Revised Site Layout

42-60 Railway Parade
Burwood NSW

Client

Holdmark

LB00078

Final Version No.003
21 June 2018

Version No.	Basis of issue	Author	Date	Reviewers
001	Draft report for submission to Client	SK	10 May 2018	PW
002	Final report including minor wording changes	SK	14 May 2018	PW
003	Final Report with new building layout diagrams	PWW	21 June 2018	SK

Contents

1 Introduction

1.1 Revision of development

On 1 May 2018, Holdmark advised that an amended planning proposal was required for the development at 42 – 60 Railway Parade, Burwood, to reflect a revised scheme with an increase in the Gross Floor Area (GFA) of the building envelope.

L&B has previously prepared aeronautical impact assessments for this site, and approvals have been issued by the Department of Infrastructure, Regional Development and Cities (the Department) for the building and construction crane activity.

There are no planned changes to the height of the development, and therefore no requirement to revise the applications for infringement of prescribed airspace with Sydney Airport Corporation Limited, and the Department.

This report will be submitted in support of the amended planning proposal required for this site.

1.2 History

In 2015, Holdmark submitted an application to Sydney Airport Corporation Limited (SACL) requesting approval to construct a multi-building development at 42 – 60 Railway Parade, Burwood, under the Airports (Protection of Airspace) Regulations 1996.

In the planning stages, the building and the cranes required for the construction activity were identified as infringing the prescribed airspace for Sydney and Bankstown airports, namely the Radar Terrain Clearance Chart surface (RTCC), and the Outer Horizontal Surface (OHS).

As a result of these findings, Holdmark reduced the building and crane height, and limited the duration of operation of the crane at its full height to minimize the impact on prescribed airspace.

Figure 1: Location of the development site in relation to Sydney and Bankstown Airport Aerodrome Reference Point (ARP).

2 Approvals

Following agreement by Airservices Australia (ASA) to raise the RTCC surface height above the Railway Parade development, the Department were able to issue the following approvals.

On the 6 March 2018 the Department delivered to Holdmark approval to construct a multi-building development at 42 – 60 Railway Parade, Burwood.

Subsequently, on the 23 April 2018, the Department delivered their approval for Holdmark to operate a crane for the purpose of constructing the building at 42 – 60 Railway Parade, Burwood.

These approvals are attached included at Appendix A.

2.1 The building

The building has been approved to a maximum height of 163.5 m AHD which represents an infringement of the OHS by 7.5 metres (Department reference F17/2779-72). The development will not infringe the RTCC surface.

Activity	MGA 94 Coordinates	Maximum Height (AHD)	Penetration of prescribed airspace
Building	E 324347, N 6249804	163.5 metres	7.5 metres

Table 1: Height and location of proposed building activity

2.2 The crane

The construction crane has been approved to infringe the OHS and operate to a height of 181.5 m AHD from 1 January 2019 until 31 December 2026 (Department reference F17/2779-90). The crane will not infringe the RTCC surface.

Activity	MGA 94 Coordinates	Maximum Height (AHD)	Penetration of prescribed airspace
Crane Operation	E 324347, N 6249804	181.5 metres	25.5 metres

Table 2: Height and location of proposed crane activity

3 Development changes

Due to changes made to the architectural plans to increase several tower sizes and overall residential yield, an amended planning proposal must be submitted.

Tower A remains the highest building in the development at the already approved height of 163.50 m AHD.

As there is no increase in height of the development, there will be no change to the impact to aviation activities.

Construction cranes will be limited to the approved height of 181.5 m AHD.

Attachment B includes the revised architectural plans for the development at 42-60 Railway Parade.

4 Conclusion

The new plans do not require an increase to the height of the development's tallest structure, or to the height or activity duration of the construction cranes.

Therefore, there is no change to the impact on aviation activities which have already been assessed by CASA, Airservices Australia, Sydney Airport Corporation Limited, and ultimately approved by the Department of Infrastructure, Regional Development and Cities.

Appendix A

Department of Infrastructure, Regional Development and Cities Approvals

1. Approval for Construction of Building

Australian Government
Department of Infrastructure, Regional Development and Cities

File reference: F17/2779-72

TO	CC	FROM
Mr Gavin Carrier **Holdmark** gavin.carrier@holdmark.com.au	**Sydney Airport** airspaceprotection@syd.com.au **Civil Aviation Safety Authority** airspace.protection@casa.gov.au **Airservices Australia** airport.developments@airservicesaustralia.com ifp@airservicesaustralia.com **Burwood Council** council@burwood.nsw.gov.au	Flysafe **Airspace Protection** flysafe@infrastructure.gov.au

DECISION UNDER THE AIRPORTS (PROTECTION OF AIRSPACE) REGULATIONS 1996

Proposed Activity: Construction of a building

Location: 42-60 Railway Parade, Burwood NSW

MGA 94 Coordinates: E 324347, N 6249804

Proponent: Holdmark

I refer to the application from Holdmark (the Proponent), received by the Department of Infrastructure, Regional Development and Cities (the Department) on 14 December 2017 from Sydney Airport Corporation Limited (SACL). This application sought approval under the Airports (Protection of Airspace) Regulations 1996 (the Regulations) for the intrusion of a building at 42-60 Railway Parade, Burwood NSW (the site) into airspace which, under the Regulations, is prescribed airspace for Sydney Airport.

