

Perth Airport 

Master Plan 2020

APRIL 2020



Welcome to Perth





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ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Noongar people as the Traditional Custodians of the land on which Perth Airport is located and recognise their continuing connection to land, waters and culture. We pay our respects to Elders, past, present and emerging.

Master Plan 2020

Contents

Foreword	6	Section 7: Airport Safeguarding	149
Executive Summary	8	7.1 Introduction	150
Section 1: Introduction	13	7.2 Aircraft Noise	150
1.1 Perth Airport	14	7.3 Aircraft Noise Metrics	155
1.2 Ownership of Perth Airport	16	7.4 Airspace Protection	173
1.3 Perth Airport Lease	16	7.5 Managing the Risk of Wildlife Strikes in the Vicinity of Perth Airport	176
1.4 History and Development of Perth Airport	18	7.6 Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation	176
1.5 Benefits of Perth Airport	27	7.7 Managing the Risk of Distractions to Pilots from Lighting	176
Section 2: Planning Context	37	7.8 Managing the Risk of Building Generated Windshear and Turbulence	179
2.1 The Importance of Integrated Planning	38	7.9 Protecting Aviation Facilities – Communications, Navigation and Surveillance	179
2.2 Master Plan Process	38	7.10 Public Safety Areas	180
2.3 Commonwealth Policy	38	7.11 Managing the Risk of Exhaust Plumes	182
2.4 Commonwealth Regulatory Framework	39	7.12 Improving Airport Safeguarding	182
2.5 State Policy and Regulatory Framework	41	Section 8: Services	185
2.6 Local Government	47	8.1 Introduction	186
2.7 Perth Airport Integrated Planning Framework	49	8.2 Stormwater Drainage	186
2.8 Planning Criteria	53	8.3 Water Supply	192
2.9 Development Considerations	55	8.4 Sewerage System	195
2.10 Perth Airport Activity Forecasts	57	8.5 Power Supply	196
Section 3: Land Use Planning	65	8.6 Irrigation	199
3.1 Land Use Plan	66	8.7 Gas Supply	199
3.2 Precincts	67	8.8 Communications	200
3.3 Land Use Zones	71	8.9 Sustainability	200
3.4 Sensitive Developments	75	Section 9: Environment Strategy	203
3.5 Changes from Master Plan 2014	77	9.1 Introduction	204
3.6 Pre-existing Interests at the Perth Airport Estate	77	9.2 Responsibilities	204
Section 4: Aviation Development	79	9.3 Environmental and Sustainability Management Framework	205
4.1 Introduction	80	9.4 Environmentally Significant Areas	208
4.2 Existing Airfield Configuration	80	9.5 Environmental Aspects	208
4.3 Runway Use	82	9.6 Soil Management	208
4.4 Need for Additional Runway Infrastructure	84	9.7 Groundwater and Surface Water Management	211
4.5 Proposed Airfield Development Plan	87	9.8 Biodiversity Management	214
4.6 Terminals	91	9.9 Carbon and Energy Sustainability	226
4.7 Aviation Support	97	9.10 Water Management	228
4.8 General Aviation and Helicopters	98	9.11 Waste Management	229
4.9 Air Freight	99	9.12 Air Quality Management	230
4.10 Air Navigation Facilities and Services	99	9.13 Ground-based Noise Management	231
Section 5: Non-Aviation Development Plan	101	9.14 Contamination and Hazardous Material Management	232
5.1 Introduction	102	9.15 Aboriginal Heritage and Engagement	233
5.2 Precinct Planning	103	9.16 Five Year Environment Strategy and Heritage Management and Engagement Implementation Plan	236
5.3 Proposed Five-Year Non-Aviation Development Plan	105	Section 10: Consultation	239
5.4 Impacts of Non-Aviation Development	111	10.1 Introduction	240
5.5 Consistency with State and Local Government Planning	111	10.2 Stakeholder Consultation	240
5.6 Design Guidelines for Non-Aviation Development	111	10.3 Master Plan 2020 Consultation	242
Section 6: Ground Transport Plan	113	Section 11: Implementation	247
6.1 Introduction	114	11.1 Approvals Required to Undertake Development	248
6.2 State Planning	114	11.2 Review Process	249
6.3 Current Road Network	116	Section 12: References	251
6.4 Public Transport	120	12.1 Commonwealth Legislation and Policy	252
6.5 On Airport Traffic	124	12.2 Western Australian Legislation	252
6.6 Airport Central Precinct	127	12.3 State and Local Planning Instruments	252
6.7 Airport West Precinct	129	12.4 Other Publications	253
6.8 Airport North Precinct	130	Appendices	255
6.9 Airport South Precinct	133	Appendix A: Airports Act Compliance	256
6.10 Car Parking	136	Appendix B: Glossary and Acronyms	260
6.11 Commercial Vehicle Facilities	139	Glossary of Terms	262
6.12 Taxi Facilities	139		
6.13 Rideshare Facilities	139		
6.14 Shared Path and Cycleway Facilities	141		
6.15 Wayfinding	143		
6.16 Five Year Ground Transport Implementation Plan	144		
6.17 Twenty-Year Ground Transport Implementation Plan	147		

List of Tables

Table 1-1 Shareholders of Perth Airport Development Group Pty Ltd as at December 2019	16
Table 1-2 Perth Airport aviation and non-aviation developments between 2015 and 2019	25
Table 1-3 Annual economic benefit of Perth Airport (2018)	28
Table 1-4 Current annual tourism enabled economic benefit of Perth Airport (2018)	29
Table 1-5 Annual economic benefit of Perth Airport in 2025	30
Table 1-6 Annual economic benefit of Perth Airport in 2040	30
Table 1-7 Comparison of international capacity at Perth Airport between 2008 and 2018	32
Table 1-8 Intrastate aviation passenger growth at Perth Airport	33
Table 1-9 Interstate aviation passenger growth at Perth Airport	33
Table 2-1 Overview of development triggers that guide the timing of Perth Airport developments	53
Table 2-2 Passenger Forecasts for Perth Airport (000s Passengers) central scenario	59
Table 2-3 Aircraft Movement Forecasts for Perth Airport (000s Movements)	60
Table 3-1 Overview of airport precincts	67
Table 3-2 Airfield Zone objectives and uses	71
Table 3-3 Terminal Zone objectives and uses	73
Table 3-4 Airport Services Zone objectives and uses	73
Table 3-5 Commercial Zone objectives and uses	74
Table 4-1 Perth Airport Terminal Details	91
Table 4-2 T1 International stand demand	94
Table 4-3 T1 Domestic stand demand	94
Table 4-4 T2 stand demand	95
Table 4-5 T3 and T4 Stand Demand	95
Table 4-6 T3 International stand demand	95
Table 4-7 Airport Central Precinct stand demand by 2040	95
Table 5-1 Non-aviation developments constructed in Airport North within the past five years	105
Table 5-2 Non-aviation developments in Airport West within the past five years	107
Table 5-3 Non-aviation developments constructed in Airport South within the past five years	109
Table 5-4 Non-aviation developments constructed in Airport Central within the past five years	111
Table 6-1 Predicted terminal-related vehicle traffic using Airport Drive and Horrie Miller Drive	127
Table 6-2 Five-year Ground Transport Implementation Plan	144
Table 6-3 Twenty-year Ground Transport Implementation Plan	147
Table 7-1 Organisations responsible for aircraft noise management	151
Table 7-2 Building site acceptability table based on Australian Noise Exposure Forecast contours	155
Table 7-3 ANEC 1 aircraft movement data	159
Table 7-4 ANEC 2 aircraft movement data	161
Table 7-5 Public Safety Area compatibility for new and proposed developments	180
Table 9-1 Perth Airport Monitoring	207
Table 9-2 Vegetation Type Description	219
Table 9-3 Listed Environmental Values on Perth Airport estate	225
Table 10-1 Master Plan Engagement Process	242
Table 11-1 Perth Airport's regulatory framework for development	248

List of Figures



Figure 1-1 Perth Airport in relation to key infrastructure	15
Figure 1-2 Perth Airport Estate	17
Figure 1-3 Vision for the future - Airport Central consolidation	19
Figure 1-4 Stage 1 Capital investment program for consolidation	20
Figure 1-5 Stage 1 Capital investment program for consolidation	21
Figure 1-6 Gateway WA Perth Airport and Freight Access Project	23
Figure 1-7 Key projects in the next decade to support consolidation	26
Figure 1-8 Interstate and Intrastate routes from Perth Airport	27
Figure 1-9 International routes from Perth Airport	28
Figure 1-10 Perth Airport FIFO passenger movements by region	29
Figure 1-11 Value of agricultural exports products exported through Perth Airport (12 months to March 2018) ('000,000)	30
Figure 1-12 Comparison of propensity for international travel for each State	34
Figure 2-1 Perth Airport in the context of the Metropolitan Region Scheme	44
Figure 2-2 Perth Airport in the context of Local Government boundaries	46
Figure 2-3 Perth Airport Integrated Planning Framework	48
Figure 2-4 Perth Airport Layout Master Plan 1985	50
Figure 2-5 Perth Airport Airfield Layout Master Plan 1999	50
Figure 2-6 Perth Airport Airfield Layout Master Plan 2004	51
Figure 2-7 Perth Airport Airfield Layout Master Plan 2009	51
Figure 2-8 Perth Airport Airfield Layout Master Plan 2014 Minor Variation	52
Figure 2-9 Perth Airport Annual international and domestic passenger numbers	55
Figure 2-10 Perth Airport Intrastate vs interstate passenger numbers ('000)	56
Figure 2-11 Perth Airport Year-on-year passenger growth comparison at Perth Airport	57
Figure 2-12 Perth Airport Total passenger forecasts comparison for Perth Airport	59
Figure 2-13 Total aircraft movement forecast comparison for Perth Airport (000s Movements)	60
Figure 2-14 Forecast growth of international air freight 2017 to 2040	62
Figure 2-15 Forecast growth in domestic air freight 2017 to 2040	62
Figure 3-1 Perth Airport Precincts	68
Figure 3-2 Perth Airport Land Use Plan	72
Figure 3-3 Comparison of the Perth Airport Master Plan 2014 and Master Plan 2020 Land Use Plans	76
Figure 4-1 Existing Aviation development layout (2018)	81
Figure 4-2 Existing runway modes	82
Figure 4-3 Wednesday departures slot demand – winter season 2013	84
Figure 4-4 Wednesday departures slot demand – winter season 2018	84
Figure 4-5 Wednesday arrival slot demand – winter season 2013	85
Figure 4-6 Wednesday arrival slot demand – winter season 2018	85
Figure 4-7 Wednesday total runway slot demand – winter season 2013	86
Figure 4-8 Wednesday total runway slot demand – winter season 2018	86
Figure 4-9 Proposed airfield layout 2040	88
Figure 4-10 Current terminal locations	90
Figure 4-11 Indicative Airport Central Development Plan	92
Figure 4-12 Location of aviation support services	96
Figure 5-1 Airport North Precinct	104
Figure 5-2 Airport West Precinct	106
Figure 5-3 Airport South Precinct	108
Figure 5-4 Airport Central Precinct	110
Figure 6-1 Perth Airport in the context of metropolitan transport	115
Figure 6-2 Main Roads WA road hierarchy	117
Figure 6-3 Existing road network within and around Perth Airport	118
Figure 6-4 Forrestfield-Airport Rail Link	120
Figure 6-5 Planned METRONET rail network	121
Figure 6-6 Bus routes on and around the airport	122
Figure 6-7 2015 and projected passenger travel modes to and from the airport	124
Figure 6-8 Proposed five year ground transport plan concept for Airport Central	126
Figure 6-9 Proposed five year ground transport plan concept for Airport West	128
Figure 6-10 Proposed five year ground transport plan concept for Airport North	131

Figure 6-11 Five-year ground transport plan concept for Airport South	132
Figure 6-12 Options considered following the future re-closure of Grogan Road	135
Figure 6-13 Annual Car Parking Transactions	136
Figure 6-14 T1 and T2 Parking and Transport	137
Figure 6-15 T3 and T4 Parking and Transport	137
Figure 6-16 Projected car parking across the Perth Airport estate	138
Figure 6-17 Pedestrian and cycle access	140
Figure 6-18 Regional road directional signs for terminal access	142
Figure 6-19 Perth Airport estate five-year ground transport plan concept	145
Figure 6-20 Perth Airport estate twenty-year ground transport plan concept	146
Figure 7-1 Perth Airport Aircraft Noise Management Framework	152
Figure 7-2 Perth Airport Aircraft Noise Information Portal	153
Figure 7-3 ANEC scenarios	156
Figure 7-4 2020 Ultimate ANEF	157
Figure 7-5 2016 ANEI	162
Figure 7-6 Perth Airport Operating Flows	163
Figure 7-7 ANEC 1 south flow arrivals and departures flight path diagram	164
Figure 7-8 ANEC 1 north flow arrivals and departures flight path diagram	165
Figure 7-9 ANEC 2 south flow arrivals and departures flight path diagram	166
Figure 7-10 ANEC 2 north flow arrivals and departures flight path diagram	167
Figure 7-11 2016 N65 contour	169
Figure 7-12 Ultimate N65 contour	170
Figure 7-13 2016 N60 contour	171
Figure 7-14 Ultimate N60 contour	172
Figure 7-15 Perth Airport Obstacle Limitation Surface (OLS)	174
Figure 7-16 Perth Airport Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)	175
Figure 7-17 Perth Airport Lighting Control Zones	177
Figure 7-18 Windshear Trigger Assessment Areas	178
Figure 7-19 Public Safety Areas at Ultimate Capacity	181
Figure 8-1 Perth Airport water catchment boundaries	187
Figure 8-2 Perth Airport major stormwater drainage systems	188
Figure 8-3 Perth Airport potable water mains	193
Figure 8-4 Perth Airport sewerage systems	194
Figure 8-5 Perth Airport high voltage power supply network	197
Figure 8-6 Perth Airport irrigation bores	198
Figure 8-7 Perth Airport gas supply network	201
Figure 9-1 Environmental and Sustainability Management Framework	204
Figure 9-2 Perth Airport Heritage Management Framework	205
Figure 9-3 Environmentally Significant Areas	209
Figure 9-4 Groundwater and surface water monitoring sites	213
Figure 9-5 Vegetation Condition	215
Figure 9-6 Vegetation Association Class	216
Figure 9-7 Threatened Flora within the Perth Airport estate	217
Figure 9-8 Vegetation Community Types	218
Figure 9-9 Threatened Ecological Communities	221
Figure 9-10 Black Cockatoo Foraging Habitat (Carnaby's)	222
Figure 9-11 Black Cockatoo Foraging Habitat (Forrest Red-tail (FRTBC) and Baudins)	223
Figure 9-12 Wetlands within the Perth Airport estate	224
Figure 9-13 Perth Airport PFAS Management Strategy	232
Figure 9-14 Registered Aboriginal Sites	234
Figure 10-1 Master Plan Stages	243



Foreword



On behalf of the Perth Airport Board, I am pleased to present our Master Plan 2020.

For more than 40 years, the planning for Perth Airport has been working towards the consolidation of all commercial air services to a central location.

Following the release of the past two Master Plans, Perth Airport completed its first stage of consolidation with a privately funded investment program worth more than \$1 billion, delivering:

- a new T2 terminal dedicated to supporting flights to regional WA,
- a new T1 Domestic terminal which saw Virgin Australia relocate its services to the Airport Central precinct - a milestone to achieve our vision of consolidation,
- an expansion of the T1 international terminal,
- new taxiways, taxiway widening, enhanced lighting and navigation approach equipment as well as runway overlays, and
- significant upgrades to roads and carparks.

These developments have supported growth, increased efficiency and produced a better customer experience for our passengers.

This Master Plan 2020 outlines our next steps towards consolidation and ensures we address demand and growth, while striking a balance between economic development, environmental management and sustainability.

It also ensures that our infrastructure development coincides with the predicted growth. We forecast that by 2040:

- annual passenger numbers will nearly double to 28.5 million,
- annual aircraft movements will grow to 202,000 movements, and
- domestic and international air freight could grow to 383,000 tonnes.

We want to deliver the capacity and flexibility to allow our airline partners to grow their businesses which in turn helps the Western Australian economy grow.

Over the next ten years Perth Airport is planning to spend up to \$2.5 billion building new facilities, including an expanded international terminal, construction of a new terminal for the move of Qantas Group operations to Airport Central, and construction of a new runway, to ensure Western Australia's airport is future proofed.

Our next wave of investment will give passengers a stress free, seamless travel experience, provide our airlines partners greater efficiency and room to grow and give Western Australia, its economy and its people the maximum benefit from the multibillion-dollar investments in road and rail projects made by the State and Commonwealth governments in recent years.

But it's not just about aviation; the airport estate's industrial and retail precincts also continue to generate new growth and new jobs for our city and State.

An important part of the Master Plan process was our commitment to transparent and effective community engagement during the 60 day public comment period. Our team held a number of events in various local government areas and also opened our Airport Experience Centre to give the public the opportunity to speak directly with the Perth Airport team about the plan.

During the preparation of the Master Plan, Perth Airport engaged with the Traditional Custodian representatives, including: the Whadjuk Working Group, the South West Aboriginal Land and Sea Council, and Aboriginal Partnership Agreement Group members.

Our website was also updated with Fact Sheets outlining the key components of the plan.

We encourage our community and business stakeholders to engage with us on our Master Plan 2020 so we can strengthen Australia's Western Hub to provide for the growing needs of the residents of Western Australia and our visitors, and to enable Western Australia to realise its full potential.

Kevin Brown
Chief Executive Officer
Perth Airport





Executive Summary



Perth Airport is Australia's Western Hub providing the people of Western Australia with a critical link to the rest of Australia and the world.

Perth Airport provides economic, social and cultural benefits for Western Australian's by connecting people, business and communities. This strengthens cultural, family and social bonds, as well as supporting business, tourism and leisure travel.

Perth Airport is located on 2,105 hectares of land owned by the Commonwealth of Australia. The airport is operated by Perth Airport Pty Ltd (previously known as Westralia Airports Corporation), under a 50-year lease with a 49-year option granted by the Commonwealth Government in 1997.

The Master Plan is the blueprint for the future development of Perth Airport. It provides transparency and facilitates public scrutiny of Perth Airport's development plans for the next 20 years and beyond. A new Master Plan is prepared every five years to comply with the Commonwealth Airports Act 1996.

Master Plan 2020 refreshes the Perth Airport Master Plan 2014 and considers changes over the past five years. For example, this Master Plan 2020 includes updates with regard to passenger, aircraft movement and freight forecasts, detailed planning for ground transport improvements, the Environment and Heritage Strategy action plan to be undertaken between 2020 and 2025, and the vision for development of the airport estate for the next 20 year planning period.



Forecast growth

Planning for Perth Airport is based on forecasts of future aviation growth. This ensures that terminal facilities, airfield infrastructure and ground transport requirements are determined and developed to meet demand.

Master Plan 2020 forecasts that by 2040:

- annual passenger numbers will nearly double to 28.5 million,
- annual aircraft movements will grow from 130,000 movements in 2018 to 202,000 movements, and
- domestic and international air freight could grow from 215,000 tonnes to between 263,000 and 383,000 tonnes by 2040.

Achieving consolidation

For more than 40 years, the planning for Perth Airport has identified the future consolidation of commercial air services to a central location, supported by a parallel runway system.

Over the past ten years, Perth Airport completed the first stage of consolidation with a privately funded investment program worth more than \$1 billion. This investment included the opening of the \$121 million Terminal 2 in March 2013, \$80 million transformation of the Terminal 1 International arrivals experience in 2014, opening of the \$338 million new Terminal 1 Domestic pier in 2015, and \$250 million invested in new taxiways, taxiway widening, enhanced lighting and navigation approach equipment as well as runway overlays.

To meet forecast growth and provide a seamless experience for all travellers, Perth Airport has now planned an investment program of up to \$2.5 billion to be undertaken over the next decade to achieve the consolidation of all commercial air services into the Airport Central Precinct. This includes:

- expansion of international terminal facilities through the upgrade projects,
- construction of a new terminal for the consolidation of Qantas Group operations to Airport Central by 2025,
- construction of Multi-Modal Transport Interchanges (MMTI) facilities (including multi-storey car parks) within the consolidated central terminal, and
- construction of a new runway.

Perth Airport today



24/7

operation



2,105

hectare site



2

runways



5

terminals



117

aircraft parking positions



130,115

aircraft movements



14.3

million passengers



215,000

tonnes of domestic and international freight



30

airlines



50+

destinations



16,700

aviation and non-aviation full-time jobs



\$3.5b

to WA economy



26,000

car parking bays



\$1b

private investment in infrastructure in the past 10 years



93%

of visitors to the State use air transport



Making the best use of Perth Airport land

Planning for the use of the 2,105 hectare airport estate balances the safeguarding of long-term airfield, terminal and aviation support operations with the development of land. This incorporates the efficient use and development of non-aviation land.

Master Plan 2020 divides the airport into five precincts. Two of these are solely aviation-related: the Airfield Precinct for aircraft operations and the Airport Central Precinct for passenger facilitation. The Airport West, Airport North and Airport South Precincts have, or are planned to have, a mix of aviation and non-aviation developments.

Perth Airport's status as a 'Specialised Activity Centre' in State Government strategic plans highlights the importance of the role the airport plays in promoting economic development and creating employment opportunities within Western Australia. The planning for Perth Airport identifies further opportunities for the development of high-quality commercial, industrial, retail, aviation support, and logistics and freight facilities.

Getting to and from Perth Airport

Ground transport planning is critical to the continual growth of Perth Airport and ensuring that there are good connections and easy access for people coming to and going from the airport.

The Ground Transport Plan seeks to ensure that the necessary road and public transport infrastructure is planned and provided as Perth Airport continues to grow. This is achieved through a collaborative approach with State and Local Governments to ensure that airport roads function in harmony with the surrounding road network and that public transport is developed and operated to a suitable level of service.

A key focus of Master Plan 2020 is ensuring that ground transport infrastructure is in place for the final stage of consolidation of commercial air services to Airport Central in 2025, including MMTI facilities and the new Airport Central Train Station.

Utilities Infrastructure

The safe, effective and efficient operation of Perth Airport and the activities within the estate depend upon having reliable access to services including power, water, drainage and telecommunications.

Perth Airport operates its own internal power, water, waste water and communications networks, integrating with the State's systems at the estate boundary. Perth Airport also controls stormwater drainage running through the estate. Gas and commercial telecommunications are provided throughout the estate by external suppliers.

Master Plan 2020 outlines the strategies to ensure utility services are reliable and available to meet current requirements as well as being adaptable to the growing needs of the airport as demand increases.

Safeguarding Perth Airport

As a critical element of public infrastructure that operates 24 hours a day, seven days a week, the current and future safety, viability and growth of Perth Airport operations must be appropriately safeguarded against inappropriate land development and activities in the areas surrounding the airport.

Safeguarding is a shared responsibility of Perth Airport and all levels of government.

Master Plan 2020 considers the National Airports Safeguarding Framework (NASF) guidelines, which include aircraft noise management, protecting airspace from intrusions, managing risk associated with public safety areas, distractions to pilots from lighting, building induced windshear, wildlife strikes, and protecting communication, navigation and surveillance infrastructure.

Aircraft Noise

Master Plan 2020 outlines Perth Airport's approach to working with Airservices Australia, government and the aviation industry to actively manage aircraft noise exposure and its effect on the surrounding community, while balancing the need for critical and safe air services.

Noise modelling has been produced for current and future operations, including a revised Australian Noise Exposure Forecast (ANEF) for Perth Airport, which was endorsed by Airservices in July 2019.

Current flight paths and indicative flight corridors for the future parallel runway operations are also provided.

Looking after the Environment and Heritage

Master Plan 2020 includes an Environmental Strategy and a Heritage Management and Engagement Plan which outlines the areas of environmental, sustainability and heritage focus in a five-year plan. The Environment and Heritage Strategy addresses factors which have been identified as having the potential to be impacted by airport development and operations, including biodiversity and land management, carbon and energy, air quality, ground-based noise and heritage locations. Specific heritage actions include further work with Traditional Custodians and engagement of Aboriginal businesses for land management works.

Working with the Community

Engagement and consultation with a wide range of stakeholders and the community plays a key role in managing and informing the transformation of Perth Airport.

Master Plan 2020 outlines the ongoing consultation and education mechanisms undertaken by Perth Airport to ensure that the diverse range of interests and needs of stakeholders – including Local, State and Federal Governments, airline partners, airport tenants, the Noongar people and the surrounding community – are taken into account in the planning and operation of the airport.

Conclusion

Perth Airport is a vital public transport facility that operates 24 hours a day, seven days a week. It provides an essential link for business and leisure travel and meets the needs of regional communities, the resource sector, and the freight and export industry.

The Perth Airport Master Plan 2020 has been prepared to ensure that Perth Airport is planned and developed incrementally in an effective and efficient manner to support the growth of the State whilst delivering passengers a seamless and quality travel experience.







Section 1: **Introduction**

Perth Airport is Australia's western hub linking Western Australia to the rest of the state, country and world. Perth Airport is a vital infrastructure asset for Western Australia.



Every five years, Perth Airport develops a master plan to comply with the *Commonwealth Airports Act 1996*. The master plan outlines Perth Airport's development plans for a 20-year planning period.

1.1 Perth Airport

Perth Airport is Australia's western hub and is Western Australia's primary link to the rest of Australia and the world. It operates 24 hours a day, seven days a week, and is a vital public transport infrastructure facility.

As the fourth-largest domestic and international airport in Australia by passenger volume, Perth Airport is currently serviced by more than 30 international, intrastate and interstate airlines that operate to more than 50 destinations.

Within Australia, Perth Airport provides an access point to Western Australia from interstate locations and serves as the central transportation hub for regional destinations, such as significant mining regions and popular tourist destinations. The airport is a vital link in the resources sector supply chain, providing connectivity for the fly-in fly-out (FIFO) workforce and for Western Australians who live in remote communities.

Internationally, Perth Airport is strategically located for access to Southeast Asia, the Middle East, Europe and Africa. Perth Airport's contribution to tourism is significant. Approximately 93 per cent of people visiting Western Australia arrived by air and contributed more than \$4.1 billion to the Western Australian economy in 2018.

Perth Airport is located 12 kilometres east of Perth's Central Business District (CBD) and is well connected and integrated with major highway and freeway networks, including Tonkin Highway, Leach Highway and Roe Highway, linking the city, north-south and east-west. The location of Perth Airport in relation to the Perth metropolitan region and key transport infrastructure is shown in Figure 1-1.

Perth's metropolitan community is inextricably linked to its airport. The distances between major population centres make air travel, and Perth Airport, indispensable to the people of Western Australia and to the State's economic, social and cultural development.

The growth of Perth is driven by Western Australia's emergence as a global resources centre. This has spurred Perth's population growth to just over two million in 2017. The Western Australian Government's strategic planning documents anticipate that the population in the Perth and Peel region will reach 3.5 million by 2050.

This growth has driven significant infrastructure development in Perth, particularly new road and rail transport infrastructure.

Additional transport infrastructure is under construction by the State Government, including the Forresterfield-Airport Link (FAL). FAL is being delivered as part of the State Government's METRONET program. The FAL project will deliver a new rail service to the eastern suburbs of Perth with three new stations at Redcliffe, Airport Central and Forresterfield. Due to be completed in 2021, this project will:

- support domestic and international tourism with improved access between the city and Perth Airport,
- act as a catalyst for residential and commercial development around the new stations at Redcliffe and Forresterfield,
- increase public transport options for the eastern suburbs and foothills area, and
- relieve pressure on Perth's roads.

Perth Airport is the biggest of four airports in the greater Perth metropolitan region. Jandakot Airport, located about 19 kilometres south-west of Perth Airport, is the region's secondary airport and handles smaller general aviation traffic (refer Figure 1-1). The Royal Australian Air Force (RAAF) has two aerodromes in the region, with RAAF Pearce and Gingin located about 30 kilometres and 54 kilometres north of Perth Airport respectively. They share airspace with Perth Airport but are not available for commercial aviation.

The Perth Airport estate is 2,105 hectares in size and has sufficient land to support Western Australia's demand for commercial aviation services for many decades. Land not required for aviation purposes can be used for commercial and industrial purposes.

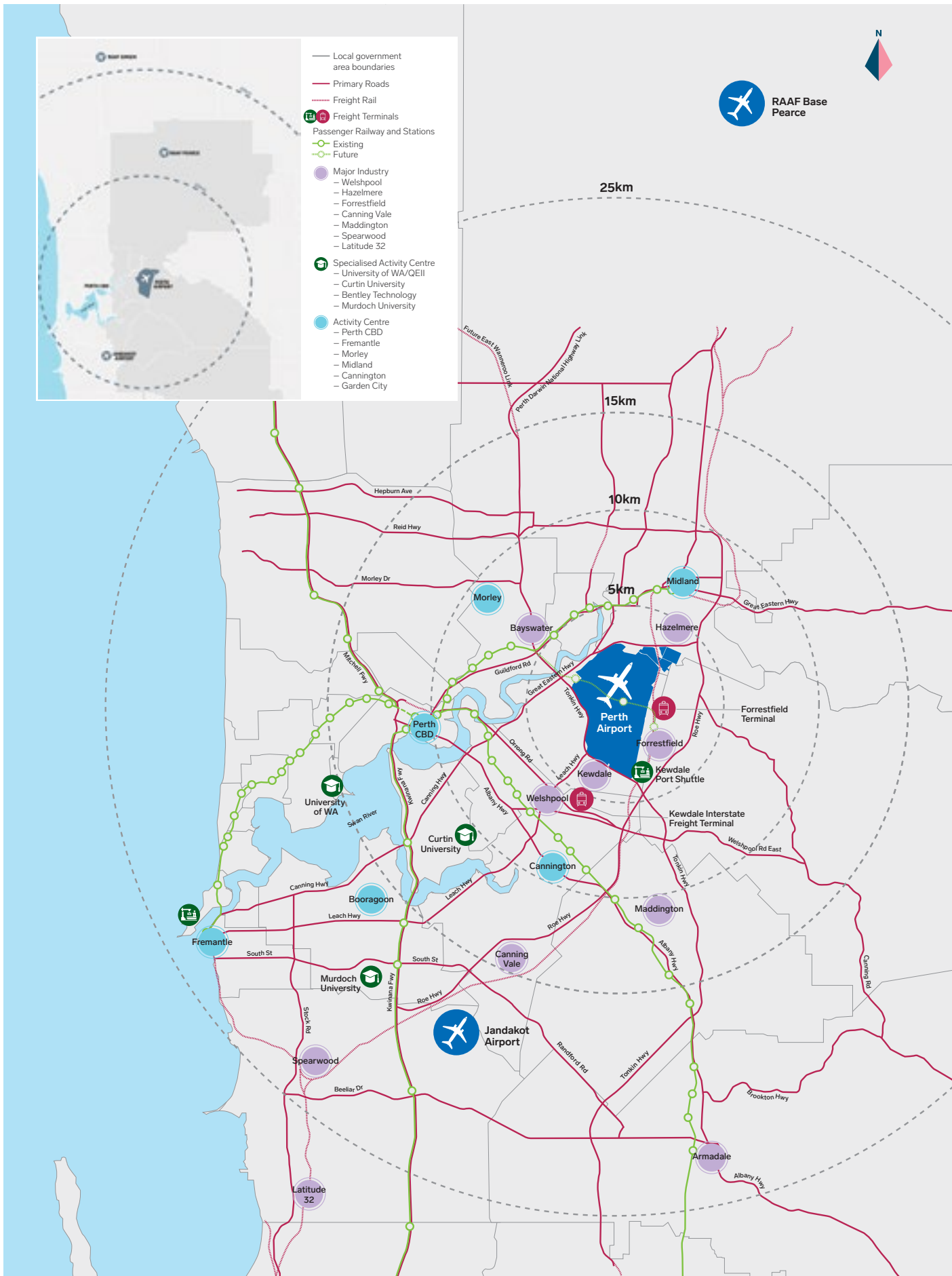


Figure 1-1 Perth Airport in relation to key infrastructure
Source: Perth Airport

1.2 Ownership of Perth Airport

In July 1997, the operation and management of Perth Airport was transferred from the Commonwealth of Australia to Westralia Airports Corporation under a 50-year lease with a 49-year option for extension. In 2011, Westralia Airports Corporation changed its trading name to Perth Airport Pty Ltd.

Perth Airport Pty Ltd is a wholly-owned subsidiary of Perth Airport Development Group Pty Ltd (PADG). The shareholders of PADG, as at March 2019, are shown in Table 1-1.

A breakdown of the shareholder representation highlights that superannuation funds make up 70 per cent of the ownership and Australia's sovereign wealth fund comprises 30 per cent. The investment strategies of superannuation funds, which include having funds allocated to long-term infrastructure investments, together with their continuing inflow of funds, makes them very suitable as shareholders for Perth Airport.

Perth Airport funds infrastructure development and maintenance investment through a mix of equity and debt from banks and capital markets.

Shareholders of Perth Airport Development Group Pty Ltd	Percentage Ownership
Utilities of Australia Pty Ltd ATF Utilities Trust of Australia (UTA)	38.26%
The Northern Trust Company (TNTC) TNTC in its capacity as custodian for Future Fund Investment Company No.3 Pty Ltd (FFIC3), a wholly owned subsidiary of The Future Fund Board of Guardians (FFBG)	30.01%
Utilities of Australia Pty Ltd ATF Perth Airport Property Fund (PAPF)	17.34%
Gardior Pty Ltd as trustee for The Infrastructure Fund	7.19%
AustralianSuper Pty Ltd	5.25%
Sunsuper Pty Ltd	1.95%

Table 1-1 Shareholders of Perth Airport Development Group Pty Ltd as at December 2019

Source: Perth Airport

1.3 Perth Airport Lease

Perth Airport Pty Ltd is the lessee of 214 lots of land which make up the 2,105 hectares of airport estate (refer Figure 1-2). The lease with the Commonwealth of Australia was executed on 1 July 1997, for a period of 50 years, with an option of a further 49 years extension.

An essential term of the lease is that the lessee must comply with all legislation relating to the airport site, including the *Airports Act 1996* (Airports Act). Perth Airport's substantial program of investment in aviation infrastructure is consistent with the company's obligations under the lease to develop the airport, and in doing so, having regard to:

- the actual and anticipated future growth in, and pattern of, traffic demand for the airport site,
- the quality standards reasonably expected of such an airport in Australia, and
- good business practice.

The lease not only requires that Perth Airport operate the estate as an airport, but also allows non-aviation development that supports the economic viability of Perth Airport and in turn the State's economy. All airport estate development must be in accordance with the approved master plan.

There have been no lease boundary changes since the Master Plan 2014. Perth Airport is in the process of minor land acquisition, disposal and land swaps with State and Local Governments in consultation with the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications (formerly Department of Infrastructure, Transport, Cities and Regional Development).





Figure 1-2 Perth Airport Estate
Source: Perth Airport

1.4 History and Development of Perth Airport

There is a long and rich history of activity on the Perth Airport estate. Western Australia can claim to be the birthplace of civil aviation in Australia with the nation's first significant flight taking place in 1911 in addition to the earliest and largest civil aviation network of any State. The State therefore has a long history of enjoying the benefits of air travel, and Perth Airport has played a major role in this history.

1.4.1 Pre-European

Leading archaeologists date Aboriginal activity in the Perth area to around 40,000 years ago. The land on which the estate is located forms part of the traditional network of communication routes, meeting places and camping sites of the Noongar people. A number of archaeological and ethnographic sites have been identified on the estate. As the Traditional Custodians, the Noongar people maintain a strong interest in the land use of the airport and its operations.

1.4.2 Early Airport Development

The first recorded flight in Western Australia occurred in 1911, when Joseph Hammond flew a biplane from a makeshift airstrip at the Belmont Racecourse over the city and Kings Park. In 1919, Norman Brearley started operating demonstration and joy flights from the Western Australia Cricket Association ground in East Perth, before moving in 1920 to Langley Park, located along the Swan River adjacent to Perth city centre. In 1925, Norman Brearley relocated his fledgling airline, Western Australian Airlines, to the newly constructed Maylands Aerodrome.

Maylands Aerodrome quickly grew with increasing air traffic movements and the development of larger aircraft types. To accommodate growth, the Dunreath Golf Course and market garden land was acquired in 1938 as the site of the new Guildford Aerodrome. In early 1942, this land was converted to a Royal Australian Air Force (RAAF) base and the first runway (the now closed runway 01/19), designed for RAAF aircraft, was built in 1943 by Western Australia's Main Roads Department. A second runway (now the cross runway 06/24) was laid down a year later. As Maylands Aerodrome was too small for the larger passenger aircraft being used, in 1944 the Commonwealth Government agreed to allow Australian National Airways and the Queensland and Northern Territory Aerial Services Ltd (Qantas) to share Guildford Aerodrome with the RAAF. Guildford Aerodrome continued to operate as a RAAF base until 1945.

A third runway (now the main runway 03/21) was constructed in 1949.

In 1952, Guildford Aerodrome was officially renamed Perth International Airport and facilitated its first international flight to South Africa. In the same year, the first international terminal was built with second-hand wartime materials at a cost of £180,000.

By the mid-1950s less than eight per cent of the Australian population had ever flown. Words like 'tour' and 'holiday' had begun to be included in the marketing of air travel and passenger numbers and demand for flights began rising rapidly.

In 1962, the main domestic airlines moved out of their individual hangars and into the first combined domestic and international terminal, which was opened to coincide with that year's British Empire and Commonwealth Games hosted by Perth.

In 1966, the main runway was extended and upgraded to cater for larger jet aircraft such as the Boeing 707. By the time Qantas flew the first Boeing 747 (Jumbo) flight to Perth on 3 September 1971, the facilities at Perth Airport were battling to cope with the demand for domestic and international flights.

1.4.3 Airport Expansion

In 1973, a Joint State and Commonwealth Committee completed a study which confirmed that the Perth Airport site would continue as the sole Regular Passenger Transport (RPT) airport for the Perth region.

A final report on the aviation requirements for the Perth Region was released by the Commonwealth Department of Transport in 1979. The Committee concluded that Perth Airport should be developed as the primary airport for the Perth metropolitan region and that it be based on a parallel runway system.

Following the Committee's recommendations, additional land was acquired to the east to accommodate the long-term expansion of the airport, including a proposed parallel runway system.

During this period the main runway was also extended by 300 metres to its current length of 3,444 metres.

Formalising the planning from the Joint Committee, the Commonwealth Department of Aviation released Perth Airport's first public Master Plan in 1985. The Master Plan 1985 outlined:

- the planning concept for consolidation of terminals into a central location,
- the alignment and location for a parallel runway system, comprising the existing main runway and a new runway,
- an aircraft noise footprint, in the form of an Australian Noise Exposure Forecast (ANEF), for the future runway infrastructure options, and
- the need to ensure appropriate land-use development around the airport to minimise the impact of future operations on surrounding communities.

On 25 October 1986, Prime Minister Bob Hawke opened a new \$60 million International Terminal Complex (Terminal 1) on the eastern side of the airport, along with a new Air Traffic Control tower.

In the late 1980's, Qantas constructed the now Terminal 4 (T4) and Ansett Australia constructed the now Terminal 3 (T3) for their individual domestic operations on the western side of the estate.

The Federal Airports Corporation (FAC) was formed in 1988 to manage Australia's largest and busiest airports, including Perth Airport, as a self-funding commercial entity. In 1992, FAC continued compulsory acquisition of land for the long-term development of the Perth Airport site.

1.4.4 Privatisation

As a result of the increasing cost of maintaining aging airfield infrastructure and the need for major redevelopment of airport facilities, the Commonwealth Government commenced the privatisation of major Australian airports on a leasehold basis.

As part of the first phase of privatisation of Australian airports, in 1997, control of Perth Airport was transferred to Perth Airport Pty Ltd (then Westralia Airports Corporation) under a 50-year plus 49-year leasehold option.

As a condition of the lease, Perth Airport was required to gain approval for a new master plan. The Commonwealth Minister for Transport and Regional Services approved the Master Plan 1999 which outlined future developments on the estate. The approved Master Plan 1999 remained consistent with the earlier Master Plan 1985 that saw a future central terminal precinct and a parallel runway system. Since privatisation, a revised master plan has been prepared by Perth Airport and approved by the Commonwealth Minister every five years.

In 2001, Perth Airport purchased T3 following the financial collapse of Ansett. At that time, T3 became a multi-user terminal, servicing Skywest, Virgin Australia and Alliance Airlines operations.



Figure 1-3 Vision for the future - Airport Central consolidation

Source: Perth Airport

1.4.5 Airport Development

In May 2008, Perth Airport released its 'Vision for the Future' which, through a staged major redevelopment, would see all commercial air services consolidated in terminal facilities within the Airport Central Precinct. The future high-level concept for the Airport Central consolidation, which includes a hotel and MMTI facilities, is shown in Figure 1-3.

Perth Airport committed to the first stage of consolidation with a privately funded investment program worth more than \$1 billion, including 92 projects each valued over \$5 million. A summary of the key projects is shown in Figure 1-4 and Figure 1-5. The opening of the \$121 million T2, adjacent to T1 International, in March 2013 marked the first stage of consolidation, with Alliance Airlines, Virgin Australia Regional Airlines (formerly Skywest) and Tigerair relocating from T3 into the new T2. T2 has a gross floor area of approximately 21,500 square metres and parking for up to 36 aircraft.

The transformation of the T1 International arrivals experience was completed in late 2014. The \$80 million project substantially expanded and enhanced customs, baggage reclaim, biosecurity and duty-free retail areas. In 2015 a further \$41 million was spent to upgrade the international departures experience, with outbound immigration, passenger security screening and retail areas expanded and renewed.

The new T1 Domestic pier was opened in 2016. The \$338 million domestic pier allowed Virgin Australia to consolidate its services into Airport Central and provides passengers with a seamless transfer between regional, interstate and international services in one convenient location.

T1 provides up to nine aircraft parking bays, 12 aerobridge serviced gates, 28 domestic check-in kiosks and 14 hybrid self-service bag drop desks incorporating a new fast-track check-in system, and a new Virgin Australia Lounge with views of the Perth CBD. The project also included innovative sustainable design features to reduce energy consumption, particularly the use of natural light and a façade providing shade during the summer months.

The pier design also facilitates "swing gate" operations for up to four aircraft, enabling the gates to be used for either international or domestic aircraft optimising the use of both the terminal infrastructure and aircraft parking bays. Additional swing gates are planned for the proposed new terminal building and expanded international facilities. Up to eight parking bays will be able to accommodate either international or domestic operations, delivering further operational flexibility for our airline partners.

Included in this program of works were significant airfield infrastructure upgrades, with \$250 million invested in new taxiways, taxiway widening, enhanced lighting and approach equipment as well as runway overlays. In 2016, Perth Airport began a \$36 million investment to upgrade its airfield infrastructure to a Category III (CAT III) aerodrome to allow landings in reduced visibility during adverse weather, such as fog. Although fog and periods of severe low visibility occur infrequently each year, the upgrade improves Perth Airport's operational effectiveness and provides greater certainty to passengers and businesses by reducing the likelihood of air services requiring delay or cancellation, or worst case, diversion to alternative airports. The upgrade to Category III infrastructure was completed in 2018.



Project
New Domestic Terminal (T2)

T2, which opened in March 2013 next to T1, marked the first stage of consolidation when Alliance Airlines, Virgin Australia Regional Airlines (formerly Skywest) and Tigerair relocated from Terminal 3 (T3) into T2.

T2 has a gross floor area of approximately 21,500 square metres and aircraft parking for up to 36 aircraft.

Value
\$121 M



Project
Terminal 1 (T1) International Arrivals Expansion

Transformation of the international arrivals experience, including substantially expanded and enhanced customs, baggage reclaim, biosecurity and duty free retail areas. The first stage opened in November 2013, with full completion in late 2014.

Value
\$80 M



Project
T1 International Departures Upgrade

Outbound immigration, passenger security screening and retail areas expanded and renewed, with the project completed in 2015.

Value
\$41 M



Figure 1-4 Stage 1 Capital investment program for consolidation
Source: Perth Airport



Project

T1 Domestic Pier and International Departures Expansion

The T1 Domestic Pier and International Departures Expansion projects were completed in 2016.

These projects allowed Virgin Australia to consolidate its services into Airport Central.

Value
\$338 M

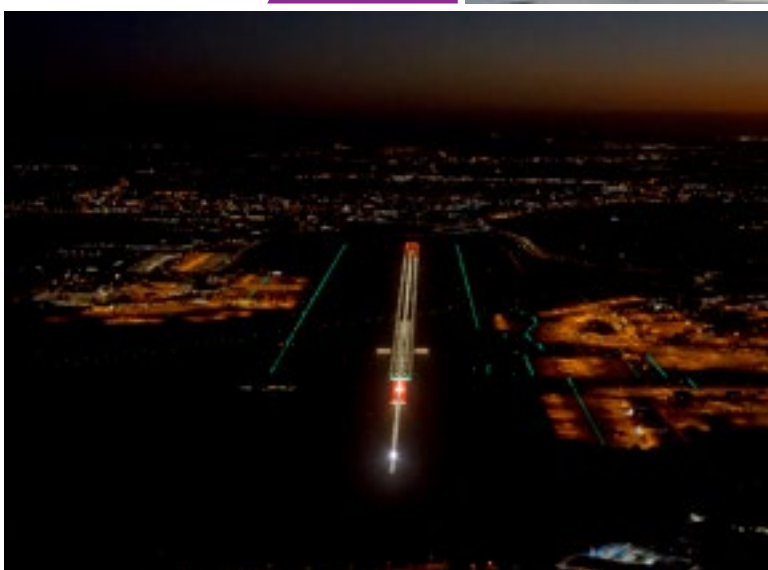


Project

Forecourt Upgrade

Landscaping of Terminal 1 Forecourt with native Western Australian species and materials to provide visitors with a glimpse of the unique landscape of the State.

Value
\$22 M



Project

Airfield Projects

Upgrades to airfield infrastructure including new taxiways, to deliver increased efficiencies for aircraft moving around the airport, and lighting upgrades, allowing aircraft to land in low visibility when they would otherwise need to divert to another airport.

Value
\$250 M



Figure 1-5 Stage 1 Capital investment program for consolidation
Source: Perth Airport

On 24 March 2018, Qantas commenced direct Perth-London flights using the new Boeing 787-9 Dreamliner aircraft, operating from T3. There is agreement for additional ultra-long routes to Europe to be facilitated through T3. To enable international services from the T3/T4 precinct, Perth Airport and Qantas undertook significant works to produce new and improved facilities, including a new international transit area to provide Qantas customers with a seamless and integrated travel experience. The \$28 million upgrade has provided an integrated terminal that can alternate between domestic and international operations and provides flexibility and a seamless journey for passengers who are transiting from international to a regional destination. The new international wing features a large outdoor deck with alfresco seating, a streamlined immigration and customs area to enable a faster transfer experience, additional food and beverage outlets, and a new duty-free store. This investment was undertaken to prove up Perth as the western hub for Australia with Qantas committing as part of this investment to ultimately move to Airport Central by no later than 31 December 2025.

The operation of T4, including terminal management, security screening, facilities maintenance, advertising, food and beverage and speciality retail, was transferred to Perth Airport from the Qantas Group on the 31 January 2019, following the expiry of a 30-year lease.

Perth Airport has also undertaken significant investment in commercial and industrial property development on land not required for sustainable aeronautical development. The estate currently hosts more than 150 tenants, with planned further expansion. This includes expansion of services and ground transport networks to facilitate developments in consultation with external stakeholders such as Main Roads and the Public Transport Authority (PTA). The airport is recognised as a prime location for transport, logistics and resource sector companies because it gives efficient access to multiple transport modes, coupled with high safety and security standards.

