



East Pye Solar
High Level Investigative Report

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EXECUTIVE SUMMARY

Report Purpose

This report investigates the impact to Engine Failure After Take-Off (EFATO) and Glider Launch Failure (GLF), thermal updrafts, and wind shear and turbulence, upon aviation activity associated with Norfolk Gliding Club at Tibenham Airfield.

Assessment Conclusions

EFATO and GLF

The proposed development is 1.59km from the closest runway threshold and will reduce the available landing space by approximately 6.46% within a 60-degree sector (30 degrees either side of the extended runway centreline) out to 2,000m. Therefore, the proposed development is not predicted to significantly reduce the available space for EFATO and GLF, based on best practice.

Thermal Updrafts

Considering the weak nature of thermals as a result of solar panels, and the expected vertical separation between pilots during circuits and the height of solar panels, the proposed development is not judged to cause a significant impact as a result of thermal updrafts.

Turbulence and Wind Shear

Considering the vertical separation distance between the proposed development and the closest circuit performed at Tibenham Airfield, no significant turbulence and wind shear impacts are predicted.



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ABOUT PAGER POWER

Pager Power is a specialist technical consultancy based in the United Kingdom and has been providing independent expertise on planning issues for solar, wind, and building developments for over 20 years.

Established in 1997, the company initially specialised in assessing the impact of wind turbines on radar systems. Pager Power has since expanded into a multidisciplinary technical planning consultancy that offers a comprehensive range of services and has supported renewable and building projects in more than 60 countries.

Pager Power's core competencies now include:

- Aviation and Radar
- Daylight, Sunlight and Overshadowing
- Glint and Glare
- Shadow Flicker
- Telecommunications

Using proprietary modelling software, each study is tailored to the individual project, ensuring that results are relevant, defensible, and aligned with current national and international standards. The company also provides planning support and stakeholder consultation across all service areas, helping clients to understand constraints, explore potential mitigation options, and forge a path forward for their projects.

Pager Power's work helps clients identify potential risks, inform project design, and support the decision-making process. The company can provide support at any stage of a project, from initial feasibility through to completion. Pager Power's assessments – recognised for their objectivity, accuracy, and technical integrity – are designed to withstand legal scrutiny and are trusted by developers and stakeholders alike.



1 PROPOSED DEVELOPMENT AND AERODROME DETAILS

1.1 Proposed Development

The proposed development proposes solar panels and a battery energy storage system (BESS) as part of Site 1 relative to Tibenham Airfield.

Figure 1 below shows the proposed development relative to Tibenham Airfield. The closest panels (Site 1A and 1B) measure 1.59km from the closest runway threshold.



Figure 1 Proposed development relative to Tibenham Airfield

1.2 Tibenham Airfield Details

Tibenham Airfield is an unlicensed aerodrome primarily operated by Norfolk Gliding Club, facilitating both powered aircraft and gliders via three asphalt runways: 03/21, 08/26 and 15/33.

It is understood that the grass strips adjacent to the asphalt runways are also utilised. In order to quantify the impacts, the assessment has considered the main asphalt runways, which are considered representative of the grass strips used, due to the vicinity of these strips to the main runways. The overall conclusions are therefore considered representative of both the asphalt runways and the grass strips, and no separate assessment of the grass strips is required.

2 GUIDANCE AND METHODOLOGY

2.1 Overview

There is no known guidance in the United Kingdom or internationally pertaining to the EFATO and GLF effects of solar developments upon aviation operations. The Combined Aerodrome Safeguarding Team (CAST), supported by the Civil Aviation Authority (CAA), have published Advice Note 5 that outlines safeguarding considerations for solar developments but does not provide specific details or prescribe a specific methodology.

There is no known guidance in the United Kingdom or internationally pertaining to the turbulence effects of solar developments on aviation operations. The United Kingdom's (UK) CAA Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines has been considered for reference (and its technical merit) within this assessment.

Pager Power's industry experience has shown that turbulence effects can extend downstream of a development between 10-20 times the height of the building/development. This is further reinforced by the recommended 8-12 rotor diameter distance (for wind turbines) defined by the CAA CAP 764. This distance represents a highly conservative case as wind turbines are significantly larger than solar panels and buildings; in addition to also having moving components.

