

> Airspace Protection

Bankstown Airport

Master Plan
2004/05



> Airspace Protection

25.1 Airspace Protection Overview

The protection of the airspace surrounding airports is a critical component of maintaining a safe operating environment for both current traffic types and levels as well as for future traffic types and levels.

Consequently, it is necessary to restrict some types of development and land uses in the vicinity of airports. This ensures that airspace required to facilitate aircraft operations remain obstacle free and hence contribute to the safety and efficiency of those operations.

In order to facilitate broad community understanding of these restrictions, the following aspects are provided below:

- description of the regional airspace and operating procedures;
- prescribed airspace (OLS and PANS-OPS);
- external lighting limitations; and
- stack and vent efflux limitations.

25.2 Regional Airspace

25.2.1 Overview

Airservices Australia is responsible for airspace management within the Sydney Basin, as well as elsewhere in Australia. The airspace within the Sydney Basin is dominated by the Sydney Airport Control Zone (CTR) and the requirement to efficiently manage the large volume of domestic and international aircraft movements into and out of that airport.

The Sydney Airport Control Area (CTA) is comprised of a series of controlled airspace blocks, ascending in vertical steps, and extending out to a maximum radius of 45 nautical miles (NM) at its greatest dimension. The Airservices Australia Sydney Terminal Control Unit (TCU) provides traffic management and separation within the airport CTA and CTR. Aircraft take off and landing clearances, as well as ground movements, are handled by the Sydney Control Tower.

The Bankstown Airport CTR extends out 3 NM from the airport, except where it would otherwise overlap the Sydney Airport CTR to the east. To prevent overlapping CTRs, the Bankstown Control Zone is truncated to approximately 2 NM from the airport. The ability of Bankstown and Sydney Airports to

operate independently is predicated on the ability of aircraft using Bankstown to remain within the airport's CTR and to not infringe on Sydney Airport airspace.

Under visual flight rule (VFR) conditions when the Air Traffic Control Tower (ATCT) is in operation, all aircraft operating at Bankstown are required to follow General Aviation Airport Procedures (GAAP) within the airport's CTR. When the ATCT is closed, pilots are required to report their position under Mandatory Broadcast Zone (MBZ) procedures. However, under proposed changes to the National Airspace System (NAS), MBZ procedures may be replaced in the future by use of Common Traffic Advisory Frequency (CTAF) or some similar requirement. During instrument flight rule (IFR) conditions, the Sydney TCU provides separation services for instrument arrivals and departures at Bankstown. However, IFR traffic into and out of Bankstown must be managed in association with and sequenced relative to aircraft traffic at Sydney Airport.

The proximity of Bankstown Airport and Sydney Airport, combined with the orientation of runways at the two airports create the potential for airspace conflicts under certain combinations of conditions and flight operations. In 1998, the Minister of Transport and Regional Development advised Airservices Australia that Sydney International Airport operations should be given priority over those at Bankstown Airport, as well as other airports in the Sydney Basin. Since that time, airspace and air traffic management procedures have given precedence to accommodating traffic at Sydney International Airport.

Of the remaining airports in the Sydney Basin, Camden Airport has a CTR and GAAP procedures are used to maintain traffic separation during the hours the control tower is in operation. When the control tower is closed, MBZ procedures are in effect. Hoxton Park Airport is an uncontrolled airport and a CTAF zone applies within 2 NM of the airport. RAAF Richmond has a control tower and CTR. In its south east quadrant, the Richmond CTR abuts portions of the Sydney CTR.

Airservices Australia has established a Lane of Entry (LOE) to the Bankstown CTR, which allows aircraft access to and from Bankstown without needing to enter the Control Zones surrounding RAAF Richmond and Sydney Airport. The LOE is a corridor of airspace 8 to 10 NM in width and a ceiling height of 2,000 to 2,500 feet. Additionally, the LOE may also be used by smaller aircraft wishing to transit from north of Sydney to areas south and south west of the city.

