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 19/12/24 from University of Galway 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.

Section 131 not to be invoked at this stage. ✓

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

Signed	Date
[signature] EO	23/12/24
SEO/SAO	

M

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

To	Task No	Allow 2/3/4 weeks
		BP

Signed	Date
EO	
AA	

An Bord Pleanála

Planning Appeal Online Observation

Online Reference
NPA-OBS-004117

BPHO to issue
VFVR, 24/12

Online Observation Details

Contact Name	Lodgement Date	Case Number / Description
Eoin King	19/12/2024 23:32:41	314485

Payment Details

Payment Method	Cardholder Name	Payment Amount
Online Payment	Eoin King	€50.00

Processing Section

S.131 Consideration Required

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

Signed
Cathy Carleton
EO

Date
23/12/24

Fee Refund Requisition

Please Arrange a Refund of Fee of
€

Lodgement No
LDG— 076845-24

Reason for Refund

Documents Returned to Observer
☐ Yes ☐ No

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

Signed

EO

Date

Finance Section

Payment Reference
ch_3QXtCvB1CW0EN5FC1Z76S2Fz

Checked Against Fee Income Online

EO/AA (Accounts Section)

Amount
€

Refund Date

Authorised By (1)

SEO (Finance)

Authorised By (2)

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

Date

Date

OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

An Bord Pleanála
64 Marlborough Street,
Dublin 1, D01 V902

December 19th 2024

To whom it may concern,

Re: Bord Pleanála Case reference PL06F.314485

We, the undersigned, are a coalition of Irish academics with expertise in acoustics, noise control, mechanical engineering, and urban planning. We are united in our commitment to safeguarding public health and community wellbeing in areas affected by environmental noise. We write to express our strong support for the draft decision to introduce a Noise Quota Scheme (NQS) in conjunction with an annual aircraft movement limit at Dublin Airport.

Our collective expertise encompasses a range of technical fields relevant to this issue, including noise control, noise pollution modelling, health impact assessments, and planning policies. Drawing on this expertise, we have reviewed international best practices, particularly from London airports, which serve as the basis for the proposed NQS. We have also conducted scenario analyses for Dublin Airport, examining the projected impact of various flight volumes and noise levels on local communities. Additionally, we highlight recent research on the health risks associated with prolonged exposure to aircraft noise. Key findings from these analyses are included in the appendices of this letter.

In our professional judgment, the evidence is unequivocal:

- A movement limit is an absolute necessity for the correct implementation of a Noise Quota Scheme - without it, the scheme would fail to operate as a meaningful noise control measure.
- Contour maps highlighting the affected areas, including those under existing and planned insulation schemes, emphasise the need for operational planning and community engagement to manage health impacts.
- Noise simulations for the proposed Noise Quota Scheme reveal significant seasonal differences in community exposure, with up to 2,000 residents potentially exposed to 80 dB(A) L_{Amax} and approximately 20,000 exposed to nighttime noise levels exceeding 50 dB(A) L_{night}, during the busy summer months. However, the proposed seasonal split in the movement limit provides residents with a period of relative respite during the quieter winter months, helping to balance community impacts over the full calendar year.
- The health impacts of aircraft noise are well-documented, including chronic annoyance, sleep disturbances, cardiovascular issues (like hypertension and heart disease), and cognitive impairments in children. Vulnerable populations, such as children, the elderly, and low-income communities, are disproportionately affected.
- Unlike other health risks, noise exposure requires systemic, rather than individual, intervention to reduce its adverse health impacts.

OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

We commend the planning authority's proactive approach in introducing an annual aircraft movement limit alongside the proposed Noise Quota Scheme. We urge the authority to adopt robust noise management policies in the final decision, as these measures are essential to protecting public health and community wellbeing.

