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18 September 2024
Our File Ref: B22492AL001REV2
Contact: Bridget Wouts

Bankstown Airport Proprietary Limited
c/- Project Director
RP Infrastructure
Level 19, 9 Hunter Street
Sydney NSW 2000

Attention: Sean Gilchrist

RE: PROPOSED AVIATION HANGAR PROJECT – BANKSTOWN AIRPORT
NATIONAL AIRPORTS SAFEGUARDING FRAMEWORK ASSESSMENT

L+R Airport Consulting was engaged by Bankstown Airport Proprietary Limited (BAPL) to undertake an airport safeguarding assessment of the proposed Aviation Hangar Project (formerly known as "Skyfield"), as it relates to Bankstown Airport against the National Airports Safeguarding Framework (NASF) Guidelines.

1.0 Proposed Aviation Hangar Project

RP Infrastructure provided the following Crawford Architects drawings in PDF and CAD format for assessment.

- Drawing No 22060/A007/Issue 05 Site Plan – 1a
- Drawing No 22060/A020/Issue 05 Optional Internal Planning Arrangement
- Drawing No 22060/A030/Issue 02 Site Plan Existing Taxiways
- Drawing No 22060/A031/Issue 02 Site Plan Removed Taxiways
- Drawing No 22060/A032/Issue 03 Site Plan Proposed Taxiways
- Drawing No 22060/A300/Issue 02 Elevaitons Sheet 01
- Drawing No 22060/A301/Issue 01 Elevation Sheet 02

The proposed Aviation Hangar Project includes two (2) hangar blocks known as the Northern Hangars and the Southern Hangars with ancillary office and amenities, car parking and fencing. The site also includes apron areas associated with the hangar blocks, an aircraft parking area, landscaping and a services zone.

The services zone, at RP Infrastructure's request (email dated 24.01.2024) is evaluated at the proposed Northern Hangars building elevation for flexibility of services placement during the detailed design phase. The proposed Northern Hangars and services zone are proposed at maximum 21.1 m AHD and the Southern Hangars are proposed at maximum 21.6 m AHD.

Changes to landside and airside access arrangements and other operational and security matters are subject to separate discussions with BAPL and do not form part of this NASF assessment.

2.0 Bankstown Airport Prescribed Airspace

The proposed Aviation Hangar Project is within the extents of prescribed airspace for Bankstown Airport as described in the following sections.

2.1 Obstacle Limitation Surfaces (OLS)

The proposed development lies within the extents of the existing and future Obstacle Limitation Surfaces (OLS) at Bankstown Airport.

2.1.1. Existing OLS

The proposed development is below the Bankstown Airport existing OLS Runway 11C/29C transitional surface and Runway 11L/29R transitional surface as illustrated on Figure B22492/03.

The proposed Northern Hangars/Services Zone at a maximum elevation of 21.1 m AHD will also not infringe the OLS:

- Runway 11L/29R transitional surface at 28.1 m AHD; and
- Runway 11C/29C transitional surface at 32.6 m AHD.

The proposed Southern Hangars at a maximum elevation of 21.6 m AHD will not infringe the OLS:

- Runway 11L/29R transitional surface at 28.0 m AHD; and
- Runway 11C/29C transitional surface at 32.5 m AHD.

Illustrations of the landscaping e.g. trees, is illustrated below the building maximum elevation. Regular maintenance will be required to ensure all vegetation remains below the OLS. Detailed landscaping plans when available must be submitted to BAPL for review (refer Section 0).

The proposed car parking and fencing at a maximum 10.9 m AHD (ground floor 8.4 m AHD + estimated maximum 2.5 m high fence and vehicle). The proposed car parking and fencing at a maximum elevation of 10.9 m AHD would remain below the OLS:

- Runway 11L/29R transitional surface at 21.2 m AHD; and
- Runway 11C/29C transitional surface at 27.6 m AHD.

Any lighting proposed in the car parking area will also need to remain below the OLS.

The apron areas and the aircraft parking area are also within the Bankstown Airport existing Runway 11L/29R and Runway 11C/29C transitional surfaces. The Northern and Southern apron areas most restrictive OLS limit is 24.2 m AHD which will allow for aircraft tail heights up to the height of the hangar to remain below the OLS when parked on the apron.

The proposed aircraft parking area OLS limit would be 21.2 m AHD. Aircraft tail height limits will need to be confirmed once detailed finished ground levels are available and aircraft parked in accordance with CASA Part 139 (Aerodromes) Manual of Standards (Part 139 MOS) (i.e. so that the tail remains below the OLS).

2.1.2. Future OLS

The proposed development is also within the extents of the Bankstown Airport Master Plan 2019 (MP19) OLS which allows for Runway 11C/29C to be extended and provided with a precision instrument approach.

The critical surface over the proposed Northern and Southern Hangars within the future OLS would be the Runway 11C/29C transitional surface, which would be at a minimum of 21.9 m AHD. The Runway 11L/29R transitional surface would remain unchanged at a minimum of 28.1 m AHD within the MP19 OLS.

The proposed Northern and Southern Hangars at a maximum elevation of 21.6 m AHD will not infringe the Bankstown Airport Master Plan 2019 OLS as illustrated on Figure B22492/04.

The Northern apron area future OLS limit is 26.5 m AHD which will allow for aircraft tail heights up to the height of the Northern Hangars to remain below the OLS when parked on the apron.

The Southern apron area future OLS limit is 19.3 m AHD which will allow for aircraft tail heights at least 11 m (approx.) high, based on the ground floor level of 8.4 m AHD (refer Crawford Architects drawing no 22060/A300/Issue 02 Elevations Sheet 01) depending on its parked position.

The proposed car parking and fencing at a maximum 10.9 m AHD (ground floor 8.4 m AHD + estimated maximum 2.5 m high fence and vehicle). The proposed car parking and fencing at a maximum elevation of 10.9 m AHD would remain below the future OLS:

- Runway 11C/29C transitional surface at 16.9 m AHD; and
- Runway 11L/29R transitional surface at 21.2 m AHD.

Any proposed car park lighting must also remain below the future OLS.

The aircraft parking area OLS limit would be a minimum of 17.4 m AHD. Aircraft tail height limits will need to be confirmed once detailed finished ground levels are available, and aircraft parked below the OLS in accordance with Part 139 MOS.

2.1.3. Helicopter Landing Sites

Bankstown Airport has a Main HLS located centrally to the runway environment and north of Runway 11L/29R as illustrated in Figure B22492/05. There are also two (2) helicopter aiming points provided on Taxiway N2 and west of Taxiway N1 both northeast of the proposed Aviation Hangar Precinct. All flight paths operate parallel to the runway centrelines so as not to cause traffic conflicts with fixed wing operations.

The proposed Southern Hangars at a maximum elevation of 21.6 m AHD would remain below the Main HLS helicopter OLS at 47.6 m AHD and outside the lateral extents, a minimum of approximately 200 m south, of both aiming points.

The Northern and Southern apron areas most restrictive helicopter OLS limit is 40.6 m AHD which will allow for aircraft tail heights up to the height of the hangar to remain below the helicopter OLS when parked on the apron.

The proposed car parking and fence at maximum elevation of 10.9 m AHD would remain below the helicopter OLS limit at 53.9 m AHD.

The helicopter Main HLS OLS limit over the proposed aircraft parking area is a minimum of 21.5 m AHD. Aircraft tail height limits will need to be confirmed once detailed finished ground levels are available.

Interaction between rotary overflight and the proposed development, in particular as it relates to rotor downwash, must be considered by BAPL as an operational matter which is not the subject of this assessment.

The future (fixed-wing) OLS would remain the critical surface over the proposed Aviation Hangar Project.

2.2 PANS-OPS

The proposed Aviation Hangar Project lies within the extents of the existing and future PANS-OPS airspace at Bankstown Airport.

2.2.1. Existing PANS-OPS

The approach and departure procedures (effective 5 September 2024) at Bankstown Airport are published in Airservices Australia Aeronautical Information Package (AIP) as follows:

- SID Bankstown Nine Departure – Runway 11C/29C (Am 179)
- RNP Runway 11C (Am 179)
- NDB Runway 11C (Am 179)
- NDB-A (Am 179)

The proposed development lies within the extents of all four procedures listed above. We estimate the critical surface over the site to be the Bankstown Airport PANS-OPS Standard Instrument Departure (SID) Bankstown Nine Departure Runway 11C and 29C turn area (Area 3) as illustrated on Figure B22492/06.

We have estimated the SID Area 3 protection surface to be at a minimum of 79 m AHD, as such the proposed development maximum elevation at 21.6 m AHD should remain below PANS-OPS airspace.

However, the proposal must be submitted to Airservices Australia for formal assessment and confirmation of any impacts on its procedures and facilities.

2.2.2. Future PANS-OPS

The future Bankstown Airport prescribed airspace includes an ILS (precision) approach for Runway 11C.

The proposed Northern Hangars/Services Zone at 21.1 m AHD should also remain below the future PANS-OPS Runway 11C Basic ILS surface, estimated at approximately 21.9 m AHD, as illustrated on Figure B22492/07.

The proposed Southern Hangars at a maximum 21.6 m AHD should remain below the future PANS-OPS Runway 11C Basic ILS surface, estimated at approximately 21.7 m AHD, as illustrated on Figure B22492/07.

The Northern apron area future PANS-OPS limit is 26.5 m AHD which will allow for aircraft tail heights up to the height of the Northern Hangars to remain below the future PANS-OPS when parked on the apron.

The Southern apron area future PANS-OPS limit is 19.3 m AHD which will allow for aircraft tail heights of at least approximately 10.9 m high, based on the ground floor level of 8.4 m AHD (refer Crawford Architects drawing no 22060/A004/Rev 02 Site Plan).