CAP 738 Safeguarding of Aerodromes outlines that the responsibility for all safeguarding activities at these aerodromes' rests with the aerodrome operator. Whilst CAP 738 is primarily applicable for licensed aerodromes, it is considered informative (of assistance) for unlicensed aerodromes, such as Tibenham Airfield.

The key points from the referenced guidance documents are presented in Appendix A.



3 ENGINE FAILURE AFTER TAKE OFF AND GLIDER LAUNCH FAILURE

3.1 Overview

3.1.1 Engine Failure After Take-Off

Engine Failure After Take-Off (EFATO) is defined within the CAST Advice Note 5 as ‘an aircraft having to conduct a forced landing in an area around the aerodrome, often off the end of a runway and often not within the aerodrome’s land ownership’.

The following points from the CAST Advice Note 5 (presented in Appendix A) are considered:

- It is recommended that a pilot does not conduct a turn greater than 45 degrees straight ahead²;
- There is no defined safeguarding area for an EFATO, however, considering the above, an area extending 45 degrees either side of the extended runway centreline can be established.

The following points from *The Private Pilot’s Licence Course*² are considered:

- Select a landing area within about 45° either side of straight ahead;
- Experiments have shown that up to 1,400ft of height may be needed to complete the turn back to the runway.

3.1.2 Glider Launch Failure

Glider Launch Failure (GLF) can be considered as a failure of the launch from the point after the wheels leave the ground until the aircraft reaches a height³ of 300ft above the ground.

3.2 Assessment

The proposed development is located east of the aerodrome and is therefore most relevant to EFATO and GLF from runway 08 (i.e. threshold 26). Areas available following EFATO and GLF from runways 03/21 and 15/33 remain as per the baseline and are not judged to be impacted by the proposed development.

Figure 2 on the following page shows the proposed development relative to possible areas considered following EFATO and GLF out to 2,000m from the threshold. The sectors consider:

- A 90-degree sector (45 degrees either side of the extended runway centreline) in accordance with the most relevant guidance;
- A 60-degree sector (30 degrees either side of the extended runway centreline) following consultation undertaken with Norfolk Gliding Club.

² AFE – The Private Pilot’s Licence Course, [REDACTED] – Flying Training

³ This figure is based on a literature review of *The Glider Pilot’s Manual* 4th Edition by Ken Stewart