Perth Airport has invested significantly in commercial developments that provide employment opportunities and growth in the economic prosperity of the eastern metropolitan region of Perth and the State generally. These include:

- office developments such as Alpha, Bravo, Echo 1 and Echo 2 (tenanted by Rio Tinto's remote mining operations centre),
- various warehousing and logistics facilities (including Australia Post and Toll),
- the \$140 million Direct Factory Outlet (DFO) major destination retail development undertaken through a joint venture with Vicinity Centres (ASX:VCX) which opened in October 2018, and
- the \$55 million Costco large format retail warehouse which commenced construction in May 2019.

The combination of extensive aviation-related and commercial developments has underpinned the transformation of Perth Airport from a pure aviation-support facility into an integrated transportation and logistics hub with other commercial operations. The co-location of Perth Airport operations with transport dependent businesses on the estate and in the neighbouring Kewdale precinct, together with the rail freight hub and the supporting major road network, reflects sensible long-term urban planning.

In addition to the Perth Airport funded projects, both the State and Commonwealth Governments have contributed significantly to fund infrastructure supporting the transformation of Perth Airport in recent years. The investments improved road access to the airport and were designed to support the consolidation of all commercial air services to the Airport Central Precinct.

The most significant infrastructure project completed to date is the \$1 billion Gateway WA project, Western Australia's largest-ever road project, that greatly improved access to Perth Airport as well as improving the safety and efficiency of one of the State's most important freight transport corridors. The Commonwealth Government provided \$676 million and the State contributed \$310 million to fund the development, with Perth Airport supporting the project through the contribution of nearly 30 hectares of land, a financial contribution, and the construction of roadworks valued at \$35 million within the estate. The Gateway WA Project, shown in Figure 1-6, was completed in April 2016.



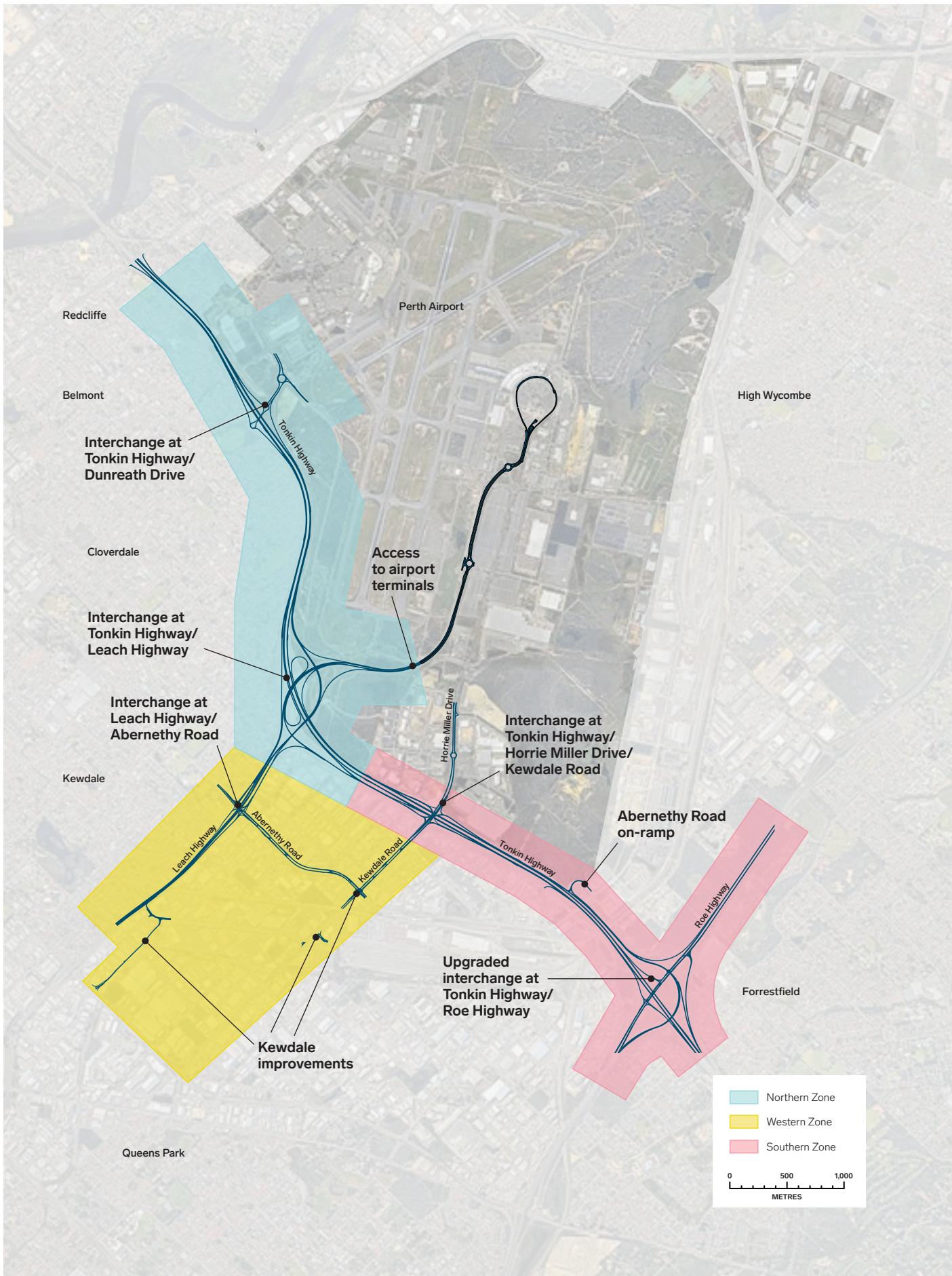


Figure 1-6 Gateway WA Perth Airport and Freight Access Project
 Source: Main Roads WA

1.4.6 Current Developments

The completion of the \$1.86 billion Forrestfield-Airport Link will provide passengers arriving and departing Perth Airport with an alternative mode option. This project is an 8.5-kilometre underground extension of the Perth rail network from Bayswater to Forrestfield, of which 3.8 kilometres is located within the Perth Airport estate. The project is jointly funded by the Commonwealth (\$490 million) and State Government (\$1.37 billion) and is being delivered by the State Government. Perth Airport has contributed 2.2 hectares of land for the Airport Central Station, Redcliffe Station and the Redcliffe Station car park.

The rail link will form an integral component of Perth's long-term public transport network to meet existing and future public transport demand. The rail service will provide improved connectivity between Perth's eastern suburbs, Perth Airport and

the Perth CBD, as well as providing a viable alternative to car travel between these destinations.

As part of the Forrestfield-Airport Link project, the Airport Central Station is being constructed next to the Air Traffic Control tower and will give passengers access to T1 and T2 via a 280 metre long elevated 'Skybridge' walkway (the latter of which included an airport contribution \$8.6 million). The Forrestfield-Airport Link also provides two additional train stations outside the estate at Redcliffe (Redcliffe Station) and High Wycombe (Forrestfield Station). The delivery of Redcliffe Station will improve access to the Airport West Precinct. Works on the Forrestfield-Airport Link project commenced in October 2016 and are expected to be completed by the end of 2021.

Table 1-2 outlines the aviation and non-aviation related developments that were completed during the term of the Master Plan 2014.

Projects completed in 2015

Terminal 1 Domestic pier	New terminal and apron for Virgin Australia domestic operations. The pier provides nine aircraft parking bays, 12 aerobridge serviced gates, 28 domestic check-in kiosks and 14 hybrid self-service bag drop desks, and airline lounge
Terminal 1 International - First Floor Redevelopment	New screening, emigration outwards point and landside retail
Terminal 1 International - Arrivals Expansion	Expansion of the baggage reclaim hall, quarantine and Border Force areas
Terminal 1 International	Upgrade of the baggage handling system and screening equipment
Taxiway Charlie Extension	1,200 metre extension to Taxiway Charlie to provide improved aircraft access to the main runway 03 threshold
A380 Airfield Upgrade	Construction of pavement fillets (for turning aircraft) on various taxiways and blast pavements along taxiway Charlie for A380 operations
Airfield Transmissometers	Installation of sensors at key points within the airfield to allow air traffic controllers to determine visibility
T1/T2 Long Term Car Park H	Perth Airport constructed an expansion to an existing car park to provide an additional 1,290 parking bays
T2 Short Term Car Park	Perth Airport constructed a new car park to accommodate 440 bays for the new T2 terminal
T1/T2 Long Term Car Park J	Perth Airport constructed a new car park to accommodate 1,734 bays
T1/T2 Long Term Car Park K	Perth Airport constructed a new car park to accommodate 1,632 bays
Airport Drive Development	Perth Airport constructed a new two-lane dual carriageway road into T1 and T2 connecting into Gateway WA
Bravo Building	Four storey building with 9,000m ² of 'A' grade office accommodation. Constructed by Perth Airport, the design incorporated Australian best practice environmental design (targeting 4.5 NABERS and 4-Green Star ratings) and has end-of-trip facilities including showers, change rooms and bicycle storage
Toll Express	Expansion and renovation of freight distribution warehouse, office building and truck parking area
Ceva Logistics	A new, sustainably designed 60,000m ² multi-user warehouse complex including office space, advanced technology and efficient management systems
Siemens	This purpose-built industrial facility was constructed by Perth Airport to accommodate Siemens large drive servicing business. Siemens is one of the largest providers of energy and resource efficient technologies in the world, and the development included 3,100m ² of office and workshop space with a highly technical integrated fit-out
Mainfreight	A new freight distribution facility providing 9,422m ² of warehousing space and associated offices

Projects completed in 2016

Terminal 1 International Departures Expansion	New departures lounge with over 700 seats; expansion of the check-in area with 16 new check-in desks; expanded outbound immigration area; expanded security screening area; and remodelling and refurbishing of level one to create a central retail and dining area
Dunreath Drive and Snook Road Roundabout	New dual-lane roundabout constructed by Perth Airport to facilitate access to T3 and T4
Fuchs & Speno	This 5,300m ² industrial facility was constructed by Perth Airport in response to ongoing market demand for high quality industrial buildings in Perth's eastern industrial corridor. The building is split into two tenancies with Unit 1 utilised by the Fuchs Group as their primary WA distribution centre and Unit 2 housing Speno Rail Maintenance, one of the world's leaders in the field of rail maintenance, technology, diagnostics and rectification
Avis Car Rental Premises	Relocation of office and car rental facility to a new 1.1 hectare site with above ground fuel tank, cleaning facilities, car parking and office space
FedEx	New 3,000m ² office and warehouse facility was constructed by Perth Airport for FedEx, the world's largest express transportation company, to accommodate the expansion of their package delivery business and includes a state of the art automated cargo sorting system
Europcar	Relocation of car rental facility to a new 6,000m ² site with above ground fuel tank, cleaning facilities, car parking and office space
Bunnings	8,058m ² trade warehouse and office on a 1.44 hectare site

Projects completed in 2017

T3/T4 Apron Renewal	Asphalt overlay of the Terminal 3 apron and reconstruction of Terminal 4 pavement areas
Fauntleroy Avenue and Dunreath Drive Roundabout	New single-lane roundabout constructed by Perth Airport to improve traffic flow and direct access to T3 and T4
Hertz	Relocation of car rental facility to a new 0.8 hectare site with above ground fuel tank, cleaning facilities, car parking and office space

Projects completed in 2018

Terminal 1 Departure Lounge	Expansion of seating areas, reconfiguration of the airline lounges, new food and beverage outlets and expansion of duty-free store
Terminal 3 International	Redevelopment of Terminal 3 to provide an integrated terminal that can alternate between domestic and international operations. The new international wing features a large outdoor deck with alfresco seating, a streamlined immigration and customs area to enable a faster transfer experience, additional food and beverage outlets, and duty-free store
Category III Instrument Landing System Lighting Upgrade	Installation of airfield ground lighting to improve runway visibility during adverse weather. The two-year project was undertaken by Perth Airport and required approximately 3,800 lights, 650 kilometres of cabling and 150 kilometres of electrical conduit Airservices Australia also upgraded the Instrument Landing System (pilot navigation aid)
Thrifty	New 476m ² building and car rental facility on a 0.55 hectare site with above ground fuel tank, cleaning facilities, car parking and office space
Epiroc	This modern 5,250m ² office and warehouse facility has been purpose built by Perth Airport for the Epiroc Group and will be utilised by their warehousing and distribution operations
Direct Factory Outlet	Opened in October 2018, the 24,000m ² retail outlet centre features 110 speciality retail stores, food and beverage outlets, and 1,600 car parking spaces. The development is a joint venture between Perth Airport and Vicinity Centres

Projects in 2019/2020

Runway and taxiway works	Surface and structural pavement overlays on the main runway, cross runway and various taxiways
Terminal 4	Redevelopment and refurbishment of 15 retail and food and beverage stores in T4, following the transfer of the operation and management of T4 from Qantas to Perth Airport
Costco	14,000m ² large format retail warehouse, including an optical centre, hearing aid centre, tyre centre and petrol station (completed March 2020)
Geodis	Purpose built for Geodis Australia, a world leading logistics company, the 2,900m ² office and warehouse facility is being constructed by Perth Airport and will be utilised by Geodis as its primary WA warehousing and distribution centre

Table 1-2 Perth Airport aviation and non-aviation developments between 2015 and 2019

1.4.7 Future Consolidation

Perth Airport is committed to the consolidation of all commercial air services into the Airport Central Precinct.

An investment program of up to \$2.5 billion is planned to be undertaken over the next decade to support consolidation. The key projects are shown in Figure 1-7 and include:

- expansion of international facilities through the international terminal upgrades,
- construction of a new terminal for the consolidation of Qantas operations to the Airport Central Precinct by 2025, and
- construction of the new runway.

International terminal upgrades will include:

- a new international departures area,
- greatly expanded retail offering,
- new airline lounges,
- new baggage handling system,
- new aerobridge-services and aircraft parking positions for wide-bodied aircraft, and
- new taxiways to connect the terminal to the existing and future airfield systems.

The first stage of the international terminal upgrades is expected to be completed in 2020.

The final stage of consolidation is the relocation of the Qantas Group from its existing location in T3 and T4, on the west of the airport, to expanded terminal facilities that are proposed to be constructed in Airport Central to the east of T1 (referred to as the new terminal). Perth Airport is working with Qantas towards consolidation by 31 December 2025.

The new runway forms a key part of supporting the consolidation of operations into Airport Central. Consistent with the first master plan released in 1985 and based on the extensive studies and reviews in the 1970's, consolidation was identified as a fundamental principle in achieving an effective primary airport to meet the needs of the Perth metropolitan region.

The new runway, as part of a parallel runway system, is critical to enabling the full and intended operation of all passenger operations from a centralised precinct. The additional infrastructure will support the new terminals by providing access for arrivals and departures to be balanced on either side of the Airport Central terminal precinct.

The Preliminary Draft Major Development Plan for the New Runway Project was released for a 60-business day public comment period between May and August 2018. The Major Development Plan identified that the runway is expected to be operational between 2023 and 2032, subject to demand and agreement with airlines. The Draft Major Development Plan was submitted to the Federal Minister for Infrastructure, Transport and regional Development in late-2019 for consideration.

The consolidation of commercial services into the Airport Central Precinct is also underpinned by recent significant State and Commonwealth Government investment in key infrastructure projects, such as Gateway WA and the Forrestfield-Airport Link, which have been designed to improve access to the future consolidated precinct.



Figure 1-7 Key projects in the next decade to support consolidation
Source: Perth Airport

1.5 Benefits of Perth Airport

Perth Airport provides numerous economic, social and cultural benefits to Western Australians by connecting their communities to critical services. This not only strengthens cultural, family and social ties, but also supports tourism and leisure. Most importantly, Perth Airport plays an essential role in economic development by providing transport services for companies; supporting them to undertake their operations, service their customers and grow their businesses.

Central to providing these benefits are the activities of Perth Airport, airlines and the State Government in expanding both the range of destinations that can be accessed directly from Perth and the number of flights. More than 30 airlines operate services from Perth Airport, reaching around 50 intrastate, interstate and international destinations. The intrastate, interstate and international destinations currently served by Perth Airport are shown in Figure 1-8 and Figure 1-9.

1.5.1 Benefit of operating 24 hours, seven days a week

Perth Airport operates 24 hours, seven days a week, providing an essential link for business and leisure travel, and meeting the needs of:

- regional communities and the resource sector,
- online shopping and overnight freight,
- interstate domestic travel, and
- international access to multiple global hub airports.

Maintaining operational flexibility is critical to supporting Western Australia's economy. Perth Airport is part of a national and global aviation network and as such, flight times and schedules are not directly controlled locally.

The viability of many of Perth's international air services depend on linking with connecting networks through major hub airports, such as Hong Kong, Dubai and Singapore. Any restrictions on the operations of Perth Airport would lead to a significant loss of air services, which may result in a reduction of service levels and a possible increase in the cost of flying for community members and businesses.

International aircraft services are the lifeblood of the State's international tourism business and the many jobs directly and indirectly generated by that industry. The reduced level of international air services that would arise from any restrictions on Perth Airport operations would therefore have profound impacts on tourism, business and all those who rely on industry.

Perth Airport acknowledges that there are communities which are affected by the 24-hour operation of the airport. However, this impact is balanced against the broader community and economic benefit that arises from these operations. Perth Airport's commitment to aircraft noise management is outlined in Section 7.

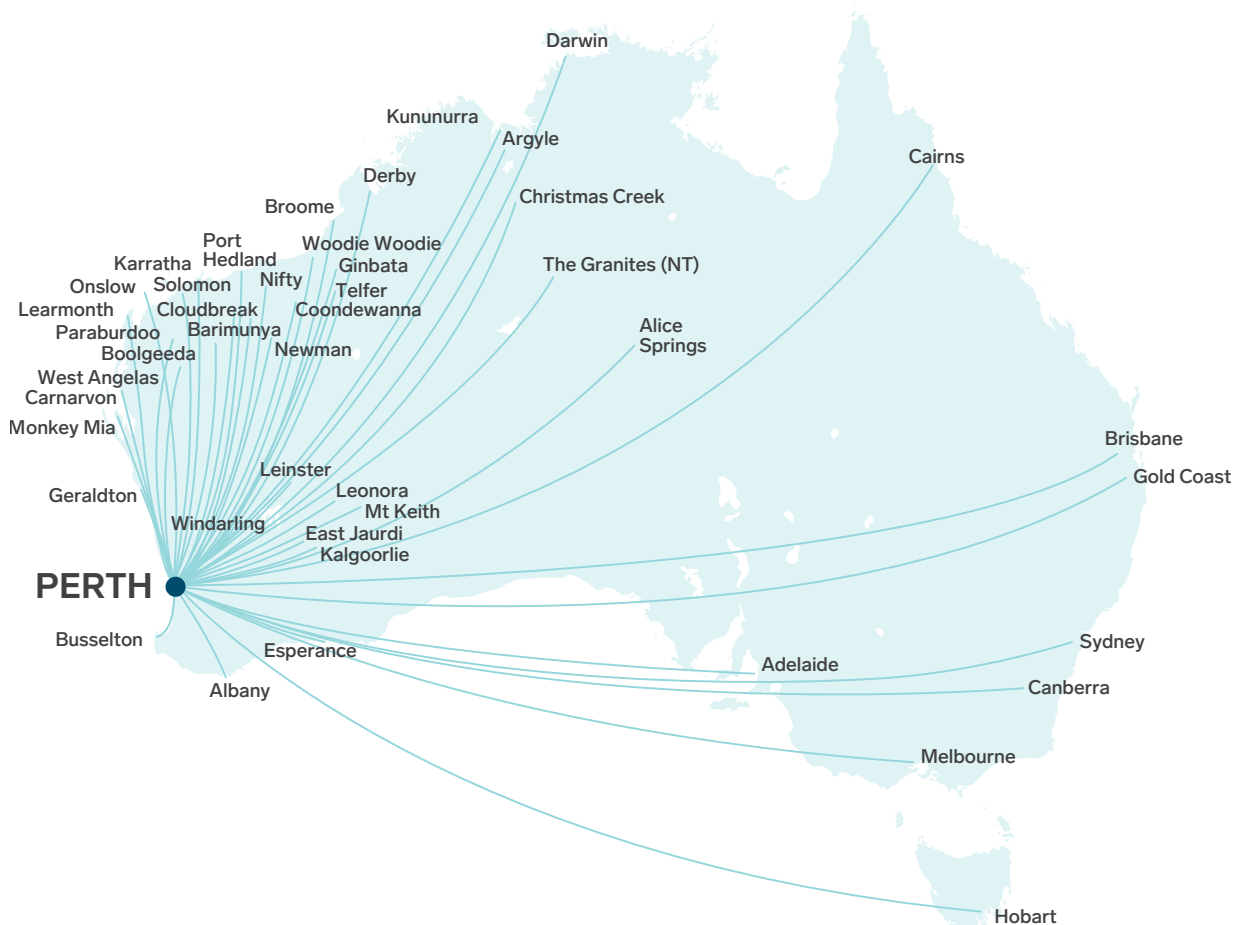


Figure 1-8 Interstate and Intrastate routes from Perth Airport
Source: Perth Airport

1.5.2 Economic Importance of Perth Airport

Perth Airport is a major centre of employment in the Perth metropolitan area, and currently (as at 2018) employs directly and indirectly an estimated 9,900 aviation-related full-time employees who contribute \$2.2 billion to the gross regional product (GRP). The number of non-aviation related full-time employees is estimated at 6,700, and they add approximately \$1.27 billion to the GRP. Perth Airport’s direct contribution to economic activity in the Western Australian economy is about 1.4 per cent of gross state product (GSP).

Aviation and Non-Aviation	Full Time Employment	Annual Adding Value to GRP
Aviation (direct and indirect)	9,951	\$2.285 billion
Non-aviation (direct and indirect)	6,768	\$1.274 billion
Total	16,719	\$3.558 billion

Table 1-3 Annual economic benefit of Perth Airport (2018)
Source: ACIL Allen

Aviation through Perth Airport also facilitates other economic benefits in the wider economy and society that would not take place or would be reduced, if there was no aviation support. Day-return or overnight business trips, short leisure trips and urgent freight deliveries would all be difficult or logistically impossible without aviation. Aviation results in lower transport costs (after allowing for the value of time) as well as improvements in transport quality.

Perth Airport not only contributes to the Perth, Western Australian and Australian economies directly through the aviation-related and non-aviation activities that take place within the estate, but it also acts as an enabler for many other activities that impact those economies such as mining, tourism, education exports, and agricultural exports.

1.5.2.1 Resource Sector

Perth Airport plays a significant role in facilitating the flow of labour that is integral to the success of the oil, gas and mining sector in Western Australia. FIFO workers commute by air to their place of work, allowing them to remain living in their home community and maintain their economic and social networks.

In 2017, there were 53,500 flights carrying just over 3.2 million passengers between Perth Airport and intrastate destinations where the majority of passengers would be classified as FIFO workers.

Figure 1-10 summarises the number of FIFO passengers by region between 2013 and 2017. The majority of FIFO workers are employed in iron ore and LNG operations in the Pilbara region of Western Australia. There are also large numbers of workers employed in the gold and nickel industry in the Goldfields Esperance region and in the growing lithium sector.

While there has been a decrease in FIFO movements and passengers since the peak of the resource construction activity in 2013, as at March 2018 the Western Australian Department of Mines, Industry Regulation and Safety (DMIRS) identified an estimated \$103 billion worth of resource projects being planned for WA.

In 2017, the value of minerals and energy production in Western Australia was \$108.6 billion, which is just over half the value of the Australian production of minerals and energy. The role of Perth Airport in supporting the resources sector is therefore crucial to the economy of Western Australia and Australia.

The effectiveness and success of the Western Australian resource sector, which represents 40.7 per cent of Australian Annual National Income, is critically dependent on the FIFO system of employment resourcing.



Figure 1-9 International routes from Perth Airport
Source: Perth Airport

The Chamber of Minerals and Energy Western Australia (CMEWA) estimates that the number of direct employees in the Western Australian resource sector was approximately 118,000 at April 2018. CMEWA also estimates that FIFO workers account for 55 per cent of the resource sector workforce in Western Australia, with the majority of these workers residing in the Perth and Peel regions. Perth Airport estimates (developed by Tourism Futures International) indicate that FIFO accounts for approximately 70 per cent of all intrastate passengers, the majority of these being regular FIFO employees.

1.5.2.2 Tourism

The aviation activities at Perth Airport generate additional benefits for Perth and Western Australia by facilitating tourism spending by domestic and international visitors who arrive in the region by air.

In 2018, Perth Airport enabled more than \$4.1 billion of tourism activity in the state that supported more than 37,600 full time equivalent (FTE) jobs. This is forecast to increase to \$5.4 billion in 2025 with approximately 46,000 FTE positions, and \$9 billion in 2040 with approximately 74,000 FTE positions.

Tourism Enabled	Full Time Employment	Annual Adding Value to GRP
Direct Value	28,860	\$2.548 billion
Indirect	8,778	\$1.598 billion
Total	37,638	\$4.146 billion

Table 1-4 Current annual tourism enabled economic benefit of Perth Airport (2018)

Source: ACIL Allen

According to Tourism Research Australia (TRA), there were 1.422 million interstate overnight visitors to Western Australia in the year ended 31 March 2018. Of these visitors, 93 per cent used air transport. In addition, there were 8.42 million intrastate overnight visitors, of which 16 per cent travelled by air, and 20.186 million day visitors, of which five per cent travelled by air.

Data also collected by the International Visitor Survey show that there were 719,000 international visitors to Perth and 967,000 international visitors to Western Australia in the year ended 31 March 2018. During this time, these visitors spent a total of \$2.28 billion in the state, of which \$2.11 billion was spent in Perth.

Interstate and intrastate overnight visitors spent a total of \$3.06 billion in Perth and \$3.64 billion in regional Western Australia (including airfares). Day visitors spent a total of \$1.17 billion in Perth and \$802 million in regional Western Australia.

1.5.2.3 Education

The export of international student services has become increasingly important to the Australian economy. Between 1994 and 2017, the number of international student enrolments in Australia rose from less than 100,000 to 800,000. In Western Australia, enrolments rose from 27,100 in 2002 to 50,500 in 2015.

In the 12 months to March 2018, nearly seven per cent of international passengers arriving at Perth Airport stated that their main reason for travel was for education purposes.

A 2016 report by the Bankwest Curtin Economics Centre identified that 46.4 per cent of expenditure by international students enrolled in Western Australian universities are on fees, with the next highest expenditure category being food, drink and accommodation (34.4 per cent). The study estimated that, in 2015, international students delivered a value-add of \$770 million to the Western Australian economy, of which \$520 million was delivered by those enrolled in higher education and \$150 million by those enrolled in Vocational Education and Training (VET). In addition, it is estimated that the expenditure of international students generated additional employment of 8,070 FTEs in Western Australia that year, of which 3,515 FTEs were the result of the expenditure on food, drink and accommodation.

The study also projected international student enrolments to increase from 50,500 in 2015 to 67,300 in 2025 (of which 15.5 per cent are projected to be from India and 12.5 per cent from China). These students are forecast to spend \$1.82 billion on fees as well as goods and services, which will in turn result in a value add of \$1.1 billion and an additional 11,200 FTEs in employment in Western Australia.

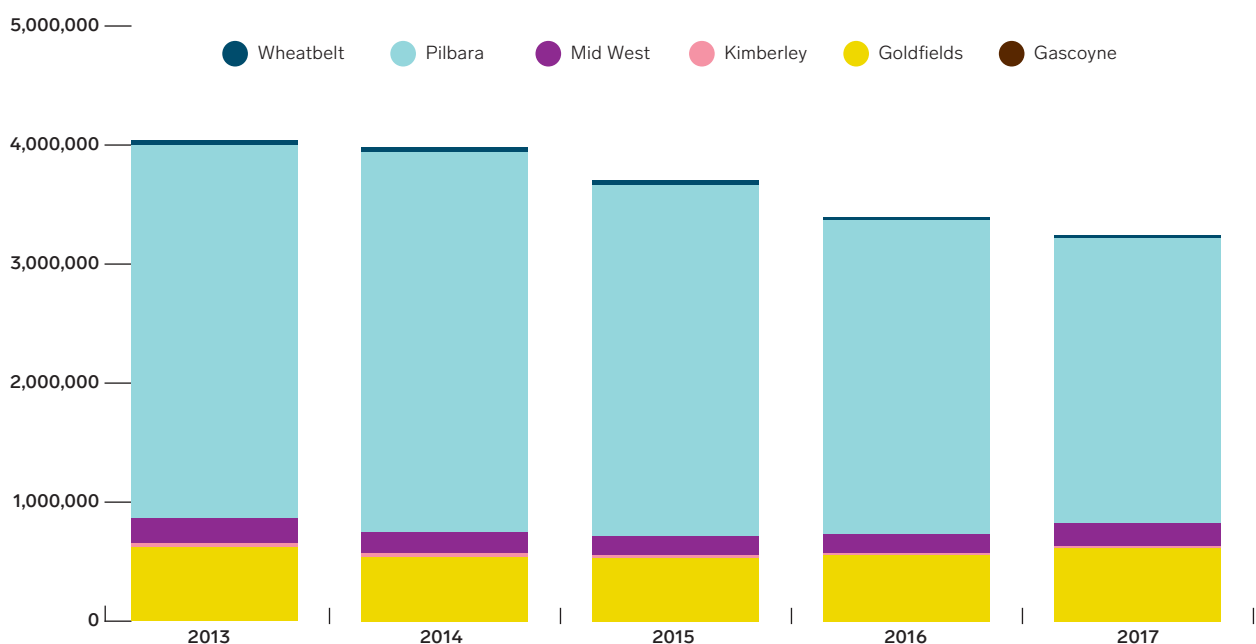


Figure 1-10 Perth Airport FIFO passenger movements by region

Source: ACIL Allen

1.5.2.4 Agriculture

The use of air freight allows producers of agricultural products, particularly those that are time-sensitive and perishable, to service overseas and interstate markets. Perth Airport handles a large variety of agricultural products including fresh fruit and vegetables, seafood and fresh meat. The majority of agricultural freight is carried as cargo on regular passenger flights.

Figure 1-11 shows the key agricultural products exported through Perth Airport in the 12 months to the end of March 2018. In this period, nearly 34,000 tonnes of agricultural products worth over \$566 million were exported through the airport. Nearly two thirds (64 per cent) of this value was made up of fish and crustacean products, while fresh meat comprised 22 per cent of the total value exported. Meat exports out of Perth Airport have increased nearly threefold from 7,000 tonnes in 2011-12 to 20,500 tonnes in 2017-18.

Perth Airport is an essential link in facilitating the movement of perishable consumer goods to international markets. Providing appropriate infrastructure and strategic air linkages is critical to continued growth of the agricultural export markets.

1.5.3 Future Economic Importance

Taking into consideration the developments proposed in the first five years of this Master Plan 2020, it is forecast that by 2025 the total number of direct and indirect aviation-related full-time employees will be approximately 12,200, accounting for approximately \$3.08 billion of GRP (at 2017/18 prices). The total number of non-aviation-related full-time employees is forecast to be approximately 9,100 contributing approximately \$1.84 billion to the GRP.

In 2025, the spending by domestic and international tourism enabled by Perth Airport is forecast to generate approximately 46,300 full-time employees, adding value to the GRP of approximately \$5.420 billion per year.

2025	Full Time Employment	Annual Adding Value to GRP
Aviation (direct and indirect)	12,238	\$3.084 billion
Non-aviation (direct and indirect)	9,097	\$1.842 billion
Total	21,336	\$4.927 billion

Table 1-5 Annual economic benefit of Perth Airport in 2025

Source: ACIL Allen

For the proposed developments over the 20 year planning period of this Master Plan 2020, it is forecast that by 2040, the total (direct and indirect) number of aviation-related full-time employees will be approximately 18,700 accounting for approximately \$5.1 billion of GRP at 2017/18 prices. In 2040, the spending by domestic and international tourism enabled by Perth Airport is forecast to generate approximately 74,600 full-time employees, adding value to the GRP of approximately \$9.04 billion per year.

2040	Full Time Employment	Annual Adding Value to GRP
Aviation (direct and indirect)	18,671	\$5.080 billion
Non-aviation (direct and indirect)	17,996	\$3.934 billion
Total	36,667	\$9.015 billion

Table 1-6 Annual economic benefit of Perth Airport in 2040

Source: ACIL Allen

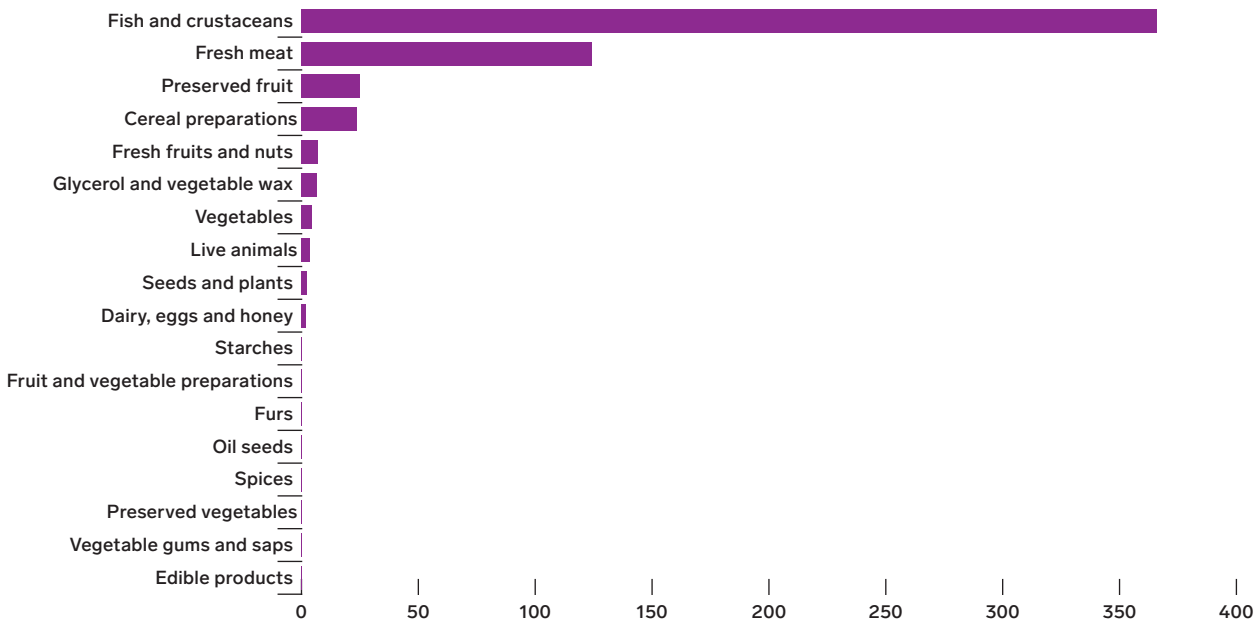


Figure 1-11 Value of agricultural exports products exported through Perth Airport (12 months to March 2018) ('000,000)

Source: Maritrade

1.5.4 Social and Cultural Benefits of Perth Airport

The location of Perth, the size of Western Australia and proximity to South-East Asia place Perth Airport in the unique position of being a major contributor to the lives of Western Australians. Western Australian residents rely on air transport more than most other Australians as they travel by air more frequently and over longer distances for work, education, recreation, health and to visit friends and relatives.

Without aviation, personal travel beyond 300 kilometres would become more difficult. People would travel less and part of the time away would be unproductive, travelling for long periods in cars, buses and trains. This would reduce the amount of personal 'connectivity' with friends and relatives, the ability to attend important family events and the opportunity for holidays, as well as cultural and sporting trips.

The development of the unique whole-of-state FIFO method of employment and services sourcing by the resource sector has largely been driven by the fact that Western Australia remains primarily a single-city State. The bulk of high-level services, including health, education, retail and recreational services, are located within the Perth metropolitan area. These factors mean that Perth Airport is critical to the lives of many West Australians.

The role of Perth Airport is not confined to providing and operating airport infrastructure: significant resources are also applied by Perth Airport through working with airline partners and the State Government for expansions to available air services.

Over the past 10 years, Perth Airport and the State Government have continued to be successful in attracting international airlines to Perth. As shown in Table 1-7, the number of airlines, destinations and aircraft seats to Perth has increased from 11 airlines and 12 international ports, to 21 airlines operating to 17 international ports. New and expanded services at Perth Airport include:

- China Southern Airlines launched flights to Guangzhou in 2011 and currently operate up to four services per week,
- Scoot introduced services in December 2013 and now operate nine services per week between Perth and Singapore,
- Qantas resumed services to Singapore in June 2015 and currently operate a daily service,
- Malindo Air launched services to Kuala Lumpur in November 2015, and currently operate 12 services each week,
- Batik Air launched services to Denpasar in June 2017 and currently operate a daily service,

- Qantas commenced a daily direct flight to London Heathrow in March 2018,
- in May 2018, Garuda Indonesia added a fifth service on the Perth-Jakarta route,
- from 9 June 2019, Indonesia AirAsia commenced four services per week to Lombok, Indonesia, and
- from 1 September 2019, All Nippon Airways (ANA) commenced a daily direct service to Tokyo Narita.

In the past few years, several airlines have consolidated operations and withdrawn some services out of Perth. This includes Virgin withdrawing its flights to Phuket in January 2016, Jetstar Asia withdrawing its Singapore services in March 2018, and Etihad withdrawing its Abu Dhabi services in October 2018. Notable changes driving the consolidation of services through the Middle East include tougher trading conditions and increased competition from direct flights.

Perth Airport targets specific markets to introduce new routes or increase capacity in existing routes. To leverage Perth's favourable geography and as the western gateway to Australia, Perth Airport is currently targeting routes to India and additional services to Europe. India is currently the fastest growing inbound market into Perth and the growth potential from a direct flight is significant, while further non-stop flights to Europe are possible following the success of the Perth-London service.

Perth Airport is also targeting direct flights to Vietnam, The Philippines and Phuket, Thailand. Non-stop flights to these markets are possible with new aircraft technology which enables cost-efficient narrow-body aircraft to fly longer distances of up to 7 hours.

Table 1-7 provides a comparison of international capacity at Perth Airport between 2008 and 2018.



SECTION 1: INTRODUCTION

Port	Airline	2007/08		2017/18		Percentage Change	
		Seats	Flights	Seats	Flights	Seats	Flights
Abu Dhabi	Etihad Airways			212,778	730		
Auckland	Air New Zealand	142,450	607	246,345	830	73%	37%
	Qantas Airways			8,672	32		
Bangkok	Thai Airways	115,774	366	190,872	729	65%	99%
Brunei	Royal Brunei Airlines	96,328	490			-100%	-100%
Christchurch	Air New Zealand			21,663	72		
Christmas Island	Alliance Airlines			5,280	66		
	National Jet Systems	5,418	71	164	2	-97%	-97%
	Virgin Australia			18,984	113		
Cocos Island	National Jet Systems	4,028	53			-100%	-100%
	Virgin Australia			15,792	94		
Denpasar	Batik Air			233,916	1,313		
	Garuda Indonesia	192,116	1,235	157,471	681	-18%	-45%
	Indonesia AirAsia			383,220	2,129		
	Jetstar Airways			386,718	2,144		
	Ozjet Airlines	17,820	162			-100%	-100%
	Qantas Airways	57,768	332	522	3	-99%	-99%
Doha	Qatar Airways			280,342	730		
Dubai	Emirates	477,080	1,464	581,312	1,460	22%	0%
Guangzhou	China Southern Airlines			113,726	434		
Hong Kong	Cathay Pacific Airways	152,797	491	264,361	997	73%	103%
	Qantas Airways	84,601	314			-100%	-100%
Jakarta	Garuda Indonesia	41,880	417	70,386	433	68%	4%
	Qantas Airways	50,982	293			-100%	-100%
Johannesburg	Qantas Airways	5,400	12			-100%	-100%
	South African Airways	135,534	537	181,154	696	34%	30%
Kota Kinabalu	Malaysia Airlines			16,012	100		
Kuala Lumpur	AirAsia X			429,026	1,138		
	Malaysia Airlines	278,422	961	152,384	804	-45%	-16%
	Malindo Airways			188,100	1,150		
London Heathrow	Qantas Airways			46,256	196		
Mauritius	Air Mauritius	61,902	207	80,498	288	30%	39%
	Qantas Airways	229	1			-100%	-100%
Phuket	Thai Airways	49,576	156			-100%	-100%
Singapore	Jetstar Asia			133,920	744		
	Qantas Airways	449,591	1,457	173,678	987	-61%	-32%
	Scoot Tigerair	138,240	768	240,936	696	74%	-9%
	Singapore Airlines	635,419	2,073	822,827	2,933	29%	41%
Tokyo-Narita	Qantas Airways	74,538	314			-100%	-100%
Grand Total		3,267,893	12,781	5,657,315	22,724	73%	78%

Table 1-7 Comparison of international capacity at Perth Airport between 2008 and 2018

1.5.5 Connectivity within Western Australia

Perth Airport is both the primary airport in Western Australia and the hub through which nearly all regional aviation is serviced.

One quarter of Western Australia's population live in regional areas. The vast area of Western Australia and the distances between the regions and Perth mean that air travel is often the quickest method of travel. Perth Airport is vital for people living in these communities to gain access to medical care, education, legal and government services, and a range of cultural, sporting and recreational activities.

Due to the remote location of many of Western Australia's resource developments, aviation plays an essential role in helping to attract and maintain staff on site. FIFO commuting to work is not only a major economic facilitator for Western Australia, it is also a social facilitator allowing workers to remain living in their home location while commuting to work.

Seven airlines currently operate intrastate services in Western Australia and they account for more than 50 per cent of all flight movements through Perth Airport. Around 80 per cent are scheduled flights; the remainder are charter and general aviation flights.

In 2017, Perth Airport recorded more than 2.5 million passengers that travelled through Perth Airport on intrastate RPT services representing 20 per cent of all RPT movements through the airport. In addition, charter flights, particularly those catering to the resources related industries carry large numbers of passengers through the airport. In 2017, charter flights catering to resource-related industries carried around 3.2 million passengers.

The change in regional aviation at Perth Airport between 2014 and 2018 is shown in Table 1-8.

Year	Total Perth Airport Passengers (Million)	Number of Intrastate Passengers (Million)	Intrastate Percentage of Total Passengers
2014	14.91	4.73	31.7
2015	14.76	4.59	31.1
2016	14.49	4.23	29.2
2017	14.28	4.00	28.0
2018	14.29	4.04	28.3

Table 1-8 Intrastate aviation passenger growth at Perth Airport

Source: Perth Airport

1.5.6 Connectivity with the rest of Australia

Perth Airport is the largest airport on the west coast of Australia and the key port of entry and departure for anyone arriving to or departing from the State. Reflecting this, domestic passengers make up the majority of passengers through Perth Airport.

In 2017, there were 5.4 million interstate RPT passengers through Perth Airport, comprising 46 per cent of all passengers. The number of interstate passengers has increased from nearly 3.1 million in 2014 to just over 5.8 million in 2017. The change in interstate services over the past five years is shown in Table 1-9.

Year	Total Perth Airport Passengers (Million)	Number of Interstate Passengers (Million)	Interstate Percentage of Total Passengers
2014	14.91	6.07	40.7
2015	14.76	5.98	40.5
2016	14.49	6.00	41.4
2017	14.28	5.88	41.2
2018	14.29	5.88	41.2

Table 1-9 Interstate aviation passenger growth at Perth Airport

Source: Perth Airport

Given the vast distances to other Australian states, interstate air services are the only efficient passenger transport mode. In terms of population increases in Western Australia, interstate migration has, over a long period, provided an important contribution to Western Australia's population growth.

1.5.7 Connectivity with the world

International passenger numbers have typically represented a third of total passengers through Perth Airport.

International passengers at Perth Airport have grown at an average annual rate of 7.4 per cent over the past ten years. In 2017, there were nearly 4.4 million international passengers that travelled through Perth Airport on regular passenger transport services. This is equivalent to 34 per cent of all passengers.

Figure 1-12 shows that Western Australians have the highest propensity for international air travel compared to all other Australian States. Propensity to travel is calculated by dividing resident passenger movements by the resident population. Factors contributing to this feature are the higher proportion of the State's population with overseas and interstate family ties, accessibility to high quality leisure destinations within Asia, and the nature of Western Australia's economy with its strong global connections.

The 2016 Australian Bureau of Statistics (ABS) Census recorded that 39.7 per cent of all Western Australians were born outside Australia compared to 33.3 per cent for the average total Australian population. This trend is even more pronounced for Perth where 42.7 per cent were born outside of Australia.

Perth Airport plays a vital role in assisting these residents to stay connected with families, friends and cultures in their place of origin. However, it is not only social and cultural ties that encourage overseas travel; Western Australia's proximity to South East Asia means that countries such as Indonesia, Thailand and Malaysia have become popular holiday destinations for Western Australians, and Perth has become a convenient and attractive place for people from those countries to visit, study, live and invest in. Growing economic ties means that Australian businesses are increasingly forming business relationships with South East Asian countries and China.

1.5.8 Community Benefit of Perth Airport

Perth Airport proudly contributes to a range of local schools, sporting organisations, not for profit charities and groups as well as key industry groups with the aim of supporting those in need and engaging with our community. Our relationship with the Western Australian community is an important part of our values and over the past decade, we have invested more than \$7.5 million to positively impact the lives of many Western Australians.

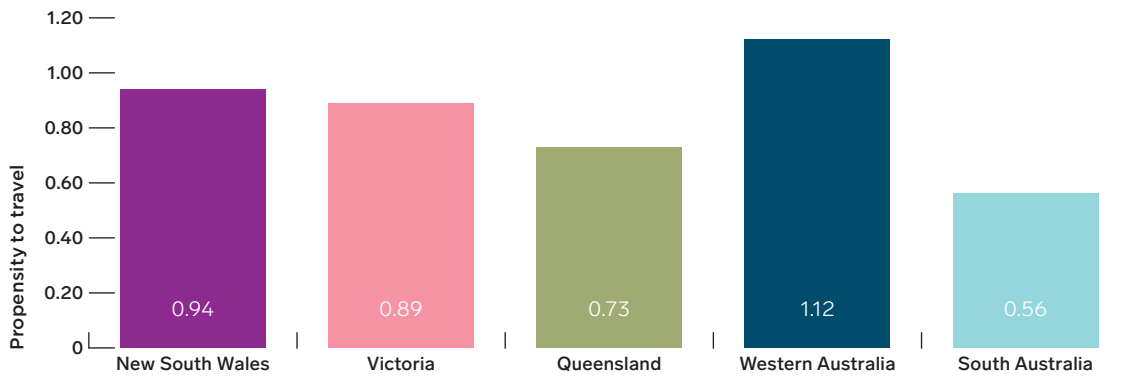


Figure 1-12 Comparison of propensity for international travel for each State
 Source: BITRE 2017 / ABS 2016 Census



The importance of Perth Airport



4.30am – 7.30am
Demand linked to resource sector shifts

INTRASTATE

45.5%

of Australian export income generated by resource sector

24%

of traffic is FIFO related



10pm – 1am
Interstate nightly services

INTERSTATE

24/7

Due to demand airlines need to use larger aircraft & offer services 24/7



Red-eye special

provides a cheaper alternative



10pm – 2am
Airline schedules linked to international

INTERNATIONAL

967,000

International visitors to WA

\$4.6 billion

Tourism enabled in WA



12pm – 6am
Possible lower airfare alternatives

FREIGHT

34,000

tonnes of agricultural produce per year



Express post

Supports express postage services and online shopping



95%

of visitors travelling to WA use air transport



35 million

Passengers will grow from 14.3 million in 2018 to 35 million in 2045

Benefits of Perth Airport to WA 2018 → 2040



36,600

Employment will grow from 16,700 Full Time Equivalents in 2018 to 36,000 in 2040



\$9 billion

Contribution to Gross Regional Product will grow from \$3.5 billion in 2018 to \$9 billion in 2040





Section 2: **Planning Context**

Perth Airport's success goes hand-in-hand with meeting today's challenges while planning for the future.