The proposed car parking and fence at a maximum elevation of 10.9 m AHD would also remain below the future PANS-OPS Runway 11C basic ILS surface, estimated at approximately 17.8 m AHD.

The aircraft parking area future PANS-OPS limit is 17.4 m AHD. Aircraft tail height limits will need to be confirmed once detailed finished ground levels are available, and aircraft parked in accordance with Part 139 MOS.

2.3 Plume Rise

Plume rise must also be considered in relation to penetration of the OLS and PANS-OPS airspace. Aircraft operations in various stages of flight may be affected by an exhaust plume of significant vertical velocity.

Any plume rise exceeding a velocity of 4.3 m/s at the point of emission in accordance with the *Airports (Protection of Airspace) Regulations 1996* is an activity that results in air turbulence and must not be carried out without an approval.

CASA has published an Advisory Circular *AC 139.E-02 v1.0 Plume Rise Assessments.* The proponent should complete CASA Form 1247 *Operational Assessment of a Proposed Plume Rise* with the relevant details once these are available and submit the form directly to CASA Office of Airspace Regulations in order to commence the assessment process.

3.0 National Airports Safeguarding Framework

The National Airports Safeguarding Framework (NASF) is a national land use planning framework that aims to:

- Improve community amenity by minimising aircraft noise-sensitive developments near airports including through the use of additional noise metrics and improved noise-disclosure mechanisms; 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.

All Guidelines can be found at www.infrastructure.gov.au.

NASF currently consists of a set of nine (9) guidelines, as below. Each has been summarised in relation to the proposed Aviation Hangar Project on Bankstown Airport.

3.1 Guideline A: Measures for Managing Impacts of Aircraft Noise

Guideline A can be used in the assessment of new development applications for noise sensitive uses.

The proposed Aviation Hangar Project lies within the endorsed Bankstown Airport 2039 ANEF as illustrated on Figure B22492/08. The proposed Northern Hangars building is within the ANEF 30 to 35 zone. The Southern Hangars building is partially within the ANEF 30 to 35 zone and partially within the ANEF 35 and greater.

Australian Standard Acoustics – Aircraft noise intrusion – Building siting and construction (AS2021:2015) provides building site acceptability based on ANEF zones. AS2021-2015 would classify:

- Commercial buildings as 'conditionally acceptable' in 25 to 35 ANEF, and 'unacceptable' in greater than 35 ANEF;
- Light industrial use as 'conditionally acceptable' in 30 to 40 ANEF; and
- Other industrial 'acceptable' in all ANEF zones.

For 'conditionally acceptable' land uses, consideration of aircraft noise attenuation is required in accordance with AS2021-2015.

Given the location of the site is in close proximity to busy runways, the proponent should consider the acoustic treatment of the proposed internal spaces to ensure it is fit for the use of the intended occupant (i.e. office spaces within the hangars). AS2021:2015 Table 2.1 Note 3 states that:

> There will be cases where a building of a particular type will contain spaces used for activities which would generally be found in a different type of budling (e.g. an office in an industrial building). In these cases, Table 2.1 *Building site acceptability based on ANEF zones* should be used to determine site acceptability, but internal design noise levels within the specific spaces should be determined by Table 3.3 *Indoor design sound levels for determination of aircraft noise reduction*.

3.2 Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports

The purpose of this Guideline is to assist land use planners and airport operators in their planning and development processes to reduce the risk of building generated windshear and turbulence at airports near runways. Applicability of Guideline B is initially determined by the location of the 'assessment trigger area' around the runway, that is:

- 1200 m or closer perpendicular from the runway centreline (or extended runway centreline);

- 900 m or closer in front of runway threshold (towards the landside of the airport); and
- 500 m or closer from the runway threshold along the runway.

The proposed Aviation Hangar Project buildings are within the assessment trigger areas for Runways 11L, 11C and 11R as illustrated on Figure B22492/09.

For developments within the assessment trigger areas Guideline B then refers to the mitigation of risk by use of a 'height multiplier' (the 1:35 surface) determining that if buildings do not exceed the 1:35 surface they will not create unsafe wind effects. That is, the distance from the runway centreline or extended centreline to the closest point of the building should be more than 35 times the height (above runway level) of the building.

The proposed Northern Hangars/Services Zone at a maximum elevation of 21.1 m AHD and the proposed Southern Hangars at a maximum elevation of 21.6 m AHD would infringe the 1 in 35 surface for Runways 11L, 11C and 11R by maximum of approximately 10.5 m as shown in Table 1 below. Therefore, in accordance with Guideline B further assessment is required.

Table 1: Proposed Development - Guideline B: 1 in 35 Surfaces

Runway Assessment Trigger Areas	Runway Threshold Elev.	Proposed Northern Hangars/Services Zone		
		21.1		
		Distance	1:35 sfc	+above/-below
11L	6.8	165	11.5	+9.6
29R	Outside Assessment Trigger Area			
11C	6.3	275	14.2	+6.9
29C	Outside Assessment Trigger Area			
11R	5.7	380	16.6	+4.5
29L	Outside Assessment Trigger Area			

Runway Assessment Trigger Areas	Runway Threshold Elev.	Proposed Southern Hangars		
		21.6		
		Distance	1:35 sfc	+above/-below
11L	6.8	150	11.1	+10.5
29R	Outside Assessment Trigger Area			
11C	6.6	255	13.9	+7.7
29C	Outside Assessment Trigger Area			
11R	5.7	365	16.1	+5.5
29L	Outside Assessment Trigger Area			

Threshold elevations as per the OLS survey March 2021

RP Infrastructure provided the SLR *Aviation Hangar Project – CFD-based Windshear and Turbulence Study* Revision R02-v3.0 (SLR Study). The SLR Study recommends the following:

§ *…to implement operational risk mitigation measures accepted by the airport operator and CASA when winds exceed 11.9 kt from the NNE (wind angle 33.8°±22.5°); and*

- *The addition of the proposed development has a minor impact on the peak turbulence levels, i.e. it increases the peak turbulence level by ~0.9 kt for the worst-case scenario, taking into account all analysed wind directions.*

L+R Airport Consulting has not analysed the SLR Study, however we would recommend that BAPL and CASA review the SLR Study as to the acceptability of the tested scenarios and to ensure there are acceptable mitigation measures available and sufficient to airport operators and operations.

3.3 Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports

Guideline C pertains to the way in which existing land use is managed in the vicinity of airports with respect to the attraction of wildlife, particularly birds.

The proposed Aviation Hangar Project is on-airport and the site plan illustrates landscaping and new vegetation. When the landscaping proposal is developed in detail it must be submitted to BAPL for review against the Bankstown Airport Wildlife Hazard Management Plan for approval.

3.4 Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers

This Guideline provides general information and advice in relation to wind farms and turbines and their hazards to aviation. Guideline D is not relevant to the proposed Aviation Hangar Project as provided.

3.5 Guideline E: Managing the Risk of Distraction to Pilots from Lighting in the Vicinity of Airports.

NASF Guideline E provides guidance on the risk of distractions to pilots of aircraft from lighting and light fixtures near airports. The CASA *Part 139 (Aerodromes) Manual of Standards 2019* Section 9.144: *Lights – requirements for zones* sets out the restrictions and degree of interference ground lights can cause as a pilot approaches, and provides advice to lighting designers and suppliers. The proposed development site is within the light control zones as illustrated on Figure B22492/10.

Lighting zones shown are for Runway 11C/29C only. Permanent lighting for Runway 11L/29R is no longer available but rather only portable lighting. As such lighting zones for Runway 11L/29R have not been included.

The proposed Aviation Hangar Project is partially within light control Zones A and B. Any external lighting associated with the proposed development (e.g. car parking and apron floodlighting) should therefore meet the restrictions associated with Zone A. Zone A does not allow for any (0 cd) intensity of light sources measured 3 degrees above the horizontal.

The design of lighting should take into consideration Guideline E to ensure there is no conflict from light fittings, coloured lights or glare caused by reflective surfaces and/or mitigation measures to be put in place. The lighting designer will need to ensure that the lights meet the requirements prescribed in the CASA *Part 139 (Aerodromes) Manual of Standards 2019.*

It should be noted that solar panel installation is a particular consideration in relation to glare/reflectivity affecting aircraft in various stages of flight as well as ATC operations. If any solar panels are proposed (such as roof-mounted array), whether as part of the initial construction or subsequently, the proponent may need to complete a solar glare hazard analysis to satisfy CASA that the safety of aircraft, and ATC operations in particular, will not be affected.

3.6 Guideline F: Managing the Risk of Intrusions into the Protected Airspace of Airports

Guideline F is intended to address the issue of intrusions into the operational airspace of airports by tall structures, such as buildings, cranes or activities that could cause air turbulence affecting aircraft in flight in the prescribed airspace.

This Guideline has been considered in this assessment of the proposed Aviation Hangar Project throughout Section 2.0.

Guideline F should also be considered for activities that could cause air turbulence and/or emissions of dust or other particulate matter.

Potential impacts during construction are discussed in Section 5.0.

3.7 Guideline G: Protecting Aviation Facilities – Communication, Navigation and Surveillance (CNS)

The purpose of Guideline G is to formalise the protection of CNS facilities in land use planning decisions. The Guideline provides land use planning guidance to better protect CNS facilities which support the systems and processes in place by various agencies to safely manage the flow of aircraft into, out of and across Australian airspace. The Guideline also informs procedures which ensure development associated activities within Building Restricted Areas (BRA) of CNS facilities do not adversely affect the facility or cause interference for air traffic controllers or aircraft in transit.

3.7.1. Existing CNS Facilities

The existing CNS facilities at Bankstown Airport include a Non-Directional Beacon (NDB) and a Precision Approach Path Indicator (PAPI). The proposed development has been assessed based on the guidance provided in NASF Guideline G for both facilities.

