

Moore Point, Liverpool NSW: Planning Proposal — Aeronautical Impact Assessment

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Document Title: Moore Point, Liverpool NSW: Planning Proposal -**Aeronautical Impact Assessment**

Purpose / Abstract: This Aeronautical Assessment Report has been prepared by Strategic Airspace (StratAir) on behalf of Learnac and Coronation to address the aviation-related airspace height constraints and impacts in relation to a Planning Proposal at Moore Point, Liverpool (the site).

> The Moore Point site is located east of Liverpool CBD on the opposite side of the Georges River and north of Newbridge Road. It provides a site area of 38.5 hectares (approx.) and is currently developed with industrial uses.

The site is situated within Liverpool Collaboration Area's Georges River North precinct and is subject to the priorities and actions of the Liverpool Place Strategy (Strategy), which was released by the Greater Sydney Commission (GSC) in December 2018.

The objective of this aeronautical impact report is to inform the strategic development of the ongoing planning process. The heights used for assessment against the aviation-related airspace height protection surfaces are based on the top RLs of the proposed building envelopes.

Given the site location — approximately 5km to the west of Bankstown Airport — the Planning Proposal is subject to the Prescribed Airspace of the airport.

The low-rise buildings are unlikely to infringe the prescribed airspace of the airport and would therefore not require any specific height approvals. The mid-rise and taller buildings are likely to infringe the airport's Obstacle Limitation Surface (OLS) heights and would therefore need to be referred for an airspace approval under the Airports (Protection of Airspace) Regulations 1996 (APAR) prior to construction. Applications can be submitted at any time; and at the latest would be submitted at the time of DA submission and are usually a condition of DA approval. Height approvals are not required for rezoning applications.

Whilst applications are submitted to the airport, the authority responsible for making final determinations of such applications is the Commonwealth Department of Infrastructure, Transport, Regional Development and Communication (DITRDC).

Based on current airspace constraints, the maximum permissible heights for buildings across the site fall into two categories: 108m Australian Height Datum (AHD) in the eastern portion of the site; and 136m AHD in the western portion of the site. Furthermore, it is highly likely that the same height constraint would be applicable to cranes required for the construction of buildings, except where the applicant can demonstrate that taller cranes can be operated safety and within likely operational approval conditions. The absolute maximum height up to which cranes would potentially be approved is 152.4m AHD. The potential approvability of cranes that would be required for any building is considered as part of a 'feasibility test' when assessing a building height application, when detail design drawings denoting the construction methodology can be assessed. Therefore, this must be considered an important factor as part of the ongoing planning of building heights, and the construction and delivery of Moore Point.

In summary, the maximum heights of building envelopes in the Planning Proposal do not exceed the PANS-OPS height limits, the maximum permissible building heights in the relevant areas, and so are considered technically approvable under the APAR.

Nothing in the body of this report/assessment would preclude the Planning Proposal from rezoning and gazettal for residential/mixed use purposes, based on the findings of this aeronautical assessment.

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Contents

	Cha	inge History	iv
	Dist	ribution Control	iv
_			
Exe	ecutiv	/e Summary	1
	1.1	Constraints Affecting the Precinct	2
	1.2	Assessment Conclusions	3
1	Intr	oduction	5
•	1 1	The Moore Point Planning Proposal	5
	1.1	1.1.1 Infrastructure and Collaboration	5
		1.1.2 Productivity	7
		1.1.3 Liveability	7
		1.1.4 Sustainability	7
	1.2	Purpose of This Report	7
		1.2.1 Study Requirements	7
	1.3	Maximum Planned Building Envelope Heights &	0
		Assessment Elevations	9
2	Aer	onautical Impact Context	11
	2.1	Location of the Proposed Development	
		2.1.1 Location in relation to Bankstown Airport	11
		2.1.2 Location in relation to Other Airports in the Sydney Basin	12
		2.1.3 Location in relation to Helicopter Landing Sites & Defined Chopper	40
	~ ~	Flight Routes	12
	2.2	Nethodology	13
		2.2.1 Airspace Regulations	13
		2.2.3 Note about Heights: Australian Height Datum (AHD) vs Above	
		Ground Level (AGL)	15
		2.2.4 The Application Pathway for Airspace Height Approvals	15
		2.2.5 Applications for Buildings	10
	23	Airport Plans & Aeronautical Data References for the Study	16
	2.0	2.3.1 Bankstown Airport Master Plan 2019	16
		2.3.2 Bankstown Airport Prescribed Airspace Plans	17
		2.3.3 Procedure & Airspace Charts published by Airservices Australia	17
2	۸nc	shuaia	10
3		Analysis	10
	3.1		18
	3.2		19
	3.3	PANS-OPS Analysis	21
		3.3.1.1 Minimum Sector Altitudes (MSAs)	23
		3.3.1.2 Circling Minima	23
		3.3.2 Instrument Approaches & Missed Approaches, and Standard	
		Instrument Departures (SIDs)	24
	3.4	Other Assessment Considerations	24
	3.5	Considerations re Max Building Heights & Future Cranes	25
4	Cor	nclusion	

Tables

Table 1 — Study Requirements	2
Table 2 — Summary of Key Airspace Height Constraints	3
Table 3 — Study Requirements	8
Table 4 — Planned Maximum Heights of the Proposed Building Envelopes as per the Structure Plan	er 9
Table 5 — Analysis Summary — Airspace Height Constraints	18
Table 6 — PANS-OPS Height Limit Summary	23
Table 7 — Other Assessable Height Limitations — including the RTCC Surface Limit	24
Table 8 — All PANS-OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 162 – WEF 20200227 – 20200520)	2

Figures

Figure 1 — Site within the Georges River North Precinct & In relation to Bankstown Airport	1
Figure 2 — Site Aerial	5
Figure 3 — A Place Strategy for Liverpool	3
Figure 4 — Indicative Concept Proposal	3
Figure 5 — Moore Point Structure Plan (with Superlot References shown)	9
Figure 6 — Site in relation to Bankstown Airport1	1
Figure 7 — Site in relation to Liverpool Hospital and Standard Helicopter Routes 13	3
Figure 8 — Indicative OLS Conical Surface Height Contours over the Site)
Figure 9 — Building Envelopes which would infringe the OLS Conical Surface — in 2D and 3D	1 1
Figure 10 — PANS-OPS Cat B & Cat C Constraining Surfaces over the Site 22	2
Figure 11 — 3D View of Planning Proposal Building Model relative to the PANS- OPS Circling Surfaces22	2

Appendices

Appendix 1 — Abbreviations

Appendix 2 — PANS-OPS Procedures

Executive Summary

This Aeronautical Assessment Report has been prepared by Strategic Airspace (StratAir) on behalf of Leamac and Coronation to address the aviation-related airspace height constraints and impacts in relation to a Planning Proposal at Moore Point, Liverpool (the site).

The Moore Point site is located east of Liverpool CBD on the opposite side of the Georges River and north of Newbridge Road. It provides a site area of 38.5 hectares (approx.) and is currently developed with industrial uses.

The site is situated within Liverpool Collaboration Area's Georges River North precinct and is subject to the priorities and actions of the Liverpool Place Strategy (Strategy), which was released by the Greater Sydney Commission (GSC) in December 2018. Refer to the precinct and site map inset in Figure 1 below.



Aligning with the priorities of Government and implementation

phase of the Place Strategy, the Planning Proposal involves the creation of a mixed use precinct, providing new homes and open space adjoining the Georges River and connecting to the Liverpool CBD.