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There are six flying training areas within the Sydney Basin. The areas are encompassed within an area bounded by a line extending from the western boundary of the Bankstown CTR to the Richmond CTR then to the Blue Mountains, Camden, Hoxton Park and back to the Bankstown CTR. The training areas are designated (Class G) uncontrolled airspace which extends from the surface up to the base of the overlying CTA step at 4,500 feet. Bankstown, Camden and Hoxton Park Airports are reported to be the predominant source of flying training activity using this area.

Regional airspace allocations within the Sydney Airport CTR are depicted in Figure 19.

25.2.2 Local Airspace and Air Traffic Control

As discussed above, Bankstown is a GAAP CTR with a vertical limit of 1,500 feet and a nominal radius of 3 nautical miles. To avoid overlapping CTRs, the Bankstown CTR is truncated to 2 NM where it abuts Sydney International Airport's CTR. Flight procedures at Bankstown are normally conducted so as to avoid aircraft entry into the Sydney International CTR unless specific clearances have been received to do so from the Sydney TCU.

When the Bankstown CTR is active, i.e. when the ATCT is in operation, aircraft are not authorised to enter the CTR without clearance from the tower.

There are two designated GAAP approach points and associated routes identified in the Airservices Australia Enroute Supplement for Bankstown:

- Prospect Reservoir to the north-west, on a radial of 136 degrees M; and
- abeam the 2RN radio transmitter to the southwest, on a radial of 057 degrees M.

The GAAP Prospect approach route serves as an entry for aircraft arriving from the north west, including those returning from the designated flying training areas. The GAAP 2RN approach route is the entry point for traffic arriving from the south and west.

A Bankstown Lane of Entry (LOE) has been established to create a corridor for light aircraft access to and from the Bankstown CTR without entering the adjacent controlled airspace for Sydney Airport and RAAF Richmond. In addition, the Bankstown LOE provides a corridor outside of controlled airspace for light aircraft transiting between

areas north of Sydney and areas to the south and south west of Sydney.

The LOE specifies vertical limits on operating altitude to ensure adequate aircraft separation from overlying controlled and restricted airspace. When using the LOE, pilots must operate VFR and comply with general flight rules regarding terrain clearance, and flights over populated and low-level restricted areas.

As already noted in the discussion of regional airspace above, the area west of Bankstown to the Warragamba Dam/Lake Burragorang and bounded by the Great Western and Hume Highways is a designated flying training area. This flying training area is reported to be heavily used by aircraft from Bankstown Airport.

Studies have examined the airspace implications of potential RPT service at Bankstown and possible air traffic conflicts arising from larger, more sophisticated aircraft that might be associated with scheduled passenger service. A February, 2001 Airservices Australia study concluded that:

"The introduction of RPT operations to Bankstown will necessitate the expansion of controlled airspace around Bankstown, the introduction of Class C airspace traffic management procedures at Bankstown and the redesign of the Bankstown procedures for arrivals from the east (runway 29 CI (C) arrivals) and departures to the east (runway 11CI (C) departures). These new arrival and departure procedures will result in increased interaction with Sydney Airport operations."

Airservices Australia notes that the Bankstown CTR is currently designed to accommodate low to medium performance general aviation aircraft. Should larger, faster commercial passenger turbo propeller or turbo jet aircraft serve the airport in the future, airspace and air traffic management procedures will need to be carefully examined to minimise conflicts between the two airports.

More recently, Airservices noted in discussions with BAL, that at low levels of RPT operations, Class C airspace management procedures may only need to apply when the larger aircraft are present in the system, and the airport could otherwise continue to operate under GAAP.

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While a significant number of RPT operations could require more general application of Class C airspace for both arriving and departing aircraft, the number of RPT movements triggering such a change would likely need to exceed 12 or more per hour. BAL will continue to work with Airservices Australia to determine airspace and approach issues for RPT on a demand driven basis.

