

National Airports Safeguarding Framework Guideline B Review

Background

In 2010 the National Airports Safeguarding Advisory Group (NASAG) was formed and tasked with preparing a National Airports Safeguarding Framework (NASF).

The NASF was agreed by Governments in 2012. It is a national land use planning framework that aims to:

- improve community amenity by minimising aircraft noise-sensitive developments near airports; and
- improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions through guidelines being adopted by jurisdictions on various safety-related issues.

The NASF has implications for anyone working in town planning, residential or commercial development, building construction or related industries. It consists of a set of guiding principles with seven guidelines, including one on managing the risk of building-generated windshear and turbulence at airports (Guideline B).

High levels of crosswind (including turbulence) during landing and take-off may create safety risks for aviation operations. Buildings that are situated close to airport runways have the potential to generate or increase wind turbulence or windshear. Studies indicate that the significance of building-generated wind effects may be dependent on the height, breadth and length of buildings as well as building design and location relative to the runway. There have been reports of aircraft encountering building-generated turbulence and windshear on their final approach to landing or during their take-off roll at several aerodromes around the world including in Australia.

In 2016 NASAG identified the need to review and update NASF Guideline B - *Managing the Risk of Building Generated Windshear and Turbulence at Airports*. The original Guideline B was developed in 2011 and NASAG came to understand that it may not have provided adequate guidance on assessing or mitigating the effects of building generated turbulence, nor on differentiating between the effects of cross-runway and along-runway windshear.

The subject matter is extremely complex, thereby making it relatively technical in nature. While there are simple checks that can be applied, there may be a need to obtain specialist wind engineering expertise.

Scope of the Review

The Department of Infrastructure and Regional Development contracted a specialist wind engineering consultant to review Guideline B and produce a report that would inform a potential update of Guideline B by NASAG.

The Department advised the successful consultant should:

- review existing guidance material and world's best practice research and approaches to windshear and turbulence (such as the National Aerospace Laboratory of the Netherlands report NLR-TP-2010-312 *Wind criteria due to obstacles at and around airports*);
- review recent experiences with the application of Guideline B at Australian airports; and
- recommend a methodology to establish and/or update the criteria used in Guideline B to assess the potential for both building-generated windshear and turbulence to affect the safety of operations at airports (including the assessment zone/envelope).

The aim of the review was to ensure that NASF Guideline B reflects current world's best practice and available science, and encourages the use of existing assessment technologies and methodologies.

The aim was not to re-define world's best practice. Conducting in-depth research or producing significant new assessment methodologies was outside of the scope of this review.

Process and Consultation

- Consultant's review report – completed July 2016.
- Consultant's report circulated to CASA, AAA, AIPA, AusALPA and NASAG for comments.¹
- Peer review of consultant's report – completed September 2016.
- Peer review report circulated to CASA, AAA, AIPA, AusALPA and NASAG for comments.
- Targeted industry consultation on first draft of the updated Guideline B – completed March 2017.
- Further drafting in consultation with CASA.
- NASAG consideration of draft updated Guideline and agreement to public consultation – August 2017.
- Public consultation on the draft updated Guideline B – October 2017.
- Transport and Infrastructure Senior Officials' Committee (TISOC) agreement to provide the draft updated Guideline to the Transport Infrastructure Council (TIC) for endorsement – March 2018
- TIC endorsement of the updated Guideline – May 2018

What has Changed?

Additional windshear and turbulence criteria

The updated Guideline B contains additional turbulence and windshear criteria. The two new criteria are:

- the "6-knot crosswind criterion" – i.e. the variation in mean wind speed due to wind disturbing structures must remain below 6 knots across the aircraft trajectory at heights below 200ft. The speed deficit change of 6 knots must take place over a distance of at least 100m.
- the "4-knot turbulence criterion" – i.e. the standard deviation of wind speed must remain below 4 knots at heights below 200ft.

The inclusion of these two new criteria was the driving reason behind the review of Guideline B, due to a perception by some industry participants that the Australian approach was lagging behind the approach adopted by some other countries.

At the same time, the Department took the opportunity to undertake a comprehensive update of the Guideline and address a number of other issues, outlined below.

Layout

The updated Guideline is more targeted towards the decision makers who assess and approve building proposals, Development Applications, etc. The Department received feedback that the previous Guideline was too technical to interpret and required a simplification, including a set of simple steps for assessing windshear/turbulence and a checklist or decision tree for applying these steps.

The updated Guideline contains background information (purpose, how it should be used, roles and responsibilities, etc.) presented in simple terms, followed by an explanation of the criteria used and lastly, five steps that can be applied to check whether a development is safe for wind effects.

The more technical information, mitigation options and information for wind specialists conducting quantitative assessments, has been moved into the Attachment.

Terminology

The Guideline has been updated to refer to *penetrating the 1:35 surface*, rather than *failing the 1:35 rule*. This brings the Guideline into line with other aviation terminology around obstacle limitation surfaces etc.

The critical area around runway ends, within which buildings must be assessed, previously known as the *zone of influence*, is now called the *assessment trigger area*.

¹ CASA (Civil Aviation Safety Authority), AAA (Australian Airports Association), AIPA (Australian and International Pilots Association), AusALPA (Australian Airline Pilots' Association)

Roles and Responsibilities

The updated Guideline has an expanded discussion around the roles and responsibilities of key stakeholders, particularly on CASA's role and regulatory powers and on state/territory/local government's role in assessing and approving building proposals and Development Applications.

Providing More Flexibility

The previous Guideline was perceived as being a pass-fail set of criteria and therefore restrictive for airport developments and obliging proponents to engage professional wind specialists to model the proposals.

The updated Guideline provides more flexibility and clarifies that the criteria are not hard-and-fast, pass-fail criteria but rather indicators of risk. The aim of the update was to increase awareness and have building proponents, planners and approvers consider the risk of wind effects.

The updated Guideline allows for a building proponent to provide safety cases and/or mitigations if a building fails the simple tests or the windshear and turbulence criteria. In some cases, a proposed building that fails the criteria may still be acceptable, and specialist testing may be avoided, provided that the proponent has considered and mitigated the risk of any wind effects caused by the building.

These assessment steps are further clarified through the provision of a decision tree flowchart.

Building-induced Wind Deficit (BWD) Simple Assessment

With the addition of the turbulence criterion, the simple BWD assessment can no longer be used on its own as a step in the pre-quantitative-analysis methodology, as it only assesses windshear acceptability.

NASAG notes that a number of stakeholders have supported keeping as many simple checks as possible in the guideline to assist, in particular, smaller airports.

The BWD assessment has been left in the guideline, but with a disclaimer that passing the BWD assessment does not mean that the proponent isn't required to complete a quantitative assessment.

The reasoning is that any form of additional simple tests may encourage smaller aerodromes to give some consideration to building generated wind effects where they may not otherwise have been able to engage a wind specialist to undertake quantitative analysis.

Further work

Consultation has raised the need for further research in a number of areas related to the assessment of building-induced windshear and turbulence (including in the area of quality assurance, a simpler turbulence assessment and further development of the NLR work). NASAG supports the continued review and refinement of the NASF Guidelines.