AVIATION PROJECTS

Rafal Piwonski
Civil Project Technical Lead
Stantec Australia Pty Ltd (Stantec)
By email: rafal.piwonski@stantec.com

October 2023

Our reference: 067301-01

Dear Rafal

Re: Bankstown Airport Project– Preliminary Aviation Impact Assessment

Reference is invited to your request for a Preliminary Aviation Impact Assessment of the proposed project located at 125 Nancy Ellis Leebold Drive, Bankstown NSW.

Please find following an assessment of possible development constraints due to aviation impacts. This analysis is based on the information provided in your email correspondence.

1.1. Project background

Stantec Australia Pty Ltd (Stantec) has been awarded the warehouse project located at 125 Nancy Ellis Leebold Drive. The Project has been identified as being within Bankstown Airport's aviation zone.

Urbis is conducting the planning and coordination of the Project and has engaged Aviation Projects to provide an aviation impact assessment (AIA) to support the development application.

1.2. References

References used or consulted in the preparation of this report included:

- Airservices Australia, Aeronautical Information Package (AIP); including AIP Book, Departure and Approach Procedures and En-Route Supplement Australia, dated 7 September 2023.
- Airservices Australia, Designated Airspace Handbook, effective 15 June 2023.
- Civil Aviation Safety Authority, *Civil Aviation Regulations 1998 (CAR).*
- Civil Aviation Safety Authority, *Civil Aviation Safety Regulations 1998* (CASR).
- CASR Part 139 *Manual of Standards– Aerodromes*, dated August 2020.
- CASR Part 173 Manual of Standards– Standards Applicable to Instrument Flight Procedure Design, version 1.7, dated August 2020.
- National Airports Safeguarding Framework (NASF) Guideline A to I.
- International Civil Aviation Organization (ICAO), *Doc 8168 Procedures for Air Navigation Services—Aircraft Operations (PANS-OPS).*
- ICAO Standards and Recommended Practices, Annex 14—*Aerodromes.*
- Other references as noted.

1.3. Client material

Urbis provided the following material for the purpose of this analysis:

- 37 TP-B-CD-001_AB_Site Levels.pdf
- 41 TP-B-CD-005_AB_Footing Plan.pdf
- 51 TP-B-CD-200_AB_Elevations.pdf
- 53 TP-B-CD-210_AB_Sections.pdf

1.4. National Airports Safeguarding Framework

The National Airports Safeguarding Advisory Group (NASAG) was established by the Commonwealth Department of Infrastructure and Transport to develop a national land use planning framework called the National Airports Safeguarding Framework (NASF). The purpose of the NASF is to enhance the current and future safety, viability, and growth of aviation operations at Australian airports.

The relevant NASF guidelines include:

- NASF Guideline A: Measures for Managing Impacts of Aircraft Noise
- NASF Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports
- NASF Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports
- NASF Guideline F: Managing the Risk of Intrusions into the Protected Operational Airspace of Airports
- NASF Guideline G: Protecting Aviation Facilities – Communication, Navigation and Surveillance (CNS)
- NASF Guideline I: Public Safety Areas (PSAs)

1.5. Passenger transport operations

Scheduled and non-scheduled air transport operations at Bankstown Airport generally operate under the instrument flight rules (IFR) and use the instrument approach and departure procedures published in AIP.

1.6. Private operations

Private operations are generally conducted under day or night VFR, with some IFR.

Aircraft operating within the aerodrome circuit comply with AC 91-10 v1.1 regarding turn direction and minimum altitudes and in accordance with Air Traffic Control instruction during operating hours.

1.7. Bankstown Airport Master Plan (2019)

The Bankstown Airport Master Plan 2019 was approved by the Commonwealth Minister for Infrastructure, Transport and Regional Developments on 7 November 2019.

> *5.0 Aircraft Noise*
>
> *The most effective means for reducing the impact of aircraft noise is through the proper planning of land use for areas adjacent to the Airport. BAL works closely with Canterbury-Bankstown, Liverpool*

and Fairfield Councils in relation to the application of land use planning controls surrounding the Airport. This is further addressed in Chapter 6.0.

Aside from land use planning, other noise mitigation measures include the use of alternative runway

alignments, flight paths, restrictions of aircraft movements and aircraft operational procedures aimed at reducing noise.

Airservices implemented a detailed noise monitoring program around Bankstown Airport in 2013. This program produced an in-depth analysis of aircraft movements, including numbers of aircraft operating, seasonal variations in aircraft movements, time of operations, runway usage and types of aircraft operating at the Airport. Such data, along with the detailed flight path data from the previous Master Plan, have provided a base of information about the spread of approaching and departing aircraft and circuit training around the Airport.

The Airports Act requires this Master Plan to forecast noise levels resulting from the operation of the Airport. The Australian Government has specified the use of a computer-based Integrated Noise Model (INM) which produces Australian Noise Exposure Forecast (ANEF) contours for the prediction of exposure to aircraft noise. ANEF contours assist to determine aircraft noise impacts on surrounding land and communities and assist planning authorities to regulate land use and future development around airports.

The modelling of noise generated by aircraft movements in this Master Plan provides the most accurate estimates of noise exposure to surrounding communities. The forecasts indicate minor changes in the level of noise generated by aircraft activity compared with the 2014 Master Plan.

6.0 Airport Safeguarding and Airspace Protection

The capacity of an airport to operate and respond to growth in the aviation sector is directly impacted by what occurs on and surrounding the airport.

Long-term and effective protection and safeguarding of Bankstown Airport is critical to ensuring ongoing aviation operations and safety. Consideration therefore needs to be given to:

- *Land use planning around the Airport, to minimise development which may be impacted by aircraft noise and operations*
- *Siting, location and design of buildings and structures which may impact windshear and turbulence, affecting aircraft operations*
- *Minimising impacts from ground lighting that may distract or confuse aircraft pilots*
- *Protecting the airspace surrounding the Airport from buildings and structures, which may impinge on the safe arrival and departure of aircraft*
- *Protecting aviation facilities from development encroachment.*
- *Protecting areas at the end of runways, through public safety areas.*