The proposed development is beyond the lateral limits of the obstacle assessment surfaces associated with Runway 11C/29C PAPI and the NDB located on the south side of the Bankstown Airport runways.

The proposal should be submitted to Airservices Australia to ensure there is no impact on procedures and any other facilities (see Section 2.2.1).

3.7.2. Future CNS Facilities

The proposed development has been considered with respect to the guidance on Building Restricted Areas (BRA) for Instrument Landing Systems (ILS) installations provided in NASF Guideline G, for the scenario of a possible ILS installed on an extended Runway 11C/29C.

An ILS allows aircraft to land at an airport when there is poor or low visibility. The system is made up of two transmitters, the localiser and the glide slope, which ensures the aircraft is within the lateral and vertical parameters for the runway being used.

The proposed Aviation Hangar Project is within the lateral extents of the BRAs associated with a possible future Runway 11C and 29C ILS, as shown on Figure B22492/11. The proposed development is within the BRAs for the Runway 11C and 29C future ILS localisers.

Previous discussions with BAPL, have advised that when a precision approach to the runway is proposed, a conventional ILS installation may not be viable due to the already surrounding development and may be replaced by more advanced systems, and as such BAPL may seek other technologies to deliver the precision approach capability. Other technologies may include:

- An approach and landing system known as a Ground Based Augmentation System (GBAS) Landing System (or GLS). This system, which provides greater accuracy, is one array of four short transmitter/receiver towers installed at an airport, which would require a feasibility study to determine an appropriate location taking into account pre-existing developments at such time; or
- Satellite Based Augmentation System (SBAS) once this becomes available in Australia.

Infringements of the ILS BRAs or any other options would need to be assessed further by Airservices Australia in accordance with Guideline G. However, the specifics of the ILS or any other equipment (including location, as we have assumed 'typical' ILS locations only) is not yet defined and as such it is unlikely that Airservices would be able to the complete the specialist engineering assessment referred to in the Guideline at this stage.

3.8 Guideline H: Protecting Strategically Important Helicopter Landing sites (HLS)

Guideline H is not relevant to the proposed development. Guideline H defines such Strategic Helicopter Landing Sites as being areas not located on an aerodrome. The Bankstown Airport HLS are discussed under Section 2.1.3 above.

3.9 Guideline I: Managing the Risk in Public Safety Areas at the Ends of Runways

Guideline I provides guidance on approaches for the application of Public Safety Areas (PSA) planning framework in Australian jurisdictions. The Guideline is intended to ensure there is no increase in risk from new development and assist land-use planners to better consider public safety when assessing development proposals, rezoning requires and when development strategic land use plans.

The Guideline acknowledges that the UK and Queensland approaches to the development of PSA contours are of most relevance to Australia. The dimensions of the Queensland PSA template were determined with reference to the UK methodology for determining third party risk. The Queensland State Planning Policy – Public Safety Area Model is included in Attachment 2 to Guideline I.

Using the Queensland State Planning Policy method, Bankstown Airport has identified Public Safety Areas at the end of each runway as illustrated on Figure B22492/12. This is one method of calculating Public Safety Areas, utilising an isosceles trapezoid for the end of each runway that forms the shape of an isosceles trapezoid - 1,000 metres long and 350 metres wide closest to the runway end tapering to a width of 250 metres furthest from the runway.

As part of the master planning process, and the ongoing on-airport development approval process, Bankstown Airport has regard to crash risk and public safety. Depending on the type of development being proposed, Bankstown Airport undertakes a safety case.

The level of risk has been calculated for the proposed development site in accordance with the historical practice adopted by BAPL based on the 2039 Australian Noise Exposure Forecast breakdown of aircraft types and movement distributions by runway. The estimated individual risk is a maximum of 0.6 in 100,000 per year which is less than the NASF Guideline I threshold of 1 in 100,000 per year for establishing a PSA.

While the level of risk is estimated to be below the NASF Guideline I threshold, part of the proposed development plan lies within the published Bankstown Airport PSA. In accordance with the above it will be for BAPL and CASA, through the on-airport development approval process, to determine whether further public safety assessment is required.

The detailed design should consider the general guidance provided in Guideline I with respect to the published PSAs, in consultation with BAPL and CASA, to ensure risks to public safety are as low as reasonably practicable.

4.0 Other Considerations

4.1 Wind Direction Indicator

The Bankstown Airport Wind Direction Indicator (WDI) and signal circle is within the proposed Aviation Hangar Project site on the southern side.

The WDI and signal circle are proposed to be relocated to the western side of PolAir and is subject to a separate assessment process with BAPL and CASA.

4.2 Air Traffic Control (ATC) Line of Sight

The proposed Aviation Hangar Project is within the extents of the line of sight from Bankstown Airport ATC tower eye level to the movement area per CASA MOS Part 172 – *Air Traffic Services* Version 2.2 Section 3.03 (1).

The proposed Northern and Southern Hangars at a maximum elevation of 21.1 m AHD and 21.6 m AHD, respectively, and illustrated on Figure B22492/13 would infringe the Bankstown Airport ATC visibility to the movement area, proposed Taxilane Kilo, on the north-eastern site of the proposed Aviation Hangar Precinct.

The proposal must be referred to Airservices Australia for their comment in relation to line of sight.

5.0 Construction Stage Impacts

Information in relation to the construction of the proposed development has not been provided. During construction, the construction sequencing and methodology should be considered carefully in relation to the OLS and PANS-OPS surfaces.

Penetrations of prescribed airspace by construction plant and equipment during construction constitute a controlled activity under the *Airports (Protection of Airspace) Regulations 1996*.

Construction activities on the site will need to be assessed and any penetrations of prescribed airspace will require approval under the Regulations.

6.0 Conclusion

L+R Airport Consulting has completed an aviation assessment against the National Airports Safeguarding Framework (NASF) Guidelines for the proposed Aviation Hangar Project on Bankstown Airport. The proposed Aviation Hangar Project at a maximum elevation of 21.6 m AHD assessment is summarised below.

- Will not infringe the existing Bankstown Airport OLS. All proposed landscaping and any car parking lighting must be kept below the OLS. Aircraft tail heights up to the height of the hangars would remain below the OLS when parked on the apron areas. Aircraft tail height limits will need to be confirmed, on the aircraft parking area once detailed finished ground levels are available;
- Will not infringe the future OLS Bankstown Airport Master Plan 2019. Aircraft tail heights up to the height of the Northern Hangars would remain below the future OLS. Aircraft tail heights at least 11 m high on the southern apron area would remain below the future OLS. Aircraft tail height limits, on the parking area, will need to be confirmed once detailed finished ground levels are available;
- Will not infringe the Main HLS OLS at Bankstown Airport. The northern and southern apron areas would allow for aircraft tail heights up to the height of the hangar and remain below the helicopter OLS. Aircraft tail height limits, within the aircraft parking area, will need to be confirmed once detailed finished ground levels are available.
- Should not infringe the existing PANS-OPS Runway 11C and 29C SID, however, must be submitted to Airservices Australia for formal assessment and confirmation of any impacts on procedures or facilities;
- Should not infringe the future PANS-OPS Runway 11C basic ILS surface. The northern apron area will allow for aircraft tail heights up to the height of the Northern Hangars and remain below. The southern apron area will allow for aircraft tail heights of at least approximately 10.9 m high. Aircraft tail height limits, on the aircraft parking area, will need to be confirmed once detailed finished ground levels are available;