Under regulation 6(1), 'prescribed airspace' includes 'the airspace above any part of either an Obstacle Limitation Surface (OLS) or Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surface for the airport'.

The Outer Horizontal Surface of the OLS above this site is at a height of 156 metres above the Australian Height Datum (AHD) and hence prescribed airspace above the site commences at 156 metres AHD. At a maximum height of 163.5 metres AHD, the building will penetrate the OLS by 7.5 metres.

Accordingly, the construction of the building constitutes a "controlled activity" under Section 182 of the *Airports Act 1996* (the Act). Section 183 of the Act specifies that controlled activities cannot be carried out without approval. Details of the penetration of prescribed airspace are provided in Table 1.

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GPO Box 594 Canberra ACT 2601 Australia • Telephone: 02 6274 7111 • Facsimile: 02 6257 2505
Website: www.infrastructure.gov.au • ABN 86 267 354 017

Table 1: Height and location of the proposed activity that will intrude into prescribed airspace for Sydney Airport.

Activity	MGA 94 Coordinates	Maximum height (AHD)	Penetration of prescribed airspace
Building	E 324347, N 6249804	163.5 metres	7.5 metres

Regulation 14 provides that a proposal to carry out a controlled activity must be approved unless carrying out the controlled activity would interfere with the safety, efficiency or regularity of existing or future air transport operations into or out of the airport concerned. Regulation 14(1)(b) provides that an approval may be granted subject to conditions.

Under the Regulations, the Secretary of the Department is empowered to make decisions in relation to the approval of controlled activities, and impose conditions on the approval.

Decision

As you may be aware, the Secretary is required under regulation 15(1AB) of the Regulations to make a decision about the proposal within 28 days of receiving the application. I am the Secretary's Delegate for the purposes of the Regulations.

Due to the time taken to receive all the information that is relevant to the making of a decision, in particular, in relation to the associated crane activities, a decision was not made within this timeframe. Therefore, under regulation 15(2) this proposal was taken to have been refused. However, the Department has now considered the application in full and I have re-made the decision.

In accordance with regulation 14, **I approve** the controlled activity for the intrusion of a building at 42-60 Railway Parade, Burwood NSW into prescribed airspace for Sydney Airport to a **maximum height of 163.5 metres AHD**.

In making my decision, I have taken into consideration the opinions of the Proponent, the Civil Aviation Safety Authority, Airservices Australia's (Airservices) advice numbers SY-CA-277 P2 and SY-CO-505 P3, airlines and SACL.

In accordance with regulation 14(1)(b), I impose the following conditions on my approval:

1. The building **must not exceed** a maximum height of **163.5 metres AHD**, inclusive of all lift over-runs, vents, chimneys, aerials, antennas, lightning rods, any roof top garden plantings, exhaust flues etc.

2. The building **must be obstacle lit** by medium intensity steady red lighting during the hours of darkness at the highest point of the building. Obstacle lights are to be arranged to ensure the building can be observed in a 360 degree radius as per subsection 9.4.3 of the Manual of Standards Part 139 – Aerodromes (MOS). Characteristics for medium intensity lights are stated in subsection 9.4.7 of the MOS.

3. The Proponent **must ensure** obstacle lighting arrangements have a remote monitoring capability, in lieu of observation every 24 hours, to alert SACL reporting staff of any outage. For detailed requirements for obstacle lighting monitoring within the OLS of an aerodrome, refer to subsection 9.4.10 of the MOS.

4. The obstacle lighting **must have** a built-in alarm system that will provide remote monitoring to notify the person responsible for the maintenance of the obstacle lighting. The designated person must be available 24 hours per day, 7 days per week. Immediate action must be taken to repair the obstacle lighting and notify Sydney Airport of any outage. The contact details of the person responsible for the maintenance of the obstacle lighting must be sent to Sydney Airport prior to the completion of the building being constructed, and must be kept up to date. In the event of the obstacle lighting being inoperable, the person responsible for the maintenance of the obstacle lighting is to immediately contact the Sydney Airport Airfield Operations Supervisor on 0419 278 208 or 9667 9824.