The site lies to the west of Bankstown Airport, approximately 4.95 km (2.67 Nautical Miles, NM) from the aerodrome reference point (ARP). In this location it is subject to the Prescribed Airspace of the airport, making any future building development airport subject to the maximum permissible height constraints of that airspace under the Airports (Protection of Airspace) Regulations 1996 (APAR), which are administered by the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications (DITRDC).

The Planning Proposal comprises a mix of low-rise, mid-rise and taller buildings, distributed across the site so as to satisfy planning objectives. The proposal has also been designed so that no building envelope would exceed the maximum permissible airspace height limits.

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Table 1 — Study Requirements

Ref No	Study Requirement	Addressed at
SR.1	Review relevant background information, including the 'Bankstown Airport Master Plan' to understand the current and proposed future operations of the airport, as relevant to the precinct.	Sections 2.2.2 (p14) & 2.3 (p16)
SR.2	Identify and clearly map the OLS, PANS OPS and any other relevant airport height limitation layers and surfaces.	The whole of Section 3 (p18)
SR.3	Translate these layers into a maximum height for permanent (e.g. buildings) and temporary (e.g. cranes) structures include a building methodology specialist to translate this information into maximum building envelope height planes.	<i>Summary</i> : Section 3.1 (p18) and 4 (p26) <i>Buildings</i> : Sections 2.2.5 (p16) and 3.3 (p21) <i>Cranes</i> : Section 3.5 (p25)
SR.4	Advise on other measures, if necessary, to ensure the precinct does not have an adverse impact on the operations of the airport — eg, lighting, reflective surfaces, etc).	Sections 3.4 (p24)
SR.5	Advise on the pathway required to secure approval from relevant bodies — eg, Airservices Australia, as part of subsequent development application processes, including for temporary structures such as cranes.	Section 2.2.4 (p15)
SR.6	Certify that subject to any recommended measures, the precinct proposal will not have an adverse impact on the operations of the airport.	Executive Summary (p4) & Section 4 (p26)

Pursuant to the Study Requirements (Table 1), this report has been prepared having regard to Prescribed Airspace for Bankstown Airport. It examines the current and forecast regulated airspace height constraints overhead the site that are related to aviation airspace protection requirements which would:

- a) Trigger the requirement to apply for an airspace height approval the Obstacle Limitation Surfaces (OLS).
- b) Constrain the maximum permissible building envelope heights the PANS-OPS surfaces heights.
- c) Potentially constrain the maximum permissible heights for cranes that would be required to enable construction of the proposed development (although approvals for cranes are only necessary after DA and prior to construction).

1.1 Constraints Affecting the Precinct

The relevant airspace constraints overhead the Planning Proposal study area are summarised in the following table.

Height Limits (AHD)	Height Limit Detail	Comment	
∼76m – 108m OLS Conical Surface		Threshold Heights for Airspace Height Applications — as depicted in Figure 8 (p20). Any development that would exceed the relevant limiting OLS height would require an 'airspace height' approval from the Department of Infrastructure, Transport, Regional Development and Communication (DITRDC) under the Airports (Protection of Airspace) Regulations (or APAR) prior to construction. Applications are usually made at the time of DA; and if the airspace approval may be subject of a DA consent condition if the airspace application is still under evaluation at the time of DA approval.	
		A height application can be made for each building separately, a block or Superlot containing a number of buildings to be developed at the same time, or a single application can be made for the entire Moore Point precinct. The mid-rise and tall buildings proposed would infringe the OLS and would thus require airspace approvals — see Figure 9 (p21)	
108.1m	PANS-OPS CIRCLING Surface for Category B Aircraft — Eastern portion of the study area	These constraint are the current maximum permissible building heights that would be approved today by the aviation authorities (see Figure 10, p22). None of the proposed building envelopes in the relative Circling coverage areas exceed these heights, and so could be considered technically approvable under the APARs.	
136m	for Category C Aircraft — Eastern portion of the study area	It is likely also to be the maximum height that would be considered approvable for cranes without necessarily requiring operating duration constraints (refer also section 3.5, p25) See Figure 10 (p22) and Figure 11 (p22)	

Table 2 — Summary of F	ey Airspace Height	Constraints
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1.2 Assessment Conclusions

The airspace constraints affecting Waterloo South have been examined in relation to the maximum proposed building envelope heights, which are depicted in Figure 1 above.

The site is:

- Subject to Obstacle Limitation Surface (OLS) height limits which slope up from ~76m Australian Height Datum (AHD) at the north-eastern corner to around 108m AHD at the western edge of the study area. OLS heights can be considered threshold heights; any building or crane which would exceed the relevant height would need to gain airspace height approvals from the Commonwealth Department of Infrastructure, Transport, Regional Development and Communication (DITRDC), under the Airports (Protection of Airspace) Regulations (APAR) prior to construction or erection.
 - The low-rise buildings will not require prior airspace approvals as they do not exceed the relevant OLS heights.
- Buildings ultimately constrained by the PANS-OPS Circling surface heights: at the Category B surface height of ~108m AHD in the east and at the Category C surface height of 136m in the west.

PANS-OPS surface heights are based on the heights related to the protection requirements of the various PANS-OPS Instrument Flight Procedures for Bankstown Airport. These define the maximum permissible heights for buildings (including all overruns) under the APAR, except where another aviation safety-related airspace constraint is lower.

- No building envelope in the Planning Proposal exceeds these heights, and so all could be considered technically approvable under the APAR. Cranes up to this height would be approved without operating duration constraints.
- Ultimately limited by the Radar Terrain Clearance Chart (RTCC) / surfaces, at a fixed attitude of 152.4m AHD, across the entire site. This will most likely be the absolute maximum height limit for future cranes. Cranes which would exceed the relevant PANS-OPS surface height limit would be subject to 3-month durations and may also be required to be lowered to the PANS-OPS heights at night. This is the general principle. Applications for buildings are usually submitted at the time of a DA, and for cranes prior to construction.

The structure of the Superlots and the distribution of the taller buildings in the Planning Proposal already take into account the maximum permissible building heights related to the PANS-OPS height constraints imposed by the circling surface heights. As such, all building envelopes would remain below the relevant PANS-OPS surface height limit overhead, and as such are considered technically approvable under the Airports (Protection of Airspace) Regulations.

It is considered that that future applications for buildings in the Planning Proposal, under the Airports (Protection of Airspace) Regulations, supported by a full aeronautical assessment and safety case would be approved by the Department of Infrastructure, Transport, Regional Development and Communications.

Thus, nothing in the body of this report/assessment would preclude the Planning Proposal from rezoning and gazettal for residential/mixed use purposes based on the findings of this aeronautical assessment.

1 Introduction

This Aeronautical Assessment Report has been prepared by Strategic Airspace (StratAir) on behalf of Leamac and Coronation to address the aviation-related airspace height constraints and impacts in relation to a Planning Proposal at Moore Point, Liverpool (the site).

1.1 The Moore Point Planning Proposal

The site is located east of Liverpool CBD on the opposite side of the Georges River and north of Newbridge Road. It provides a site area of 38.5 hectares (approx.) and is currently developed with industrial uses. There is nothing contained within this report to preclude rezoning.

