scale of the decibel it is equivalent to 40% more noise energy.

The applicant has had since August 2022 when the North Runway opened to carry out monitoring and justify the accuracy of their models. They have not done this despite the huge community reaction to the noise and the associated

media coverage. It is implausible the applicant was not aware of the concerns being raised and yet they have done nothing to convince the planning authority that their predictions are accurate.

Adding to this, an October 2024 report by Anderson Acoustics which was shared by Michelle Molloy Community Engagement Manager at daa, see Appendix, presents noise contours that closely align with real-world monitoring data at my home. Unlike previous models, Anderson Acoustics' contours accurately reflect the 2 dB higher noise levels observed in monitoring during the 92-day period. This report demonstrates that more accurate modelling is achievable when using the right methodologies and assumptions.

Figure 1 presents the single mode westerly departure contours for 15 August 2024 from the Anderson Acoustics report and overlays my homes location where the single mode noise level during Summer 2023 was 66dB $L_{Aeq,16hr}$.



SEL (dBA)	Area (sq. km)		Dwelling count	
	Baseline	ICAO A	Baseline	ICAO A
51	119	120	6,718	6,790
54	68	69	3,738	3,758
57	40	41	1,452	1,468
60	22	22	229	234
63	12	12	110	113
66	7	6	42	39
69	4	4	15	15

Figure 1 Comparison of Noise Measurements and Noise Modelling

At my home there is almost exact agreement between the measured single mode noise level and the modelled noise level. Yet the Relevant Action modelled contours show my home exposed to 40% less noise.

The Anderson Acoustics report exposes a stark difference in outcomes between consultants, namely Bickerdike Allen Partners (BAP) who prepared the noise contours for the Relevant Action. If Anderson's models are accurate, the noise contours provided by BAP in the Relevant Action are off by approximately 40%. Such a discrepancy raises questions about the consistency of methodologies and the oversight of noise modelling practices. It also suggests that the daa's reliance on BAP might lead to systemic underreporting of noise impacts, skewing public consultation outcomes and regulatory submissions.

I therefore ask the inspector to consider the validity of the noise predictions presented to the board and to refuse permission on the basis that sufficient accuracy cannot be determined.

5.0 CONCLUSION

The submitted argument outlines critical concerns with the noise impact assessment, mitigation measures, and procedural adequacy of the Environmental Impact Assessment Report (EIAR) related to flight operations at Dublin Airport and the draft decision on the Relevant Action. Key conclusions include:

1. **Movement Limit Necessity**: The focus on additional awakenings as a significant metric underscores the inadequacy of daa's approach, which primarily relied on average noise metrics. The Inspector's recommendation for a movement limit of 13,000 night flights annually is supported as essential to mitigate profound noise impacts, which are inadequately addressed by the proposed insulation grant and noise monitoring framework.
2. **Inadequacy of EIAR**:
    - The mitigation measures proposed are insufficient to address significant adverse impacts, particularly in highly affected areas.
    - Alternatives to flight paths and operational modes were not adequately considered, violating EIA directive requirements.
    - Failure to address these gaps calls for outright refusal of the application.
3. **Flight Path Deviations**:
    - The applicant used flight paths that differ from those assessed in the original Environmental Impact Statement (EIS), leading to unassessed noise impacts.
    - This deviation undermines the legitimacy of the application and demands reassessment based on the original 2007 flight paths.

4. **Accuracy of Noise Modelling**:

   - Discrepancies of up to 40% between modelled and real-world noise levels raise concerns about the reliability of daa's noise assessments.
   - Evidence from Anderson Acoustics demonstrates the feasibility of more accurate modelling, further discrediting the applicant's submissions.

Overall, the flaws in mitigation, lack of alternatives, inaccuracies in modelling, and unassessed impacts due to flight path deviations justify rejecting the application. Any granted permission must include robust mitigation measures such as the proposed movement limit and an extended voluntary purchase/relocation scheme for those impact by night-time noise.

APPENDIX 1

ANDERSON ACOUSTICS REPORT

Anderson Acoustics

Dublin Airport

Departure profiles noise investigation

October 2024

Jack Naumann MIOA

Ref: 7669_001R_1-0_JN

Contents

Objective of this study

To provide an understanding of the implications for noise exposure of flights using ICAO A or ICAO B for local communities relative to today's operation and relative to one another.

The approach (using AEDT 3G throughout):

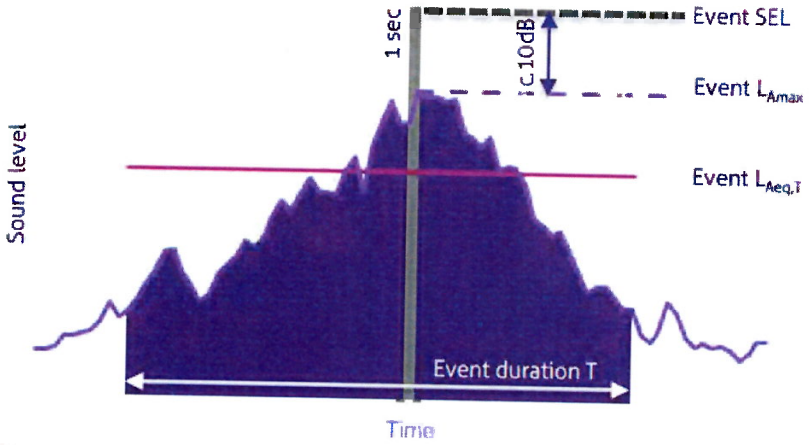
1. To identify and understand the sound level differences between the ICAO A and ICAO B procedures for individual aircraft types.
   - We have selected the 737-800 and A320 as the two most common aircraft operating at Dublin Airport in addition to the 777-300ER as the loudest aircraft.
2. To model today's baseline scenario on one full day of easterly and one full day of westerly operations in summer 2024 to generate single day $L_{Aeq,16hr}$ sound levels;
   - Westerly day: 15/08/2024
   - Easterly day: 31/08/2024
3. To use track analysis tools to understand the degree to which ICAO A and ICAO B are used across the days provided;
4. Apply the ICAO A procedures to the full day selected, and apply the ICAO B procedures to the full day selected;
5. Throughout the above identify communities where change may occur.

Metrics:

Long-term average ($L_{Aeq,16hr}$) and event based (SEL) descriptors of noise exposure.

Noise events

As an aircraft passes over a location, noise levels slowly increase from ambient levels, reach a maximum and decrease back down to ambient levels. An example flyover is shown below.



There are a number of metrics that can then be used to characterise a noise event and are generally present in measurements and can also be derived from modelling:

- The L_{Amax} is the highest sound pressure level during the event, it is an instantaneous value, this is used typically with noise limits;
- The $L_{Aeq,t}$ is the continuous sound pressure level that would generate the same energy as that of the fluctuating noise level during the event of period T. It is in effect the average noise level over the time of the event;
- The SEL (sound exposure level or single event level), is the sound pressure that would arise for if all the energy of the event were to be delivered in 1 second it is useful for comparing events.
- The SEL for individual aircraft events has been derived using modelling for this analysis. This analysis has not used measured data.

Long term noise exposure

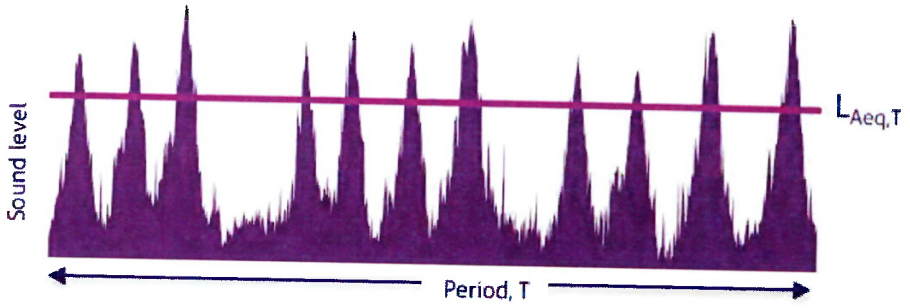
The standard approach for describing noise exposure is to use the Equivalent Continuous Sound Pressure Level ($L_{Aeq,T}$).

The $L_{Aeq,T}$ is used to describe the equivalent continuous and steady sound level which would contain the same sound energy as the time varying sound over that time T.

An example, showing typical sound levels over time under a busy flight path is given in the figure below.

This metric can be applied to any period. In UK aviation policy the average 92 day Summer Contours are the $L_{Aeq,16hr}$ average over the official summer period. It is also used with the L_{den} metric.

In the work reported herein the $L_{Aeq,16hr}$ has been derived for single westerly and easterly 16hr days (07:00-23:00) and is used to describe overall/average noise exposure on a single day.



Contents

Methodology.

Modelled not measured:

The differences between the procedures are likely to be experienced over a wide area. This investigation has therefore used modelling techniques to understand theoretical differences between the two procedures.

AEDT model:

AEDT 3G has been used for the analysis (see the following slide for a summary of our approach to modelling). AEDT is the US FAA's commercially available noise model tool. It is the most commonly used noise modelling software.

Aircraft Events:

We have derived and reviewed differences between SELs for events of specific aircraft types with ICAO A and ICAO B comparing them on the same easterly and westerly tracks. The differences between each procedure will vary depending on stage length and aircraft type, typical examples have been used to illustrate.

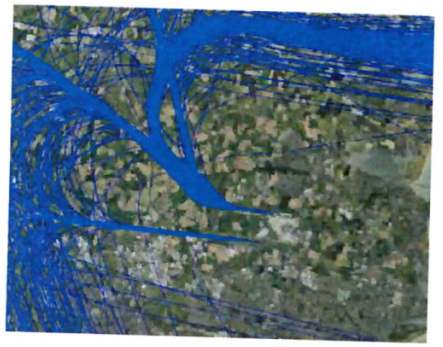
On the day average noise levels:

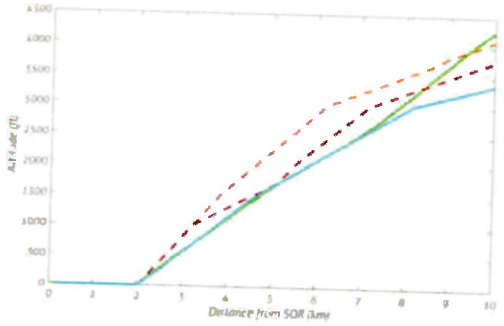
$L_{AEq,16hr}$ noise levels for one day of westerly and one of easterly operations have been modelled. The "as-is" (using the "best-fit" approach) has been compared with two scenarios – one where all departures have been shifted to be on an equivalent ICAO A procedure & another if all tracks were using ICAO B.

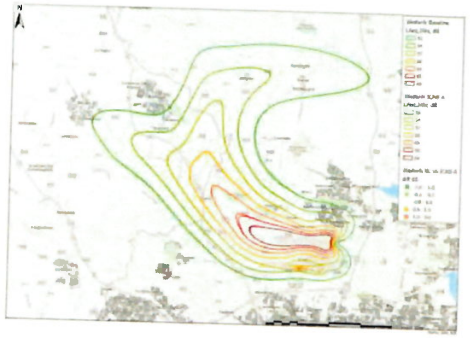
Best fit climb profiles:

Flight track analysis tools have been used to infer which is the best fit climb profile from the actual track.

Note: This is not, nor is it intended to be, an exhaustive analysis – it is to provide indicative understanding of potential differences between departure procedures.





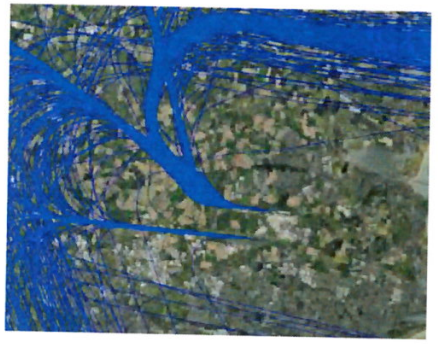


Our approach to noise modelling.

Traditional approach:

Noise modelling of departures is based on a set of "backbone" tracks and climb profiles derived from the distance to the destination (city-pair distance).

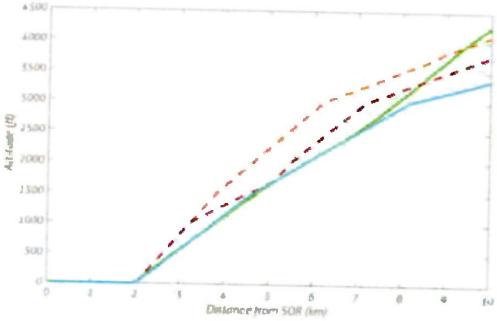
Aircraft are distributed across the backbone tracks based on analysis of NTK system data to derive dispersion; and, climb profiles (which determine thrust characteristics) are determined based on city-pair distances to derive groups of stage length, (used as a proxy for weight) - the selection of ICAO A or B is based on assumptions understanding an airline's procedure.



Our track-based modelling:

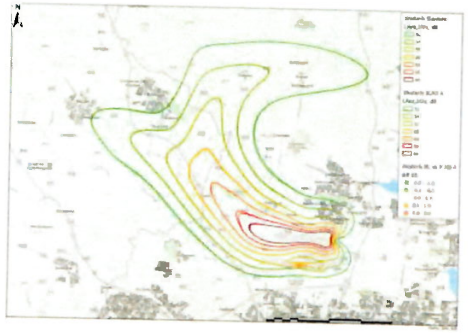
Every departure track is modelled – dispersion "backbones" are not used. Our tools enable us to identify the AEDT climb profile that best fits the actual and determine whether the procedure was closest to ICAO A or ICAO B.