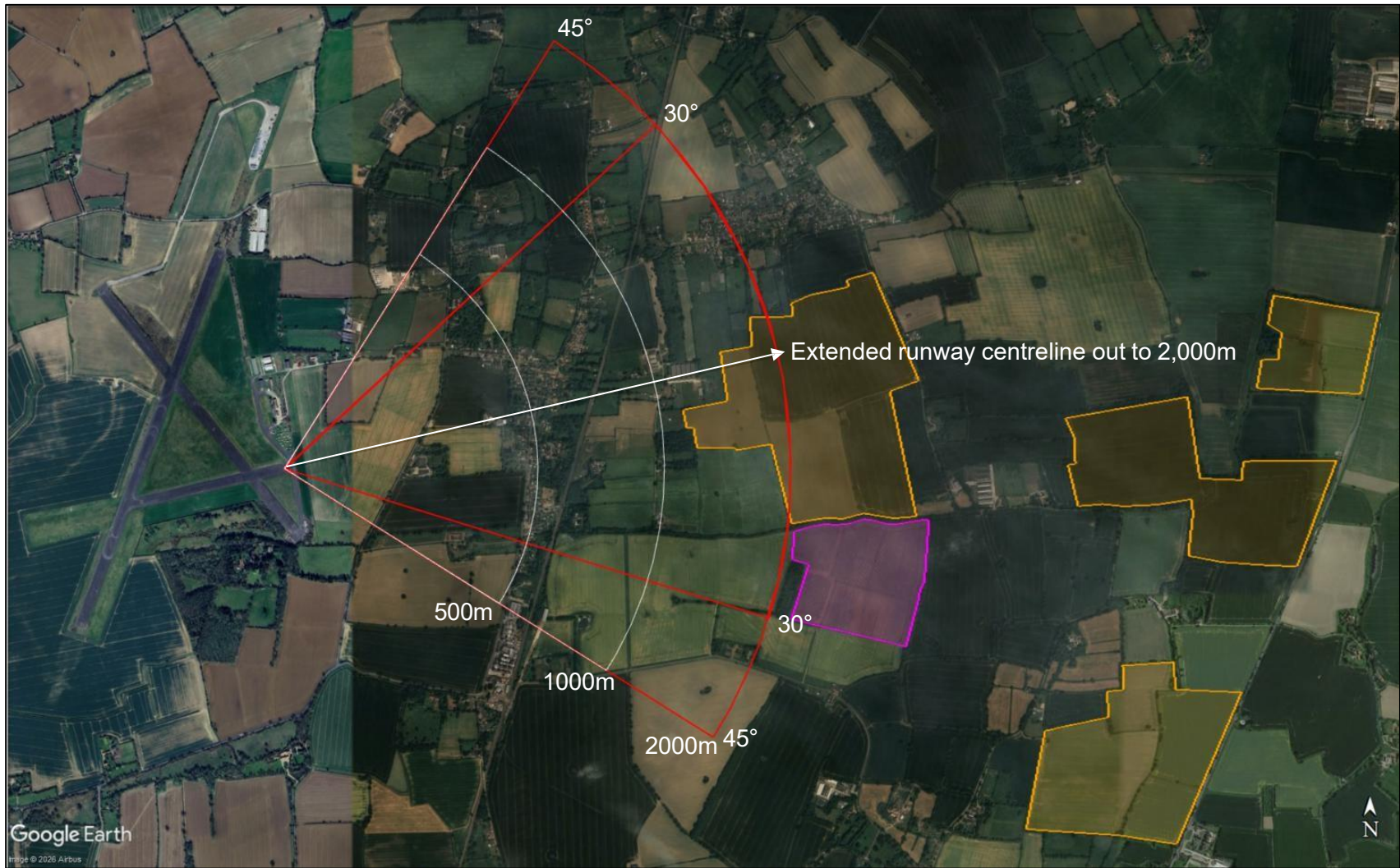


Figure 2 EFATO and GLF sectors



For comparative purposes, the existing baseline conditions for areas not suitable for an emergency landing are considered⁴. Figures 3 and 4 below identify these areas in blue for each of the 60-degree and 90-degree sectors.



Figure 3 *Baseline 60-degree sector*



Figure 4 *Baseline 90-degree sector*

⁴ The most significant areas i.e. areas of dense population, dwellings and non-residential buildings have been considered

Table 1 below summarises the percentage of land occupied by the proposed development relative to each sector.

Sector	Baseline Percentage of Land Occupied (%)	Percentage of Land Occupied by Proposed Development (%)	Remaining Percentage of Land Suitable for Emergency Landing (%)
60-degree (30 degrees either side of the extended runway centreline)	15.90	6.46	77.64
90-degree (45 degrees either side of the extended runway centreline)	12.38	4.30	83.32

Table 1 Percentage of land occupied by proposed development

It is considered that a pilot will be at a significant altitude in order to achieve a lateral distance of 2,000m following EFATO from threshold 26, and therefore able to continue to glide forwards and land straight ahead; which is considered best practice. The areas in this forward direction remain as per the baseline. The proposed development occupies a 484m-lateral area after 2,000m. Considering a worst-case height⁵ of 300ft (94m) at this 2,000m point, a pilot would need to achieve a glide ratio⁶ of at least 5.29:1 to clear this 484m-lateral area, which is within the capability of typical aircraft.

3.3 Conclusion

The proposed development will occupy less than 10% of the land within the recommended and advised sectors following EFATO and GLF, out to 2,000m from threshold 26. The proposed development also occupies less land than compared to the existing baseline conditions.

In accordance with CAP 738, the introduction of new obstacles, such as the proposed development, should be considered in the event of emergency scenarios and as part of recommended good practices (i.e. pre-flight planning). However, the safeguarding of any aerodrome is not based on elimination of all potential risks and hazards. General Aviation (GA) aerodromes, such as Tibenham Airfield, regularly operate in environments where traffic, obstacles in the form of vegetation and buildings, and sometimes restricted airspace exist within the vicinity of the extended runway centreline.