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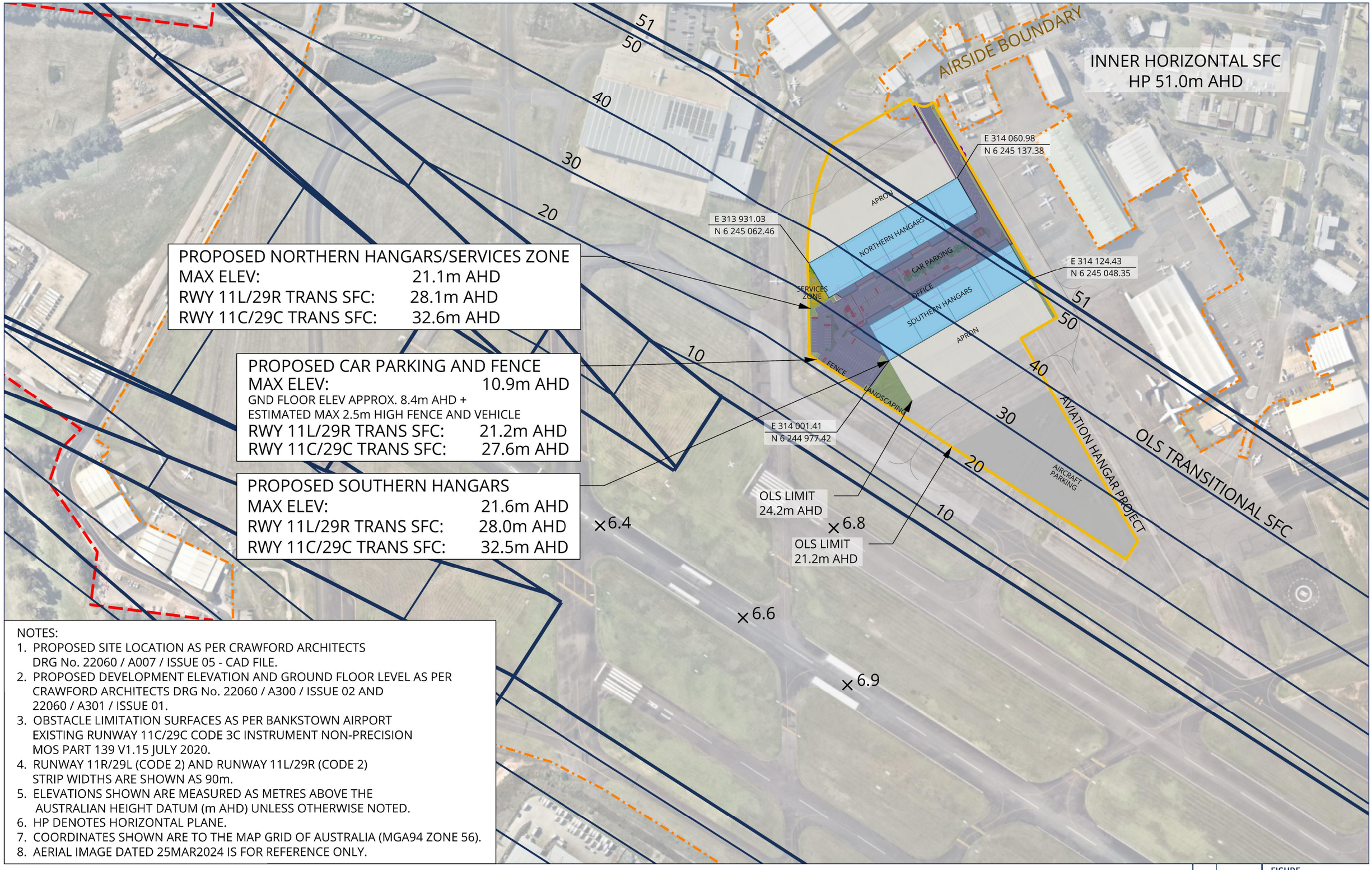
- Is partially within the current Bankstown Airport 2039 ANEF 30 to 35 zone and the ANEF 35 and greater zone. Commercial buildings are 'conditionally acceptable' in 25 to 35 ANEF, and 'unacceptable' in greater than 35 ANEF, light industrial use is 'conditionally acceptable' in 30 to 40 ANEF, and other industrial use is 'acceptable' in all ANEF zones. For 'conditionally acceptable' land uses, consideration of aircraft noise attenuation is required in accordance with AS2021-2015. Given the location of the site is in close proximity to busy runways, the proponent should consider the acoustic treatment of the proposed internal spaces to ensure it is fit for the use of the intended occupant;
- Is within the Guideline B building generated windshear and turbulence assessment trigger areas for Runways 11L, 11C and 11R, and infringes the 1:35 slope for all three runways. SLR has provided further specialist assessment;
- A detailed landscaping plan must be submitted to BAPL for review against the Bankstown Airport Wildlife Hazard Management Plan for approval;
- Is within the light control Zones A and B and should therefore meet the restrictions associated with Zone A. Zone A does not allow for any (0 cd) intensity of light sources measured 3 degrees above the horizontal. The lighting designer will need to ensure that the lights meet all requirements prescribed in the CASA *Part 139 (Aerodromes) Manual of Standards 2019*;
- Is outside the lateral protection areas associated with the Non-Directional Beacon (NDB), the Runway 11C/29C PAPI as per NASF Guideline G;
- Is within the BRAs for a possible future ILS, however, previous discussions with Bankstown Airport Proprietary Limited, have advised that when a precision approach to the runway is proposed, an ILS installation may not be viable due to the already surrounding development;
- Is within the Bankstown Airport PSAs. In accordance with Bankstown Airport master planning process, and the ongoing on-airport development approval process, it will be for BAPL and CASA to determine whether further public safety assessment is required;
- Would infringe the ATC line of sight to the manoeuvring area. The proposal must be submitted to Airservices Australia for comment; and
- Construction sequencing and methodology must be considered in relation to the OLS and PANS-OPS surfaces and airside access arrangements. Penetrations of prescribed airspace by construction plan and equipment during construction constitute a controlled activity under the *Airports (Protection of Airspace) Regulations 1996*.

For further information in relation to this matter please do not hesitate to contact the undersigned.

Yours faithfully,
For and on behalf of
LAMBERT & REHBEIN (SEQ) PTY LTD

B. WOUTS MPIA
PRINCIPAL CONSULTANT
AVIATION

Enc: Figures B22492/03 – 13



PROPOSED NORTHERN HANGARS/SERVICES ZONE
MAX ELEV: 21.1m AHD
RWY 11L/29R TRANS SFC: 28.1m AHD
RWY 11C/29C TRANS SFC: 32.6m AHD

PROPOSED CAR PARKING AND FENCE
MAX ELEV: 10.9m AHD
GND FLOOR ELEV APPROX. 8.4m AHD +
ESTIMATED MAX 2.5m HIGH FENCE AND VEHICLE
RWY 11L/29R TRANS SFC: 21.2m AHD
RWY 11C/29C TRANS SFC: 27.6m AHD

PROPOSED SOUTHERN HANGARS
MAX ELEV: 21.6m AHD
RWY 11L/29R TRANS SFC: 28.0m AHD
RWY 11C/29C TRANS SFC: 32.5m AHD

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AND GROUND FLOOR LEVEL AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. OBSTACLE LIMITATION SURFACES AS PER BANKSTOWN AIRPORT EXISTING RUNWAY 11C/29C CODE 3C INSTRUMENT NON-PRECISION MOS PART 139 V1.15 JULY 2020.
4. RUNWAY 11R/29L (CODE 2) AND RUNWAY 11L/29R (CODE 2) STRIP WIDTHS ARE SHOWN AS 90m.
5. ELEVATIONS SHOWN ARE MEASURED AS METRES ABOVE THE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
6. HP DENOTES HORIZONTAL PLANE.
7. COORDINATES SHOWN ARE TO THE MAP GRID OF AUSTRALIA (MGA94 ZONE 56).
8. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

EXISTING OBSTACLE LIMITATION SURFACES

NORTH
0 30 75 125m
1:3000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE:
B22492/03
Drawn: MK
Checked: BMW
Approved: BJH

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AND GROUND FLOOR LEVEL AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. OBSTACLE LIMITATION SURFACES AS PER BANKSTOWN AIRPORT MASTER PLAN 2019 WHICH INCLUDES AN EXTENSION FOR RUNWAY 11C/29C TO INSTRUMENT PRECISION 220m LONG AND WIDENING OF THE RUNWAY STRIP FROM 150 TO 300 METRES.
4. ELEVATIONS SHOWN ARE MEASURED AS METRES ABOVE THE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
5. HP DENOTES HORIZONTAL PLANE.
6. COORDINATES SHOWN ARE TO THE MAP GRID OF AUSTRALIA (MGA94 ZONE 56).
7. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

INNER HORIZONTAL SFC
HP 51.0m AHD

RWY 11C APPROACH SFC

RWY 11C/29C TRANSITIONAL SFC
BASED ON 300m RWS

AIRSIDE BOUNDARY

E 314 060.98
N 6 245 137.38

E 313 931.03
N 6 245 062.46

E 314 124.43
N 6 245 048.35

E 314 001.41
N 6 244 977.42

OLS LIMIT
26.5m AHD

OLS LIMIT
19.3m AHD

OLS LIMIT
17.4m AHD

PROPOSED NORTHERN HANGARS/SERVICES ZONE
MAX ELEV: 21.1m AHD
RWY 11C/29C TRANS SFC: 21.9m AHD
RWY 11L/29R TRANS SFC: 28.1m AHD

PROPOSED CAR PARKING AND FENCE
MAX ELEV: 10.9m AHD
GND FLOOR ELEV APPROX. 8.4m AHD +
ESTIMATED MAX 2.5m HIGH FENCE AND VEHICLE
RWY 11C/29C TRANS SFC: 16.9m AHD
RWY 11L/29R TRANS SFC: 21.2m AHD