Sincerely,

Dr. Eoin King
University of Galway

Dr. John Kennedy
Trinity College Dublin

Prof. Enda Murphy
University College Dublin

Address for Correspondence:

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Appendix

A1. Review of international application of Noise Quota Schemes

An Bord Pleanála's draft decision to replace Dublin Airport's 65-flights-per-night limit with a Noise Quota System (NQS) is a positive step forward. The draft decision not only provides greater flexibility during the busy summer months but also aligns with best practices for managing airport noise. By introducing both a quota count and an annual night-time movement limit, it ensures that night flights are controlled, while also encouraging the use of quieter aircraft. Planes with lower noise levels can operate more frequently, but the total number of flights remains restricted. Meanwhile, noisier planes will face stricter limits due to their higher quota scores.

DAA initially suggested a NQS in their application to modify the planning conditions. Their proposed NQS was based on the system adopted by the United Kingdom (UK) Department for Transport (DfT) in restricting night-time aircraft noise at Stansted Airport. The Quota System in Stansted Airport is actually applied across three airports in London; Heathrow, Gatwick and Stansted.

Summary of Application in London Airports

The points system in the NQS involves the classification of aircraft into different categories, based on the Effective Perceived Noise Level (EPNL), as determined from their ICAO noise certification data. Different types of aircraft are classified separately for landing and take-off into different Quota Count (QC) categories. The Quota Count doubles for every 3dB increase in measured EPNL. In a logarithmic scale, a 3dB increase is equivalent to a doubling of energy - therefore a doubling of sound energy leads to a doubling of the QC. By extension, one movement of a QC/2 aircraft is equivalent to two movements of a QC/1 aircraft, and four movements of a QC/0.5 aircraft. Aircraft quieter than QC/0.125 are currently exempt from the noise quota but, importantly, they do count towards each airport's movement limits in the London airports. If not for the movement limit, any aircraft movement with a quota count value of zero would be unlimited, even though it is a noise generating movement.

The London airports set two separate quotas, one to be applied in the summer, the other in the winter. The London airports also include a movement limit. The movement limit and quota count restrictions work together to make sure the overall number of night flights are limited and that the quietest planes are used. The values for the movement limits and Noise Quota Limits in the London airports, as well as those proposed for Dublin are summarised in Table 1.

Table 1: Summary of Noise Quota Scheme for London Airports and that proposed for Dublin

		Movement Limit	Noise Quota Limit	Time Period
Heathrow	Winter	2,550	2,415	23:30 - 06:00
	Summer	3,250	2,735	
	(Totals)	*5,800*	*5,150*	
Gatwick	Winter	3,250	1,785	23:30 - 06:00
	Summer	11,200	5,150	
	(Totals)	14,450	6,935	
Stansted	Winter	5,600	3,310	23:30 - 06:00
	Summer	8,100	4,560	
	(Totals)	*13,700*	*7,870*	

Dublin	Winter	3,900	-	23:00 - 06:59
	Summer	9,100	-	
	(Totals)	*13,000*	*16,260*	

Appendix

Review of (initial) proposed Dublin Airport NQS

In a review of the proposed noise quota system for Dublin Airport, presented at INTER-NOISE 2022[1] (the International Congress and Exposition on Noise Control Engineering), King notes the following:

- The Noise Quota Scheme initially proposed by DAA was an incomplete interpretation of that operated in the London airports. The London airports operate a Noise Quota Scheme together with a movement limit. The proposed system for Dublin dropped this critical aspect. If the Dublin approach is based upon the London Stansted approach, then it should have included a movement limit.
- The use of a quota system alone fails to account for individual noise events. A movement limit in parallel with the noise quota would go some way to address this issue.
- If there is no movement limit, any aircraft movement with a quota count value of zero would in effect be unlimited, even though it is a noise generating movement.

King also challenged the appropriateness of the actual value of the quota count proposed (16,260). In their application, DAA determined that a target average fleet noise per movement be used to determine the overall Annual Night Quota. This figure of 16,260 - which was initially calculated by DAA - appears to be a representation of what the quota could be for the airport to operate as forecasted and appears unrelated to noise control. It is noted that the figure far exceeds the figures presented for the London airports, though differences in the definition of nighttime complicate direct comparison. Notably, the quota count for London airports is determined by the UK Department for Transport. Given such a high figure (16,260) is being proposed for Dublin, it is imperative that a movement limit is introduced alongside it. Without this safeguard, noise pollution could increase unchecked, with no mechanism for its control.