This provides, on average, significantly more reliable and accurate noise level for each aircraft.



Independently verified:

Our track-based approach has been verified in our work at Heathrow and has been found to reliably reflect average measured noise levels at a variety of distances from the airport.



"Best-fit" profile matching enables us to derive the procedure adopted and, on average, much more reliable noise level prediction.

A key element in the process of predicting noise levels is to select the right stage length and procedure.

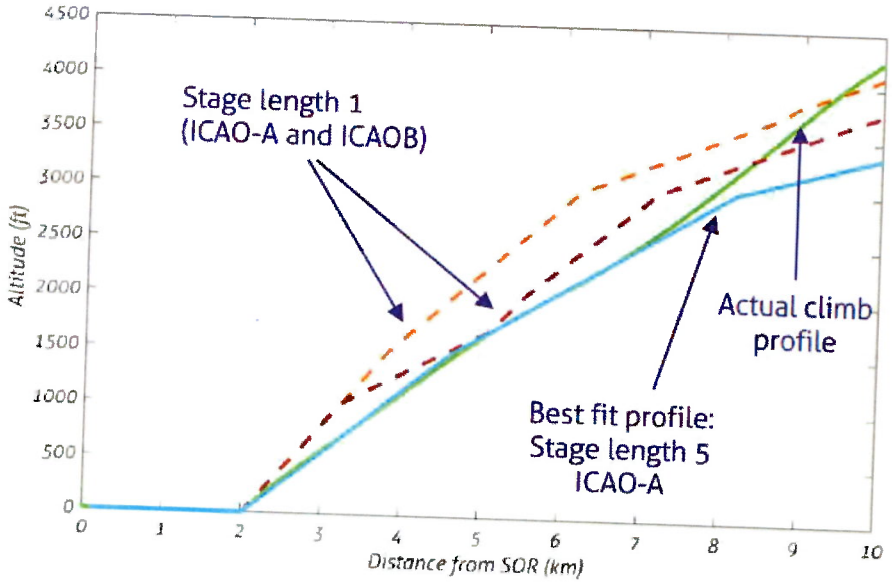
The traditional approach has generally been found to underestimate noise levels as the profile selected is often a lower stage length - aircraft are higher and therefore modelled noise levels lower.

An example of the improved reliability of our "best fit" profile matching is presented here using a 737-800 flying to Edinburgh.

The green line is the actual climb profile from the radar track data. The orange and red lines are the climb profiles that would have resulted from traditional city-pair distance approach (Stage length 1).

The selected "best-fit" profile was the ICAO A SL5 which can be seen to be a much better fit than the standard city-pair profile.

It should be noted that whilst this process is not 100% accurate (in this example the two profiles deviate beyond 8km from SOR) it significantly improves noise level predictions on average.



Contents

What are NADP-1 and NADP-2?

There are two standard families of noise abatement departure procedures developed by ICAO:

- The NADP-1 family is designed to reduce noise levels for those communities considered close-in;
- The NADP-2 family is designed to reduce noise levels for those communities further out.

The principal difference is the order in which thrust is cutback to climb thrust relative to flap/slat retraction and acceleration.

NADP-1 – 'close in'

- Based on the application of thrust cutback before flaps and slats retraction. Climb thrust is selected at reaching a certain altitude (typically around 1,000-1,500 ft).
- At another altitude (often around 3,000 ft), pitch angle is reduced such that the aircraft will climb and accelerate simultaneously. As speed increases, flaps and slats are retracted on schedule.
- Aims to deliver noise reduction for areas located close to the airport.

ICAO A

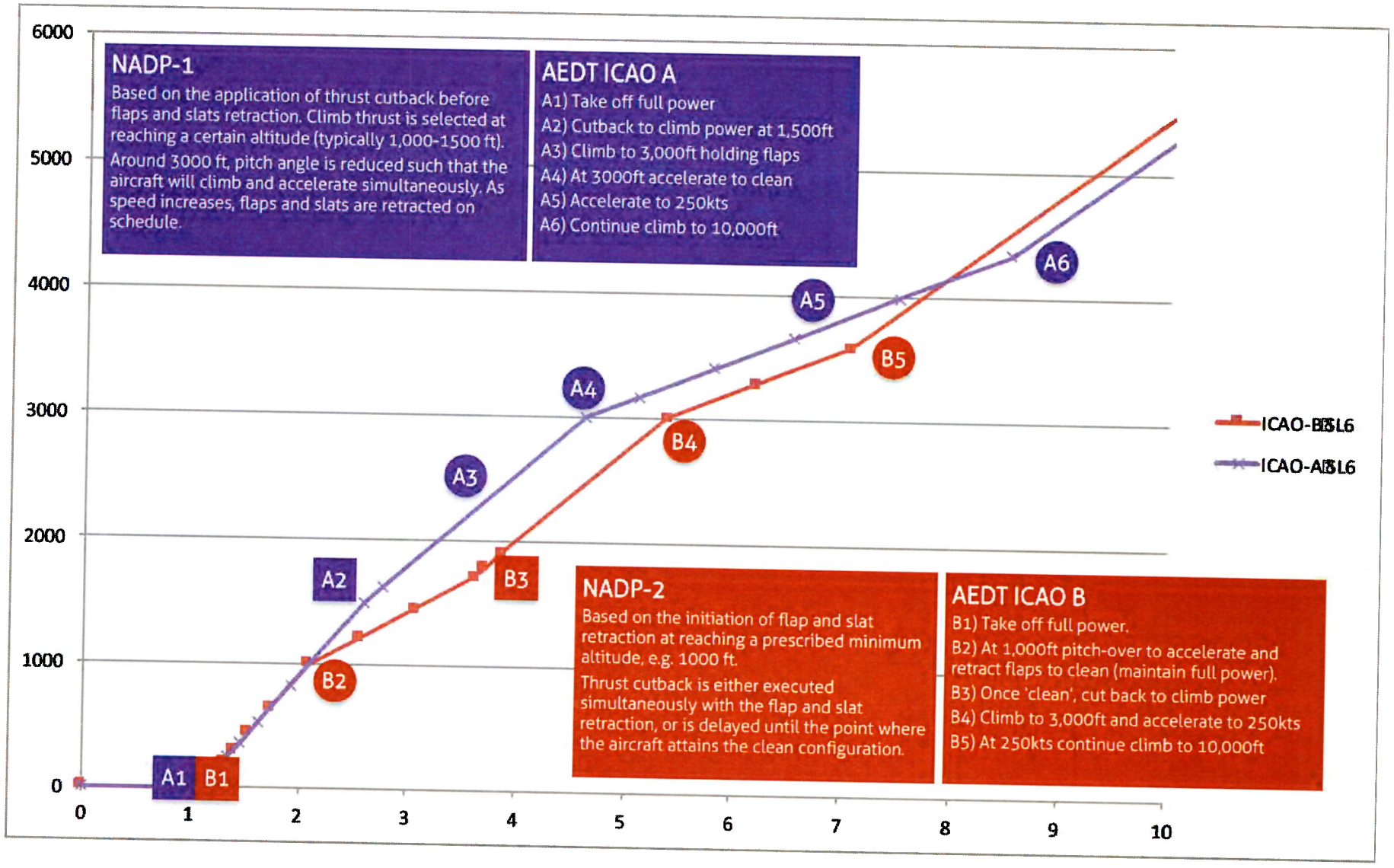
NADP-2 – 'further out'

- Based on the initiation of flap and slat retraction at reaching a prescribed minimum altitude, e.g. 1,000 ft.
- Thrust cutback is either executed simultaneously with the flap and slat retraction, or is delayed until the point where the aircraft attains the clean configuration.
- This procedure intends to provide noise reduction areas further from the airport.

ICAO B

What do these procedures look like?

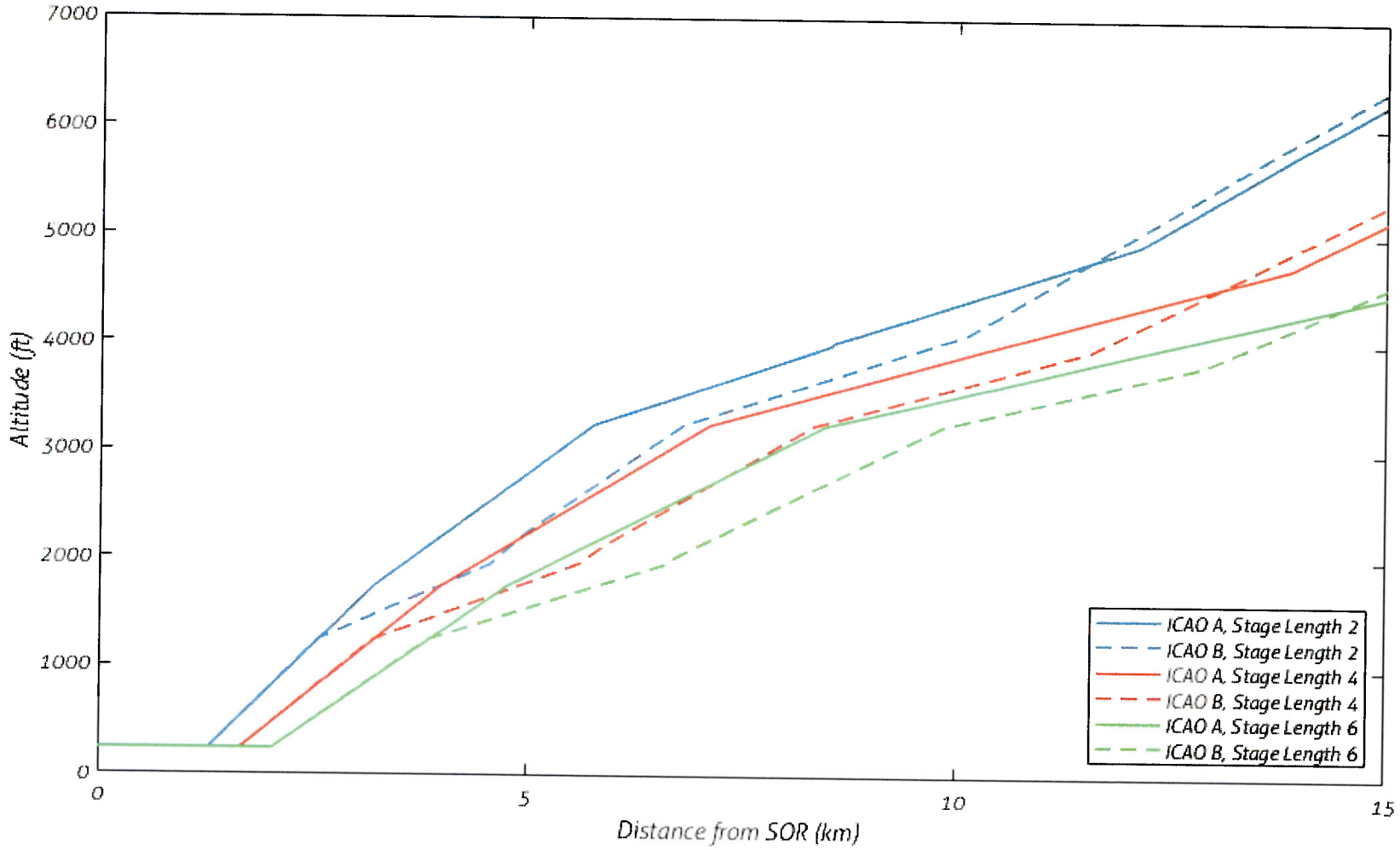
Two typical profiles for the same aircraft and flight distance are presented below for ICAO-A and ICAO-B



Climb profile and Stage Length.

AEDT uses the concept of a Stage Length (SL) as a proxy for the weight of the aircraft – higher SL, greater distance, heavier aircraft, reduced climb gradient.

The figure below presents the effect of SL on the climb profile for the ICAO A and ICAO B procedures. For a given SL the profile is the same to 1,000ft and they broadly come back together again around 4,000ft .



What difference does procedure make to aircraft event noise levels? Presentation of results using GIS.

Aircraft events: SEL contours:

On the following pages we present typical 90 dBA (pink) and the 80 dBA SEL contour (blue) for the ICAO A (solid) and ICAO B (dashed) procedures for specific aircraft types on a NW heading, derived from our model (an example is shown to the right).