5. Following completion of the building, the Proponent **must advise** SACL, in writing, that the future owner(s)/manager(s) have been informed of their obligation to maintain the obstacle lighting in accordance with conditions of this approval.

6. The Proponent **must advise** Airservices at least three business days prior to the controlled activity commencing by emailing <*ifp@airservicesaustralia.com*> and quoting SY-CA-277 P2.

7. Separate approval **must be sought** under the Regulations for any construction equipment (i.e. cranes) required to construct the building.

   - I note the crane associated with the construction of this building is proposed to operate at a maximum height of 181.5 metres AHD, and that the initial Airservices assessment indicated that the crane would intrude into both the OLS and RTCC surface for Sydney Airport. On 1 March 2018, Airservices confirmed that it will be implementing changes to the RTCC surface that would mean that the crane will no longer impact the RTCC. An approval for the crane intrusion into the OLS will be considered when the RTCC changes are finalised by Airservices.

8. At the completion of the construction of the building, a certified surveyor **must notify** (in writing) SACL of the finished height of the building.

Breaches of approval conditions are subject to significant penalties under Sections 185 and 187 of the Act.

I apologise for the delay in finalising this approval.

Yours sincerely

Craig Downsborough
Director, Airspace Protection
Aviation and Airports Division

6 March 2018

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2. Approval for Crane Operations

Australian Government

Department of Infrastructure, Regional Development and Cities

File reference: F17/2779-90

TO	CC	FROM
Mr Gavin Carrier **Holdmark** gavin.carrier@holdmark.com.au	**Sydney Airport** airspaceprotection@syd.com.au **Civil Aviation Safety Authority** airspace.protection@casa.gov.au **Airservices Australia** airport.developments@airservicesaustralia.com ifp@airservicesaustralia.com **Burwood Council** council@burwood.nsw.gov.au	Flysafe **Airspace Protection** flysafe@infrastructure.gov.au

DECISION UNDER THE AIRPORTS (PROTECTION OF AIRSPACE) REGULATIONS 1996

Proposed Activity:	Crane Operation
Location:	42-60 Railway Parade, Burwood NSW
MGA 94 Coordinates:	E 324347, N 6249804
Proponent:	Holdmark

I refer to the application from Holdmark (the Proponent), received by the Department of Infrastructure, Regional Development and Cities (the Department) on 24 January 2018 from Sydney Airport Corporation Limited (SACL). This application sought approval under the Airports (Protection of Airspace) Regulations 1996 (the Regulations) for the intrusion of a crane at 42-60 Railway Parade, Burwood NSW (the site) into airspace which, under the Regulations, is prescribed airspace for Sydney Airport.

Under regulation 6(1), 'prescribed airspace' includes 'the airspace above any part of either an Obstacle Limitation Surface (OLS) or Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surface for the airport'.

The Outer Horizontal Surface of the OLS above this site is at a height of 156 metres above the Australian Height Datum (AHD) and hence prescribed airspace above the site commences at 156 metres AHD. At a maximum height of 181.5 metres AHD, the crane will penetrate the OLS by up to 25.5 metres.

Accordingly, the proposed operation of the crane would constitute a "controlled activity" under Section 182 of the *Airports Act 1996* (the Act). Section 183 of the Act specifies that controlled activities cannot be carried out without approval. Details of the penetration of prescribed airspace are provided in the Table 1.

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Website: www.infrastructure.gov.au • ABN 86 267 354 017

Table 1: Height and location of proposed activity at the site that will intrude into prescribed airspace for Sydney Airport.

Activity	MGA 94 Coordinates	Maximum height (AHD)	Penetration of prescribed airspace
Crane Operation	E 324347, N 6249804	181.5 metres	25.5 metres

The crane is to be used to construct a building which was approved by the Department on 6 March 2018 that will intrude 7.5 meters into prescribed airspace for Sydney Airport.

On 5 April 2018, Airservices Australia advised that the changes to the Sydney RTCC have now been completed and are being implemented. Therefore this controlled activity does not impact the RTCC.

Regulation 14 provides that a proposal to carry out a controlled activity must be approved unless carrying out the controlled activity would interfere with the safety, efficiency or regularity of existing or future air transport operations into or out of the airport concerned. Regulation 14(1)(b) provides that an approval may be granted subject to conditions.

Under the Regulations, the Secretary of the Department is empowered to make decisions in relation to the approval of controlled activities, and impose conditions on the approval.

Decision

As you may be aware, the Secretary is required under regulation 15(1AB) of the Regulations to make a decision about the proposal within 28 days of receiving the application. I am the Secretary's Delegate for the purposes of the Regulations.

Due to the time taken to implement the changes to the Sydney RTCC and receive all the information that is relevant to the making of a decision, a decision was not made within this timeframe. Therefore, under regulation 15(2) this proposal was taken to have been refused. However, the Department has now considered the application in full and I have re-made the decision.