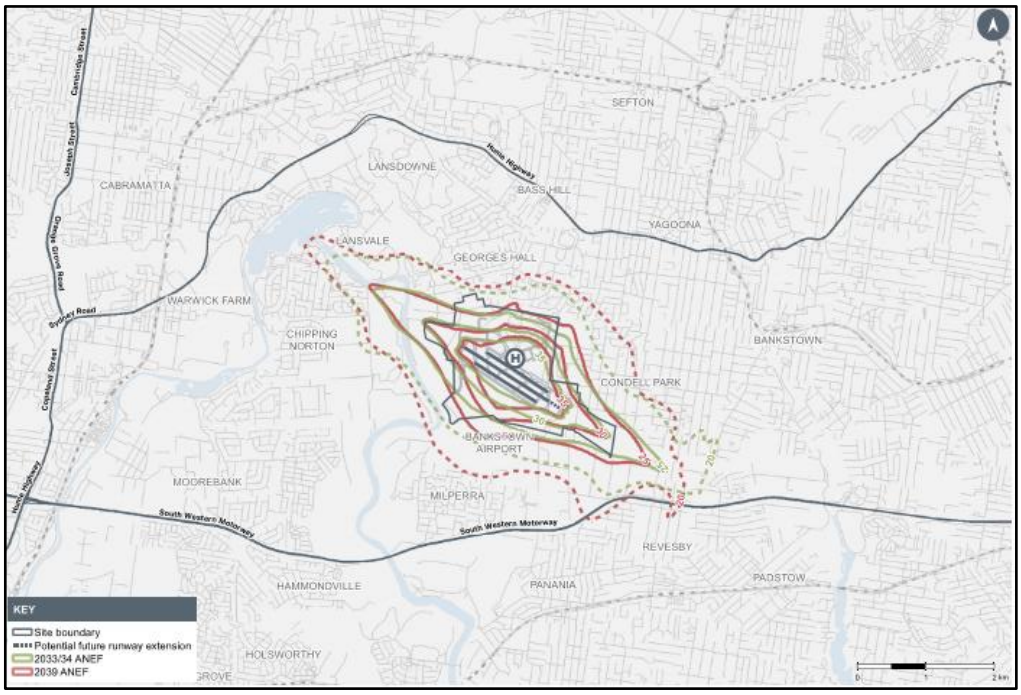


Figure 1 2033/34 and 2039 ANEF

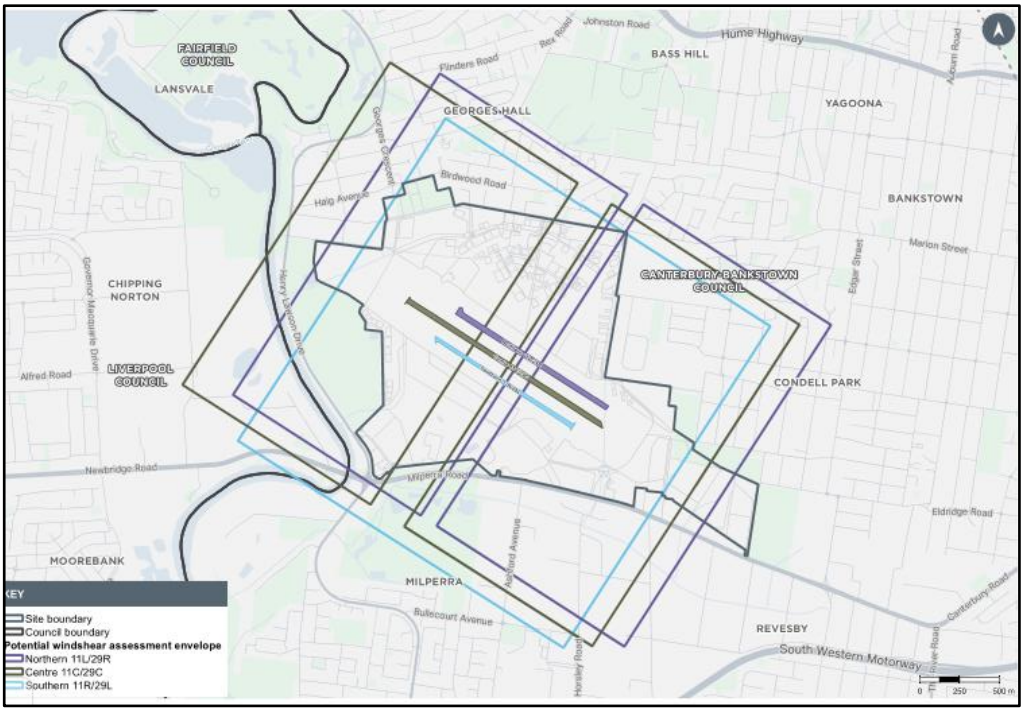


Figure 2 Potential windshear assessment envelopes

Figure 3 Lighting Restriction Zones

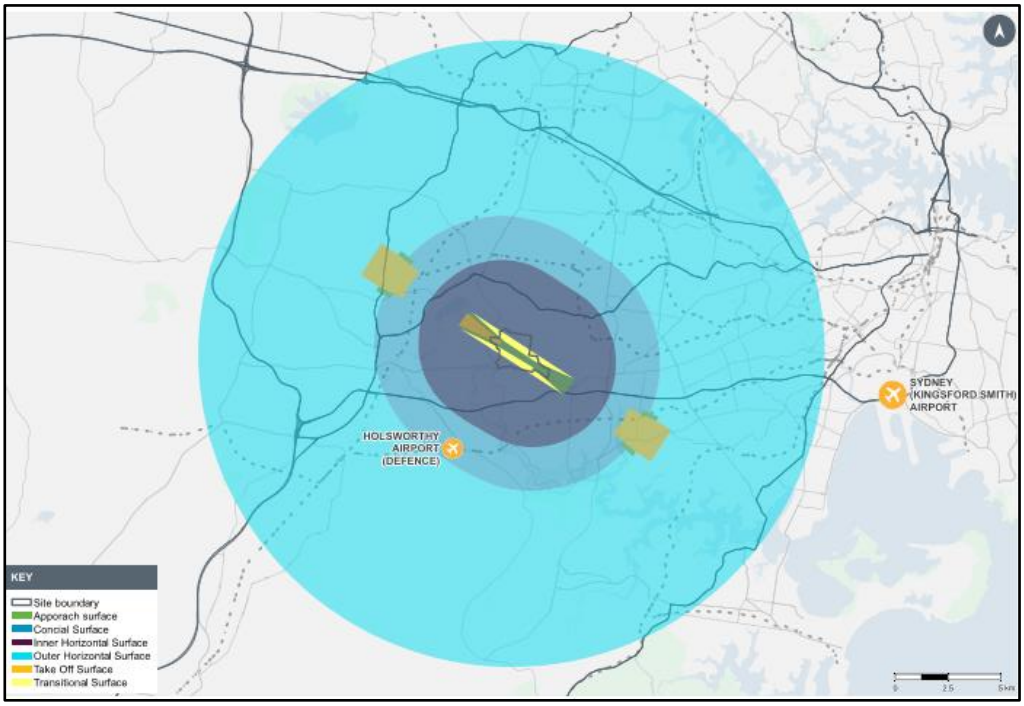


Figure 4 Bankstown Airport OLS

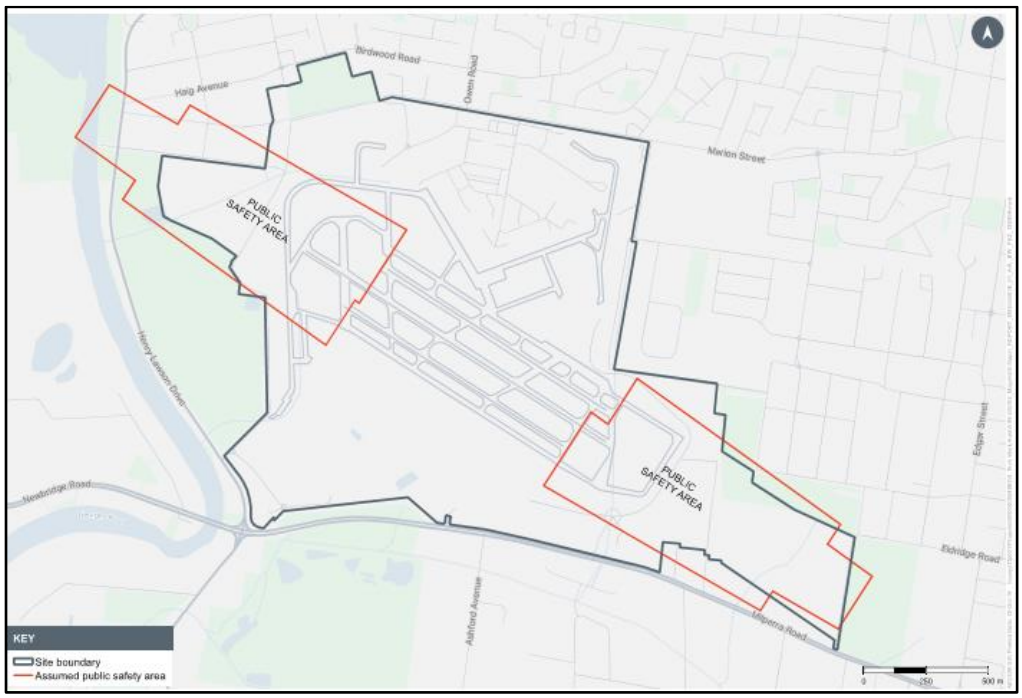


Figure 5 Bankstown Airport Public Safety Area

1.8. Site description

This section focuses on the potential impact of the warehouse to create a hazard to aircraft operations at Bankstown Airport.