⁵ This figure is based on guidance outlined by EASA document 'Easy Access Rules for Air Operations', where 'It is accepted that performance accountability for engine failure need not be considered until a height of 300 ft is reached'

⁶ Ratio of the horizontal distance achieved to the vertical height lost (i.e. horizontal distance ÷ vertical drop)



GA aerodromes and solar developments are seen to coexist safely; some at closer distances than the proposed development to Tibenham Airfield. Figures 3 and 4 on the following page show GA aerodromes relative to existing solar developments outlined in red.

No significant risk is predicted upon EFATO and GLF when following best practices.

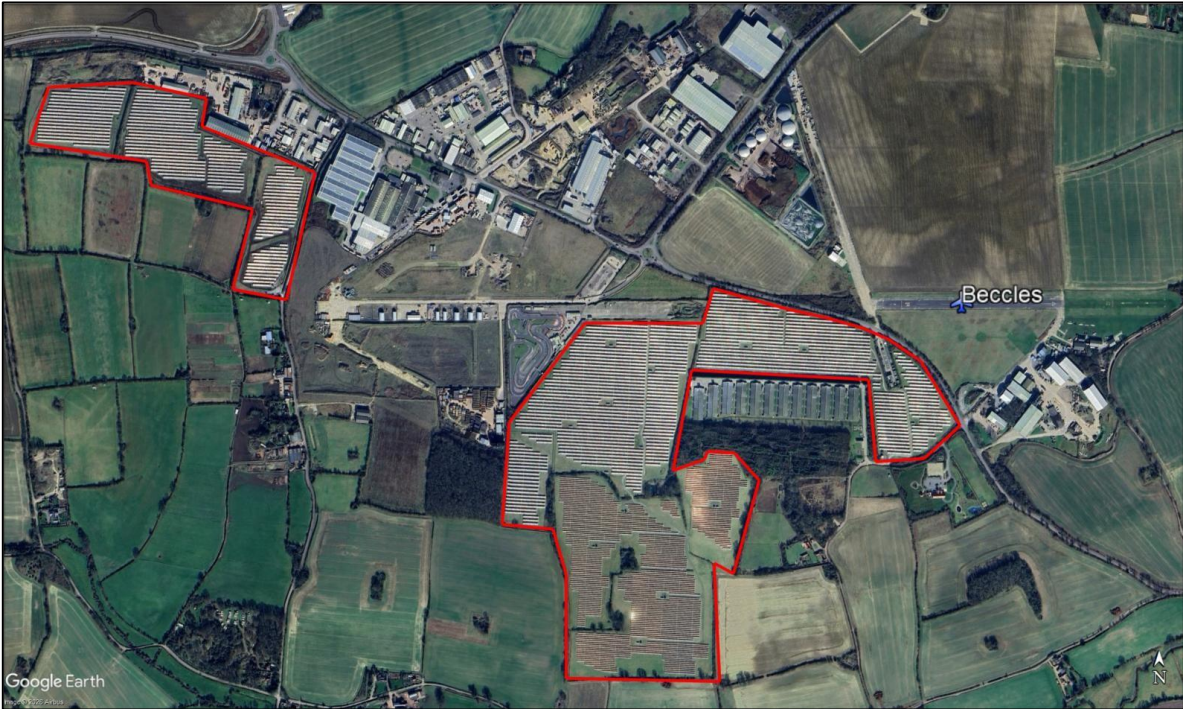


Figure 5 Beccles Aerodrome relative to existing surroundings



Figure 6 Turweston Aerodrome relative to existing surroundings



4 THERMAL UPDRAFTS

4.1 Overview

During operation, especially within direct sunlight, the surface of solar panels can reach higher temperatures than their surroundings. Solar panels are designed to absorb as much energy from the sun (i.e. sunlight) as possible; however, some energy is wasted in the form of heat. This causes the surface of the panels to warm up. The heated surface then transfers this heat to the air immediately above it, causing it to increase in temperature. Warm air is less dense than the surrounding cooler air, so it rises. The upward/rising movement of warm air is what is referred to as thermal updraft/thermals.

Thermals are used by gliders to gain and maintain altitude during flight. In order to do so, gliders manoeuvre into the core of a rising thermal, referred to as centring.

