Objection Review

Drummarnock Wind Farm

Report

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Executive Summary

This report assesses the aviation-related concerns raised in objection, submitted by Cumbernauld Airport, to the proposed Drummarnock Farm Wind Farm Development (planning application 24/00494/FUL), located approximately 8 km north-northwest of Cumbernauld Airfield. The development supports Scotland's strategic commitment to expand onshore wind generation in alignment with national energy and planning policies, including the Scottish Energy Strategy and National Planning Framework 4 (NPF4). In addition, the development supports the objectives set in the Stirling Councils Climate and Nature Emergency Plan 2021-2045.

Cumbernauld Airfield, a licensed general aviation (GA) aerodrome, raised its objections, in a letter dated 05 September 2024 to the Stirling Council Planning and Building Standards section. The letter raised concerns to potential impacts on light aircraft safety, airspace availability, wake turbulence, emergency landing options, and low-level flight risks. This report evaluates those concerns using authoritative sources including Civil Aviation Authority (CAA) guidelines, international research, and operational aviation best practices.

Key Findings:

- **Wake Turbulence**: Turbulence generated by wind turbines—while real—is well understood and dissipates within known limits. The proposed turbine locations are sufficiently distant from established circuit patterns and air routes. Empirical studies and CAA CAP 764 guidance confirm that, when appropriate separation, by the aircraft, is maintained, turbine wakes do not present a significant hazard to light aircraft.
- **Airspace Availability**: The surrounding airspace is predominantly Class G (uncontrolled airspace) with overlaying Class D (controlled airspace) from Glasgow and Edinburgh. Aircraft flying under Visual Flight Rules (VFR) can operate safely within these volumes, subject to standard Air Traffic Control (ATC) clearance procedures. There is no evidence that the proposed development restricts airspace availability or operational flexibility.
- **Emergency Landing Zones**: The terrain around Cumbernauld is already challenging for emergency landings due to natural forestation and topography. The addition of turbines does not significantly increase this risk. Pilots are trained to plan for contingencies and adhere to safe minimum altitudes, in accordance with the UK CAA Skyway Code and pre-flight planning protocols.
- **Structural and Low-Level Risks**: The turbines will be charted, marked, and lit according to regulatory requirements. Structural risks are mitigated through proper aeronautical notification and publication. There are a number of airports with nearby turbines, these include Newquay and East Midlands where wind farms are within 5km of the runway. There have been no recorded UK accidents involving properly safeguarded wind turbines.
- **Precedents and Regulatory Context**: No evidence from UK incident reports or precedent planning cases indicates that similar windfarm developments have caused or contributed to aviation accidents. CAP 764 provides a balanced policy framework that recognises both aviation and renewable energy as critical national priorities.

In conclusion, the aviation objections, while sincere, do not substantiate a valid basis for refusal of the proposed Drummarnock Wind Farm. Airspace is not an exclusive use sovereign asset for aviation alone; the renewable and aviation industries must work collaboratively and use airspace as a shared asset.

The development is fully compliant with UK aviation safety regulations and will not compromise the safe operation of aircraft at or near Cumbernauld Airfield.

Abbreviations

AAIB	Aircraft Accident Investigation Bureau
ATC	Air Traffic Control
ANO	Air Navigation Order
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CFD	Computation Fluid Dynamics
CTA	Control Area
GA	General Aviation
GPS	Global Positioning System
Km	Kilometres
LiDAR	Light Detection and Ranging
MOD	Ministry of Defence
MTOW	Minimum Take-Off Weight
NATS	National Air Traffic Services
Ofcom	Regulator for communications services
TEM	Threat and Error Management
UK	United Kingdom
VFR	Visual Flight Rules

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Overview

1. The proposed development, Drummarnock Wind Farm, forms part of Scotland's strategic commitment to increase renewable energy generation, with a particular focus on onshore wind as a cost-effective and rapidly deployable solution. The development aligns with national policy frameworks including the Scottish Energy Strategy and the National Planning Framework 4 (NPF4), which identifies onshore wind as a key component of Scotland's future energy mix. In addition, the development supports the objectives set in the Stirling Councils Climate and Nature Emergency Plan 2021-2045.