The following details for the building are relevant to the assessment herein:

- Building height is 23.15 m AHD (79.95 ft AMSL)
- Assume a 2 m exhausting fan above the roof
- Total height of building: 25.15 m AHD (82.5 ft AMSL)
- The lower side of the new awning is 16.44 m AHD (53.94 ft AMSL), and the higher side of the new awning is 17.29 m AHD (56.7 ft AMSL)

Figure 6 and Figure 7 show the elevation information of the project development (source: Urbis)

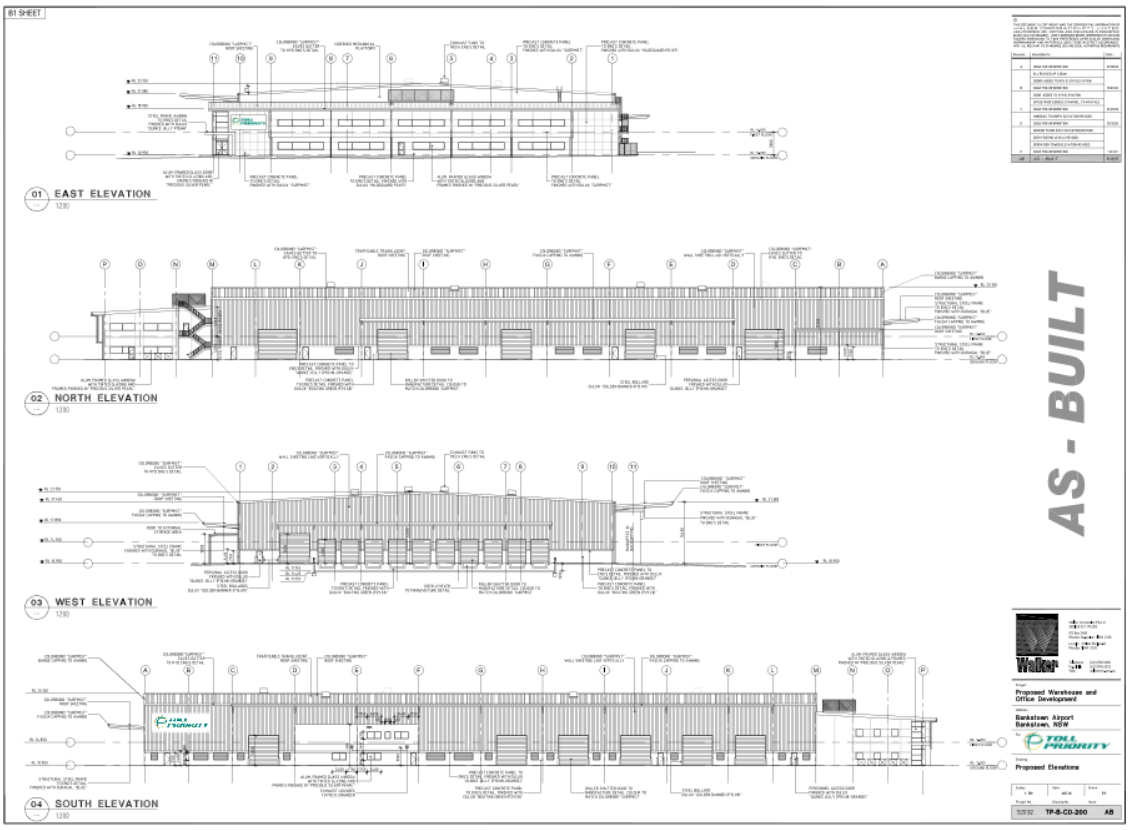


Figure 6 Project site section drawing

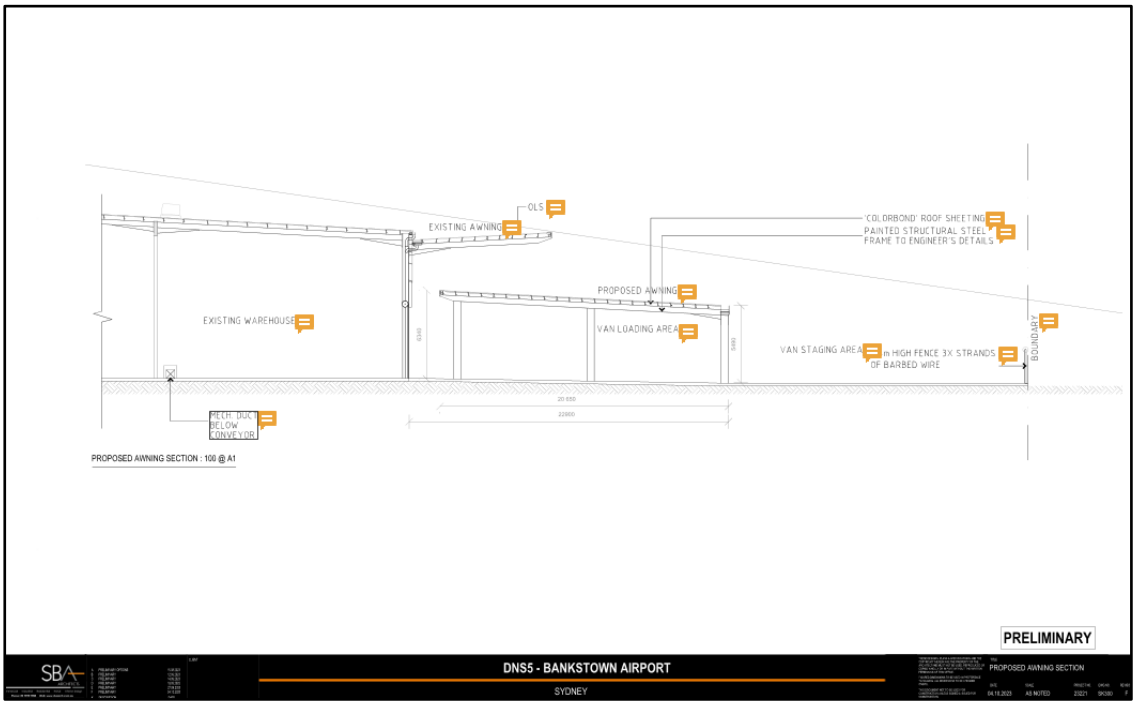


Figure 7 Proposed new awning layout.

1.9. Bankstown Airport (YSBK)

Bankstown Airport Limited operates Bankstown Airport (YSBK).