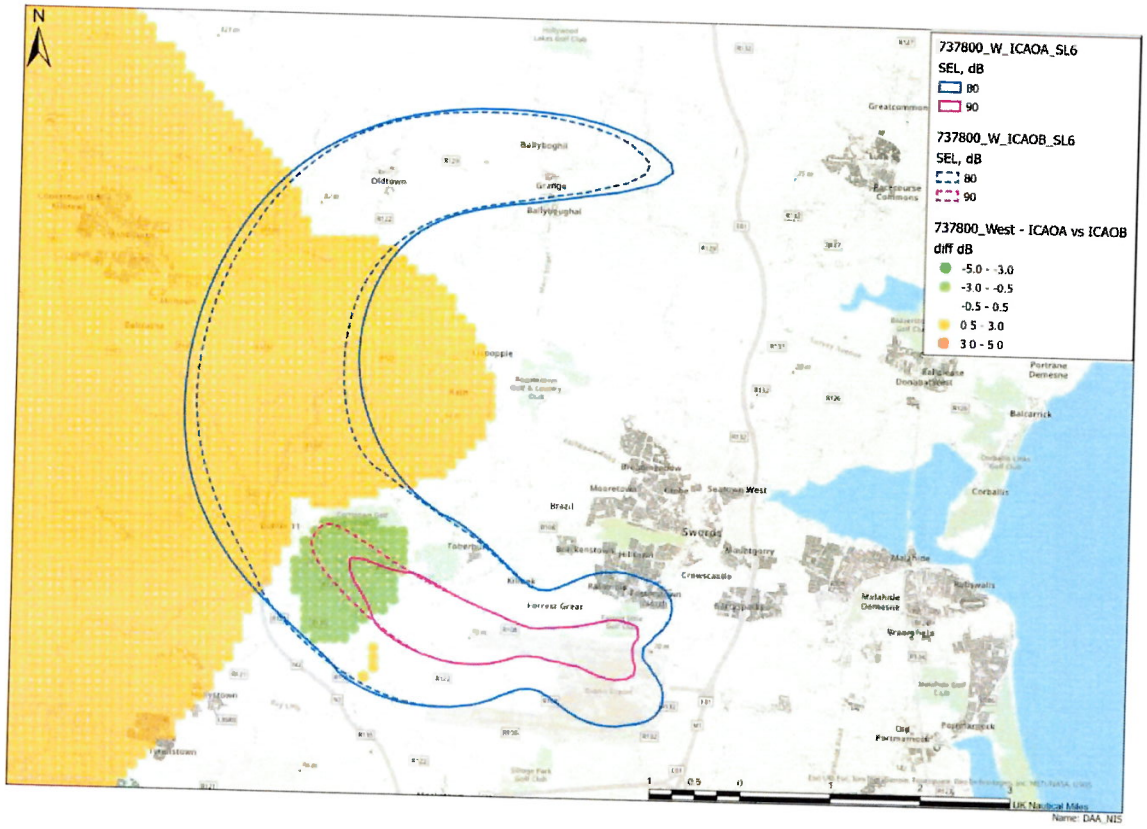
SEL difference:

The difference in the SEL between the ICAO-A and ICAO-B procedures is presented as a "heat" map. This indicates the differences over a wider area than those just that presented by the contours

The orange area indicates where the SEL for ICAO-A is higher than that for ICAO-B; the green area indicates areas where the SEL from ICAO-A is higher than that for ICAO-B.

Population density:

The grey spots provide an indication of areas of population



What difference does procedure make to aircraft event noise levels?

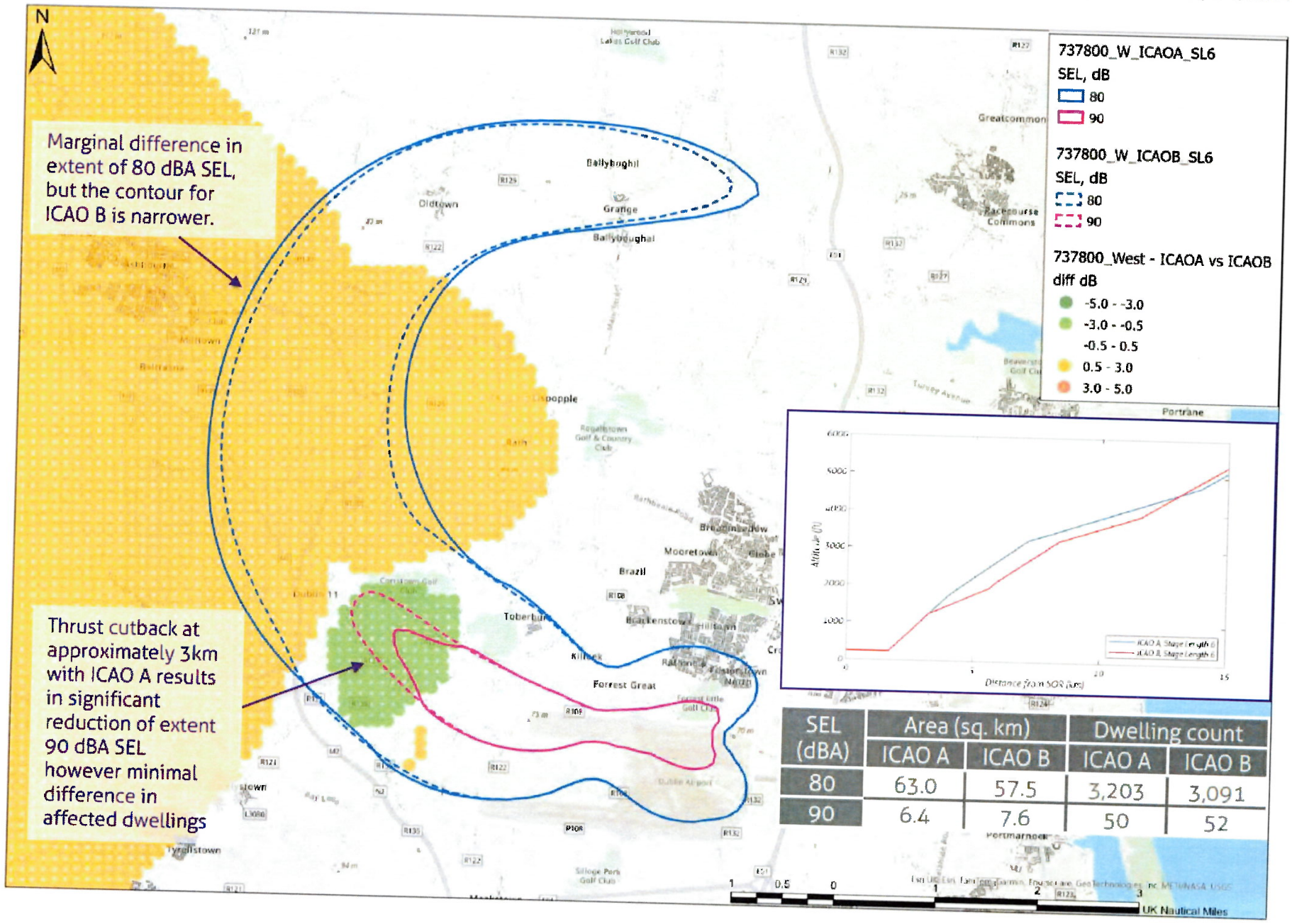
Summary

The images to the right present the difference and SEL contours for specific examples of the 737-800, A320, and 777-300ER aircraft. The selected stage length was based on the most common stage length (based on profile matching) flown by each aircraft type. The following pages present these in larger form.

- It is noted that the magnitude and pattern of difference for each aircraft type is different.
- Depending on the location relative to the flight path, there is between an approximately 4dB difference between the ICAO A and ICAO B procedures.
- Generally, the most substantial benefits of using the ICAO A procedure are directly below the flight path around the end of the 90dB SEL contour. The benefits of using the ICAO B procedures are further out across a wider swath either side of the flight path
- There is, broadly speaking, a common area that experiences benefits with all the types that is approximately 5-8km from start of roll .

What difference does procedure make to 737-800 event noise levels?

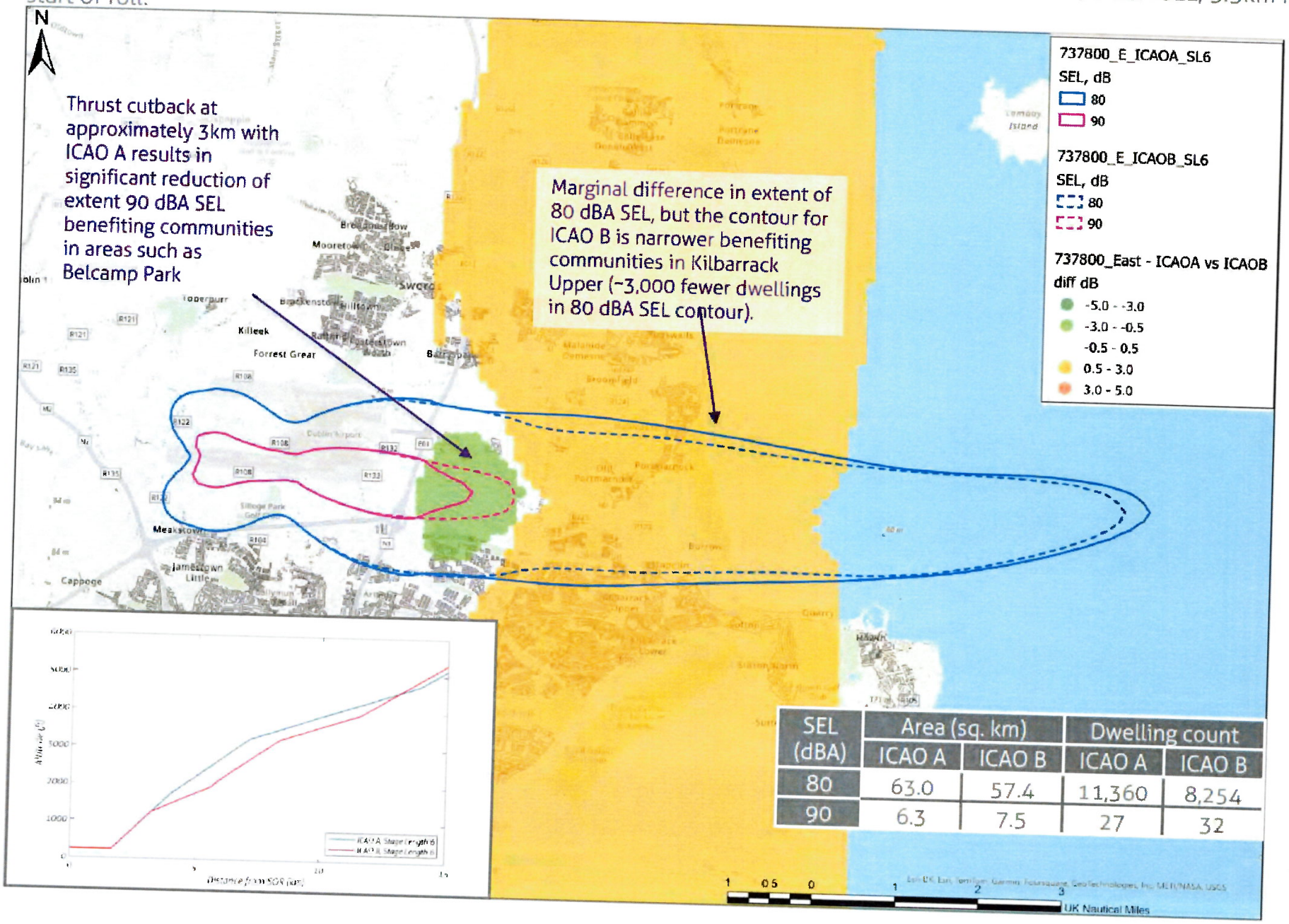
Data indicates ICAO A currently dominates (~82%). Substantial benefit (c.3dB) from ICAO A around 90 dBA SEL, 5.5km from start of roll.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
80	63.0	57.5	3,203	3,091
90	6.4	7.6	50	52

What difference does procedure make to 737-800 event noise levels?