Context of Aviation Concerns

2. Cumbernauld Airfield is a licensed airfield that serves as a hub for general aviation (GA), providing services for flight training, private aviation, and recreational flying. The airfield's operators have raised specific concerns regarding the proposed development (24/00494/FUL):
   - Potential disruption to established flight corridors
   - Effects of wind turbine wakes on light aircraft stability
   - Impacts on emergency landing options
   - General aviation safety considerations

3. This report evaluates these concerns and provides evidence-based counterarguments, drawing on:
   - Civil Aviation Authority (CAA) guidelines
   - Technical assessments of turbine wake effects

Location

4. The proposed development is 8km north-northwest of Cumbernauld Airfield (Figure 1) – National Grid reference – NS 73185 87482.

FIGURE 1: PROPOSED DEVELOPMENT RELATIVE TO CUMBERNAULD AIRFIELD

Turbulence from Wind Turbines

5. Turbulence generated by wind turbines — commonly referred to as turbine wake turbulence — has been the subject of increasing interest and research as turbine rotor diameters have increased and more wind farms are proposed in proximity to aviation activities.
6. Wake turbulence is typically characterised by a reduction in wind speed and increased turbulence intensity in the downstream flow of a turbine, with its persistence and vertical extent depending on wind speed, atmospheric stability, rotor size, and terrain.
7. There are a number of airports with wind farms in close proximity to the runway. Newquay Airport has two wind farms within 5km north of the runway, Denzell Down has five turbines and Bears Down 16 turbines. The nearest turbine is 3.62km from the runway. Newquay is a mixed-use airport consisting of light aircraft operators and commercial traffic.
8. East Midlands Airport operates its own wind farm consisting of four turbines within 3km of the runway.
9. In aviation safety terms, the concern is whether these wakes, under conditions deemed safe for flying, could have a detrimental impact on the controllability and stability of aircraft, particularly light aircraft and helicopters operating under Visual Flight Rules (VFR) in Class G airspace.

Turbulence Extent and Severity

10. Empirical and computational studies consistently demonstrate that wind turbine wakes extend:
    - Vertically to approximately 2 rotor diameters above the hub height; and
    - Horizontally between 6-12 rotor diameters downstream, with diminishing intensity over distance.

11. This modelling is supported by the EU-funded UpWind project (European Commission FP6, 2008), which remains a foundational research effort on large wind turbine aerodynamics. Its findings were corroborated by Magnusson and Smedman (1994) and more recently by Emeis et al. (2011).
12. Notably, Barthelmie et al. (2009), in their large-scale assessment of offshore and onshore turbine wakes, found that wake turbulence may be detectable over 10 km downwind under certain meteorological conditions, but that turbulence intensity rarely exceeded levels that would compromise light aircraft stability — particularly when operations are conducted at standard altitudes and under favourable weather conditions. Notably, light aircraft operations do not operate in adverse weather conditions, especially microlights where strong winds exceed the capability of the aircraft’s performance.

UK Regulatory Position

13. The UK Civil Aviation Authority (CAA), via CAP 764 – Policy and Guidelines on Wind Turbines, 6th Edition, provides policy guidance on wake turbulence to 16 times rotor diameter.
14. The latest edition[1] (7th Edition), currently out for consultation, states that "*published research suggests a distance of 8-12 rotors downstream of the wind turbine is a distance at which the turbulence effects are not expected to affect conventional aircraft flying.*"
15. CAP 764 does not prohibit wind turbines near aerodromes or in uncontrolled airspace, provided that aircraft have adequate vertical and lateral clearance from wind turbine structures and that the turbines do not interfere with instrument approach procedures, obstacle limitation surfaces (OLS), or radar coverage.
16. Moreover, CAP 764 states that, "*There were no occurrence reports or aircraft accidents related to wind turbines between 2000 and early 2022*". The lack of empirical data coupled with acknowledged research has resulted in a regulatory view that the distance can be reduced.

Aircraft Susceptibility and Mitigation

17. While smaller aircraft, particularly microlights and helicopters, may be more sensitive to turbulence, pilots are trained to avoid known sources of disturbance and plan ahead to ensure that conditions are suitable for flying (including orographic turbulence, convective activity, and mechanical turbulence from tall obstacles).
18. Wind turbines are fixed, charted obstacles and can be accounted for in both flight planning and tactical navigation.
19. Where wind turbines are located near VFR transit routes or visual reference points, developers are expected to liaise with local aerodromes, airspace users, and planning authorities to ensure adequate route design and emergency landing options are considered. However, this is a matter of airspace design and operational awareness, not a general prohibition on turbine development.