A check of Airservices Australia's Aeronautical Information Package (AIP) dated 7 September 2023, shows that airspace procedures are measured from the aerodrome reference point (ARP). The coordinates published in Airservices Australia's Designated Airspace Handbook (DAH) dated 15 June 2023 are as follows:

- ARP coordinates: Latitude 33°55'28"S and Longitude 150°59'18"E

According to the En Route Supplementary Australia (ERSA) facilities information chart (FAC) for Bankstown Airport, the airport has an aerodrome elevation of 10.4 m AHD (34 ft AMSL).

Bankstown Airport has 3 runways:

- Runway 11R/29L is a Code 2 runway 1038 m x 23 m (runway strip: 90m)
- Runway 11C/29C is a Code 3 runway 1416 m x 30 m (runway strip: 90m)
- Runway 11L/29R is a Code 2 runway 1100 m x 30 m (runway strip: 90m)

1.9.1. Instrument approach and departure procedures

A check of the Aeronautical Information Package (AIP) via the Airservices Australia website showed that Bankstown Airport is served by non-precision flight procedures (source: AsA, effective 7 September 2023).

Table 1 identifies the aerodrome and procedure charts designed by Airservices Australia.

Table 1 Bankstown Airport (YSBK) aerodrome and procedure charts

Chart name (Procedure Designer)	*Effective date*
AERODROME CHART PAGE 1 (AsA)	1 December 2022 (Am 173)
AERODROME CHART PAGE 2 (AsA)	1 December 2022 (Am 173)
SID BANKSTOWN EIGHT DEP – RWY 11C/29C (AsA)	24 March 2022 (Am 170)
NDB RWY 11C (AsA)	23 March 2023 (AM 174)
NDB A (AsA)	23 March 2023 (AM 174)
RNP RWY 11C (AsA)	23 March 2023 (AM 174)

1.9.2. PANS-OPS Surfaces

A detailed assessment of the PANS-OPS surfaces associated with the published instrument approach procedures was undertaken. The Pans-OPS surface of the precision approach of runways 11C and 29C has also been included, as indicated in the Bankstown Master Plan 2019.

The Project will be beneath all PANS-OPS surfaces. Table 2 details the assessment for each instrument approach procedure.

Table 2 Bankstown Airport PANS-OPS Assessment

Airport Instrument Approach Title	*Minimum Altitude over Project (ft AMSL)*	*PANS- OPS Surface (ft AMSL)*	*Impact*	*Potential solution*	*Impact on aircraft ops*
SID BANKSTOWN EIGHT DEP – RWY 11C/29C	Nil	Nil	Nil – beneath	N/A	N/A
NDB RWY 11C	600 (MDA)	354	Nil – beneath	N/A	N/A
NDB A	650 (Circling)	355	Nil – beneath	N/A	N/A
RNP RWY 11C	680 (MDA)	434	Nil – beneath	N/A	N/A
ILS 11C	Nil	Nil	Nil – beneath	N/A	N/A
ILS 29C	Nil	Nil	Nil – beneath	N/A	N/A
Circling – Category A&B	650	355	Nil – beneath	N/A	N/A
Circling – Category C	840	446	Nil – beneath	N/A	N/A

1.9.3. IFR Circling areas

An IFR circling approach is an extension of an instrument approach to the specified circling minima (lowest altitude permitted without visual reference to the ground) at which point the pilot will visually manoeuvre the aircraft to align with the runway for landing.

Typically, a circling approach is only conducted where there is no runway-aligned instrument procedure or if the runway used for the approach procedure is not suitable for landing.

Circling areas are established by the instrument flight procedure designer based on ICAO specifications related to the performance category of the designed aircraft. The circling area is determined by drawing an arc centred on the threshold of each usable runway and joining these arcs by tangents. Category C is the most demanding aircraft category in Bankstown Airport's instrument flight procedures.

The radii for each relevant category of aircraft are provided below:

- Category A – 1.63 nm / 3.03 km
- Category B – 2.59 nm / 4.80 km
- Category C – 4.11 nm / 7.62 km

The Project is located within all Categories, and the lowest circling surface will be Category A and B, which is 198.1 m AHD (650 ft AMSL). The PANS-OPS surface of Category A and B will be 108.2 m AHD (355 ft AMSL).

The Project's maximum height is 25.15 m AHD (82.5 ft AMSL), including exhaust fan, which is assumed to be 2 m above the roof. It will not affect the IFR circling area.

1.9.4. Obstacle Limitation Surface (OLS)

The Master Plan for Bankstown Airport 2019 provides a map that shows the contours of the different OLS surfaces of Bankstown Airport.

The maximum horizontal distance that an OLS may extend for an aerodrome in Australia is 15 km (8.1 nm) from the edge of a runway strip, and the maximum lateral extent of the OLS is up to 5.5 km for the conical surface. The Project is constrained by the transitional surface, as shown in Figure 8 (source: Google Earth, Bankstown Airport).

The transitional surface constrains the proposed development site. The height constraint at the rooftop is 29.2 m AHD (95.8 ft AMSL). The proposed building's maximum height is 25.15 m AHD (82.5 ft AMSL). The height constraint at the lower side of the new awning is 21.6 m AHD (70.8 ft AMSL), and the higher side is 24.5 m AHD (80.4 ft AMSL). The proposed awning height is 16.44 m AHD (53.94 ft AMSL) at the lower side and 17.29 m AHD (56.7 ft AMSL) at the higher side.

The proposed site will be underneath the OLS surface.

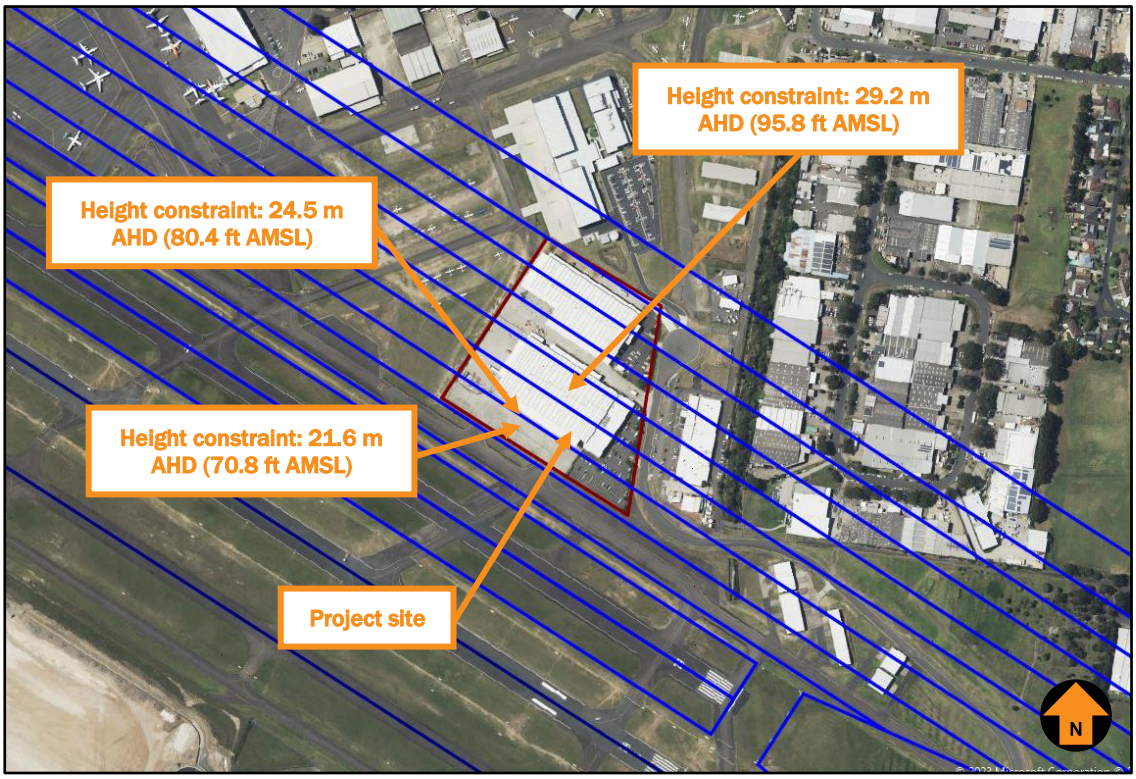


Figure 8 Bankstown Airport OLS contours and project site

1.10. Airspace Protection

The Project is located within controlled airspace Class D (457.2m AHD, 1500 ft AMSL) and is not located in any Prohibited, Restricted or Danger areas. Therefore, the project site will not impact controlled or designated airspace.