PROPOSED SOUTHERN HANGARS
MAX ELEV: 21.6m AHD
RWY 11C/29C TRANS SFC: 21.9m AHD
RWY 11L/29R TRANS SFC: 28.0m AHD

APRON
NORTHERN HANGARS
CAR PARKING
SERVICES ZONE
OFFICE
SOUTHERN HANGARS
APRON
FENCE
LANDSCAPING
AIRCRAFT PARKING

51 50 40 30 20 10 6.1 6.4 6.6 6.8 6.9

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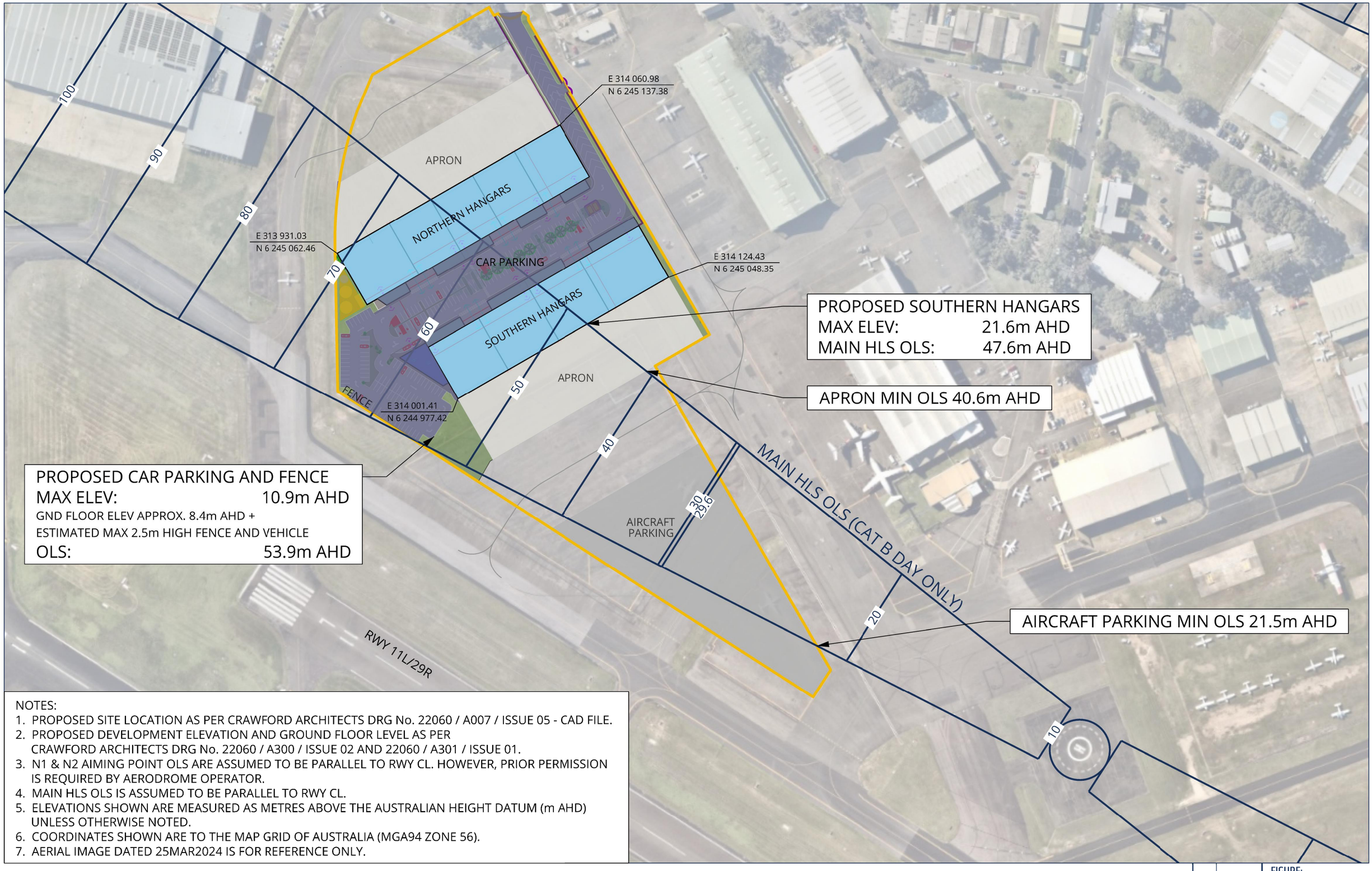
FUTURE OBSTACLE LIMITATION SURFACES

NORTH
0 30 75 125m
1:3000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE:
B22492/04

Drawn: MK
Checked: BMW
Approved: BJH



NOTES:

1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AND GROUND FLOOR LEVEL AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. N1 & N2 AIMING POINT OLS ARE ASSUMED TO BE PARALLEL TO RWY CL. HOWEVER, PRIOR PERMISSION IS REQUIRED BY AERODROME OPERATOR.
4. MAIN HLS OLS IS ASSUMED TO BE PARALLEL TO RWY CL.
5. ELEVATIONS SHOWN ARE MEASURED AS METRES ABOVE THE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
6. COORDINATES SHOWN ARE TO THE MAP GRID OF AUSTRALIA (MGA94 ZONE 56).
7. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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HELICOPTER OLS

NORTH

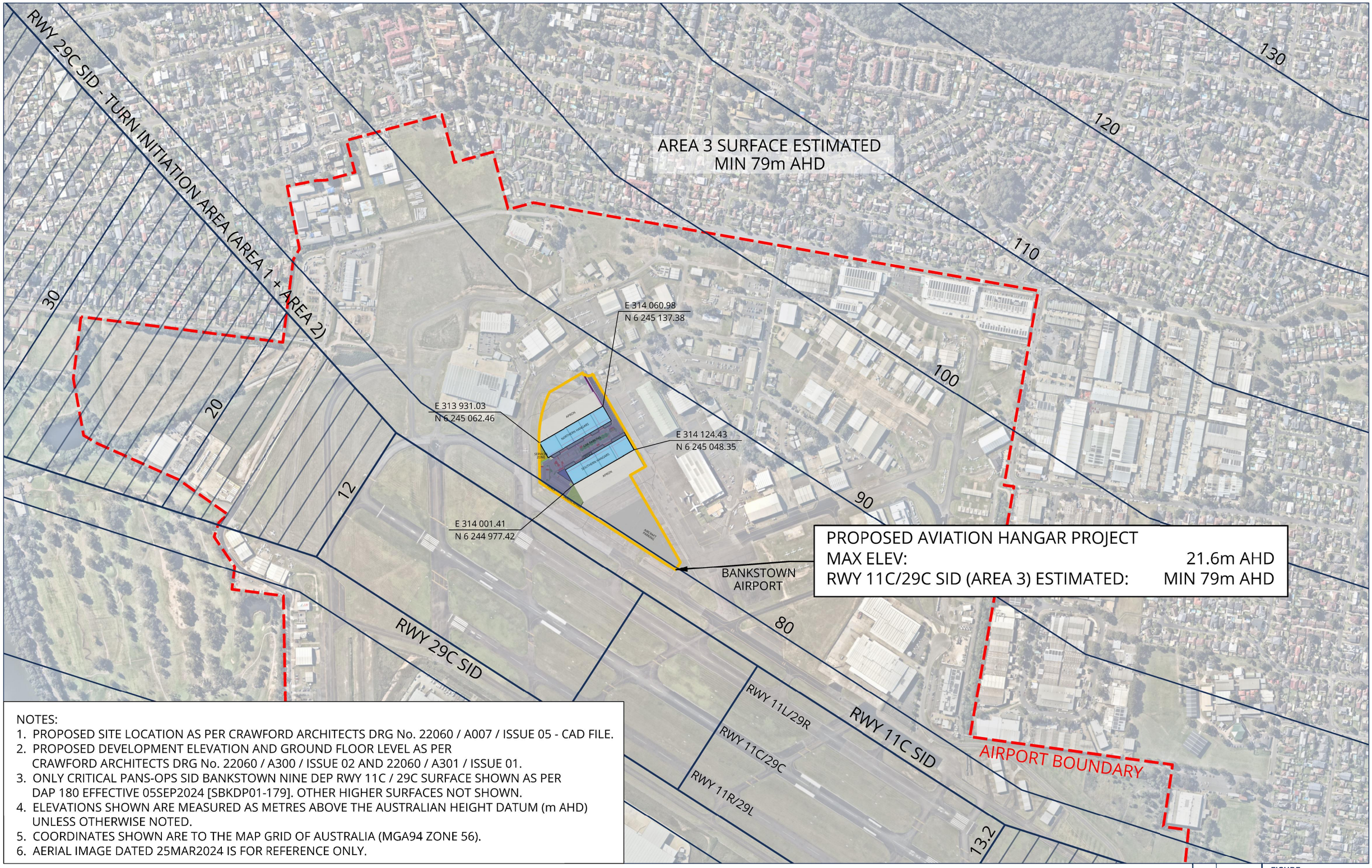
0 20 180 300m

1:2000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE:
B22492/05

Drawn: MK
Checked: BMW
Approved: BJH



NOTES:

1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AND GROUND FLOOR LEVEL AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. ONLY CRITICAL PANS-OPS SID BANKSTOWN NINE DEP RWY 11C / 29C SURFACE SHOWN AS PER DAP 180 EFFECTIVE 05SEP2024 [SBKDP01-179]. OTHER HIGHER SURFACES NOT SHOWN.
4. ELEVATIONS SHOWN ARE MEASURED AS METRES ABOVE THE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
5. COORDINATES SHOWN ARE TO THE MAP GRID OF AUSTRALIA (MGA94 ZONE 56).
6. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

PANS-OPS SID BANKSTOWN NINE DEP RWY 11C / 29C

NORTH

0 70 210 350m

1:7000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE: B22492/06

Drawn: MK
Checked: BMW
Approved: BJH

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AND GROUND FLOOR LEVEL AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. FUTURE PANS-OPS RWY 11C BASIC ILS AS PER BANKSTOWN AIRPORT MASTER PLAN 2019 WHICH INCLUDES AN EXTENSION FOR RUNWAY 11C/29C TO INSTRUMENT PRECISION 220m LONG AND WIDENING OF THE RUNWAY STRIP FROM 150 TO 300 METRES.
4. ELEVATIONS SHOWN ARE MEASURED AS METRES ABOVE THE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
6. COORDINATES SHOWN ARE TO THE MAP GRID OF AUSTRALIA (MGA94 ZONE 56).
7. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY..