The site is situated within Liverpool Collaboration Area's Georges River North precinct and is subject to the priorities and actions of the Liverpool Place Strategy (Strategy), which was released by the Greater Sydney Commission (GSC) in December 2018. Refer to the figure below:



Source: Nearmap, modified by Mecone

Figure 2 — Site Aerial

The Strategy states that by 2036 Liverpool will be a rejuvenated river city, offering diverse and growing residential and employment opportunities. Major health, education and retail precincts, and a mixture of open spaces and parklands alongside the Georges River, will create a rich mix of jobs and workplaces, public spaces, shops and entertainment.

Under the Strategy the site is identified as 'mixed use', which comprises:

'a mixture of commercial, retail, residential and community uses that provide sustainable employment, that is complementary to, and not in competition with, the commercial core'

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Source: Source: Liverpool Collaboration Area Place Strategy 2018

Figure 3 — A Place Strategy for Liverpool

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The 2019 Annual report summary for Liverpool Collaboration Area highlighted key steps commenced and completed to address the imperatives acknowledged in the Strategy to accelerate the delivery of the Collaboration Area. These included:

- Engagement with TfNSW to prepare the Liverpool Place-based Integrated Transport Strategy and accelerated investment; and
- Flood studies and floodplain risk management plan completed by Liverpool City Council.

The land uses reflected in the Strategy are reinforced in Liverpool City Council's Local Strategic Planning Statement (LSPS), which identifies the site for investigation as residential/mixed use to support the CBD and Innovation Precinct in tandem with linking open space and green corridors.

The draft LSPS provides the following short term action (12-24 months) specific to the Georges River North precinct:

Action 11.2 Amend LEP to rezone Georges River Precinct north of Newbridge Road as a mixed-zone to support the Liverpool CBD and innovation Precinct, with an extensive open space system and cross-river linkages (short term).

The Planning Proposal involves the creation of a mixed use precinct, providing new homes, jobs and open space adjoining the Georges River and connecting to Liverpool CBD. Key features of the proposal include:

- Adaptive re-use of existing heritage;
- Foreshore embellishments and new open spaces;
- Educational and cultural facilities;
- Connections to Liverpool CBD and Train Station; and
- Transport, intersection and collector road improvements.

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The Planning Proposal aligns with the priorities of Government and the implementation phase of the Place Strategy by facilitating the transformation of the Collaboration Area with new jobs, infrastructure, green spaces and housing. The Planning Proposal responds to The Pulse of Greater Sydney's performance indicators, which sit under the following key themes:

1.1.1 Infrastructure and Collaboration

The Planning Proposal will facilitate additional jobs, education and housing in close proximity to Liverpool CBD and Train Station. The proposal will support additional medium and long-term housing supply in Liverpool CBD through diverse and new housing products. The proposal supports the continual expansion and growth of Liverpool Innovation precinct and nearby health infrastructure, with potential to provide complementary uses near Liverpool Hospital and educational and cultural facilities on the site.

1.1.2 **Productivity**

The Planning Proposal supports the growth of the thirty-minute city, ensuring Liverpool emerges as a premier CBD in the Western City. The proposal provides capacity for new transport infrastructure on the site, road and intersection upgrades and locating density near major transport infrastructure (Liverpool Train Station and Badgery's Creek Aerotropolis). The proposal encourages additional business activity and investment in Liverpool by providing new commercial uses that will complement Liverpool CBD.

1.1.3 Liveability

The Planning Proposal significantly improves upon the existing use of the site by creating walkable places for people to live work and play. This includes foreshore embellishments to the Georges River, improved connections across the Georges River and adaptative re-use of existing heritage items. These measures will contribute to Sydney's Green Grid, improve access to services in Liverpool CBD and establish a community that celebrates identity and place.

1.1.4 Sustainability

The Planning Proposal addresses the urban heat island effect by significantly increasing the quantum of green space on the site for active and passive recreational use. The proposal will provide new parks and green connections to surrounding open spaces including Haigh Park, which will contribute to the urban tree canopy of the area.

Overall, the Planning Proposal represents a clear and consistent strategic line of site with the priorities of government. It meets the performance indicators, priorities and objectives expressed in the District Plan, Place Strategy, LSPS and The Pulse of Greater Sydney.

1.2 Purpose of This Report

This report relates to the Moore Point Planning Proposal, with the report being focussed on the proposal's height impact in relation to the airspace required for the continuing safe operation of air traffic to and from Bankstown Airport especially (as the closest airport) and other airports in the greater Sydney Basin.

1.2.1 Study Requirements

The key matters addressed as part of this study are described in Table 3.

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Table 3 — Study Requirements

Ref No	Study Requirement	Addressed at
SR.1	Review relevant background information, including the 'Bankstown Airport Master Plan' to understand the current and proposed future operations of the airport, as relevant to the precinct.	Sections 2.2.2 (p14) & 2.3 (p16)
SR.2	Identify and clearly map the OLS, PANS OPS and any other relevant airport height limitation layers and surfaces.	The whole of Section 3 (p18)
SR.3	Translate these layers into a maximum height for permanent (e.g. buildings) and temporary (e.g. cranes) structures include a building methodology specialist to translate this information into maximum building envelope height planes.	<i>Summary</i> : Section 3.1 (p18) and 4 (p26) <i>Buildings</i> : Sections 2.2.5 (p16) and 3.3 (p21) <i>Cranes</i> : Section 3.5 (p25)
SR.4	Advise on other measures, if necessary, to ensure the precinct does not have an adverse impact on the operations of the airport — eg, lighting, reflective surfaces, etc).	Sections 3.4 (p24)
SR.5	Advise on the pathway required to secure approval from relevant bodies — eg, Airservices Australia, as part of subsequent development application processes, including for temporary structures such as cranes.	Section 2.2.4 (p15)
SR.6	Certify that subject to any recommended measures, the precinct proposal will not have an adverse impact on the operations of the airport.	Executive Summary (p4) & Section 4 (p26)



Figure 4 — Indicative Concept Proposal

1.3 Maximum Planned Building Envelope Heights & Assessment Elevations

The maximum heights of each building in the Planning Proposal have been designed to remain below the maximum permissible building heights defined by the PANS-OPS protection surfaces related to Bankstown Airport.

The relative levels (RLs) of the top of each building envelope are the equivalent of elevation in metres Australian Height Datum (AHD). The maximum RLs are based on the surveyed ground elevations, the number of storeys planned, design floor-floor heights and where relevant additional allowances for roof top features.

Table 4 below includes the maximum envelope elevations for the tallest building envelopes in each Superlot (which themselves are identified in Figure 5). Those Superlots shaded in grey have already been pre-assessed as containing building envelopes which are so low as to not have any impact on the Bankstown airspace.



Source: SJB

Figure 5 — Moore Point Structure Plan (with Superlot References shown)

Table 4 — Planned Maximum Heights of the Proposed Building Envelopes as per the Structure Plan

Superlot*	Building Hgt AGL (m)	Maximum Elevation (m AHD)	Potentially Subject to Height Assessment
Α	127	135	Y
В	24	32	_

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Superlot*	Building Hgt AGL (m)	Maximum Elevation (m AHD)	Potentially Subject to Height Assessment
C	126	134	Y
D	125	134	Y
E	6	14	-
F	127	135	Y
G	127	135	Y
Н	100	108	Y
I	17	23	-
J	14	23	-
К	128	136	Y
L	93	101	Y
М	91	99	Y
N	100	108	Y
0	98	106	Y
P	99	106	Y
Q	23	32	-
R	97	106	Y
S	72	80	Y
Т	124	132	Y
U	127	135	Y
V	100	107	Y
W	95	100	Y
X	95	97	Y
Y	26	34	-
Z	99	106	Y
AA	83	91	Y

* For Superlot references, refer to Figure 5 above

Nothing contained in the body of this report would preclude the Planning Proposal from rezoning and gazettal for residential/mixed use purposes, based on the aeronautical impact assessment of the Moore Point structure plan design and maximum building heights proposed.