4.2 Assessment

Thermals from solar panels are generally weaker than natural sources relied upon, such as changes in terrain (i.e. hills), warm ground and buildings, and limited to the immediate vicinity of the solar panels (i.e. localised). Glider pilots rely on strong, sustained thermals created by larger land features such as open fields, hills, or other expansive heat sources to gain altitude and extend their flights. In comparison to solar panels which produce relatively uniform heat over a localised area, the resulting thermals lack the strength to significantly impact a glider's activity. Solar panels are designed to absorb light from the sun and typically operate most efficiently at a temperature of approximately 25°C. The panels are therefore designed to remain cool in direct sunlight, and it is not anticipated that panels would reach temperatures significantly greater than the surrounding ground.

The configuration of solar panels will be in uniform arrays and have a consistent surface temperature during operation, the resulting updrafts are weaker due to the more uniform arrangement of panels compared to natural thermals, generated by uneven heating of the Earth's surface due to varied terrain or land cover. The resulting thermals from natural sources are much stronger and larger updrafts that are more noticeable and useful for activities like glider flight.

Gliding through a thermal without using it (i.e. centring) has minimal impact on a glider's flight performance. As the glider enters a thermal, the rising air can momentarily increase its wing tip attitude, causing the glider to tip the glider away from the thermal. These effects are momentarily experienced and not significant if not utilised by centring.

The proposed development occupies land that will be directly below powered-aircraft pilots and glider pilots during the downwind and base leg sections of the circuits when attempting to land at runways 03 and 33. Figure 5 on the following page shows these sections of the circuits relative to the proposed development. **The figure is used for illustration purposes only, serving as a visual aid to indicate and visualise the sections being discussed. It is NOT to be taken as exact or made to scale.**