Future technologies such as Global Navigation Satellite System (GNSS) may eventually create long-term solutions by allowing curved approaches, which could offer air traffic management procedures not presently available.

25.2.3 Air Traffic Control

The air traffic control tower operates generally from 6:00am until 9:00pm Monday through Friday, and 6:00am to 8:00pm Saturday and Sunday. Aircraft wishing to enter the Bankstown CTR must seek clearance from the tower prior to entry. Outside tower hours the GAAP CTR reverts to a MBZ.

Essentially there are three parallel runways which operate as a single entity. Under visual conditions, the outer runways are operated simultaneously with contra-rotating circuits. One runway, typically Runway 11L/29R, provides for arrival and departures while the other runway, Runway 11R/29L, is used for circuit training or touch and go operations.

Circuit training, which involves repetitious operations, is directed to runway 11R/29L for noise abatement reasons. This allows the aircraft to overfly primarily open space and commercial/industrial properties. Arrivals and departures are managed on runway 11L/29R with aircraft departing from or joining circuits to the north of the airport.

Circuits are conducted at 1,000 feet. Aircraft depart either on runway heading or on the extended crosswind leg and maintain 1,000 feet until clear of the CTR. Arriving aircraft enter the CTR at 1,500 feet and maintain this altitude until the mid-point of the downwind circuit. This guarantees vertical separation of conflicting traffic.

At night or in instrument conditions, all operations are confined to the central runway (Runway 11C/29C).

25.2.4 Available Approaches

All instrument approach procedures into to Bankstown Airport are non-precision. As a result, the minimum pilot decision heights are relatively high compared

to precision instrument approaches. The lowest classification of precision instrument approach is Category I, which provides a minimum decision height of 200 feet.

Table 11
Available Approaches at Bankstown Airport

Published Approach	Type	Minimum Decision Height (in Feet AGL)
Runway 11C NDB/SY DME	NDB (Note: GPS may be used in lieu of SY DME)	Code A, B, C aircraft – 651 feet
Radar One/ BK NDB	Circling Approach	Code A, B – 881 feet Code C - 911
Radar Two/ BK NDB/SY VOR	Circling Approach	Code A, B – 881 feet Code C - 911
Runway 11C GPS	GPS	Code A, B, C aircraft – 651 feet
Sydney VOR/ BK NDB	Circling Approach	Code A, B – 881 feet Code C - 911

In addition to the published non-precision approaches, there are two Standard Arrival Routes (STARs) for Bankstown. The WATLE Four STAR is for aircraft arriving from the west and the Richmond Four STAR is for aircraft arriving from the north to north west. Standard Instrument Departure procedures (SIDs) are published for all Bankstown runways except Runway 18/36.

25.3 Prescribed Airspace

The Airports Act 1996 requires the production of prescribed airspace plans for airports. Under the Airports (Protection of Airspace) Regulations, prescribed airspace is defined as airspace above any part of the OLS or PANS-OPS surfaces, whichever represents the lower airspace surface.

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The object of prescribed airspace is to ensure that the airport is not adversely affected by the building of structures in the area used by arriving and departing aircraft. The prescribed airspace plan which represents the OLS and PANS-OPS surfaces gives airport operators guidance in protecting critical surfaces that affect instrument approach minimum altitudes.

25.3.1 OLS

The OLS at Bankstown Airport are defined under the CASA MOS Part 139 – Aerodromes, Section 7.3 and they are established in accordance with International Civil Aviation Organization (ICAO) specifications. The OLS are comprised of a series of imaginary planes surrounding an airport which must be kept free and clear of obstructions that could be hazardous to aircraft taking off or landing at the facility. The surfaces are intended to prevent development of airspace obstructions that could adversely impact air navigation or the usability of the facility. The height restrictions imposed by the OLS are determined based on the following factors:

- the intended use of the runway, i.e. for take-off, landing or both;
- the runway code as determined by the runway length and type of aircraft using the runway; and
- type of approach, i.e. non-instrument, non-precision or precision instrument.