Summary

20. While turbine wake turbulence is a real aerodynamic phenomenon, its safety impact on aviation remains limited and manageable when standard regulatory safeguards are applied.
21. There is no current evidence to suggest that wind turbines compliant with CAA guidance pose an unacceptable safety hazard due to turbulence alone.

[1] CAP 764 Issue 6 (2022) is currently the effective version, with a 7th Edition under consultation as of 2025. This report is based on the current regulatory position while noting likely policy trends.

22. Ongoing research — including CFD modelling, LiDAR wake profiling, and pilot reports — should continue to inform future policy updates. However, at present, turbine-induced turbulence does not constitute a basis for refusal of wind energy developments from an aviation safety standpoint.

Response to Objection: Application 24/00494/FUL

Introduction

23. This report acknowledges the concerns raised by stakeholders operating from Cumbernauld Airport in relation to the proposed Drummarnock Wind Farm.
24. Ensuring aviation safety is of utmost importance, and the interaction between renewable energy infrastructure and aviation interests must always be addressed with diligence.
25. However, having reviewed the objection and considered current regulatory frameworks and evidence-based guidance, we believe that the concerns, while sincere, do not substantiate grounds for rejection of the application. A detailed response, addressing each of the following headlined objections, is set out in the following sections.
    - Airspace constraints and aircraft operations.
    - Turbulence and wake effects on light aircraft.
    - Emergency landing safety.
    - Height and structural hazards.
    - Incident comparisons.

Airspace Constraints and Aircraft Operations

Objection 1: The objection outlines concern about restricted airspace between Edinburgh and Glasgow controlled zones, with Cumbernauld Airport situated beneath the Glasgow CTA from 3,000 ft AGL upwards. The claim is that GA pilots are funnelled into narrower corridors with reduced flexibility, and this is exacerbated by wind turbines.

Response:

26. It is important to note that GA operations, particularly those under Visual Flight Rules (VFR), are designed to operate safely in Class G (uncontrolled) airspace. UK GA traffic routinely operates safely around existing wind turbines across the country.
27. Drummarnock Wind Farm is located within Class G airspace; this is commonly known as 'uncontrolled Airspace" due to a controlled Air Traffic Control (ATC) service not being provided. The surrounding airspace is defined as Controlled Airspace (CAS) designated as Class D. This classification allows VFR aircraft to operate within the airspace, subject to an air traffic control clearance from either Glasgow or Edinburgh airports.
28. The assertion that this airspace is restricted is incorrect and may cause misunderstandings. Concerns regarding the access restrictions imposed by these ATC units should be addressed to the respective airports and the Civil Aviation Authority (CAA). It is highly likely that ATC permits GA operations when

traffic levels within the respective airspace volumes allow. While Glasgow and Edinburgh airports experience peak periods, during non-peak periods there is ample capacity to accommodate GA operations. Both airports have two short peak periods each day, so GA aircraft can be accommodated most of the time. It must be noted that with the presence of wind farms is not the issue as VFR aircraft regularly contact airport ATC units for shorter routings through portions of airspace.

29. The introduction section of CAP 764 (CAA Policy and Guidelines on Wind Turbines) clearly states the following:

    "*Both wind energy and aviation are important to UK national interests and both industries have legitimate interests that must be balanced carefully. Therefore, it is important that the aviation community recognises the Government aspiration for wind turbine developments to play an increasing role in the national economy. As such, the aviation community must engage positively in the process of developing solutions to potential conflicts of interest between wind energy and aviation operations*."

    As such, the perceived restrictions placed on GA operations by other aviation stakeholders should not be used to place restrictions on the wind energy industry.

30. CAP764 further states that wind turbines do not inherently restrict airspace; instead, their impact is assessed on a case-by-case basis considering height, proximity, and operational relevance. Once again, the position stated by the UK CAA in a policy document (CAP764) should carry sufficient weight in the determining the position of this objection.
31. Additionally, the airspace mentioned is already well-defined, and turbines proposed at Drummarnock Wind Farm lie outside controlled airspace, and outside published instrument approach procedures for any licensed airfields.
32. There is no current or proposed airspace change linked to the proposed turbines that would impact the defined operational airspace volumes of Cumbernauld Airport.
33. In summary, the presence of wind turbines, within this proposed development, does not impact operational airspace availability.