2 Aeronautical Impact Context

2.1 Location of the Proposed Development

2.1.1 Location in relation to Bankstown Airport

The site lies to the west of Bankstown Airport, approximately 4.95 km (2.67 Nautical Miles, NM) from the aerodrome reference point (ARP) at a bearing of 256° Magnetic (M) or 268.4° True (T) — as indicated in Figure 5 below.

The measurement point used is the edge of the closest tall building to the airport — the eastern edge of the tower building proposed for Superlot R (see Figure 5 above). The coordinates of the measurement point are:

WGS84 Latitude & Longitude	33° 55' 32.06" S	150° 56' 05.54" E
MGA94 Easting & Northing (Z56)	309107.967 E	6244175.946 N

The western border of the precinct is ~5.5 km (~3 NM) from the ARP.



Figure 6 — Site in relation to Bankstown Airport

There are three runways at the airport:

- The Northern runway (RWY) 11L/29R the main (most used) runway, servicing flying training and general aviation arrivals and departures.
- The centre runway, RWY 11C/29C the longest (and the only Code C) runway. This takes overflow traffic from the northern runway and is used for larger aircraft and those departing into controlled airspace. This runway and the instrument flight procedures for the airport are the primary basis of the PANS-OPS surfaces which define the maximum permissible development heights at the site.
- The Southern runway, RWY11R/29L the least used runway, typically used for flying circuit training.

In relation to the central runway, RWY 11C/29C, the closest end of the runway is the northern end, the landing threshold identified as RWY 11C. The measurement point is ~4.63 km (2.5 NM) at 250°M (262.5°T) from the threshold of RWY 11C.

Although not under the direct flight paths in and out of the airport, the precinct still lies under the protection surfaces which define the height limits of the airport's Prescribed Airspace.

2.1.2 Location in relation to Other Airports in the Sydney Basin

The other airports in the Sydney Basin are too distant from the study area to have any impact on the airspace above it — with the exception of the minimum vector altitude (MVA) sectors used by the air traffic controllers, which are charted on Sydney Airport's Radar Terrain Clearance Chart (RTCC) surfaces plan.

2.1.3 Location in relation to Helicopter Landing Sites & Defined Chopper Flight Routes

The proximity of the site to nearby Liverpool Hospital's helicopter landing facilities, which are used for Emergency Medical Services (EMS) helicopter traffic, is also worth noting.

Whilst helicopter routes are not part of the prescribed airspace, there is an accepted requirement that new developments not interfere with helicopter emergency management services (HEMS) flights to/from hospital helipads serviced by the NSW Ambulance helicopter service. This requirement was set out in Guideline H of the National Airports Safeguarding Framework (NASF) in 2018. As such, the potential impact of new developments is now included as part of the set of key factors to be considered when evaluating airspace approvability under the APAR.

The north-west corner of the precinct is approximately 270m from the helipads¹ at Liverpool Hospital. However, the normal final approach and initial take-off flight paths for the hospital's helicopter landing pads do not cross the precinct area: they are north of and almost parallel to the section of the Georges River which defines the northern border of the precinct, as highlighted in the inset to Figure 7 below. The elevation of the HLS is 130 ft (39.6m AHD)², which is approximately 32m above ground level, and flights to/from the HLS would start/end at hover heights above that. Furthermore, all flights to/from the HLS must be made using Visual Flight Rules (VFR³), which means that the pilots must visually scan to stay clear of obstacles on the ground as well as other air traffic.

The precinct is well away from the standard northern and southern 'Chopper' routes to be used for helicopter arrivals to and departures from Bankstown Airport (which are defined by fixed arrival/departure locations in the Australian Aeronautical Information Publication (AIP), published by Airservices Australia). These are also depicted in the figure below.

¹ Only the primary helipad (helipad East) is in operation. The old circular helipad (helipad West, the secondary helipad) at Liverpool Hospital closed in Q3 2019 and is not expected to be operational again until upgraded; the upgrade program is anticipated to occur sometime in the next 3-5 years.

² Source: https://www.ozrunways.com/helipads/view/helipad.jsp?code=OZHJM

³ There are no PANS-OPS instrument flight procedures (IFR) to the Liverpool Hospital primary helipad.

<image>

Moore Point Liverpool — Aeronautical Assessment for Planning

Figure 7 — Site in relation to Liverpool Hospital and Standard Helicopter Routes

The site is too far from the Westmead Hospital Strategic Helicopter Landing Site (SHLS) — approximately 14 km (7.6 NM) 189°M (202°T) — to have any impact on the helicopter EMS (HEMS) traffic to/from that site.

2.2 Methodology

The methodology used to determine the maximum permissible building heights is based on an orderly assessment of the potential impact against the various elements described in this section.

2.2.1 Airspace Regulations

The proposed development site is subject to the Airports (Protection of Airspace) Regulations (APAR), under the Commonwealth's Airports Act, 1996), because of its proximity to Bankstown Airport and because of its proposed height. These regulations define both: how building height limitations due to airspace safety can be determined; and the process for gaining approval of the proposed development under the regulations.

The Prescribed Airspace Regulations, and their impact upon building height limitations, are described below.

2.2.2 Prescribed Airspace

Prescribed airspace, under these regulations, includes at minimum:

Obstacle Limitation Surfaces (OLS)

- The OLS surfaces are used to identify buildings and other structures that may have an impact upon the safety or regularity of aircraft operations at an airport. This impact depends upon both the type of operations at the aerodrome and which OLS surfaces are penetrated by a (proposed) building or structure.
- The OLS are flat and rising (invisible) surfaces around the airport. They are based on the geometry of the airport and its runways and therefore they rarely change.
- If a permanent building development (or temporary crane) that is proposed at a height that will penetrate (exceed) the height limit of an OLS surface, then an application must be made to the Commonwealth Department of Infrastructure, Transport, Regional Development and Communication (DITRDC) via the closest airport, and with copies to any other potentially affected airport for an airspace height approval prior to construction of the permanent development &/or erection of the temporary crane obstacle. Such applications should demonstrate that the proposed building development does not penetrate or adversely affect surfaces protecting: instrument flight procedures (PANS-OPS surfaces); radar vectoring; navigation infrastructure; and anything else that might affect the safety, efficiency or regularity of current and future air transport operations at the airport.

■ PANS-OPS* Surfaces

- PANS-OPS surfaces represent the protection surfaces for published instrument flight procedures to and from the airport. These surfaces comprise flat, sloping and complex surface components.
 - * PANS-OPS is the abbreviation of the international regulations related to the design to instrument flight procedures, a document published by the International Civil Aviation Organisation (ICAO), Doc 8168, Vol 2, Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS). In Australia, PANS OPS rules are adopted and codified in the Civil Aviation Safety Regulations Manual of Standards (CASR MOS) Part 173, which is maintained by the Civil Aviation Safety Authority (CASA).
- PANS-OPS surfaces must not be penetrated by either permanent or temporary buildings or structures. However, for a variety of reasons, PANS-OPS surfaces can and do change over time.
- As flight procedures are changed from time to time (usually by Airservices), the PANS-OPS Surface Plan published by an airport may not reflect the current situation — which is why we not only reference the airport's plans but also review the published charts for current (or pending) instrument flight procedures and evaluate the associated PANS-OPS height limits. The regulations also make a provision for any factor which may be deemed to adversely affect the safety, regularity or efficiency of aircraft operations at an airport. In light of this, it is necessary to consider the following factors.