PROPOSED NORTHERN HANGARS/SERVICES ZONE
ELEV: 21.1m AHD
FUTURE PANS-OPS RWY 11C BASIC ILS: 21.9m AHD

PROPOSED CAR PARKING AND FENCE
MAX ELEV: 10.9m AHD
GND FLOOR ELEV APPROX. 8.4m AHD + ESTIMATED MAX 2.5m HIGH FENCE AND VEHICLE
FUTURE PANS-OPS RWY 11C BASIC ILS: 17.8m AHD

PROPOSED SOUTHERN HANGARS
MAX ELEV: 21.6m AHD
FUTURE PANS-OPS RWY 11C BASIC ILS: 21.7m AHD

APRON AREA
FUTURE PANS-OPS LIMIT 26.5m AHD

APRON AREA
FUTURE PANS-OPS LIMIT 19.3m AHD

AIRCRAFT PARKING AREA
FUTURE PANS-OPS LIMIT 17.4m AHD

PANS-OPS RWY 11C BASIC ILS TRANS SFC

E 314 060.98
N 6 245 137.38

E 313 931.03
N 6 245 062.46

E 314 124.43
N 6 245 048.35

E 314 001.41
N 6 244 977.42

BANKSTOWN AIRPORT

RWY 11C/29C

RWY 11L/29R

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FUTURE PANS-OPS RWY 11C BASIC ILS

NORTH

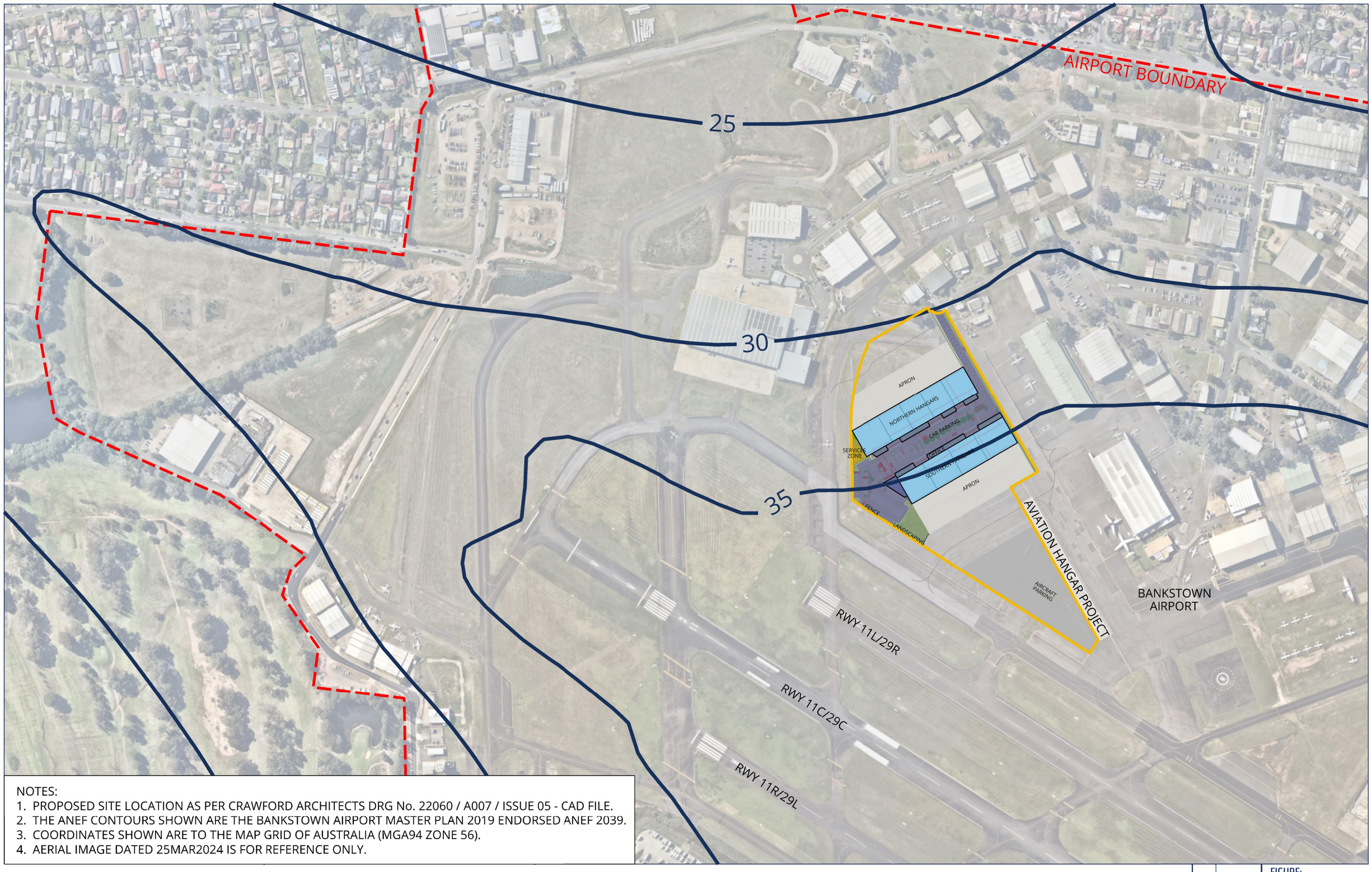
0 30 90 150m

1:3000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE:
B22492/07

Drawn: MK
Checked: BMW
Approved: BJH



NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. THE ANEF CONTOURS SHOWN ARE THE BANKSTOWN AIRPORT MASTER PLAN 2019 ENDORSED ANEF 2039.
3. COORDINATES SHOWN ARE TO THE MAP GRID OF AUSTRALIA (MGA94 ZONE 56).
4. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

NASF GUIDELINE A - BANKSTOWN AIRPORT ENDORSED ANEF 2039

NORTH

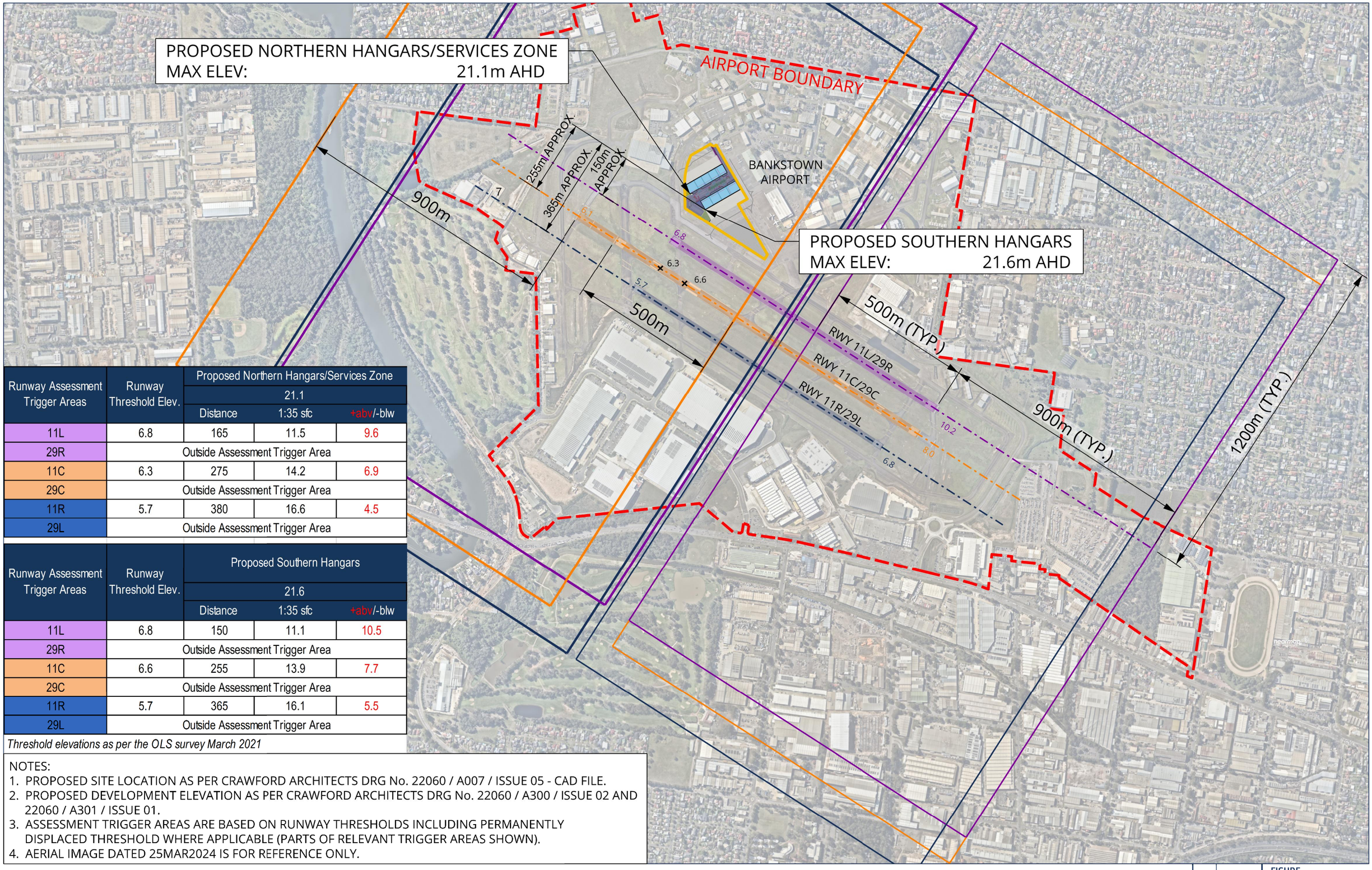
0 40 120 200m

1:4000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE: B22492/08

Drawn: MK
Checked: BMW
Approved: BJH



Runway Assessment Trigger Areas	Runway Threshold Elev.	Proposed Northern Hangars/Services Zone		
		21.1		
		Distance	1:35 sfc	+abv/-blw
11L	6.8	165	11.5	9.6
29R	Outside Assessment Trigger Area			
11C	6.3	275	14.2	6.9
29C	Outside Assessment Trigger Area			
11R	5.7	380	16.6	4.5
29L	Outside Assessment Trigger Area			

Runway Assessment Trigger Areas	Runway Threshold Elev.	Proposed Southern Hangars		
		21.6		
		Distance	1:35 sfc	+abv/-blw
11L	6.8	150	11.1	10.5
29R	Outside Assessment Trigger Area			
11C	6.6	255	13.9	7.7
29C	Outside Assessment Trigger Area			
11R	5.7	365	16.1	5.5
29L	Outside Assessment Trigger Area			

Threshold elevations as per the OLS survey March 2021

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. ASSESSMENT TRIGGER AREAS ARE BASED ON RUNWAY THRESHOLDS INCLUDING PERMANENTLY DISPLACED THRESHOLD WHERE APPLICABLE (PARTS OF RELEVANT TRIGGER AREAS SHOWN).
4. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