Turbulence and Wake Effects on Light Aircraft

Objection 2: Wind turbine wakes could destabilize small aircraft, particularly those with low MTOW (<5700kg).

Response:

34. While it is acknowledged that wind turbines generate wake turbulence, CAP 764 offers clear and conservative guidance to mitigate this issue:

- Vertical wake effect is conservatively estimated to extend up to 2 rotor diameters, and horizontally 10 rotor diameters downwind.
- The design of the Drummarnock Wind Farm has incorporated these clearances relative to known aviation routes and Cumbernauld's circuit patterns.
- The UK CAA does not currently consider turbine wake to pose an unacceptable hazard to GA operations provided separation distances are respected.

35. To date, no peer-reviewed, quantitative evidence has demonstrated that wind turbines installed within these parameters have caused fatal or serious wake turbulence incidents involving GA aircraft in the UK.
36. Wake turbine turbulence studies are conducted in worst-case environments, i.e., stable air and flat ground. The proposed development is in a mountainous area and so the presence of uneven terrain, that will result in the wake turbulence dissipating quicker. Figure 2 provides a Google Earth view of the topography. The effect of obstacles reducing turbulence can be evidenced in an airport environment where blast fences are placed to protect ground assets from jet blast created by aircraft taxiing within the airport environment, i.e., apron and taxiways.

FIGURE 2: TOPOGRAPGHY OF STIRLING AND SURROUNDING AREA

37. Moreover, wake turbulence is generally an issue under high-wind conditions — circumstances under which many GA flights (especially microlight or VFR training flights) would not typically operate. This is expanded upon below.

General Wind Speed Guidelines for Light Aircraft

38. This section considers small general aviation (GA) aircraft as typically a Cessna 172 and Piper PA-28.
39. Data has been derived from aircraft handbooks and general guidance available on the internet. The data provided is generic across the various aircraft models and therefore not specific. The data aligns with the author’s own experience of working at general aviation airports as an ATC where strong winds, typically those provided below, resulted in light aircraft not flying.

Maximum Demonstrated Crosswind Component

40. This is the most important wind-related limitation and is published in each aircraft's Pilot Operating Handbook (POH).
    - Typical range: 15–20 knots for most light aircraft
    - This is not a strict limit, but rather the strongest crosswind encountered during certification testing by a test pilot. Pilots may operate in stronger crosswinds at their discretion, but doing so requires skill and caution.

Headwind Limits

41. Light aircraft generally perform better with headwinds (improved take-off and landing performance), but:
    - Sustained surface winds >30 knots can be challenging
    - Gusts above 35 knots may cause control difficulties, especially during landing

Tailwind Limitations

42. Most aircraft prohibit take-off or landing with a tailwind component >10 knots
43. Even small tailwinds greatly increased landing distance and risk of overrunning

Excessive Winds – When Not to Fly

44. Wind speeds may be considered excessive for light aircraft[2] operations when:

Wind Type	Excessive Threshold (Typical)
Crosswind	> 20 knots for most light aircraft
Gust spread	> 10–15 knots between steady and gusting
Headwind	> 30–35 knots, especially with gusts
Tailwind	> 10 knots (most manufacturers' limits)

Other Considerations

45. Turbulence and wind shear are also critical. Even moderate wind aloft (e.g., 40+ knots at low levels) can cause dangerous conditions during climb or approach.

Summary Table – Light Aircraft Wind Guidelines

Condition	Recommended Limit (General Aviation Aircraft)
Max Crosswind	15–20 knots (demonstrated)
Max Headwind	30–35 knots (sustained)
Max Tailwind	10 knots (manufacturer limit)
Gust Spread Concern	>10–15 knots
Unsafe Total Wind	>35–40 knots (depends on aircraft & pilot)

Key Wind Considerations for Microlight Operations[3]

Wind Factor	Typical Thresholds & Considerations
Crosswind Limits	Most microlights are limited to 8–12 knots maximum demonstrated crosswind. Exceeding this can cause directional control issues during landing.
Headwind Limits	Headwinds help reduce take-off and landing roll but become hazardous if gusts exceed 20–25 knots, especially if accompanied by turbulence.
Tailwind	Strongly discouraged. Many microlights have no certified tailwind capability.
Gust Spread	A gust difference of more than 10 knots can lead to unstable approaches, ballooning, or loss of control in flare.