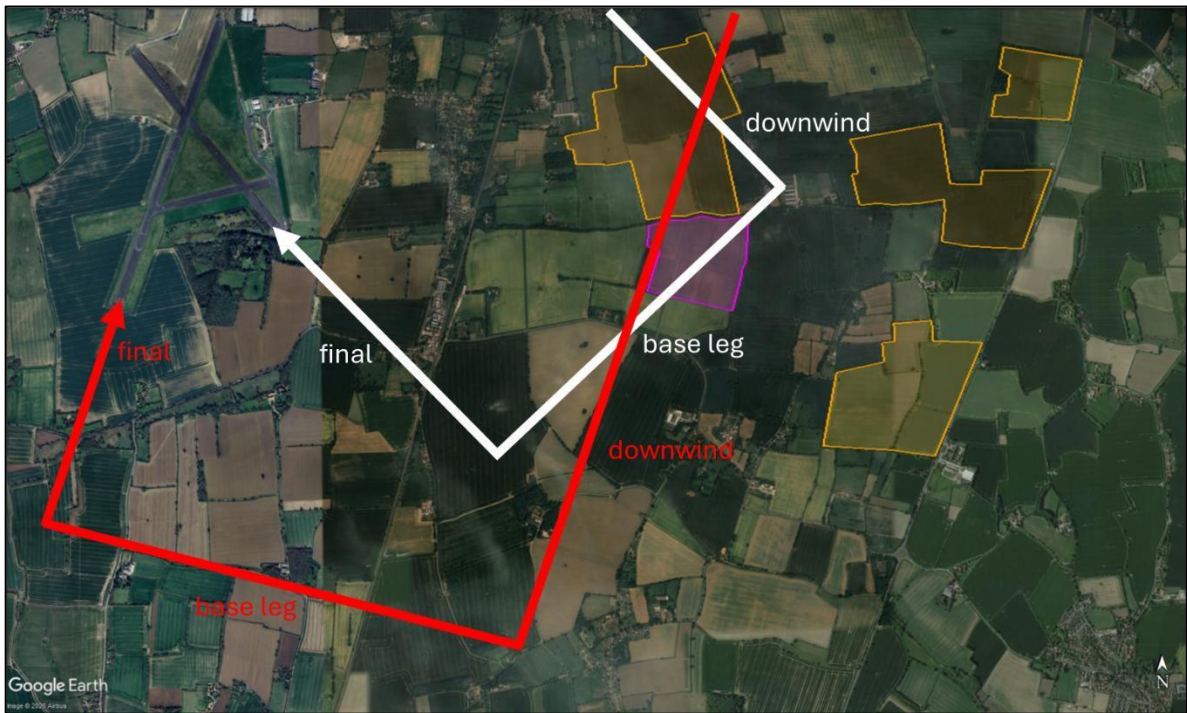


Figure 7 Circuit sections relative to proposed development

The height of powered aircraft pilots and glider pilots is understood to depend on various factors. For the purposes of quantifying the impact, the assessment considered the minimum target height for both pilots. The following points are taken from Norfolk Gliding Club’s circuit dimensions (presented in Appendix B):

- Powered aircraft pilots intend to make the downwind/base turn in the range of 500ft to 800ft above ground level (agl);
- The target height for gliders is to start the downwind leg at about 800ft agl and complete the diagonal to base turn at about 600ft agl;
- The target height for the final turn is around 400ft.

Solar panels will have a maximum⁷ height of 4.5m agl; relative to locations where pilots will be at least 500ft/150m agl. Any thermal as a result of the proposed development is considered to be negligible, as warmer air will stop rising when it cools to the same temperature as the surrounding air.

4.3 Conclusions

Considering the weak nature of thermals as a result of solar panels, and the expected vertical separation between pilots during circuits and the height of solar panels, the proposed development is not judged to cause a significant impact as a result of thermal updrafts.

⁷ Maximum height of single-axis tracker panels



5 TURBULENCE AND WIND SHEAR

5.1 Overview

Obstructions can cause disruption to the air by introducing an obstacle for the air travel over. The disruption causes changes to the speed and direction of the air over a short distance. The result of the irregular movement is considered turbulence, and the change in wind speed and direction across a short distance is referred to as wind shear.

An obstruction to the air will introduce a source of turbulence and wind shear, which can disrupt the stability of a flight.

5.2 Assessment

There is no known guidance or cases pertaining to the impact of solar panels causing turbulence or wind shear. When considering the impact of turbulence and wind shear due to an obstacle, CAA CAP 764 suggests ‘a distance of 8-12 rotor diameters downstream of the wind turbine is a distance at which the turbulence effects are not expected to affect conventional aircraft flying’. Pager Power’s industry experience has shown that turbulence effects can extend downstream of a development between 10-20 times the height of the building/development.

Figure 6 below shows a 90m-buffer (20 times the maximum 4.5m height of tracking solar panels) for the closest solar panels to Tibenham Airfield. This considers a worst-case assessment, as tracking panels will be at maximum height and tilt angle for a very small amount of time.



Figure 8 Wind shear and turbulence buffer for proposed development

The buffer measures 1.5km from threshold 26. At most, pilots during the final approach of powered aircraft attempting to land at runway 26 are expected to be at most 1.5km from the threshold and 400ft/121m agl. Considering the estimated vertical separation distance (greater than 100m) between a pilot and the proposed development, any turbulence and wind shear effects due to the proposed development are considered to be negligible at this height.

Wake turbulence occurs when vortices of air form at the wingtip of an aircraft as it flies. The vortices are caused by differences in pressure above and below the wing, which causes lift. Solar panels, including panels implementing a single-axis tracker do not move constantly, and have smooth surfaces that generate very little aerodynamic disruption. Unlike large and constantly moving objects, such as wind turbines, they do not create significant vortices or wake turbulence.

5.3 Conclusions

Considering the vertical separation distance between the proposed development and the closest circuit performed at Tibenham Airfield, no significant turbulence and wind shear impacts are predicted.