Extending off the end of each runway, the OLS standards define both a “take-off climb” surface and an “approach surface” for landing. Where take-offs and landings may occur in either direction along a runway, the more restrictive approach surfaces for landings should be used in determining obstacle height restrictions. At Bankstown Airport, it is assumed that take-offs and landings may occur in either direction of the runways and therefore the landing approach surfaces are used in this analysis.

Surrounding the runway pavement is the Runway Strip. The Runway Strip is defined as an area including the runway and stopway, if any, intended to reduce the risk of damage to aircraft running off the runway surface, and to protect aircraft flying over it during take-off or landing. The dimensions of the Runway Strip determine where the OLS surfaces begin and are defined based on the width of the runway pavement, type of aircraft using the runway, and level of precision approach capability available.

The OLS for Bankstown Airport are depicted in Figure 20.

25.3.2 PANS-OPS

The PANS OPS surfaces cover all current approaches based on conventional radar navigation aids at Bankstown. Future procedures for the airport have been considered and consequently, to preserve future options, both Global Positioning System – Precision & Non-Precision Approach (GPS-NPA) surfaces have been identified for protection.

Any precision approach will need to be determined by AirServices Australia taking into consideration the interface with Sydney Airport air space and the schedule, fleet mix and aircraft type of any future RPT operator.

The PANS-OPS surfaces for Bankstown Airport are presented in Figure 21.

25.3.3 Changes to the OLS & PANS-OPS

The proposed aviation development concept contained in this DMP results in a number of changes to the existing OLS and PANS-OPS for the airport. The changes to the OLS include:

- extension of the OLS for runway (11C/29C) by 220m and widening of the runway strip from 150m to 300m;
- deletion of all OLS surfaces associated with 18/36 runway;
- flattening of the take-off and approach surfaces to reflect a Code 3 Category 1 Precision Approach; and
- changes to the transitional and related surfaces to reflect the 11C/29C runway extension and strip widening.

In terms of PANS-OPS, the existing surfaces have been identified for each of the instrument procedures published by Air Services Australia. These include a standard instrument departure (SID) from runway 18/36. This surface is not included in the future airspace protection. The surfaces for the parallel runway complex have been amended to account for the extension of Runway 11C/29C and the use of a precision approach.

25.4 Restrictions to External Lighting

CASA provides airport operators with guidance on protecting aircraft operations from adverse impacts resulting from ground lighting, particularly during the landing phase of flight. Furthermore, under regulation 94 of the Civil Aviation Regulations 1988 (CAR 1988),

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CASA has the authority to require lights which may cause confusion, distraction or glare to pilots in the air to be extinguished or modified. Pilot confusion or distraction may be the result of lighting colour, position, pattern or intensity of emission above the horizontal plane.

Should the owner of property creating a lighting hazard fail to take remedial action once they have been notified, CASA is authorised under the regulations to make modifications to remove the hazard at the property owner's expense.

General guidance is provided for situations where lights are to be installed within a 6 km radius of the airport as lights within this area are considered most likely to fall under the provisions of regulation 94 of CAR 1988. Further guidance is provided as to allowable light levels, as measured 3 degrees above the horizontal, in four zones surrounding the runway and extending out a total distance of 4,500 metres from the runway threshold. The zones become narrower and shorter the closer to the runway threshold. The maximum allowable lighting intensity in each zone decreases the closer to the runway. The most critical area is the inner zone (Zone A), which extends 1000 metres beyond the runway threshold and 300 metres to each side of the runway centre line.

Potential conflicts or distractions caused by lighting colour are noted as independent from lighting intensity as some colours may cause confusion with airport lighting.

Adverse impacts from ground lighting can often be associated with outdoor advertising displays, sports field lighting and street lighting. At present, no adverse impacts from ground light emissions are known to exist at the airport. Lighting associated with future development in the airport vicinity should conform to the provisions of regulation 94 of the CAR.