[2] The POH for a Pa28, as an example of a light aircraft, provides details of recommended wind speeds.
[3] The UK CAA provides guidance but delegates specific operating limits to manufacturers. The TL-2000 Sting Carbon POH provides specific information.

Turbulence / Mechanical Shear	Microlights are very susceptible to mechanical turbulence behind trees, hangars, or hills. Even 15–20 knot winds can be problematic in such environments.
Wind Gradient / Shear	Rapid changes in wind speed/direction close to the ground can severely impact microlight flight during climb-out or approach.
Wind Direction vs Runway Alignment	Runway alignment becomes critical: small crosswind components can have significant impact. Grass strips may limit directional control.

Recommended Maximum Wind Limits for Safe Microlight Flying

Wind Component	Recommended Limit (Typical for Training/Leisure)
Crosswind Component	8–12 knots
Headwind (steady)	20–25 knots (with low gust spread)
Gust Spread	≤10 knots
Tailwind Component	Avoid >5 knots; most POHs prohibit any tailwind
Total Wind (Surface)	Caution advised >25 knots

Pilot and Operational Factors

46. Pilot experience is crucial; **many schools limit students to <10 kt total wind**.
47. Short-field performance is affected by gusts, especially in high-drag configurations (e.g., open-cockpit microlights). The proposed development is not within operational distance of the airfield.
48. Take-off and landing distances vary significantly with wind, especially on grass strips.

Key Wake Turbulence Considerations

Factor	Effect on Wake Turbulence
Wind speed	Higher wind speeds (e.g. >10 m/s or ~20 kt) result in stronger, more energetic wakes
Atmospheric stability	Stable conditions (e.g. at night or with temperature inversions) prolong wake dissipation
Distance from turbine	Wake turbulence can persist up to 10 rotor diameters (1–2 km) downstream
Wind direction	Determines wake alignment relative to flight paths or aerodrome approach surfaces

Risk Thresholds (Indicative)

Wind Speed (m/s or knots)	Wake Turbulence Risk Behind Wind Turbines
<5 m/s (10 kt)	Low – wakes are weaker and dissipate quickly
5–10 m/s (10–20 kt)	Moderate – **persistent wakes** up to 500–1000 m downstream
>10 m/s (20+ kt)	High – **strong wakes** and possible hazard to light aircraft/gliders

49. Wakes are strongest in winds **10–15 m/s (20–30 kt)** and in **stable atmospheric conditions**. The Royal Meteorological Society provides guidance on what makes air stable or unstable as:

"It is the vertical profile of temperature, or lapse rate of the atmosphere, which determines whether an air mass is stable or not. The temperature can be measured using an electronic thermometer attached to a helium-filled weather balloon released from the ground. As it ascends, the readings are transmitted back to earth, and, under normal circumstances, the temperature would be found to fall with height. But it does not always fall at the same lapse rate. If it falls rapidly with height, the atmosphere is said to be unstable; if it falls more slowly (or even temporarily increases with height), a stable atmosphere is present."

In basic terms, stable atmospheric conditions are generally associated with the lack of little or no vertical movement of air.

Aircraft Vulnerability

50. Wake turbulence becomes a flight safety concern primarily for:
    - Microlights, gliders, helicopters, and light aircraft, **especially when operating below 500 ft AGL**. Rules of the air prohibit low-level operations of below 500 ft; aircraft are required to be 500 ft clear (vertically and horizontally) from the nearest obstacle under clear weather conditions. Obstacles include terrain, vegetation, buildings, turbines, masts, etc.
    - Aircraft flying slowly or in climb/descent
    - Low-altitude aerial work (e.g., crop dusting, surveillance)

51. Heavier, faster aircraft are less affected due to greater inertia and shorter exposure time.
52. In summary, wind turbine wake turbulence extends further in high winds, when light aircraft are unlikely to be flying due to deemed unsafe conditions for flying, making risks manageable within current safety protocols and pilot awareness.

Emergency Landing Safety

Objection 3: Turbines reduce available emergency landing zones, leaving pilots with limited reaction time.