2.1 The Importance of Integrated Planning

Perth Airport recognises that its infrastructure plans cannot be developed in isolation from those authorities with responsibility for land-use planning in metropolitan Perth. Close and effective cooperation between Perth Airport and other authorities and infrastructure providers is critical because:

- Perth Airport's operations impact surrounding communities including the natural environment, and
- the capacity of Perth Airport to meet the community's needs is affected by land-use and infrastructure decisions made beyond the airport boundary.

2.2 Master Plan Process

A master plan is a high-level planning document with a planning period of 20 years. It incorporates:

- an Environment Strategy,
- a Ground Transport Plan, and
- details on the development to be undertaken within the first five years of the plan.

A master plan is required to be reviewed every five years and must be consistent with the *Airports Act 1996* (the Airports Act).

The Master Plan 2020 is a central element of Perth Airport's Integrated Planning Framework. It provides transparency and facilitates public scrutiny of Perth Airport's medium and long-term development plans and environmental management. It also provides much of the information that other planning authorities need to enable them to assess and plan for the interaction of the airport with other public infrastructure.

It is important to note that once a master plan is approved by the Federal Minister for Infrastructure, Transport and Regional Development (the Minister), it does not provide automatic approval for development to occur. Further Commonwealth approval processes are required as outlined in Section 11.

2.3 Commonwealth Policy

In 2013, the Commonwealth Government released its Policy for Aviation. The Policy includes a number of initiatives, such as:

- establishing a formal Aviation Industry Consultative Council to meet regularly with the Minister,
- establishing a high-level external review of aviation safety and regulation in Australia,
- reforming the structure of the Civil Aviation Safety Authority (CASA),
- focusing on better use of Australian airspace,
- supporting regional aviation by introducing a new and better targeted En-route Rebate Scheme,
- recognising the importance of Australian airports to the economy,
- enhancing aviation skills, training and development, and
- ensuring that aviation security measures are risk based.

The Policy highlights that airports must remain dedicated to providing aviation services, and that other developments on site should not be approved if they compromise the current or future aviation operations of the airport. It reflects the essential role of Australian airports, from major gateway airports and small regional airports to those that support flight training and general aviation. This Master Plan 2020 is consistent with the Government's Aviation Policy as it supports development, improvement and safeguarding of aviation infrastructure at Perth Airport.

2.3.1 National Airports Safeguarding Framework

The Commonwealth Government recognises that the current and future viability of aviation operations at Australian airports can be impacted by inappropriate developments in areas beyond the airport boundary.

The National Airports Safeguarding Advisory Group (NASAG), comprising high-level Commonwealth, State and Territory transport and planning officials, prepared and released the National Airports Safeguarding Framework (NASF) in May 2012.

The NASF aims to safeguard airports and the communities in their vicinity, and to develop, with State, Territory and Local Governments, a national land-use planning regime.

The purpose of the framework is to enhance the current and future safety, viability and growth of aviation operations at Australian airports, by supporting and enabling:

- the implementation of best practice land use assessment and decision making in the vicinity of airports,
- assurance of community safety and amenity near airports,
- better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions,
- the provision of greater certainty and clarity for developers and land owners,
- improvements to regulatory certainty and efficiency, and
- the publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

Perth Airport believes that the NASF considers a comprehensive range of important safety matters and supports the framework. As a critical future element of public infrastructure to Western Australia, Perth Airport must be safeguarded against inappropriate land development. Perth Airport seeks to implement the NASF where applicable throughout its planning, as outlined in Section 7.

2.3.2 Key Policy Principles for Airspace Administration

The Commonwealth Government recognises airspace as a national resource overlying territorial Australia and adjacent oceanic regions. Legislation and policy relating to airports and aviation, including airspace, is overseen by the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications.

Key principles have been developed by the Commonwealth Government to guide the administration of airspace as a national resource. The principles are specified in the Australian Airspace Policy Statement (2018), and summarised below:

- shall be in the best interests of Australia,
- shall consider the current and future needs of the Australian aviation industry, which includes civil and military aviation,
- shall consider cost implications for all airspace users,
- shall consider adopting proven international best practice airspace systems adapted to benefit Australia's aviation environment, and
- shall take advantage of advances in technology wherever practicable.

The Civil Aviation Safety Authority (CASA) sets regulations and standards for civil aviation operations in Australia, with the Office of Airspace Regulation (OAR) regulating airspace aspects. The Commonwealth Department of Defence is responsible for military aviation operations. Air traffic services are provided by Airservices Australia and the Commonwealth Department of Defence. Perth Airport is surrounded by both civil and military airspace.

2.4 Commonwealth Regulatory Framework

Perth Airport is located on land owned by the Commonwealth of Australia and, although the day-to-day management of Perth Airport was privatised in 1997, the Commonwealth Government continues to play an important regulatory and oversight role through the Airports Act and associated regulations. This statutory regime ensures that the public interest is protected.

The key Commonwealth legislation applicable to planning, land use, and development of Perth Airport comprises:

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*,
- *Airports Act 1996*,
- Airports Regulations 1997,
- Airports (Building Control) Regulations 1996,
- Airports (Control of On-Airport Activities) Regulations 1997,
- Airports (Protection of Airspace) Regulations 1996,
- Airports (Environment Protection) Regulations 1997,
- *Airspace Act 2007*,
- *Aviation Transport Security Act 2004*,
- *Civil Aviation Act 1988*,
- Civil Aviation Regulations 1988,
- Civil Aviation Safety Regulations 1998,
- *Environment Protection and Biodiversity Conservation Act 1999*, and
- *Native Title Act 1993*.

2.4.1 Airports Act 1996

The Airports Act is the principal statute regulating the ownership, management and operation of the leased Commonwealth airports. Part 5 and Part 6 of the Airports Act prescribe controls over land use planning, environment management and development at airports, including the requirements for a Final Master Plan and Major Development Plans.

Under Section 70 (1) of the Airports Act, each airport is required to produce a Final Master Plan. The Final Master Plan is one that has been submitted to the relevant Federal Minister as a draft and approved by the Minister. Prior to submitting a Draft Master Plan to the Minister, the airport is required to consider public comments. Subsequent developments at the airport must be consistent with the Final Master Plan.

Section 70 of the Airports Act states that the purposes of a Final Master Plan for an airport are to:

- establish the strategic direction for efficient and economic development at the airport over the planning period,
- provide for the development of additional uses of the airport site,
- indicate to the public the intended uses of the airport site,
- reduce potential conflicts between uses of the airport site, and to ensure that its uses are compatible with the areas surrounding the airport,
- ensure that all operations at the airport are undertaken in accordance with relevant environmental legislation and standards,
- establish a framework for assessing compliance at the airport with relevant environmental legislation and standards, and
- promote the continual improvement of environmental management at the airport.

Section 71(2) of the Airports Act requires a final master plan to include:

- a) the airport-lessee company's development objectives for the airport,
- b) the airport-lessee company's assessment of the future needs of civil aviation users of the airport, and other users of the airport, for services and facilities relating to the airport,
- c) the airport-lessee company's intentions for land use and related development of the airport site, where the uses and developments embrace airside, landside, surface access and land planning/zoning aspects,
- d) an Australian Noise Exposure Forecast (in accordance with regulations, if any, made for the purpose of this paragraph) for the areas surrounding the airport,
- da) flight paths (in accordance with regulations, if any, made for the purpose of this paragraph) at the airport,
- e) the airport-lessee company's plans, developed following consultations with the airlines that use the airport and local government bodies in the vicinity of the airport, for managing aircraft noise intrusion in areas forecast to be subject to exposure above the significant ANEF levels,
- f) the airport-lessee company's assessment of environmental issues that might reasonably be expected to be associated with the implementation of the plan,
- g) the airport-lessee company's plans for dealing with the environmental issues mentioned in paragraph (f) (including plans for ameliorating or preventing environmental impacts),
- ga) in relation to the initial period (see subsection (3A) of the master plan – a plan for a ground transport system on the landside of the airport that details:
 - i. a road network plan,
 - ii. the facilities for moving people (employees, passengers and other airport users) and freight at the airport,
 - iii. the linkages between those facilities, the road network and public transport system at the airport and the road network and public transport system outside the airport,
 - iv. the arrangements for working with the State or local authorities or other bodies responsible for the road network and the public transport system,
 - v. the capacity of the ground transport system at the airport to support operations and other activities at the airport,
 - vi. the likely effect of the proposed developments in the master plan on the ground transport system and traffic flows at, and surrounding, the airport,
- gb) in relation to the initial period (see subsection (3A) of the master plan – detailed information on the proposed developments in the master plan that are to be used for:
 - i. commercial, community, office or retail purposes,
 - ii. for any other purpose that is not related to airport services,
- gc) in relation to the initial period (see subsection (3A) of the master plan – the likely effect of the proposed developments in the master plan on:
 - i. employment levels at the airport,
 - ii. the local and regional economy and community, including an analysis of how the proposed developments fit within the planning schemes for commercial and retail development in the area that is adjacent to the airport,
- h) in relation to the initial period (see subsection (3A) of the master plan - an environment strategy that details:
 - i. the airport-lessee company's objectives for the environmental management of the airport,
 - ii. the areas (if any) within the airport site which the airport-lessee company, in consultation with State and Federal conservation bodies, identifies as environmentally significant,

- iii. the sources of environmental impact associated with civil aviation operations,
 - iv. the studies, reviews and monitoring to be carried out by the airport-lessee company in connection with the environmental impact associated with civil aviation operations,
 - v. the time frames for completion of those studies and reviews and for reporting on that monitoring,
 - vi. the specific measures to be carried out by the airport-lessee company for the purposes of preventing, controlling or reducing the environmental impact associated with civil aviation operations,
 - vii. the time frames for completion of those specific measures,
 - viii. details of the consultations undertaken in preparing the strategy (including the outcome of the consultations),
 - ix. any other matters that are prescribed in the regulations,
- i) such other matters (if any) as are specified in the regulations.

In accordance with these requirements, the Commonwealth Minister for Transport and Regional Services approved Perth Airport's first master plan in May 1999.

The Master Plan 2014 was approved by the Commonwealth Minister for Infrastructure and Regional Development, the Hon. Warren Truss, on 9 January 2015. A minor variation to the Master Plan 2014 was approved by the Commonwealth Minister for Infrastructure and Transport, the Hon. Darren Chester MP, on 15 June 2017.

A compliance matrix for this Master Plan 2020 against the relevant requirements of the Act and associated regulations is included in Appendix A.

2.4.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the Commonwealth framework for, amongst other things, protecting and managing nationally and internationally important flora, fauna, ecological communities and heritage places that are defined in the EPBC Act as 'matters of national environmental significance'. The EPBC Act also confers jurisdiction over actions that have the potential to make a significant impact on the environment where the actions affect, or are taken on, Commonwealth land or are carried out by a Commonwealth agency.

It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as matters of national environmental significance. The nine matters of national environmental significance to which the EPBC Act applies are:

- world heritage sites,
- national heritage places,
- wetlands of international importance (listed under the Ramsar Convention),
- listed threatened species and ecological communities,
- migratory species protected under international agreements,
- Commonwealth marine areas,
- the Great Barrier Reef Marine Park,
- nuclear actions (including uranium mines), and
- a water resource, in relation to coal seam gas development and large coal mining development.

The EPBC Act also confers jurisdiction over actions that have the potential to make a significant impact on the environment where the actions affect, or are taken on, Commonwealth land or are carried out by a Commonwealth agency (even if that significant impact is not one of the nine matters of national environmental significance). Collectively these are termed 'protected matters'.

The EPBC Act has provisions which address any action likely to have a significant impact on a protected matter. A significant impact, as defined by the EPBC Act, is an impact which is important, notable, or of consequence, having regard to its context or intensity. Significant impact guidelines assist in the determination of whether an action is likely to be significant for a protected matter. A requirement of the Airports Act and the EPBC Act is that Perth Airport must seek approval for a significant impact on any protected matter via the Airports Act through the major development plan process.

2.4.2.1 Environment Protection and Biodiversity Conservation Act 1999 Environmental Offset Policy

The EPBC Act Environmental Offset Policy (2012) provides guidance on the role of offsets in environmental impact assessments, and how the Commonwealth Department of the Environment and Energy considers the suitability of proposed offsets. The Policy recognises that there are different ways to achieve good environmental outcomes and seeks to provide flexibility in delivering these. The policy aims to improve environmental outcomes through the consistent application of best practice offset principles, providing more certainty and transparency, and encouraging advanced planning of offsets.

In recognition of the critical role played by Perth Airport in the economic development and employment framework for Perth and Western Australia, the Master Plan 2020 incorporates application of the Environmental Offsets Policy to enable suitable environmental offsets to be determined and applied (both onsite and offsite), recognising the strategic use of the land within the airport estate to support the growing demand for airport services.

2.4.3 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

Australia's State and Territory Governments are generally responsible for the recognition and protection of Australia's Indigenous heritage places. All states and territories have laws that protect various types of Indigenous heritage.

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* enables the Commonwealth to respond to requests to protect important Indigenous areas and objects that are under threat if it appears that state or territory laws have not provided effective protection.

There are no nationally protected heritage sites on Perth Airport.

2.4.4 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title rights and interests. Native Title refers to the communal, group or individual rights and interests of Aboriginal and or Torres Strait Islanders in relation to land or waters.

In the case of Perth Airport, native title is extinguished by the issue of Crown leases.

2.4.5 Civil Aviation Act 1988

The *Civil Aviation Act 1988* establishes a regulatory framework for maintaining, enhancing and promoting the safety of civil aviation, including the design and operations of Perth Airport.

Australia's CASA is responsible under the Civil Aviation Act for developing and disseminating appropriate aviation safety standards. Perth Airport, as the airport operator licenced by CASA, is responsible for the safety of the aerodrome in accordance with the Civil Aviation Safety Regulations 1998 (CASR) Part 139 – Aerodromes. These regulations are supported by a Manual of Standards Part 139 – Aerodromes (MOS 139), which prescribes the technical standards for aerodromes used for air transport operations.

2.4.6 Airspace Act 2007

Changes to airspace architecture require an airspace change approval under the *Airspace Act 2007* and Airspace Regulations 2007.

The CASA's Office of Airspace Regulation will consider safety implications, environmental considerations, consultation, government policy, and the promotion and fostering of civil aviation.

2.4.7 Aviation Transport Security Act 2004

The security of Perth Airport is managed in accordance with the *Aviation Transport Security Act 2004* and Aviation Transport Security Regulations 2005. As a security-controlled airport, Perth Airport is required to implement and manage a Transport Security Program (TSP) which is designed to meet aviation security obligations and safeguard against unlawful interference with aviation. The TSP also defines the airside and landside boundary, known as the Airside Security Zone.

2.4.8 Regulations

The Regulations that are relevant to Perth Airport planning and development include:

- Airports Regulations 1997, which provides land use, planning and building controls for federally leased airports,
- Airports (Building Control) Regulations 1996, which establishes a system for approving appropriate building activities on the airport site,
- Airports (Control of On-Airport Activities) Regulations 1997, which details requirements for the control of liquor, commercial trading, gambling, smoking, and landside and airside vehicle control,
- Airports (Environment Protection) Regulations 1997, which details the process for environmental impact assessment, management, pollution prevention, and reporting, and
- Airports (Protection of Airspace) Regulations 1996, which provides for the planning, protection and management of Prescribed Airspace.

2.5 State Policy and Regulatory Framework

Perth Airport is located on Commonwealth land and State legislation will generally only apply for activities for where Commonwealth legislation does not exist. State legislation that is applicable to Perth Airport includes the Western Australian *Aboriginal Heritage Act 1972* (AH Act), the *Bush Fires Act 1954* and *Dampier to Bunbury Pipeline Act 1997* (DBP Act).

While State planning laws do not apply to the Perth Airport lease area, the Airports Act and subsidiary regulations require that a

master plan, where possible, describes proposals for land-use planning and zoning in a format consistent with that used by the State or Territory in which the airport is located.

Where possible, this Master Plan 2020 has considered State planning requirements and has used zones and land use descriptions derived from the surrounding Local Government planning frameworks. State Government planning is controlled by the Western Australian Planning Commission (WAPC) which administers the State Planning Framework and the Metropolitan Region Scheme (MRS) and disseminates policies and strategies on a wide range of planning matters. The planning policies and strategies developed by the WAPC set the strategic context in which the MRS operates.

The land use plan presented in Section 3 takes into account, and is consistent with, the State Planning Framework which identifies Perth Airport as a 'Specialised Centre', as described in Section 2.5.8.

The specific commercial and industrial developments envisaged at Perth Airport complement the existing and future land uses in the areas surrounding the estate and are consistent with the respective surrounding Local Government land use zones. Development at Perth Airport also assists by increasing employment generating land uses and by achieving the activity centre objectives of the State Government.

2.5.1 Aboriginal Heritage Act 1972

The AH Act provides for the preservation, on behalf of the community, of places and objects customarily used by the original inhabitants of Australia or their descendants. In the absence of any prescriptive Commonwealth legislation, the AH Act bears relevance to Perth Airport, particularly where the State Department of Planning, Lands and Heritage site register indicates the presence of sites.

2.5.2 Bush Fires Act 1954

The *Bush Fires Act 1954* (WA) establishes the requirements for the preparedness, prevention and management of bush fires within the State. Relevant to the Perth Airport estate are the provisions for establishing firebreaks, activity and equipment restrictions during fire bans, and burning on Commonwealth lands.

2.5.3 Dampier to Bunbury Pipeline Act 1997

The DBP Act is administered by the State Department of Treasury, under the portfolio of the State Minister for Energy. The Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor is an area of land that houses the DBNGP, and sections of other high-pressure gas pipelines where they connect into the DBNGP.

The DBNGP corridor is approximately 1,600 kilometres long extending from the town of Dampier through to the City of Bunbury and traverses the Perth Airport estate along the length of the eastern boundary adjacent to the freight rail and Abernethy Road.

The DBNGP corridor is managed under the DBP Act, which establishes the management framework and ownership of the pipeline, as well as establishing the land within the DBNGP corridor and restrictions on its use. The land within the corridor is not to be used for any purpose without the approval in writing of the DBNGP Land Access Minister (appointed under the DBP Act).

2.5.4 State Aviation Strategy

The first State Aviation Strategy was published in February 2015. This Strategy was prepared by the State Department of Transport in conjunction with key State Government agencies covering economic development, planning, tourism, Local Government and regional development.

The State Aviation Strategy is aimed at “supporting the economic and social development of the State through the provision of safe, affordable, efficient and effective aviation services and infrastructure” and “provides a sound framework for policy setting, future planning and investment in Western Australia’s international and domestic air services and airport infrastructure”. It proposes actions that the State will take to work in partnership with airports, regional shire councils, airline partners, and the resources and energy sectors to ensure adequate services continue to meet the needs of Western Australia.

The Strategy also acknowledged the need for the new runway at Perth Airport, stating that the new runway will “provide the step-change in capacity needed to cope with current peak hour demand as well as accommodate continuing high levels of growth at Perth Airport”, and “will benefit all users, improving reliability, reducing delays and permitting peak-period demand growth across interstate and international sectors, as well as resource and other intrastate users”.

In addition, the State Aviation Strategy recognises that a Perth airport curfew would reduce aircraft utilisation in Australia by preventing them from flying overnight on the long-haul routes across Australia to and from Perth, in turn reducing aircraft efficiency, increasing costs and adding to airfares. This would substantially reduce the frequency of air services to and from Perth, both domestic and international, causing severe consequences for the Western Australian economy.

In April 2018, the State Government announced it would be reviewing the strategy. The updated strategy is expected to be released in 2020.

2.5.5 Perth and Peel @ 3.5 million

In March 2018, the State Government released the Perth and Peel @ 3.5 million suite of land use planning and infrastructure frameworks to accommodate 3.5 million people by 2050. The Central, North-West and South Metropolitan Peel sub-regional planning frameworks provide guidance on future land to accommodate new homes and jobs and making the best use of existing and proposed infrastructure.

Perth Airport is referenced in the Central, North East, North West and South Metropolitan Peel Sub-regional Planning Framework, which designate the estate as a ‘specialised activity centre’ in line with other State policies.

Perth Airport is also referenced as a key employment node important to the diversification of the economy, particularly within the central sub region where Perth Airport is the focus of employment and is a major contributor to productivity, and facilitator of business clustering and agglomeration. Jobs growth at Perth Airport as outlined in this document is predicated in part, on the development of non-aviation land uses, including within the Airport North and Airport West precincts. Perth Airport has the capacity to provide land for this development in a central location. The opportunity for employees to live in close proximity to their place of employment is considered to be a future benefit which will grow over time.

Perth and Peel @ 3.5 Million includes the long-term planning for transport infrastructure for the Perth metropolitan region. The Plan provides a framework to develop an efficient transport network to cater for Perth’s population as it approaches 3.5 million and beyond.

Whilst Perth Airport provided a submission on the draft report, there is limited reference to the significance of Perth Airport as a major generator of people, freight movements and employment, particularly with regard to considering future passenger and freight growth, and the development of employment nodes in and around Perth.

2.5.6 State Planning Strategy 2050

The State Planning Strategy 2050, prepared by the WAPC and endorsed by the Western Australian State Cabinet, was launched in June 2014. The Strategy provides the strategic guidance for land-use planning within Western Australia until 2050, as well as the vision and principles for coordinated and sustainable development. While it does not provide a specific land use plan for the Perth metropolitan region, the Strategy does identify the need to provide efficient transport routes and hubs.

It also recognises Perth Airport as a key element in the movement network of the State, and as the international gateway to Perth and Western Australia, and a focal point for the growth of the tourism industry.

2.5.7 State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region

State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region (2010) aims to provide a policy and implementation framework that ensures bushland protection and management issues in the Perth metropolitan region are appropriately addressed and integrated with broader land use planning and decision making. The Policy identifies measures that apply to proposals or decisions on State land that are likely to have an adverse impact on regionally significant bushland within a Bush Forever site, as identified in the policy and the MRS.

Bush Forever sites located on State or local reserved or managed land have specific measures detailed within the policy.

SPP 2.8 identifies Bush Forever sites on the Perth Airport estate. This State policy does not directly relate to the activities on the estate, and the Department of Planning, Lands and Heritage (DPLH) has recently proposed to remove significant portions of Bush Forever from the estate.

2.5.8 State Planning Policy 4.2 – Activity Centres for Perth and Peel

The State Planning Policy 4.2 Activity Centres for Perth and Peel considers the planning and development of ‘activity centres’ throughout the Perth and Peel metropolitan region. It details the distribution, function, broad land use and urban design criteria of activity centres, and the coordination of land use and infrastructure planning.

Other purposes of the Policy include:

- the integration of activity centres with public transport,
- ensuring activity centres contain a range of activities to promote community benefits through infrastructure,
- efficiency and economic benefits of business clusters, and
- lower transport energy use and associated carbon emissions.

The Policy also reflects WAPC's intention to encourage and consolidate residential and commercial development in activity centres, so that they contribute to a balanced network. Under the policy, Perth Airport is identified as a 'Specialised Centre', with primary functions of aviation and logistics services.

These provide opportunities for the development of complementary activities, particularly knowledge-based businesses. A range of land uses that complement the primary function of these centres will be encouraged on a scale that will not detract from other centres in the hierarchy.

2.5.9 State Planning Policy 5.1 – Land Use Planning in the Vicinity of Perth Airport

State Planning Policy 5.1 Land Use Planning in the Vicinity of Perth Airport applies to land in proximity to Perth Airport which is, or may be in the future, affected by aircraft noise, and states:

Perth Airport is fundamental to the continued development of the Perth metropolitan region and the State as a whole. Investment in airport infrastructure and the economic opportunities associated with the operation of the airport are now recognised as important and perhaps critical elements in the prosperity of a city such as Perth. Accordingly, the airport and its ongoing development need to be recognised in the planning of the region, and its operation protected, as far as practicable, from development that could potentially prejudice its performance. One of the main issues to be addressed in the planning of areas in the vicinity of the airport is aircraft noise, which is the focus of this policy.

The role of this Policy is to provide guidance to Local Governments in the vicinity of Perth Airport and the WAPC when considering developments on land adjacent to, or affected by, the airport. In practice, the Policy requires relevant Local Government authorities to give due consideration to Perth Airport's Australian Noise Exposure Forecast (ANEF) contours in local planning decision making.

The intent of this is to ensure that Policy measures (such as zoning, residential density, subdivisions, development, notification on titles, and advice) are appropriately applied to applications for development, to avoid potential land-use planning conflicts, which may subsequently impact and restrict airport operations.

Under the Airports Act, Perth Airport is required to produce an ANEF for technical endorsement by Airservices Australia. The ANEF is incorporated in each airport master plan which is reviewed every five years. Consideration of aircraft noise exposure in line with the endorsed ANEF is beneficial. However, the effectiveness of the policy to protect the community is dependent on both the continuity of its application, and further work in collaboration with the WAPC to strengthen policy measures. Perth Airport will continue to work with the WAPC to protect the community from exposure to aircraft noise.

2.5.10 State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning

State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning (2019) identifies the primary freight roads and rail routes within the Perth metropolitan area, with the objective to protect these key corridors from future urban expansion. The Policy recognises the hierarchy and jurisdiction of freight roads into and around Perth Airport, and delineates both Tonkin Highway and Great Eastern Highway as Primary Freight Routes and Kewdale Road/Horrie Miller Drive as a future Primary Freight route. Noting the strategic location Perth Airport has in relation to these freight routes, the implementation of SPP 5.4 requirements in planning decisions made off the estate carry importance for the future of the airport.

2.5.11 Swan Urban Growth Corridor Sub-Regional Structure Plan

The Swan Urban Growth Corridor Sub-Regional Structure Plan (2009) has been prepared by the State DPLH as a strategic document to ensure orderly planning and development of land and infrastructure consistently across the study area.

The Plan is based on the outcomes sought by Directions 2031. It sets employment and housing targets for the Swan region, investigates opportunities for the delivery of the targets, and sets strategic priorities for the long-term development of the sub-region.

The current projections estimate a future population of 33,000 with approximately 12,500 residential lots being developed over the next 25 years. The sub-regional structure plan provides a set of principles to guide future development in the corridor in a coordinated manner, commensurate with the needs of the community.

It considers factors such as economic development, road networks, transit stations, community facilities, district open space, urban densities, activity corridors and neighbourhood centres.

2.5.12 Metropolitan Region Scheme

The Metropolitan Region Scheme (MRS) is prepared and administered by the WAPC as the principal planning scheme for the Perth metropolitan region. The MRS considers generalised broad-scale land uses and sets out regional reservations.

Most of the airport estate is reserved for 'Public Purposes: Commonwealth Government' and a small portion (18.14 hectares) is zoned 'Urban' under the MRS. The land zoned 'Urban' is an anomaly, and Perth Airport is working with the WAPC to pursue rezoning to be consistent with the remainder of the estate. Although the land zoned 'Urban' under the MRS has a different classification than the land reserved for 'Public Purposes', its use and intent is consistent with that of the reserve. The MRS does not place any limitations on permissible land uses for reserved land and this anomaly does not have any real impact on planning or development on the estate. The airport estate in the context of the MRS is shown in Figure 2-1.

Metropolitan Region Scheme

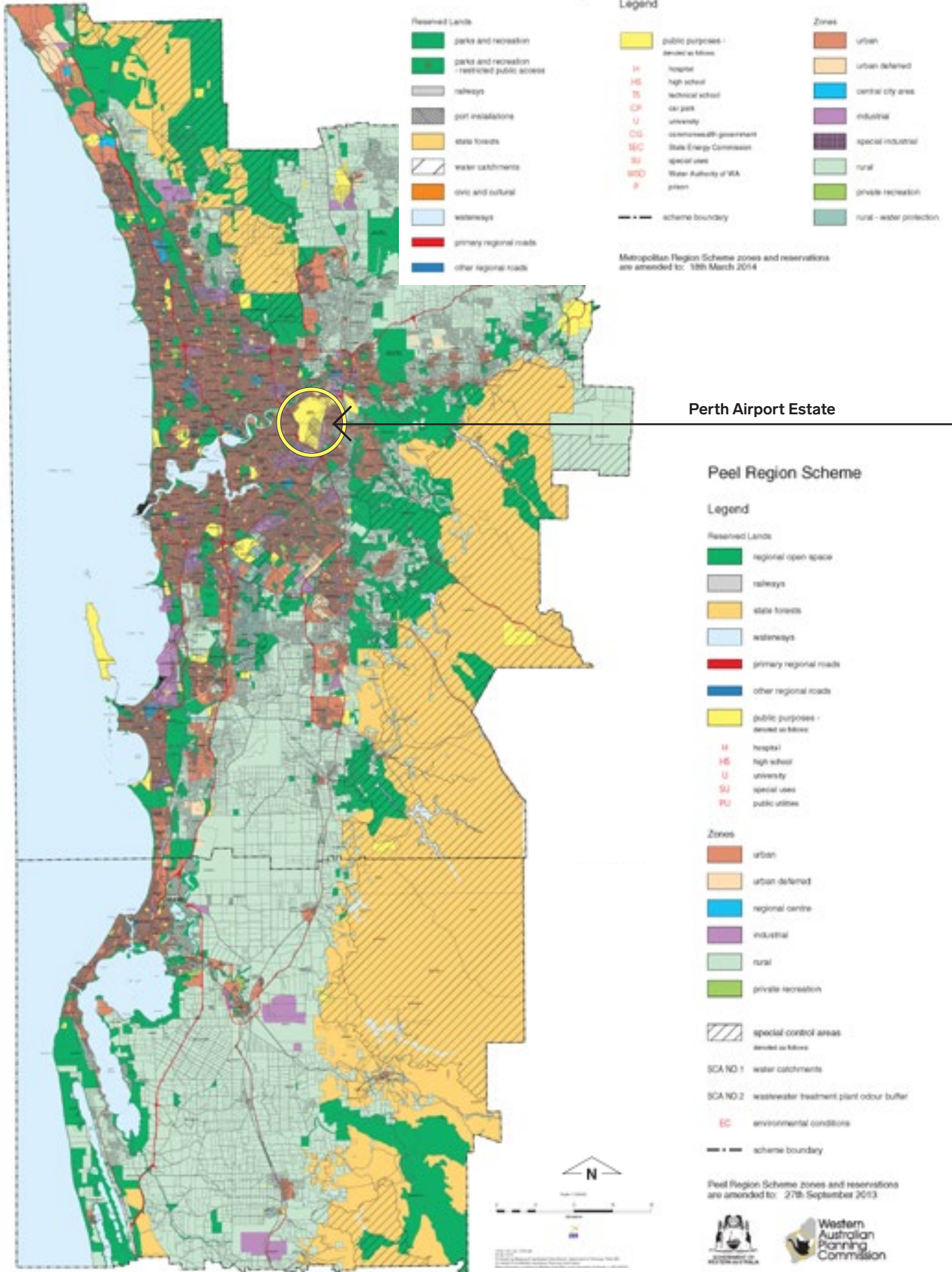
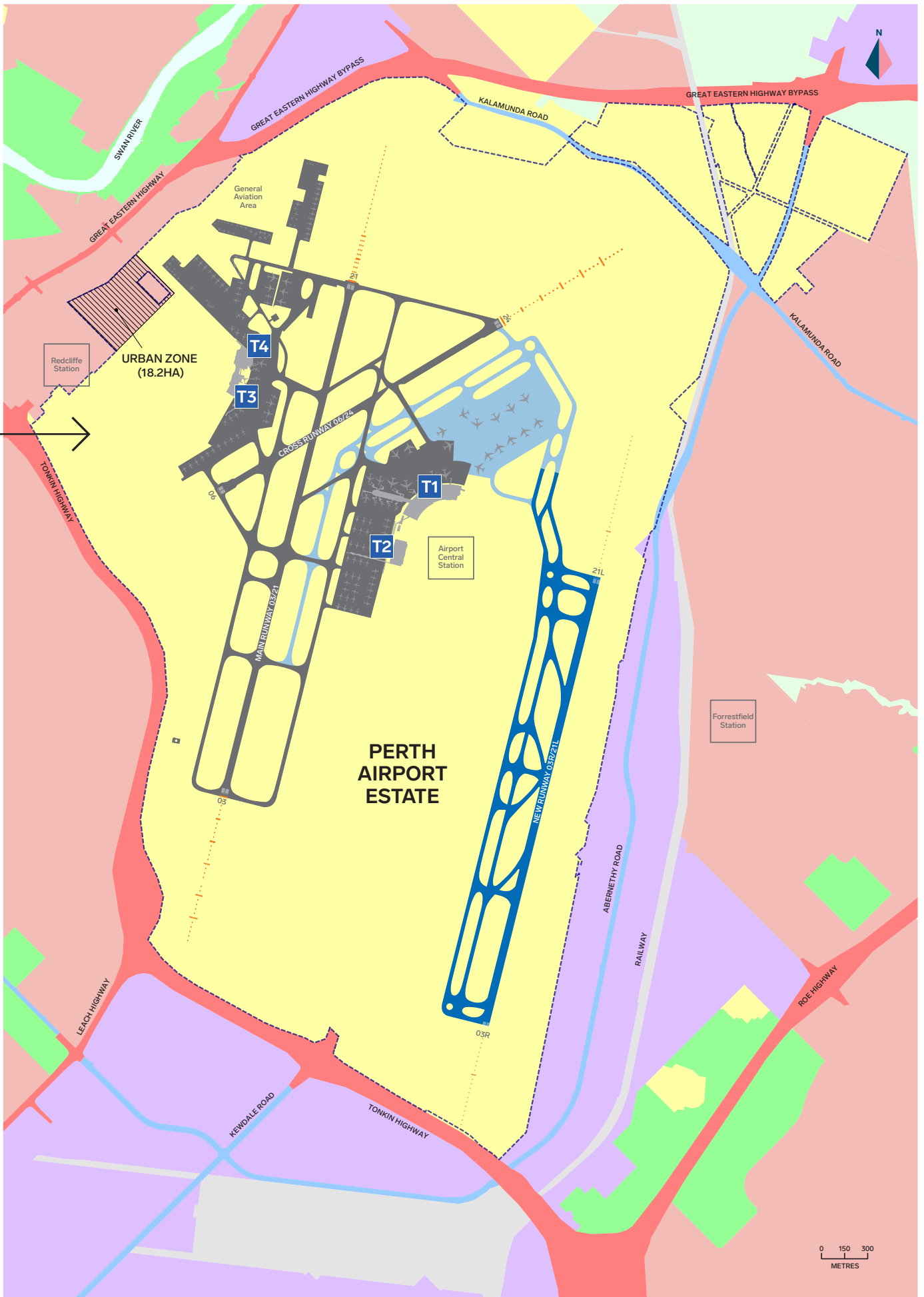


Figure 2-1 Perth Airport in the context of the Metropolitan Region Scheme
Source: Perth Airport



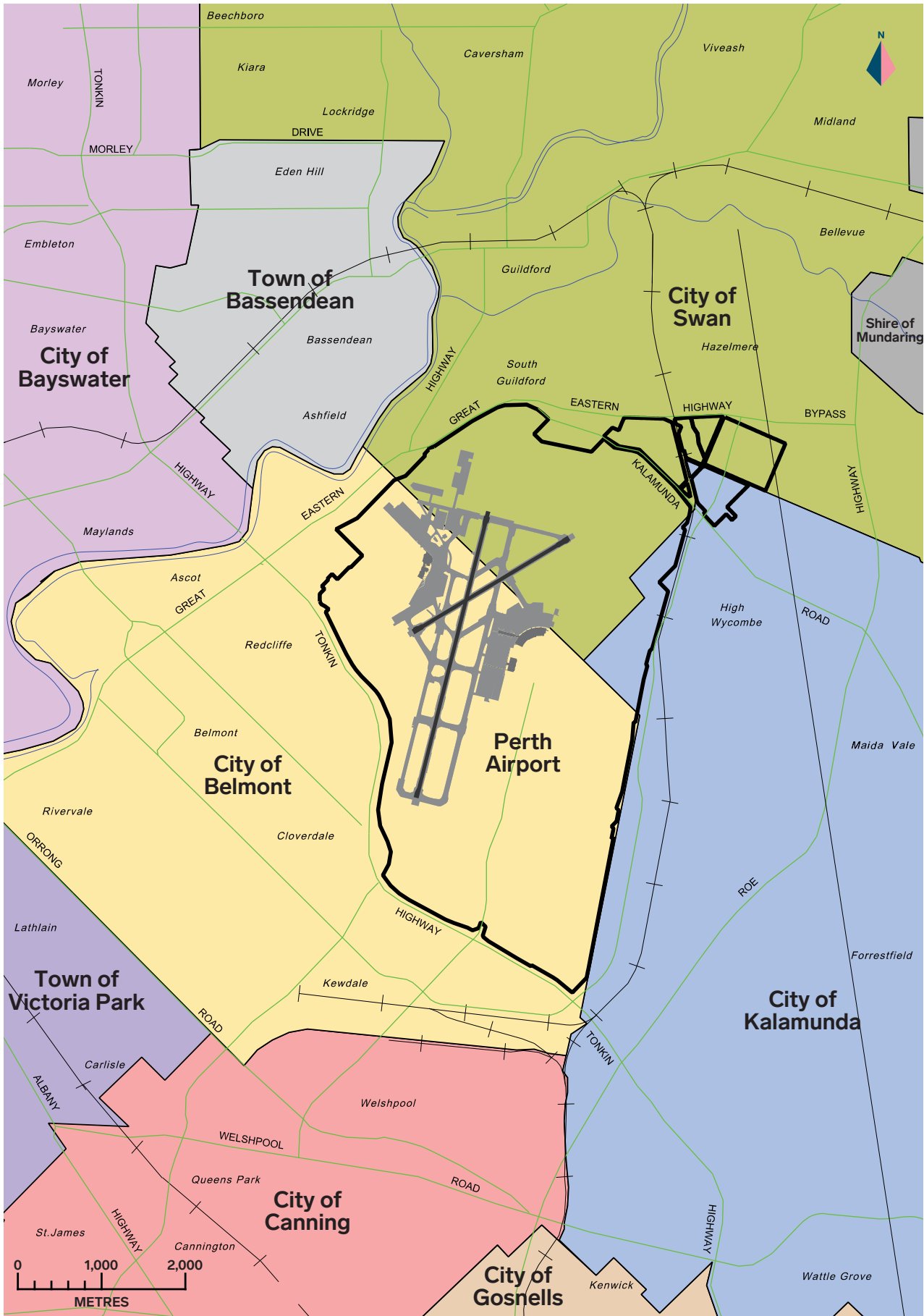


Figure 2-2 Perth Airport in the context of Local Government boundaries
 Source: Department of Local Government

2.6 Local Government

Local Governments are responsible for planning their local communities by ensuring appropriate planning controls exist for land use and development. Local planning schemes and strategies are prepared by each individual Local Government area to:

- set out the manner in which land is to be used and developed,
- classify and determine the acceptability of various land uses, and
- establish the provisions for the coordination of infrastructure and development within the Local Government area.

The Perth Airport estate boundary is adjacent to three Local Government authority areas, divided between the City of Belmont, City of Swan and the City of Kalamunda. Furthermore, Perth Airport operations impact Local Government planning within a much wider catchment of the Perth metropolitan area – largely due to the central location of the estate, only 12 kilometres from the Perth CBD, and strategic location within the metropolitan arterial road network.

The airport estate in the context of the Local Government boundaries is shown Figure 2-2. The local planning schemes of Local Governments must be consistent with the MRS and State planning policies.

To provide compatible land uses and develop appropriate surface access arrangements, Perth Airport ensures that planning for the airport estate has due regard to the planning frameworks of adjoining local authorities. To achieve this outcome, Perth Airport works with the neighbouring Local Governments through the Perth Airport Planning Coordination Forum (see Section 10). Perth Airport also investigates, where practical, initiatives such as joint visioning and development concept projects for areas on the boundary of the airport estate which share common features such as communities of interest, environment or transport networks.

2.6.1 City of Belmont Local Planning Scheme No. 15

The City of Belmont Local Planning Scheme No. 15 (LPS 15) provides for 'Industrial' and 'Residential' zones adjacent to the estate, including the major Kewdale industrial area and the residential suburbs of Cloverdale and Redcliffe. Under LPS 15, approximately 33 per cent of the City of Belmont is reserved for 'Public Purposes', which predominantly covers the airport estate, 22 per cent is zoned 'Residential' and seven per cent zoned 'Industrial'. LPS 15 incorporates provisions relating to land located within the ANEF to ensure referral of development proposals to Perth Airport in line with State policy, and to ensure the planning and design of new developments within the City considers, amongst other things, aircraft noise exposure and protected airspace.

Since the early 1990s, substantial redevelopment of residential land within the City has occurred, as older housing stock has been replaced at increased densities. There are further residential infill opportunities in the area of Rivervale known as 'The Springs' and also within Development Area 6 (an area of Redcliffe immediately to the west of the airport estate). Local Planning Policy No. 14 Development Area 6 Vision (LPP 14) was adopted by Council on the 23 February 2016, following the finalisation of the Forrestfield-Airport Link rail route, which will incorporate a train station in Redcliffe (to be named Redcliffe Station).

The location of the proposed Redcliffe Station is also within Development Area 6, which will leverage off the area's location to the future Redcliffe train station to create opportunities for medium to high density residential infill and commercial development in line with a Transit Oriented Development.

The Kewdale Industrial Area is strategically located around major freight rail and highway networks. State Planning policy has recognised the importance of the area as a transport and logistics hub. Under LPS 15, the City of Belmont has the capacity to approve a wide range of industrial activities within this zone, ranging from heavy to light industrial and commercial. Current land uses include the BP Fuel Storage facility, the Kewdale Freight Terminal (which accesses the heavy freight rail and other logistics, freight forwarding and manufacturing uses). It is expected that the importance of this industrial area will further develop over time given its strategic location. The City of Belmont is also serviced by Belmont Forum, being a Secondary Centre in SPP 4.2.

The City of Belmont, along with the cities of Canning, Kalamunda and Swan, have formed the Inland Port Member Council (IPMC), a regional body representing Local Government in the freight, transport and logistics sector. The IPMC aims to, through collaboration, facilitate the efficient movement of goods for the State.

2.6.2 City of Swan Local Planning Scheme No. 17

The City of Swan Local Planning Scheme No. 17 (LPS 17) provides for 'Industrial', 'Residential' and 'Rural' areas immediately adjacent to the airport estate. The majority of the City of Swan is a mix of 'Residential', 'Commercial', 'Industrial' and 'Rural' zoned land, across an area that is the second-largest municipality in Western Australia.

The City is serviced by the Midland City Centre, which is classified as a Strategic Metropolitan Centre under the provisions of SPP 4.2 Activity Centres for Perth and Peel. Planning within the City of Swan will consider, amongst other things, the future infrastructure upgrades to link the Midland town centre to the airport. The intent of the centre is to cater for substantial future population growth in line with State strategies such as Directions 2031, and Perth and Peel @ 3.5 million. The City of Swan has prepared the Midland Activity Centre Structure Plan to guide the development of the centre to support high density residential and mixed land uses. The Structure Plan considers height limitations for development in line with protected airspace and provides for assessment of possible noise attenuation measures where development is proposed within the 20 ANEF contour and above.

The primary residential growth area in the City of Swan is within the 1,100-hectare Urban Growth Corridor Local Area, which extends north from the Midland City Centre through to the northern boundary of the area of interest. The Urban Growth Corridor includes the suburbs of Brabham and Dayton, and parts of the suburbs of Caversham, West Swan, Whiteman and Bennett Springs. Strategic plans for Brabham include the development of a large neighbourhood centre, and the placement of residential development in this locality was undertaken in accordance with State Policy.

LPS 17 incorporates provisions relating to land located within the ANEF to ensure referrals to Perth Airport occur in-line with State policy, and to ensure the planning and design of new developments within the City considers, amongst other things, aircraft noise exposure and Perth Airport's airspace.

The residential suburb of South Guildford and historic Guildford Town Centre are located immediately to the north of the airport estate, separated by Kalamunda Road, the Great Eastern Highway Bypass and the Midland freight rail.

The Hazelmere Industrial area is located immediately north east of the estate. Its location provides access to air and rail freight transport as well as ready access to major road transport routes including the Tonkin, Roe, Reid, Great Northern, and Great Eastern Highways.

The Hazelmere Enterprise Area Structure Plan (HEASP) has been prepared on behalf of the City of Swan and the DPLH. It provides a structural framework to guide future planning and decision making that optimises the development of Hazelmere in a sustainable way. This includes appropriate responses to the sensitive environmental features, necessary servicing and infrastructure to support industrial development, and surrounding residential areas. The north-east corner of the estate falls within the HEASP area and is complementary to the land uses identified in the HEASP.

2.6.3 City of Kalamunda Local Planning Scheme No. 3

The City of Kalamunda Local Planning Scheme No. 3 (LPS 3) provides for 'Industrial' and 'Residential' areas immediately adjacent to the airport estate. The wider local authority comprises rural residential, general rural and incorporates significant reserves for State Forest and Parks and Recreation to the eastern extent of the area of interest.

The Local Government area is serviced by the Kalamunda City Centre and Forrestfield District Centre, both classified as 'District Centres' under the provisions of SPP 4.2, comprising scope for some multiple dwellings and higher urban densities. Existing residential areas in High Wycombe, immediately to the east and north east of the estate, have been developed over the past 30 years despite knowledge of the intention to proceed with the development of the new runway as outlined in Perth Airport master plans since the mid 1980's.

The Forrestfield-Airport Link project includes the construction of a rail station in Forrestfield (to be named Forrestfield Station), located within the City of Kalamunda. The City of Kalamunda has prepared and adopted the Forrestfield North District Structure Plan to guide the development of a new activity centre and a commercially focused Transit Oriented Development precinct based around the future train station. In June 2019 the Metropolitan Redevelopment Authority (MRA) announced the Forrestfield station precinct will be brought into a redevelopment area known as the METRONET East Redevelopment Area, which will capitalise on transport infrastructure and focus on maximising development opportunities to provide housing and jobs. Building on the work already undertaken, the MRA will be working with key stakeholders to inform and finalise the planning framework for the area.

The LPS 3 has considered the placement of residential development outside of the ANEF 20 and above contours in accordance with the provisions of SPP 5.1. Perth Airport is actively involved in technical working groups for Forrestfield North, to ensure the project is consistent with airport operations.