Other Considerations

- Bankstown & Sydney Airport's Declared Airspace Plans additionally include:
 - Sydney Airport's Radar Terrain Clearance Charts (RTCC), which depict the areas and height limits related to the Minimum Vector Altitudes (MVAs) used by Air Traffic Controllers when vectoring aircraft.
 - Lighting and visual guidance protection plans used for approach guidance by aircraft, especially at night and in times of poor visibility.
 - Navaid and radar evaluation / protection surface plans.
- > Other Factors
 - Protection for other Instrument Flight Procedure surfaces, where the procedures are not classified as PANS-OPS and/or have been omitted from Bankstown Airport's declared PANS-OPS surfaces charts.
 - Airline Engine-Out (Contingency) Take-Off Splays (as per Civil Aviation Order 20.7 1b) These are generally assessed independently by the airlines as part of their own evaluations of any given airspace height application, but it is prudent to evaluate any potential impact in advance.
 - Other miscellaneous factors that may be considered as potential safety issues by any of the key stakeholders, and the Civil Aviation Safety Authority (CASA) in particular. This may also include protection of critical airspace for visual

flight procedures used for emergency management service (EMS) helicopter landing sites (HLS).

Note: Airspace that is approved by the Department of Infrastructure, Transport, Regional Development and Communication (DITRDC) as Declared Airspace is considered part of an airport's Prescribed Airspace.

2.2.3 Note about Heights: Australian Height Datum (AHD) vs Above Ground Level (AGL)

All "heights" provided in this document are elevations expressed in metres in the Australian Height Datum (AHD) — and thus they are true elevations, and NOT heights above ground level (AGL).

For estimating maximum development heights AGL, the ground elevation^{AHD} should be subtracted from the airspace height limits^{AHD}.

Note also for aviation-related airspace height limits, any building height approval under the Airports (Protection of Airspace) Regulations is regarded as inclusive of the building itself plus all rooftop furniture and overruns (plant buildings, lift risers, etc).

For the purposes of this Planning Proposal it is assumed that the building envelopes in the concept masterplan are inclusive of such overruns.

2.2.4 The Application Pathway for Airspace Height Approvals

All applications for permanent structure (called *controlled activities*) and temporary (*short-term controlled activities*) under APAR must be submitted to DITRDC, at the appropriate time, through the closest relevant airport. At the latest, approvals for buildings must be gained prior to construction, but are usually required as a condition of approval of Development Applications by most Councils, including the Liverpool City Council.

Note that prior airspace approval is not required for rezoning.

Applications should include aeronautical impact assessment reports that are based on the most current plans for the proposed development available at the time. For major developments, such reports should include consideration of cranes that will be required for construction: this information will be used for assessment of the feasibility of constructing the buildings if approved at the maximum heights sought. Separate applications for cranes will also be required at the appropriate times during the construction period, prior to their erection.

There are a number of factors and considerations that would influence a decision on when to make an APAR application for a building. Common decision criteria are outlined below.

- The need for early certainty of approval, versus the effort entailed in preparing documentation and supporting details required to prepare and justify an APAR application that can be approved.
- Application assessment lead time: under the APAR, the minimum processing time for evaluation is 49 days, but it may be substantially longer before a determination is made if additional information and/or clarifications are required.
- Approvals are sometimes not required prior to submitting a development application (DA) but in other cases planning assessment requires a level of certainty that an APAR application would be approved in the event that the Planning Proposal or DA is approved.
 - Some DAs are granted with the requirement to secure an airspace height approval as a consent condition.
 - Bankstown Airport, CASA and DITRDC prefer to process applications that already have DA approval for several reasons:

- Because applications based on advanced development plans and designs (eg, to DA level or beyond) will have enough associated information — eg, a Construction Management Plan which includes preliminary crane plans — that will help to support and justify the feasibility of construction in the event of an APAR approval; and
- To reduce the likelihood that they will have to re-evaluate the sites for amended applications in the future due to changed designs (for example, following DA resolution).
- That said, the airport has a formal process for applications as a result of DA referrals by councils, and applications will be accepted at any time even well before submissions of applications for DAs or similar.
- In the event that changes to a design or construction events are likely to exceed an approval already granted for the site, an application for an amendment to the pre-existing approval would need to be made. The documentation requirements and assessment periods for amendments are usually the same as for an initial application.

2.2.5 Applications for Buildings

For proposed developments that would penetrate the OLS, the airport would seek consultation from Airservices Australia, CASA and other key stakeholders (such as major airlines), and then within 3 weeks from the date of receipt forward the application to DITRDC. Upon final receipt of technical calculations and agency and stakeholder feedback, DITRDC would make a determination and advise the referring airport and the applicant. Whilst the APAR provide a 4-week response timeframe for the DITRDC response, there are provisions whereby this timeframe can be extended, especially where DITRDC seeks clarification or further information to help in the assessment of complex cases.

A successful application would be given approval under Regulation 14 of the APAR as a controlled activity.

2.2.6 Applications for Cranes

For proposed cranes and temporary structures that would penetrate the OLS but not infringe the PANS-OPS constraint overhead, the airport may grant approval of applications under delegation. If an application seeks approval for cranes that would penetrate the PANS-OPS height constraint, permission may be granted by DITRDC subject to operational and safety assessments, as well as the agreement of the airport. In such cases, a crane which infringes the PANS-OPS would be approved for a maximum duration of 3 contiguous months as a short-term controlled activity under Regulation 14(5) of the APAR.

See also section 3.5 Considerations re Max Building Heights & Future Cranes (p25) regarding future crane implications for buildings in the Planning Proposal.

2.3 Airport Plans & Aeronautical Data References for the Study

2.3.1 Bankstown Airport Master Plan 2019

The current plan in effect, the Bankstown Airport Master Plan 2019, has two planning timeframes: a shorter-term planning period to 2024 and a longer-term forecast period from 2024 to 2039.

The master plan continues the provision for an extension of the main instrument flight runway, RWY 11C/29C. This will have no adverse effect on the existing airspace constraints overhead the site because the planned

extension is at the RWY29C (south-eastern) end of the runway. The master plan does not forecast any other potential changes to the aerodrome infrastructure or flight paths which would cause any additional impact on the airspace protection constraints overhead the site.

Similarly, the master plan indicates that even up to 2039 there would be no effective change in the ANEF noise contour overhead the site.

2.3.2 Bankstown Airport Prescribed Airspace Plans

The currently available plans comprise the OLS and PANS-OPS surfaces charts. The 2013 OLS chart (Declared 2016) is based on the planned extension to the east of the centre runway RWY 11C/29C. The OLS contours over the site are the same as those shown in section 3.2 below (p19).

The Bankstown Airport PANS-OPS surfaces chart, titled the Critical Surfaces (2018), was recently updated: this 12-Mar-2020 update includes some updates to take into account currently published PANS-OPS instrument flight procedures, but still appears to contain some inaccuracies due to reference ot outdated PANS-OPS standards. Nevertheless, the height constraints over the site are consistent with those analysed by StratAir and documented in section 3.3 (p21).