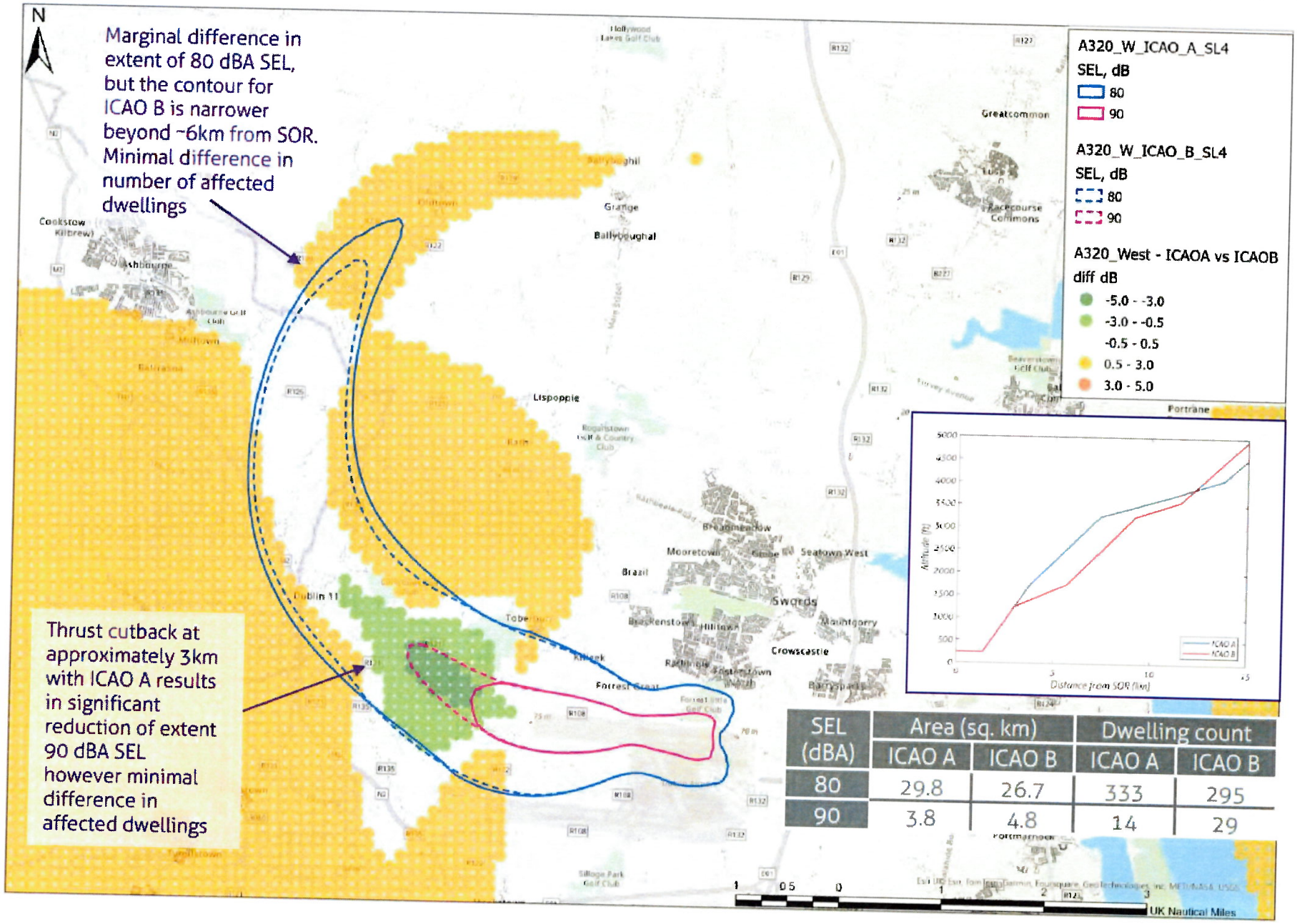
Data indicates ICAO A currently dominates (~82%). Substantial benefit (c.3dB) from ICAO A around 90 dBA SEL, 5.5km from start of roll.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
80	63.0	57.4	11,360	8,254
90	6.3	7.5	27	32

What difference does procedure make to A320 event noise levels?

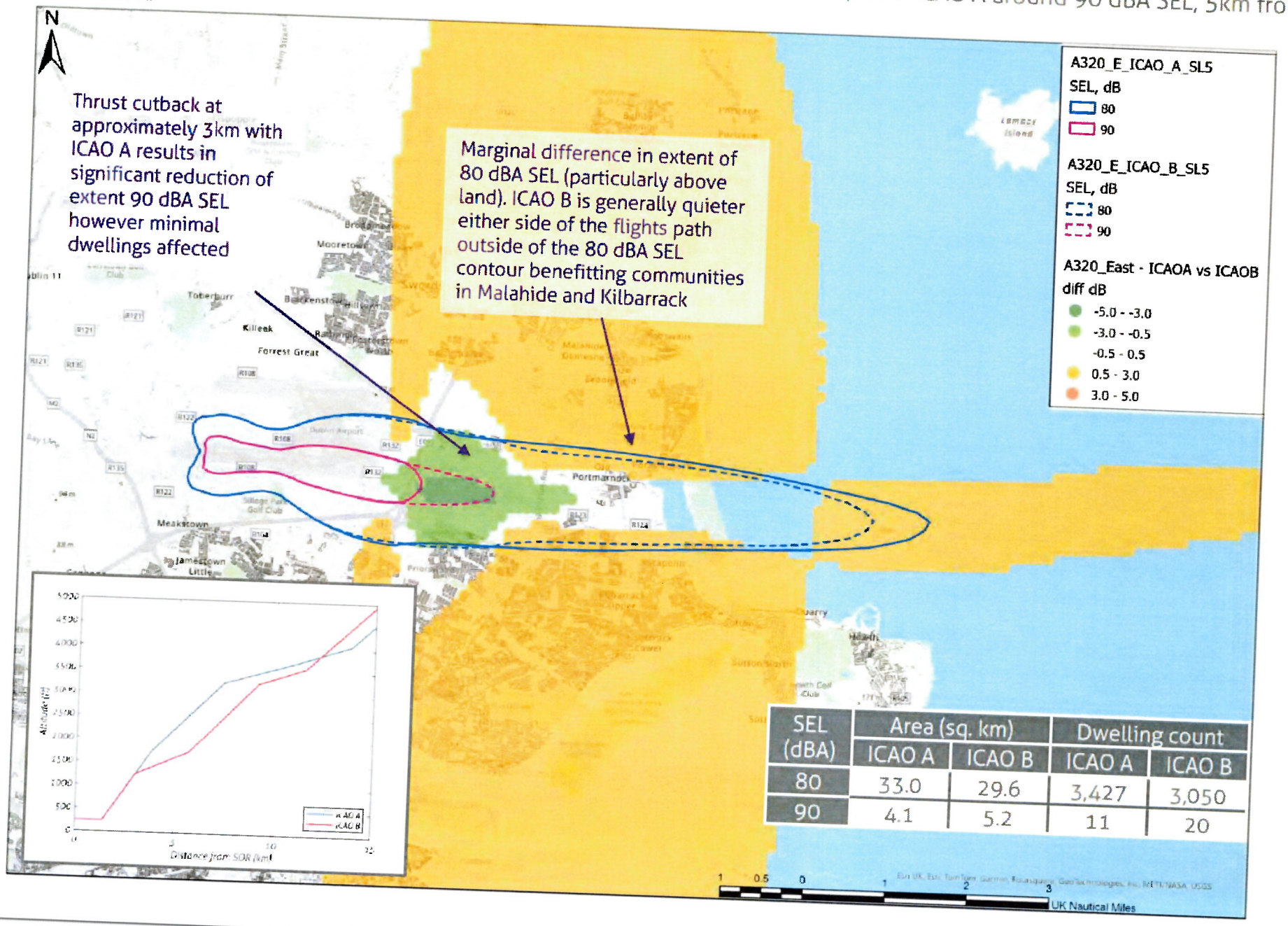
Data indicates ICAO A currently dominates (~96%). Substantial benefit (c.4dB) from ICAO A around 90 dBA SEL, 5km from start of roll.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
80	29.8	26.7	333	295
90	3.8	4.8	14	29

What difference does procedure make to A320 event noise levels?

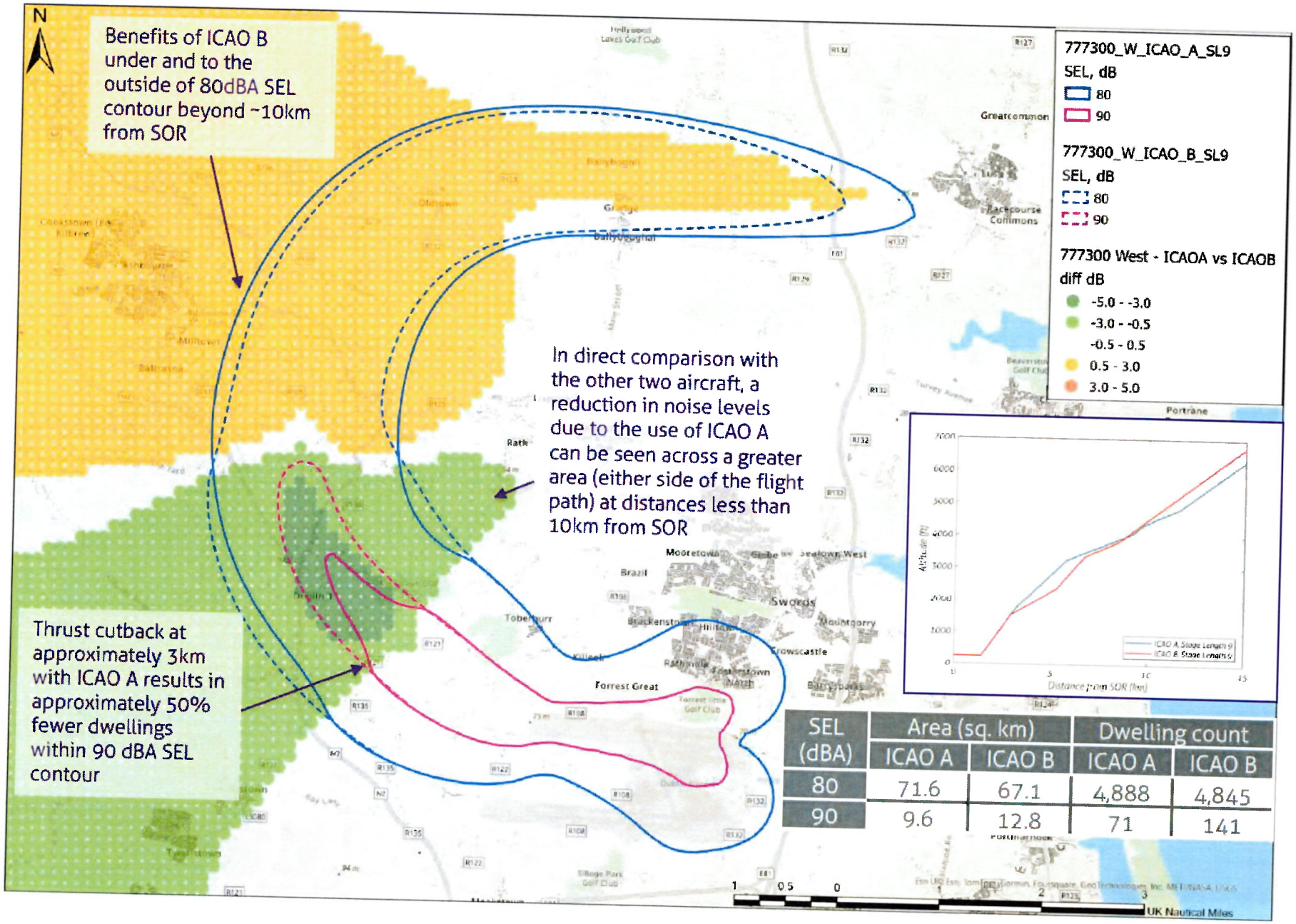
Data indicates ICAO A currently dominates (~96%). Substantial benefit (c.4dB) from ICAO A around 90 dBA SEL, 5km from start of roll.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
80	33.0	29.6	3,427	3,050
90	4.1	5.2	11	20

What difference does procedure make to 777-300ER event noise levels?

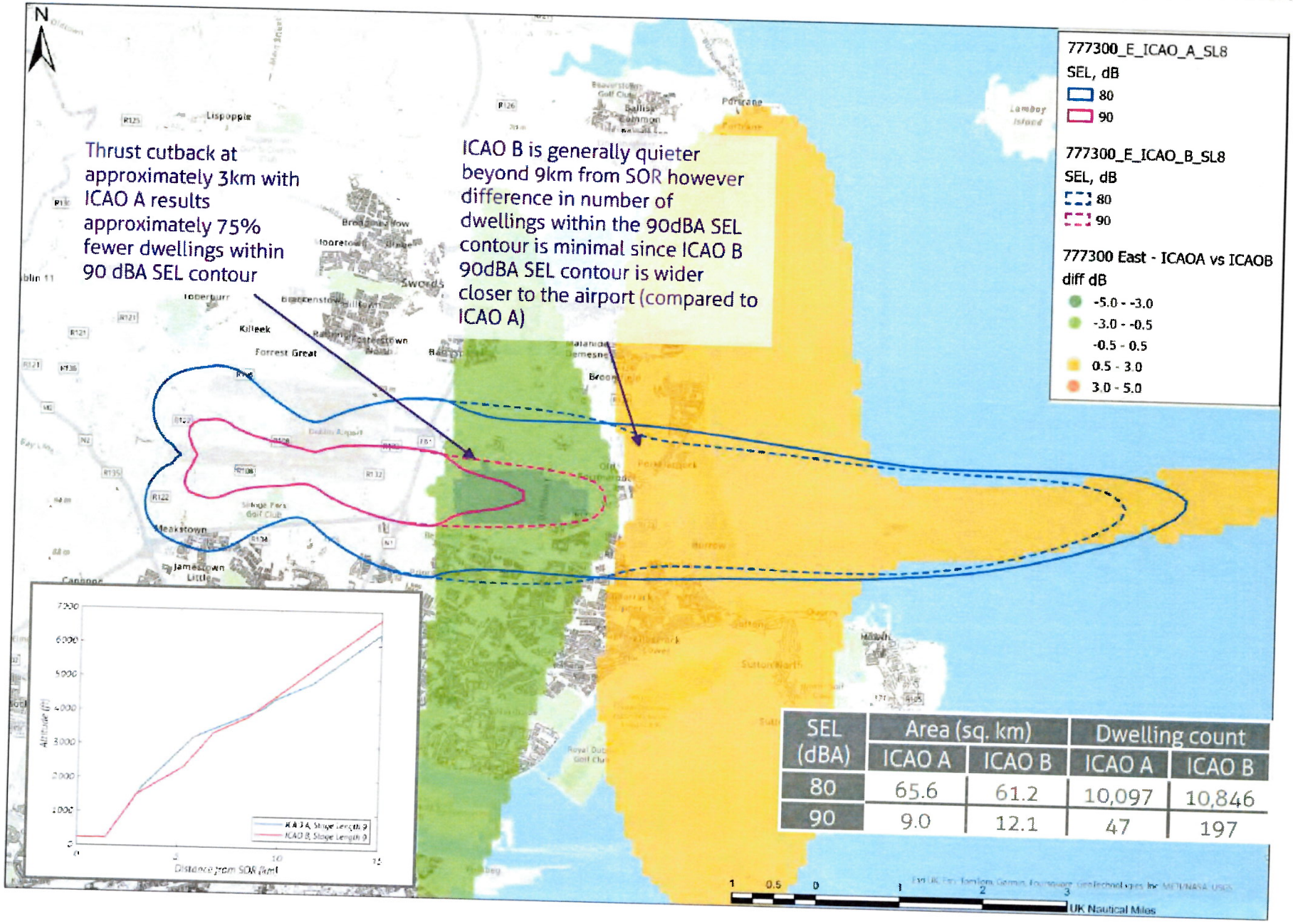
Data indicates ICAO A currently dominates . Substantial benefit (c.4dB) from ICAO A around 90 dBA SEL, 7kmfrom start of roll.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
80	71.6	67.1	4,888	4,845
90	9.6	12.8	71	141

What difference does procedure make to 777-300ER event noise levels?