The WAPC's North-East Subregional Planning Framework (March 2018) has earmarked the areas of Wattle Grove and Maida Vale for future urban expansion. The draft plan states: *The spatial plan addresses the need to: avoid land use conflicts by taking into account buffer requirements such as those required for industry, airports and wastewater treatment plants.*

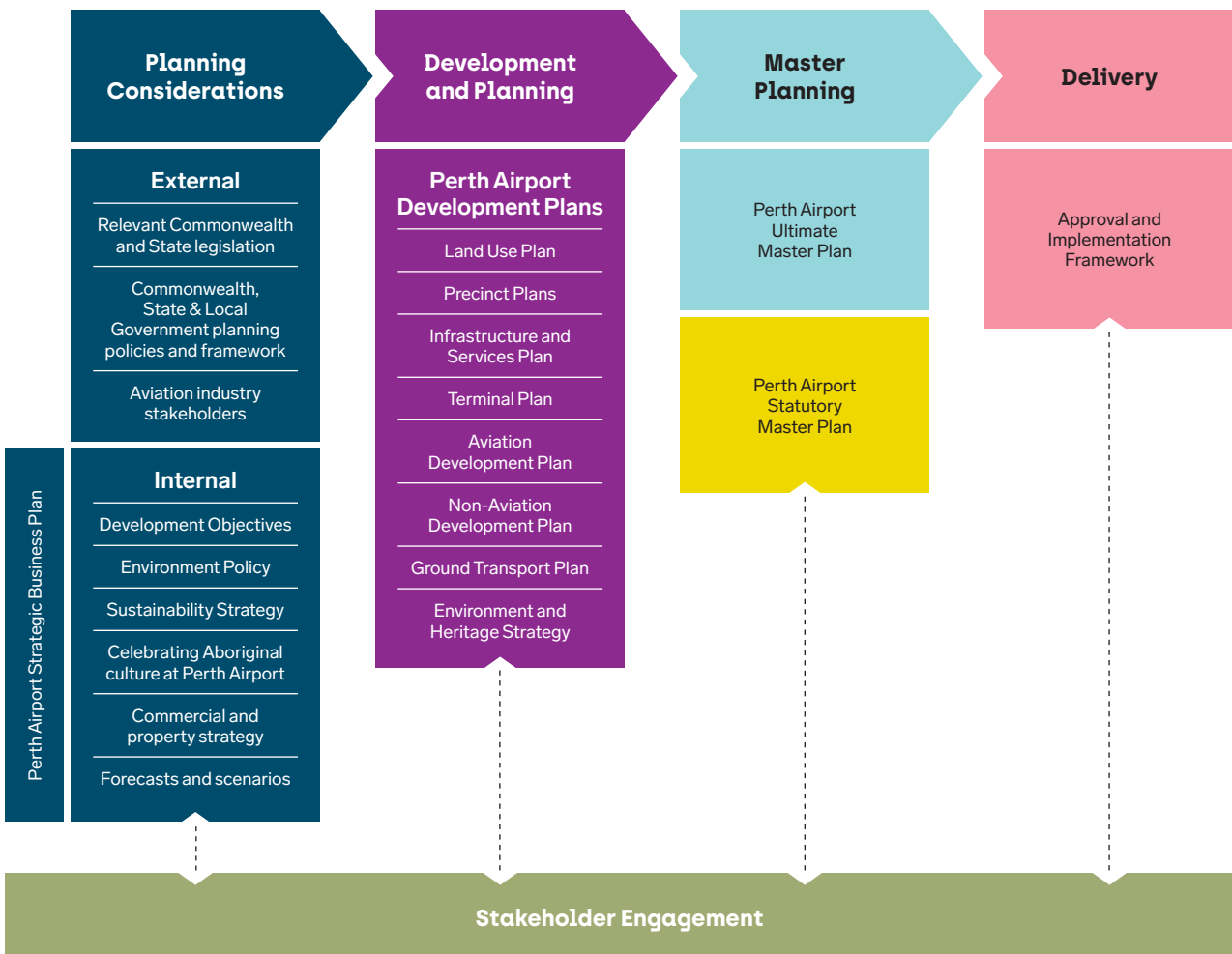


Figure 2-3 Perth Airport Integrated Planning Framework
Source: Perth Airport

2.7 Perth Airport Integrated Planning Framework

Perth Airport devotes significant resources to planning and has developed an Integrated Planning Framework that ensures the interrelationships between the various inputs are properly defined, assessed and incorporated into future strategic planning and development. Figure 2-3 provides a general description of Perth Airport's Integrated Planning Framework.

2.7.1 Perth Airport Development Objectives

Developments at Perth Airport are guided by a set of development objectives which evolve from the company's vision and corporate objectives.

Perth Airport's vision is to be:

Australia's Western Hub – connecting lives, businesses and communities to a world full of possibilities.

The objectives that guide Perth Airport's development are:

- develop a consolidated central terminal precinct maximising efficiency for airline partners and passengers and supporting the State and Commonwealth Government's significant investment in road and rail connections within the central precinct,
- deliver aviation services that are guided by airline partners, business enterprises and customer needs and expectations, striking a balance between amenity, cost, value and return on investment,
- ensure all facilities are safe and secure for all people who use them or live in the vicinity of the airport,
- bring land not required for long-term aviation services into productive use to support economic development and create employment in Western Australia,
- ensure the airport's development and operations respect the strong bond that exists between the Noongar people and the land that comprises the Perth Airport estate,
- ensure that the airport's development and operations minimise adverse impact on surrounding communities and the environment,
- ensure that Perth Airport achieves an adequate and sustained return on investment to support continuing investment in the facilities, and
- ensure the ongoing integrity of critical infrastructure that may be impacted by airport development.

2.7.2 Planning Approach

This Master Plan 2020 retains the fundamental concepts of all previously approved master plans, from the first Perth Airport Master Plan 1985, published by the then Commonwealth Department of Aviation, which identified a future centralised terminal precinct supported by a parallel runway system.

The consistency in planning that has been maintained can be seen in the progression of master plans from 1985 to 2014 as shown in Figure 2-4 to Figure 2-8.

In preparing this Master Plan 2020, Perth Airport has reviewed previous studies and reassessed the location and spatial requirements for land use developments to cater for aviation needs over the 20-year planning period. The long-term planning requirements beyond the 20-year planning period have also been considered. The key consideration of the reviews was to ensure that future development planning adequately accommodated aviation growth forecasts, including aviation support facilities, safeguarding for ground transport requirements, and integration with Local Government planning schemes, while managing environmental impacts.

Developments within the non-aviation precincts will consider Local Government planning strategies and seek to complement development adjacent to the estate. State and Local planning outcomes which facilitate the economic development and enhancement of the key corridors connecting Perth Airport to the Perth CBD, and to other key metropolitan regional centres, are supported.

While these developments occur outside of the airport estate and control, they formalise and support the role and function of Perth Airport as an integrated and essential economic element of the Perth metropolitan system.

Perth Airport reviews have also focused on ensuring that the integration of both aviation developments and the development of commercial precincts on the airport estate provide a safe and efficient airport environment. The planning also considered pre-existing interests on the airport estate, including easements. These reviews were undertaken in consultation with the Commonwealth and State Government departments and agencies, Local Governments, industry partners and other external stakeholders.

Further detail is provided in this Master Plan regarding what is expected to occur in the first five-year period for non-aviation development and ground transportation (refer Sections 5 and 6 respectively). It is essential that land is safeguarded for the ultimate airfield configuration of the airport, even though some of the components of these developments are not planned to occur within the next 20-year period.

Long-term concepts are also included for aviation developments. This information is provided as an indicative concept, as the actual growth in traffic demand and commercial needs of Perth Airport's customers will influence the actual timing of these developments.

The Environment Strategy (Section 9) outlines potential environmental impacts of development and operation at the airport and sets strategies and management in relation to these impacts. It details strategies Perth Airport will adopt in the upcoming five-year period to achieve continuous improvement in environmental management. Previous environment strategies were reviewed, areas requiring further analysis were identified, and the future of the airport estate was considered in the context of growth forecasts, and environmental values and processes.

The delivery and implementation of this Master Plan 2020 forms a critical part of the Perth Airport operations and decision-making processes. Annual-based estimates of timing for works can be inaccurate and misleading, given the volatility of forecasting and the process of determining commercial arrangements for new works. While broad figures such as the annual passenger movements have a role in planning and defining triggers for development, it is acknowledged that more specific metrics should be adopted for each element of the aviation-related function. These triggers are identified in Section 2.8.



Figure 2-4 Perth Airport Layout Master Plan 1985
 Source: Perth Airport Master Plan 1985, Department of Aviation

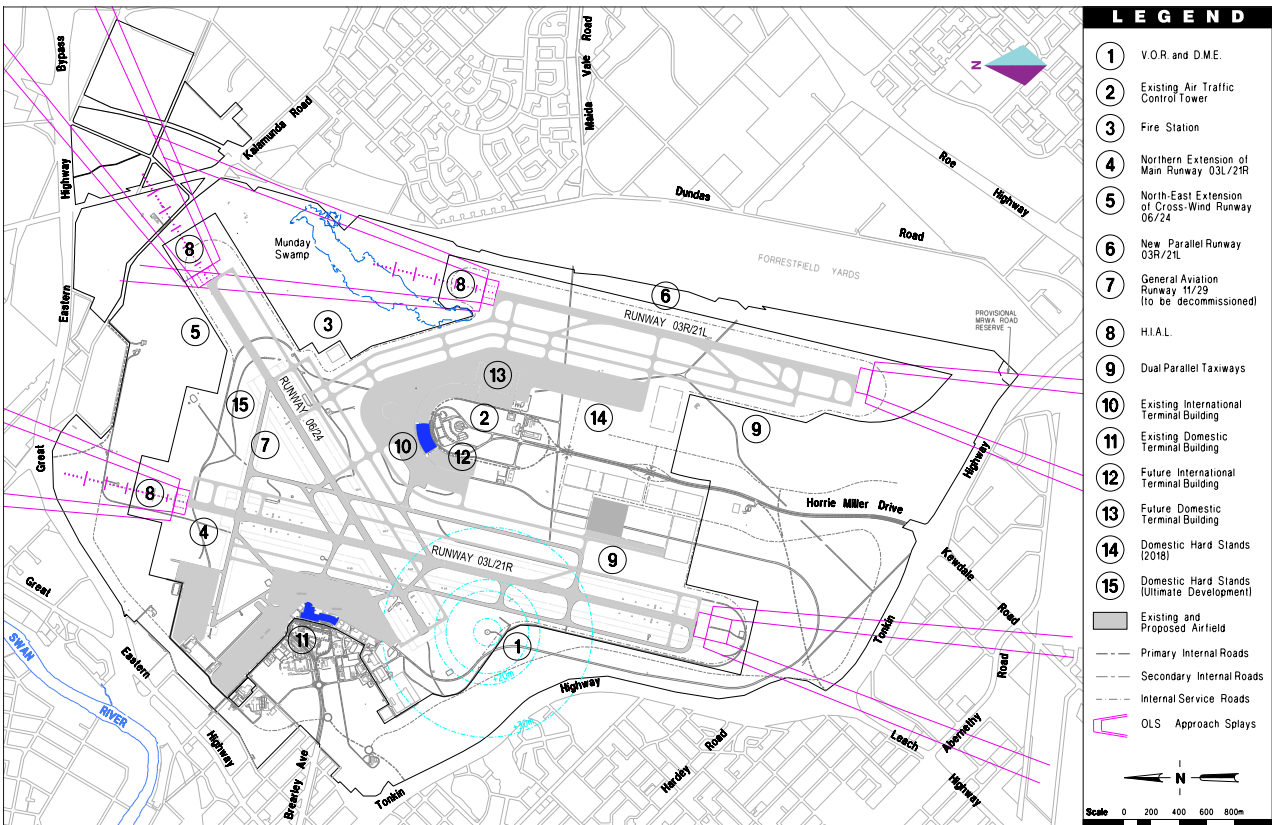


Figure 2-5 Perth Airport Airfield Layout Master Plan 1999
 Source: Perth Airport Master Plan 1999

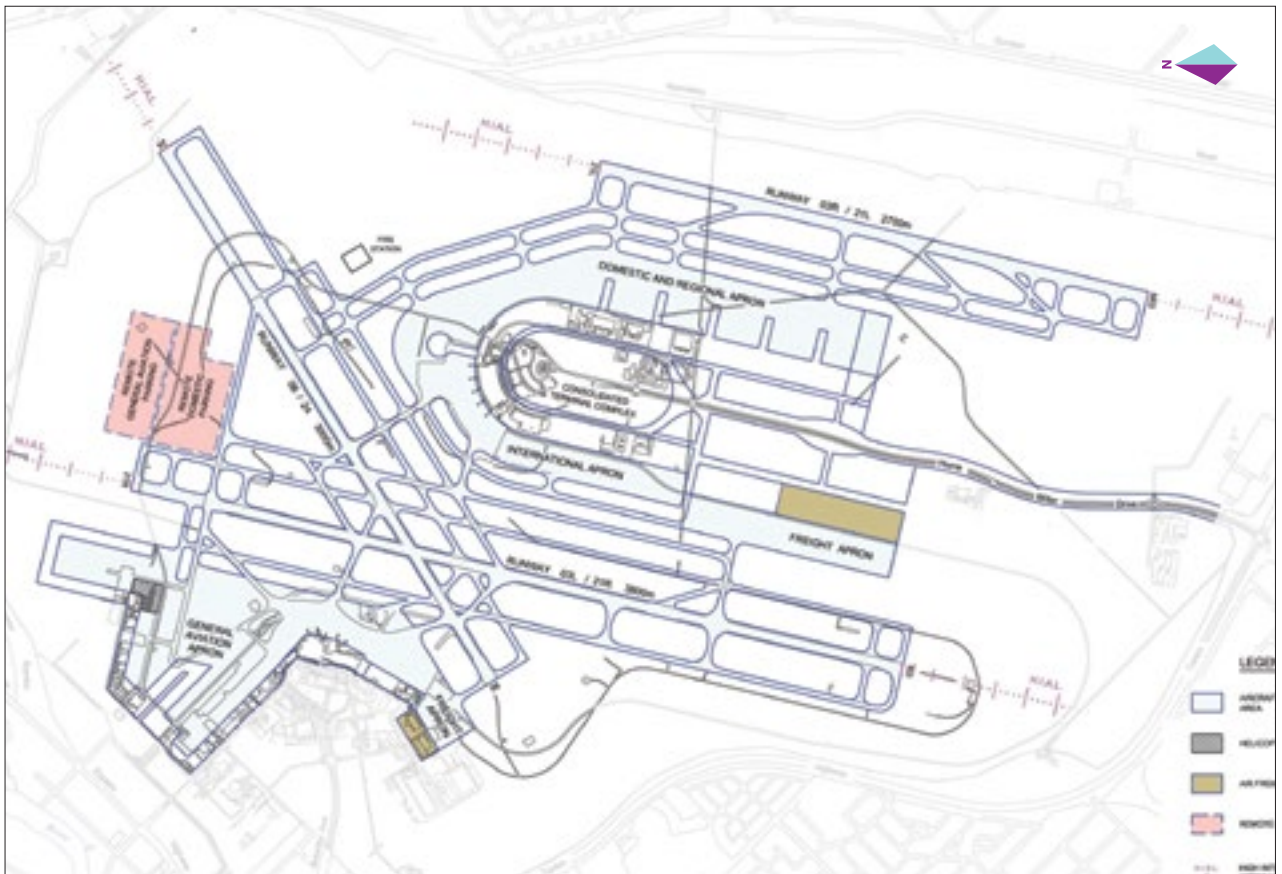


Figure 2-6 Perth Airport Airfield Layout Master Plan 2004
 Source: Perth Airport Master Plan 2004

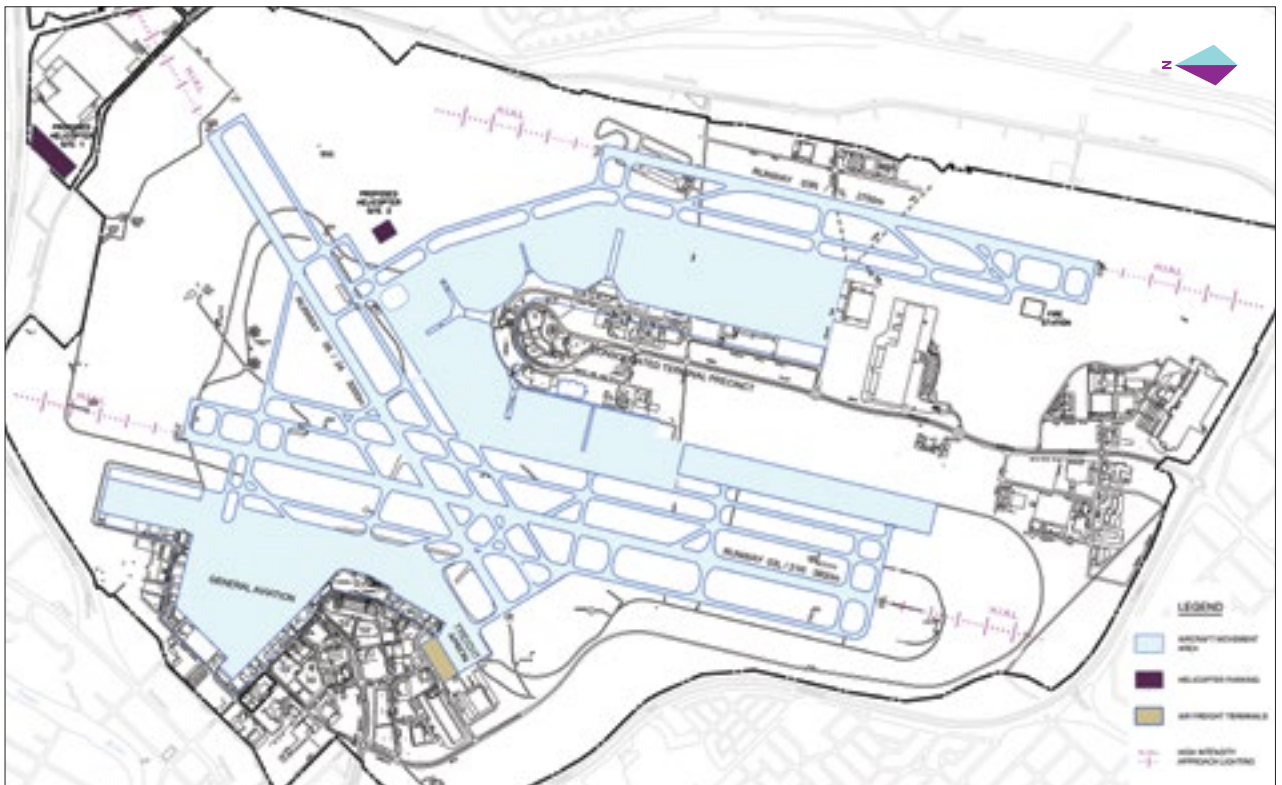


Figure 2-7 Perth Airport Airfield Layout Master Plan 2009
 Source: Perth Airport Master Plan 2009



Figure 2-8 Perth Airport Airfield Layout Master Plan 2014 Minor Variation
 Source: Perth Airport Master Plan 2014 Minor Variation

2.8 Planning Criteria

This Master Plan 2020 is underpinned by a number of key planning criteria relevant to land use planning, infrastructure development and airport operations.

The development triggers that guide the timing of Perth Airport's developments are summarised in Table 2-1.

Component Development Triggers

Runways	<ul style="list-style-type: none"> • Peak period aircraft movement demand for arrivals, departures or a mix of arrivals and departures (increase in runway capacity required) • Forecast annual aircraft movements • Improve holding and taxiing delays, reduce fuel burn and emissions • Maintain and improve on time performance • Introduction of new aircraft types
Taxiways	<ul style="list-style-type: none"> • Reduce taxiing delays, fuel burn and emissions • Reduce runway occupancy times (ROT) • Introduction of new aircraft types • New terminals • Link in with new runway infrastructure • Improved safety
Apron	<ul style="list-style-type: none"> • Busy hour demand • New terminals • Improved customer experience • New aircraft, larger aircraft size • Overnight parking demands • Improved safety
Terminals	<ul style="list-style-type: none"> • Busy hour demand • New terminals • Improved customer experience • Reduce processing delays (such as improving security screening processing times) • New legislation (such as new security screening measures) • Improved safety
Roads	<ul style="list-style-type: none"> • Improved customer experience • Improved safety • Reduced delays and congestion • React to a change in mode share • Connect to new external road access points • New terminals • New commercial developments

Table 2-1 Overview of development triggers that guide the timing of Perth Airport developments

Source: Perth Airport

2.8.1 Runway, Taxiway and Aprons

Perth Airport, as the airport operator, is responsible for the safety of the aerodrome in accordance with CASR Part 139 – Aerodromes. These regulations are supported by a Manual of Standards Part 139 – Aerodromes (MOS 139), which prescribes the technical standards for aerodromes used in air transport operations.

The specifications contained in MOS 139 are largely the same as the International Civil Aviation Organization (ICAO) standards, noting that there are some differences. The ICAO and MOS adopt a code system, known as the 'aerodrome reference code'.

The code comprises of a code number and a code letter. The code number is based on the aircraft reference field length and the code letter is based on the aircraft wingspan and the outer main gear wheel span. The reference code provides a method of grouping aircraft with different characteristics which behave similarly when landing, taking off, taxiing and parking. The planning of runways, aprons and taxiways is largely based on the aerodrome reference code.

The reference code then corresponds to a critical aircraft which is the most demanding aircraft type for the airport's infrastructure. For Perth Airport this is a Code 4F aircraft which represents an Airbus A380. Infrastructure such as apron and aircraft parking positions also consider the most common aircraft that use the facilities, and then balance the need for the infrastructure and costs to meet the needs of a range of aircraft types.

2.8.2 Terminals

The International Air Transport Association (IATA) publishes the Airport Development Reference Manual (ADRM) as a guide for planning new or extending existing airport facilities. The ADRM is an important source of best industry practice with regard to the planning and design of airports. It is used by Perth Airport, in conjunction with numerous other planning tools and techniques, including simulation, customer surveys, industry benchmarking and extensive stakeholder consultation, to inform the design of the passenger terminal buildings. Design standards and levels of service are fundamental components of terminal planning.

The size of a terminal building, including the number of aircraft gates, is based on the forecast number of passengers, aircraft movements and visitors during the 'design busy hour', and takes into account the desired level of service required to be provided by the infrastructure.

The 'design busy hour' passenger forecasts represent demand that is unconstrained by infrastructure restrictions, however airlines have a material influence on the level of service parameters upon which airport infrastructure is planned and designed, which are based on value judgements about the standard that is acceptable for passengers. Airline partners generally require Perth Airport to adopt the IATA Optimum Level of Service standard in the targeted design year when designing terminal infrastructure.

The Optimum Level of Service is defined in the IATA Airport Development Reference Manual as providing 'a good level of service; conditions of stable flow, acceptable delays and good levels of comfort'. The Optimum Level of Service is recommended as the minimum design objective by IATA as it denotes good service at reasonable cost and is the standard typically adopted by most airports. Acquiring an optimum design level of service avoids over design and under-design, and balances economic terminal dimensions with passenger expectations.

The actual level of service experienced by a passenger in a terminal may differ from the design level of service modelled through the planning and design stages and is heavily influenced by factors such as resource allocation on the day, wayfinding and legibility of the passenger journey and technology. Given the importance of customer experience to the aviation business, Perth Airport has a dedicated customer experience team to ensure a customer-centric focus is imbedded across all business activities.

Data from the Airports Council International's Airports Service Quality (ASQ) Monitoring Program is one source used to drive and prioritise improvements to facilities, with the survey undertaken quarterly at Perth Airport. The ASQ focuses on seven key areas which define the passenger experience through Perth Airport's managed terminals. These are:

- access to and from the airport,
- check-in,
- passport control,
- security screening,
- wayfinding,
- airport facilities, and
- the airport environment.

This information allows Perth Airport to establish the highest priority areas for the improvement of the customer experience and focus resources and initiatives appropriately. Since 2014, ASQ scores have increased year on year, following a number of investments specifically targeted at enhancing the passenger journey at every touchpoint.

Perth Airport continues its significant investment in a redevelopment program that is changing the customer experience at the airport, inside and out. During 2017-18, over 4.3 million international passengers were processed arriving and departing Perth Airport, and that figure is projected to increase in 2018-19. The Australian Competition and Consumer Commission (ACCC) rated Perth Airport in the top spot for overall service quality in its last two Airport Monitoring Reports. The ACCC also noted that Perth Airport's significant improvement in quality of service ratings over the last three years has coincided with a substantial investment program. The independently compiled Airport Service Quality ratings, which are based on customer surveys, also shows that Perth Airport is a consistent leader amongst its benchmark group of major Australian and New Zealand airports.

2.8.3 Ground Transport

Ground transport infrastructure planning is informed by simulation modelling and considers the daily passenger profiles, peak traffic on the external road networks and surveyed transport mode splits. These inputs are tested against the peak hourly volumes of the annual tenth-busiest day. The design and construction of on-airport estate roads meet appropriate Australian standards.

2.8.4 Environmental Management

Environmental management and sustainability at Perth Airport are guided by a vision to operate and grow in a manner that minimises environmental impacts and considers sustainable solutions for the development and operation of the airport estate.

This is achieved through integrated planning, developing solutions, management techniques, engaging staff, contractors, tenants and the wider community in the operation and growth of the airport. Perth Airport also participates in independent, third-party benchmarking and accreditation programs, such as the Airport Carbon Accreditation initiative from the Airports

Council International (Europe), and annually assesses its sustainability performance against the international GRESB benchmark for real assets.

Perth Airport incorporates sustainability principles into planning and development in several ways, including:

- the integration of environment and sustainability into planning processes to enable early identification of opportunities and constraints,
- the consideration of building management, vegetation retention, canopy provision, and resource conservation opportunities during the planning and design phases of development,
- ongoing review and assessment of compliance of environmental outcomes, and
- inclusion, where applicable, of independent sustainability performance rating systems for design, construction and operation of infrastructure.

2.9 Development Considerations

The planning and development of Perth Airport is underpinned by a number of development considerations which influence the infrastructure that is built and when it is delivered.

Development considerations include forecasts of passenger and aircraft movements annually and, in peak periods, air freight volumes and the level of service expected by different airlines.

2.9.1 Recent Performance

The Perth aviation market is comprised of international, interstate and intrastate sectors, with each sector being influenced by different factors. When combined, interstate and intrastate are referred to as domestic passengers.

Over the past decade, Perth aviation markets have experienced periods of high growth as well as periods of contraction. The historical trends in aircraft movements can be summarised as follows:

- Western Australia experienced a resource construction boom from 2007 until its peak in 2014, which contributed to significant aircraft movement and passenger growth at Perth Airport. During this period, Perth Airport was the fastest growing airport in Australia with an average annual passenger movement growth rate of 7.5 per cent, nearly twice as much as the next fastest growing airport (Brisbane). At the peak, airlines and passengers experienced significant delays, which had flow on impacts to the many industries and the wider Western Australian economy.
- Domestic and general aviation movements at Perth Airport have declined since 2013, mostly associated with a slowing of the economy and the Western Australian resource sector. However, this is a normalising of demand when considered in the context of the significant growth experienced between 2003 and 2015 when the Western Australian resource sector was in a strong construction phase.
- International aircraft movements have shown relatively strong and stable growth. While there was a decline in 2015 and 2016 as a result of airlines using larger aircraft, movement numbers began to grow again in 2017 and 2018.

Total passengers travelling through Perth Airport surged from 6.7 million passengers in 2005 to 14.9 million passengers in 2014. Since the peak in 2014, there has been a slowing in passenger numbers driven by a reduction in intrastate and interstate traffic with 2018 having 14.3 million total passengers. Figure 2-9 shows the passenger movements at Perth Airport between 2005 to 2018.

Note: General Aviation passenger numbers were not recorded until 2012 and are not shown below for the years 2005 to 2011. As a result of adding General Aviation passengers, the actual passenger number for FY13 is greater than that reported in the 2014 Master Plan.

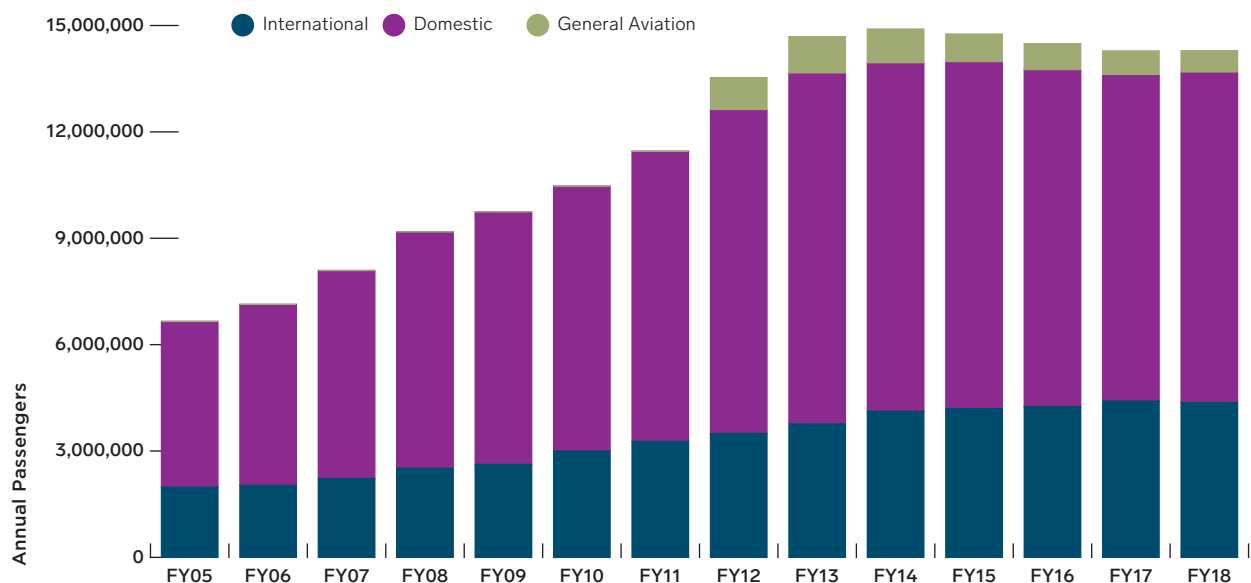


Figure 2-9 Perth Airport Annual international and domestic passenger numbers

Source: Perth Airport

Domestic passenger numbers increased from 4.7 million in 2005 to 9.3 million in 2018, representing an average annual increase of nearly 6.5 per cent. The strong growth from 2005 to 2013 reflects the recovery from the Ansett collapse (in 2001), the growth of low-cost carriers such as Virgin Australia and Jetstar, the strong economy and significant resource sector investments. The softening of the domestic market since 2014 reflects the end of the resource investment boom and the easing of commodity prices.

Figure 2-10 shows the share of intrastate passengers as a proportion of total domestic passengers. The share of intrastate passengers increased dramatically between 2005 and 2013 before moderating somewhat. Intrastate traffic is influenced by major resource projects, with project sites serviced by either RPT airline services or general aviation charters. Intrastate traffic saw a peak in 2013 of just under five million passengers. Since this time many mines have completed construction and moved into operational mode. This, combined with increasing automation of mining equipment, has seen a decrease in the number of staff required on site.

International passengers have typically represented a third of total passengers through Perth Airport. In 2005, there were 2 million passengers, increasing to 4.4 million in 2018. International passengers at Perth Airport have grown at an average annual rate of 6.4 per cent over the past ten years.

Figure 2-11 shows a comparison of international and domestic passenger growth year on year. International passenger numbers have experienced positive levels of growth up until 2018, which was affected by Perth Airport’s largest passenger route, Perth to Bali, being interrupted by volcanic ash cloud events. Since this time, Perth Airport has seen a return to growth in the international passenger segment.

2.9.2 Industry Outlook

Perth Airport forecasts and industry outlooks are produced by Tourism Futures International (TFI), a research-oriented company specialising in aviation, travel and tourism forecasting. TFI expects the decline in air traffic growth to be moderated in the short term with a return to growth in the medium term due to a range of economic indicators including:

- the Australian dollar remaining around its depressed long-term average,
- domestic travel costs to increase in the short term with declines in the medium term,
- growth in international travel costs from lower or declining passenger growth,
- oil prices to increase,
- fares trending upwards in the short term with medium-term declines,
- increase in the working-age population,
- mining investment to stabilise, and
- a return to economic growth below the long-term average in the WA economy.

Whilst aviation growth prospects are positive into the medium/long term, there remain uncertainties that can stall growth. These include:

- policy challenges in China, with fiscal policy supporting growth but contributing to rising public debt. Chinese growth has a significant impact on the WA economy,
- possibility of financial market corrections, with a faster than expected tightening of global financing terms,
- possible adoption of inward-looking policies. Important long-standing commercial agreements are currently under renegotiation and there is substantial uncertainty about possible changes to UK and US trade and immigration policies,
- geopolitical tensions, notably in East Asia and the Middle East, which at the very least could dampen confidence and lead to financial market volatility, and
- in the longer term the risk of recurrent extreme climate events that impose humanitarian costs and economic losses on the affected regions.

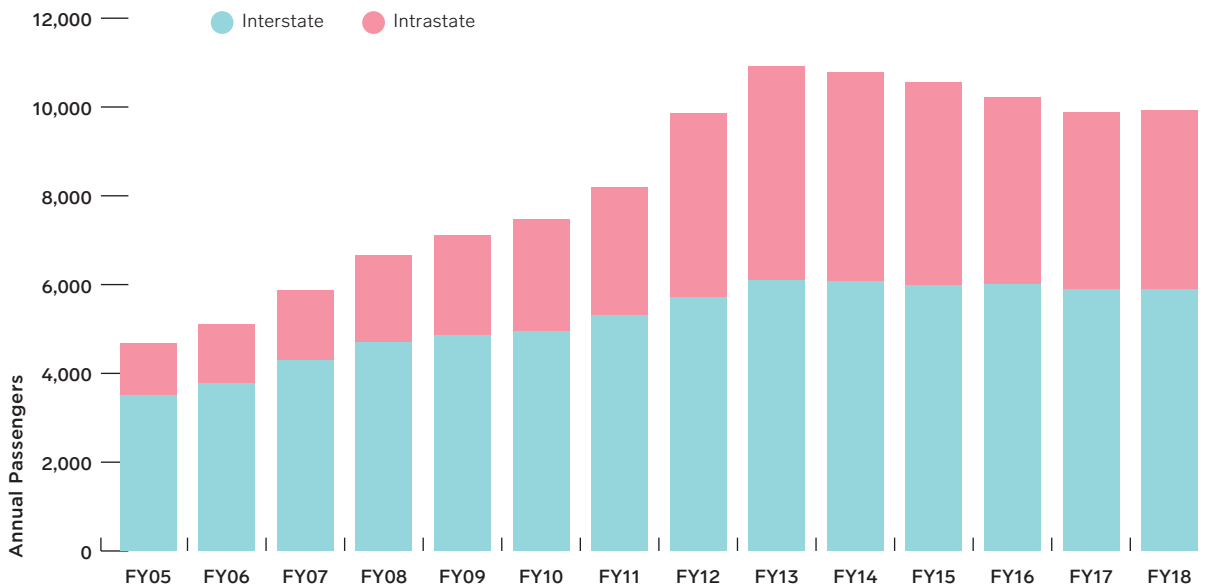


Figure 2-10 Perth Airport Intrastate vs interstate passenger numbers ('000)
Source: Perth Airport

2.10 Perth Airport Activity Forecasts

Airline passenger forecasts are not based on a single homogenous market. In preparing passenger forecasts, a segmentation approach is applied to Perth Airport's international and domestic markets to better understand and assess the significance of different drivers.

This approach allows for a clearer picture of the relative size and impact of each market segment, resulting in forecasts that are more responsive to events specific to a given market. A large number of factors influence the growth in air travel, the most significant ones being:

- gross domestic product on a national and regional level,
- disposable incomes of potential travellers (of importance is the level of income and confidence that these levels will be maintained and grow),
- the price of air transport and the ground component of travel,
- the competitiveness (quality, product attributes and price) of a destination compared to alternative destinations,
- the supply of airline services, frequency, reliability, quality of service,
- the promotion of tourism by governments, airlines and industry bodies,
- consumer tastes and available time for travel, and
- one-off factors and shocks that impact travel such as:
 - the terrorist attacks of 11 September 2001 and those in Bali in 2002 and 2005,
 - ash clouds from the eruption of Mount Agung in 2017,
 - the collapse of an airline, such as Ansett in 2001, and
 - large events such as the America's Cup and the Sydney Olympics.

2.10.1 Review of Master Plan 2014 Forecast

The forecasts presented in Master Plan 2014 were an overestimation of the passenger growth that actually occurred.

At the time it was considered that while the pace of growth in passengers would decline it would still be positive, averaging 4.5 per cent in the period 2014 to 2018. Key assumptions included:

- that the Australian economy would maintain Gross Domestic Product growth in excess of 3 per cent per annum, which was higher than actually occurred,
- belief that demand for commodities from major trading partners such as China would continue to support economic activity in Western Australia, which occurred but to a lesser degree,
- that commodity prices, while forecast to soften, would remain stronger than what actually occurred,
- overestimating the pipeline of investment within the resource sector which was greatly reduced following 2014, and
- underestimating the pace at which demand for fly-in fly-out services would drop off due to the completion of major projects.

2.10.2 Use of Forecasts in Perth Airport Planning

Passenger forecasts are combined with aircraft load factors and airline fleet-mix assumptions to develop forecasts of passenger aircraft movements. General aviation aircraft movement forecasts are based on trend analysis in the industry sectors within which these operators contract. Freight and passenger aircraft movement forecasts are combined to produce total aircraft movement forecasts.

Aircraft movement forecasts, including type and operational time of day, are also a key input into noise exposure forecasting. However, annual forecasts only give a high-level overview of projected growth patterns and do not trigger infrastructure investments. Forecast demand in peak periods, when compared to the capacity of each individual element of the airport's infrastructure (for example roads, check-in, security screening, departures lounge size, aircraft parking positions and runway capacity) informs the timing of specific developments.

The capacity of airport infrastructure needs to provide the targeted levels of efficiency and customer service in peak demand periods. Therefore, a critical element of airport planning is the combination of activity forecasts with future airline schedule assumptions to forecast peak hour demand for each element of airport infrastructure.

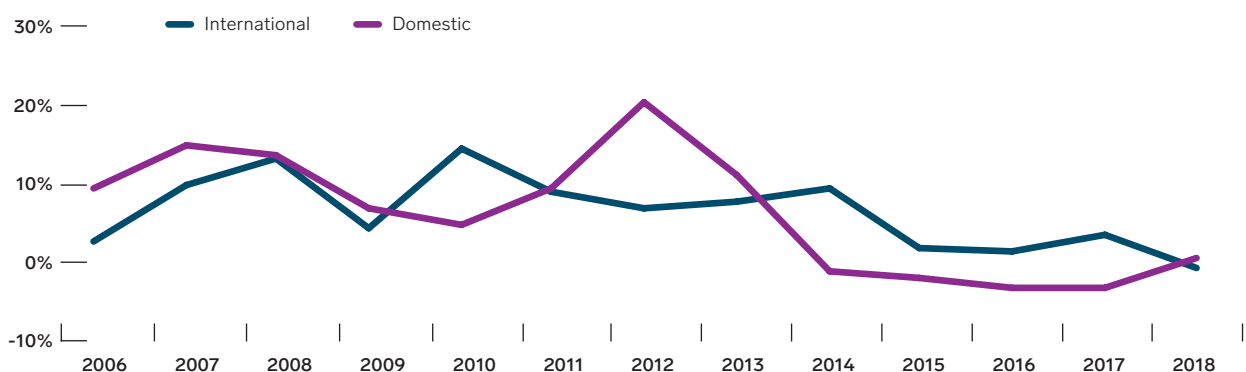


Figure 2-11 Perth Airport Year-on-year passenger growth comparison at Perth Airport

Source: Perth Airport

2.10.3 Forecasting Methodology

While many factors have an impact on air service demand, only some of these factors can be reliably measured and their impacts included in the forecasting models. Perth Airport forecasts are based on a number of elements, including:

- the segmentation of Perth's international and domestic markets to assess the significance of traffic drivers,
- a review of the traffic history available for Perth Airport and an assessment of statistical trends which include:
 - development of seasonal indices and time series forecasts for all items forecast. This is often found to provide a useful shorter-term view of future traffic behaviour,
 - development of a quarterly 'indicators' model that shows the movements in leading indicators relative to traffic. Indicators include stock market performance, company profits, average weekly earnings, and business and consumer confidence,
 - analysis of Perth's traffic responses to previous economic downturns and other traffic 'shocks', and
 - analysis of the general aviation and business environment and current airline schedules. This assists with developing assumptions and identifying qualitative factors that might influence traffic outcomes.
- models linking drivers and aircraft traffic:
 - macro models linking economic indicators,
 - micro models based on extensive statistical analysis and published studies which are generally based on a market and/or travel purpose (for example, European holiday) or routes,
 - final model outcomes are based on an iterative process between the modelling approaches listed above and are constantly being tested and updated, and
 - a review of official tourism forecasts in Australia and elsewhere.

In preparing passenger forecasts, Perth Airport develops scenarios for high, central and low passenger and aircraft movement growth. The low, central and high forecasts have been provided in this Master Plan 2020.

2.10.4 Passenger Forecasts

To ensure that Perth Airport can meet future demand when required, activity forecasts are prepared annually to support effective infrastructure planning and investment decision making.

Detailed analysis considers the factors that impact and / or trigger the need for infrastructure developments, in addition to preparing a new master plan every five years. These revalidation processes help to ensure (to the best of current available knowledge) that infrastructure capacity is delivered to meet demand, and that it is not delivered too early, noting that this would place unnecessary costs on the users of Perth Airport, including the travelling public.

Statistics published by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) are incorporated in the annual forecasting reviews.

Perth Airport ensures that its infrastructure planning and design emphasise modularity and flexibility to support construction of expanded capacity within shortened timeframes. Importantly, Perth Airport's infrastructure development plans are such that high activity forecasts will trigger timely development to ensure capacity exists to support continuing growth, while providing acceptable levels of service.

Based on a central growth rate scenario, annual international passengers at Perth Airport are forecast to grow from 4.37 million in 2018 to 10.20 million in 2040. In the same period, annual domestic passengers are forecast to grow from 9.92 million to 18.31 million.

Total annual passengers are forecast to grow from 14.29 million in 2018 to 28.51 million in 2040. These forecasts and the annual percentage growths are shown in Table 2-2. These numbers include general aviation and charter passengers in addition to the RPT movements, which are usually reported separately.



Financial Year	2018 (Actual)	2019	2020	2021	2022	2023	2024	2025	2030	2035	2040
International											
Passengers	4,365	4,301	4,489	4,739	4,981	5,232	5,488	5,751	7,197	8,654	10,200
Annual % change		-1.2%	4.4%	5.6%	5.1%	5.0%	4.9%	4.8%	4.4%	3.6%	3.2%
Domestic											
Interstate	5,884	5,753	5,937	6,158	6,434	6,725	7,027	7,342	8,964	10,674	12,364
Intrastate	4,038	3,707	3,595	3,562	3,647	3,751	3,857	3,969	4,611	5,294	5,946
Domestic – Total	9,923	9,460	9,532	9,720	10,081	10,476	10,884	11,311	13,575	15,968	18,310
Annual % change		-4.7%	0.8%	2.0%	3.7%	3.9%	3.9%	3.9%	3.5%	3.1%	2.5%
International and Domestic											
Total Passengers	14,288	13,762	14,021	14,458	15,063	15,708	16,372	17,062	20,773	24,622	28,510
Annual % change		-3.7%	1.9%	3.1%	4.2%	4.3%	4.2%	4.2%	3.9%	3.3%	2.7%

Table 2-2 Passenger Forecasts for Perth Airport (000s Passengers) central scenario

Source: Perth Airport

A summary comparison between the low, central and high growth rate scenario forecasts is shown in Figure 2-12.

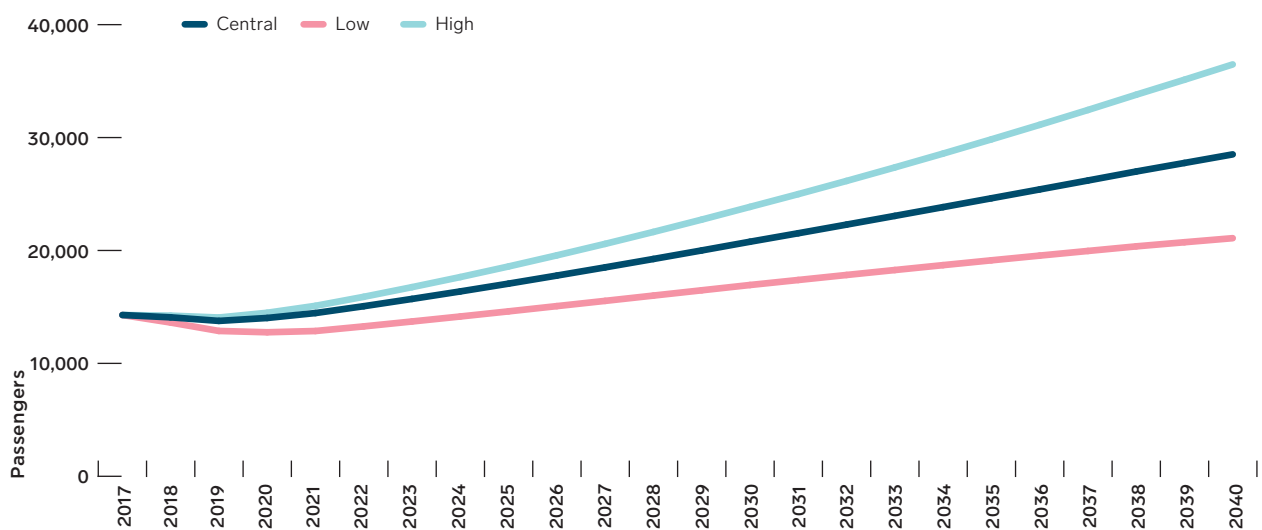


Figure 2-12 Perth Airport Total passenger forecasts comparison for Perth Airport

Source: Perth Airport

2.10.5 Aircraft Movement Growth Forecasts

Based on a central growth rate scenario, annual international aircraft movements at Perth Airport are forecast to grow from 23,400 in 2018 to 37,200 in 2040. In the same period, annual domestic aircraft movements are forecast to grow from 106,600 in 2018 to 163,000 in 2040. Total annual aircraft movements are forecast to grow from 129,900 in 2018 to 202,000 movements in 2040.

It should be noted that these numbers include general aviation and charter passengers in addition to the RPT movements, which are usually reported separately. Table 2-3 below considers general aviation and charter separately.

Financial Year	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2040
International Movements											
Passengers	22.8	22.0	22.5	23.3	24.0	24.7	25.4	26.1	29.9	33.6	37.2
Annual % change		-3.4%	2.5%	3.5%	3.0%	3.0%	2.9%	2.8%	3.0%	2.3%	2.0%
Domestic Movements											
Passenger Aircraft	85.1	82.1	81.4	82.0	84.4	87.0	89.7	92.5	104.2	117.2	129.7
Annual % change		-3.5%	-0.8%	0.7%	2.9%	3.1%	3.1%	3.2%	2.3%	2%	2.0%
Freighters											
Movements	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.9	2.1	2.3
General aviation											
Passenger Aircraft	20.6	21.2	22.3	23.7	25.2	26.7	28.3	29.9	31.2	32.1	32.8
Total Movements											
Movements	129.9	126.7	127.7	130.5	135.1	140.0	145.0	150.2	167.1	185.1	202.0
Annual % change		-2.5%	0.8%	2.2%	3.5%	3.6%	3.6%	3.6%	2.1%	2.0%	1.8%

Table 2-3 Aircraft Movement Forecasts for Perth Airport (000s Movements)

Source: Perth Airport

The aircraft movement forecasts are based on a central growth rate scenario. A summary comparison between the low, central and high scenario forecasts is shown in Figure 2-13.