Moreover, a separate study by Dunleavy et al. (2024)[2], underscores the inherent shortcomings of relying solely on a Quota Count system. The study found that different flight-mix scenarios, all operating within the same Quota Count, could produce variations in L_{night} levels of up to 10dB(A). This variability highlights the quota system's inability to guarantee consistent L_{night} levels, exposing a critical flaw that must be addressed. A movement limit goes some way to mitigate against this.

Review of Draft Decision Proposal

The draft decision (ABP-314485-22) includes a recommendation to revoke the condition related to a nighttime movement limit of 65-flight-per-night, and replace it with a Noise Quota System with an annual limit of 16,260 between the hours of 2300 and 0659. Importantly, the draft decision also includes an annual aircraft movement limit of 13,000 between the nighttime hours of 2300 and 0659. The decision to operate a NQS in conjunction with a movement limit reflects current practice in the UK airports, upon which this proposed system is based. Further, the introduction of an annual movement limit, with a split between winter and summer months is a welcome measure, as it allows operational flexibility between summer and winter schedules while maintaining control over nighttime noise pollution.

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[1] King E.A., "A review of a proposed noise quota system for Dublin Airport", proceedings of INTER-NOISE 2022, Glasgow, August 2022

[2] Dunleavy, C., Manohare, M., King E.A., "On the use of the intermittency ratio for the assessment of aircraft noise during the night", proceedings of INTER-NOISE 2024, Nantes, August 2024.

Appendix

Concluding Remarks

To align with the established practice in London airports (as well as other airports including Aberdeen and Luton), the Dublin NQS must include a movement limit. Without this, and considering the extremely high proposed limit of 16,260, some aircraft could operate without restriction, undermining the system's intent to reduce noise impacts. This view is supported by the Board's independent consultant who states that "*reliance on the QC system alone to manage noise effects at night is regarded as inadequate as it would permit substantial increases in ATMs for only marginal reductions in how noisy each aircraft is*"[3]. The Board's Inspector's Report considered this independent advice in detail and made the recommendation to introduce an aircraft movement limit. There is no doubt that the introduction of a movement limit is necessary for a complete and thorough implementation of a Noise Quota System.

While several parties have criticised the introduction of a movement limit in the draft decision, these objections appear to stem from misunderstandings of how a Noise Quota System operates in conjunction with a movement limit, as it does so in other jurisdictions. Properly implemented, the movement limit ensures that the total number of night flights remains controlled, thereby effectively managing noise levels.

Finally, the proposed Noise Abatement Objective (NAO) for Dublin Airport must be considered. The objective is to limit and reduce the long-term adverse effects of aircraft noise on health and quality of life, particularly at night. The operation of a NQS without a movement limit would do little to effectively mitigate these adverse effects, as it would essentially allow for an unrestricted number of low-quota or zero-quota aircraft movements. While these movements may individually generate less noise, their cumulative impact could still result in significant noise pollution, undermining the NAO's intent. As such, it is unlikely the NQS alone would meet the Noise Abatement Objective. A combined system of a quota limit and a movement restriction is essential to ensure a balanced approach that prioritises both operational flexibility and the well-being of surrounding communities.

In conclusion, the proposed NQS represents a significant opportunity to enhance noise management at Dublin Airport. However, it is imperative to include a movement limit to ensure the system achieves the stated Noise Abatement Objective. The movement limit is a critical addition to safeguard community well-being.