Response:

53. Terrain-based risk is an existing feature of VFR navigation, especially in areas like Central and Western Scotland. The Carron Valley area is already surrounded by forest, elevation changes, and limited flat terrain.
54. The proposed turbine locations do not significantly alter the topographical characteristics of the area. Furthermore, the risk of power failure leading to a forced landing is statistically extremely low for well-maintained, licensed GA aircraft. According to UK AAIB reports from the past decade, forced landings in the vicinity of turbines are extremely rare.

55. Even in the event of an emergency, aircraft are legally required to maintain a minimum vertical height of 500 ft above and 500ft laterally from the highest obstacle (ANO 2016, Rule 5). A pilot complying with the ANO and conducting an effective pre-flight briefing and flight planning will ensure the flight is conducted clear of obstacles, with sufficient altitude to perform an emergency landing if required.
56. The CAA has produced CAP1535, The Skyway Code, Version 4, dated November 2023. This publication sets out guidance on pre-flight preparation. The significance of this section sets out guidance for pilots when undertaking cross-country flying. The guidance includes setting out the route and considering applying Threat and Error Management (TEM, page 126) principles as part of the checklist of activities prior to getting airborne.
57. The Skyway Code is not an exclusive publication, as pre-flight preparations are an essential aspect of pilot training. Understanding the planned flight route and preparing for potential emergencies are vital for ensuring flight safety.
58. Consequently, a pilot planning to fly over challenging terrain should identify suitable landing areas for emergencies requiring forced landings and plan the flight route and altitude accordingly to facilitate such occurrences.
59. In summary, emergency landing safety will not be compromised where pilots follow the training they have undertaken and apply the guidance provided in the Skyway Code.

Height and Structural Hazards

Objection 4: Turbines pose an unacceptable physical risk to low-flying aircraft.

Response:

60. The physical risks posed by wind turbines to low-flying aircraft are thoroughly mitigated through a combination of regulatory compliance and safety protocols. Aviation lighting and marking will be installed in strict accordance with Civil Aviation Authority (CAA) requirements, ensuring that turbines are highly visible to pilots under all flight conditions.
61. It should be noted that the CAA has already approved a lighting scheme for the Drummarnock Wind Farm.
62. In addition to these precautions, obstacles such as wind turbines are promulgated following both international and UK regulatory processes. The aviation impact assessment conducted for such projects aligns with standards set by global regulatory entities and the UK's aviation authorities, including CAP 764 and CAP 168 guidelines.

63. These assessments ensure that turbines are charted as obstacles in VFR navigation systems and GPS databases, providing pilots with accurate and up-to-date information well in advance of any potential interaction.
64. A case study highlights the efficacy of these measures: no recorded accidents in the UK involving turbine collisions with properly marked structures have occurred. This demonstrates the effectiveness of existing safeguards in preventing risks associated with obstacles like wind turbines in the aviation environment.
65. In summary, structural risks are adequately addressed through stringent regulatory compliance, international coordination, and robust safeguarding measures. The presence of wind turbines does not pose an unacceptable risk to low-flying aircraft **when all safety protocols are followed**.

Incident Comparisons (German Fatality & Scottish Downdraft Case)

Objection 5: Past accidents (e.g., German turbine collision) demonstrate inherent risks.

Response:

66. The German incident was an extraordinary and isolated case, investigated in the context of aircraft malfunction and regulatory failure. In the UK, there have been no recorded fatalities involving wind turbine collisions by civil aircraft.
67. UK regulatory oversight through the CAA, NATS, MOD, and Ofcom ensures rigorous safeguarding assessments are undertaken. In this case, an aviation impact assessment has been conducted in line with CAP 764, CAP 168 (Aerodromes), and MOD safeguarding zones.
68. Additionally, turbine databases maintained by NATS and the CAA already account for obstacle data that are electronically charted for VFR navigation. The UK's GA community is familiar with wind farms and their locations, which are widely documented in VFR charts and GPS systems.
69. Downdraft risks, which occur naturally due to atmospheric conditions, are not exclusive to wind farms and can arise in various scenarios involving turbulence. These phenomena are influenced by weather patterns, terrain, and airflow dynamics, and pilots are trained to navigate such challenges as part of routine operations.
70. While downdrafts can occasionally affect aircraft performance, proper assessment and adherence to aviation safety protocols mitigate their impact.
71. While such incidents can understandably raise concerns, their applicability to this context is negligible due to differences in regulatory oversight and operational environment.
72. In summary, isolated incidents do not justify refusal of a properly assessed wind farm.