1.11. Aviation facilities

The closest aviation facilities to the project site are located at Bankstown Airport (YSSY) (Non-Directional Beacon (NDB)).

According to National Airports Safeguarding Framework Guideline G Protecting Aviation Facilities - Communications, Navigation and Surveillance (CNS), the navigation facilities have areas restricted to developments.

- Non-Directional Beacon (NDB):
    - Zone A: 0 - 60 m
    - Zone B: 60 - 300 m
    - Area of Interest: N/A

The project site is located approximately 780 m from the NDB, outside the building restricted areas, and therefore will not interfere with this facility.

1.12. Radar assessment

Airservices Australia currently requires an assessment of the potential for a development site to affect radar lines of sight.

With respect to aviation radar facilities, the following facilities are referenced:

- Sydney Primary Surveillance Radar (PSR) - approximately 17.44 km southeast of the Project
- Sydney Secondary Surveillance Radar (SSR) - approximately 17.44 km southeast of the Project
- Cecil Park Primary Surveillance Radar (PSR) - approximately 15.25 km northwest of the Project
- Cecil Park Secondary Surveillance Radar (SSR) - approximately 15.25 km northwest of the Project

According to National Airports Safeguarding Framework Guideline G Protecting Aviation Facilities - Communications, Navigation and Surveillance (CNS), the navigation facilities have areas restricted to developments.

- Primary Surveillance Radar (PSR):
    - Zone A: 0 - 500 m
    - Zone B: 500 - 4000 m
    - Area of Interest: 4000 - 15000 m
- Secondary Surveillance Radar (PSR):
    - Zone A: 0 - 500 m
    - Zone B: 500 - 4000 m
    - Area of Interest: 4000 - 15000 m

Both Sydney PSR and SSR are 17.44 km away from the site. The site will be outside the interest area and will not affect the line of sight of both Sydney PSR and SSR.

Cecil Park PSR and SSR are 15.25 km away from the site. The site will be outside the interest area and will not affect the line of sight of both Cecil Park PSR and SSR.

1.13. Aircraft Noise

National Airports Safeguarding Framework, Guideline A: *Measures for Managing Impacts of Aircraft Noise* provides details of land use planning considerations associated with aircraft noise with reference to the Australian Noise Exposure Forecast (ANEF) System and the Australian Standard AS 2021-2015 *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction* (AS2021).

Building site acceptability criteria based on ANEF zones are specified in Table 2.1 of AS 2021-2015. The Australian Standard also provides guidelines for determining the building construction type necessary for noise reduction.

A range of aircraft noise exposure charts are provided in the Bankstown Airport Master Plan 2019. Figure 9 (below) shows the 2033/34 and 2039 ANEF charts.

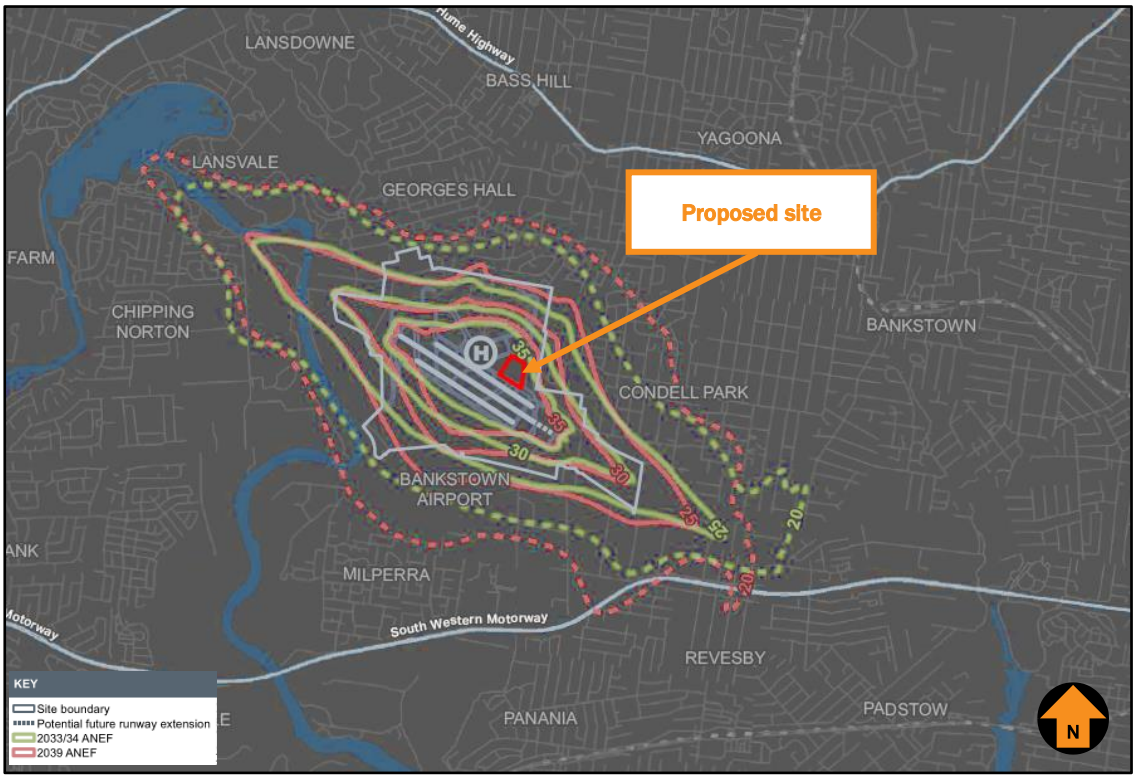


Figure 9 Project site in relation to 2033/34 ANEF and 2039 ANEF

Table 2.1 in AS 2021:2015 indicates that building sites for light industrial facilities are classified as "conditionally acceptable" when located within the 30 to 40 ANEF zone.

The project site is located within the 35 ANEF contour (2039). It is conditionally acceptable.

1.14. Building generated windshear and turbulence

Building generated windshear / turbulence becomes safety critical when a significant obstacle (such as a building) is located in the path of a crosswind to an operational runway. The wind flow will be diverted around and over the buildings, causing the crosswind speed to vary along the runway.

National Airports Safeguarding Framework, Guideline B: *Managing the Risk of Building Generated Windshear and Turbulence at Airports* provides details on mitigating risk by building siting and location.