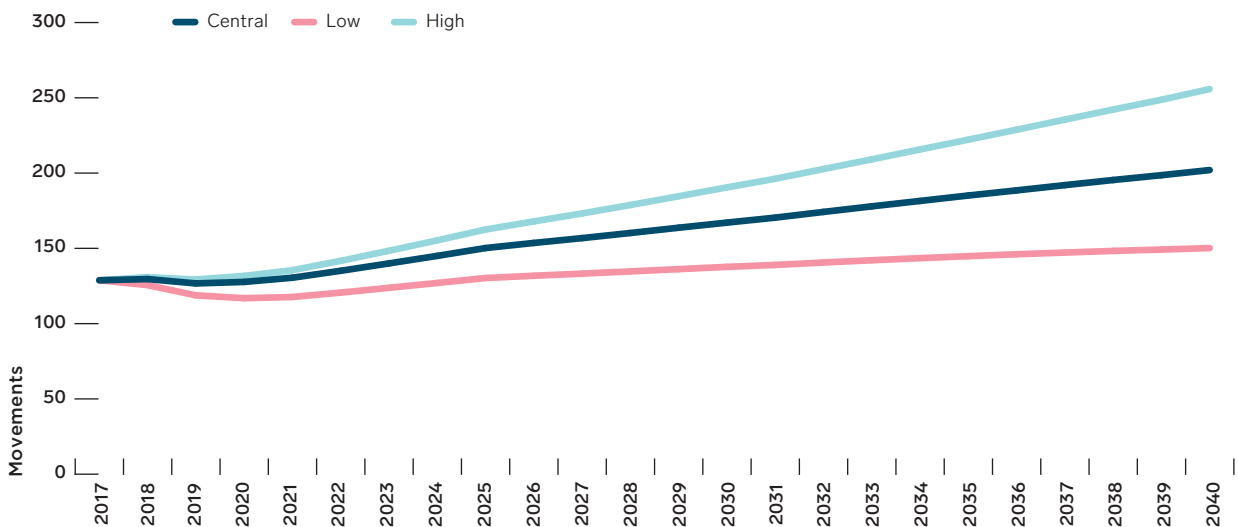


Figure 2-13 Total aircraft movement forecast comparison for Perth Airport (000s Movements)

Source: Perth Airport

2.10.6 Air Freight Growth Forecasts

Air freight provides the fastest method of transporting goods over long distances. Given Perth's distance from major trading partners and other Australian major ports, road, rail and sea are not viable options for goods which are time-critical or have a short shelf life.

Air freight serves regional and remote communities by delivering vital supplies, such as medicines and fresh foods, and is used to deliver heavy machinery and specialised equipment to remote and regional mining sites.

Perth's air freight market is primarily driven by Western Australia's resource and agri-food industries. Free trade agreements, the expanding airline route networks and the proximity of Perth to the Asian and Middle East markets have benefited the air freight market.

Major air exports are gold and gold products (which require the enhanced level of security provided by air transport), and agricultural products such as live rock lobsters, fresh meat and fresh fruit which are highly perishable and need to move from harvest to consumption within 48 hours.

Imports are typically gold and gold products, machinery and vehicle parts, and general household goods.

The majority of air freight at Perth Airport is carried in the hold of regular passenger air services and is a factor in the financial viability of scheduled air services. The rate of growth for air freight therefore has some correlation with the rate of passenger air services growth.

International Air Freight

In 2017, Perth Airport catered for nearly 109,000 tonnes of international air freight. International air freight is largely carried on passenger services, and therefore capacity is again expected to increase with growth of international passenger services.

International air freight is expected to continue to be largely transported on passenger services due to the smaller volumes of freight. Dedicated freighters operate for peaks in demand, such as Chinese New Year.



SECTION 2: PLANNING CONTEXT

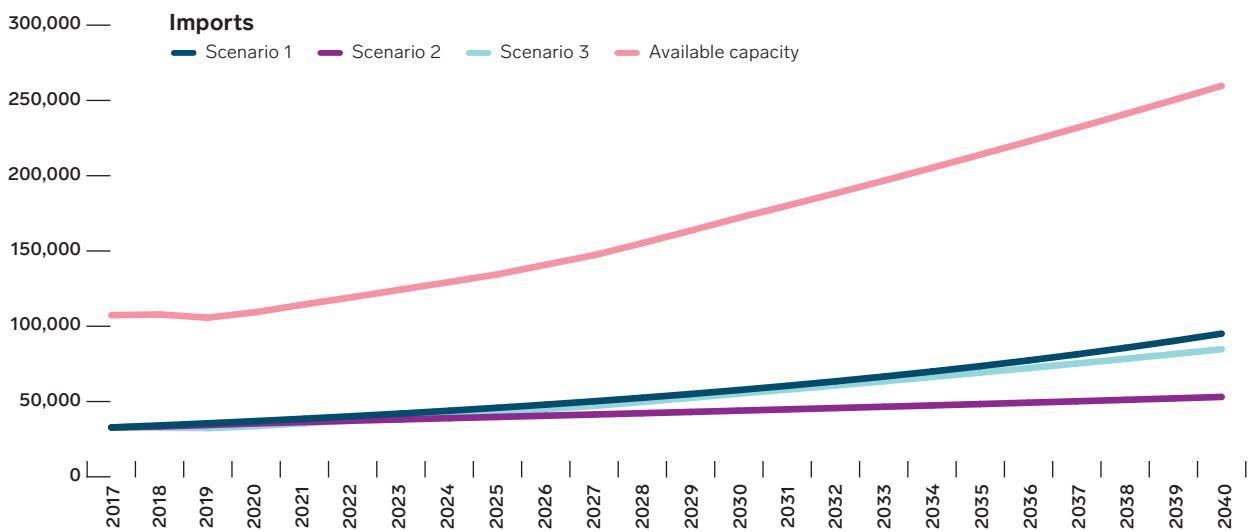
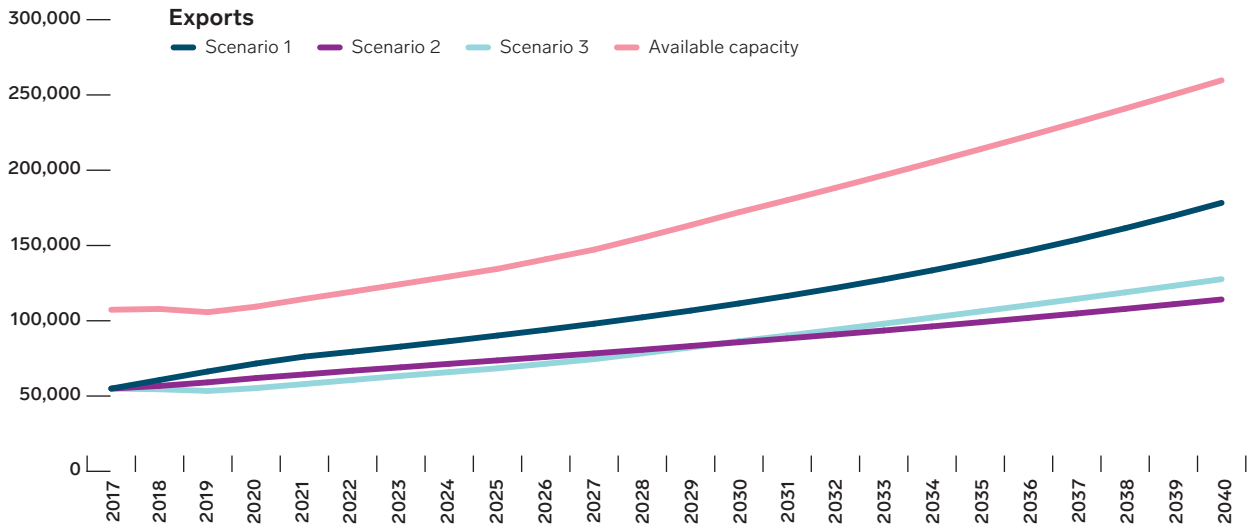


Figure 2-14 Forecast growth of international air freight 2017 to 2040

Source: PricewaterhouseCoopers

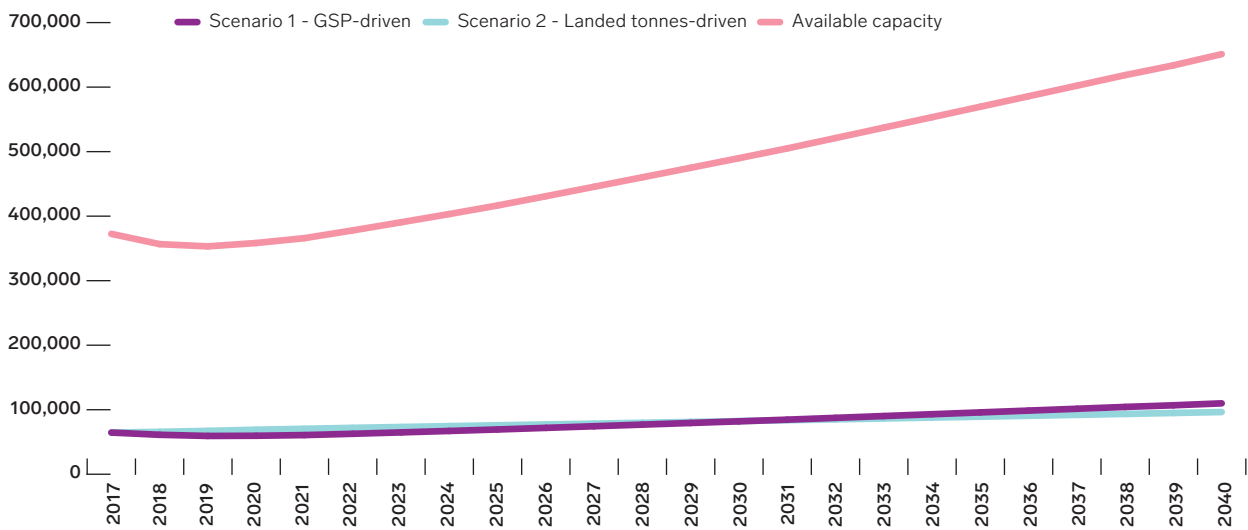


Figure 2-15 Forecast growth in domestic air freight 2017 to 2040

Source: PricewaterhouseCoopers

Forecasting identified three growth scenarios for international air freight between 2017 and 2040, as shown in Figure 2-14:

- The lower growth scenario was based on the elasticity driven model for air freight and Gross State Product (GSP). In this scenario, imports are expected to grow at 2.1 per cent and 3.2 per cent for exports, averaging growth to and from the airport at 2.8 per cent.
- The mid growth scenario assumes air freight will grow in line with new passenger services to existing major trade partners and new markets such as India. This scenario suggests imports could grow at 4.2 per cent and export growth at 3.8 per cent, with 4.0 per cent averaging growth.
- The upper growth scenario is driven by historical trends and GSP of key trade partners. In this scenario, imports are forecast to grow at 4.7 per cent with exports at 5.3 per cent averaging growth to and from the airport of 5.1 per cent. The strongest growth is expected from China and Hong Kong, which is projected to increase in market share from 17 per cent in 2017 to 35 per cent in 2040. Africa, Europe and Singapore are projected to see less growth based on recent trends. The key growth market for imports is expected to be India.

While analysis shows that there will continue to be surplus freight capacity on passenger services, some routes, such as Perth-Singapore, are likely to experience less spare freight capacity than other routes.

Domestic Air Freight

The number of dedicated air freight services is currently limited due to the existing spare cargo capacity on passenger services. Dedicated freighter aircraft predominantly operate to key domestic hubs such as Melbourne.

There is sufficient capacity for domestic air freight well into the future. In 2017, 64,000 tonnes of domestic air freight were taken as cargo on passenger services. In addition, there was 42,000 tonnes of air freight moved via dedicated freighters relating to mail and small parcel movements.

Forecasting for domestic air freight to 2040 has considered two scenarios – the first is Gross State Product driven and the second based on landed tonnes. Both models reached similar levels by the end of the forecast period, as shown in Figure 2-15.





Perth Airport



Section 3: **Land Use Planning**

The economic, social and lifestyle benefits enabled by Perth Airport's operation and development are achieved through careful land use planning.



3.1 Land Use Plan

The Perth Airport Land Use Plan balances the safeguarding of long-term airfield, terminal and aviation support land and operations with the development of the Perth Airport estate. This will incorporate the efficient use and development of non-aviation land for long term growth, which will also ensure an appropriate level of flexibility to respond to operational requirements, market developments and business expectations.

To support Western Australia's population and economic growth, additional infrastructure and air transport services need to be planned for and provided.

Perth Airport is designated as a 'Specialised Activity Centre' in State strategic planning documents. An Activity Centre is a focal point where activities such as commercial, higher density housing, entertainment, tourism, civic/community, higher education, and medical services are grouped together. Activity centres vary in size and diversity, are designed to be well-serviced by public transport and sit within a six-tiered hierarchy. Specialised Activity Centres focus on regionally significant economic or institutional activities that attract substantial numbers of people. They involve the clustering of complementary activities and key uses and can deliver additional economic benefits. Perth Airport understands it has a role to play as a Specialised Activity Centre, by attracting investment and stimulating infrastructure development that contributes to the growth of the economy. This is achieved by providing serviceable, well-connected land parcels for the establishment of businesses. This connectivity is soon to be enhanced by the delivery of the Forrestfield Airport Link project, which encompasses a train station on the estate (Airport Central) and two stations off the estate in close proximity (Redcliffe Station and Forrestfield Station). Development of the estate also drives employment opportunities in aviation and non-aviation sectors.

This Master Plan 2020 has adopted terminology consistent with the Western Australian planning system, and accordingly has use zones, land uses, and planning provisions derived from the Western Australian Government's Planning and Development (Local Planning Schemes) Regulations 2015.

The objectives of the Perth Airport Land Use Plan are to:

- ensure long-term aviation growth requirements are provided for,
- support the consolidation of all commercial air services to a central terminal precinct,
- bring land not required for long-term aviation services into productive use by facilitating land use and development in accordance with this Master Plan 2020,
- strengthen Perth Airport's position as a key Activity Centre by supporting economic development and creating employment in Western Australia,
- understand, and be able to respond to, the changing needs and wants of industry, business, consumers and visitors,
- protect the airport's 24-hour, seven day a week operations for the benefit of Western Australia,
- support land uses and zoning consistent with surrounding areas and uses complementary to aviation such as retail, transport, business/commercial and tourism, and
- encourage sustainable outcomes that create safe, attractive and connected places offering high amenity for visitors and the local workforce.

The Perth Airport estate comprises 2,105 hectares of land that includes:

- the airfield and terminals,
- aviation support and related commercial facilities,
- roads and infrastructure services,
- a range of industrial, business and commercial activities, and
- remnant vegetation and wetlands.

This Master Plan 2020 is consistent with the use of precincts and zones as previously detailed in the Master Plan 2014.



3.2 Precincts

The use of precincts in the Perth Airport Land Use Plan represents the high-level division of the airport estate for airport planning, development and identification.

Precincts have differing objectives and characteristics based on the following:

- communities of interest,
- contiguous land uses,
- access points and available transport, and
- interfaces with neighbouring land uses and communities.

The use of a precinct within the context of the airport estate can be compared to the concept of a suburb (or locality) within a Local Government area. At this high-level, precincts define the locational characteristic of a respective area but not the land uses or zones. This is similar to the way in which a suburb may contain a range of land uses. Each precinct therefore comprises land use zones.

The precincts and their respective primary purposes are identified in Table 3-1 and shown in Figure 3-1.

Precinct	Area (Hectares)	Description	Purpose	Vision
Airfield	759	Land required for runways, taxiways and associated aviation infrastructure now, and into the future.	To provide for and protect the ultimate aviation capacity of the airport.	Safe, secure and efficient operations 24 hours a day, seven days a week.
Airport Central	405	Terminal buildings and facilities required for passenger and ground transport, and commercial and retail development.	To provide consolidated and integrated passenger terminal and associated ground transport and commercial facilities that meet the changing needs of airline partners and other companies providing services in the precinct, and of the travelling public.	The airport's core, delivering the best customer experience in a convenient, unique and dynamic setting.
Airport North	363	Largely undeveloped vegetated area, except for the north-eastern corner containing industrial development.	To develop an integrated mix of industrial, logistics and related commercial land uses that maximise the precinct's strategic location and road and rail infrastructure.	The centre for global-reaching businesses and leading-edge smart technology industries.
Airport West	341	A growing key retail and commercial Activity Centre. Large areas of undeveloped commercially zoned land in the southern portion of the precinct.	To transition from providing aviation support and ground transport facilities to developing complementary non-aviation commercial developments including office, retail and bulky goods and education for the growing surrounding population.	The hub for showcasing Western Australia's leisure, health, knowledge and enterprise attractions.
Airport South	237	Largely developed precinct encompassing logistics and distribution land uses.	To provide for a range of aviation and non-aviation uses, with a focus towards accommodating logistics and distribution facilities.	An attractive and highly functional precinct offering diversity, amenity and quality transport links and infrastructure.

Table 3-1 Overview of airport precincts

Source: Perth Airport



Figure 3-1 Perth Airport Precincts
Source: Perth Airport

3.2.1 Airfield Precinct

The Airfield Precinct comprises all infrastructure required for the current and future movement of aircraft, including runways, taxiways, facilities for navigation aids and, aviation fire-fighting and rescue services and covers approximately 759 hectares. There is sufficient land in the precinct to accommodate all required aircraft movement infrastructure for the long-term configuration of Perth Airport. This includes the planned extensions of the main runway (03L/21R) and the cross runway (06/24), and the construction of the new runway (03R/21L), as detailed in Section 4.

This precinct will continue to be used and developed to support the required aviation activities and facilities integral to the day-to-day operations of Perth Airport.

The undeveloped areas of the precinct comprise a mixture of vegetation types and conditions. Approximately 25 per cent of the Airfield Precinct is vegetated, totalling approximately 182 hectares. The vegetation condition ranges from degraded in some areas to excellent in others. Vegetation type in the northern portion of the precinct differs significantly to that in the south, mainly due to variable soil conditions.

The south of the precinct supports two Commonwealth listed flora species; *Conospermum undulatum* and *Macathuria keigheryi*, in addition to three State listed species, and approximately 52 hectares of the Commonwealth listed Banksia Woodlands of Swan Coastal Plain threatened ecological community.

Also occupying an area within the precinct is Munday Swamp, listed on the State Department of Planning, Lands and Heritage's register of Aboriginal Heritage Sites for its archaeological and ethnographic importance to the Noongar people. Munday Swamp totals approximately 20 hectares, approximately one hectare of which is open water. Munday Swamp supports diverse vegetation, invertebrate and vertebrate fauna, and is listed on the Commonwealth Directory of Important Wetlands.

The planned new runway will impact the southern portion of Munday Swamp (Perth Airport is and will continue to attempt to minimise these impacts during detailed design and construction) and is subject to Ministerial approval of the new runway Major Development Plan (MDP). Recognising the importance of Munday Swamp to the Noongar community, the design of the new runway was significantly amended in the Perth Airport Master Plan 1999 and adjustments made to the design of taxiways, boundary and security fences, roads and drainage infrastructure to further minimise the impacts to the area. In May 2018, Perth Airport received approval under Section 18(2) of the *Aboriginal Heritage Act 1972 (WA)* to use the land to develop, maintain and operate the new runway. Subsequent to this, an application was made by South West Aboriginal Land and Sea Council (SWLASC) under Section 10 of the Aboriginal Torres Strait Islander Heritage Protection Act (ATSIHP Act). While this application falls outside the scope of the new runway MDP, a Ministerial decision may be required prior to MDP approval.

3.2.2 Airport Central Precinct

The Airport Central Precinct comprises:

- terminal facilities,
- aviation support facilities including aircraft refuelling, maintenance and catering,
- aprons for aircraft parking,
- the air traffic control tower,
- freight handling,
- ground transport interfaces and road accessways, car parking (staff, short-term and long-term), ground transport systems, car rental facilities and taxi, bus, ride share and small charter vehicle access facilities,
- supporting services and utilities, including waste and central energy plant facilities, and
- commercial developments including retail and office accommodation.

The precinct, which totals approximately 405 hectares, provides sufficient land to accommodate the consolidation of all commercial air services into new facilities around the site of the existing Terminal 1 International, Terminal 1 Domestic and Terminal 2, and the envisaged ultimate configuration of Perth Airport. This includes the development of the new terminal within the planning period of this Master Plan 2020.

Airport Central includes the future development, expansion and enhancement of existing and new terminal buildings and associated facilities. Future use and development within the precinct will ensure provision of essential passenger services in accordance with forecast demand.

Planning for the precinct includes the following future facilities:

- international terminal expansion and new terminal,
- new aprons for aircraft parking,
- terminal forecourt roads for passenger drop-off/pick-up and associated access roads,
- Multi-Modal Transport Interchange facilities (including multi-storey car parks), incorporating drop-off and pick-up areas on multiple levels,
- ground transport systems including:
 - the planned provision of the Forrestfield-Airport Link rail project and Airport Central Station, and
 - a future automated mass transit system,
- additional commercial development including offices, retail and hotel accommodation,
- office accommodation for airline partners, airport administration, international air freight operations, and
- fuel storage facilities.

Contained within the south-west portion of the precinct is approximately 32 hectares of remnant bushland, of which 27 hectares is the Commonwealth-listed Banksia Woodland of the Swan Coastal Plain threatened ecological community. Vegetation condition within this area ranges from excellent to completely degraded. An occurrence of the Commonwealth and State listed flora species *Macathuria keigheryi* is also present.

3.2.3 Airport North Precinct

The Airport North Precinct, comprising approximately 363 hectares, will predominantly be developed for an integrated mix of industrial, commercial, aviation service and logistics land uses, representing an opportunity for a fuel storage facility and a major metropolitan intermodal facility servicing both airport needs and the needs of the wider Perth metropolitan area. This precinct will take advantage of the large flat sites that are available, and the potential for major road and rail freight access. The precinct also presents an opportunity for aviation related development, with direct apron frontage available from some sites.

Located within the precinct is approximately 139 hectares of remnant bushland, of which 41 hectares is the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain threatened ecological community. Vegetation condition ranges from degraded to excellent.

The Airport North Precinct comprises five known Aboriginal heritage sites that meet the criteria of a 'Site' under section 5 of the AHA. A sixth site intersects the Airport North Precinct. Due to cultural sensitivities the boundary of the site is a 'dithered' boundary intended to mask the actual boundary of the site. The DPLH has confirmed the area that intersects the Airport North Precinct is not the actual boundary of the site. Further detail is provided in Section 9.15.

Planning undertaken for this precinct proposes to retain certain areas containing high environmental and heritage values.

3.2.4 Airport West Precinct

The Airport West Precinct, comprising 341 hectares, will transition in use during the period of this Master Plan 2020. As large-scale regular passenger transport services and associated aviation support facilities transition into the Airport Central Precinct, other than those areas required for general aviation, it is envisaged that the remainder of the precinct will continue to be developed with office, education, hospitality, well-being, retail and bulky goods developments. The scale of these developments will be commensurate with a Neighbourhood Centre, as defined under the State Planning Policy 4.2 Activity Centres for Perth and Peel. Retail development in Airport West may require the production of a retail sustainability assessment.

The future Redcliffe Train Station, located off estate immediately abutting this precinct, is due for completion in 2021 and will support land use opportunities within the precinct to pursue development that provides goods, services and amenity for travellers, the future increased nearby residential population, the wider growing population of Perth and the growing employee base on the estate. As outlined in Section 2.6.1, the City of Belmont is progressing planning for DA6, which encompasses Redcliffe Station. Perth Airport's development of Airport West land centred around the train station will complement the City of Belmont's planning for DA6 and strive to deliver a transit orientated development in line with the State Government's METRONET programme and may include complementary land uses such as medical services, and education and training.

Within the southern portion of the precinct, there is approximately 52 hectares of remnant bushland covering approximately 15 per cent of the Airport West Precinct. Of this, 8 hectares is the Commonwealth listed Banksia Woodlands of the Swan Coastal Plain threatened ecological community. The vegetation condition within this precinct ranges from completely degraded to very good. The precinct supports one State listed flora species.

Within the Airport West Precinct, the ongoing needs of the general aviation sector will be accommodated. Between 2009 and 2014, the level of activity in the general aviation area increased significantly due to increased FIFO demand. The largest aircraft types operating from the General Aviation Area, and the volume of passengers in peak periods, are not consistent with the intended use when the General Aviation Area was established. It is also not consistent with the development plans that Perth Airport is implementing, which are based on high volume passenger services operating from suitable infrastructure in Airport Central. Not only are Perth Airport's development plans based on this premise, the State Government's arterial road network plans (including the Gateway WA road project and Forrestfield-Airport Link) are also predicated on this assumption. As such there is no requirement for significant terminal or passenger processing facilities in the General Aviation Area beyond that necessary to support small scale regional and charter movements. Perth Airport will continue working with general aviation operators looking to transition new operations that are not suitable for this area into existing and future common use terminals.

Following the relocation of Qantas operations to the Airport Central Precinct by the end of 2025, Terminal 3 and 4 buildings will be discontinued. The redundant terminal buildings will be demolished as they have reached the end of their useful life. The future use of the sites will be considered within the period of this Master Plan 2020.

3.2.5 Airport South Precinct

The Airport South Precinct is a highly functional precinct offering diversity, amenity and quality transport links and infrastructure.

The precinct covers approximately 237 hectares and will continue to be developed to provide a range of aviation and non-aviation uses, with a focus on logistics, freight and distribution facilities and light industrial.

Contained within the central portion of the precinct is approximately 30 hectares of remnant bushland covering approximately 13 per cent of Airport South. Nearly two hectares is the Commonwealth listed Banksia Woodlands of the Swan Coastal Plain threatened ecological community. Vegetation condition ranges from completely degraded to excellent condition. This area supports a small sub-population of the Commonwealth listed flora species *Macathuria keigheryi*, in addition to two State listed species.

3.3 Land Use Zones

The five precincts described in this Land Use Plan contain the following land use zones:

- Airfield Zone,
- Terminal Zone,
- Airport Services Zone,
- Commercial Zone, and
- Mixed Use Zone.

In accordance with Section 71(2)(c) of the Airports Act and Regulation 5.02(1) of the Airports Regulations 1997, the land uses for each of the zones identified have generally been based on those land uses included in the Western Australian State Government's Planning and Development (Local Planning Schemes) Regulations 2015, with additional uses included that are specific to Perth Airport; for example, aviation activity and aviation support facilities. Perth Airport will apply these land uses and interpret all definitions as required for the operation and development of Perth Airport. The land use tables detailed below identify discretionary uses and as such, for operational and development purposes, Perth Airport may consider the listed land use at its discretion.

Perth Airport is committed to working closely with the State Government and the adjoining Local Governments around the estate to minimise conflict and inappropriate developments.

3.3.1 Airfield Zone

The Airfield Zone is shown in Figure 3-2 and has the objectives and discretionary land uses shown in Table 3-2.

Airfield Zone Objectives

- To provide for safe, secure and efficient airfield operations 24 hours a day, seven days a week, including aircraft take-off, landing and taxiing
 - To accommodate provision of facilities that support safe and efficient airfield operations, such as aviation fire and rescue services and aircraft navigational aids
 - To enable future expansion of the airport's operations, including additional runways, taxiways and associated aviation facilities
 - To support the consolidation of all commercial air services in a central terminal precinct
-

Discretionary Uses

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Animal establishment • Aviation activity • Aviation support facilities • Car park • Helipad • Heliport • Industry – light* | <ul style="list-style-type: none"> • Industry – service* • Motor vehicle, boat or caravan sales/hire* • Navigational aids • Power plant • Recreation - Public • Telecommunications • Utilities and infrastructure • Warehouse* |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
-

Table 3-2 Airfield Zone objectives and uses

Note: *Interim uses as discussed in Section 3.3.5.

Source: Perth Airport

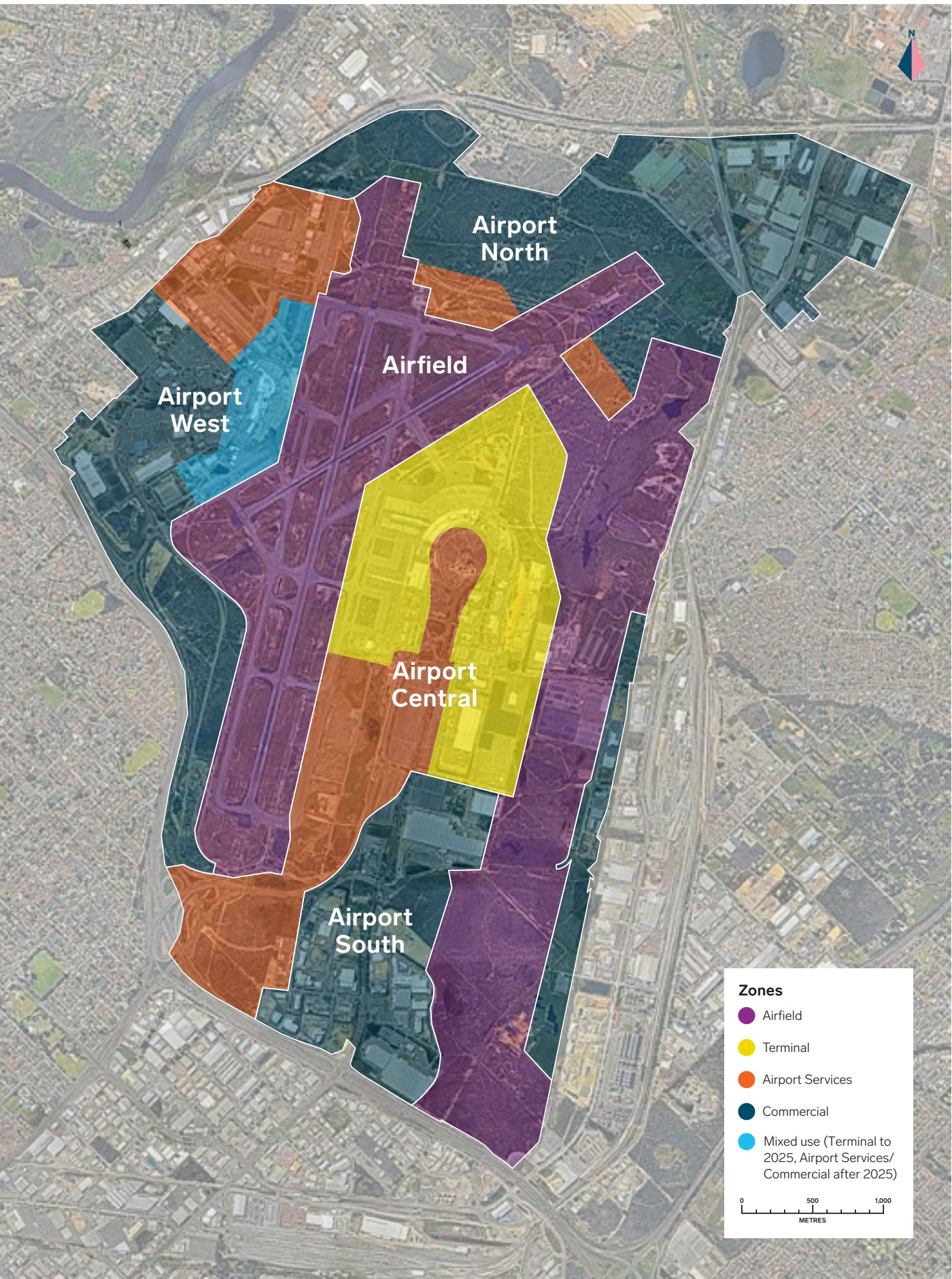


Figure 3-2 Perth Airport Land Use Plan
Source: Perth Airport

3.3.2 Terminal Zone

The Terminal Zone is shown in Figure 3-2 and has the objectives and discretionary land uses shown in Table 3-3.

Terminal Zone Objectives

- To provide for the operation, use and development of land for passenger and baggage processing and aircraft aprons, terminal and ground transport interfaces, enabling the airport facilities to operate safely, securely, efficiently and cost-effectively
- To provide quality facilities for airline partners and passengers, including efficient terminal facilities with adequately located and sized commercial areas
- To provide terminal facilities with ample commercial and retail uses
- To provide for flexible expansion of passenger terminal facilities and aircraft aprons to meet forecast demand
- To provide for appropriate freight and logistics land uses utilising the airside-landside interface

Discretionary Uses

- | | |
|--------------------------------------|-----------------------------------|
| • Art gallery | • Motor vehicle repair |
| • Automotive charging station | • Navigational aids |
| • Aviation activity | • Office |
| • Aviation support facilities | • Passenger terminal [^] |
| • Brewery | • Place of worship |
| • Car park | • Power plant |
| • Child care premises | • Reception centre |
| • Consulting rooms | • Restaurant/cafe |
| • Convenience store | • Service station |
| • Corrective Institution | • Shop |
| • Education establishment (training) | • Small bar |
| • Exhibition centre | • Telecommunications |
| • Fast food/take away | • Tourist development |
| • Hotel | • Utilities and infrastructure |
| • Medical centre | • Warehouse [*] |

Table 3-3 Terminal Zone objectives and uses

Source: Perth Airport

Note: * Interim uses as discussed in Section 3.3.5.

[^] No new development or extension to this land use permitted within the Airport West Precinct

3.3.3 Airport Services Zone

The Airport Services Zone is shown in Figure 3-2 and has the objectives and discretionary land uses shown in Table 3-4.

Airport Services Zone Objectives

- To provide a range of aviation support activities, services and facilities for use by airline partners, passengers, government agencies, freight businesses and transport providers
- To provide integrated car parking, hotel accommodation, commercial and retail uses that support the airport
- To provide an attractive and functional gateway to the airport
- To provide freight and logistics land use opportunities in appropriate locations
- To provide ground transport facilities and services for efficient access to the airport and terminals

Discretionary Uses

- | | |
|-------------------------------------------|---------------------------------------------|
| • Animal establishment | • Industry |
| • Automotive charging station | • Motel |
| • Aviation activity | • Motor vehicle repair |
| • Aviation support facilities | • Motor vehicle, boat or caravan sales/hire |
| • Car park | • Motor vehicle wash |
| • Child care premises | • Navigational aids |
| • Consulting rooms | • Office |
| • Convenience store | • Passenger terminal [^] |
| • Corrective institution | • Service station |
| • Education establishment (training) | • Serviced apartments |
| • Fast food/take away | • Shop |
| • Fuel depot | • Small bar |
| • Medical centre | • Telecommunications |
| • General aviation and support facilities | • Tourist development |
| • Health centre | • Transport depot |
| • Hostel | • Utilities and infrastructure |
| • Hotel | • Warehouse |

Table 3-4 Airport Services Zone objectives and uses

Note: [^] No new development or extension to this land use permitted within the Airport West Precinct

3.3.4 Commercial Zone

Commercial Zone is shown in Figure 3-2 and has the objectives and discretionary land uses shown in Table 3-5.

Commercial Zone Objectives

- Facilitate land use and development in line with the characteristics of a 'Specialised Activity Centre' and encourage a mix of uses and intense development around the Redcliffe train station
- Deliver a diversity of appropriate land uses to make best use of land, facilities and services and to provide a suitable interface between the airport boundary and the surrounding areas
- Create through good urban design an attractive, walkable, safe and balanced built form and natural environment
- To provide a focus for industry, business and employment generating development opportunities
- To promote environmentally sustainable design and development outcomes

Discretionary Uses

- | | |
|----------------------------------------|---------------------------------------------|
| • Abattoir [^] | • Industry – service |
| • Agriculture - intensive [^] | • Liquor store (large) |
| • Animal establishment [^] | • Logistics centre |
| • Art gallery | • Market |
| • Auction mart | • Medical centre |
| • Automotive charging station | • Motel |
| • Aviation support facilities | • Motor vehicle repair [^] |
| • Brewery | • Motor vehicle wash |
| • Bulky goods/retail showroom | • Motor vehicle, boat or caravan sales/hire |
| • Car park | • Office |
| • Child care premises | • Place of worship |
| • Cinema/theatre | • Power plant [^] |
| • Club premises | • Reception centre |
| • Community purpose | • Recreation - public |
| • Consulting rooms | • Recreation – private |
| • Convenience store | • Resource recovery centre [^] |
| • Corrective institution [^] | • Restaurant/cafe |
| • Dog kennels [^] | • Service station |
| • Education establishment (training) | • Serviced apartments |
| • Education establishment (university) | • Shop |
| • Equipment hire | • Shopping centre |
| • Exhibition centre | • Small bar |
| • Fast food/take away | • Tavern |
| • Fuel depot [^] | • Telecommunications |
| • Funeral parlour | • Tourist development |
| • Garden centre | • Trade display |
| • Health centre | • Transport depot [^] |
| • Health studio (gym) | • Utilities and infrastructure |
| • Hospital | • Veterinary centre |
| • Hostel | • Warehouse [^] |
| • Hotel | • Waste storage facility [^] |
| • Industry – light [^] | |

Table 3-5 Commercial Zone objectives and uses

Source: Perth Airport

Note: [^] land uses to be minimised within the immediate pedestrian environment surrounding Redcliffe Train Station

Within the Commercial Zone, permitted uses for the adjoining Airport Services Zone, Terminal Zone and Airfield Zone which are not identified in the above list of Commercial Zone uses may be considered if required for airport operations.

3.3.5 Interim Use and Development of Airfield, Terminal and Airport Services Zones

It is unlikely that the ultimate development of Perth Airport will occur within the statutory 20-year planning period of this Master Plan 2020. In the interim, land in the Airfield, Terminal and Airport Services Zones across all precincts may be used and developed for non-aviation uses that are consistent with uses permitted in adjacent precincts.

Commercial arrangements for the use of this land will ensure such uses will not impact on, or limit future expansion of aeronautical operations, and the intended interim uses will be consistent with the objectives of this Master Plan 2020.

In instances where interim commercial uses are planned on land that may be required for aviation services in the long-term, appropriate break clauses will be incorporated in leases and only relatively low capital intensity uses will be undertaken.

3.3.6 Consistency with State and Local Planning Framework

Part 5.02(2) of the Airports Regulations 1997 requires that 'an airport master plan must, in relation to the landside part of the airport, where possible describe proposals for land use and related planning, zoning or developments in an amount of detail equivalent to that required by, and using terminology (including definitions) consistent with that applying in, land use planning zoning and development legislation in force in the State or Territory in which the airport is located.'

In this regard, where possible, the land use zones in the Perth Airport Land Use Plan have been developed using terminology consistent with that of the Western Australian State Planning and Development (Local Planning Schemes) Regulations 2015 and the three adjoining local planning schemes of the City of Belmont, City of Swan and City of Kalamunda. The Perth Airport Land Use Plan complements the planning frameworks of City of Belmont, City of Swan and City of Kalamunda by providing additional economic and employment opportunities for growing residential populations within the adjoining Local Government Areas.

3.4 Sensitive Developments

Section 71A of the Airports Act requires a master plan to identify any proposed 'sensitive developments.' A sensitive development is defined as development or redevelopment that increases the capacity of the following:

- residential dwelling,
- community care facility,
- pre-school,
- primary, secondary, tertiary or other education institution, or
- hospital.

A sensitive development does not include the following:

- an aviation education facility,
- accommodation for students studying at an aviation education facility at the airport,
- a facility with the primary purpose of providing emergency medical treatment and which does not have in-patient facilities, or
- a facility with the primary purpose of providing in-house training to staff of an organisation conducting operations at the airport.

Sensitive developments are not permitted at Commonwealth leased airports except in exceptional circumstances and require an airport to apply to the Commonwealth Minister for approval to prepare a Draft Major Development Plan (MDP) for the proposed development. The Minister may approve the preparation of the Draft MDP only when satisfied that there are exceptional circumstances that supports its preparation.

There are two future land uses proposed in this Master Plan 2020 which are sensitive developments: 'Education' and 'Hospital'. No specific site has been identified for either land use, however, the wider Airport West precinct is seen as a preferable location. Both Hospital and Education are high trip generating uses that require both private and public transport access, as well as large land parcels with adequate infrastructure in close proximity to populated areas. Perth Airport is already well serviced by major arterial roads for car and public bus access, and in 2021 will be serviced by rail through the Forrestfield-Airport Link project. The suitable large land parcels available at Perth Airport are not easily found elsewhere in the metropolitan area, offering the potential for the two land uses to be co-located in the form of a tertiary hospital. The nearby, growing resident population within the City of Belmont's Development Area 6 (DA6) and the wider Redcliffe area will benefit from access to employment opportunities and services within a walkable catchment. Additionally, there are suitable locations within Airport West which are either completely outside of the current aircraft noise contours or are located within the lowest contour. Under State planning policy the development of these sensitive land uses within the lowest contour is conditionally acceptable, meaning it can be permitted subject to compliance with certain design criteria.

Education and Hospital land uses are aligned with both Local and State Government strategic documents which plan for the future of the eastern suburbs of metropolitan Perth. Perth Airport has liaised with the City of Belmont and received their 'in principle' support for the inclusion of these sensitive land uses in the Master Plan.

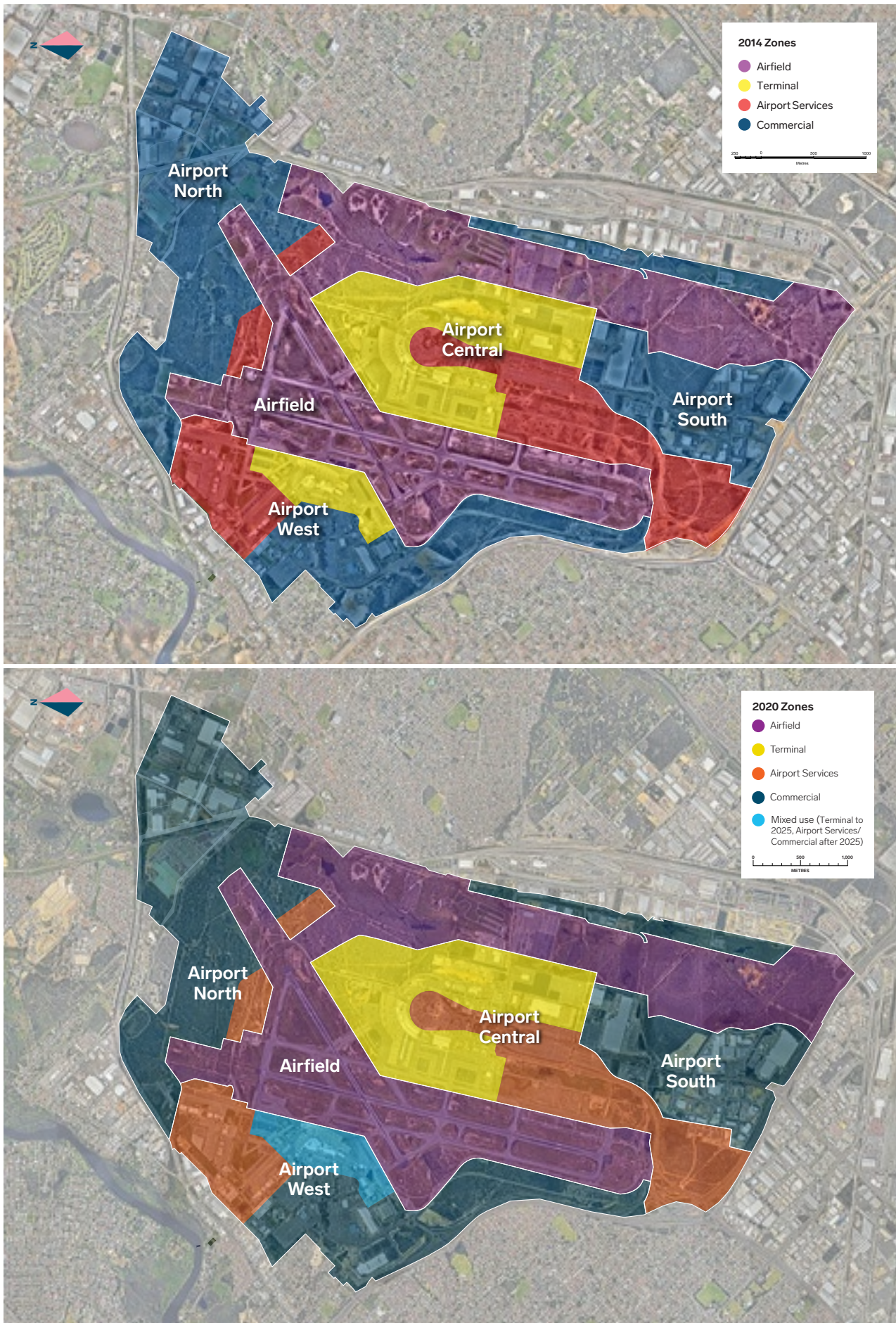


Figure 3-3 Comparison of the Perth Airport Master Plan 2014 and Master Plan 2020 Land Use Plans
 Source: Perth Airport

3.5 Changes from Master Plan 2014

The Perth Airport Land Use Plan contained within this Master Plan 2020 has remained consistent with the land-use plan as shown in the Master Plan 2014. Minor changes have been made with respect to the inclusion of additional land uses (including sensitive land uses) in each of the four zones as detailed in Section 3.5.1.

Noting the intention to consolidate all commercial air services to Airport Central by 2025, planning for the future use of Terminal 3, Terminal 4 and surrounds in Airport West will be considered within the period of this Master Plan 2020. As shown in Figure 3-3, the area comprising Terminal 3 and Terminal 4, zoned as 'Terminal' use in Master Plan 2014, has changed in this Master Plan 2020 to a Mixed Use zone. The 'Mixed Use' Zone is a transitional zone which until 2025 will remain zoned as 'Terminal' and be subject to planning control and land uses as outlined in Section 3.3.2. Post consolidation of Qantas to Airport Central, the Mixed Use will transition to a combination of the Commercial and Airport Services zones, and the planning controls and land uses outlined in sections 3.3.3 and 3.3.4. Having reached the end of their useful life in 2025, the redundant terminal buildings will be demolished. The objective of the Mixed Use zone is to provide a flexible planning framework. The future planning for this area is outlined in further detail in Section 5.

3.5.1 Commercial Zone Changes

A number of new land uses have been incorporated into the Commercial Zone to:

- reflect what already exists on the airport estate,
- provide consistency with terminology used in State and Local Government planning documents,
- use the airport's strategic location and Activity Centre status to provide services and amenity for nearby communities and visitors to the estate, and
- leverage off existing and future physical infrastructure to provide economic opportunities.

Some of the new land uses are also included in the other zones (Airfield, Terminal and Airport Services) as detailed in Section 3.3.

3.6 Pre-existing Interests at the Perth Airport Estate

There are a number of pre-existing interests that provide for access and use of land within the airport estate by external parties. These are in the form of licences, leases and easements over the airport estate which existed when the operation and management of Perth Airport was transferred from the Commonwealth to Westralia Airports Corporation on 2 July 1997.

Since the Master Plan 2014, some leases have expired or vacated, and a number have been renegotiated and new leases entered into with Perth Airport. The majority are commercial interests or Government authorities, which provide services for purposes related to international airport activities. Others include utilities that pass through the airport estate, or into the airport estate, such as aviation fuel. The gas mains, the water main and the Telstra fibre optic route are major assets which provide services of economic importance to Western Australia.

Future developments on the airport estate will recognise the existence of these interests and Perth Airport will liaise with the owners and operators of these services to ensure their relevant needs are addressed as development occurs. Perth Airport will also protect the rights of those parties as provided for in the leases and licences and abide by the relevant regulations and legislation in relation to the easements.





Section 4: **Aviation Development**

Perth Airport is working toward delivering the long-held vision of a single centralised airport precinct to provide a seamless travel experience and greater convenience for all.



It is vital to the continuing prosperity of Australia and the State that Perth Airport preserves and enhances its capacity to grow commercial aviation services.

4.1 Introduction

The Aviation Development Plan includes runways, taxiways, aircraft parking areas, navigation infrastructure and terminal facilities. The plan takes into consideration:

- maximising airport and airspace capacity in the ultimate airfield configuration,
- ensuring aircraft movements between runways and terminals deliver the most efficient taxiing, lowest fuel burn and therefore the lowest environmental impact and costs,
- all aircraft types up to the largest passenger aircraft (currently the Airbus A380),
- airline partner requirements to meet their business needs,
- customer experience and amenity, and
- the environmental and Aboriginal heritage values across the Perth Airport estate.

Aircraft movements reached a peak of 151,335 in 2013, at the height of the resource sector construction period. In 2018, there were 129,931 movements. Growth forecasts predict that aircraft movements will reach the 2013 peak again by 2025.