Additional Considerations

73. Previous windfarm applications have been objected to, with similar objections, and the decisions taken at these applications should be considered for context.
74. A previous decision for the Shelloch Windfarm (20/00840/FUL), following an independent study, found in favour of the developer over the raised aviation concerns.

Conclusion

75. The proposed development, Drummarnock Wind Farm, has been comprehensively assessed in relation to its potential impacts on general aviation operations at Cumbernauld Airport. While the concerns raised—specifically regarding wake turbulence, emergency landing options, and physical obstruction risks—are understandable, the analysis demonstrates that they do not present an unacceptable hazard when assessed against current evidence, regulatory guidance, and operational best practice.
76. Wake turbulence, while a valid aerodynamic phenomenon, dissipates within predictable bounds that have been conservatively accounted for in the site design. Aircraft most susceptible to such effects—microlights and light GA aircraft—operate with performance limitations that naturally preclude flight during the high-wind conditions under which turbine wakes are most pronounced. Further, pilots are trained to anticipate and mitigate such disturbances through route planning, in-flight navigation, and adherence to published safety protocols.
77. Concerns regarding airspace congestion and flight corridor restriction are not substantiated when viewed through the lens of UK Class G and Class D airspace operations. There is no evidence that the proposed turbine layout would infringe upon existing controlled or uncontrolled airspace volumes, nor would it compromise emergency procedures or access to instrument flight paths.
78. Emergency landing zones, though an important safety consideration, are already constrained in the terrain surrounding Cumbernauld. The addition of further turbines does not fundamentally alter this risk profile, particularly for pilots adhering to the CAA's Skyway Code and standard pre-flight planning practices. Similarly, structural hazard risks posed by turbines are addressed through rigorous regulatory oversight, visibility marking, and navigational charting, as mandated by CAP 764 and CAP 168.
79. Finally, historical incident comparisons lack direct relevance to the proposed development. The UK's regulatory framework and proven operational experience with wind farms nationwide provide a strong foundation for concluding that aviation and renewable energy infrastructure can coexist safely.
80. Airspace is considered a sovereign asset, with the UK Government highlighting its significance to both the aviation and energy sectors. It is not reserved exclusively for aviation; the renewable energy industry also has a stake in this shared resource.
81. In conclusion, there is no compelling aviation safety justification to refuse planning consent for the proposed development, Drummarnock Wind Farm. The proposal is compliant with CAA policy,

consistent with national energy strategy, and reflects a balanced, evidence-based approach to aviation safeguarding.

References

W. S. Starreveld, Captain (2023). Safety impact of wind turbines in the vicinity of aerodromes and air routes, Revision 1.5/Final.

CAP 764 – CAA Policy and Guidelines on Wind Turbines, Issue 6, UK Civil Aviation Authority (2022), 01 February 2016.

CAP482 – British civil Airworthiness requirements, Section S – Microlight and Small Light Aeroplanes, Issue 8, UK Civil Aviation Authority, 15 May 2023.

R.J.J. Bakker, & P.J. van der Geest (2019). Determining a safe-distance guideline for helicopters near a wind turbine and wind park. National Aerospace Centre, report number: NLR-TP-2019-083.

P.J. van der Geest (2016). Wind Turbines near Airports, Problems and solutions for wind turbines siting in the vicinity of airports.

EUROCONTROL Guidelines: Impact of wind turbines on aviation surveillance and aerodrome operations, 09 Septermber 2014, Version 1.2.

Emeis, S., et al. (2011). Wind turbine wakes and wake effects in offshore wind farms. Journal of Physics: Conference Series, 555.

Barthelmie, R. J., et al. (2009). Modelling and measuring flow and wind turbine wakes in large wind farms. Wind Energy, 12(5), 431–444.

UpWind Project, European Commission Framework Programme 6 (2008).

ICAO Doc 9157, Part 6: Aerodrome Design Manual, 2006, 1st Edition.

Magnusson, M., & Smedman, A.-S. (1994). Influence of atmospheric stability on wind turbine wakes. Wind Engineering, 18(3), 139–152.

Warrior II, Pa-28-161, Pilot's Operating Handbook, FAA Approved Airplane Flight Manual, approved 13 August 1982.

TL-2000 Sting carbon, Flight and Operational Manual, Letiste, published December 2000.