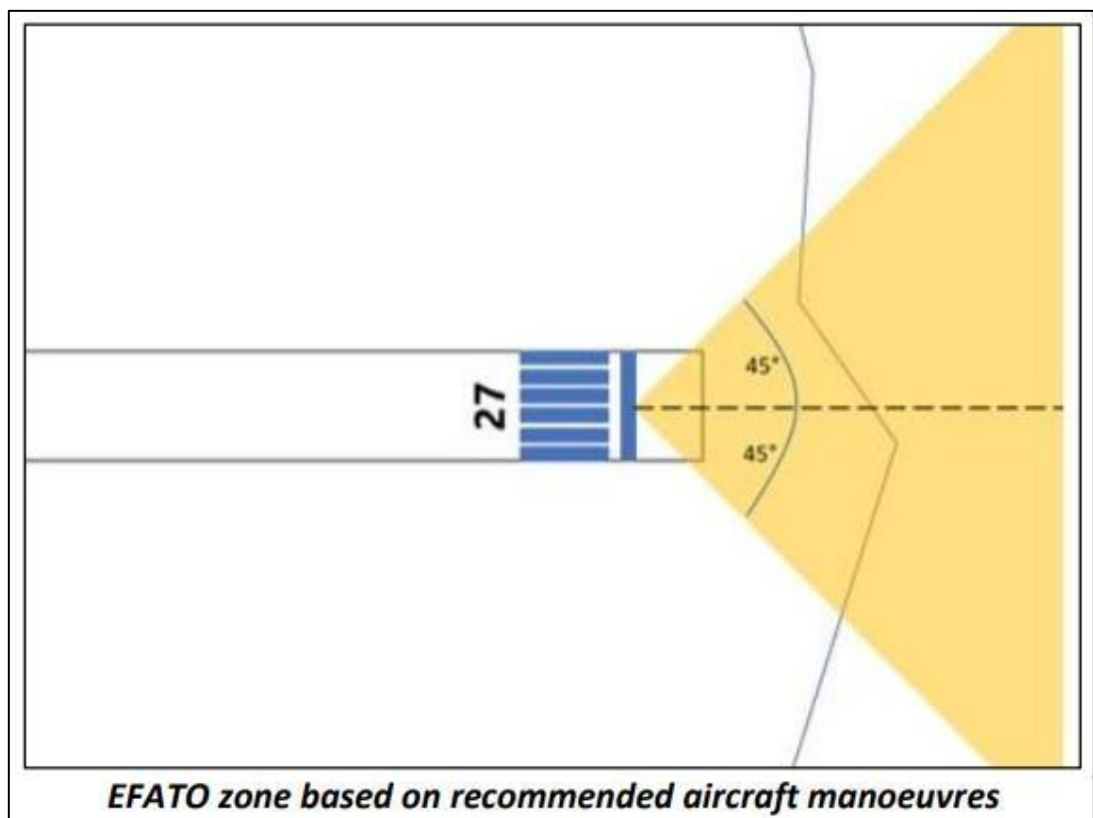
APPENDIX A – GUIDANCE DOCUMENTS

CAST Advice Note 5: Renewable Energy Developments

2.2.2 Engine Failure after Take-Off (EFATO)

An engine failure after take-off (EFATO) may result in an aircraft having to conduct a forced landing in an area around the aerodrome, often off the end of a runway and often not within the aerodrome's land ownership. Following an EFATO, it is recommended that a pilot does not conduct a turn greater than 45 degrees straight ahead to ensure airspeed and height are maintained as much as possible to facilitate a safe forced landing.

There is no defined safeguarding area for an EFATO, however, considering the above, an area extending 45 degrees either side of the extended runway centreline can be established, and this is shown below. There is no given distance for this area and the image is not to scale.



CAA CAP 764: Policy and Guidelines on Wind Turbines

The guidance as outlined within the CAA CAP 764 guidance, Seventh Edition, published in December 2025.

2.55 *Turbulence is caused by the wake of the turbine which extends down-wind behind the blades and the tower, from a near to a far field. The dissipation of the wake and the reduction of its intensity depend on the convection, the turbulence diffusion, the topography (obstacles, terrain etc.) and the atmospheric conditions.*

2.56 *There is evidence of considerable research activity on modelling and studying the wake characteristics within wind developments, using computational fluid dynamics techniques, wind tunnel tests and on site LIDAR measurements. A literature survey was recently conducted by the University of Liverpool and CAA¹¹ to establish the scale and the advances of current research on this front.*

2.57 *It is recognised that aircraft wake vortices can be hazardous to other aircraft, and that wind turbines produce wakes of similar, but not identical, characteristics to aircraft. Although there are independent bodies of knowledge for both of the above, currently, there is little no known method of linking the two. Published research suggests a distance of 8-12 rotor diameters downstream of the wind turbine is a distance at which the turbulence effects are not expected to affect conventional aircraft flying^{12 13}. Measurement work has been focused on the near wake due to technical challenges of the experimental set up, while modelling studies are capable of examining the wake turbulence further downstream^{14 15}.*