Data indicates ICAO A currently dominates . Substantial benefit (c.4dB) from ICAO A around 90 dBA SEL, 5.kmfrom start of roll.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
80	65.6	61.2	10,097	10,846
90	9.0	12.1	47	197

What effect does stage length (i.e. height) have on aircraft event noise levels?

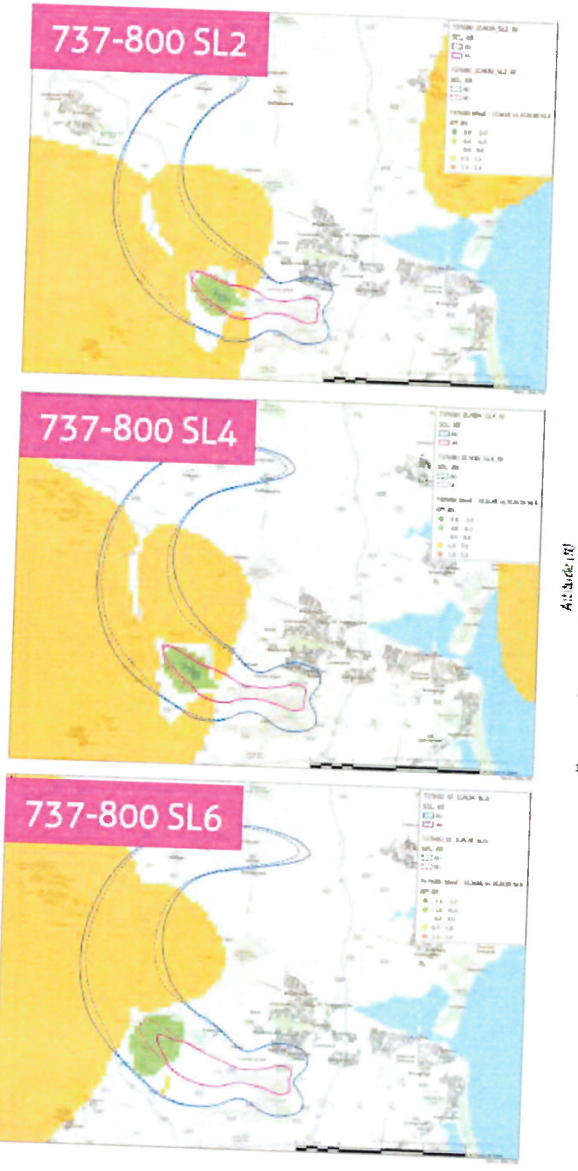
Summary

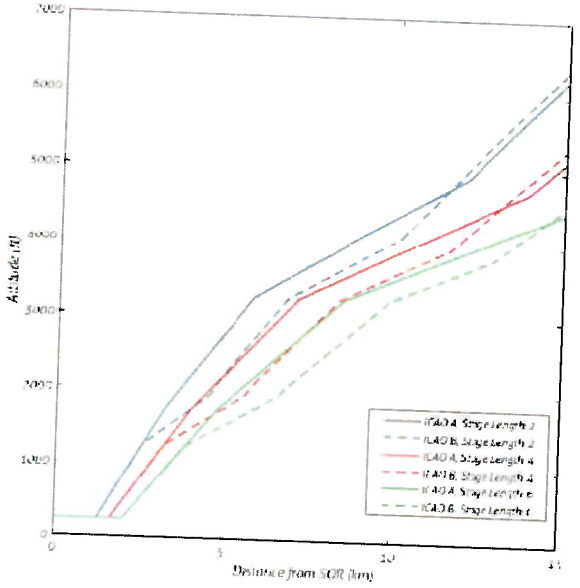
Stage length is the proxy that AEDT uses for the height element of the climb profile. A lower stage length number implies a shorter flight resulting in a higher aircraft.

The images to the right present the difference and SEL contours for Stage Lengths (SLx) 2, 4 and 6 for an 737-800 aircraft. The following 3 pages present these in larger form.

It can be seen that the noise levels are lower within the 90dBA SEL contour directly under the flight path on ICAO A departures. This area moves away from the airport with increasing stage length.

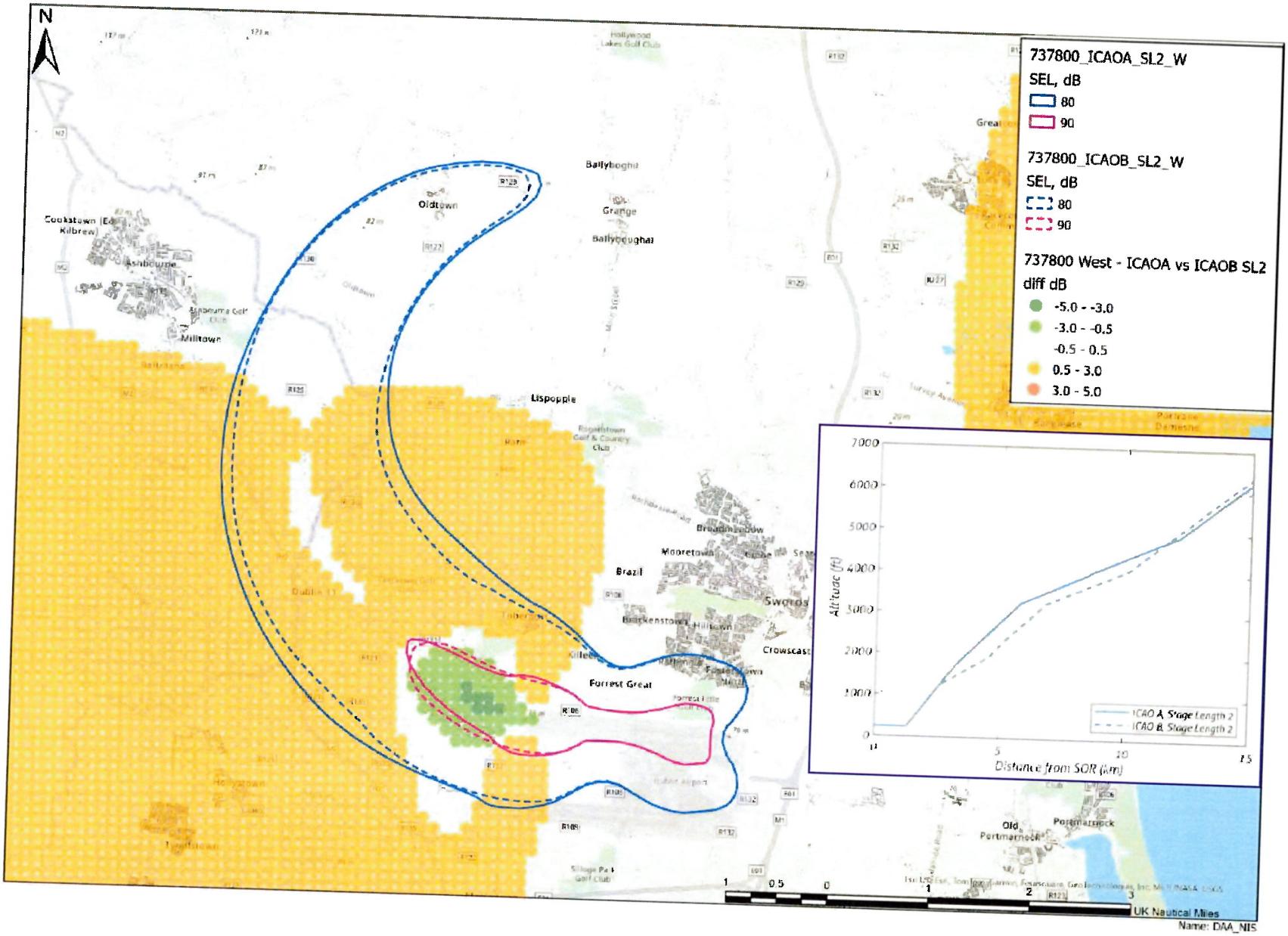
On ICOA A departures, the 737-800 is substantially higher than with ICAO B at a given distance and stage length – especially in the 4-6km range. This additional height (resulting in a more direct line of sight and less ground attenuation) contributes to the worsening of sideline noise.





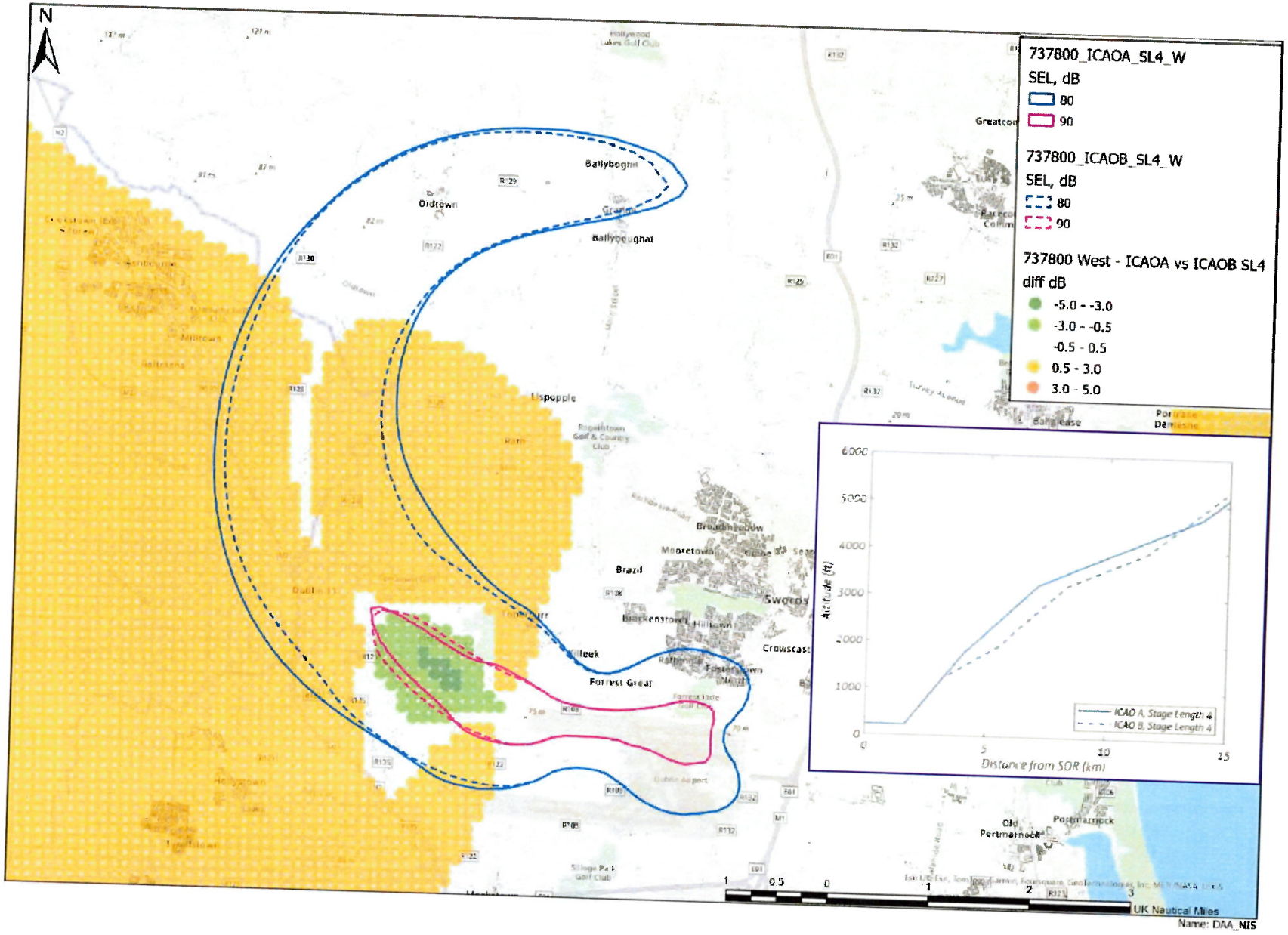
What effect does stage length (i.e. height) have on aircraft event noise levels?