NASF GUIDELINE B - ASSESSMENT TRIGGER AREAS

NORTH

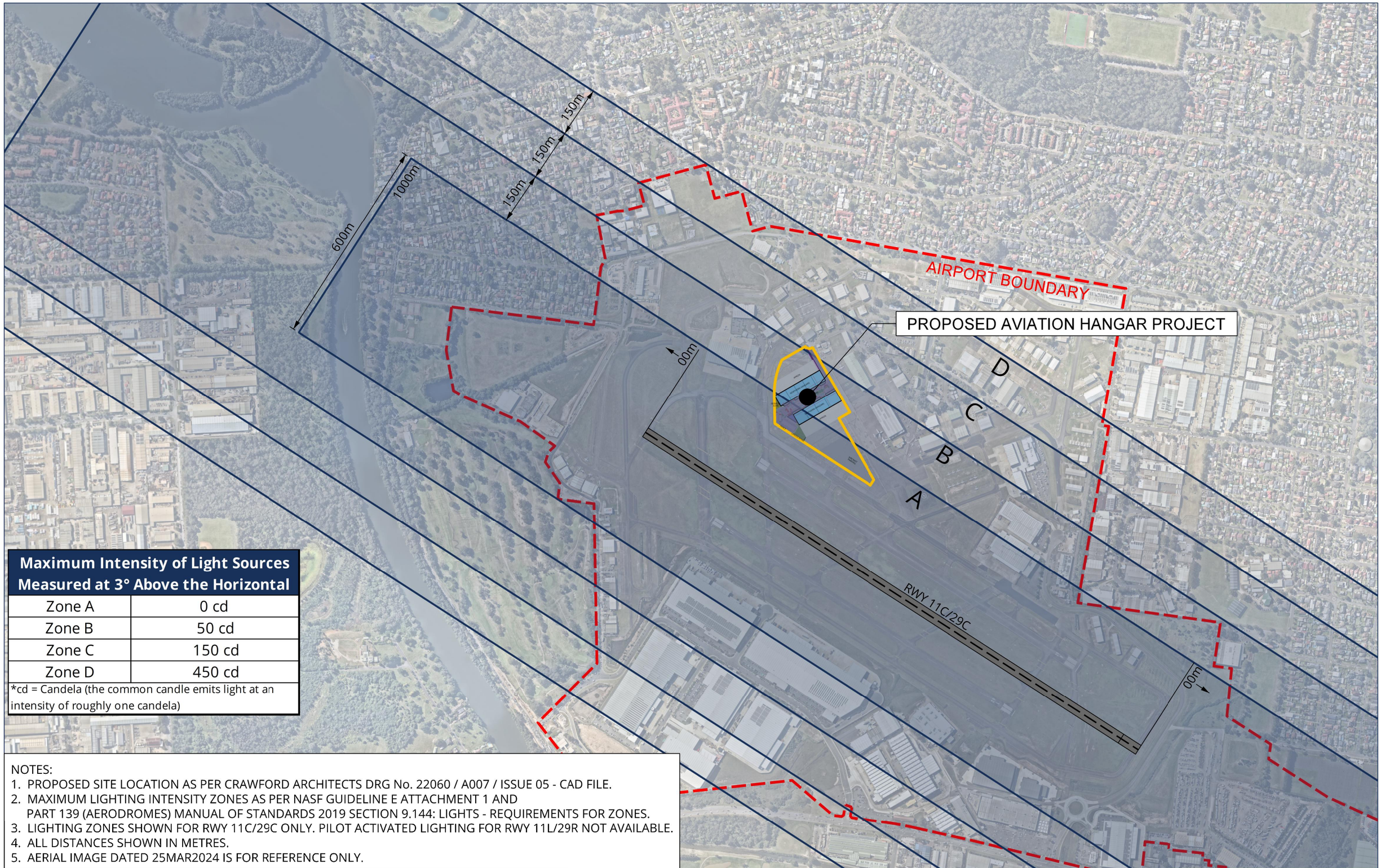
0 120 360 600m

1:12000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE: B22492/09

Drawn: MK
Checked: BMW
Approved: BJH



Maximum Intensity of Light Sources Measured at 3° Above the Horizontal	
Zone A	0 cd
Zone B	50 cd
Zone C	150 cd
Zone D	450 cd

*cd = Candela (the common candle emits light at an intensity of roughly one candela)

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. MAXIMUM LIGHTING INTENSITY ZONES AS PER NASF GUIDELINE E ATTACHMENT 1 AND PART 139 (AERODROMES) MANUAL OF STANDARDS 2019 SECTION 9.144: LIGHTS - REQUIREMENTS FOR ZONES.
3. LIGHTING ZONES SHOWN FOR RWY 11C/29C ONLY. PILOT ACTIVATED LIGHTING FOR RWY 11L/29R NOT AVAILABLE.
4. ALL DISTANCES SHOWN IN METRES.
5. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

NASF GUIDELINE E - MAXIMUM LIGHTING INTENSITY ZONES

NORTH

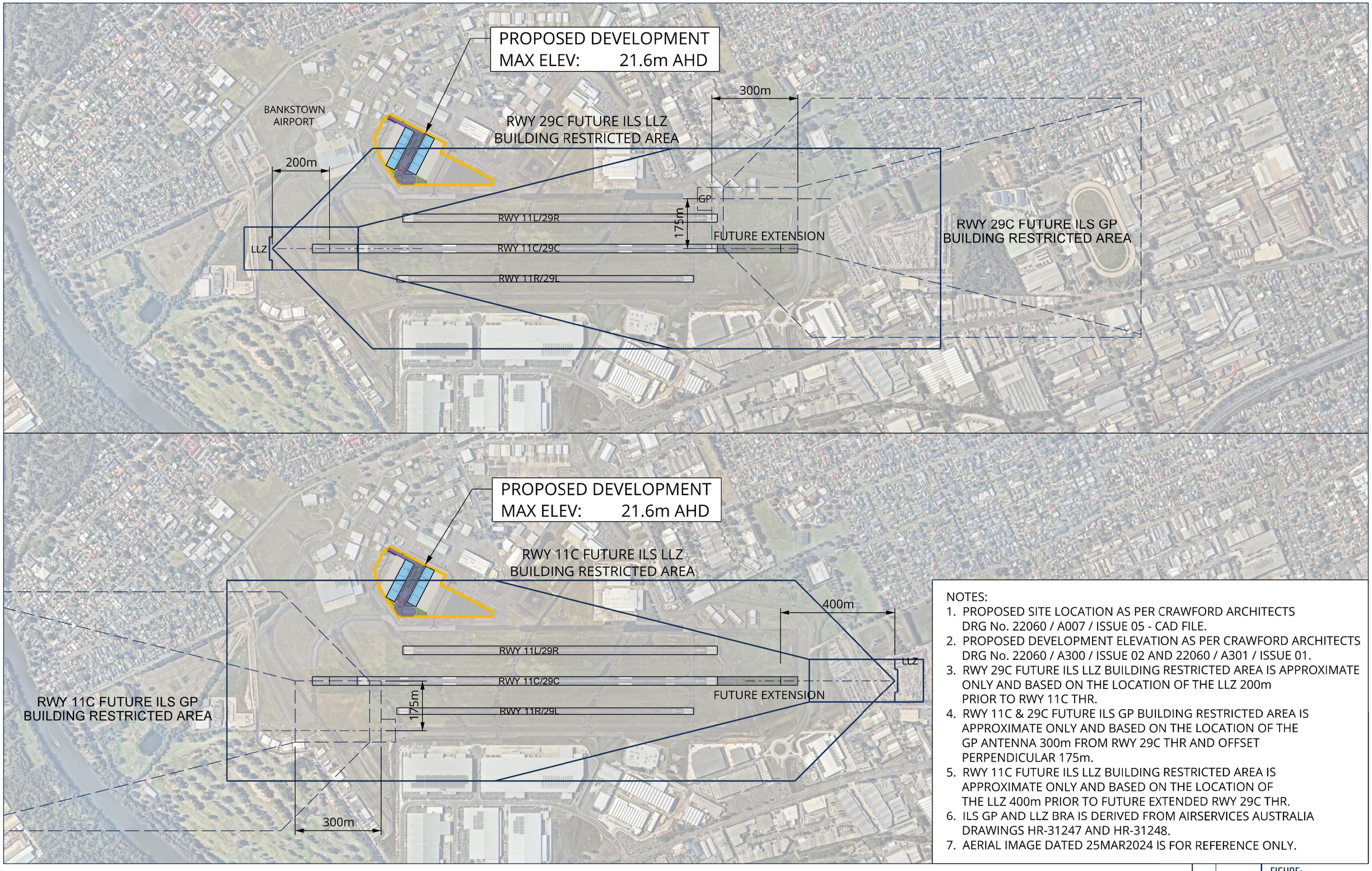
0 100 300 500m

1:10000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE: B22492/10

Drawn: MK
Checked: BMW
Approved: BJH



NOTES:

1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. RWY 29C FUTURE ILS LLZ BUILDING RESTRICTED AREA IS APPROXIMATE ONLY AND BASED ON THE LOCATION OF THE LLZ 200m PRIOR TO RWY 11C THR.
4. RWY 11C & 29C FUTURE ILS GP BUILDING RESTRICTED AREA IS APPROXIMATE ONLY AND BASED ON THE LOCATION OF THE GP ANTENNA 300m FROM RWY 29C THR AND OFFSET PERPENDICULAR 175m.
5. RWY 11C FUTURE ILS LLZ BUILDING RESTRICTED AREA IS APPROXIMATE ONLY AND BASED ON THE LOCATION OF THE LLZ 400m PRIOR TO FUTURE EXTENDED RWY 29C THR.
6. ILS GP AND LLZ BRA IS DERIVED FROM AIRSERVICES AUSTRALIA DRAWINGS HR-31247 AND HR-31248.
7. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

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FUTURE ILS BUILDING RESTRICTED AREAS