In accordance with regulation 14, **I approve** the controlled activity for the intrusion of a crane at 42-60 Railway Parade, Burwood NSW into prescribed airspace for Sydney Airport to a **maximum height of 181.5 metres AHD**.

In making my decision, I have taken into consideration the opinions of the Proponent, the Civil Aviation Safety Authority, Airservices Australia's advice numbers SY-CO-505 P3 and SY-MI-028 and SACL.

In accordance with regulation 14(1)(b), I **impose the following conditions on my approval**:

1. The crane **must not** exceed a maximum height of **181.5 metres AHD**.

2. The crane may engage in operations which will cause it to intrude into prescribed airspace **only** as follows:
    - from **1 January 2019 to 31 December 2026**.

3. The crane **must be obstacle marked** in alternating red and white bands of colour in accordance with subsection 8.10.2 of the Manual of Standards - Part 139 Aerodromes (MOS), or it should be lit with flashing white obstacle lighting during daylight hours.

4. The crane **must be obstacle lit** with medium intensity steady red lighting at night at the tip of the boom and the highest point of the engine platform or A frame. Characteristics for medium intensity lights are stated in subsection 9.4.7 of the MOS. Obstacle lights are to be arranged to ensure the lighting can be observed in a 360 degree radius as per subsection 9.4.3 of the MOS.

5. The Proponent **must ensure** the obstacle lighting has a remote monitoring capability, or SACL is to monitor the ongoing availability of the obstacle lighting. For detailed requirements for the monitoring of obstacle lights within the aerodrome's OLS refer to subsection 9.4.10 of MOS.

6. The Proponent **must ensure** obstacle lighting is maintained in serviceable condition and any outage immediately reported to SACL.

7. The Proponent **must give** SACL at least two business days notice prior to the crane being erected above 156 metres AHD. SACL needs to ensure that a NOTAM has been issued regarding the crane's height and location, in accordance with paragraph 7.1.4.3 of the MOS.

8. The Proponent **must advise** Airservices Australia at least three business days prior to the controlled activity commencing by emailing <*ifp@airservicesaustralia.com*> and quoting SY-CO-505 P3.

9. The Proponent **must provide** SACL with surveyed as installed details including the height of the crane after it is erected.

10. At the end of the project the Proponent **must notify** SACL of the dates and hours for the removal of the crane and give a minimum of two business days notice.

Breaches of approval conditions are subject to significant penalties under Sections 185 and 187 of the Act.

I apologise for the delay in finalising this approval.