To assist developers, lighting designers and installation contractors in the vicinity of airports, BAL has prepared a plan highlighting maximum lighting intensities in areas surrounding Bankstown Airport. This is presented in Figure 22 below. External advertising, sports field floodlighting and street lighting are some of the more likely lighting sources requiring consideration. BAL will consult and liaise with Bankstown City Council, and other Councils as appropriate, on the most appropriate mechanism for ensuring that external lighting does not adversely impact on Airport operations.

25.5 Stack and Vent Efflux

CASA has identified the need to assess the potential hazard to aviation where the vertical velocity from gas efflux may cause airframe damage and/or affect the handling characteristics of an aircraft in flight. This is especially critical during periods of high pilot workload or when the aircraft is being manoeuvred at low altitudes, particularly with flaps extended and/or gear down.

Typically this includes the initial take-off climb or approach to land, when the aircraft is in the vicinity of an airport.

In some cases the high efflux temperature or velocity may cause air disturbance at higher altitudes. If so, CASA also requires an assessment of the potential for the exhaust plume to affect the safe handling of aircraft in other phases of flight.

The draft CASA Advisory Circular AC 139-05(0) provides airport operators with guidance for assessing possible adverse impacts of gas efflux on aircraft operations in the vicinity of the airport. Plumes with a vertical velocity greater than 4.3 meters/second may cause airframe damage to aircraft during critical stages of flight, such as landing with full flaps extended.

Proponents of a facility to be located within 15 kilometres of an airport are to consult the airport operator if that facility includes a combustion source which generates an exhaust plume which has a vertical velocity greater than 4.3 m/s at the OLS.

The Advisory Circular notes that plumes exceeding 4.3 meters/second vertical velocity at the Obstacle Limitation Surface, or 360 feet AGL should be deemed a potential hazard to aircraft and identified as an "obstacle" in accordance with the provisions of CASR Part 139.

The hazards addressed in the Advisory Circular are typically associated with industrial processes. At Bankstown Airport, there are no known sources of gas efflux or plumes that would constitute a hazard to aircraft operating at the airport. The Airports Act 1996 also provides for protection of airspace against stack and vent efflux. BAL will consult and liaise with Bankstown City Council, and other Councils as appropriate, on the most appropriate mechanism so that stack and vent efflux does not adversely impact on Airport operations.