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[3] Vanguardia Report, "Dublin Airport North Runway, Addendum Report – Noise", 19 April 2024

Appendix

A2. Noise Modelling Results

To better understand the proposed Noise Quota Scheme several scenarios were modelled. Aircraft noise simulations were conducted using the Aircraft Noise and Performance (ANP) database in commercial software SoundPLAN (aircraft noise calculation standard: ECAC Doc 29 4th Edition). The modelling process incorporates Noise-Power-Distance (NPD) data to represent the flight paths and noise emissions of existing aircraft models operating at Dublin airport. The methodology followed was recently published by Trinity College Dublin in the top tier peer reviewed journal Applied Acoustics:

- Einicke K, Kennedy J. Predicting airport noise impact to 2040: Traffic growth and technology uptake. Applied Acoustics. 2025 Jan 5;227:110229. https://doi.org/10.1016/j.apacoust.2024.110229

The nighttime noise contours were calculated for both winter and summer months under the movement limits included in the proposed Noise Quota Scheme. Due to the sensitivity of the noise contours to aircraft types and runway usage, several scenarios were considered. A key factor in estimating the noise impact is the fleet share and the makeup between wide body, narrow body, regional, and turboprop aircraft. Input data was taken from real flights that operated through Dublin airport in January, February, June, and July of 2023. The two extremes of winter and summer months were considered with 14 nighttime flights for the winter months, and 99 nighttime flights for the summer months. For these two extremes two scenarios were modelled with significant differences in fleet share between aircraft types, reflecting the range of aircraft that operate through Dublin airport. The aircraft types used in each scenario are reported in Table 1.

Contour lines and area and population exposure are shown for each nighttime flight scenario for L_{night} = 50 dB(A) and L_{max} = 80 dB(A). These contour lines align with current common practice and the inspector's report. The contour lines are plotted in conjunction with existing insulation schemes and planned residential areas according to the development plan for 2023-2029. Data was available for two existing insulation schemes: RNIS (Residential Noise Insulation Scheme) which is based on the predicted $L_{Aeq,16h}$ = 63 dB(A) contour line for 2022 forecast, and the HSIP (Home Sound Insulation Programme) which is based on the $L_{Aeq,16h}$ = 63 dB(A) contour line for 2026. In this work a 1 km grid with population data from 2022 is combined with residential properties from 2023 to analyse population exposure around Dublin Airport. The population in each 1 km^2 is equally distributed and projected onto the buildings from Geo Directory in QGIS. Subsequently, the generated noise maps are projected onto the population data. The population exposure is then analysed depending on the contour line and noise exposure levels.

Figure 1 to Figure 3 report the relevant contours lines for the modelled scenarios. Table 2 reports the area and population exposure within each contour line for the scenarios considered. Considering the proposed movement limits there is still significant noise exposure to existing communities, with potentially close to 2000 residents within the L_{Amax} 80 dB(A) contour for summer scenario 1. Zoned residential areas are highlighted in the contour maps and several areas fall within both the L_{Amax} 80 dB(A) and L_{night} 50 dB(A) contour lines for summer scenario 1, which favours south runway operation.

The scenarios calculated demonstrate large changes in community noise exposure between winter and summer months. The contour lines are sensitive to fleet changes and runway modes and therefore on-going operational decisions should be assessed in advance to facilitate community engagement and communication in accordance with the Balanced Approach to airport noise control. The health implications of this community noise exposure will be addressed in the following section.

		Winter Scenario		Summer Scenario	
Aircraft		1	2	1	2
A343	wide	2			
B788	wide	2		5	3
777ER	wide	1			2
A330-301	wide			3	4
76700	wide			4	
777200	wide			1	1
777300	wide			2	
7878R	wide				1
CNA510	turboprop			1	
E190	regional			1	3
HS748A	regional				1
A20N	narrow	1			1
737800	narrow	5			33
7378MAX	narrow	3	3	16	17
737800	narrow		6	29	
A320-211	narrow		4	26	25
A319-131	narrow		1		
737700	narrow			4	1
737400	narrow			3	
A21N	narrow			2	4
757300	narrow			1	1
A321-232	narrow			1	2
	wide	36 %	0 %	15 %	11 %
Fleet Share	narrow	64 %	100 %	83 %	85 %
	regional	0 %	0 %	1 %	4 %
	turboprop	0 %	0 %	1 %	0 %
10L	arrival				
	departure				
28R	arrival		7		
	departure				25
10R	arrival			49	
	departure			50	
28L	arrival	7			49
	departure	7	7		25
	arrival	7	7	49	49
	departure	7	7	50	50
Total		14	14	99	99