Figure 10 provides a copy of Figure 1 of Guideline B that shows the assessment trigger areas around runways, within which buildings should be assessed.

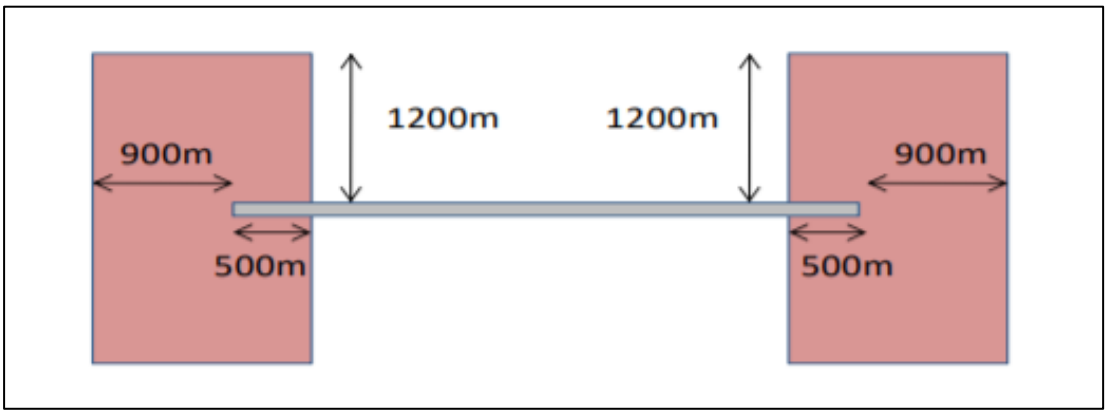


Figure 10 Figure 1 – NASF Guideline B

Paragraph 51 of NASF Guideline B states the following requirements for the assessment:

> *51. For buildings within the assessment trigger area, the first step is to consider the height of the building to determine its acceptability. The rule adopted in Australia is based on one developed in the Netherlands. This proposes that buildings should not penetrate a 1:35 surface extending perpendicular from the runway centreline (or extended runway centreline within the assessment trigger area). As the 1:35 surface extends from the runway centreline, when considering buildings against the 1:35 surface the building height should be measured above runway level.*

Figure 11 illustrates the concept of the 1:35 surface that applies within the assessment trigger area (source: NASF Guideline B).

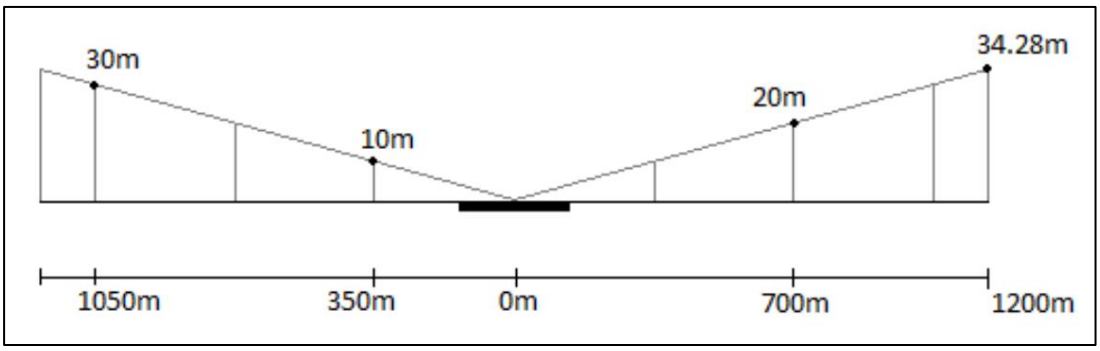


Figure 11 Part Figure 2 (Elevation) – NASF Guideline B

The windshear assessment trigger areas at Bankstown Airport are illustrated in Figure 12 (below) (source: Bankstown Airport Master Plan, Google Earth).

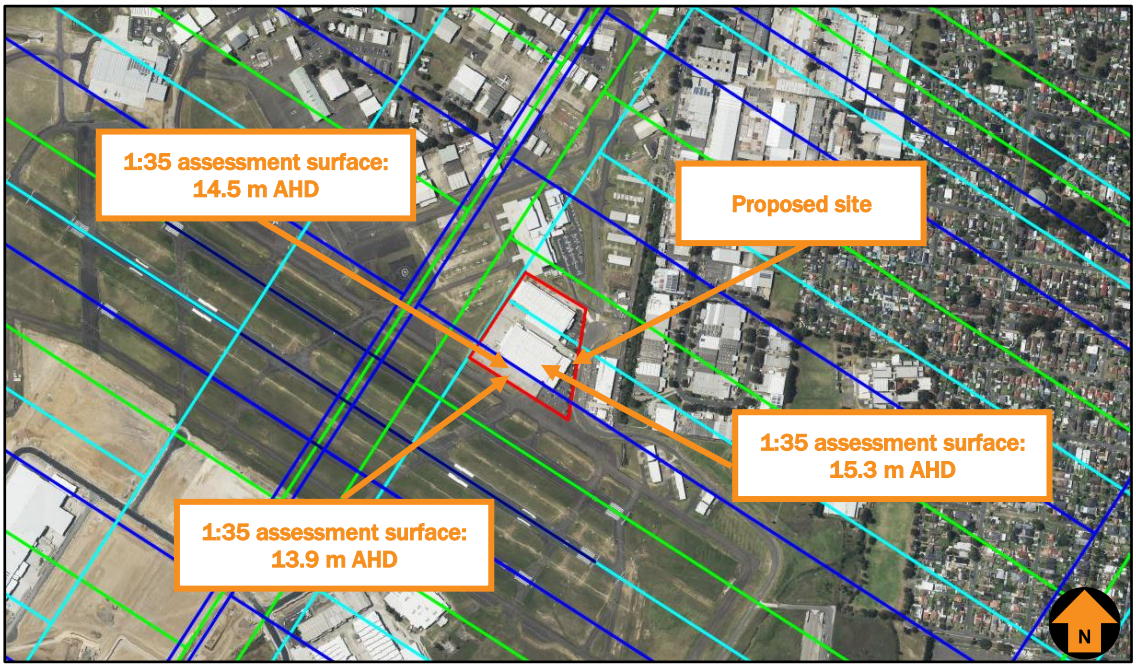


Figure 12 Windshear Assessment Zones at Bankstown Airport

The subject site is located within a rectangular 'assessment trigger area' around Bankstown Airport and therefore is likely to trigger a requirement to be assessed for the potential to induce building generated windshear and turbulence.

Subject to further detailed assessment, the lower side of new awning to the runway is located approximately 123.3 m from the centreline of the northern runway 11L/29R. At this distance from the runway, the 1:35 assessment surface is approximately 13.9 m AHD, compared to the proposed lower side of the new awning height of 16.44 m. The higher side of the new awning is located approximately 144 m from the centreline of the runway 11L/29R. The 1:35 assessment surface is 14.5 m AHD, compared to the proposed height of 17.29 m.

The rooftop of the building is located approximately 173.4m from the centreline of the runway 11L/29R. The 1:35 assessment surface is 15.3 m AHD, compared to the proposed roof height of 23.15 m, plus the assumed 2 m exhaust fan height.

The building will infringe on the 1:35 surface.

This initial preliminary assessment of the proposed building height indicates that the proposed structure exceeds the 1:35 assessment surface.

NASF Guideline B outlines the methodology required to assess the risk of windshear and turbulence resulting from the proposed development.