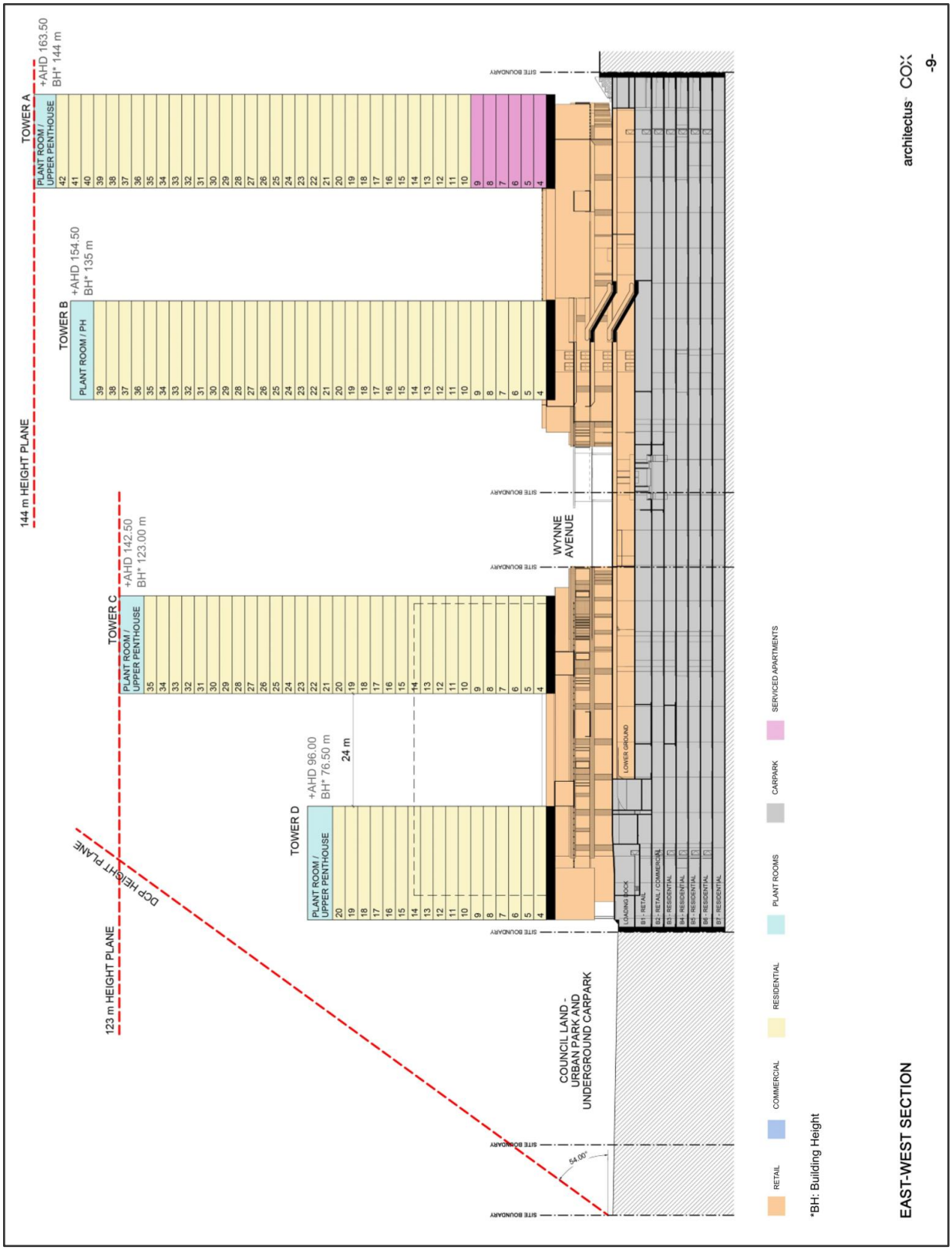
Yours sincerely

Craig Downsborough
Director, Airspace Protection
Aviation and Airports Division

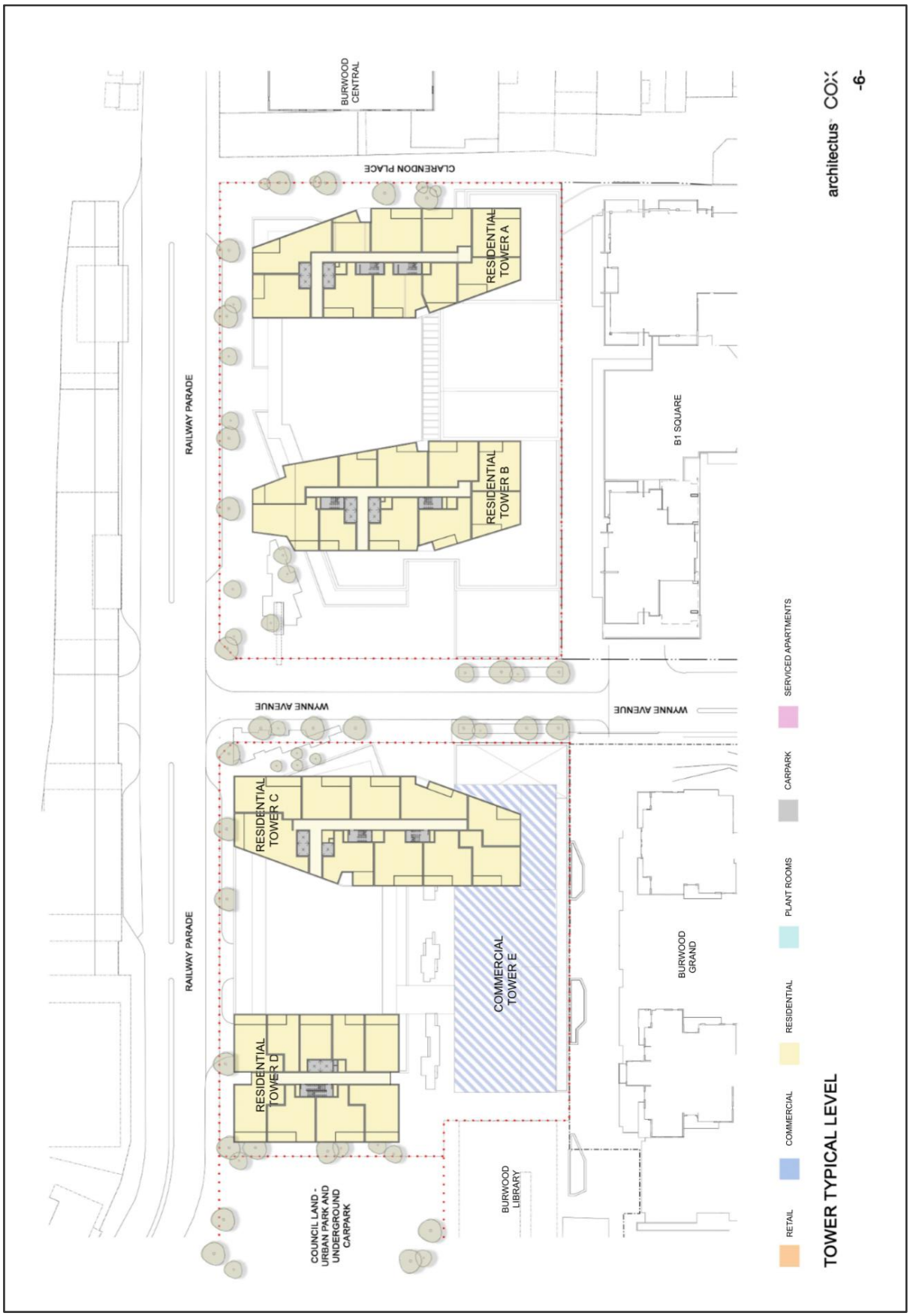
23 April 2018

Appendix B

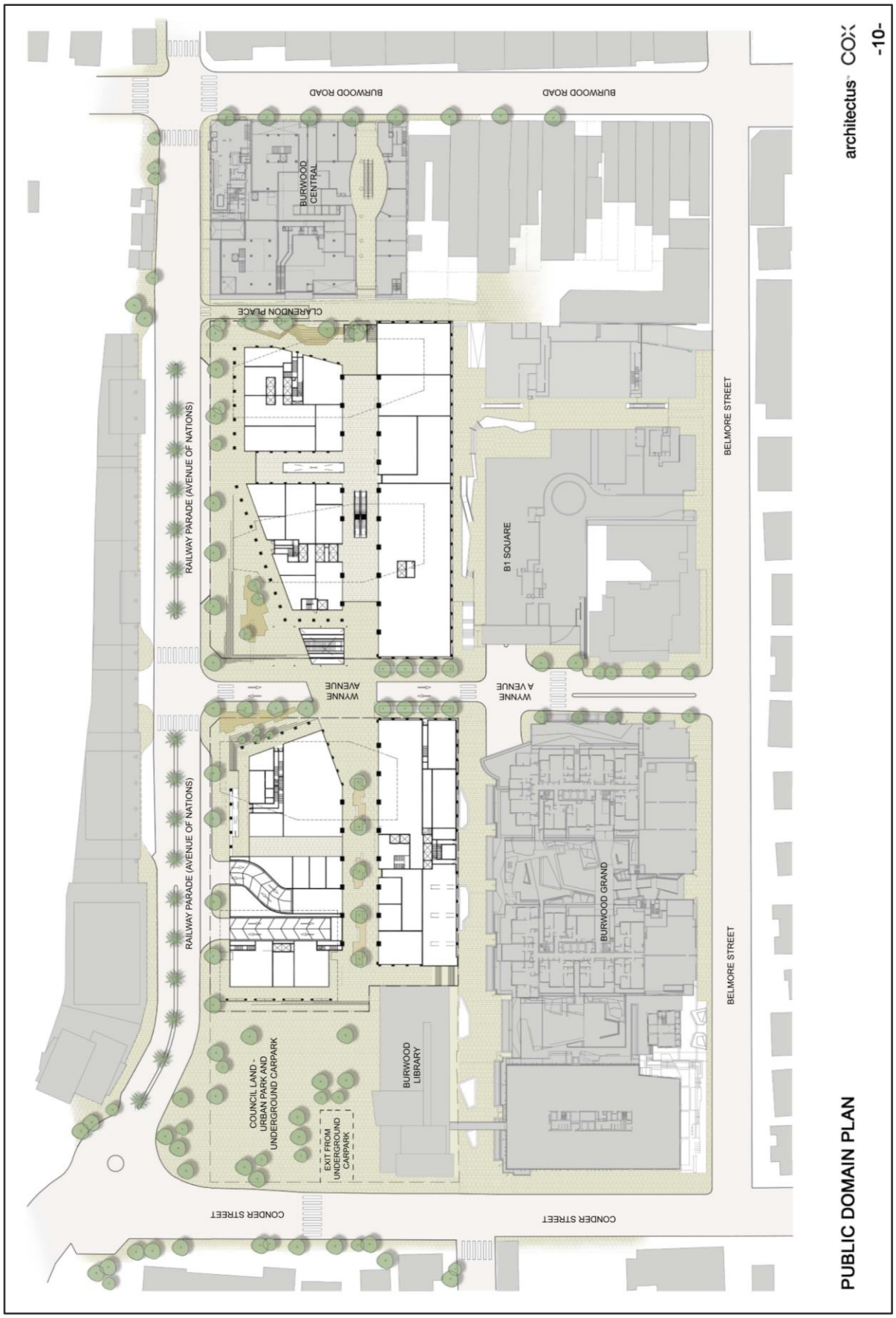
Building Height and Site Layout Diagrams



Maximum building heights
Source: Cox Architecture



Site Layout 1
Source: Cox Architecture



Site Layout 2
Source: Cox Architecture

Appendix C

Glossary of Aeronautical Terms and Abbreviations

To facilitate the understanding of aviation terminology used in this report, the following is a glossary of terms and acronyms that are commonly used in aeronautical impact assessments and similar aeronautical studies.