2.3.3 Procedure & Airspace Charts published by Airservices Australia

These charts are regularly updated every three months and the updates are published on Airservices Australia's website six weeks prior to implementation. These charts reflect changes in the international standards for PANS-OPS procedures, changes in the navigation infrastructure used and other changes implemented as a result of air traffic management demands and practices from time to time.

The PANS-OPS instrument flight procedures published in these charts are the procedures pilots are obliged to follow. Hence, they are the best source of information in deriving current airspace restrictions. The height limitations identified in this report are based on the most recent version of these and other relevant charts published by Airservices Australia. The charts referenced are listed in Appendix 2 — PANS-OPS Procedures.

3 Analysis

3.1 Analysis Summary

The impact of the various building height limitations, from lowest to highest, is summarised in the following table.

Height Limits (AHD)	Height Limit Detail	Comment
~76m – 108m	OLS Conical Surface	Threshold Heights for Airspace Height Applications — as depicted in Figure 8 (p20).
		Any development that would exceed the relevant limiting OLS height would require an 'airspace height' approval from the Department of Infrastructure, Transport, Regional Development and Communication (DITRDC) under the Airports (Protection of Airspace) Regulations (or APAR) prior to construction. Applications are usually made at the time of DA; and if the airspace approval may be subject of a DA consent condition if the airspace application is still under evaluation at the time of DA approval.
		A height application can be made for each building separately, a block or Superlot containing a number of buildings to be developed at the same time, or a single application can be made for the entire Moore Point precinct.
		The mid-rise and tall buildings proposed would infringe the OLS and would thus require airspace approvals — see Figure 9 (p21)
108 .1m	PANS-OPS CIRCLING Surface for Category B Aircraft	This constraint is the current maximum permissible building height for buildings under this coverage area that would be approved today by the aviation authorities (see Figure 10, p22).
	— Eastern portion of the study area	None of the proposed building envelopes exceed this height, and so could be considered technically approvable under the APARs.
		It is likely also to be the maximum height that would be considered approvable for cranes without necessarily requiring operating duration constraints (refer also section 3.5, p25)
136m	PANS-OPS CIRCLING Surface for Category C Aircraft	This constraint is the current maximum permissible building height for buildings under this coverage area (west of the Cat B circling area) that would be approved today by the aviation authorities (see Figure 10, p22).
	— Western portion of the study area	None of the proposed building envelopes exceed this height, and so could be considered technically approvable under the APARs.
		It is likely also to be the maximum height that would be considered approvable for cranes without necessarily requiring operating duration constraints (refer also section 3.5, p25)

Table 5 — Analysis Summary — Airspace Height Constraints

Moore Point Liverpool — Aeronautical Assessment for Planning Report by Strategic Airspace

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Height Limits (AHD)	Height Limit Detail	Comment
152.4m	Radar Terrain Clearance Chart (RTCC) Surface — Entirety of the study area	This constraint is the likely maximum permissible height that may potentially be considered approvable for cranes. Where cranes are approved at heights that exceed the relevant PANS-OPS surface height, there would be strict operational conditions (refer also section 3.5, p25). Note that applications for cranes are only required prior to construction, typically not until after approval of DA.
N/A	PANS-OPS Approaches & Departures Surfaces	The study area is outside the extent of the protection areas of PANS-OPS Approach Surfaces for Sydney Airport. Where PANS-OPS Missed Approach and Departure Procedure Surfaces do overlay the study area, the limiting heights are higher than those of the Circling Surface height limits — and so are not applicable to the approvability of the building envelopes included in this Planning Proposal.
NA	Other Surfaces	The study area is outside any airspace protection requirements related to Bankstown Airport's Navigation and Airport Lighting and Visual Guidance facilities. It is also clear of the primary flight paths used by emergency services helicopters to and from the nearest hospital (Liverpool Hospital).

3.2 OLS Analysis

The precinct is under Bankstown Airport's OLS Conical Surface, which rises at a gradient of 5%. As illustrated in Figure 8 below, the OLS height limits range:

- from approximately 76m AHD above the north-eastern corner of the site;
- to approximately 108m AHD at the south-western corner of the precinct.

Any of the buildings in the precinct, as well as cranes used for construction (when applicable), where their maximum heights would penetrate the relevant OLS height constraint overhead would need to be included in 'airspace height' applications under the Airports (Protection of Airspace) Regulations, for consideration and explicit approval prior to construction. APAR height applications for buildings would not be required until the submission of DAs at the earliest.

Proposed buildings with maximum heights that would be lower than the relevant OLS height constraint do not need such 'airspace height' approvals.

Moore Point Liverpool — Aeronautical Assessment for Planning Report by Strategic Airspace



Figure 8 — Indicative OLS Conical Surface Height Contours over the Site

For: Leamac | Coronation

Figure 9 below illustrates which building envelopes — based on the Planning Proposal masterplan and the maximum heights indicated in Table 4 above (p9) — would infringe the OLS Conical Surface. The 3D view depicts the extent of penetration.

For: Leamac | Coronation



Figure 9 — Building Envelopes which would infringe the OLS Conical Surface — in 2D and 3D

Buildings that ultimately gain height approvals may be required (as part of the approval conditions) to install and operate obstacle lights on the sides and/or tops of the buildings, subject to recommendations made by CASA during their assessment of a height application and based on the specifications in the Civil Aviation Safety Regulations (CASR) Manual of Standards (MOS) Part 139.

3.3 PANS-OPS Analysis

None of proposed buildings in the precinct would penetrate the limiting PANS-OPS surfaces shown in Bankstown Airport's Prescribed Airspace. Therefore, all such buildings could be considered approvable under the Airports (Protection of Airspace) Regulations — subject to other safety considerations that CASA might consider relevant.

In this particular case, the consultants believe that all such buildings would be granted 'airspace height' approvals by DITCRD. The taller buildings may be approved with conditions such as need to install obstacle lighting.

In addition to reviewing the PANS-OPS Surfaces chart of Bankstown Airport's PANS-OPS Critical Surfaces (2018, updated 12-Mar-020) plan, assessment was conducted of the following instrument (non-visual) procedure types for Bankstown Airport, as published by Airservices Australia in the Australian Aeronautical Information Publication (AIP) Departure and Approach Procedures (DAP), up to the current Amendment 162 (effective 27-Feb-2020 to 20-May-2020).

- The Circling Minima and Minimum Sector Altitudes (MSAs) for existing PANS-OPS procedures "Area" procedures, which provide protection for aircraft manoeuvring or circling within defined areas above the airport and surrounds
- The discrete minima for the Instrument Approach Procedures.
- Missed Approaches as part of the evaluation of Approach Procedures
- The existing Standard Instrument Departure Procedures (SIDs)

Analysis of these procedures confirms that the precinct is constrained by the circling minima for Category B and Category C aircraft — as depicted in the figures below.