737-800 Stage Length 2



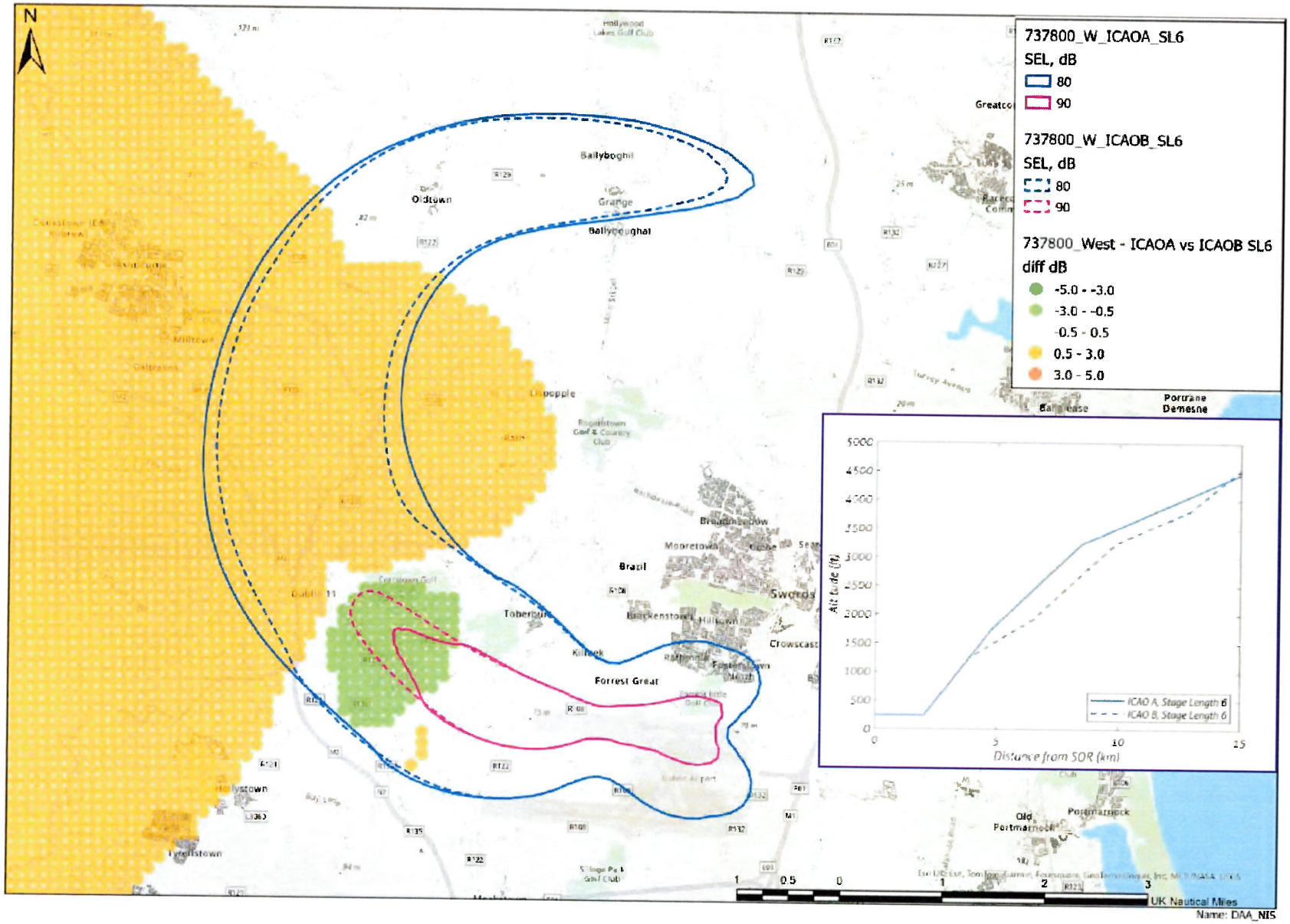
What effect does stage length (ie height) have on aircraft event noise levels?

737-800 Stage Length 4



What effect does stage length (ie height) have on aircraft event noise levels?

737-800 Stage Length 6



Contents

Procedure analysis indicates ICAO-A (or equivalent) is dominant

- Of more than 650 departure tracks analysed, around 73% are ICAO-A or an equivalent, the remainder are ICAO-B or an equivalent.
- The proportion of ICAO A departures appears to be greater (84%) when the airport is on westerly operations.

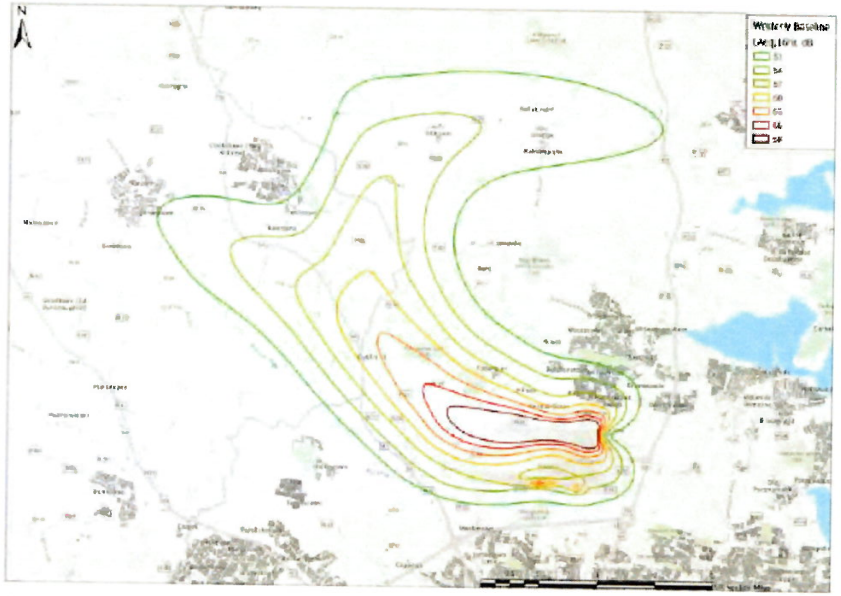
Departure Procedure	Westerly	Easterly	All
ICAO A	84%	61%	73%
ICAO B	16%	39%	27%
Total	100%	100%	100%

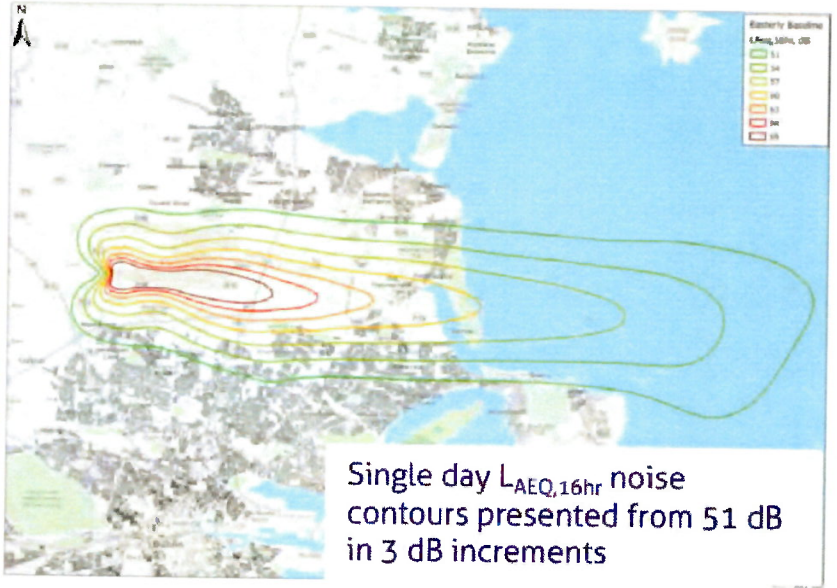
- [redacted] appear to have preference for flying for ICAO A on westerly departures and ICAO B on easterly departures
- [redacted] tend to fly ICAO A regardless of wind direction

Airline	Westerly			Easterly			Total			Total %		
	ICAO A	ICAO B	Total	ICAO A	ICAO B	Total	ICAO A	ICAO B	Total	ICAO A	ICAO B	Total
[redacted]	111	25	136	42	88	130	153	113	266	58%	42%	100%
[redacted]	74	7	81	76	12	88	150	19	169	89%	11%	100%
[redacted]	36	0	36	32	0	32	68	0	68	100%	0%	100%
[redacted]	3	4	7	3	4	7	6	8	14	43%	57%	100%
[redacted]	4	1	5	3	1	4	7	2	9	78%	22%	100%
[redacted]	3	1	4	3	2	5	6	3	9	67%	33%	100%
[redacted]	2	2	4	5	0	5	7	2	9	78%	22%	100%
[redacted]	4	0	4	4	0	4	8	0	8	100%	0%	100%
[redacted]	2	3	5	1	1	2	3	4	7	43%	57%	100%
[redacted]	1	2	3	2	2	4	3	4	7	43%	57%	100%
Other	47	9	56	28	16	44	75	25	100	75%	25%	100%
Total	287	54	341	199	126	325	486	180	666	73%	27%	100%

Contents

Daytime average noise levels: Average noise ($L_{Aeq,16hr}$) contours have been derived for one easterly day and one westerly day.





Single day $L_{AEQ,16hr}$ noise contours presented from 51 dB in 3 dB increments

Contents

Investigating the difference change of procedure would make to overall average noise levels.

Average $L_{Aeq,16hr}$ noise contours have been developed for a **single westerly and a single easterly day** using the "best fit" profile method described previously – this had approximately 84% ICAO A, 16% ICAO B on westerly operations and 61% ICAO A and 39% ICAO B on easterly operations.

The implications for these westerly and easterly days have been investigated using the following two cases:

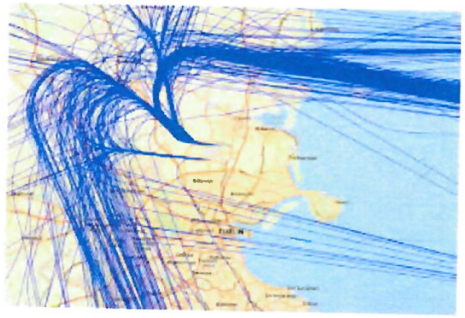
- All flights with an ICAO A profile; and
- All flights with an ICAO B profile.

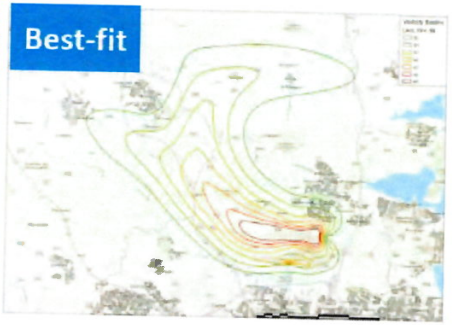
Differences have been derived and mapped using GIS:

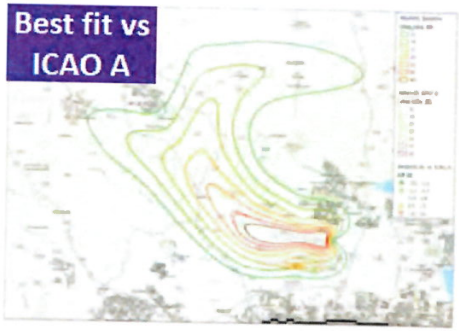
- between the current best fit and ICAO A result;
- between the current best fit and ICAO B result;
- between a case where all flights ICAO A and where all flights were ICAO B.

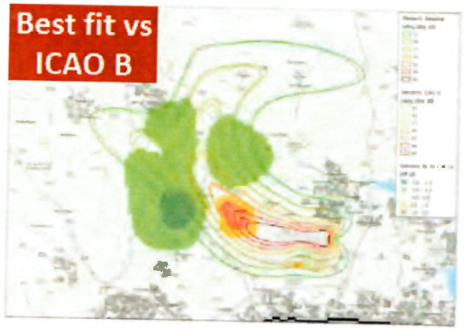
In summary, the results indicate that the choice of departure procedure would have a minimal impact on the number of dwellings within key contours on westerly operations however on easterly operations communities around Dublin Airport may experience a modest benefit from the adoption of an ICAO-B type procedure.

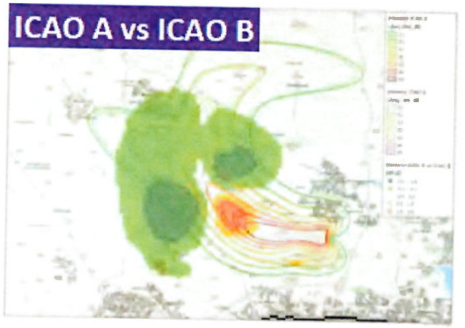
This analysis has made an implicit assumption that the average climb profile stage-length would be the same if flying ICAO-A or ICAO-B, ie a SL5 ICAO-B departure would move to an ICAO-A SL5 departure.