AC (Advisory Circulars) are issued by CASA and are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with the *Regulations*.

Aeronautical study is a tool used to review aerodrome and airspace processes and procedures to ensure that safety criteria are appropriate.

AIPs (Aeronautical Information Publications) are publications promulgated to provide operators with aeronautical information of a lasting character essential to air navigation. They contain details of regulations, procedures and other information pertinent to flying and operation of aircraft. In Australia, AIP is issued by Airservices Australia on behalf of CASA.

Air routes exist between navigation aid equipped aerodromes or waypoints to facilitate the regular and safe flow of aircraft operating under IFR.

Airservices Australia is the Australian government-owned corporation providing safe and environmentally sound air traffic management and related airside services to the aviation industry.

Altitude is the vertical distance of a level, a point or an object, considered as a point, measured from mean sea level.

ATC (Air Traffic Control) service is a service provided for the purpose of:

a. preventing collisions:
    1. between aircraft; and
    2. on the manoeuvring area between aircraft and obstructions; and
b. expediting and maintaining an orderly flow of air traffic.

CASA (Civil Aviation Safety Authority) is the Australian government authority responsible under the *Civil Aviation Act 1988* for developing and promulgating appropriate, clear and concise aviation safety standards. As Australia is a signatory to the ICAO *Chicago Convention,* CASA adopts the standards and recommended practices established by ICAO, except where a difference has been notified.

CASR (Civil Aviation Safety Regulations) are promulgated by CASA and establish the regulatory framework *(Regulations)* within which all service providers must operate.

Civil Aviation Act 1988 (the Act) establishes the CASA with functions relating to civil aviation, in particular the safety of civil aviation and for related purposes.

ICAO (International Civil Aviation Organization) is an agency of the United Nations which codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth. The ICAO Council adopts standards and recommended practices concerning air navigation, its infrastructure, flight inspection, prevention of unlawful interference, and facilitation of border-crossing procedures for international civil aviation. In addition, the ICAO defines the protocols for air accident investigation followed by transport safety authorities in countries signatory to the Convention on International Civil Aviation, commonly known as the *Chicago Convention*. Australia is a signatory to the *Chicago Convention.*

IFR (Instrument Flight Rules) are rules applicable to the conduct of flight under IMC. IFR are established to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals. It is also referred to as, “a term used by pilots and controllers to indicate the type of flight plan an aircraft is flying,” such as an IFR or VFR flight plan. Pilots must hold IFR qualifications and aircraft must be suitably equipped with appropriate instruments and navigation aids to enable flight in IMC.

IMC (Instrument Meteorological Conditions) are meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, less than the minimum specified for visual meteorological conditions.

LSALT (Lowest Safe Altitudes) are published for each low level air route segment. Their purpose is to allow pilots of aircraft that suffer a system failure to descend to the LSALT to ensure terrain or obstacle clearance in IMC where the pilot cannot see the terrain or obstacles due to cloud or poor visibility conditions. It is an altitude that is at least 1,000 feet above any obstacle or terrain within a defined safety buffer region around a particular route that a pilot might fly.

MOS (Manual of Standards) comprises specifications (Standards) prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation.

NOTAMs (Notices to Airmen) are notices issued by the NOTAM office containing information or instruction concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.

Obstacles. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

OLS (Obstacle Limitation Surfaces) are a series of planes associated with each runway at an aerodrome that defines the desirable limits to which objects may project into the airspace around the aerodrome so that aircraft operations may be conducted safely.

PANS OPS (Procedures for Air Navigation Services - Aircraft Operations) is an Air Traffic Control term denominating rules for designing instrument approach and departure procedures. Such procedures are used to allow aircraft to land and take off under Instrument Meteorological Conditions (IMC) or Instrument Flight Rules (IFR). ICAO document 8168-OPS/611 (volumes 1 and 2) outlines the principles for airspace protection and procedure design which all ICAO signatory states must adhere to. The regulatory material surrounding PANS OPS may vary from country to country.

PANS OPS Surfaces. Similar to an Obstacle Limitation Surface, the PANS OPS protection surfaces are imaginary surfaces in space which guarantee the aircraft a certain minimum obstacle clearance. These surfaces may be used as a tool for local governments in assessing building development. Where buildings may (under certain circumstances) be permitted to infringe the OLS, they cannot be permitted to infringe any PANS OPS surface, because the purpose of these surfaces is to guarantee pilots operating under IMC an obstacle free descent path for a given approach.