> Figure 20

Bankstown Airport Obstacle Limitation Surfaces

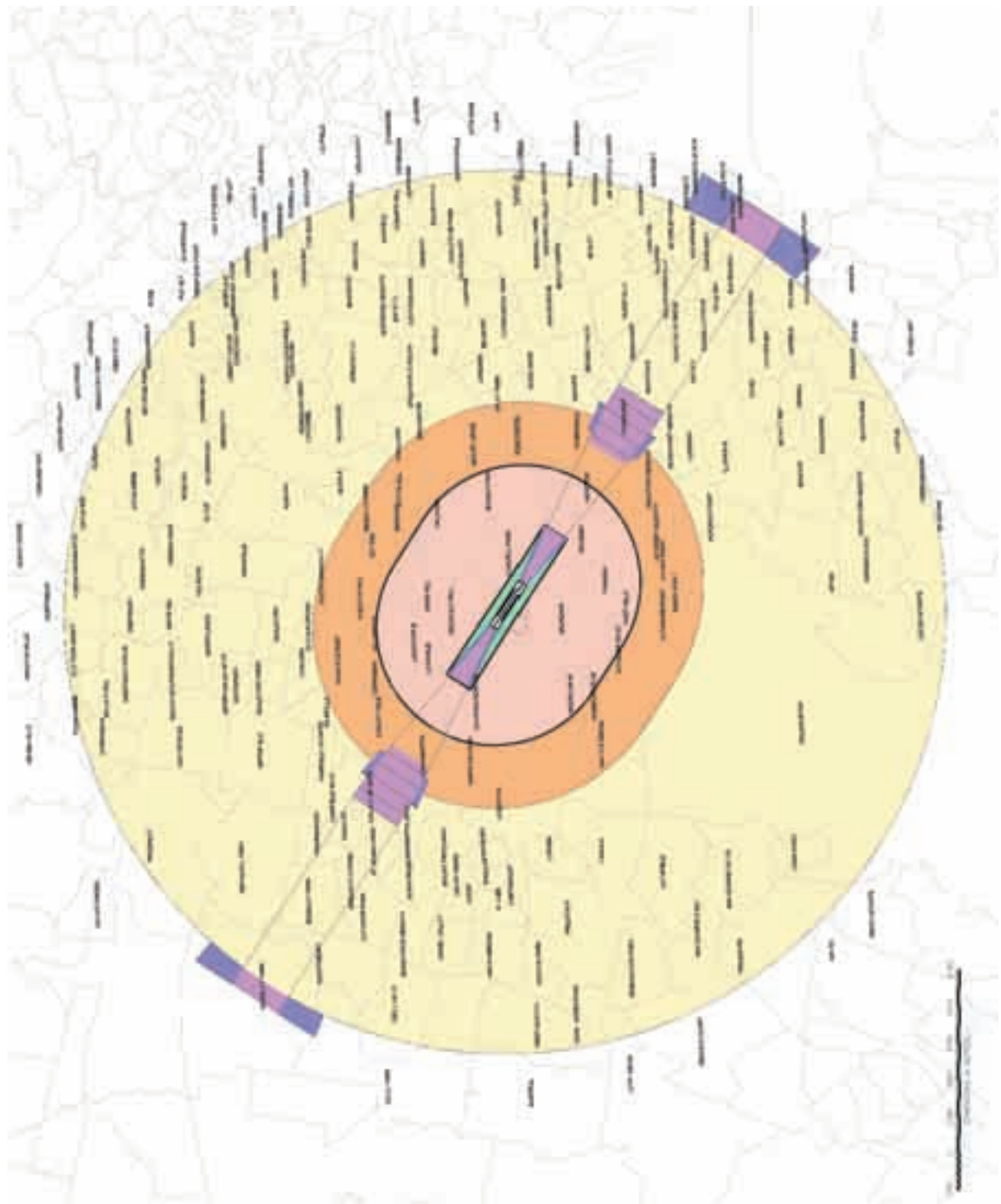


LEGEND

- APPROACH SURFACE (2% SLOPE FIRST SECTION, 2.5% SLOPE SECOND SECTION, THEN HORIZONTAL SECTION)
- TAKE OFF SURFACE (2% SLOPE)
- TRANSITIONAL SURFACE (14.3% SLOPE)
- CONICAL SURFACE (5% SLOPE)

- INNER HORIZONTAL SURFACE (51M AHD)
- OUTER HORIZONTAL SURFACE (159M AHD)