Moore Point Liverpool — Aeronautical Assessment for Planning Report by Strategic Airspace



Model Source: SJB

Figure 10 — PANS-OPS Cat B & Cat C Constraining Surfaces over the Site

For: Leamac | Coronation



Model Source: SJB

Figure 11 — 3D View of Planning Proposal Building Model relative to the PANS-OPS Circling Surfaces

Table 6 — PANS-OPS H	leight Limit Summary
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Procedure	Height Limit (m AHD)	Description
Circling — Cat B	108.1	Category B Circling — The 108.12m Cat B circling surface height constraint covers the area closer to the airport and extends out to approximately 40% of the eastern portion of the site. Refer Figure 10 and Figure 11 above.
		The calculated height limit is marginally more conservative in height than that published on the Bankstown Airport PANS-OPS chart.
		This height is considered the maximum permissible building height over the coverage area.
		None of the building envelopes in the Planning Proposal which are under the coverage area of this surface exceed this limiting height, and so can be considered technically approvable under the APARs.
Circling — Cat C	136	Category C Circling — Covers the area over the site outside of the area already covered by the Cat B circling. Refer Figure 10 and Figure 11 above.
		The calculated height limit of 136.032m (which is marginally higher than the 135.9m height published on the Bankstown Airport PANS-OPS chart) results applying the from standards in the ICAO PANS-OPS document to the published circling minima.
		This height is considered the maximum permissible building height over the coverage area.
		None of the building envelopes in the Planning Proposal which are under the coverage area of this surface exceed this limiting height, and so can be considered technically approvable under the APARs.
Approaches and Missed Approaches to all Runways	N/A	Outside the lateral protection areas of many procedures. Where protection surfaces overlay the study area, the lowest limits are higher than the circling surface height constraints.
Departures	N/A	Where protection surfaces overlay the study area, the lowest limit is higher than the circling surface height constraints.
Minimum Sector Altitude (MSA)	457.2	10NM Inner MSA of 2500ft.

Further details are provided in the following sections.

3.3.1 "Area" Procedures

3.3.1.1 Minimum Sector Altitudes (MSAs)

The height restrictions imposed by Minimum Sector Altitudes are higher than the limits imposed by other procedures.

3.3.1.2 Circling Minima

These are areas that define where and how low aircraft are allowed to circle the airport before landing. They apply to the published landing procedures: the Cat B minima for smaller category A and B aircraft; and the Cat C minima for the larger and/or faster category C aircraft.

As noted Table 6 above and as illustrated in the figures above, the eastern portion of the site is constrained by the Cat B circling surface height and the

western portion of the site is constrained by the higher height related to the Cat C circling surface.

3.3.2 Instrument Approaches & Missed Approaches, and Standard Instrument Departures (SIDs)

The site is outside the lateral extent of the protection surfaces for some of the published instrument flight procedures (IFPs), and thus presents no impact to those procedures.

Where the site is under the coverage area of other IFPs, the limiting heights of the PANS-OPS protection surfaces for those procedures are higher than the Circling surface height constraints.

3.4 Other Assessment Considerations

The following table provides a brief assessment of other considerations.

Procedure	Height Limit (m AHD)	Description
Radar Terrain	152.4	This height constraint is applicable over the entire site
Clearance Chart (RTCC)		This is the limit related to the Minimum Vectoring Altitude (MVA), which is used by air traffic controllers. This information is sourced from the RTCC published as part of Sydney Airport's Prescribed Airspace Plans.
		This would be regarded as the absolute maximum permissible height for cranes, noting that the preference of the airport and aviation agencies would be for cranes to operate at maximum heights which would not infringe the relevant PANS-OPS surface height constraints.
Navigation Infrastructure	N/A	Based on the site location and maximum height, we believe that the proposed development will not adversely affect the NDB navigation aid at Bankstown Airport, and it will not adversely affect the radars used for monitoring aircraft operations in the Sydney Basin.
Airlines Engine Out Procedures	N/A	The location of the proposed development is outside any areas that would be assessed for impact or required for use under One-Engine Inoperative operations by relevant passenger transport aircraft operators that use Bankstown Airport.
Strategic Helicopter Landing Sites (SHLS)	N/A	The precinct location lies just to the south of the main final approach and initial take-off/departure flight path for EMS helicopter traffic to and from the Liverpool Hospital helipads.
		Further, even if helicopter traffic were to fly over the Georges River along the northern border of the precinct, the proposed buildings are buffered firstly by green space and then by lower buildings which would be well below the critical height of the helicopters at those locations.
		The precinct is also well clear of the published arrival and departure routes required to be used by helicopters using the helipad at Bankstown Airport.
		Refer also to section 2.1.3 (p12) and Figure 7 (p13).

There are no other known considerations that are considered relevant and which would constrain the maximum height of the proposed development.

3.5 Considerations re Max Building Heights & Future Cranes

As previously noted in section 2.2.4 The Application Pathway for Airspace Height Approvals and section 2.2.6 Applications for Cranes (p16), height applications for cranes are usually made only when required, prior to construction.

All buildings in this Planning Proposal which have maximum RLs less than say 70m AHD in the Cat B circling area of coverage and those less than say 100m AHD under the Cat C circling area height constraint would most likely be able to be constructed using cranes that would not infringe the relevant PANS-OPS height constraints. Not only does this mean that height applications for the buildings themselves would be simpler to process, it also means that cranes for such buildings could be approved without operating duration restrictions.

For the taller buildings, airspace height applications may require supporting information to confirm that cranes which would exceed the PANS-OPS height limit could be safely operated at heights that would be below the next highest PANS-OPS or the RTCC surface height limit — which in this case is probable because there is sufficient vertical clearance between the maximum building heights proposed and the limiting RTCC height of 152.4m AHD — and that the applicant is aware that any associated cranes approvals would be to strict conditions. Such approval conditions would include a strict 3-month operating duration, and other operating conditions. This was the case for the height application of the tallest buildings for the nearby Green Square development itself, and later applications for cranes that exceeded the PANS-OPS circling height limit.

These are not conditions that are applicable to approval of a rezoning application per se, but are mentioned here as information that would pertain to developers at the time of preparation of DAs and height applications for buildings.

4 Conclusion

The Planning Proposal contains a number of buildings which would infringe the OLS conical surface which rise across the site — from approximately 76m AHD in the east to 108m AHD at the western edge. The masterplan contains buildings of different types and heights dispersed across the site, following the planning concepts and objective. The low-rise buildings would not infringe the OLS and so would not require any aviation-related airspace height approvals. Those buildings that ultimately would infringe the relevant OLS height constraint would require airspace height approvals under the APAR prior to construction (and most likely at the time of a DA).

The structure of the Superlots and the distribution of the taller buildings in the Planning Proposal already take into account the maximum permissible building heights related to the PANS-OPS height constraints imposed by the circling surface heights. As such, all building envelopes would remain below the relevant PANS-OPS surface height limit overhead, and as such are considered technically approvable under the Airports (Protection of Airspace) Regulations.

In conclusion:

- There is no technical impediment to approval of the development of the Moore Point Planning Proposal, and
- It is considered that that future applications for buildings in the Indicative Concept Proposal, under the Airports (Protection of Airspace) Regulations, supported by a full aeronautical assessment and safety case would be approved by the Department of Infrastructure, Transport, Regional Development and Communications.

Thus, nothing in the body of this report/assessment would preclude the Planning Proposal from rezoning and gazettal for residential/mixed use purposes based on the findings of this aeronautical assessment.