Prescribed airspace is an airspace specified in, or ascertained in accordance with, the Regulations, where it is in the interests of the safety, efficiency or regularity of existing or future air transport operations into or out of an airport for the airspace to be protected. The prescribed airspace for an airport is the airspace above any part of either an OLS or a PANS OPS surface for the airport and airspace declared in a declaration relating to the airport.

Radar Terrain Clearance Chart (RTCC) is a chart that provides air traffic controllers with the lowest usable altitude that they can vector an aircraft using prescribed surveillance procedures within controlled airspace. There is a protection surface below this usable altitude which is shown in airport master plans.

Regulations (Civil Aviation Safety Regulations)

VFR (Visual Flight Rules) are rules applicable to the conduct of flight under VMC. VFR allow a pilot to operate an aircraft in weather conditions generally clear enough to allow the pilot to maintain visual contact with the terrain and to see where the aircraft is going. Specifically, the weather must be better than basic VFR weather minima. If the weather is worse than VFR minima, pilots are required to use instrument flight rules. Pilots must be specifically qualified and aircraft specifically equipped to enable flight in IMC,

VMC (Visual Meteorological Conditions) are meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, equal or better than specified minima.

Abbreviations

Abbreviations used in this report, and the meanings assigned to them for the purposes of this report are detailed in the following table.

Abbreviation	Meaning
AC	Advisory Circular (document support CAR 1998)
ACFT	Aircraft
AD	Aerodrome
ADS-B	Automatic Dependent Surveillance - Broadcast
AHD	Australian Height Datum
AIP	Aeronautical Information Publication
Airports Act	Airports Act 1996, as amended
AIS	Aeronautical Information Service
ALT	Altitude
AMSL	Above Mean Sea Level
APARs	Airports (Protection of Airspace) Regulations, 1996 as amended
ARP	Aerodrome Reference Point
AsA	Airservices Australia
ATC	Air Traffic Control(ler)
ATM	Air Traffic Management
BRA	Building Restricted Area
CAO	Civil Aviation Order
CAR	Civil Aviation Regulation
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation
Cat	Category
DAP	Departure and Approach Procedures (charts published by AsA)
DER	Departure End of (the) Runway
DME	Distance Measuring Equipment
Doc nn	ICAO Document Number nn
DIT	Department of Infrastructure and Transport. (Formerly Dept. of Infrastructure, Transport, Regional Development and Local Government and Department of Transport and Regional Services (DoTARS))
DOTARS	See DIT above
ELEV	Elevation (above mean sea level)
ENE	East North East
ERSA	Enroute Supplement Australia
FAF	Final Approach Fix
FAP	Final Approach Point

Abbreviation	Meaning
ft	feet
GBAS	Ground Based Augmentation System (satellite precision landing system)
GNSS	Global Navigation Satellite System
GP	Glide Path
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organisation
IHS	Inner Horizontal Surface, an Obstacle Limitation Surface
ILS	Instrument Landing System
ISA	International Standard Atmosphere
km	kilometres
kt	Knot (one nautical mile per hour)
LAT	Latitude
LLZ	Localizer
LONG	Longitude
m	metres
MAPt	Missed Approach Point
MDA	Minimum Descent Altitude
MGA94	Map Grid Australia 1994
MOC	Minimum Obstacle Clearance
MOS	Manual of Standards, published by CASA
MSA	Minimum Sector Altitude
MVA	Minimum Vector Altitude
NASAG	National Airports Safeguarding Advisory Group
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
NOTAM	NOtice to AirMen
OAS	Obstacle Assessment Surface
OCA	Obstacle Clearance Altitude
OCH	Obstacle Clearance Height
OHS	Outer Horizontal Surface
OIS	Obstacle Identification Surface
OLS	Obstacle Limitation Surface
PANS OPS	Procedures for Air Navigation Services – Aircraft Operations, ICAO Doc 8168
PBN	Performance Based Navigation

Abbreviation	Meaning
PRM	Precision Runway Monitor
QNH	An altimeter setting relative to height above mean sea level
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
RPT	Regular Public Transport
RTCC	Radar Terrain Clearance Chart
RWY	Runway
SFC	Surface
SID	Standard Instrument Departure
SOC	Start Of Climb
STAR	STandard ARrival
SGHAT	Solar Glare Hazard Analysis Tool
TAR	Terminal Approach Radar
TAS	True Air Speed
THR	Threshold (Runway)
TNA	Turn Altitude
TODA	Take-Off Distance Available
V_n	aircraft critical Velocity reference
VOR	Very high frequency Omni directional Range
WAC	World Aeronautical Chart