NOTE: DENOTES OLS SURFACES BUT DOES NOT SHOW ANY PENETRATIONS THAT MAY EXIST










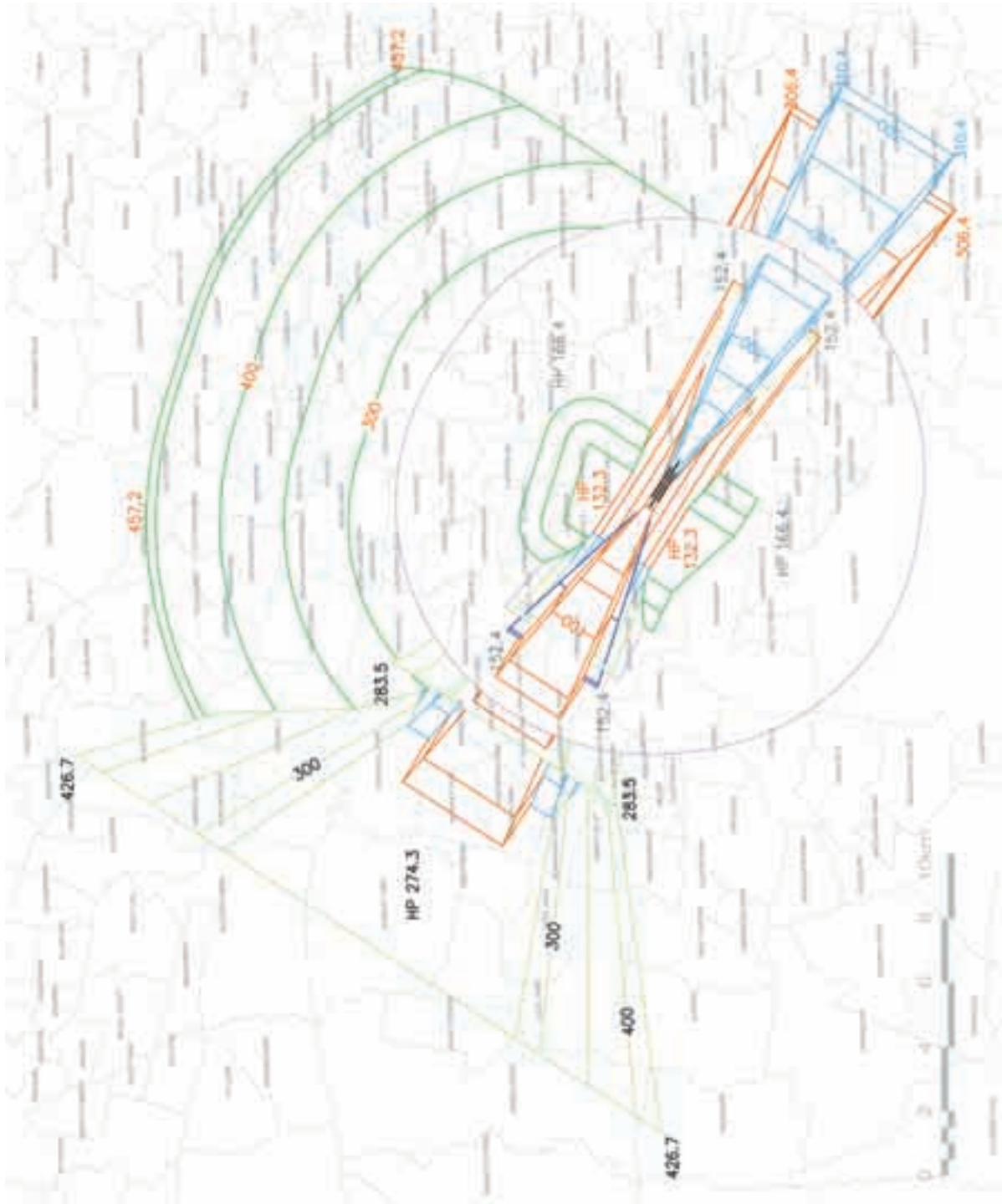
> Figure 21

Bankstown Airport – PANS-OPS



LEGEND

- | | | | |
|---|---------------------|---|----------------------|
|  | RUNWAY 11C GPS |  | SID RUNWAY 11C |
|  | RUNWAY 11C GPS MAPP |  | RUNWAY 11C BASIC ILS |
|  | SID RUNWAY 29C |  | RUNWAY 29C BASIC ILS |
|  | CIRCLING MINIMA | | |