The significant investments in both the airfield and new terminal facilities over the past five years are detailed in Section 1. The privately funded \$1 billion investment program included the opening of Terminal 2 (T2) in 2013, substantial improvements to Terminal 1 (T1) International, and the construction of the new T1 Domestic pier in 2015.

Perth Airport is planning for a further \$2.5 billion investment program over the next decade that includes the following key projects, which are subject to Major Development Plans and the associated community consultation and Commonwealth approval:

- expansion of international facilities via staged international terminal upgrades,
- construction of a new terminal in the Airport Central Precinct for the Qantas Group relocation,
- construction of Multi-Modal Transport Interchange facilities, and
- construction of a new parallel runway and associated taxiway system.

4.2 Existing Airfield Configuration

The existing airfield layout, shown in Figure 4-1, consists of two intersecting runways, associated taxiways and apron areas. The main runway (03/21), with an orientation running north-south, is currently 3,444 metres long and 45 metres wide. The runway is a flexible pavement, grooved runway and is contained within a 300-metre-wide runway strip.

The cross runway (06/24), with an orientation running northeast-southeast, is currently 2,163 metres long and 45 metres wide, contained within a 300-metre-wide runway strip.

The runway system is supported by a network of taxiways which provide access from the runways to the various passenger terminals.



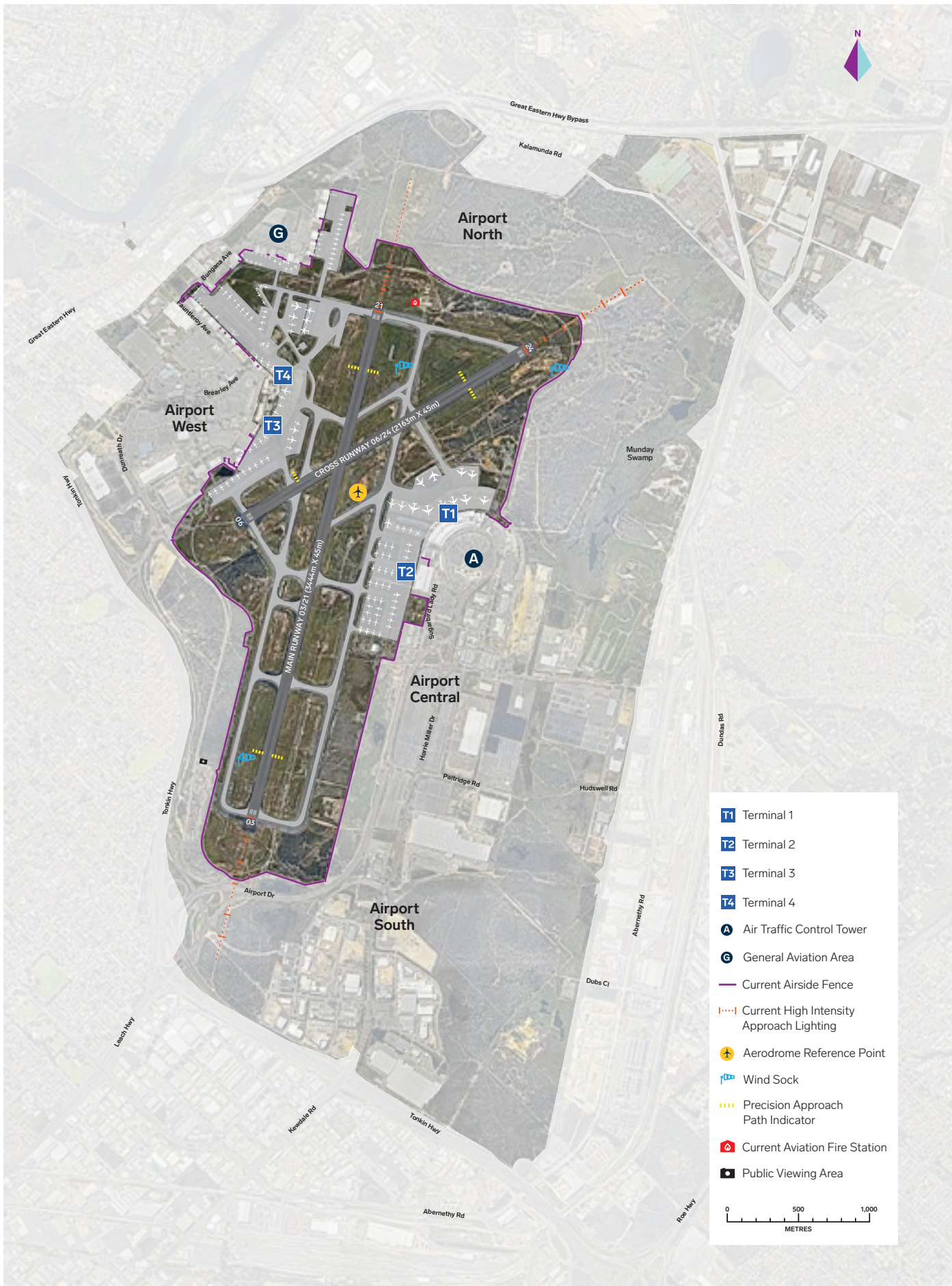


Figure 4-1 Existing Aviation development layout (2018)
 Source: Perth Airport

4.3 Runway Use

Both ends of a runway can be used for arrivals and departures. The direction being used is referred to as the operating or duty runway. An operating mode is the use of a certain runway or a combination of runways and the mode selected is based on a number of factors and selection criteria. Arriving aircraft from the north and departures to the south is referred to as the South Flow while arrivals from the south and departures to the north is referred to the North Flow. While single runway operations can occur for all runway directions (03, 06, 21, or 24), the current runway modes that achieve maximum capacity are shown in Figure 4-2 and comprise:

- arrivals on Runway 03; and departures on Runway 03 and 06, and
- arrivals on Runway 21 and 24; and departures on Runway 21.

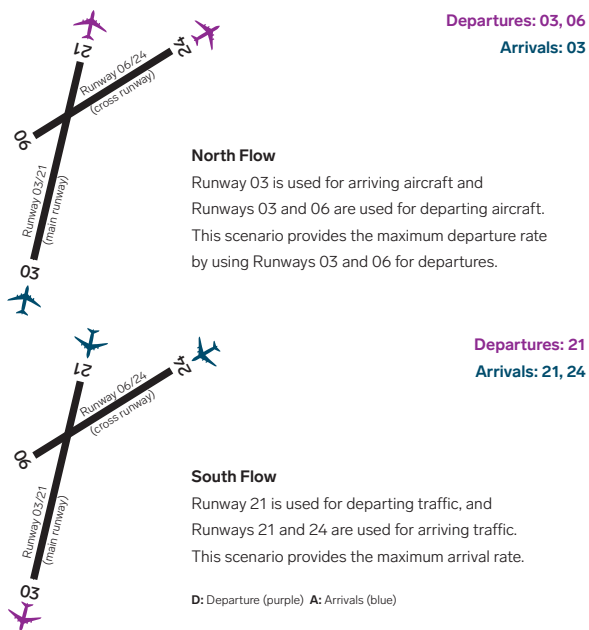


Figure 4-2 Existing runway modes
Source: Perth Airport

The selection of a runway to be used for aircraft arrivals or departures is based on many considerations including the weather, local airspace and traffic demand, and to allow runway maintenance to occur at times.

The runway selection also takes into consideration the requirement for aircraft to depart or arrive during peak periods. Due to the nature of the demand at Perth Airport, currently Tuesdays, Wednesdays and Thursdays are the busiest days with less demand experienced on Mondays and Fridays. Weekend movement figures are approximately half that of the mid-week peak days.

Noise abatement procedures (NAPs) are designed to reduce the impact of aircraft noise on the community. They include procedures for runway use and flight paths to reduce flights over residential areas. NAPs are implemented by Air Traffic Control, but their use is not mandatory and is subject to weather conditions and aircraft requirements. The current NAPs for Perth Airport are available at www.airservicesaustralia.com. Airservices Australia (Airservices) conduct regular reviews to check the effectiveness of NAPs and to seek improvements.

The NAPs have formed the basis for Perth Airport's runway usage since the 1980s. The NAPs were reviewed by Airservices and updated in 2016. The update simplified the preferred runways while maintaining a lower preference for movements to the south west. The NAPs allocate departures to, and arrivals from, the south-southwest (on runway 06/24) as the least preferred and are minimised as there are densely populated suburbs located southwest of Perth Airport with the runway end located 960 metres from residential areas in Redcliffe and Cloverdale. Therefore, the cross runway (06/24) is predominantly used for departures to the north and northeast on Runway 06; and for arrivals from the north and northeast on Runway 24.

The cross runway (06/24) is used for departures to, or arrivals from, the south and southwest, overflying the more densely populated areas of Belmont, Rivervale and Redcliffe in strong crosswind conditions or when runway maintenance works are being completed on the main runway (03/21).



4.3.1 Airfield Capacity Enhancement

Since 2012, Perth Airport has been working with Airservices to support the Airport Capacity Enhancement (ACE) program. The primary objective of ACE is to make the best use of the existing infrastructure to maximise operational efficiency, by improvements to the processes and practices of air traffic controllers, airport operators and airline partners.

The ACE program has helped to address capacity issues and meet industry challenges by managing the efficiency and impact of air traffic at Perth Airport. ACE focuses on three main themes:

- **Harmonisation:** The steps taken to increase efficiency needed to be in harmony with current Australian standards and practices, while providing sufficient room for the development of local procedures,
- **Collaboration:** Every movement matters and every second counts. Over many aircraft movements, the seconds add up to create additional capacity that in turn can reduce delays. The benefits are shared by all and can be achieved collaboratively, and
- **Performance management:** Performance must be monitored and measured to tactically manage improvement in Air Traffic Control and pilot performance. By measuring performance, new methods can be assessed and refined.

The ACE study identified several opportunities to enhance the existing airfield and airspace capacity and performance under the three main themes. Based on the three themes, 28 initiatives were considered and as of March 2019:

- 21 were closed or completed,
- five were underway, and
- two were ongoing.

Perth Airport was responsible for assessing and delivering seven of the 28 recommendations. These were:

- introduction of a schedule coordination system in 2013 where airlines apply for a slot to ensure that demand does not exceed capacity in peak hours,
- improved taxiway layout to allow more efficient movement of aircraft, with an extension to taxiway Charlie completed in June 2015,
- amended surface and airborne traffic flows as a result of the opening of T2 in March 2013 and the opening of the T1 Domestic pier in November 2015, to ensure efficiency is maintained,
- address airfield-chokepoints including assessing the taxiway layout to improve effectiveness and support optimum traffic flows,
- consideration of a dedicated helicopter aiming point (which was subsequently determined not to be required),
- provision of dual full-length runway entry points to optimise departures, and
- consideration of construction of Rapid Exit Taxiways (RETs) to assist in reducing runway occupancy time.



4.4 Need for Additional Runway Infrastructure

Perth Airport's existing runways continue to reach capacity during peak periods, resulting in delays to flights and disruption to travellers.

While the ACE initiative has delivered airfield and airspace efficiencies and contributed to a significant reduction in delays and congestion at peak times, it is not a solution to the fundamental issue of demand exceeding capacity at certain times of the day.

Due to the nature of the resource sector's fly-in fly-out workforce deployment, Perth Airport experiences significant peak periods of departures and arrivals demand, with approximately 85 per cent of Perth Airport's aircraft movements in the morning peak being departures and only 15 per cent arrivals. The fly-in fly-out

workforce is aircraft movement intensive, causing significant movement peaks throughout the day, as resource sector companies require their services to operate in narrow windows to meet shift change rotations. As a result, in preparation for the significant number of morning departures, there could be as many as 90 RPT, charter and general aviation aircraft parked overnight at Perth Airport.

As a result of the departure waves that feed the resource sector in midweek mornings, there are also large arrival waves which build when those aircraft return to Perth and combine with arriving interstate and international services. These arrival peaks are spread over a wider period than the departure peaks, as current airfield and airspace capacity permits fewer arrivals per hour than departures.

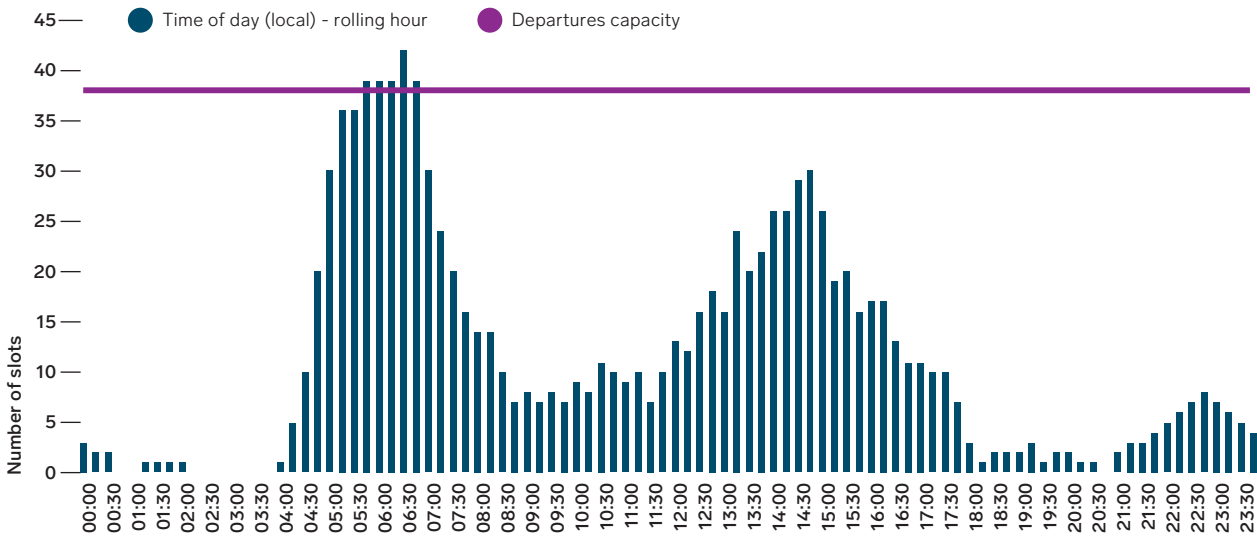


Figure 4-3 Wednesday departures slot demand – winter season 2013
Source: Airport Coordination Australia

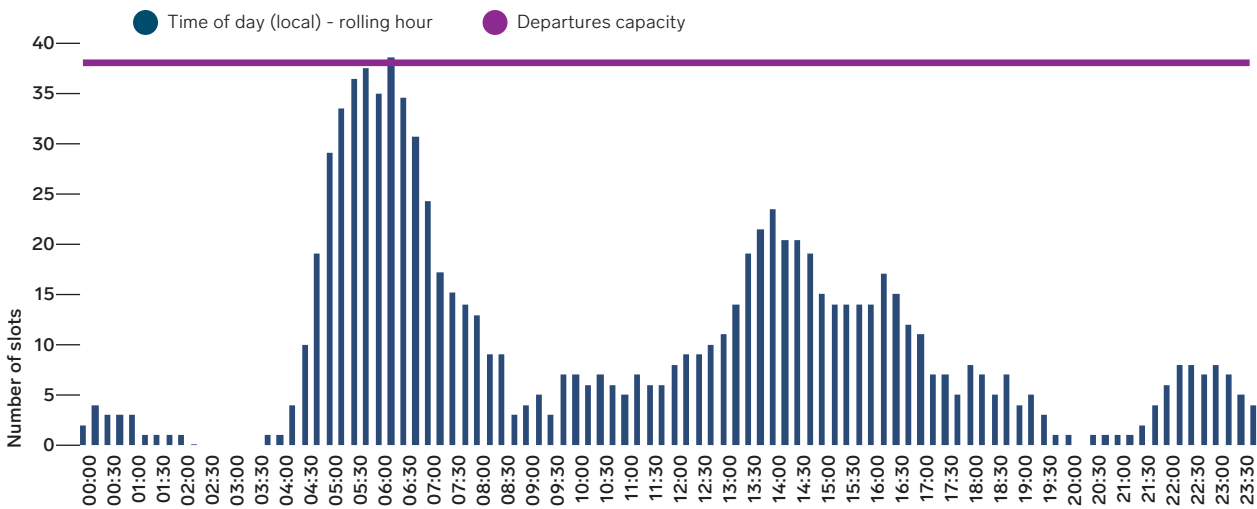


Figure 4-4 Wednesday departures slot demand – winter season 2018
Source: Airport Coordination Australia

While traffic levels have reduced in recent years, this impact is still being felt by intrastate, interstate and international airlines, and there remains evidence that, if the capacity existed, airline partners would prefer to schedule more services in peak periods. Aircraft movements are forecast to return to 2013 levels by around 2025.

Figure 4-3 and Figure 4-4 shows the 2013 and 2018 winter season departures slot demand for Wednesday, which is typically the busiest day of the week. A comparison of the figures shows demand exceeding capacity, in peak periods, even at lower traffic levels. The demand for arrivals slot filings in 2013 and 2018 also exceeded capacity in peak periods as shown in Figure 4-5 and Figure 4-6. When the departures and arrivals demands are combined it is evident that demand continues to exceed capacity during peak periods of the day, as shown in Figure 4-7 and Figure 4-8.

To prevent unacceptable delays in aircraft operations, provide for the increasing demand and to support economic growth in Western Australia, a major expansion of airfield capacity is needed, subject to Commonwealth approval under the *Airports Act 1996* and *Environmental Protection and Biodiversity Conservation Act 1999*. The only meaningful way airfield capacity expansion can be achieved is with the development of a parallel runway system through the construction of the new runway. Perth Airport has identified that, to meet future capacity demand, the new runway will be needed between 2023 and 2032, subject to actual demand and approval.

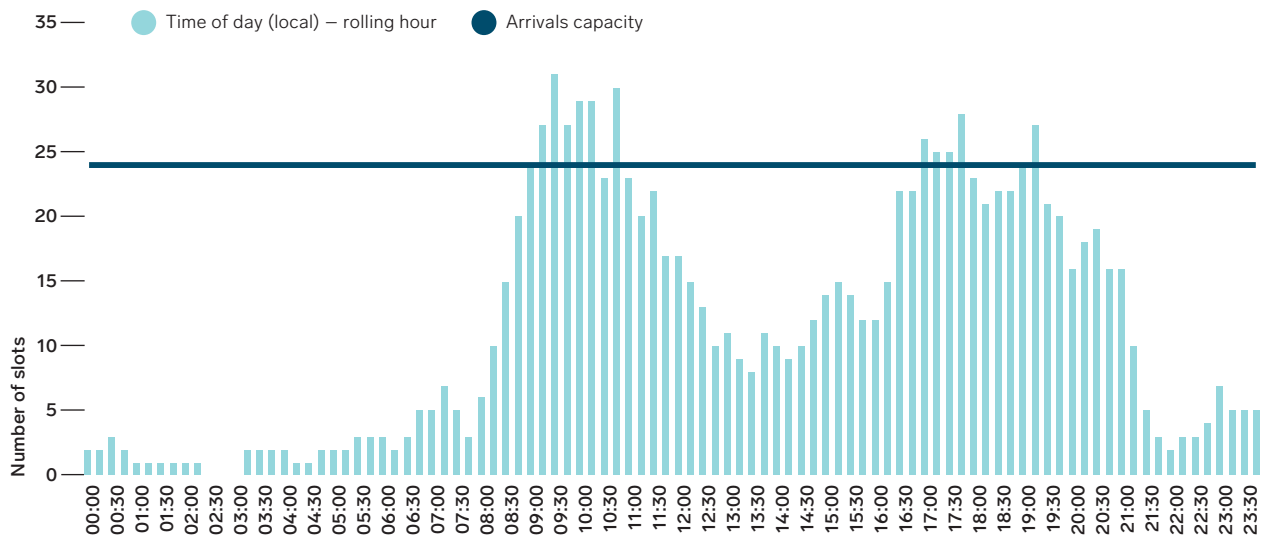


Figure 4-5 Wednesday arrival slot demand – winter season 2013
Source: Airport Coordination Australia

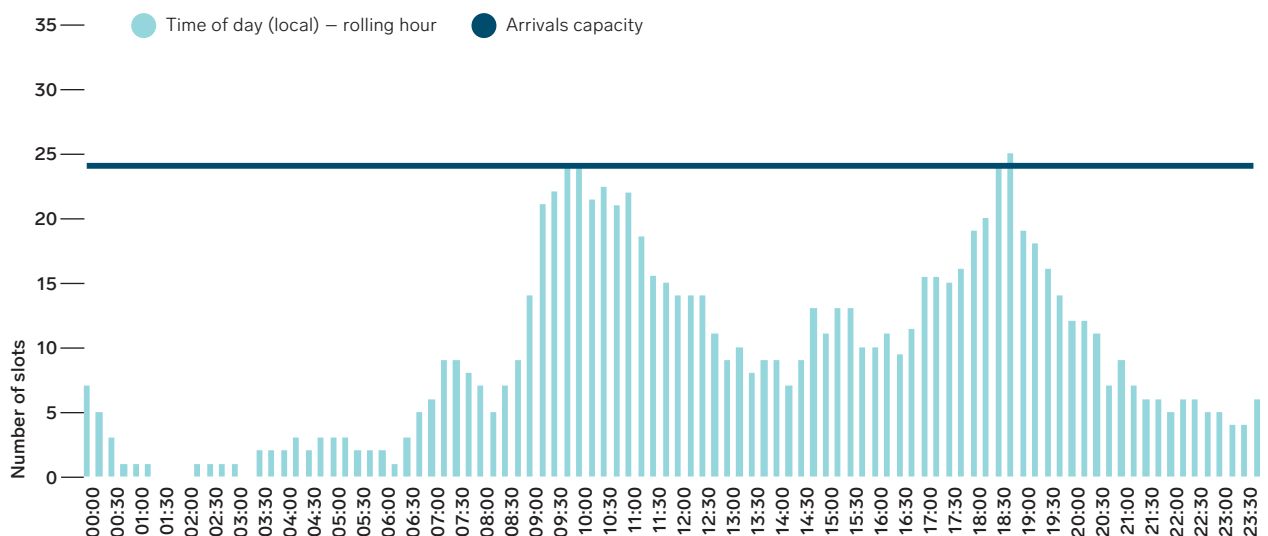


Figure 4-6 Wednesday arrival slot demand – winter season 2018
Source: Airport Coordination Australia

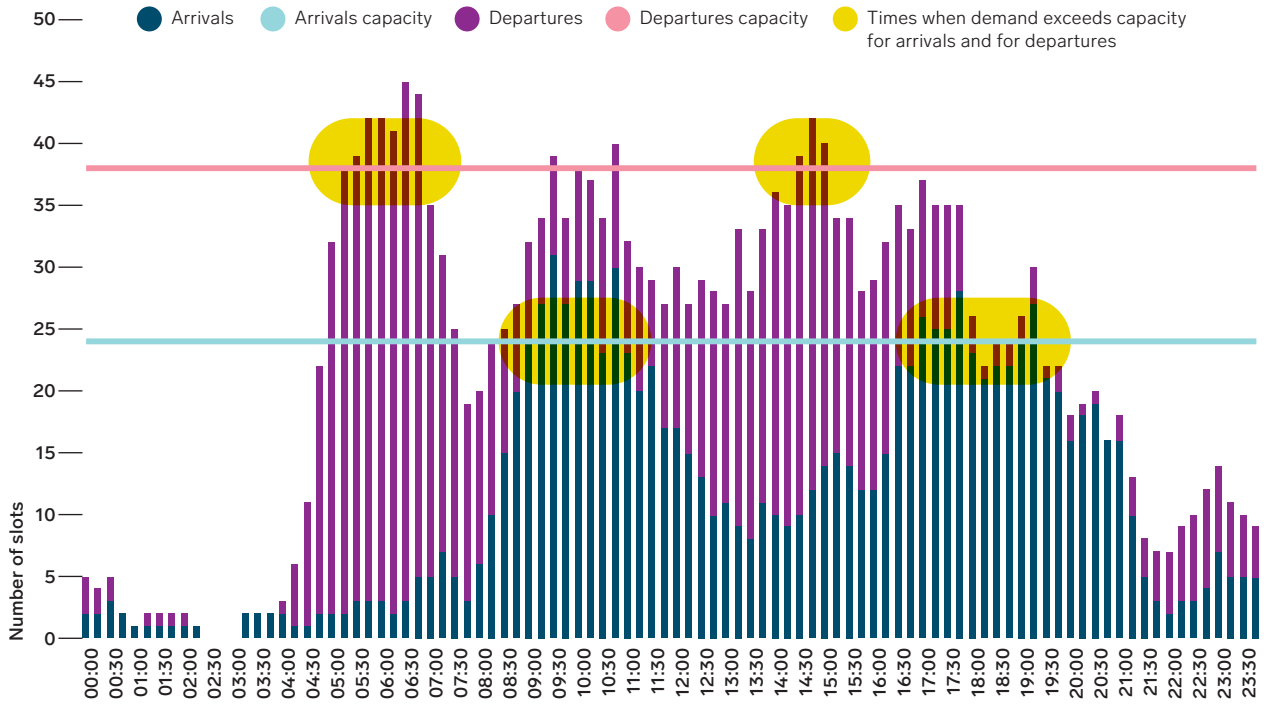


Figure 4-7 Wednesday total runway slot demand – winter season 2013
Source: Airport Coordination Australia

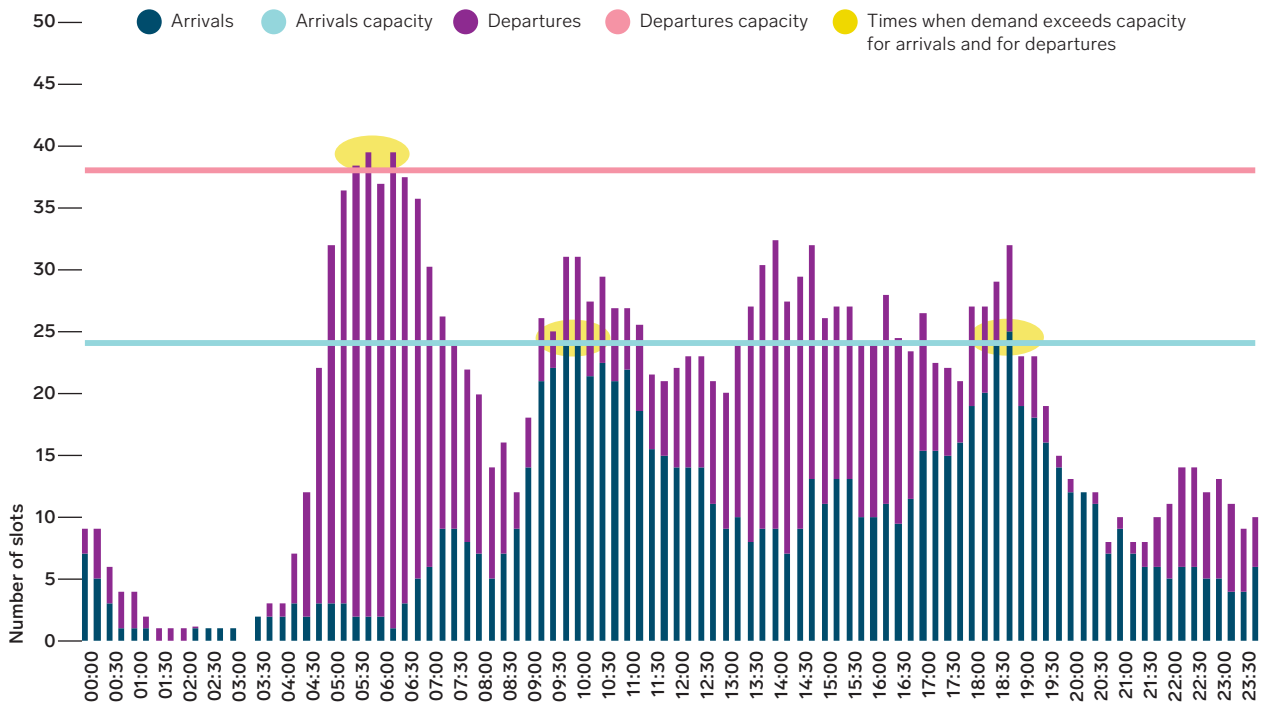


Figure 4-8 Wednesday total runway slot demand – winter season 2018
Source: Airport Coordination Australia

4.5 Proposed Airfield Development Plan

The Airfield Development Plan ensures that the long-term capacity of Perth Airport is safeguarded, and that demand is met.

The proposed Airfield Development Plan covers runways, taxiways, aprons, aircraft parking positions and aviation support services and as mentioned above, are subject to Commonwealth approval.

4.5.1 Runways

The runway configuration and characteristics, such as runway length and width, are determined by a number of factors including:

- maximising useability in most wind conditions,
- providing adequate runway length to cater for existing and future aircraft operating at maximum take-off weight in hot conditions,
- International Civil Aviation Organisation (ICAO) Annex 14 and other relevant international standards, and
- balancing noise exposure to surrounding communities.

Like the previous five master plans, this Master Plan 2020 continues to contemplate future investments in additional runway infrastructure. These are:

- extending the cross runway (06/24) to the north-east to a total length of 3,000 metres,
- extending the main runway (03L/21R) to the north to a total length of 3,800 metres,
- constructing the new runway (03R/21L) to the east of Airport Central to a length of 3,000 metres.

Technical analysis has shown that the proposed long-term airfield layout could cater for more than 475,000 annual aircraft movements (maximum theoretical capacity). This capacity is based on a flattening of the departure and arrival peak periods currently experienced at Perth Airport and spreading the traffic over the day. As discussed in Section 2, Perth Airport is forecast to grow to 202,000 aircraft movements by 2040. Therefore, these runway developments are expected to meet aviation needs beyond the 20-year planning period of this Master Plan 2020.

Subject to demand, airline agreement and approval, the future proposed airfield layout at 2040 is shown in Figure 4-9.

4.5.1.1 Main Runway

The ultimate length of the main runway is planned to increase from the existing 3,444 meters to 3,800 metres. This extended length can accommodate large aircraft at maximum take-off weight on ultra-long-haul flights in summer conditions. The timing of any runway extension will depend on demand for ultra-long-haul flights and aircraft technology. Once the new runway is in operation, the designation of the existing main runway will be 03L/21R.

4.5.1.2 Cross Runway

The existing cross runway, referred to as 06/24, is currently 2,163 metres in length. Consistent with Master Plan 2014, this Master Plan 2020 retains provision for an extension of the cross runway to 3,000 metres. With suitable noise abatement procedures, an extended cross runway could accommodate all aircraft types, including Code F, and would allow a small increase to capacity for arrivals in the southerly flow of traffic on runway 24 through the use of Land and Hold Short Operations, which would allow some aircraft to land on the cross runway and hold short of the intersection with the main runway whilst another aircraft lands or takes off from the main runway. However, it provides no improvement in the northerly flow and therefore scheduling for higher capacity carries a risk of increased aircraft delays depending on which flow is used on the day. The extension of the cross runway would only deliver short-term capacity enhancements.

In 1999, a deed of agreement between the City of Bayswater and Perth Airport was developed in relation to any future extension to the cross runway. The deed reaffirms a commitment that the proposal to extend the cross runway to the northeast will include the adoption of strict and explicit use procedures, such as take-offs to, and landing from, the southwest, which will only occur:

- in emergencies,
- in extreme weather conditions, or
- through the loss of the use of main runway (03L/21R).

The noise abatement procedures and current runway approach (06) and take-off paths (24) for aircraft greater than 20,000 kilograms would be maintained in the event of the extension of the cross runway (06/24).

Consistent with the Master Plan 2014, this Master Plan 2020 also considers that the cross runway may be closed when the parallel runway is constructed and operational. The Concept of Operations (CONOPS) for the parallel runway system showed that the continued use of the cross runway once a parallel runway is operational would reduce the efficiency and overall runway capacity at Perth Airport, therefore negating benefits of the new runway. Several factors influence any decision to decommission the cross runway (which is subject to a Ministerial decision), including operating costs and consultation with aircraft operators, Airservices and the Civil Aviation Safety Authority (CASA). The final decision on the future of the cross runway will be made once the new runway is operational.

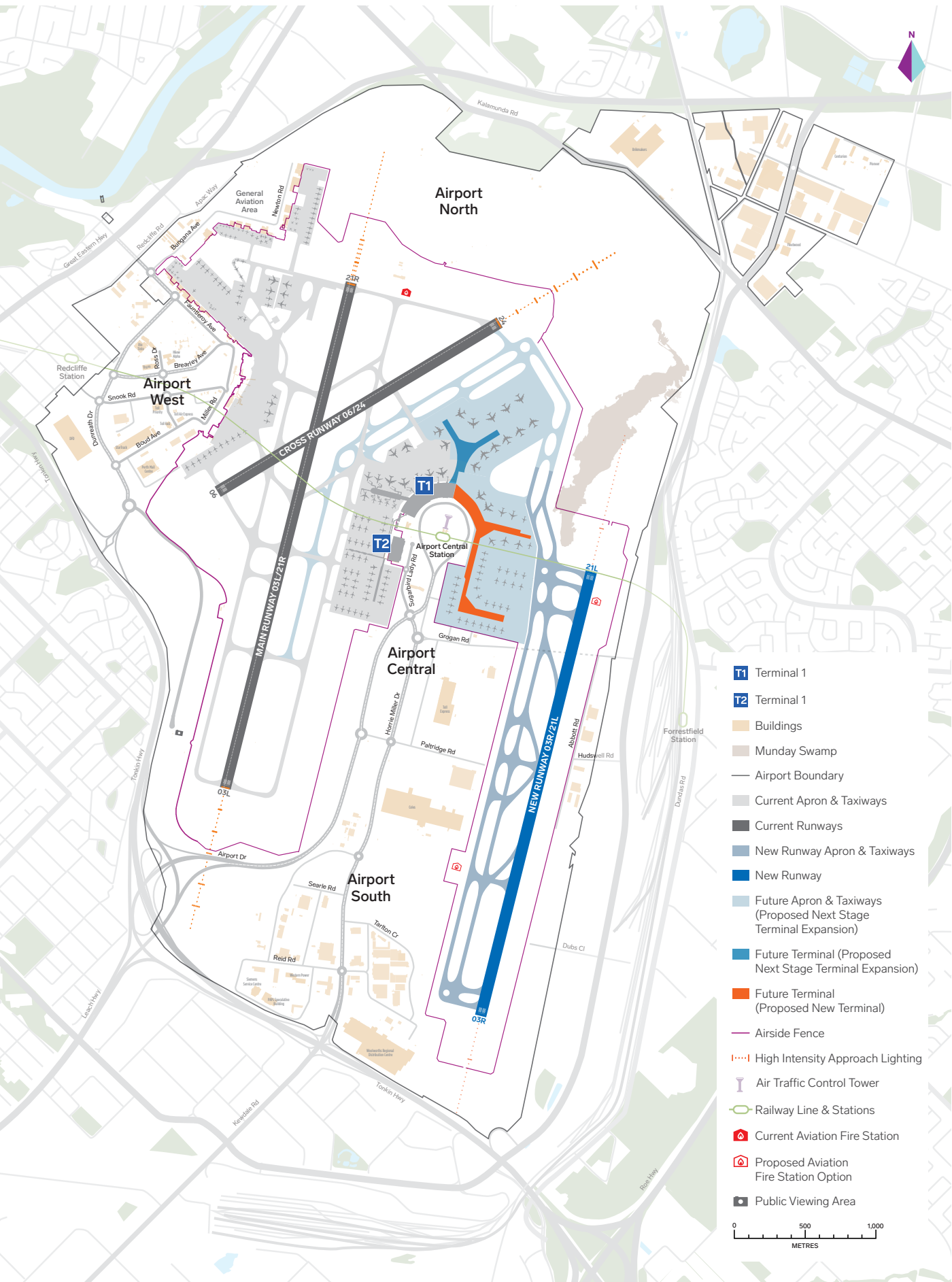


Figure 4-9 Proposed airfield layout 2040
 Source: Perth Airport

4.5.1.3 New Runway (03R/21L)

The new runway (03R/21L), with an orientation running north-south, is subject to Commonwealth approval and, if approved, will be parallel to the existing main runway and will be 3,000 metres long and 45 metres wide. The runway will be contained within a maximum of a 300-metre-wide runway strip. The new runway will be equipped with High Intensity Approach Lighting (HIAL) in both directions to support precision approaches. The new runway will be located 2,000 metres east of the existing main runway (03L/21R) which is 1,000 metres east of the Air Traffic Control tower. The new runway will be constructed with a flexible pavement and have a grooved surface.

The new runway is provided for in the future airport layout shown in Figure 4-9. The proposed location of the runway was determined in the late 1970s by the then Department of Aviation, and land was acquired for its future development. Its proposed location remains unchanged with the exception of a shift south to minimise the impact to Munday Swamp.

The Perth Airport Master Plan 2014 proposed the construction of the new runway as the preferred option to increase the capacity of Perth Airport and stated that the runway was required in the short term. Following approval of the Master Plan 2014, the Perth Airport Board of Directors approved a \$45 million investment in preconstruction activities, including environmental and other approvals, preliminary airspace design and public consultation.

The approvals process for the new runway involved the release of a Preliminary Draft Major Development Plan (MDP) in May 2018 for public comment and subsequent Commonwealth Government consideration. The MDP for the New Runway Project outlines the case for the construction and operation of the new runway. The MDP was developed in accordance with the requirements prescribed by the *Airports Act 1996* (Airports Act) and subsequent assessment of the on-ground environmental impacts under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The MDP was also prepared to meet the requirements for aviation airspace-management changes under the EPBC Act.

The draft Airspace Management Plan (AMP), included within the MDP, was developed in consultation with Airservices, airline partners and the Commonwealth Department of Defence. The draft AMP outlines the indicative flight corridors and airspace architecture required for safe and efficient operations of a parallel runway system, while also assessing aircraft noise exposure.

The 60 business day public comment period for the New Runway Project Preliminary Draft MDP, during which Perth Airport sought input from the community and other stakeholders, was completed in August 2018. Perth Airport considered all feedback received and, where possible, incorporated the concerns and issues raised in the Draft MDP, which was presented to the Federal Minister for Infrastructure, Transport and Regional Development in September 2019 for consideration.

To meet future capacity demand, the new runway is expected to be operational between 2023 and 2032, subject to actual demand and approval.

4.5.2 Taxiways

A system of taxiways is provided to connect runways with the various terminals, via aircraft aprons, and the existing airfield. The taxiway network is planned to avoid congestion on the ground while aiming to minimise taxiing distances and thereby reducing fuel burn. The taxiway system includes rapid exit taxiways (RETs), parallel taxiways and various link taxiways to provide flexibility for traffic management of aircraft while on the ground.

Further expansion of the existing taxiway system at Perth Airport is necessary within the 20-year planning period and is subject to Ministerial approval under the *Airports Act 1996* (either as part of other projects or approval in its own right), in particular the construction of the taxiway system to support the new runway (03R/21L). Likely taxiway expansions are summarised below.

4.5.2.1 Parallel Taxiways

In line with the timing of the new runway (03R/21L), an extensive parallel taxiway network will also be required. From an Air Traffic Control operational perspective and to maximise efficiency while reducing delays, a dual taxiway system that is not compromised or blocked by aircraft pushing back, aircraft under tow or vehicles is ideal. Dual parallel taxiways are planned for the new runway (03R/21L). In the short to medium term the parallel taxiway closest to the runway will extend for its full length. The second parallel taxiway will be provided, where required, to accommodate areas of dense traffic and access to apron and terminal areas. Bypass taxiway connections will also be provided at various locations.

4.5.2.2 Runway Entry and Exit Points

To improve runway efficiency, multiple runway entry points and RETs are planned for both the main runway (03L/21R) and the new runway (03R/21L). Simulation modelling and engagement with both ATC and Airlines will determine when these are required to be constructed.

Multiple access points to the runway will allow for more efficient sequencing of departing aircraft which improves runway capacity.

As highlighted in the ACE recommendations, dual full-length runway entry points and RETs will be explored to optimise departures. RETs (or high-speed taxiways by definition) are designed to expedite aircraft turning off the runway after landing, thus reducing runway occupancy times. By reducing the runway occupancy times, runway capacity increases.

In 2013, as part of the ACE initiatives, Perth Airport completed a feasibility study for RETs on the main runway (03L/21R) to improve capacity in the peak arrival afternoon period. Following consultation with airline partners, it was determined that the construction of the RETs would be delayed as the benefits were outweighed by the expected timing of the new runway (03R/21L). The new runway (03R/21L) will include the provision of RETs.

To improve runway efficiency, dual runway entry points and RETs are planned for both the main runway (03L/21R) and the new runway (03R/21L). As highlighted in the ACE recommendations, dual full-length runway entry points and RETs will be explored to optimise departures.



Figure 4-10 Current terminal locations
Source: Perth Airport

4.6 Terminals

The size of a terminal, including the number of aircraft gates, is based on the forecast number of passengers, aircraft movements and visitors during the design 'busy hour', and takes into account the desired level of service required to be provided by the infrastructure.

As shown in Figure 4-10 there are currently five terminals located in two precincts at Perth Airport:

- Terminal 1 Domestic, Terminal 1 International and Terminal 2 are located in Airport Central, and
- Terminal 3 and Terminal 4 are located in Airport West.

Several smaller terminal operations owned and operated by airline partners providing charter and general aviation services to regional areas in Western Australia, are also located within the Airport West Precinct (refer also Table 4-1).

Terminal	Airlines	Pax pa (FY18)	Aerobridge contact gates	Non-aerobridge contact bays	Stand-off bays
T1 International	All international services except Qantas	4,289,477	six (including two swing gates)	1	4
T1 Domestic	Virgin Australia (all interstate and some regional services)	2,498,680	seven-ten (excluding swing gates)	Nil	Nil
T2	Alliance Airlines (regional services, Tigerair (interstate services), Virgin Australia (most regional services), Regional Express Airlines (regional services)	1,379,611	Nil	20	16
T3	Jetstar (interstate and regional), Qantas (international, interstate and regional services)	1,783,451	9	8	34
T4	Qantas (interstate and regional)	3,740,641			

Table 4-1 Perth Airport Terminal Details

Source: Perth Airport

4.6.1 Airport West Precinct

There are currently two multi-user passenger terminals within the Airport West Precinct. T3 and T4 are linked and are currently used for Qantas Group services. Both terminals are now operated and managed by Perth Airport following the expiry of the 30-year lease for T4 with Qantas, and the subsequent transfer of day to day management and operations to Perth Airport from 30 January 2019.

In March 2018, Qantas commenced direct Perth-London flights using the new Boeing 787-9 Dreamliner aircraft with the potential for additional ultra-long routes in the future. To facilitate these services and passenger transfers from Qantas domestic flights, the existing T3 building was upgraded to accommodate international operations until the consolidation of Qantas operations to Airport Central Precinct by 2025.

4.6.2 Airport Central Precinct

The Airport Central Precinct now caters for the majority of domestic and international passenger operations. The consolidation of Qantas operations, from T3/T4 to Airport Central, is anticipated by 2025. This will fulfil the vision for the operation of all passenger terminal services from this precinct.

4.6.2.1 T1 International

T1 International provides passenger processing facilities for all international services, with the exception of the Qantas services currently operating from T3. The terminal is common use, with facilities shared by up to 20 international airline partners across the 24 hours, seven days a week schedule.

Perth Airport has invested significantly in international infrastructure over the past six years to provide sufficient capacity for growth to the early 2020's, enable Airbus A380 services and to meet new Government security requirements which were announced in 2010. T1 International provides

sufficient space for check-in and passenger processing both now and into the future, upgraded outbound and inbound immigration technology (Smart Gates), six aerobridge serviced gates, two of which have swing capabilities and are Airbus A380 capable, and a range of retail and food and beverage options both landside and airside.

Several future projects are planned to sustain capacity and improve service levels for international passengers where facilities are reaching capacity, including check-in self-service technology upgrades, gate upgrades, an expansion of the landside arrivals hall and a staged terminal expansion addressing baggage, boarding, departure lounge and processing capacity into the future (as discussed in Section 4.6.3).

4.6.2.2 Terminal 2

T2 provides terminal processing facilities primarily to meet the needs of regional WA while being able to support interstate services. T2 was constructed in 2013 due to T3 and T4 operating beyond capacity, with extensive bussing operations and a poor customer experience. T2 is currently used by Virgin Australia Regional Airlines (formerly Skywest), Regional Express Airlines (Rex), Tiger Australia and Alliance Airlines. The commencement of domestic services from the Airport Central precinct was part of the first stage of the consolidation of commercial air services to the centralised terminal precinct.

T2 is designed to provide efficient passenger check-in, screening and sufficient amenity for passengers (including retail, lounge and food and beverage facilities), with boarding from a centralised departure lounge serviced by walk-out piers. Parking is provided for up to 36 aircraft. The terminal is linked via an enclosed pedestrian walkway to T1 Domestic located to the east, providing a seamless connection for passengers between inter-regional and Virgin Australia domestic services.

4.6.2.3 T1 Domestic

T1 Domestic is located adjacent to T2 and is integrated with the T1 International building and associated ground transport. Virgin Australia commenced domestic operations from this purpose-built pier in 2015, relocating operations from T3 in the Airport West Precinct and marking another important stage towards consolidation.

The terminal provides self-service check-in facilities for passengers including kiosks and automated bag drops, efficient passenger screening, a mix of retail and food and beverage options, baggage reclaim services, and at least 8 aerobridge serviced gates for Virgin Australia services, including 2 swing gates for flexibility with adjacent international services.

4.6.3 Proposed Terminal Development Plan

Perth Airport remains focused on delivering a fully consolidated terminal precinct by 2025, in line with the consolidation strategy that was outlined in the previous Master Plan 2014.

Consolidation of all commercial passenger services in the Airport Central Precinct will address capacity constraints, provide passengers with an improved transfer experience, and will provide airlines which operate in both domestic and international markets with significant operational savings through co-location of operations.

Construction of the T2 and T1 Domestic terminals delivered the first two stages of the consolidation strategy, enabling regional airlines and Virgin Australia to move their operations to the Airport Central Precinct. In order to accommodate sufficient capacity for forecast international passenger growth in the precinct, staged expansion of T1 will be required in line with demand and accommodated through an extension of the existing building. The final stage of consolidation of all commercial passenger services into Airport Central will be achieved following the construction of new terminal facilities, enabling sufficient terminal capacity for the relocation of Qantas Group operations and ancillary functions from T3 and T4. The location of the international terminal upgrades and the new

terminal projects are shown in Figure 4-11 and are subject to Major Development Plans, the associated Commonwealth approvals and stakeholder and community consultation

4.6.3.1 Terminal 1

International traffic at Perth Airport has continued to grow over recent years and is forecast to continue increasing. Capacity and service quality analysis indicates that a number of key terminal functions are already, or will soon be reaching capacity in coming years, including:

- international stands will begin to reach capacity in the early 2020's, requiring bussing where current infrastructure cannot accommodate international services,
- the departure hall check-in infrastructure is already at capacity in peak periods, with no ability to facilitate more flights or an increase of existing services during these times,
- considerable congestion in the arrivals hall is currently experienced in the peak periods, requiring an expansion to provide additional space,
- passenger boarding of aircraft is currently via the descent of four flights of stairs, requiring the replacement of infrastructure to provide a more equitable journey for passengers with reduced mobility,
- the outbound baggage system will approach its capacity limit in the mid 2020's, and
- the international departure lounge provides a lower level of service due to its narrow linear configuration and being split across two levels.

To ensure international capacity at Perth Airport is maintained and to improve the passenger experience, an incremental upgrade of the international terminal facilities is required.