Table 1 Winter and summer scenario statistics

	Winter				Summer			
Scenario	1		2		1		2	
	Area (km²)	Population	Area (km²)	Population	Area (km²)	Population	Area (km²)	Population
L_{Amax} 80 dB(A)	12.88	682	7.49	273	15.20	1924	19.22	1584
L_{night} 50 dB(A)	10.04	204	8.51	244	43.63	20713	45.70	6973

Table 2 Area and population exposure

Appendix

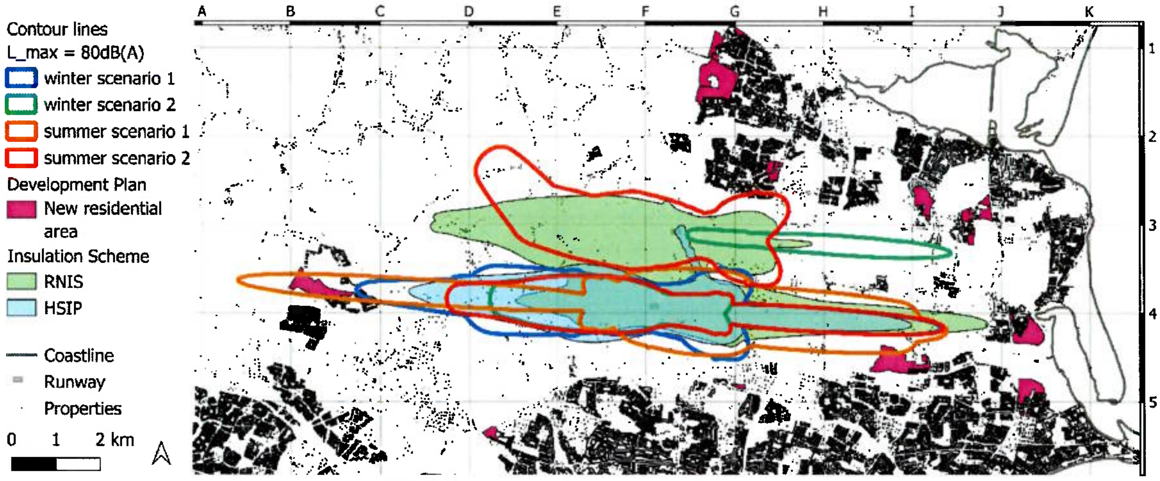

Figure 1 L_{Amax} = 80 dB(A) contour line for the winter and summer scenarios

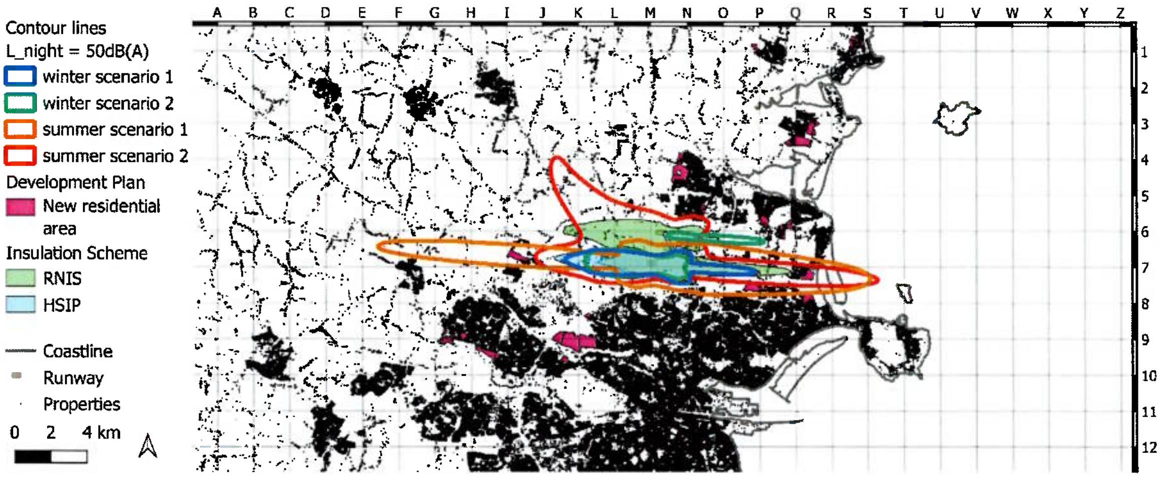

Figure 2 L_{night} = 50 dB(A) contour line for winter and summer scenarios considered (Full contour extent)

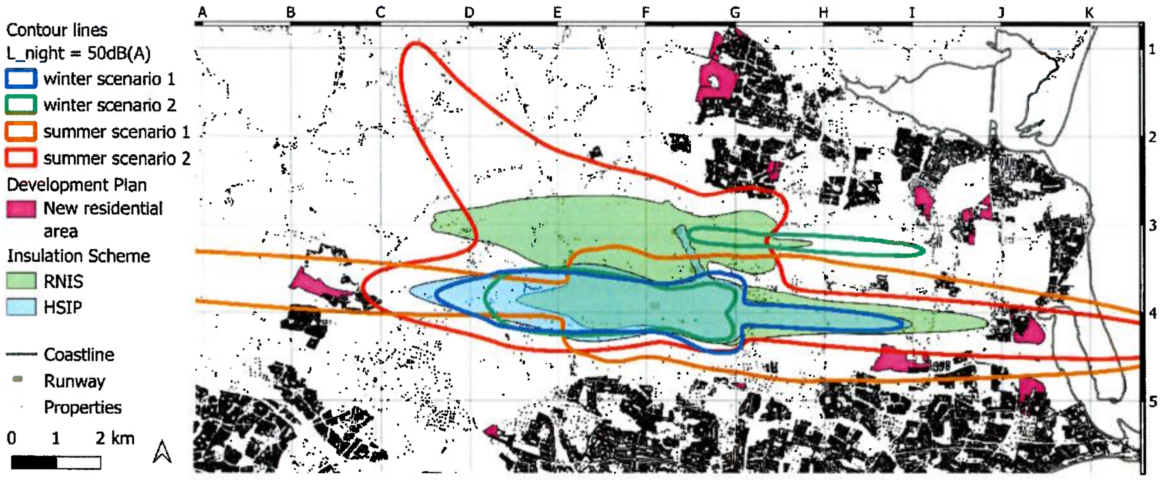

Figure 3 L_{night} = 50 dB(A) contour line for winter and summer scenarios considered (Close view)

Appendix

A3. Health Impacts

Aircraft noise is a persistent and significant environmental stressor with profound implications for public health. Among environmental noise sources such as road traffic, railways, and industrial activity, aircraft noise is considered to cause the most severe disturbance due to its irregular, high-intensity sound events and unique acoustic characteristics (Seidler et al., 2017). Its impacts extend beyond auditory disturbance, encompassing chronic annoyance, sleep disruption, cardiovascular diseases, cognitive impairment in children, and is particularly concerning for populations residing near airports or beneath flight paths.

Annoyance is one of the most pervasive consequences of aircraft noise, classified by the World Health Organization (WHO, 2018) as a significant adverse health effect. It arises from the intrusive nature of flight noise, particularly its unpredictability, loudness, and duration, which disrupt daily activities and exacerbate psychological stress (Schreckenberg et al., 2010). Studies consistently identify aircraft noise as the most annoying among transport noise sources. For instance, Wothge et al. (2017) found that aircraft noise in the Frankfurt Rhine-Main region evoked higher annoyance levels than road or railway noise, even at comparable sound levels. Gille et al. (2017) corroborated this, reporting that participants in metropolitan France rated aircraft noise as the most distressing transport noise. Chronic annoyance has broader implications, linking directly to elevated stress levels, sleep disruption, and cardiovascular risks (Guski et al., 2017).