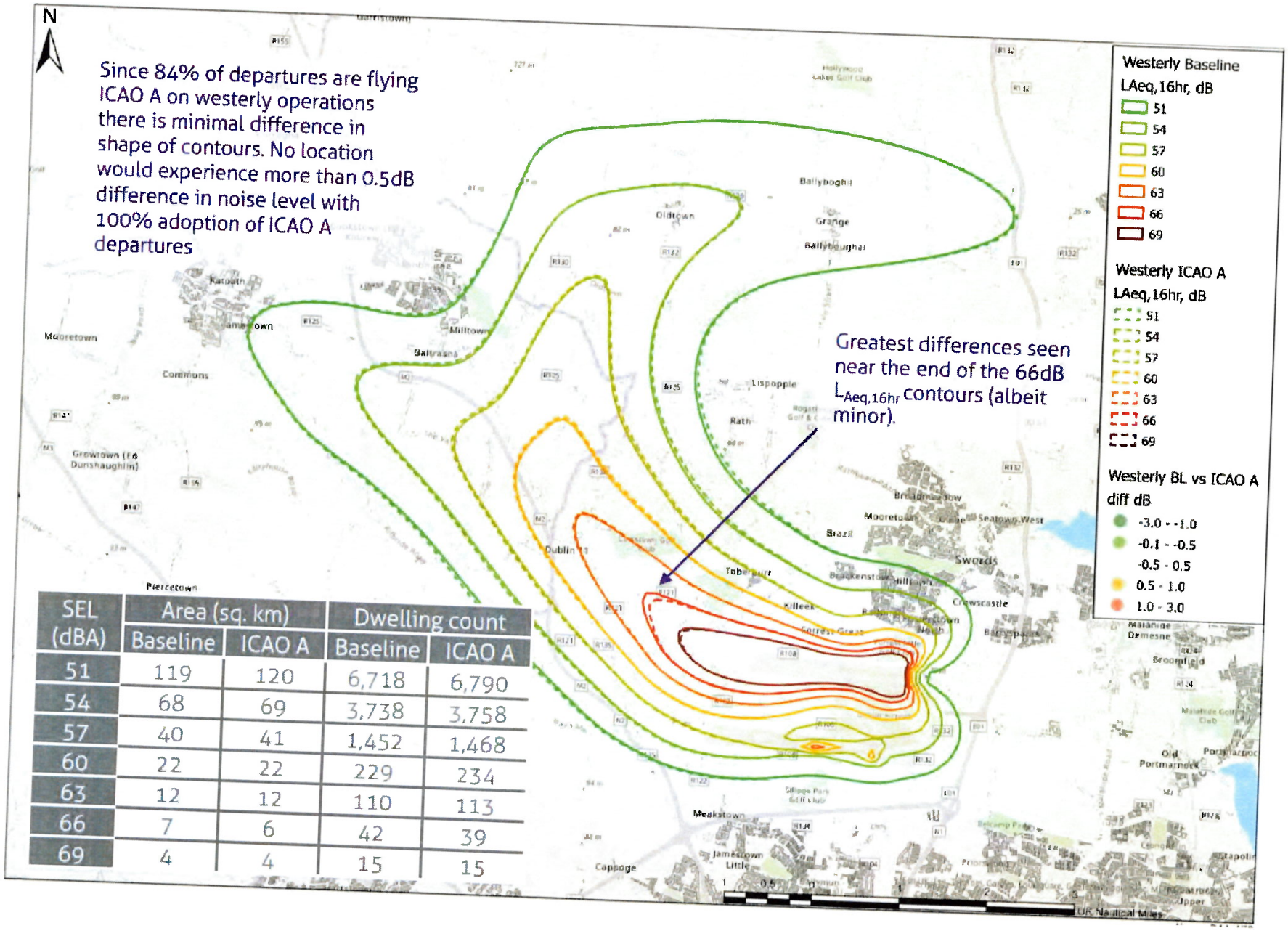






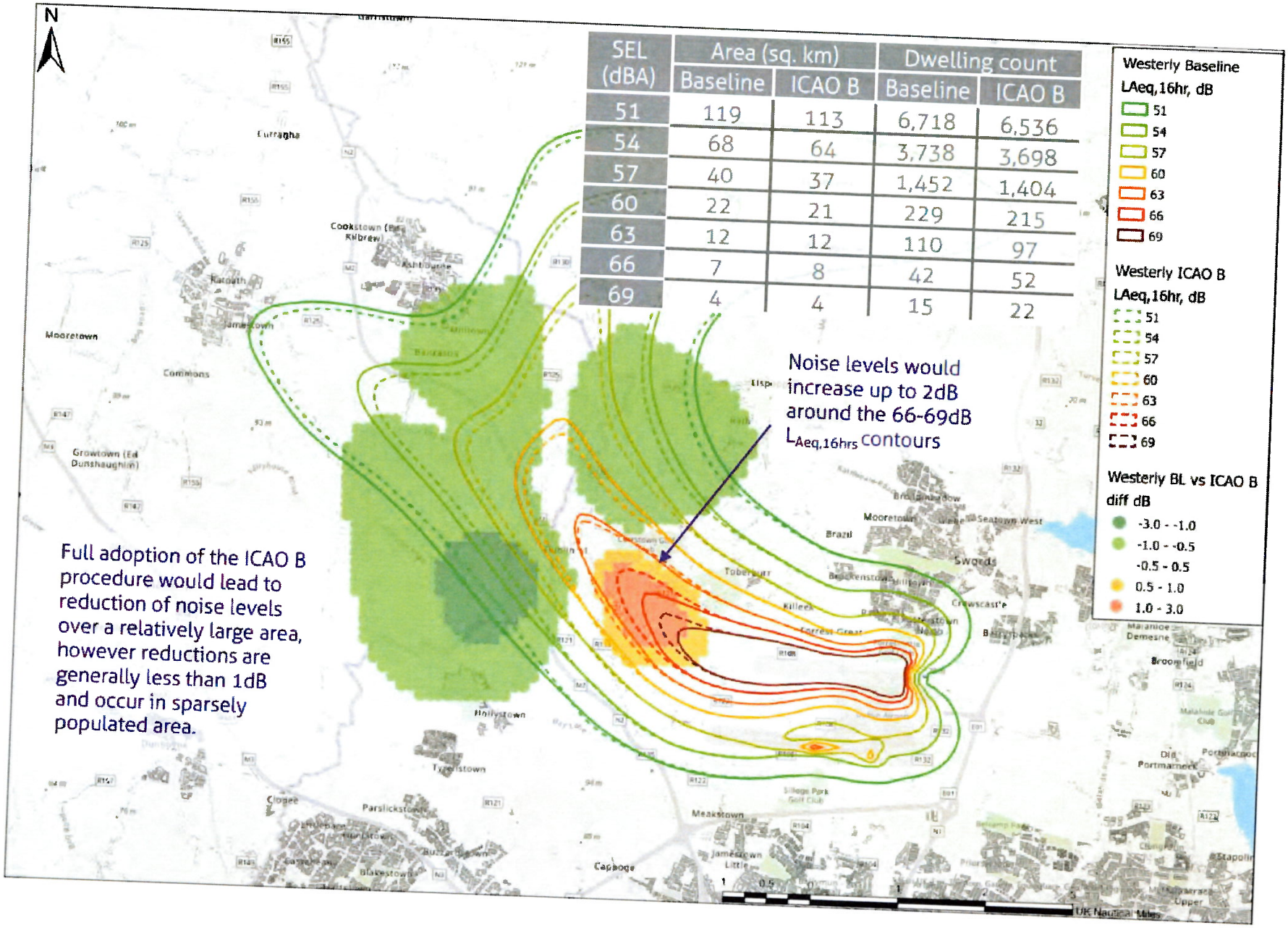


Westerly day. Comparison of baseline to 100% ICAO A departures.



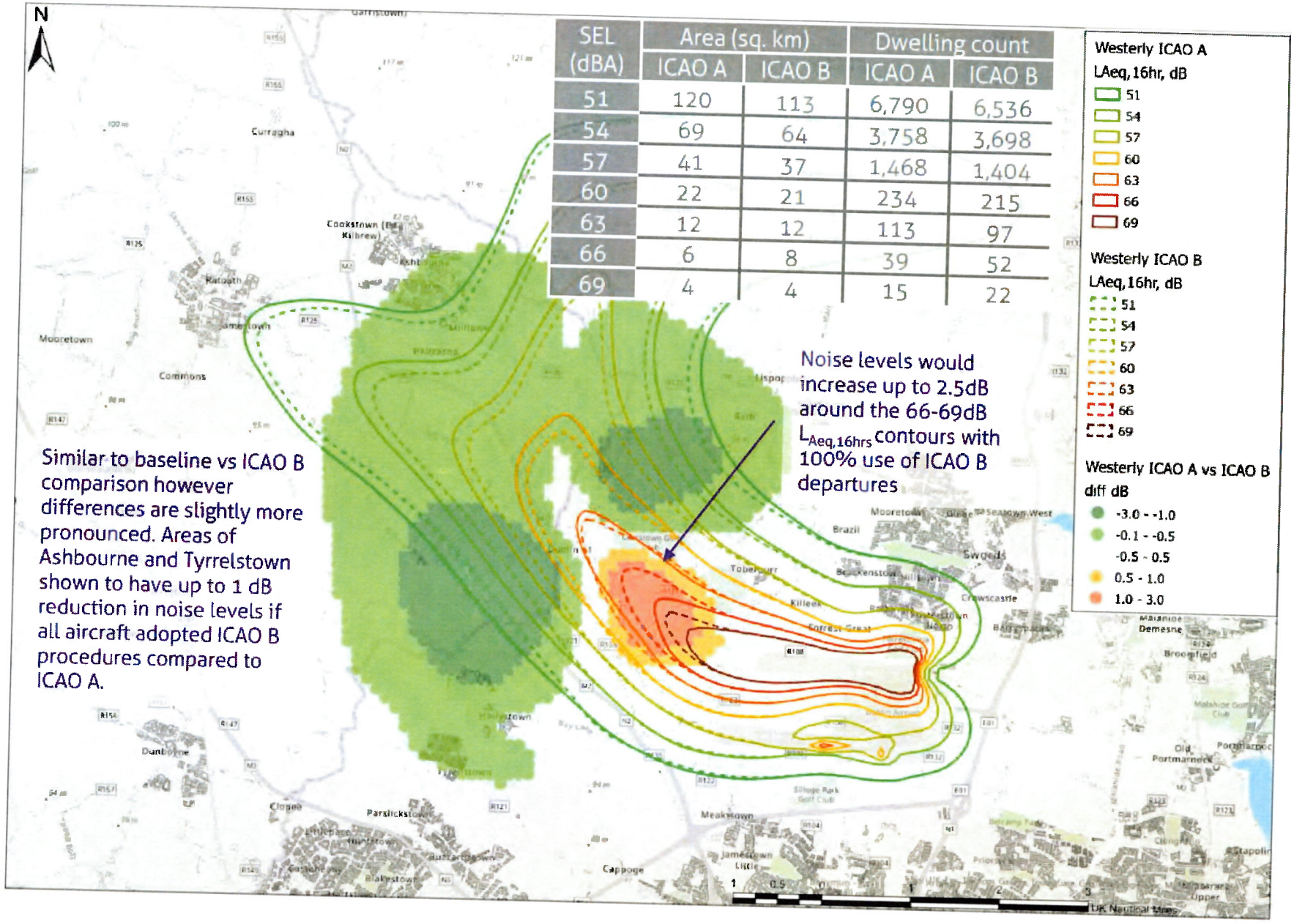
SEL (dBA)	Area (sq. km)		Dwelling count	
	Baseline	ICAO A	Baseline	ICAO A
51	119	120	6,718	6,790
54	68	69	3,738	3,758
57	40	41	1,452	1,468
60	22	22	229	234
63	12	12	110	113
66	7	6	42	39
69	4	4	15	15

Westerly day. Comparison of baseline to 100% ICAO B departures.