Perth Airport is planning to replace three of the existing aerobridges, with the first replacement expected in 2020. The new aerobridges will greatly improve passenger experience through the provision of dual headed bridges with ramps and lifts for passenger boarding, removing the need to use existing stairs.



Figure 4-11 Indicative Airport Central Development Plan

Source: Perth Airport

Other international terminal upgrades are expected to progress from 2020. Perth Airport has undertaken considerable planning on future options and is currently engaging with the Board of Airline Representatives Australia (BARA) and other international airline partners to select the preferred options for the upgrades. The projects aim to increase the capacity of international operations at Perth Airport, enhance the departures and arrivals experience for international passengers and facilitate more efficient airline operations. Key aspects of the international terminal upgrades being considered are:

- implementation of common-use self-service check-in technology for international passengers, including kiosks and automated bag drops,
- upgrade of the terminal and construction of additional contact aircraft parking positions for wide-bodied aircraft,
- additional baggage make-up capacity connected to the existing check-in areas,
- new airline lounges providing sufficient areas to meet airline requirements and with the potential for direct boarding,
- improved access for persons with reduced mobility,
- aircraft taxi lanes and aprons to allow access to the new aircraft parking positions, and
- a passenger departure lounge and amenities including duty free, food and beverage and retail facilities.

The longer-term planning considers consolidation and future interfaces with the international terminal upgrades. The plans are cognisant of the need to accommodate both international and domestic growth in the Airport Central Precinct with efficient airside and landside interfaces.

It is envisaged that in future, gates that sit on the interfaces between international and domestic operations will have swing capability.

It is planned that international terminal upgrades will be delivered in stages, with elements such as check-in technology to be prioritised to provide immediate benefit to passengers. The initial scope of the international terminal upgrades will be completed by the mid-2020's to provide capacity to meet forecast passenger growth to 2030, with additional future plans for expansion to be delivered in line with demand.

4.6.3.2 New Terminal Development

The final stage of consolidation of all commercial air services will require construction of a new open access terminal in the Airport Central Precinct to cater primarily for Qantas Group operations.

The new terminal will be located south east of the current T1 International facility. Planning for the new terminal is in the early stages with Perth Airport working closely with Qantas on the design of the building and the aircraft parking bays

The new terminal is planned to be operational by 31 December 2025. The project scope includes:

- taxiways to provide access to the aircraft parking aprons,
- aircraft parking bays, with a number able to be used for both domestic and international operations,
- a terminal building designed to deliver a significantly improved passenger and retail experience and intuitive passenger journeys,
- direct connectivity to T1 International and indirectly, to T2 to facilitate seamless passenger transfers between terminal facilities in the consolidated precinct,
- dedicated access roads with a multi-modal transport interchange (including a multi-storey car park) to service the terminal building and connectivity between the terminal and airport central train station, and
- a design that incorporates sustainable building practices.

4.6.3.3 Terminal expansion plans beyond consolidation

Perth Airport has developed a long-term development plan for growth beyond the full consolidation of all commercial air services into Airport Central. Post consolidation, it will be necessary to expand terminal facilities over time in order to meet growth and maintain acceptable service levels for airline partners and passengers.

The need for terminal upgrade and expansion projects will be assessed as a result of regular passenger forecasting studies, ongoing monitoring and capacity analysis of terminal facilities, feedback and survey results from airline partners, passengers and other Perth Airport stakeholders.

The principles upon which the long-term expansion planning for terminal facilities will be undertaken include:

- responding to the forecast traffic growth and step change in demand as airlines relocate,
- ensuring that the precinct has a sufficient aircraft parking apron area for the long-term demand,
- balancing the runways and apron to each other, as far as possible, to reduce taxiing distances, reduce fuel usage, and increase runway capacity,
- maintaining safe, efficient and free flowing ground movement of aircraft on taxiway and apron areas,
- clustering terminals around an inner precinct as far as practicable to ensure efficiency and connectivity, fully integrated with the Airport Central rail station,
- maintaining terminal piers that are perpendicular to taxiways for maximum efficiency of apron operations,
- adopting terminal layouts that optimise potential commercial performance, and maximise flexibility of common-use infrastructure between airlines and international and domestic operations,
- safeguarding for integration between terminals and processes such as seamless passenger and baggage transfers,
- safeguarding for future innovation and technology within the terminal layout, considering future trends in passenger behaviour, technology use and travel expectations, and
- adopting terminal layouts that facilitate future stages of expansion.

4.6.3.4 T2 Development and Enhancement

T2 was designed with the ability to expand as demand required. During the planning period of this Master Plan 2020, the terminal will be progressively expanded to continue to meet demand. This is likely to include:

- expansion of the departures area including additional seating areas, airline lounges, boarding gates and retail offerings,
- technology and innovation led solutions to increase operational efficiency and enhance the passenger journey, and
- additional baggage reclaim facilities.

4.6.3.5 T3-T4 Terminals Post Consolidation

Following consolidation of Qantas operations to the Airport Central precinct by the end of 2025, the T3 and T4 buildings and associated carparks will be discontinued. The redundant terminal buildings will be demolished as they have reached the end of their useful life.

General aviation operators are likely to remain in the Airport West Precinct in current facilities, and sufficient capacity exists within T2 for the relocation of any operations growing in scale to a size exceeding capacity of their existing facilities.

4.6.4 Aircraft Parking

There are currently 117 aircraft parking (contact and remote) positions located proximate to the passenger terminals, in addition to more than 60 parking positions located within leased apron areas which are controlled by various tenants. The most recent of these parking positions include those added with the construction of T1 Domestic pier in November 2015, adding 12 positions with the capability to accommodate a range of different aircraft types.

Further extensive apron works will be undertaken to accommodate future growth and to complete consolidation of passenger services into Airport Central.

A 2018 study determined the future aircraft stand demand for Perth Airport. The stand demand was forecast by developing 'design day schedules', from which busy hour demand, hourly movement demand and aircraft stand demand could be derived. The design day is a representative busy day projected forward from current aircraft traffic, considering the profile of traffic over the baseline for the various segments (international, domestic and regional). Unlike annual forecasts, this approach takes into account the peak period nature of traffic at Perth Airport.

The stand demand is based on a reference code, which refers to the grouping of aircraft types based on characteristics such as aircraft wingspan and outer main gear wheel span. The groupings of regular aircraft types operating at Perth Airport are the Fokker 100, Airbus A320 and Boeing 737 (Code C), Airbus A330, Boeing B777 and Boeing B787 (Code E), and the Airbus A380 (Code F).

4.6.4.1 Terminal 1 - International & Domestic

T1 stand demand demonstrated in the table below includes all international and domestic operations, including both T1 International and T1 Domestic operations.

Financial Year	Base Scenario Active Stands				Base Scenario Non-Active Stands				Overall Totals			
	Code F	Code E	Code C	Count Total	Code C Equ.	Code F	Code E	Code C	Count Total	Code C Equ.	Count Total	Code C Equ.
2018 Actual	2	4	2	8	12	0	2	1	3	5	10	17
2019	2	4	1	7	13	0	1	3	4	5	11	18
2025	2	6	0	8	16	0	2	3	5	7	13	23
2030	2	8	0	10	20	0	2	4	6	8	16	28
2035	3	8	0	11	22	1	1	4	6	8	17	30
2040	3	9	0	12	24	1	1	4	6	8	18	32

Table 4-2 T1 International stand demand

Source: Airbiz

Note 1: Active stands are those used for actual passenger processing, being either contact stands (i.e. those served by an aerobridge or walk-up) or passengers can be bussed to and from other locations.

Note 2: Non-active stands are those where aircraft not carrying out an immediate turnaround are towed and parked. Aircraft parking demand is impacted by Perth Airport's intensive aircraft movements at certain times of the day, due to FIFO operations.

Financial Year	Base Scenario Active Stands				Base Scenario Non-Active Stands				Overall Totals			
	Code F	Code E	Code C	Count Total	Code C Equ.	Code F	Code E	Code C	Count Total	Code C Equ.	Count Total	Code C Equ.
2018 Actual	0	3	4	7	10	0	1	9	10	11	17	21
2019	0	3	4	7	10	0	1	9	10	11	17	21
2025	0	3	6	9	12	0	1	9	10	11	19	23
2030	0	4	6	10	14	0	2	9	11	13	21	27
2035	0	4	6	10	14	0	2	9	11	13	21	27
2040	0	4	8	12	16	0	2	7	9	11	21	27

Table 4-3 T1 Domestic stand demand

Source: Airbiz

4.6.4.2 Terminal 2

T2 stand demand caters for domestic operations, both intrastate and interstate.

Financial Year	Base Scenario Active Stands					Base Scenario Non-Active Stands					Overall Totals	
	Code F	Code E	Code C	Count Total	Code C Equ.	Code F	Code E	Code C	Count Total	Code C Equ.	Count Total	Code C Equ.
2018 Actual	0	0	16	16	16	0	0	9	9	9	25	25
2019	0	0	16	16	16	0	0	10	10	10	26	26
2025	0	0	16	16	16	0	0	11	11	11	27	27
2030	0	0	17	17	17	0	0	11	11	11	28	28
2035	0	0	20	20	20	0	0	11	11	11	31	31
2040	0	0	22	22	22	0	0	13	13	13	35	35

Table 4-4 T2 stand demand

Source: Airbiz

4.6.4.3 Terminal 3 and Terminal 4

T3 and T4 stand demand includes the intrastate, interstate and international operations from these terminals, which are located in the Airport West Precinct, prior to the relocation of Qantas Group operations to the Airport Central Precinct by December 2025.

Financial Year	Base Scenario Active Stands					Base Scenario Non-Active Stands					Overall Totals	
	Code F	Code E	Code C	Count Total	Code C Equ.	Code F	Code E	Code C	Count Total	Code C Equ.	Count Total	Code C Equ.
2018 Actual	0	4	11	15	19	0	2	17	19	21	34	40
2019	0	4	13	17	21	0	2	15	17	19	34	40
2025	0	5	14	19	24	0	3	16	19	22	38	46
2030	0	5	18	23	28	0	3	17	20	23	43	51
2035	0	5	20	25	30	0	3	20	23	26	48	56
2040	0	6	20	26	32	0	3	24	27	30	53	62

Table 4-5 T3 and T4 Stand Demand

Source: Airbiz December 2018

Financial Year	Base Scenario Active Stands					Base Scenario Non-Active Stands					Overall Totals	
	Code F	Code E	Code C	Count Total	Code C Equ.	Code F	Code E	Code C	Count Total	Code C Equ.	Count Total	Code C Equ.
2018 Actual	0	1	0	1	2	0	0	0	0	0	1	2
2019	0	2	0	2	4	0	0	0	0	0	2	4
2025	0	3	0	3	6	0	0	1	1	1	4	7

Table 4-6 T3 International stand demand

Source: Airbiz

4.6.4.4 Airport Central Precinct

Perth Airport expects that full consolidation into the Airport Central Precinct will take place by December 2025 therefore, Airport Central Precinct must also cater for the full stand demand. It has been determined that by 2040 the following stands will be needed in Airport Central Precinct.

Financial Year	Base Scenario Active Stands					Base Scenario Non-Active Stands					Overall Totals	
	Code F	Code E	Code C	Count Total	Code C Equ.	Code F	Code E	Code C	Count Total	Code C Equ.	Count Total	Code C Equ.
2030	2	17	41	60	79	0	7	41	48	55	108	134
2035	3	17	46	66	86	1	6	44	51	58	117	144
2040	3	19	50	72	94	1	6	48	55	62	127	156

Table 4-7 Airport Central Precinct stand demand by 2040

Source: Airbiz

It is noted that Airport Central stand demands anticipated that the consolidation of operations will result in some efficiencies in the stand use. To accommodate this stand demand, extensive works will be required, including the construction of additional aircraft parking positions.

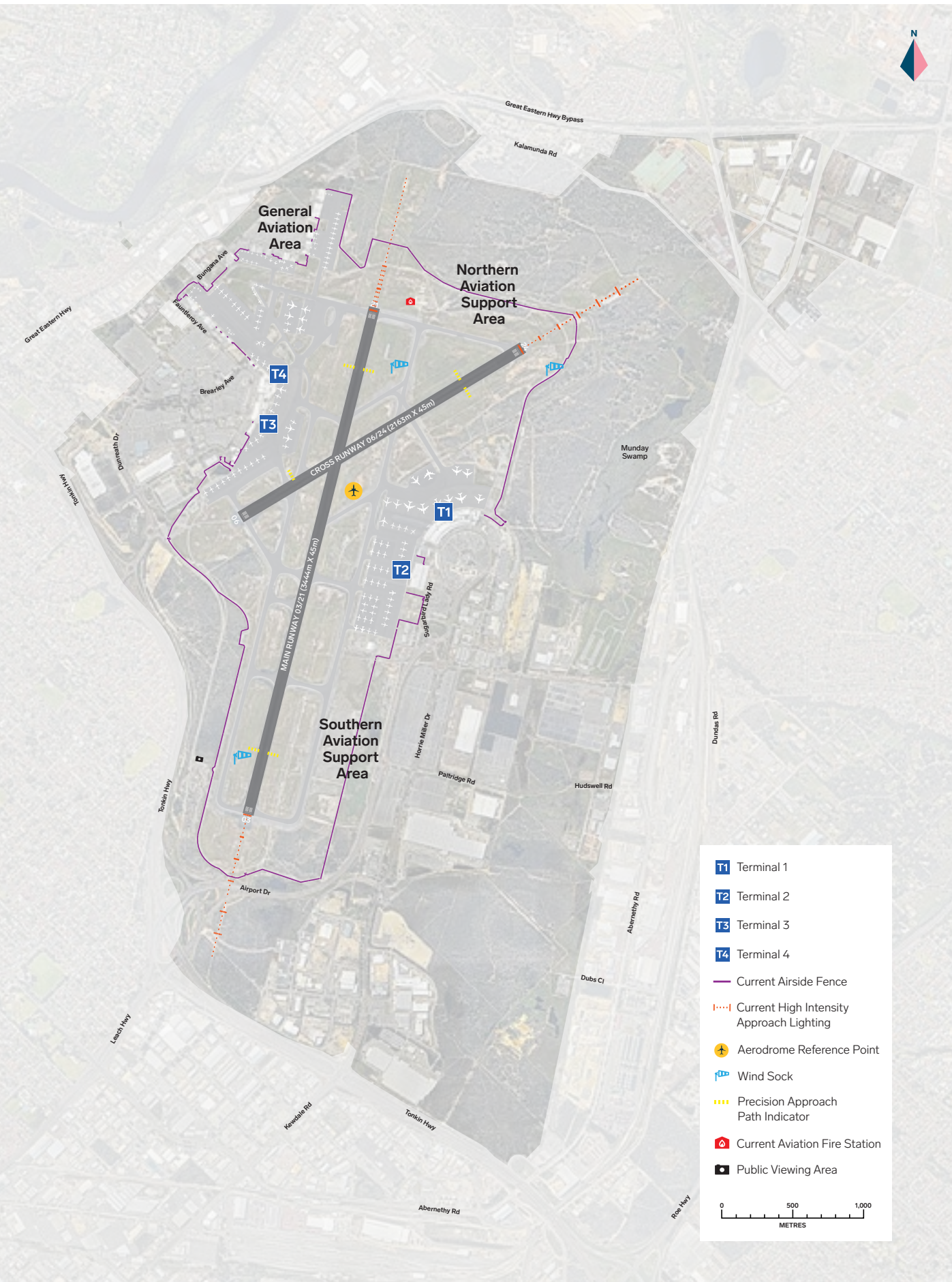


Figure 4-12 Location of aviation support services
 Source: Perth Airport

4.7 Aviation Support

Perth Airport caters for the needs of more than 30 airline partners which rely on the services of aviation support operators to provide in-flight catering, ground handling, aircraft maintenance, fuel and air freight facilities. Current tenants on the airport estate include:

- three catering companies,
- five ground handling operators,
- 11 maintenance providers,
- three air cargo terminal operators, and
- a fuel terminal and hydrant network with two fuel providers.

It is difficult to accurately project further demand and timing for development of new hangar facilities as airlines and maintenance organisations typically have many options across their network. Several maintenance and freight organisations are likely to either relocate or develop purpose-built facilities at Perth Airport, some of which will result from the Qantas Group relocating operations to the Airport Central precinct by 2025.

There is expected to be continuing demand for new aviation support facilities including:

- aircraft parking associated with aviation support activities or for layover parking associated with adjacent terminal activities,
- facilities for line or base maintenance of aircraft by airline engineering or maintenance repair overhaul service providers,
- facilities for cargo terminal operators or integrators for air freight transfer, consolidation and interim storage,
- in-flight catering facilities, and
- facilities for the maintenance and storage of ground support equipment.

Perth Airport has identified three key areas for aviation support services as shown in Figure 4-12 and include:

- General Aviation (GA) Area, within the Airport West Precinct,
- Southern Aviation Support Area, located to the south of T2, within the Airport Central Precinct, and
- Northern Aviation Support Area, located to the north of taxiway Whiskey and to the east of Runway 24 threshold, within the Airport North Precinct.

The current GA Area caters for a variety of aviation support services including airline catering and aircraft maintenance. Aviation support operators will continue to be located in the GA Area.

The Southern Aviation Support area is ideally located to provide integrated services to passenger operations in Airport Central. This area was cleared, in readiness for development, in 2014 as part of the taxiway Charlie extension project. The Southern Aviation Support area provides a prime location for future development with airside frontage and proximity to the terminals in the Airport Central Precinct.

The Airport North Precinct, with landside access from Kalamunda Road (detailed in Section 5), will provide a suitable location for the development of aviation support facilities that require access to the GA Area. Most of this area is currently undeveloped.

4.7.1 Fuel Storage

Currently, Jet A-1 fuel is pumped from a depot at Kewdale via an underground pipeline to aboveground tanks at the Joint User Hydrant Installation (JUHI) located to the south of T2. Fuel is pumped from these tanks into the apron hydrant system for refuelling of aircraft on the aprons at all four terminals. This pipeline is currently operating near capacity and is expected to be upgraded during the planning period of this Master Plan 2020.

Air BP and Viva Energy have depots in the Airport West Precinct at the Joint Oil Supply Facility (JOSF). This depot has a Jet A-1 fuel hydrant to supply road transport vehicles used for fuelling aircraft that do not have access to hydrant points. Avgas is also supplied from this depot for fuelling of piston engine aircraft.

The existing fuel storage facilities are located within the Airport Central Precinct (JUHI) and in Airport West (JOSF).

There is current storage capacity for six million litres of fuel at Perth Airport. This corresponds to up to two days of reserve fuel storage after a typical daily fuel use of approximately three million litres is deducted.

During its operation, the JUHI facility has been expanded to meet demand, however, as the lease for all the existing fuel facilities expires on 31 March 2022 and the current location of the JUHI storage tanks are in an area required for the expansion of T2, the construction of additional storage tanks has not been undertaken.

4.7.1.1 Future Fuel Storage Development

The Perth Airport Master Plan 2014 identified that the current aviation fuel storage will need to be relocated in the future. The current aviation fuel supply chain at Perth Airport is constrained by the throughput capacity of the off-airport pipeline and on-airport storage capacity, which is less than 50 per cent of that recommended by the International Air Transport Association (IATA).

The current infrastructure does not provide appropriate levels of supply security or redundancy to manage a supply disruption. To achieve this, alternative modes for fuel delivery and increased on-airport storage are needed to mitigate the risk of a single point of failure and supply disruption.

As a result of these constraints, Perth Airport has been progressing the planning of a new fuel storage facility. The proposed fuel storage facility is critical to the efficient and economic development of the airport by ensuring adequate levels of fuel storage and supply for aviation operations. Any proposed fuel storage facility would likely be subject to an MDP and appropriate environmental and other approvals.

Construction of a new fuel facility that can be supplied by multiple modes (pipeline, road and rail) will reduce the requirement for on-airport storage due to the total volume of fuel available at the BP Refinery and multiple ways of delivering to the airport. It is therefore considered appropriate that sufficient fuel be stored on the airport to provide three to four days' supply.

The estimated average daily fuel uplift at Perth Airport in 2040 will be approximately 5,000 tonnes (6.3 million litres). This estimate was arrived at by analysing the routes served by various aircraft types, the average flight times (hours), and fuel burn rates (including improved efficiency).

For the purpose of future capacity planning and to allow the safeguarding of adequate land, a site of six hectares has been allowed for the new fuel facility, able to accommodate up to eight storage tanks, a road bridging facility and associated offices and staff facilities. Additionally, separate storage will be provided for the 'into plane' refuelling tankers. An airside remote fuel tanker filling facility will also be constructed for servicing aircraft in the GA Area and on bays not connected to the fuel hydrant system.

Until the new fuel facility is constructed and commissioned, the existing facility will continue to operate to ensure continuity of fuel supply.

The Perth Airport Master 2014 identified a potential site within the Airport South Precinct. While being ideally located for supply through the existing fuel pipeline serving the current fuel facility, this location would require supplementary deliveries by road tankers to cross the main passenger flow to the terminals along Airport Drive. Road tankers will be required to supplement the supply pipeline as fuel demand increases, due to the existing delivery pipeline approaching its capacity, or in the event of pipeline supply being interrupted.

An alternate site has since been identified within the Airport North Precinct. Preliminary planning for Airport North incorporates an intermodal rail terminal which could also allow the transfer of fuel from Kwinana by rail in the future. The current Midland freight rail line, which runs along the eastern boundary of the airport estate, allows for the opportunity to provide a private rail access for the direct delivery of freight by rail into the eastern portion of Airport North. This private rail access is a key consideration for the new fuel facility as it will allow the future development of rail access as an additional mode of supply.

Constructing the fuel storage facility within the Airport North Precinct does not conflict with the off-estate areas surrounding the precinct. Areas immediately adjacent to Airport North include major roads, a cemetery and a portion of the airport estate already developed for industrial use. The proposed Airport North site will have good heavy vehicle access to existing heavy haulage routes and would not conflict with passenger traffic accessing the terminals.

A JOSF installation will continue to operate servicing T3 and T4 until all commercial air services are relocated to the Airport Central Precinct by 2025. There may also be a requirement for a satellite facility to service general aviation aircraft.

4.8 General Aviation and Helicopters

Perth Airport recognises the importance of the GA and charter sectors to the tourism, business and resources economy. In recognition of this, Perth Airport will continue to maintain and expand the GA Area in a manner which supports this specific small-medium sized aircraft focused aviation area.

The GA Area is located adjacent and to the north of T3 and T4 within the Airport West precinct and comprises numerous leased facilities from which mainly non-RPT charter services operate. Up until mid-2018, the larger companies operating from this area were Skippers, Cobham Aviation Services Australia and Network Aviation. Interspersed within the GA Area are aircraft maintenance and other aviation support services companies.

Between 2008 and 2014, the level of activity in the GA Area increased significantly, due mainly to the demand for charter services by the resource sector's fly-in fly-out workforce deployment model. Perth Airport responded to this growth by completing the construction of T2 and provided upgrades to airside infrastructure and terminal facilities at T3. These investments provided facilities that are suitable for charter and regular passenger services. As such there is no current requirement for further significant terminal or passenger processing facilities in the GA Area beyond that necessary to support small scale regional and charter movements. Perth Airport has been and will continue to work with GA operators looking to transition new operations that are not suitable for the GA Area into existing and future common use terminals.

There are currently no dedicated helicopter landing facilities at Perth Airport. Current ad-hoc helicopter movements are managed by Air Traffic Control as and when required. Due to wake turbulence requirements, where helicopters must be held and separated from large fixed-wing aircraft, there are only limited areas on the estate where helicopters could operate independent of mainstream airfield operations. The GA Area is considered the most suitable location for helicopter operations. Should Perth Airport be approached by an operator, the need for helicopter facilities on the airfield will be investigated in consultation with Airservices Australia.

Perth Airport will continue to support general aviation and helicopter operations, in the current GA Area. However, large passenger terminals are not considered to be consistent with the intended use of the GA Area or the overall development plan for Perth Airport.



4.9 Air Freight

Perth Airport is working with industry and the State Government to grow air freight capacity, including the identification of infrastructure that will enhance the efficient movement of air freight as volumes grow.

The consolidation of all domestic and international commercial air services to the Airport Central Precinct by 2025 provides an opportunity to increase the efficiency of the air freight logistics chain. The relocation of Qantas operations into Airport Central and the planned future expansion of T2 will require the relocation of a number of the existing air freight operators on the estate. Perth Airport is also considering additional airside and landside freight facilities such as cold storage (in line with Department of Transport's future response in the *'Revitalising Agricultural Region Freight Strategy – Responding to Change, 2019 Draft'*), scanning and freight holding facilities to service the future growth in air freight capacity and movements.

To facilitate improved air freight operations, new freight facilities will be centred on future airside access gates. Possible future locations are within Airport West, Airport North, and to the east or west of Airport Central.

4.10 Air Navigation Facilities and Services

Airservices Australia is responsible for air traffic control, airport rescue and fire-fighting, and navigational services at Perth Airport. Airservices has the following operational services located on the estate:

- Air Traffic Control tower,
- terminal control unit,
- navigational and aircraft approach aids, including Instrument Landing System,
- terminal surveillance radar,
- en-route surveillance radar, and
- aviation rescue and fire-fighting service, and associated facilities.

The existing Air Traffic Control tower is located between the main runway (03L/21R) and the site of the new runway (03R/21L). With an eye level of 65 metres above ground level, the tower affords controllers a good view of all parts of the airfield movement area.

The operational requirement to maintain the line of sight for the control tower to the ends of the runways imposes limits on the height of developments in the building areas to the south of the tower.

Airservices currently operate a single Aviation Rescue Fire Fighting Service (ARFF) Station located adjacent to the runway 21 threshold. This facility provides a domestic response vehicle for first aid, motor vehicle accidents, fire alarms and special service calls.

Based on CASA and ICAO regulations, ARFF has varying levels of service which dictate the required amount of water and foam that is needed to be carried, the response times, water discharge rates and the number of personnel. For the majority of the time, the ARFF Station at Perth Airport is a Category 9 level of service. A Category 10 level of service is needed for Code F (A380) services, and as these only occur at certain times of the day, the Perth Airport ARFF Station upgrades to Category 10 in the hours that the A380 operates.

The planned new runway (03R/21L) will require relocation, upgrades, and new Airservices infrastructure, including an additional ARFF station. As part of the planning for the new runway, Perth Airport will continue to work with Airservices to determine appropriate locations for this infrastructure.







Section 5: **Non-Aviation Development Plan**

The development of the Perth Airport estate supports the growth of Perth's population and economy.



Perth Airport plays a significant role in developing land which facilitates the growth of Perth and Western Australia's economy.

5.1 Introduction

The five-year Non-Aviation Development Plan supports the growth of land not required for aviation purposes and takes into consideration:

- compatibility with aviation activities including aviation support facilities,
- Perth Airport's designated status as a 'Specialised Activity Centre' in State planning documents,
- complementary development with surrounding land uses in consultation with government authorities,
- demand for non-aviation facilities including office accommodation, leisure and retail,
- demand from industries that see a benefit to their operations being located on the Perth Airport estate,
- proximity and connectivity to the Central Business District (CBD) and regional road network,
- Perth Airport's location in relation to freight hubs and transport infrastructure,
- proximity to the Airport Central Station and Redcliffe Station, being constructed as part of the Forrestfield-Airport Link project, and other supporting public transport facilities,
- security of electricity, water and communications networks,
- existing large developable land parcels on the airport estate, and
- environmental and Aboriginal heritage values.

Due to its quality, highly accessible and visible location, Perth Airport has experienced ongoing demand for non-aviation opportunities, predominantly warehouses and large format retail. Businesses expanding their existing presence on the airport estate have also played a role in the growth of non-aviation development at Perth Airport.

This demand reflects that:

- many companies need access to passenger and freight air services, particularly those servicing clients in regional Western Australia, and
- the estate is in close proximity to other transport modes, including the Kewdale rail freight facility, major highway networks and, via those roads, the Port of Fremantle.

Perth Airport has also received interest from companies associated with the mining and resource industries, seeking to locate their remote operations centres and other corporate and administration functions at Perth Airport.

Additional land for future non-aviation development opportunities is available and has been identified in the Perth Airport Land Use Plan (Figure 3-2). Many of the potential developments are subject to Commonwealth approval under the *Airports Act 1996* and the *Environmental Protection and Biodiversity Conservation Act 1999*. Perth Airport is required to submit a Major Development Plan when Airports Act triggers are met, and these plans require Stakeholder and community consultation prior to Commonwealth approval.





5.2 Precinct Planning

Consistent with Perth Airport's Integrated Planning Framework (described in Section 2), Perth Airport has developed indicative plans for each precinct across the estate. These precinct plans are guided by this Master Plan 2020 and consider:

- development objectives including long-term vision and implementation planning,
- land use plans and associated zones and uses,
- sustainable design,
- activity forecasts (aviation and non-aviation related),
- environmental and heritage values, and
- integration with surrounding land use, both on and off the estate.

The precinct planning process includes an assessment of a wide range of constraints and opportunities including:

- aviation safety, security and future planning including the consolidation of commercial air services to Airport Central by 2025,
- Federal, State and Local statutory and strategic planning and development, including the State's METRONET Forrestfield Airport Link project,
- community impacts including the development interface with adjacent communities,
- employment generating land uses,
- environmental impacts,
- bicycle and pedestrian movement, connectivity and integration with other modes,
- changes in personal and public transport options, and
- utility, infrastructure and service capacities and requirements.

The precinct planning process is used to set a framework that ensures aviation requirements are prioritised in terms of land use, is responsive to customer needs, provides innovation, and is sustainable.

Approval of this Master Plan 2020 does not provide approval for development to commence, and in many cases a Major Development Plan will be required for submission to the Commonwealth. These plans include stakeholder and community consultation prior to consideration of Commonwealth approval. The subsequent development approvals process is outlined in Section 11.



Airport North Precinct
The centre for global-reaching businesses and leading-edge smart technology industries.

Figure 5-1 Airport North Precinct
Source: Perth Airport

5.3 Proposed Five-Year Non-Aviation Development Plan

The following precinct plans inform Perth Airport's five-year non-aviation development plan for Airport North, Airport West, Airport South and Airport Central.

5.3.1 Airport North Precinct

The Airport North Precinct, shown in Figure 5-1 is 363 hectares in area and is envisaged to be developed predominately for an integrated mix of industrial, commercial, warehouse, storage, and logistics land uses, representing an opportunity for a major metropolitan intermodal logistics centre servicing the needs of both the airport and wider Perth metropolitan area. This centre will take advantage of the availability of large serviced sites and major road and rail freight access. The precinct also presents an opportunity for aviation-related development, with direct apron frontage available for some sites.

The portion of this precinct located north of Kalamunda Road is fully developed with a range of industrial, warehouse, showroom, storage and logistics land uses. Table 5-1 lists the non-aviation development completed within the past five years.

Tenant	Nature of Use	Approx. area (hectare)
Bunnings	Warehouse and office	1.44
Wridgeways	Warehouse and office	2.62
Mainfreight	Freight warehouse and office	3.15
Daimler Trucks	Showroom, warehouse and office	4.24
Ceva	Freight and logistics warehouse and office	8.14

Table 5-1 Non-aviation developments constructed in Airport North within the past five years

Source: Perth Airport

5.3.1.1 Airport North Precinct Non-Aviation Development Plan

Planning is underway for the area south of Kalamunda Road, including a proposed road realignment. The preliminary Kalamunda Road design provides a new northern access point and will improve traffic flow and access to the precinct. The realignment of Kalamunda Road is expected to be undertaken after 2020, subject to final agreement with Main Roads WA, the cities of Swan and Kalamunda and the Metropolitan Cemeteries Board. Up to three access points off Kalamunda Road and into the Airport North Precinct will be required in the long term, as discussed in Section 6.

Within the next five years, it is expected that the undeveloped portion of Airport North will begin to undergo staged development, which will include industrial, logistics and commercial land uses at a rate of approximately 10 hectares per year following the construction of access roads and other supporting utility infrastructure.

The Midland Freight Rail line also bisects Airport North, allowing for a rail spur to be extended into the precinct. Combined with opportunities for airside access to be created for air freight facilitation, the development of an intermodal facility allows for the consideration of new and more diverse land uses which do not currently exist on the estate.

An intermodal facility will improve and strengthen the link between the North-East subregion, the Kewdale/Forrestfield freight hub and the wider strategic port infrastructure located in the South-West sector, by supporting and facilitating the movement of freight by road and rail.

Airport North is highly accessible, and with the future custom designed internal road network to be constructed to accommodate the land uses within the precinct, accessibility will improve further.

The Westport: Port and Environs Strategy is outlined in Section 6.2.4 and Perth Airport's potential development of an intermodal facility within Airport North builds on the aim of the strategy to plan for the development of additional container port facilities to service future needs of a growing population. Transporting goods via rail will remove additional freight vehicles from the metropolitan road network, thereby assisting to address traffic congestion.

It is anticipated that land use planning in the precinct will extend beyond that of material freight and, in the future, may also include private passenger transport by way of vertical take-off and landing aircraft.

Given the area of land available, large lots can be created to support industrial land uses, and a range of research, innovation and technology land uses which require large flat sites can be accommodated. Opportunities also exist for autonomous/ electric vehicles (sales, storage, repair and charging stations), smart energy generation land uses, and other commercial land use supporting the main industry focus.

There is an opportunity to develop the area with other complementary, high amenity and convenient land uses for the future local workforce and resident population in Forrestfield North, within the City of Kalamunda.

As outlined in Section 4.7, a future fuel storage facility may be developed in Airport North, utilising a possible extension to the existing Midland Freight Rail line. The planned fuel facility in this location would serve a dual purpose; to provide additional fuel security for the airport, and to promote the development of fuel dependant and logistics land uses. As mentioned in Section 4, the proposed fuel facility would likely be subject to a Major Development Plan, with associated public consultation and approvals.



Airport West Precinct

The hub for showcasing Western Australia's leisure, health, knowledge and enterprise attractions.

Figure 5-2 Airport West Precinct
Source: Perth Airport

5.3.2 Airport West Precinct

The Airport West Precinct is shown in Figure 5-2 and comprises 341 hectares. It will continue to provide a range of aviation support facilities and associated ground transport infrastructure until the end of 2025, when Qantas relocates from T3/T4 (in Airport West) to a new terminal within the Airport Central Precinct.

While the Airport West Precinct currently consists of mainly aviation developments, non-aviation development has progressed over the past five years. Table 5-2 details the key Airport West non-aviation developments constructed within the past five years in addition to Costco, which is currently under construction.

Building Tenant	Nature of Use	Approx. land area (hectares)
Bravo Building	Office building	1.38
Direct Factory Outlet	Retail outlet centre	8.97
Costco	Large format retail warehouse (construction commenced in 2019)	6.30

Table 5-2 Non-aviation developments in Airport West within the past five years

Source: Perth Airport

5.3.2.1 Airport West Precinct Non-Aviation Development Plan

As all regular passenger transport services will be consolidated within the Airport Central Precinct by the end of 2025, no additional land is likely to be required for regular aviation purposes in the Airport West Precinct. Terminal 3 and Terminal 4 will remain as passenger terminals until 2025, after which the redundant terminal buildings will be demolished, as they have reached the end of their useful life.

After 2025, land within the Airport West Precinct will progressively become available for complementary, non-aviation land uses including offices, retail and commercial. The existing services and established road network with abundant car parking is available for use (and re-use) by complementary land uses. This will include, for example;

- high-amenity office park,
- destination themed retail park, and
- establishment of land uses, such as entertainment and leisure, which may not be permitted in other localities closer to noise sensitive land uses.

As outlined in Section 2.6, the City of Belmont's Development Area 6 (DA6) abuts Airport West. Structure planning is progressing for DA6, and current plans are to focus on providing medium to high density residential land uses surrounding the Redcliffe Station being constructed as part of the Forrestfield-Airport Link project.

The rate of commercial development within this precinct is dependent on market demand for land. In the next five years it is expected that non-aviation developments will continue at an average rate of approximately eight to 10 hectares per year.

Although the demand for new office development has been low, this is anticipated to increase over time, assisted by the expected uptake in the use of the Forrestfield-Airport Link rail services to Redcliffe Station and the increased surrounding residential population. This population will be ideally located for easy access to employment opportunities within the precinct.

Airport West currently has 10,210 parking bays. Following the consolidation of all commercial air services to Airport Central, these car parking areas will offer redevelopment opportunities.

The scale of commercial development within Airport West is envisaged to be commensurate with a 'Neighbourhood Centre', as defined under the State Planning Policy 4.2 Activity Centres for Perth and Peel. Redcliffe Station is due for completion in 2021, and the principles of creating a Transit Oriented Development with high intensity land uses is being sought by the City of Belmont, Perth Airport and the State Government as part of the METRONET project. It is envisaged that land uses in the precinct will leverage the opportunities that a Transit Oriented Development brings, and be centred around retail, entertainment, leisure and recreation in a high amenity, walkable 'high street' 24/7 setting for the future increasing local residential population, the growing employee base on the estate and the wider population of Perth.

The southern portion of the precinct is envisaged to accommodate commercial land such as bulk goods/retail showrooms. Other desired land uses include health and medical, and education and training, to provide convenient services for the growing nearby population and eastern suburbs (detailed in Section 3). Land use planning in the precinct may also extend to include private passenger transport by way of, for example, vertical take-off and landing aircraft in the future.



Figure 5-3 Airport South Precinct
Source: Perth Airport

5.3.3 Airport South Precinct

The Airport South Precinct comprises approximately 237 hectares of land and will continue to be developed for a range of aviation and non-aviation uses, with a focus on logistics and distribution facilities. The precinct is shown in Figure 5-3 and is supported by quality transport links and infrastructure.

The Airport South Precinct is zoned for commercial use. Table 5-3 highlights buildings constructed within the past five years with those that are currently under construction.

Building Tenant	Nature of Use	Approx. area (hectare)
FedEx	Freight distribution warehouse	0.8
Geodis	Warehouse and Office	0.94
Siemens	Warehouse and Office	1.17
Fuchs & Speno	Warehouse	1.46
Epiroc	Warehouse and Office	1.8

Table 5-3 Non-aviation developments constructed in Airport South within the past five years

Source: Perth Airport

5.3.3.1 Airport South Precinct Non-Aviation Development Plan

It is expected that for the next five years, developments will occur within the precinct (once approved) at a rate consistent with that experienced over the past five years, being on average approximately five hectares of non-aviation floorspace per year.

Airport South is serviced by Tonkin Highway, Horrie Miller Drive and Airport Drive, which provide high commercial exposure for development sites. These sites are envisaged to be available for a range of aviation-related and non-aviation purposes, including industrial (light and general), warehouse, storage, distribution and freight and logistics uses. This precinct may also be developed for office and accommodation, subject to market demand for these uses proximate to Airport Central. Industrial land uses are expected to be predominantly located along the eastern boundary of the precinct. Given the heavy vehicle access currently provided from Horrie Miller Drive, a wider range of non-aviation uses may be developed in the vicinity of this road adjacent to the Airport Central Precinct.

Development opportunities also exist to repurpose under-utilised car parking areas in the precinct for complementary non-aviation land uses. Multi-storey car parks may be constructed in Airport South in the future.

Airport South has an interface with the Airfield Precinct and noting the future development of the new runway (subject to approval), there will be an increase in the aviation workforce on the estate. As such, land uses within this precinct that provide amenity for the growing workforce will be pursued, including retail, food, entertainment, and fuel facilities.





Figure 5-4 Airport Central Precinct
Source: Perth Airport

5.3.4 Airport Central Precinct

The Airport Central Precinct will become the hub for commercial passenger operations. The precinct is shown in Figure 5-4 and is approximately 405 hectares, mainly comprising of Terminal and Airport Services Zones. T1 International, T1 Domestic pier and T2 are located within the Precinct, as well as associated ground transport facilities and the Air Traffic Control tower.

Horrie Miller Drive runs through this precinct, linking from Airport South. Heavy vehicles access the precinct via this road to service various freight and other related land uses. Airport Drive is the main terminal access road linking with Tonkin Highway.

A range of non-aviation developments also exists within the Airport Central Precinct, including retail, office accommodation and car rental facilities. The precinct presents an opportunity for aviation-related development, with direct apron frontage available for some sites. Table 5-4 details the non-aviation development constructed within the past five years.

Building Tenant	Nature of Use	Approx. area (hectare)
Thrifty	Car rental facility	0.55
Europcar	Car rental facility	0.6
Hertz	Car rental facility	0.8
Avis	Car rental facility	1.1
Toll Express	Freight distribution warehouse	5.59

Table 5-4 Non-aviation developments constructed in Airport Central within the past five years

Source: Perth Airport

5.3.4.1 Airport Central Precinct Non-Aviation Development Plan

As shown in the zoning tables in Section 3.3, a range of non-aviation land uses can be developed within the Terminal and Airport Services Zones, subject to approval. The opening of Airport Central Station (as part of the Forrestfield-Airport Link) and planned Multi-Modal Transport Interchange facilities (including multi-storey car parks) will provide the opportunity for complementary non-aviation development within the surrounds to support visitor convenience and experience. A hotel is also planned for Airport Central in a centralised location to the terminals, subject to market demand.

It is expected that for the next five years, ad hoc developments will occur on an as-needed basis as approved, in response to market demand. This is likely to include the redevelopment of under-utilised long-term car parks for other uses, such as food and beverage developments and fuel service stations.

5.4 Impacts of Non-Aviation Development

Any future development will complement, preserve and protect the primary function of current and future aviation requirements. Interim developments may be considered in areas set aside for aviation with suitable break clauses incorporated into the leases. These interim developments will be relatively low capital-intensity uses, such as vehicle storage and warehouses.

Non-aviation development at Perth Airport fulfils an important role supporting economic growth, noting the importance the airport is given within State and Local planning frameworks. As detailed in Section 1.5, the total (direct and indirect) number of non-aviation related full-time employees at the estate is

estimated at approximately 6,768, contributing approximately \$1.274 billion to Gross Regional Product (GRP) annually. In 2025, the total number of non-aviation related full time employees is forecast to be approximately 9,097, contributing approximately \$1.84 billion to GRP annually, increasing to approximately 18,000 employees, and contributing approximately \$3.9 billion to GRP annually in 2040.

5.5 Consistency with State and Local Government Planning

As discussed in Section 2.5, Perth Airport is identified as a 'Specialised Activity Centre' under the State Government's planning framework, which supports the growth of economic activity at Perth Airport as an employment generation hub.

The non-aviation development of Perth Airport is consistent with the Specialised Activity Centre designation. The estate creates a consolidated business and commercial hub that caters to companies seeking access to passenger and freight air services. These companies can take advantage of the location of the airport estate in close proximity to other transport modes, including the Kewdale rail freight facility, the Forrestfield-Airport Rail Link, major highway and regional road networks and, via those roads, the Port of Fremantle.

This Master Plan 2020 has been developed to be consistent with planning undertaken in the cities of Belmont, Swan and Kalamunda. The non-aviation development plans in particular have been guided by extensive engagement with State and Local Government. In preparing this Master Plan 2020, Perth Airport conducted workshops with key stakeholders to ensure planning for non-aviation development remains complementary to, and representative of, the aspirations of the surrounding areas.

Each precinct has defined zones which outline the discretionary land uses. These zones have considered the applicable State and Local Government planning frameworks and have sought to complement and support these to the fullest extent possible.

As discussed in Section 2.7, the estate adjoins the cities of Belmont, Swan and Kalamunda. The development of the estate as an activity centre providing economic and employment opportunities, will be complementary to and consistent with, the planning being undertaken by these Local Governments, where possible, to grow the resident population by way of infill development. Planning for non-aviation development will include, amongst other land uses, opportunities for nearby residents to access goods, services and amenity.

5.6 Design Guidelines for Non-Aviation Development

Perth Airport has prepared Design Guidelines for the Airport North, Airport West, Airport South, and Airport Central precincts.

The Design Guidelines provide built form and site development standards to encourage the development of contemporary buildings of a high design quality adding to the corporate image of the tenant and the overall vision of Perth Airport as a premier commercial and industrial location. In line with the objectives of precinct planning, sustainable outcomes that create safe, attractive and connected places offering high amenity for visitors and the local workforce are encouraged. Further, non-aviation development on the estate is encouraged to promote environmental and Aboriginal heritage values.



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Section 6: **Ground Transport Plan**

Ground transport planning is critical to the continued growth of Perth Airport and ensuring there is easy access for people coming to and going from the airport.



6.1 Introduction

Ground transport planning is critical to the efficient operation of Perth Airport. The journey to and from the airport often creates the first and last impression for people visiting Western Australia and Perth Airport is working closely with State and Local Governments to ensure road infrastructure provides easy access for all customers.

The development and implementation of the Ground Transport Plan is based on a core principle of seeking to provide multiple options and streamline the efficiency and customer experience for people coming to and going from the airport. This is achieved through integrated planning and adopting a collaborative approach with the State and Local Governments to ensure that the road, rail, shared path, and public transport networks are developed and operated to provide a suitable level of service.

The Ground Transport Plan is focused on the developments which will occur in the next five year period as well as considering the future requirements over the twenty-year planning horizon of this Master Plan 2020.

The key factors informing the Ground Transport Plan and access to Perth Airport are:

- the modes of transport used and how they will change over time,
- meeting the demands of forecast passenger numbers,
- the consolidation of all commercial air services into Airport Central by 2025,
- integration of the Forrestfield-Airport Link rail project into the transport network,
- the anticipated level of commercial development and associated employment on the airport estate,
- the growth in traffic on the roads surrounding Perth Airport generated by activities unrelated to Perth Airport,
- continuing to reduce the convergence of passenger and freight vehicle traffic,
- integration of the airport's ground transport network into the wider local and state-wide networks, and
- providing a safe, secure and sustainable ground transport network.

The key stakeholders involved in the development of the Ground Transport Plan include:

- the State Government Department of Transport, which sets policy and strategic direction for transport throughout Western Australia,
- the State Government Department of Planning, Lands and Heritage, which develops planning policies related to land use and the transport network,
- the Public Transport Authority (PTA), which manages and operates public transport within Perth and the regions,
- METRONET, which is made up of key government agencies including Department of Transport, PTA, Department of Planning, Lands and Heritage, Department of Communities, LandCorp and Metropolitan Redevelopment Authority,
- Main Roads Western Australia (Main Roads), which is responsible for planning, construction and management of the major State roads to the airport,
- Local Governments, which are responsible for the planning, construction and management of local and regional roads adjacent to and connecting to Perth Airport,
- Perth Airport, which is responsible for the planning and construction of roads within the airport estate, and
- the Commonwealth Minister for Infrastructure, Transport and Regional Development, who is responsible for the approval of the Ground Transport Plan, as part of this Master Plan 2020, as well as the approval of any subsequent major development plans required prior to the construction of road network projects.

Perth Airport works with State and Local Governments including Main Roads and the PTA to ensure that the changing demands of Perth Airport operations are reflected in strategic network modelling and planning. Perth Airport also ensures that developments within the airport estate consider the surrounding State and local infrastructure capacity. This engagement will continue to ensure both the internal and external ground transport networks cater sufficiently to meet demand.

6.2 State Planning

The State Government is both the regulator and operator of public transport services, including bus and rail for the Perth metropolitan area, including that servicing Perth Airport. Furthermore, the State Government is the regulator for taxi, rideshare and other commercial vehicle operations which service Perth Airport, in addition to its role setting the policy framework to determine mode share targets for the Perth metropolitan transport network.

Perth Airport is committed to working with State and Local Governments in achieving targets for sustainable transport options and mode share. Perth Airport will undertake this collaboration through co-ordination of projects located at the airport estate boundary, where appropriate.

State and Local Governments are responsible for the road network that surrounds and provides access to Perth Airport. The Ground Transport Plan considers and incorporates the key State Government land use and transport strategies which directly impact Perth Airport.