Sleep disturbance is among the most immediate and detrimental effects of aircraft noise exposure. Night-time noise interrupts sleep cycles, fragments rest and contributes to conditions such as insomnia and non-restorative sleep (Basner et al., 2018). Night-time flights disproportionately impact sleep due to their interference with circadian rhythms and the critical recuperative phases of sleep. Janssen et al. (2014) found that even intermittent noise events can have long-lasting effects, reducing overall sleep quality and heightening health risks. Chronic sleep disturbance exacerbates other health conditions, including obesity, diabetes, and cardiovascular disease, due to its impacts on metabolic regulation and stress response mechanisms (Münzel et al., 2021).

The association between aircraft noise and cardiovascular health is well-documented. Chronic exposure to aircraft noise activates the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic-adrenal-medullary (SAM) system, resulting in elevated cortisol and catecholamine levels (Basner et al., 2014). These physiological responses contribute to hypertension, atherosclerosis, and other cardiovascular conditions. Research on the effects of aircraft noise on human health, emphasises the role of noise as a psychosocial stressor (Wojciechowska et al., 2022). This stressor triggers a series of neuroendocrine responses, including elevated blood pressure, increased stress hormone levels, and accelerated heart rate, which collectively contribute to cardiovascular disease (Hahad et al., 2022). Moreover, chronic exposure to aircraft noise, primarily through mechanisms leading to endothelial dysfunction, has been associated with a heightened risk of hypertension (Münzel et al., 2021). Wojciechowska et al. (2022) found that long-term exposure to aircraft noise causes reversible noise-induced subclinical organ damage, emphasising the importance of combating aircraft noise exposure to improve cardiovascular health.

Aircraft noise also adversely affects children's cognitive development, particularly in areas such as memory, attention, and reading comprehension. The RANCH (Road Traffic and Aircraft Noise Exposure and Children's Cognition) study, which examined schools near major European airports, found that exposure to aircraft noise above 55 dB(A) was associated with delays in reading comprehension and poorer memory retention (Clark et al., 2006). These effects are attributed to both direct distractions and noise-induced stress responses that undermine learning environments. Chronic exposure to aircraft noise can thus have cumulative effects, hindering academic performance and emotional well-being.

The unique characteristics of aircraft noise—its intensity, episodic nature, and frequency amplify its negative health impacts. Single overflights can reach peak sound levels of over 75 dB(A) (Lavandier et al., 2022), severely disrupting activities and sleep patterns. Frequent overpasses exacerbate these effects, particularly in areas with dense flight paths, contributing to cumulative noise exposure (Frenis et al., 2022). Vulnerable populations, such as children, the elderly, and individuals with pre-existing health conditions, are disproportionately affected (Bartels et al., 2024). Children's developing cognitive systems are especially susceptible to noise-induced stress, while elderly individuals are at greater risk of cardiovascular complications due to chronic exposure (Stansfeld & Clark, 2015). Socioeconomic disparities further compound these vulnerabilities, as lower-income communities may reside near airports or under flight paths, exposing them to higher noise levels with fewer resources for mitigation (Nieuwenhuijsen et al., 2017).

Effective mitigation of aircraft noise impacts requires a multifaceted approach that combines operational, technological, and regulatory measures. Operational strategies such as optimising flight paths, implementing noise-reducing procedures, and enforcing night flight curfews have demonstrated efficacy in reducing exposure. For instance, airports like Frankfurt and Heathrow have implemented curfews and stricter operational regulations to minimize night-time disruptions (Wittmer and Noto, 2019). Unlike conventional cardiovascular risk factors like smoking or an unhealthy lifestyle, noise exposure cannot be addressed at the individual or outpatient level, but it requires comprehensive management through the implementation of guidelines and regulations at locally and systematically (Bączalska et al., 2022).

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