NORTH

0 120 360 600m

1:12000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

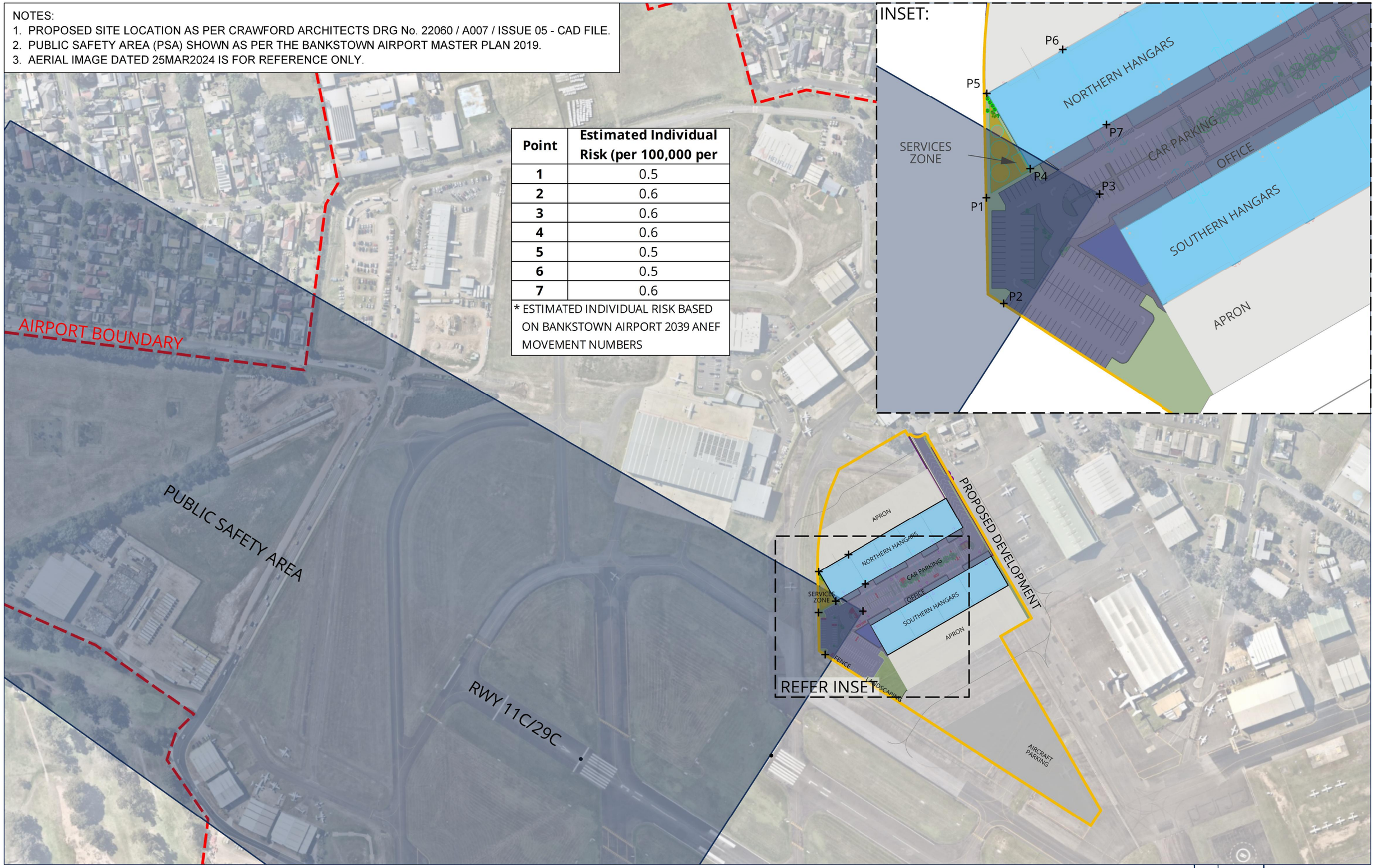
FIGURE: B22492/11

Drawn: MK
Checked: BMW
Approved: BJH

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PUBLIC SAFETY AREA (PSA) SHOWN AS PER THE BANKSTOWN AIRPORT MASTER PLAN 2019.
3. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.

Point	Estimated Individual Risk (per 100,000 per
1	0.5
2	0.6
3	0.6
4	0.6
5	0.5
6	0.5
7	0.6

* ESTIMATED INDIVIDUAL RISK BASED ON BANKSTOWN AIRPORT 2039 ANEF MOVEMENT NUMBERS



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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

NASF GUIDELINE I - PUBLIC SAFETY AREA

NORTH

0 35 105 175m

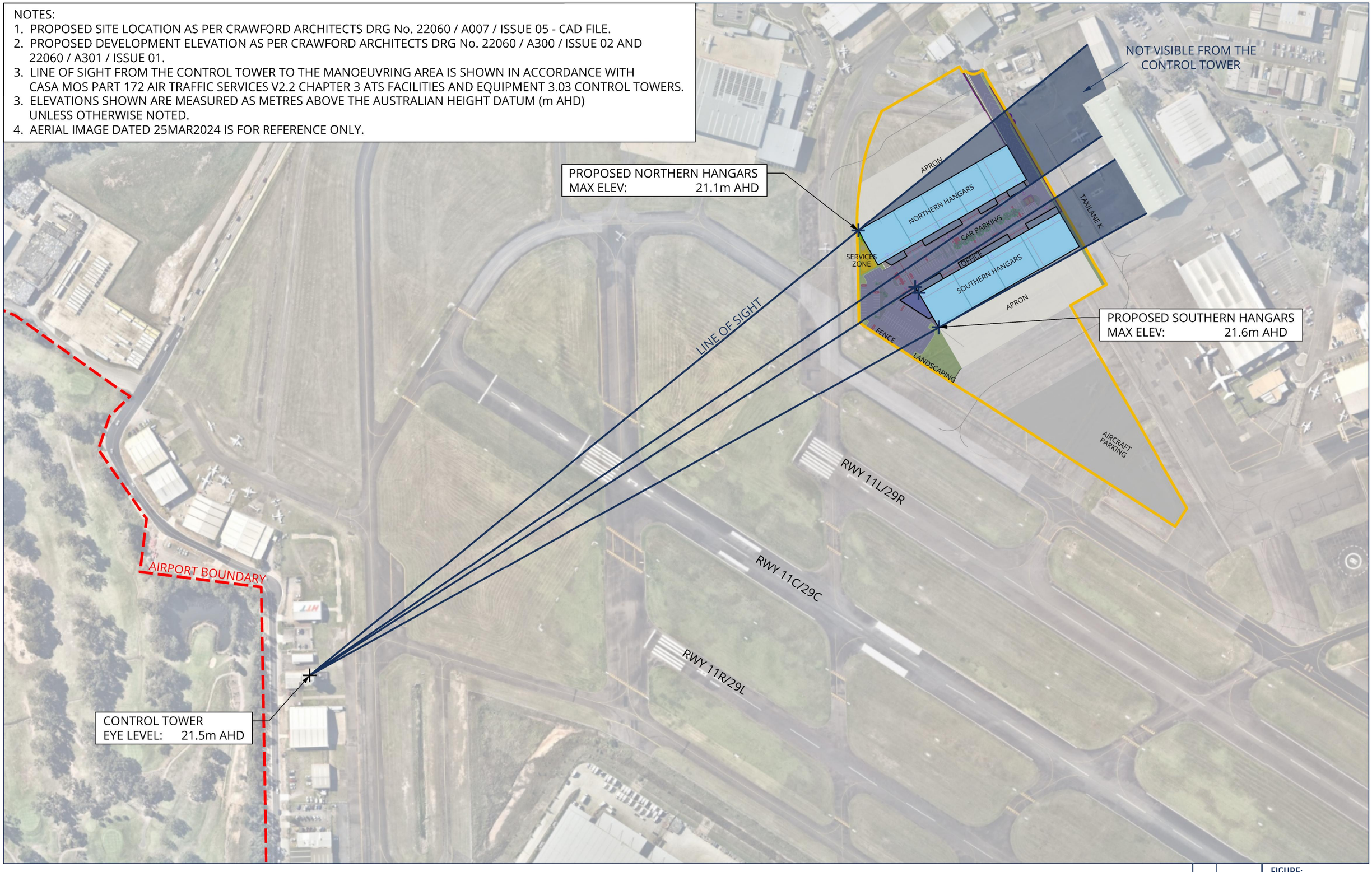
1:3500@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE:
B22492/12

Drawn: MK
Checked: BMW
Approved: BJH

NOTES:
1. PROPOSED SITE LOCATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A007 / ISSUE 05 - CAD FILE.
2. PROPOSED DEVELOPMENT ELEVATION AS PER CRAWFORD ARCHITECTS DRG No. 22060 / A300 / ISSUE 02 AND 22060 / A301 / ISSUE 01.
3. LINE OF SIGHT FROM THE CONTROL TOWER TO THE MANOEUVRING AREA IS SHOWN IN ACCORDANCE WITH CASA MOS PART 172 AIR TRAFFIC SERVICES V2.2 CHAPTER 3 ATS FACILITIES AND EQUIPMENT 3.03 CONTROL TOWERS.
3. ELEVATIONS SHOWN ARE MEASURED AS METRES ABOVE THE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
4. AERIAL IMAGE DATED 25MAR2024 IS FOR REFERENCE ONLY.



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AVIATION ASSESSMENT - AVIATION HANGAR PROJECT, BANKSTOWN AIRPORT

AIR TRAFFIC CONTROL (ATC) - LINE OF SIGHT

NORTH

0 30 90 150m

1:3000@ A3

Rev.	Date
3	17.09.24
2	21.05.24
1	15.12.23
0	01.12.23

FIGURE:
B22492/13

Drawn: MK
Checked: BMW
Approved: BJH