APPENDICES

APPENDIX 1 — ABBREVIATIONS

Abbreviations used in this report and/or associated reference documents, and the meanings assigned to them for the purposes of this report are detailed in the following table:

Abbreviation	Meaning
AC	Advisory Circular (document supporting CAR 1998)
ACFT	Aircraft
AD	Aerodrome
ADS-B	Automatic Dependent Surveillance – Broadcast: an aircraft location identification and tracking service facilitated by satellite signals and ground tracking stations, similar to (but more accurate than) radar
AGL	Above Ground Level (Height)
AHD	Australian Height Datum
AHT	Aircraft Height
AIP	Aeronautical Information Publication
Airports Act	Airports Act 1996, as amended
AIS	Aeronautical Information Services
ALARP	As Low As Reasonably Practicable
ALC	Airport Lease Company
Alt	Altitude
AMAC	Australian Mayoral Aviation Council
AMSL	Above Minimum Sea Level
ANEF	Australian Noise Exposure Forecast
ANSP	Airspace and Navigation Service Provider
APACL	Australia Pacific Airports Corporation Limited, owner of Melbourne and Launceston Airports
APCH	Approach
APARs, or A(PofA)R	Airports (Protection of Airspace) Regulations, 1996 as amended
ARP	Aerodrome Reference Point
AsA	Airservices Australia
ASDA	Accelerated Stop Distance Available
ATC	Air Traffic Control(ler)
ATM	Air Traffic Management
BA (Planning)	Building Application or Building Approval (Planning)
BAC	Brisbane Airport Corporation
BCC	Brisbane City Council
CAO	Civil Aviation Order
CAR	Civil Aviation Regulation
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation
Cat	Category
CBD	Central Business District
CG	Climb Gradient
CNS/ATM	Communications, Navigation, Surveillance / Air Traffic Management
СРА	Cairns Port Authority, Operators Of Cairns Airport
DA (Aviation)	Decision Altitude (Aviation)
DA (Planning)	Development Application or Development Approval (Planning)
DAH	Designated Airspace Handbook
DAP	Departure and Approach Procedures (published by AsA)

Abbreviation	Meaning
DEP	Departure
DER	Departure End (of the) Runway
DEVELMT	Development
DH	Decision Height
DITRDC / DITRDC / DIRD	Department of Infrastructure, Transport, Regional Development & Communications (since Dec-2019) Formerly the Department of Infrastructure, Regional Development (& Cities) (sometimes also abbreviated as Infrastructure)
DME	Distance Measuring Equipment
Doc nn	ICAO Document Number nn
DoD	Department of Defence
DODPROPS	Dependent Opposite Direction Parallel Runway OPerations
DPIE	NSW Department of Planning, Industry & Environment
EIS	Environmental Impact Study
ELEV	Elevation (above mean sea level)
ENE	East North East
ERSA	EnRoute Supplement Australia
ESE	East South East
FACS	NSW Family & Community Services — formerly part of LaHC, but since July 2019 part of the NSW Department of Communities & Justice (DCJ)
FAF	Final Approach Fix
FAP	Final Approach Point
Ft	Feet
GBAS	Ground-Based Augmentation System, a GNSS augmentation system to provide vertical guidance and additional precision to non-precision approaches — permits GLS Approaches
GDA94	GDA is the Geocentric Datum of Australia. It has been implemented as the standard datum since 1994.
GLS	GNSS Landing System – a precision landing system like ILS but based on augmented GNSS using ground and satellite systems.
GNSS	Global Navigation Satellite System
GP	Glide Path
HIAL	High Intensity Approach Light
HLS	Helicopter Landing Site
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IHS	Inner Horizontal Surface, an Obstacle Limitation Surface
ILS	Instrument Landing System, a precision approach landing system
IMC	Instrument Meteorological Conditions
IPA	Integrated Planning Act 1997, Queensland State Government
ISA	International Standard Atmosphere
IVA	Independent Visual Approach
Km	Kilometres
Kt	Knot (one nautical mile per hour)
LaHC	NSW Land and Housing Corporation, part of the NSW DPIE
LAT	Latitude
LDA	Landing Distance Available

Abbreviation	Meaning
LEP	Local Environment Plan (Planning
LLZ	Localizer
LNAV	Lateral Navigation
LONG	Longitude
LSALT	Lowest Safe ALTitude
Μ	Metres
MAPt	Missed Approach Point
MDA	Minimum Descent Altitude
MDH	Minimum Descent Height
MDP	Major Development Plan
MGA94	Map Grid Australia 1994
MOC	Minimum Obstacle Clearance
MOCA	Minimum Obstacle Clearance Altitude
MOS	Manual Of Standards, published by CASA
MP	Master Plan
MSA	Minimum Sector Altitude
MVA	Minimum Vector Altitude
NASF	National Airports Safeguarding Framework
NDB	Non-Directional Beacon
NE	North East
NM	Nautical Mile (= 1.852 km)
nnDME	Distance from the DME (in Nautical Miles)
NNE	North North East
NNW	North North West
NOTAM	NOTice to AirMen
NPR	New Parallel Runway (Project, Brisbane Airport)
OAR	Office of Airspace Regulation
OCA	Obstacle Clearance Altitude (in this case, in AMSL)
OCH	Obstacle Clearance Height
ODPROPS	Opposite Direction Parallel Runway OPerations
OHS	Outer Horizontal Surface, an Obstacle Limitation Surface
OLS	Obstacle Limitation Surface, defined by ICAO Annex 14; refer also CASA MOS Part 139
PANS-OPS	Procedures for Air Navigation – Operations, ICAO Doc 8168; refer also CASA MOS Part 173
PAPI	Precision Approach Path Indicator (a form of VGSI)
PBN	Performance Based Navigation
PRM	Precision Runway Monitor
RAAF	Royal Australian Air Force
RAPAC	Regional AirsPace users Advisory Committee
REF	Reference
RL	Relative Level
RNAV	aRea NAVigation
RNP	Required Navigation Performance
RPA	Rules and Practices for Aerodromes — replaced by the MOS Part 139 — Aerodromes

Abbreviation	Meaning
RPT	Regular Public Transport
RTCC	Radar Terrain Clearance Chart (refer also MVA)
RWY	Runway
SACL	Sydney Airport Corporation Limited
SID	Standard Instrument Departure
SODPROPS	(Independent) Simultaneous Opposite Direction Parallel Runway OPerations
SPP	State Planning Policy, Queensland (specifically SPP 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities)
SSDA	State Significant Development Application
SSP	State Significant Precinct
SSR	Secondary Surveillance Radar
STAR	STandard Arrival
STODA	Supplementary Take-Off Distance Available
TAR	Terminal Approach Radar
TAS	True Airspeed
THR	THReshold (of Runway)
ТМА	TerMinal Area
TNA	Turn Altitude
TODA	Take-off Distance Available
TORA	Take-Off Runway Available
VFR	Visual Flight Rules
VIS	Visual
VMC	Visual Meteorological Conditions
V _n	Aircraft critical velocity reference
VNAV	Vertical Navigation
VOR	Very high frequency Omni-directional Range
VSS	Visual Segment Surface
WAC	Westralia Airports Corporation, operators of Perth Airport
WAM	Wide-Area Multilateration
WNW	West North West
WSW	West South West
WGS84	World Geodetic System 1984
WSA	Western Sydney Airport – the proposed second international airport for the Sydney Basin

APPENDIX 2 — PANS-OPS PROCEDURES

The latest versions of the IFPs consulted were from the current AIP Amendment 162 (effective from 27-Feb-2020 to 20-May-2020) — as indicated in Table 8 below.

The charts and procedures that are new or updates in the relevant amendment are highlighted in deep red text.

Table 8 — All PANS-OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 162 – WEF 20200227 – 20200520)

SYDNEY/BANKSTOWN (YSBK)

Effective Date (Amendment No)
27-Feb-2020 (Am 162)
7-Nov-2019 (Am 161)
9-Nov-2017 (Am 153)
8-Nov-2018 (Am 157)
8-Nov-2018 (Am 157)
8-Nov-2018 (Am 157)

Source: AIP Book (27-Feb-2020) via http://www.airservicesaustralia.com/aip/aip.asp?pg=10