1.15. Lighting in the vicinity of airports

National Airports Safeguarding Framework, Guideline E: *Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports* and Manual of Standards Part 139 - *Aerodromes* paragraphs 9.143 and 9.144 establish a restriction to lighting in the vicinity of an airport which, by reason of its intensity, configuration or colour, might endanger the safety of an aircraft. The vicinity of the airport can be taken to be within a 6 km radius of the airport.

Both NASF Guideline E and Part 139 MOS 2019 establish four light control zones (A, B, C and D) within a 6 km radius of Bankstown Airport with nominal maximum intensity of light sources measured at 3° above the horizontal.

A copy of Figure 9.144 (2) Zone requirements for lighting is provided in Figure 13 (source: MOS 139).

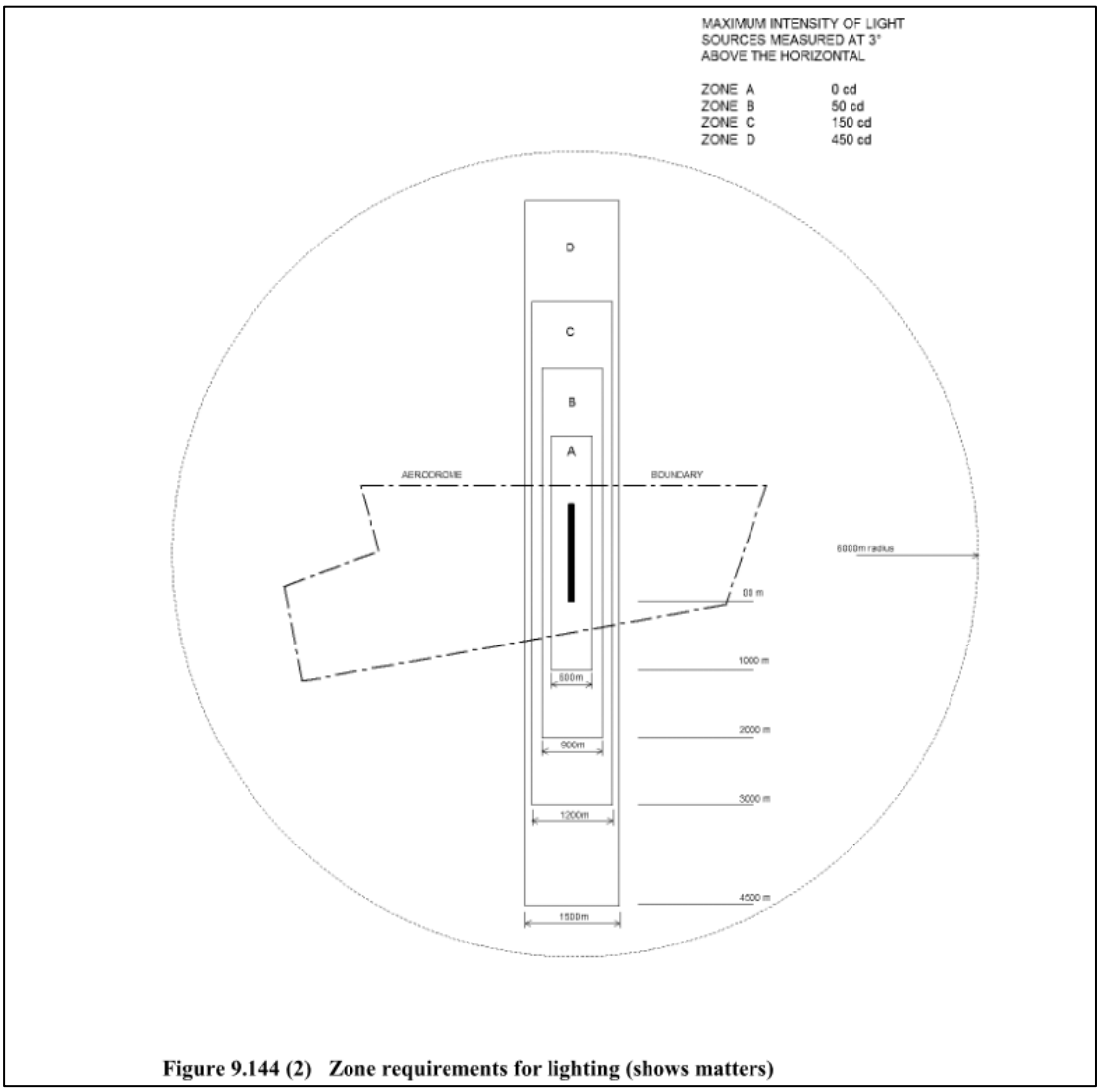


Figure 13 Copy of Figure 9.144 (2) Zone requirements for lighting

The project site is located within the defined light intensity control zones. A preliminary assessment against the northern runway 11L/29R indicates that the proposed building is located in lighting zone A (0 cd maximum intensity of light sources measured as 3° above the horizontal).

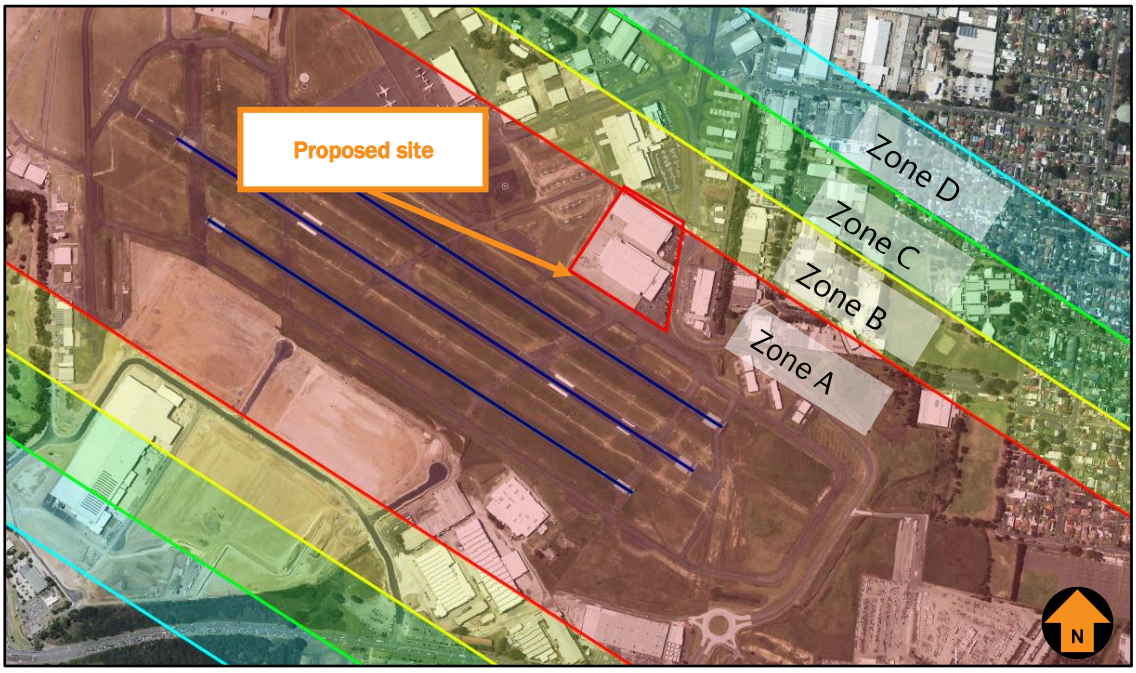


Figure 14 The project site in relation to light intensity control zones

Any lighting within the subject site should conform to the requirements of paragraphs 9.143 and 9.144 of the Part 139 MOS 2019.