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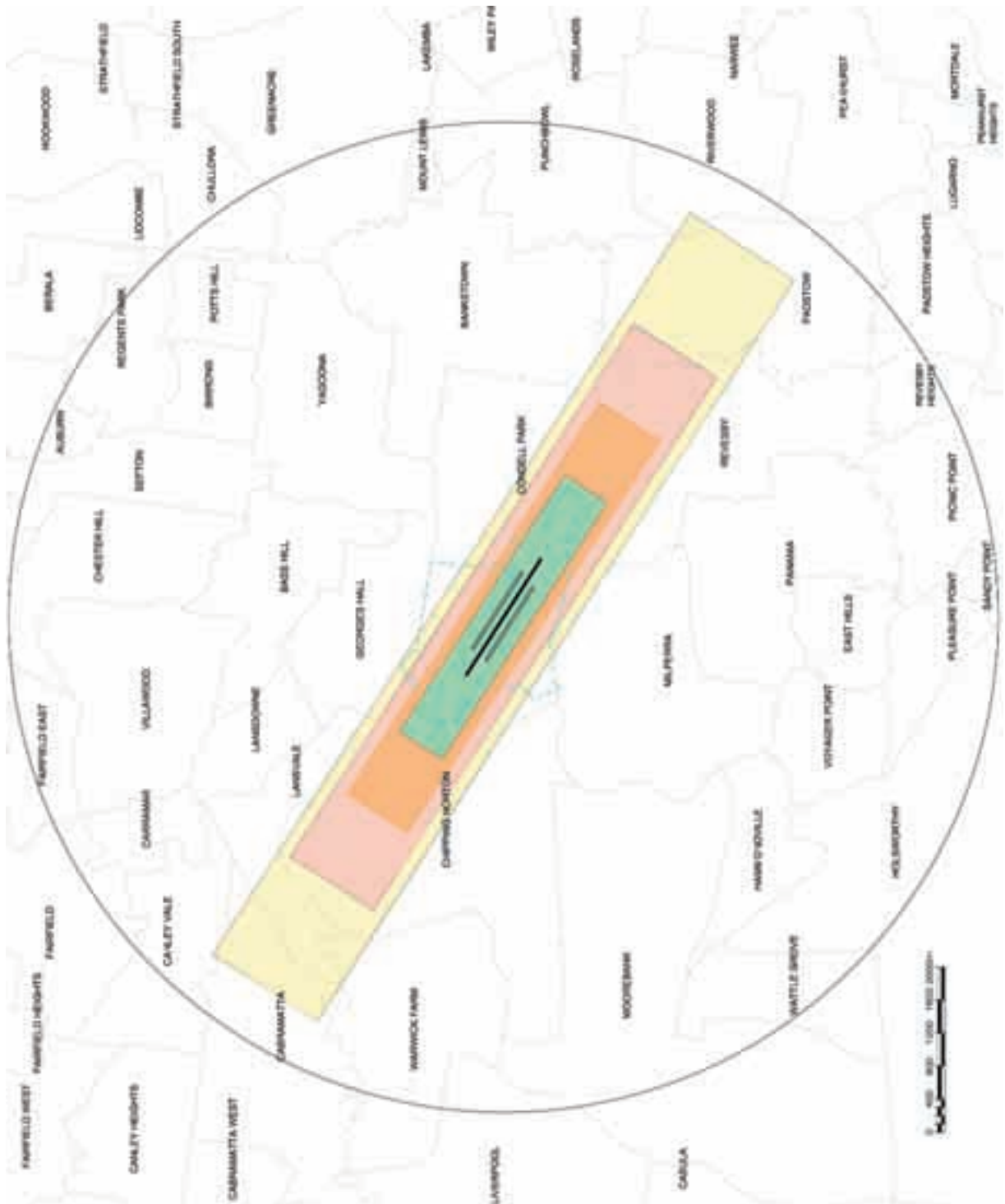
> Figure 22

Bankstown Airport Maximum Lighting Intensities



LEGEND

- ZONE A (0cd) MAXIMUM INTENSITY OF LIGHT SOURCES MEASURES AT 3° ABOVE THE HORIZONTAL
- ZONE B (50cd)
- ZONE C (150cd)
- ZONE D (450cd)





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