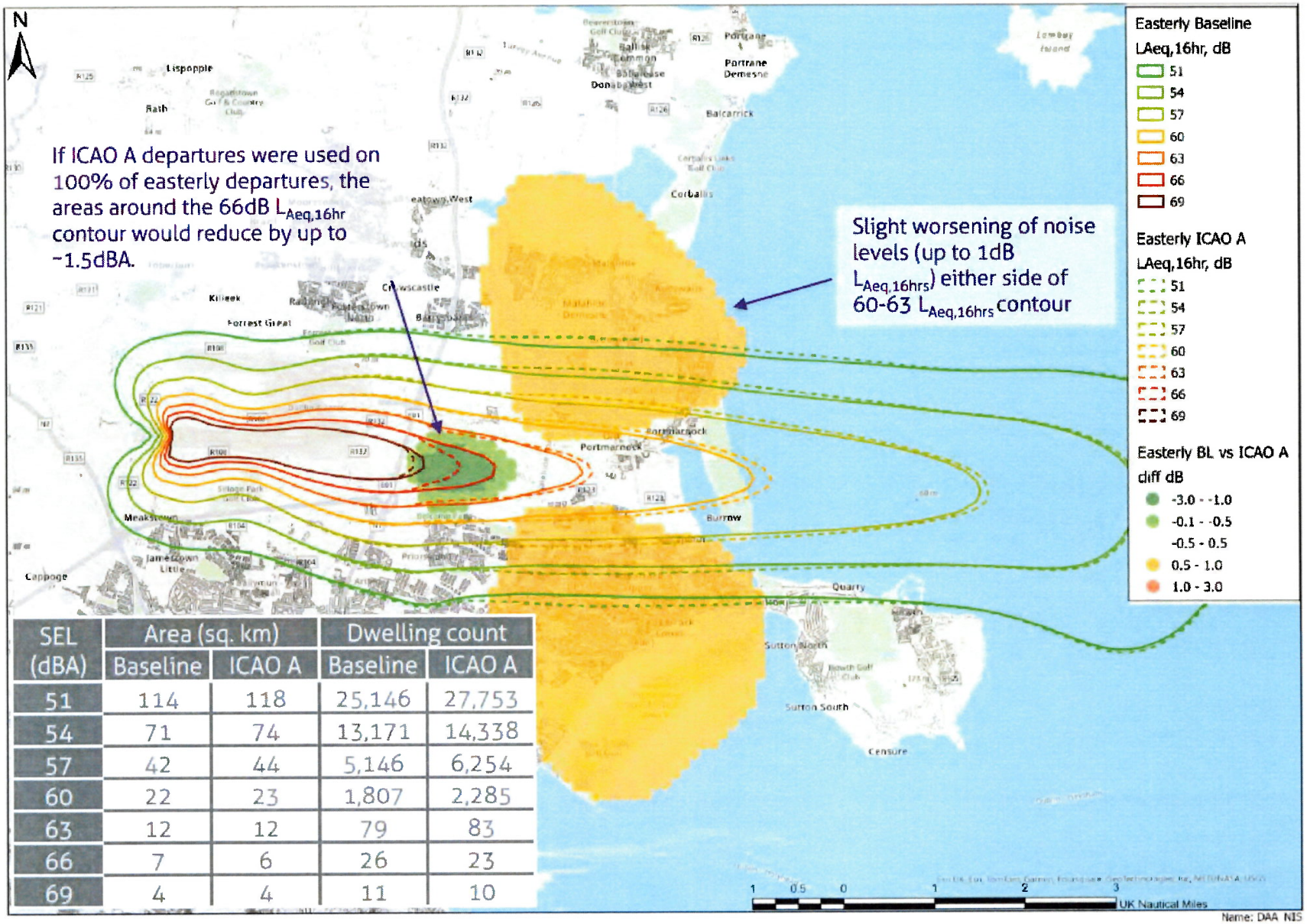
SEL (dBA)	Area (sq. km)		Dwelling count	
	Baseline	ICAO B	Baseline	ICAO B
51	119	113	6,718	6,536
54	68	64	3,738	3,698
57	40	37	1,452	1,404
60	22	21	229	215
63	12	12	110	97
66	7	8	42	52
69	4	4	15	22

Westerly day. Comparison of 100% ICAO A to 100% ICAO B departures.



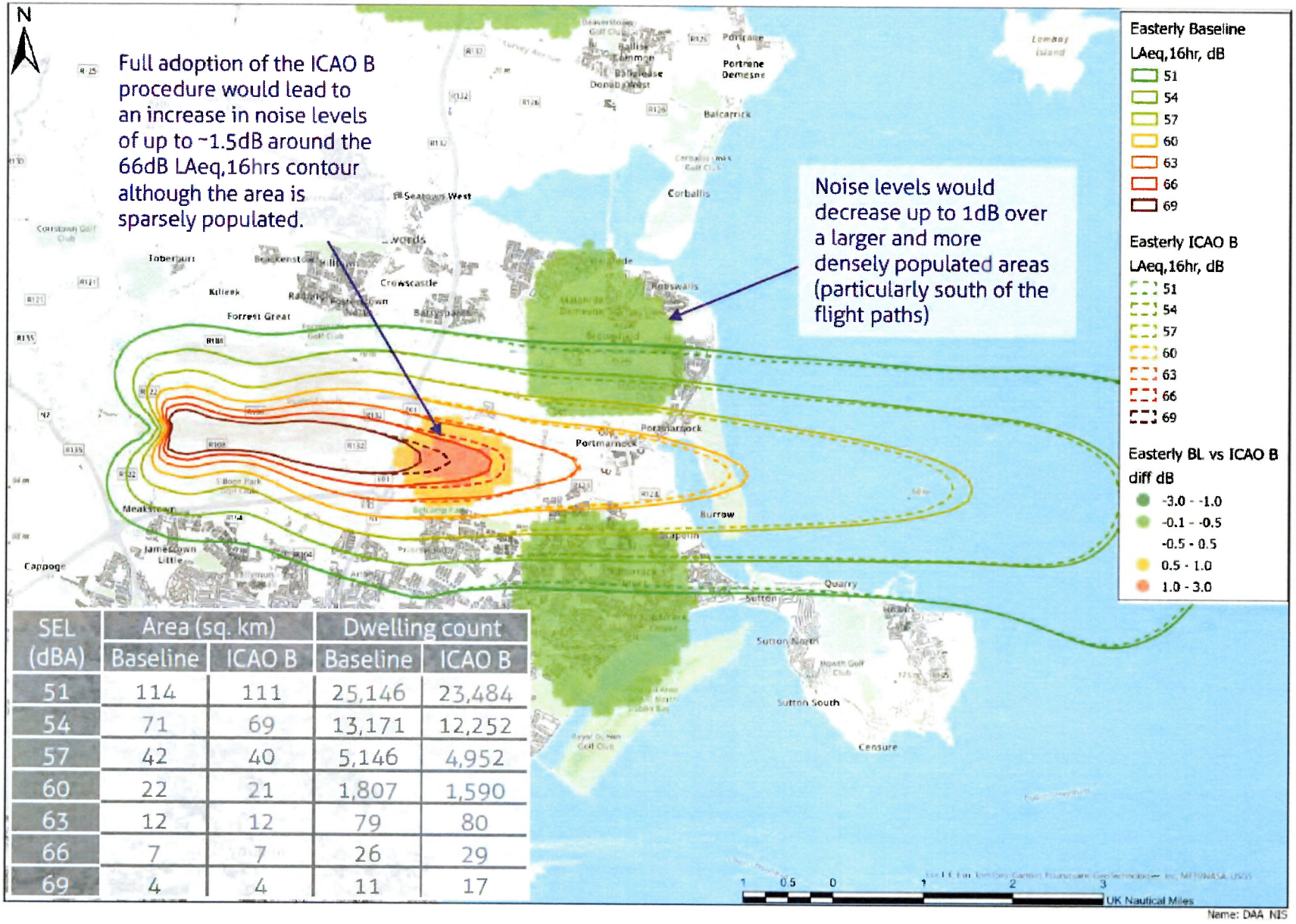
SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
51	120	113	6,790	6,536
54	69	64	3,758	3,698
57	41	37	1,468	1,404
60	22	21	234	215
63	12	12	113	97
66	6	8	39	52
69	4	4	15	22

Easterly day. Comparison of baseline to 100% ICAO A departures.



SEL (dBA)	Area (sq. km)		Dwelling count	
	Baseline	ICAO A	Baseline	ICAO A
51	114	118	25,146	27,753
54	71	74	13,171	14,338
57	42	44	5,146	6,254
60	22	23	1,807	2,285
63	12	12	79	83
66	7	6	26	23
69	4	4	11	10

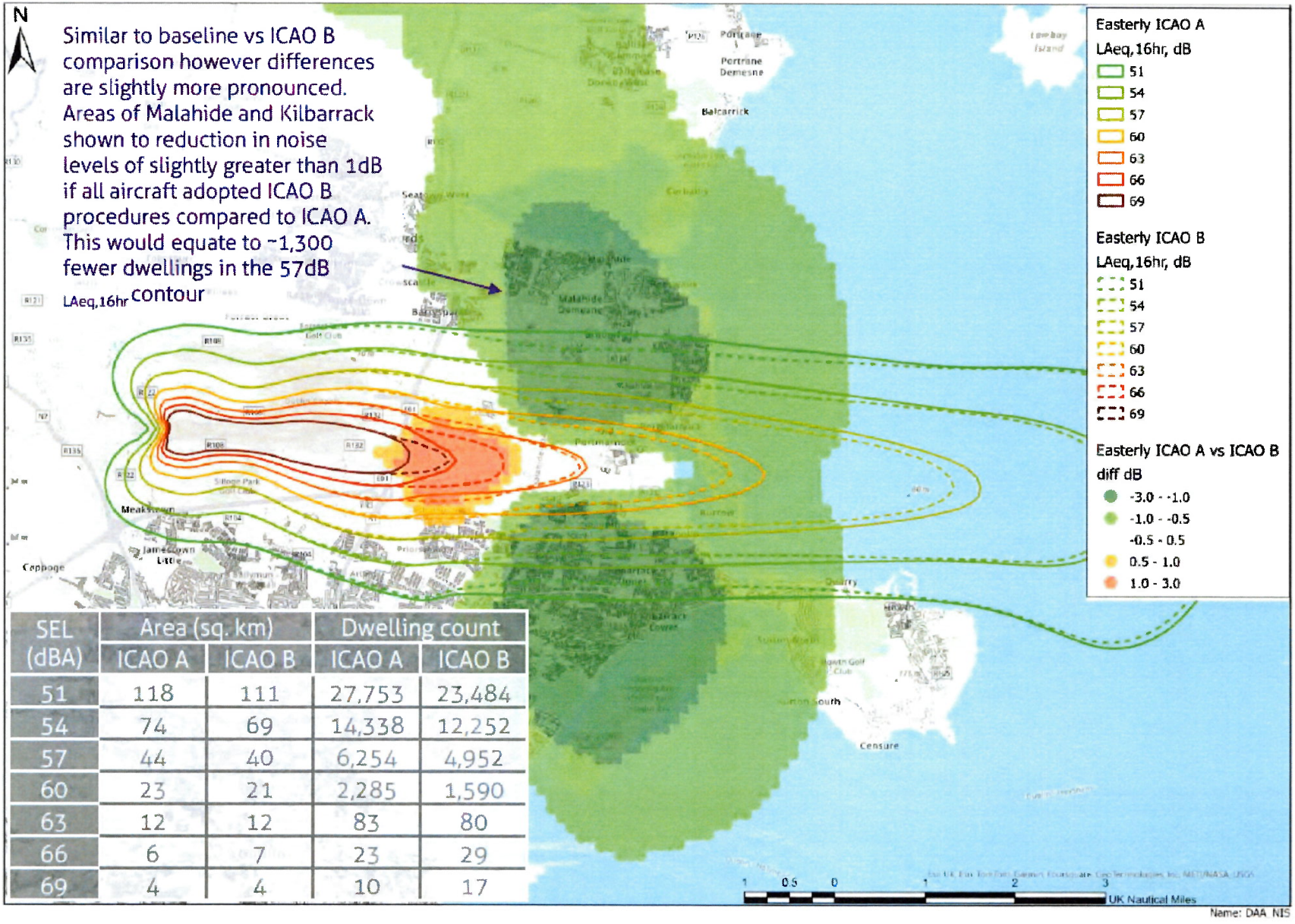
Easterly day. Comparison of baseline to 100% ICAO B departures.



SEL (dBA)	Area (sq. km)		Dwelling count	
	Baseline	ICAO B	Baseline	ICAO B
51	114	111	25,146	23,484
54	71	69	13,171	12,252
57	42	40	5,146	4,952
60	22	21	1,807	1,590
63	12	12	79	80
66	7	7	26	29
69	4	4	11	17

Name: DAA NIS

Easterly day. Comparison of 100% ICAO A to 100% ICAO B departures.



SEL (dBA)	Area (sq. km)		Dwelling count	
	ICAO A	ICAO B	ICAO A	ICAO B
51	118	111	27,753	23,484
54	74	69	14,338	12,252
57	44	40	6,254	4,952
60	23	21	2,285	1,590
63	12	12	83	80
66	6	7	23	29
69	4	4	10	17

Contents

Summary. Adopting ICAO-B as standard departure procedure on easterly operations could reduce the number of people exposed to aircraft noise > 60 dB $L_{Aeq,16hr}$

The implications of the two NADP families on noise exposure from departures from Dublin Airport has been investigated using modelling tools.

- Analysis indicates that around 73% of departures are using an ICAO A or equivalent procedure.
- At the individual aircraft event level, ICAO A shows clear benefits over ICAO B of up to ~4dB for those under the flight path, but to the sideline there can be an increase in noise level possibly due to height differences that result from the procedures.
- Westerly Operations:
  - There would be little change to the noise environment to the west of the airport if all aircraft adopted the ICAO A profile since 85% of departures already use the ICAO A profile.
  - If all aircraft switched to the ICAO B profile there would be areas within the 66dB $L_{Aeq16hr}$ contour that would experience an increase in noise levels of up to 2dB while a larger area, predominantly outside the 60dB $L_{Aeq,16hr}$ contour, would experience up to a 1dB decrease in average noise levels. Due to the population distribution the number of dwellings in each contour band would not change significantly.
- Easterly Operations:
  - Noise levels would decrease up to 1.5dB within the 66dB $L_{Aeq,16hr}$ contour with 100% ICAO A departures while areas to the side of the main flight path would increase up to 1dB increasing the number of dwellings within the 57dB $L_{Aeq,16hr}$ contour by 1,100 compared to the current mix of profiles.
  - Conversely, noise levels would increase up to 1.5dB within the 66dB $L_{Aeq,16hr}$ contour with 100% ICAO B departures while areas to the side of the main flight path would decrease up to 1dB decreasing the number of dwellings within the 57 and 60dB $L_{Aeq,16hr}$ contour by 200. This would represent a 12% decrease in dwellings within 60dB $L_{Aeq,16hr}$ contour (and 4-7% decrease in the number of dwellings in the 51-57dB $L_{Aeq,16hr}$ contours) .