1.16. Public safety areas

A public safety area (PSA) is a defined area at the end of an airport's runway where there is potentially an increased risk of an aircraft accident occurring.

When imposed by a planning instrument, the public safety area defines the area in which specified development is restricted in order to protect the safety of aircraft passengers, property and people on the ground in the event of an aircraft accident during landing or take-off.

NASF Guideline I – *Managing the Risk in Public Safety Areas at the Ends of Runways* guides states and local governments on assessing and treating potential increases in risk to public safety that could result from an aircraft incident or development proposal in areas near the end of an airport runway.

There is no consistent approach to implementing public safety areas within Australia. New South Wales has no planning controls regarding public safety areas at airports or aerodromes.

The International Civil Aviation Organization (ICAO) has not developed standards and recommended practices regarding PSAs, and CASA's aviation safety regulations and standards do not provide for their establishment.

Figure 6.9 in the Bankstown Airport Master Plan provides an indicative / assumed public safety area in relation to Bankstown Airport (using a Queensland model), as shown in Figure 15. The subject site is located outside of the assumed PSA.

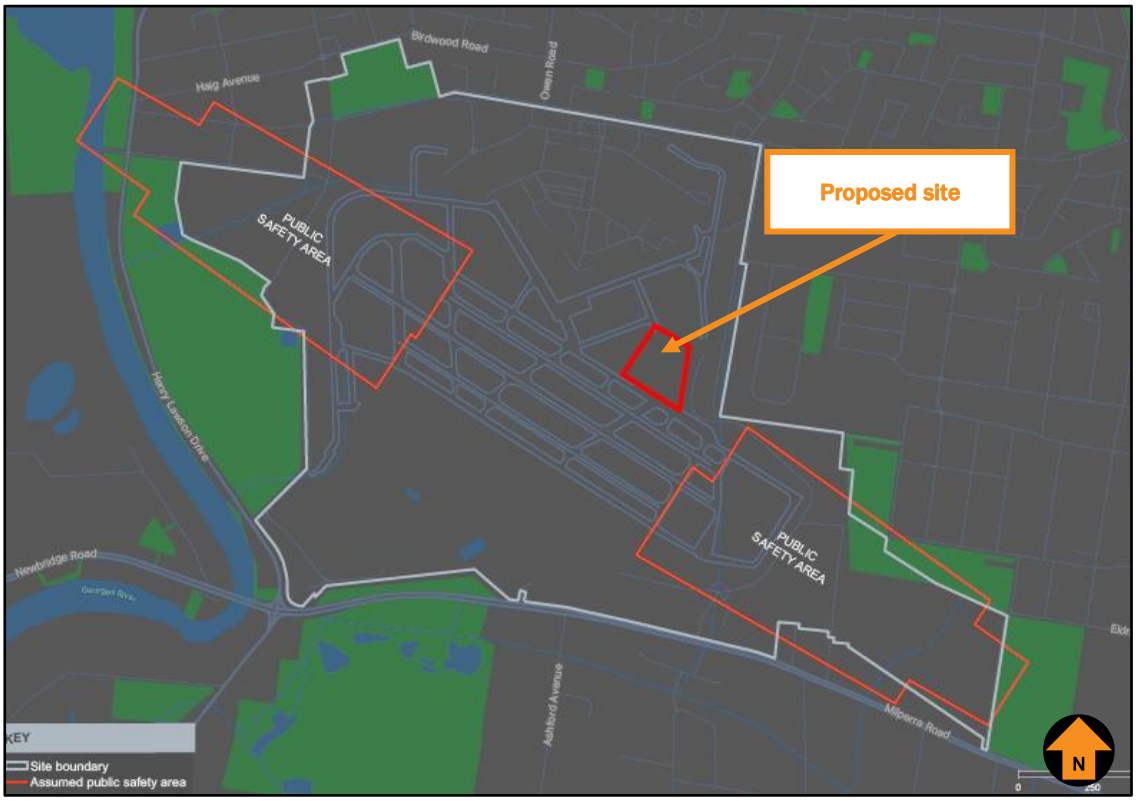


Figure 15 The project site in relation to PSA area

1.17. Vertical plumes

Advisory Circular (AC) 139.E-02v1.0 plume rise assessments, dated March 2023, sets out the way in which the Civil Aviation Safety Authority assesses the potential impacts of plume rises on aircraft safety. Any vertical plume or gaseous efflux rising from the top of a proposed building or other structure within the subject site at a rate in excess of 4.3 metres per second could be a hazard to aircraft operations.

If the exit velocity of any gaseous efflux from the proposed development within the subject site exceeds 4.3 m/s, it must be referred to CASA for assessment.

1.18. Summary

Following a high-level evaluation of aviation operation aspects of the Project, Aviation Projects has concluded:

- The proposed site has the following characteristics:
    - Building height is 23.15 m AHD (79.95 ft AMSL)
    - Assumed 2 m exhaust fan above the roof
    - Total building assessed at: 25.15 m AHD (82.5 ft AMSL)
    - The lower side of the new awning is 16.44 m AHD (53.94 ft AMSL), and the higher side of the new awning is 17.29 m AHD (56.7 ft AMSL)
- The Project will not affect PANS-OPS surfaces of any airport

- The Project will not affect circling surfaces of any airport
- The Project will not affect OLS of any airport
- The Project is located within controlled airspace Class D (457.2m AHD, 1500 ft AMSL) during ATC operating hours and Class G airspace at other times.
- Will not be located in any Prohibited, Restricted or Danger areas.
- Will be located outside aviation navigation and communication facilities.
- Will not impact the closest ATC radar installations.
- Is within the 35 ANEF contour (2039) and is conditionally acceptable.
- Initial preliminary assessment of the proposed building height indicates that the proposed structure exceeds the 1:35 assessment surface. NASF Guideline B outlines the methodology required to assess the risk of windshear and turbulence resulting from the proposed development.
- The project site is located within the defined light intensity control zones. A preliminary assessment against the northern runway 11L/29R indicates that the proposed building is located in lighting zone A (0 cd maximum intensity of light sources measured as 3° above the horizontal).
- The subject site is outside the indicative / assumed PSA included for reference in the Bankstown Airport Master Plan.
- Should development within the subject site include the potential for vertical plume or gaseous efflux rising from the top of a proposed building or other structure within the subject site, the potential impacts of plume rise on aircraft safety should be assessed in accordance with Advisory Circular (AC) 139.E-02v1.0 *Plume rise assessments*, dated March 2023.

1.19. Recommendation

- Detailed analysis is required for windshear assessment.

  Contact details of the recommended company are provided below:

  James Brett

  BE(Hons) BSc MEngSc PhD

  Principal Modelling Engineer

  Synergetics Pty Ltd (ABN 370 912 350 22)

  Positive Energy Places,

  490 Spencer Street, Melbourne

  +61 3 93284800

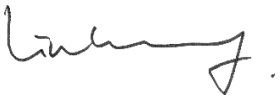
  0409 537 064

  www.synergetics.com.au

- Details of the Project must be reported to Bankstown Airport management.
- If approved, details of the Project should be reported to Airservices Australia via this email address: vod@airservicesaustralia.com

If you wish to clarify or discuss the contents of this correspondence, please contact me on 0433 747 835.

Kind regards



Lyn Wang

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06 October 2023