2.58 *There were no occurrence reports or aircraft accident reports related to wind turbines in the UK between 2000 and early 2022¹⁶. A light aircraft crash occurred in March 2022, which the pilot suggested might have been “associated with wake turbulence downstream of a wind turbine installation.” The Air Accidents Investigation Branch¹⁷ noted that “the available literature would suggest that the possibility of encountering wake turbulence from the windfarm at this airfield is remote. However, it cannot be entirely ruled out.” The CAA has also received anecdotal reports of aircraft encounters with wind turbine wakes. The effects of these wakes on a wide variety of aircraft types are not yet known.*

2.59 *The CAA investigated the effects of small wind turbine wakes on GA aircraft¹⁸. The results of this study show that wind turbines of rotor diameter (RD) of less than 30m should be treated like an obstacle and GA aircraft should maintain a 500ft clearance.*

2.60 *Pilots of any air vehicle who believe that they have encountered significant turbulence, which they believe to have been caused by a wind turbine, should consider the need to report this through the existing MOR scheme.*

2.61 *Until the result of further research is known, analysis of turbulence can only be undertaken on a case-by-case basis, taking into account the proximity of the development and the type of aviation activity conducted. Whilst being a consideration*



for all aircraft (particularly in critical stages of flight), turbulence is of particular concern to those involved in very light sport aviation such as gliding, parachuting, hang-gliding, paragliding or microlight operations as in certain circumstances turbulence could potentially cause loss of control that is impossible to recover from.

References

11. <http://www.liv.ac.uk/flight-science/cfd/wake-encounter-aircraft/>
12. *Wind Turbine Wake Analysis*, L.J. Vermeer, J.N. Sorenson, A Crespo, *Progress in Aerospace Sciences*, 39 (2003) 467-510.
13. *NLR Technical Publication 2019-083 Determining a safe-distance guideline for helicopters near a wind turbine and wind park*, February 2019
14. *Calculating the flow field in the wake of wind turbines*, J.F. Ainslie, *Journal of Wind Engineering and Industrial Aerodynamics*, 27 (1988) 213-224.
15. *Turbulence characteristics in wind-turbine wakes*, A Crespo and J Hernandez, *Journal of Wind Engineering and Industrial Aerodynamics* 61 (1996) 71-85.
16. *This is based on a search of the ECCAIRS database containing occurrence reports made under Regulation 376/2014 between 1 January 2000 and 28 February 2022*
17. https://assets.publishing.service.gov.uk/media/620bb596e90e0710aa4b69f3/Piper_PA-22-150_G-ARDS_03-22.pdf
18. <https://www.liverpool.ac.uk/flight-science/cfd/wake-encounter-aircraft/>



APPENDIX B – TIBENHAM AIRFIELD CIRCUIT DIMENSIONS

The following extract is taken from 'Circuit Dimensions – 250526' shared via Norfolk Gliding Club. This information had been confirmed applicable for the East Pye proposed development on 5th January 2026 at a meeting held onsite at Tibenham Airfield.

'Glide slopes and descent gradients

Tibenham is primarily a gliding airfield with winch cables up to 3,000ft above ground level (agl) and because of this, does not allow for what is in powered aircraft terms called an 'overhead join'. In this type of situation the pilot would fly over the runway in use and descend to circuit height.

At a gliding site this cannot be allowed because of danger presented by the winch cables and pilots are told to join the circuit on the downwind leg

Downwind leg – power

Whilst intending to make the downwind/base turn in the range of 500ft to 800ft agl, at the point of joining downwind many pilots are still descending

Downwind leg – gliders

The target height for gliders is to start the downwind leg at about 800ft agl and complete the diagonal to base turn at about 600ft agl.

However as described earlier there are many factors that affect the rate of descent and some (thermals) that cause the glider to climb

Base leg - both

The target height for the final turn is around 400ft agl but the distance of that turn from the threshold can vary according to a number of factors which in turn affects the descent gradients'





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