Figure 6-1 shows the location of Perth Airport in the context of metropolitan transport.

6.2.1 Perth and Peel @ 3.5 Million – The Transport Network

Perth and Peel @ 3.5 Million - The Transport Network (2018) was prepared by the State Department of Transport with the intent of guiding the long-term planning of transport infrastructure for the Perth metropolitan region. The Transport Network provides a framework to develop an efficient transport network catering for Perth's population as it approaches 3.5 million people and beyond.

This Master Plan 2020 is consistent with the intent of the Transport Network framework, in providing capacity to support the ongoing growth of Perth's population and subsequent required transport infrastructure.

6.2.2 State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning

The State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning (2019) (SPP 5.4) identifies primary freight roads and rail routes within the Perth metropolitan area, with the objective of promoting a system in which sustainable land use and transport are mutually compatible. The policy delineates both Tonkin Highway and Great Eastern Highway as Primary Freight Routes and identifies CBH Forrestfield, adjacent to Perth Airport, as an intermodal (rail to road) facility.

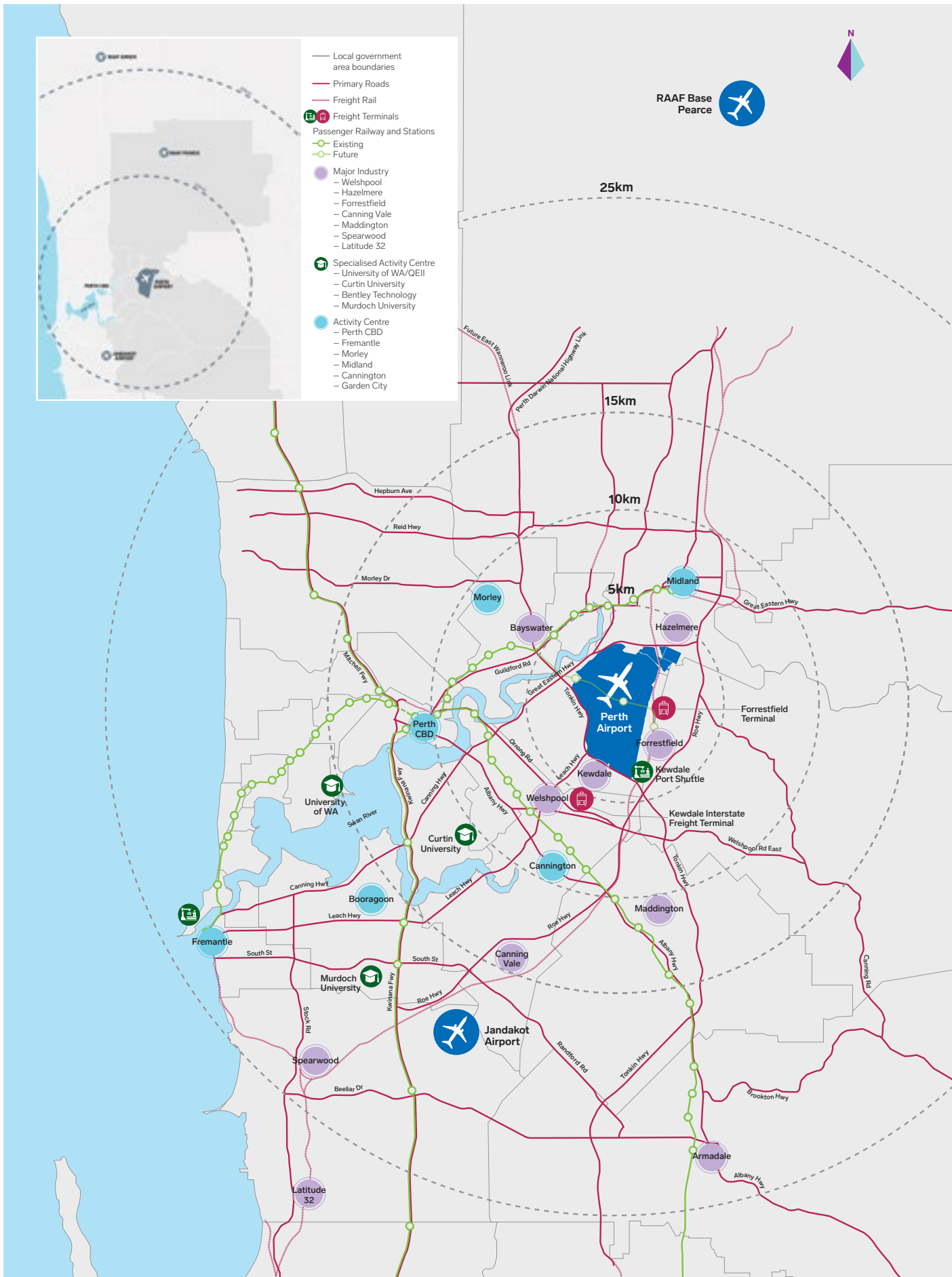


Figure 6-1 Perth Airport in the context of metropolitan transport
Source: Perth Airport

6.2.3 Western Australian Regional Freight Network Plan

The Western Australian Regional Freight Network Plan (WARFNP) identifies that the growing inner-metropolitan, Kewdale, Forrestfield, Perth Airport and Kwinana areas support Western Australia's freight activities, and that these areas will continue to represent convergence points for both metropolitan and regional freight and logistics activities. This Plan identified the need for the State Government to deliver the Gateway WA project to ensure growth in regional traffic does not constrain the freight performance of the Kewdale and Forrestfield intermodal terminals, Perth Airport and adjacent industrial precincts.

6.2.4 Westport: Port and Environs Strategy

The Westport: Port and Environs Strategy is currently being developed by the Department of Transport to provide guidance to the State Government on the planning, development and growth of the Port of Fremantle and Port of Bunbury, and also the required rail and road networks that contribute to the handling of the growing trade task.

The Strategy is focused on delivering a sustainable and globally responsive long-term supply chain strategy to optimise freight, trade and logistics needs from Fremantle and Kwinana to Bunbury. It is anticipated that strategy implementation will begin within the timeframe of this Master Plan 2020.

The Airport, neighbouring rail freight facilities and the availability of land supported by the surrounding major road freight network have led to the area being an attractive location for transport dependent businesses, making the area an important part of the State's freight and logistics supply chain.

The potential for a future intermodal development within the airport estate would contribute to future container rail activity to the port(s). This supports the State Government's target of rail accounting for a 20 per cent mode share for freight movements in WA.

6.2.5 Eastern Metropolitan Regional Council Regional Integrated Transport Strategy Action Plan

The Eastern Metropolitan Regional Council (EMRC) Regional Integrated Transport Strategy (RITS) Action Plan forms part of the land use and transport planning for the eastern region of the Perth metropolitan area. It translates the high-level, whole of metropolitan area land use and transport planning undertaken by the State Government and applies it to the regional network. This includes roads that directly integrate with and impact the Perth Airport estate.

6.3 Current Road Network

In addition to Perth Airport funded projects within the estate, both the State and Commonwealth Governments have contributed significantly to fund infrastructure supporting the transformation of Perth Airport in recent years, including improving road access to the airport to support the consolidation of all commercial air services to the Airport Central Precinct.

6.3.1 Gateway WA

Access to Perth Airport was significantly improved with the April 2016 completion of the \$1 billion Gateway WA project, at the time Western Australia's largest-ever road project.

The Commonwealth Government provided \$676 million and the State contributed \$310 million to fund the development, with Perth Airport supporting the project through the contribution of 30 hectares of land, a financial contribution, and the construction of roadworks valued at \$35 million within the estate. Gateway WA improved the safety and efficiency of one of the State's most important freight transport corridors, and included:

- upgrading Tonkin Highway between Great Eastern Highway and Roe Highway to six lanes,
- a major freeway-to-freeway interchange at Tonkin Highway and Leach Highway,
- upgrading Tonkin Highway and Roe Highway interchange to a partial freeway-to-freeway interchange,
- a new interchange at the Tonkin Highway, Horrie Miller Drive and Kewdale Road intersection,
- a new interchange at the Leach Highway and Abernethy Road intersection,
- upgrading Leach Highway between Orrong Road and Tonkin Highway to an expressway standard and associated upgrades to local roads and intersections in the Kewdale area,
- Airport Drive constructed by Perth Airport as new passenger access to the Airport Central Precinct,
- a new interchange at Boud Avenue leading to T3 and T4 (known as the Dunreath interchange), and
- an extension to the principal shared cycling and pedestrian path network along Tonkin Highway and Leach Highway.

6.3.2 Road Network Hierarchy

The road network in Western Australia is categorised by a functional hierarchy that represents the role that the road is intended to perform. The hierarchy is determined by a range of criteria, including location, degree of connectivity, predominant road use, indicative traffic volume, and recommended operating speed.

Perth Airport is well served by the metropolitan primary main road network, connecting the airport with the Perth CBD and the major metropolitan areas. The Primary Distributor roads surrounding the airport are managed by Main Roads WA. Lower-order roads (Distributor A, Distributor B, Local Distributor and Access roads) feeding into the primary road network are managed by the three Local Government authorities (cities of Belmont, Swan and Kalamunda) that adjoin the estate. The road hierarchy relevant to Perth Airport includes:

- Primary Distributor: Tonkin Highway, Great Eastern Highway, Great Eastern Highway Bypass and Roe Highway, which provide for major traffic movement and carry large volumes of generally fast moving traffic,
- Distributor A: urban area roads in built up areas that carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributor roads,
- Distributor B: similar to Distributor A roads, but with reduced capacity due to flow restrictions (often older roads with a traffic demand in excess of that originally intended),
- Local Distributor: roads that link Distributor roads (A and B) to access roads, and
- Access Roads: provide access to properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function.

Figure 6-2 shows the road hierarchy network surrounding the estate.

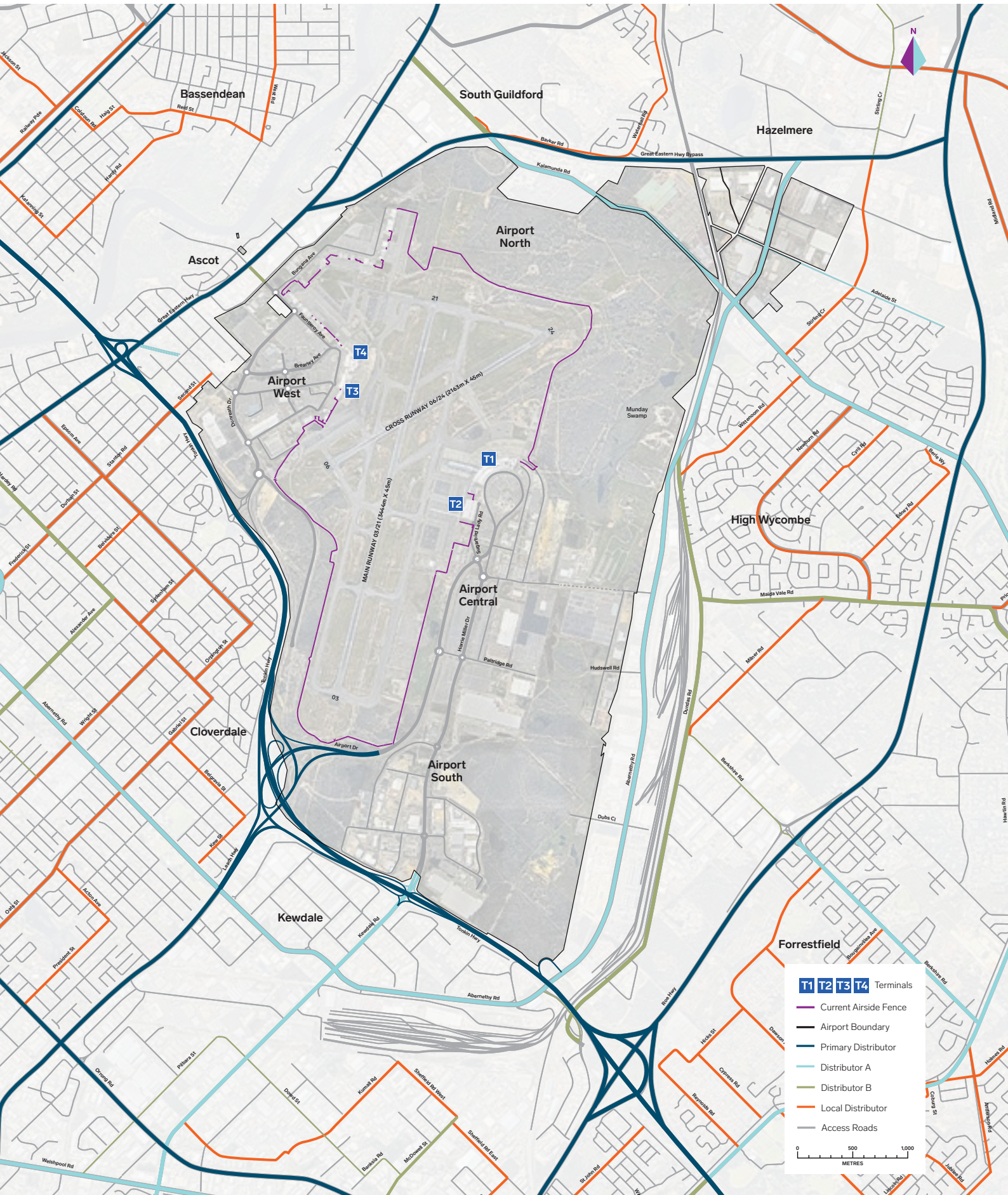


Figure 6-2 Main Roads WA road hierarchy
Source: Aurecon



Figure 6-3 Existing road network within and around Perth Airport
Source: Perth Airport

6.3.3 Access to Perth Airport

The close proximity of Perth Airport to the CBD enables good off-peak access via the arterial road network. During morning and evening peak periods, the road network surrounding Perth Airport facilitates significant volumes of commuter traffic. The peak periods for passengers using the Perth Airport passenger terminals currently differs to the traditional metropolitan commuter peak periods, reducing the impact of the airport traffic on the surrounding road network capacity at peak times.

As shown in Figure 6-3, the main access to the passenger terminals within the Airport Central Precinct is through the grade separated Tonkin Highway, Leach Highway and Airport Drive intersection.

Constructed by Perth Airport, Airport Drive is the designated primary access to Airport Central and all road signs direct traffic for T1 and T2 onto this route. It has been designed and land safeguarded to allow future upgrade to provide a three-lane dual carriageway access to the airport terminals.

The secondary access point into the Airport Central Precinct is the Tonkin Highway, Horrie Miller Drive and Kewdale Road intersection. This intersection was upgraded as part of the Gateway WA works to a grade separated single point intersection, controlled by a set of traffic signals providing access to Airport South and Kewdale industrial areas. Traffic for T1 and T2 is not directed along this route as it is intended primarily for commercial vehicle access. Traffic between the Perth CBD and the airport is directed onto the Great Eastern and Tonkin Highways, while traffic from the east on the primary road network is directed to use the Roe, Reid and Tonkin Highways.

Grogan Road historically connected to the surrounding local road network before Abernethy Road was constructed; the road was closed in 1987 following the construction of T1, preventing its use for through traffic until it was reopened in 2005. Grogan Road is currently used by local traffic either accessing T1 and T2, businesses on the estate, or as a through route to access the primary road network south and west of the estate. In fact, Grogan Road traffic surveys have determined that this through traffic constitutes a significant portion of overall traffic during commuter peak hours (westbound in the morning peak and eastbound in the afternoon peak), confirming that Grogan Road is being used by non-airport related traffic as a through-route.

Access to T3 and T4 is via the Tonkin Highway and Dunreath Drive grade separated intersection which opened in 2015 as part of the Gateway WA project. Central Avenue was extended from the airport boundary to a new roundabout constructed on Dunreath Drive to provide improved connections to the local road network. Brearley Avenue, the previous access road from Great Eastern Highway to the terminals, was permanently closed in early 2017 to allow the construction of the Forrestfield-Airport Link's Redcliffe Station.

Dunreath Drive will continue to be the main access to the Airport West Precinct after the relocation of Qantas operations to Airport Central by 2025, with Fautleroy Avenue continuing to supply secondary access and Second Street (Stanton Road) providing local access.

Access to the General Aviation (GA) Area is provided by Fautleroy Avenue, from Great Eastern Highway.

The primary road network within and surrounding the estate also forms part of the metropolitan freight network for over-size Restricted Access Vehicles (RAV). There are RAV 4 (27.5 metre B-Double, comprising a towing vehicle and two semitrailers) and RAV 6 (36.5 metre double road train 87.5 tonnes) routes on the estate and RAV 7 (36.5 metre double road train 107.5 tonnes) on Tonkin Highway and Abernethy Road providing heavy vehicle access to the estate. There is a turning restriction at the intersection of Abernethy Road and Grogan Road for all RAV vehicles, with right turns not being permitted either from Abernethy Road into Grogan Road or from Grogan Road into Abernethy Road.



6.4 Public Transport

6.4.1 Rail

The \$1.86 billion Forrestfield-Airport Link is an 8.5 kilometre underground extension of the Perth rail network from Bayswater to Forrestfield, of which 3.8 kilometres is located within the Perth Airport estate. The project is jointly funded by the State Government (\$1.37 billion) and the Commonwealth Government (\$490 million) and is being delivered by the State Government. The rail link, shown in Figure 6-4, will form an integral component of Perth's long-term public transport network to meet existing and future public transport demand. Works on the Forrestfield-Airport Link project commenced in October 2016 and are expected to be completed by 2021.

As part of the Forrestfield-Airport Link project, a rail station (Airport Central Station) is being constructed adjacent to the Air Traffic Control tower within the Airport Central precinct. Passengers will access T1 and T2 via a 280 metre long elevated 'Skybridge' walkway that is currently being constructed by Perth Airport. The new terminal, to be constructed for the relocation of Qantas operations to Airport Central by 2025, will also connect to the Airport Central Station.

The Forrestfield-Airport Link also provides two additional train stations outside the estate at Redcliffe (Redcliffe Station) and High Wycombe (Forrestfield Station).

The route provides a commuter rail service from Forrestfield that connects to Bayswater station on the existing Midland line and ultimately to the Perth CBD. The link runs underground from Forrestfield to the underground stations at Airport Central and Redcliffe before emerging on the western side of the river. As the demand for pick-up, drop-off and parking proximate to terminals in the Airport Central Precinct increases, Perth Airport will look at encouraging the use of rail access to diversify the modes by which Airport Central is accessed and increase the use of more sustainable transport methods.

6.4.2 Network Context

The Perth urban rail network is based on a 'hub-and-spoke' model focused on the Perth Central station, located in the CBD, as the hub which radiates with five separate passenger rail services.

The connection of Perth Airport to the remainder of the metropolitan rail network will offer passengers and employees who work on the estate an alternative means of accessing the airport. Current planning is for trains to run every ten minutes during peak times, providing passengers with an 18 minute journey time between Airport Central Station and the CBD at the same fare payment rates as the rest of the Metropolitan rail network. Perth Airport will continue to work with the Public Transport Authority and the nearby Local Governments to ensure the stations are well connected to other modes of transport.

6.4.3 METRONET

The Forrestfield-Airport Link is the first stage of the State Government's METRONET project, a \$3.6 billion passenger rail project comprising approximately 72 kilometres of new passenger rail and up to 18 new stations, as shown in Figure 6-5.

METRONET is the largest single investment in public transport that Perth has seen and is a catalyst to convert over 5,000 hectares of land around new stations into desirable places for investment in housing, jobs and services for growing communities.

Perth Airport supports the State Government's investment in METRONET to increase the public transport connection to the airport. Perth Airport will seek to improve connectivity from the Airport Central Station and Redcliffe Station to businesses on the estate not served by the Public Transport Authority bus service.

6.4.3.1 Redcliffe Station

Redcliffe Station is located on State-controlled land, adjacent to the airport estate. This rail station will include a public transport interchange that provides links to local bus services and will focus on general metropolitan commuter passenger demand.

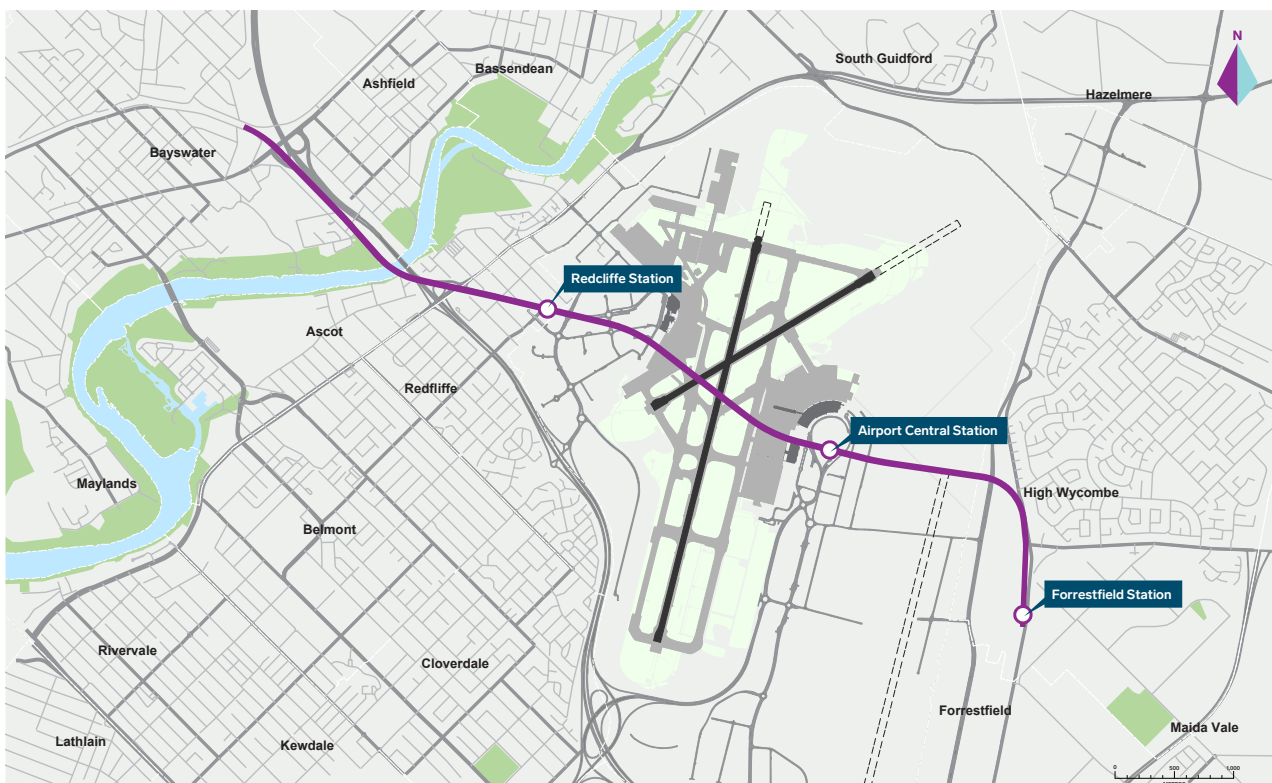


Figure 6-4 Forrestfield-Airport Rail Link

Source: Perth Airport



Figure 6-5 Planned METRONET rail network
Source: METRONET

SECTION 6: GROUND TRANSPORT PLAN

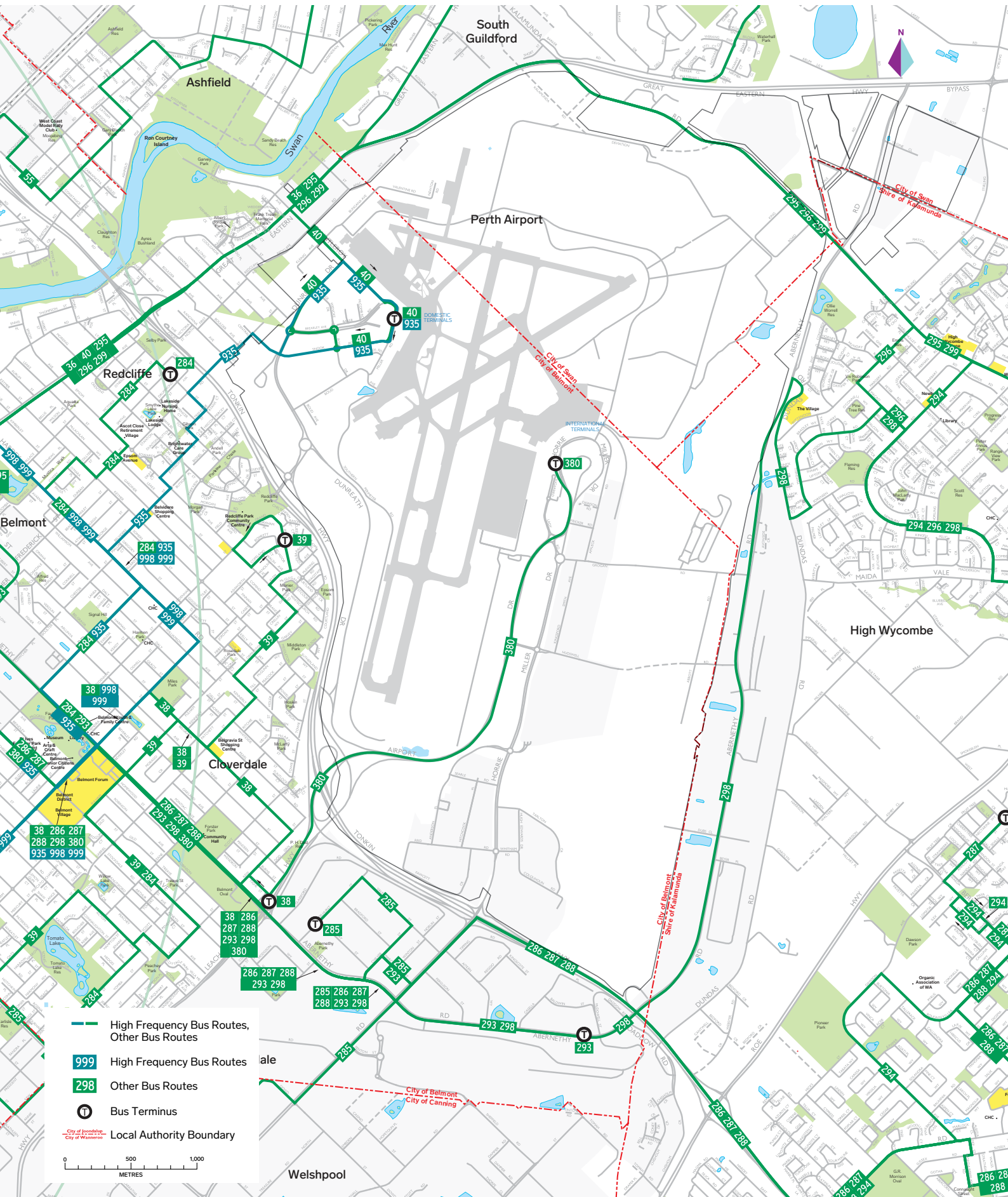


Figure 6-6 Bus routes on and around the airport
Source: Transperth

The associated bus interchange will significantly improve the catchment for public transport serving the area. The station is located less than 900m from T3 and T4 and will be connected by a footpath. After 2025, when all regular passenger transport services consolidate in the Central Terminal precinct, the station will primarily serve the needs of local residents and the Airport West retail and business park users.

In line with State Government and METRONET planning, the land in Airport West in the vicinity of the rail station will be developed along transit-oriented development principles to provide a range of jobs and services.

Perth Airport will continue to work with the Public Transport Authority, METRONET and Main Roads WA to ensure and improve connection to the station by various modes to nearby attractions and employment.

6.4.3.2 Airport Central Station

The Airport Central station is located in the core of the Airport Central Precinct and provides connectivity to the existing T1 and T2 forecourts and the future new terminal.

With the future consolidation of terminals to the Airport Central Precinct by 2025, the Airport Central Station will provide access for the majority of all regular passenger transport aviation services into and out of Perth. Integrating the rail station into the terminal and forecourt areas will provide an effective ground transport system and a high-quality passenger and visitor experience. Construction is nearing completion on Skybridge, a 280-metre elevated walkway connecting the Airport Central station to the terminal forecourts. In future, the Skybridge will also be able to provide elevated walkway links to the new terminal and the proposed future hotel (subject to demand and approval).

Longer term, underground walkways may also be considered for pedestrian access between the Airport Central Station and the new terminal to provide a grade separated access for rail passengers, as well as linking future commercial developments within the Precinct.

The rail link will provide an alternative to the current road-based access to the airport. Perth Airport will work with the Public Transport Authority to improve services to the airport and to seamlessly link the Airport Central Station with the surrounding facilities and nearby employment.

6.4.3.3 Forrestfield Station

Forrestfield Station is located on State controlled land, approximately 500m east of the estate boundary. The station will be a major transport interchange, with a park and ride facility with approximately 2,500 parking bays and a public transport interchange, with links to local bus services.

6.4.3.4 Bus Services

As shown in Figure 6-6, Airport Central is currently served by a Transperth public bus service that connects Perth Airport to the Perth CBD. Route 380 operates through the suburb of Belmont and along Airport Drive to service T1 and T2. The journey time is approximately 45 minutes between the airport and the Perth CBD. Upon completion of the Forrestfield-Airport Link this service is likely to become obsolete. Perth Airport will continue to work with the Public Transport Authority to reallocate these resources to better service those suburbs that are not served by the Midland line and Forrestfield-Airport Link.

While the ultimate services and routes are still to be finalised by the Public Transport Authority, Redcliffe Station and Forrestfield Station will incorporate bus interchanges to facilitate improved public transport connection to the airport from the surrounding suburbs. Perth Airport will continue to work with the PTA to confirm new and amended Transperth bus routes to and from the Airport Estate.



6.5 On Airport Traffic

The Ground Transport Plan caters for all activities on the estate including:

- passengers,
- employees,
- commercial development, and
- freight.

Almost 70 per cent of traffic on the estate is directly related to aviation activities, and the predominant mode of access to and from Perth Airport is road-based transport, both public and (primarily) private. Although the opening of the Forrestfield-Airport Link in 2021 and subsequent reallocation of bus services will have a significant impact on travel choice and behaviour to and from the airport, road-based transport is expected to remain the predominant mode for the next five years and throughout the planning period of this Master Plan 2020. Mode shares will change as the use of automated vehicles, ridesharing and Mobility as a Service (the shift away from personally-owned modes of transportation and towards mobility solutions that are consumed as a service) becomes widespread.

The 2015 mode split and projected change in passenger travel modes to and from Perth Airport for 2025 and 2045 are shown in Figure 6-7.

State and Local Governments are planning for and identifying opportunities to balance the transport mode share, which is currently dominated by car-based private vehicles in the Perth metropolitan area, towards more sustainable alternatives through initiatives including:

- investing in new infrastructure and services in road, rail and public transport,
- encouraging travel demand management for employees and contractors around key activity centres, and
- the provision of additional public transport options for both aviation passengers, and employees and contractors at Perth Airport.

Measures may include the provision of new infrastructure such as paths, shelters and end-of-trip facilities for cyclists and pedestrians, as well as improved access to public transport. Perth Airport will work with all relevant stakeholders to ensure a diverse range of transport infrastructure is available.

6.5.1 Emerging Technologies

Planning for the short and long-term needs to consider emerging technologies that are disrupting the more traditional ground transport options, in addition to the Forrestfield-Airport Link that will provide an alternative mode choice for accessing the airport from 2021.

The introduction of rideshare services has already seen changes in mode share, as more passengers choose to be dropped off on the forecourt as opposed to parking in the short or long term car parks. It is anticipated that this rate of change will increase.

Automated vehicles are expected to have an even greater impact. Fleet or privately-owned autonomous vehicles will be able to drive themselves to and from the airport, reducing demand for airport car parks but increasing the need for drop-off and pick-up facilities located close to the terminals.

The timing and scope of the developments and initiatives outlined in this ground transport plan are therefore flexible and will be determined by the close monitoring of ground transport trends and mode shares as they emerge.

Emerging technologies can also represent opportunities to improve ground transport and access to the airport. These are discussed in more detail in the following sections.

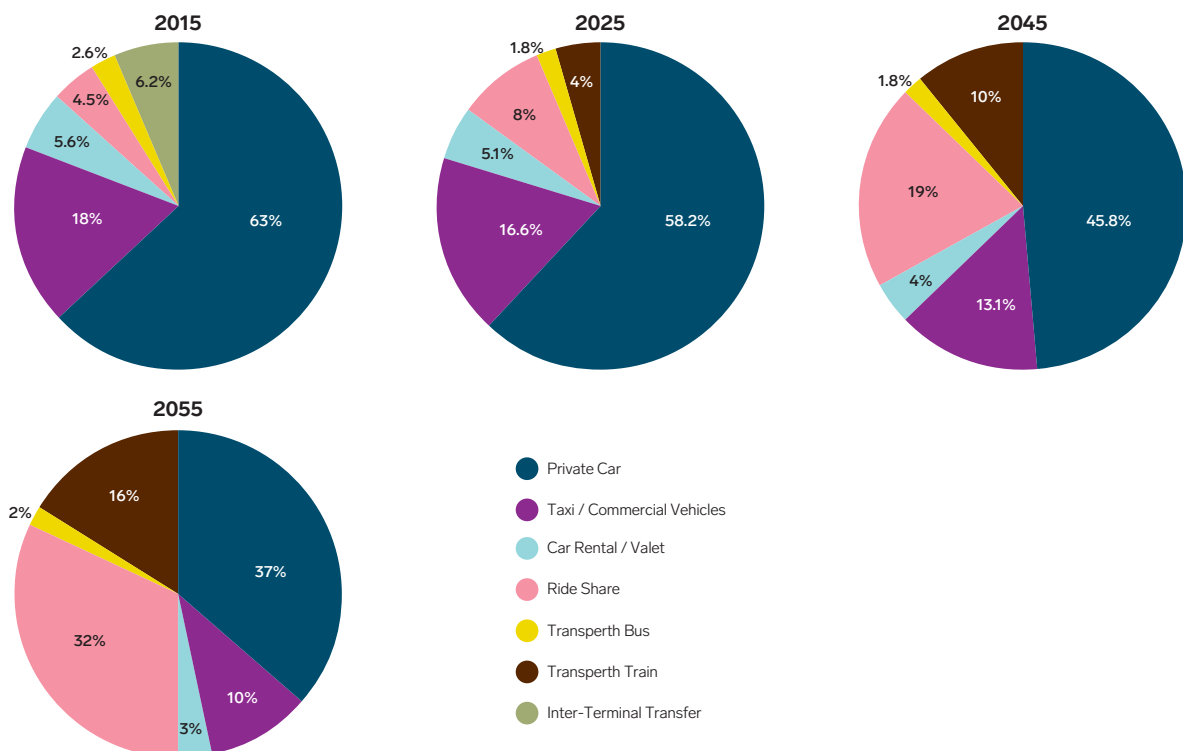


Figure 6-7 2015 and projected passenger travel modes to and from the airport
Source: Aurecon

6.5.1.1 Smart Traffic Management

In the short-term, additional smart traffic management measures are proposed to optimise the existing ground transport network. Harnessing the power of technology dramatically changes how Perth Airport operates and optimises transport networks. Rapid changes in how data can be collected and analysed in real time, will enable network operators to make informed operational decisions to improve network efficiency, safety and customer experience. Implementation of smart traffic management technology assists in managing transport networks under normal conditions, during periods of heavy congestion and when managing planned or unplanned incidents.

There are opportunities for Perth Airport to implement smart traffic management to further optimise the use of the road network and parking infrastructure, improving travel time for commuters and delaying the requirement for significant capital expenditure. The project opportunities of particular interest are:

- Foundation infrastructure – vehicle detector stations on each lane of the main access roads and key locations, which provide real-time information of traffic volumes and issues on the network. The fibre optic backbone would link back to Perth Airport operations centre, with associated control systems to monitor and display the information (see Variable Message Signs). Additional CCTV coverage would also be considered to allow visual validation of congestion or other issues on the network,
- Variable Message Signs (VMS) – digital signage is a practical example of smart traffic management that can improve customer experience and manage congestion. VMS allows airport operational staff to dynamically control messaging to road users to manage the traffic in a way that optimises traffic flow for a range of different conditions at the airport. Variable messaging on the airport road network and on the Perth Airport mobile app will be aligned with relevant Main Roads standards and guidelines as below.
- Smart parking sensors and/or use of existing CCTV can be used for pick-up and drop-off or in car parks, with end-to-end navigation to guide drivers to an available bay and smart matching between car size and bays. This concept can be extended to the use of ground positioning systems (GPS) to guide automated vehicles towards vacant spaces in car parks and on forecourts.

Standards and guidelines for smart traffic management have already been developed by Main Roads for the external road network. Smart traffic management at Perth Airport will be aligned with these standards to ensure a seamless journey for those travelling to and from the airport.

6.5.1.2 Rideshare Services

Since the introduction of Uber to Perth in 2014 and Ola in 2018, the proportion of people choosing to park their car at the airport has declined as passengers increasingly choose to use rideshare services.

The decline in demand for parking at Perth Airport and the corresponding rise in demand for drop-off and pick-up facilities will be closely monitored by Perth Airport to ensure that necessary infrastructure is available to accommodate these and other new rideshare services.

6.5.1.3 Automated Vehicles

Automation of vehicles is to emerge as a viable option within the next five years and will most likely be widely adopted within the 20-year planning horizon of this Master Plan 2020. By removing the driver, rideshare services may become significantly cheaper, resulting in an increase in the proportion of passengers accessing the airport this way. This would result in an increase in demand for pick-up and drop-off facilities.

Similarly, as private ownership of automated vehicles increases, the proportion of customers choosing to use pick-up and drop-off facilities and have their vehicle drive itself to and from their residence or nearby remote parking facility would increase. This remote parking may include Perth Airport car parks.

Although the development of MMTI facilities (including multi-storey car parks) represents an opportunity to increase the capacity of pick-up and drop-off facilities, Perth Airport will continue to monitor ground transport mode share and will consider demand management to ensure all ground transport modes are operating as efficiently as possible.

The automation of logistics delivery vehicles is also anticipated. Automated vehicles may rely on or have their operation enhanced by their ability to communicate with other vehicles, infrastructure and transport management systems and mobile devices. Further, automated vehicles may be facilitated by high-resolution digital mapping of the areas they operate in. Perth Airport will consider the technology required to facilitate this communication or other requirements of vehicle automation.

Automated vehicles are also likely to be used in place of the bus services currently used for long term car park and terminal transfers landside and for remote stand passenger transfer airside. Additionally, many of the airside vehicles servicing aircraft, such as cargo dollies and aircraft tugs could be automated.

6.5.1.4 Drone Technology

The use of drones is currently regulated by the Civil Aviation Safety Authority (CASA) under the Civil Aviation Safety Regulations 1998. These Regulations state that drones cannot be used within 5.5 kilometres of Perth Airport which precludes any freight, logistics or even passenger transfer operators from using drone technology at the airport. As such, there are no plans at this stage to dedicate any infrastructure for drone operations within this Ground Transport Plan.

Many companies are investigating drone technology for use in the long-term, particularly those in the freight forwarding and logistics industry. As drone technology matures to make their operation safer and more regular it is possible that the Regulations may be amended to facilitate their use around controlled aerodromes. This may present opportunities to operate drone-based, freight forwarding or passenger pick-up and drop-off to increase efficiency and diversify mode share. As many controlled aerodromes fulfil a significant freight forwarding and logistics function, Perth Airport will investigate drone use should the regulatory environment around drone technology evolve.

As the technology evolves, Perth Airport will continue to work with CASA and relevant stakeholders to ensure the ongoing safe operations of the airport and to explore future drone operations.

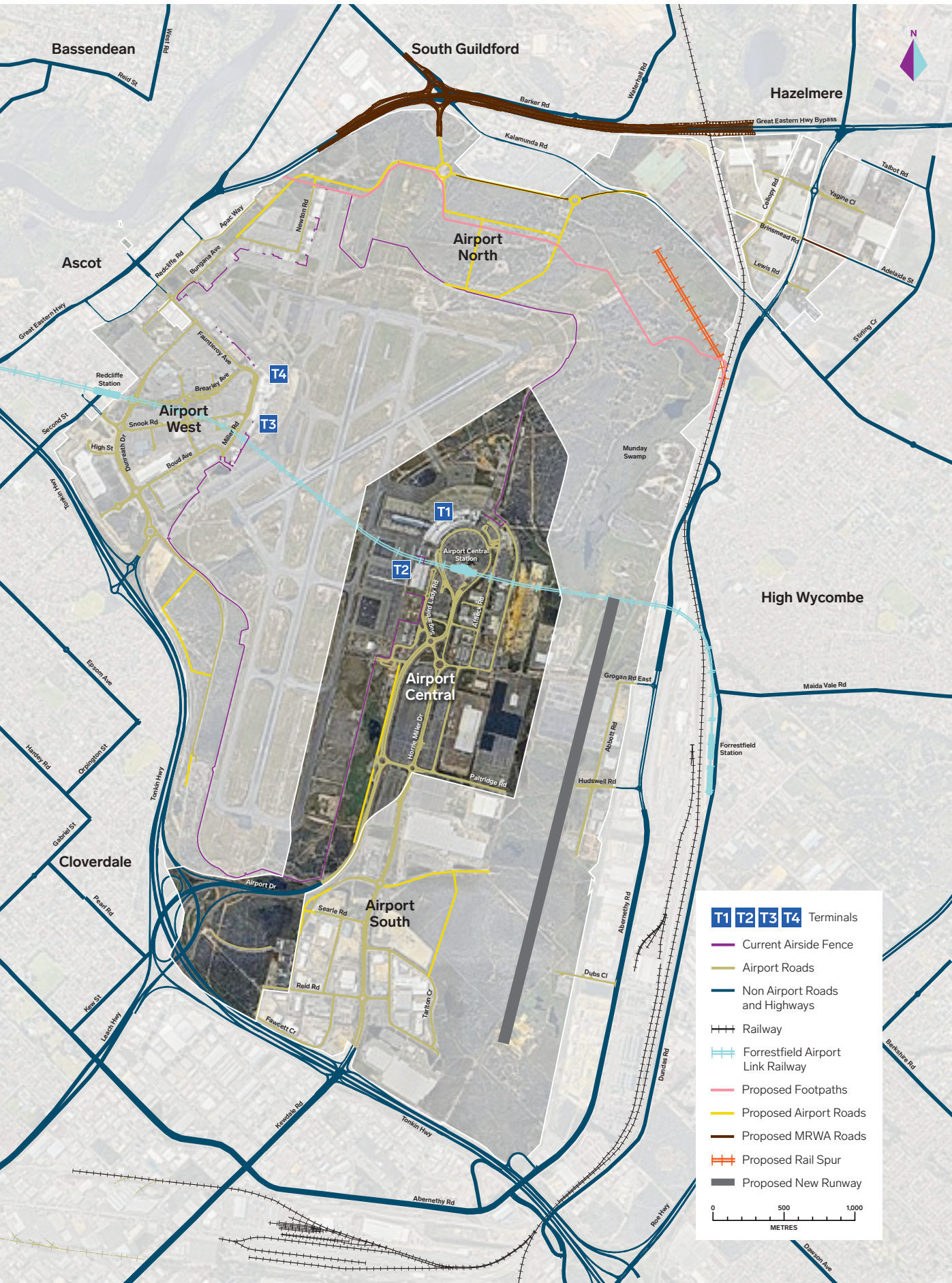


Figure 6-8 Proposed five year ground transport plan concept for Airport Central
 (Road layout to be confirmed during MDP development)
 Source: Perth Airport

6.6 Airport Central Precinct

The primary access to the Airport Central Precinct for terminal-related traffic is via Airport Drive, with freight traffic using Horrie Miller Drive.

Airport Drive is the primary traffic route to T1 and T2 and ultimately to all terminals following relocation of Qantas operations to the Airport Central Precinct by 2025. It is currently constructed as a dual carriageway with two lanes in each direction and designed to be widened to three lanes as traffic volumes increase in the future. Major intersections on Airport Drive are currently roundabout controlled, as this facilitates turning movements and ensures the free flow of traffic to the terminals. The increased traffic volumes expected with the relocation of Qantas operations to Airport Central will require the upgrade of these intersections, with the ultimate configuration requiring grade separation.

With the relocation of Qantas operations into this precinct and the forecast growth in passenger numbers, vehicle traffic volumes will experience a step change in demand by 2025. Terminal-related traffic in Airport Central is projected to increase from 30,000 vehicles per day in 2018 to almost 50,000 vehicles per day in 2025, and to 90,000 vehicles per day by 2045. The majority of the increase will be passenger related traffic concentrated on Airport Drive.

Year	Million Passengers per Annum	Total Traffic		
		Airport Drive (Vehicles per day per direction)	Horrie Miller Drive (Vehicles per day)	Terminal-Related Traffic (Vehicles per day)
2018	8.2	30,000	13,500	30,000
2025	16.6	48,500	32,800	47,800
2035	24.1	64,000	42,200	65,300
2045	32.1	96,900	42,300	90,200

Table 6-1 Predicted terminal-related vehicle traffic using Airport Drive and Horrie Miller Drive

Source: Aurecon

To avoid congestion and ensure free flow to terminals within Airport Central at consolidation, the intersection of Airport Drive with Sugarbird Lady Road will be upgraded. As shown in Figure 6-8, within the next five years, traffic signals are planned to be installed on the roundabout. In the longer term, further improvement will be needed to signalise or grade separate the remaining intersections on Airport Drive as required, dependent on the observed trends in demand.

Perth Airport is committed to collaboration with Main Roads following consolidation, to monitor increase in demands on the Gateway WA network, including key interchanges. The joint Perth Airport / Main Roads Gateway WA Development Agreement identified the trigger mechanism to be used to inform any modifications or upgrades to the network to ensure they are delivered when needed and agreed responsibility for funding.

In the longer term there are also opportunities to achieve significant overall traffic capacity increase by using Airport and Horrie Miller Drives as a one-way loop, with inbound passenger traffic using Airport Drive and outbound traffic using Horrie Miller Drive and a new connecting road back to Airport Drive. In this scenario an additional road would be constructed as a freight route to ensure the segregation of passenger and freight traffic is maintained.

The consolidation and the integration of all domestic and international terminals within Airport Central will require relocation of pick-up and drop-off facilities away from the terminal forecourt road and into the car parks. To provide the required car parking and pick-up and drop-off facilities, two MMTIs are planned to be constructed to support the terminal consolidation. The MMTIs will include multi-storey car parks and facilities for drop-off and pick-up as well as all other ground transport modes, such as car rental, buses and small charter vehicles. As demand increases, non-essential facilities will be moved out of the car parks to locations more remote from the terminals.

With the rise of rideshare services and the mainstream adoption of automated vehicles, the future demand for drop-off and pick-up services close to the terminals is expected to increase. Extra drop-off and pick-up capacity can be achieved through the re-purposing of the MMTIs. When demand requires, the MMTIs could provide separation of drop-off and pick-up facilities on different floor levels. Future demand may also be managed through premium drop-off and pick-up facilities close to the terminals and a free service that operates from a satellite location, most likely in the southern portion of Airport Central or Airport South. This satellite area would be connected to the terminals, Airport Central Station, car parks and businesses by a transit system.

Perth Airport will continue to work with the State Department of Transport to ensure suitably located facilities are provided for all vehicles.

The timing of these developments will be informed by the close monitoring of traffic levels on main access routes to the airport as well as demand for pick-up and drop-off facilities.

6.6.1 Automated Mass Transit

To ensure reasonable levels of service for those passengers choosing to be picked up and dropped off at the future free satellite locations, Perth Airport will investigate the use of Automated Mass Transit systems such as automated buses, trackless trams and automated people movers to connect this location with the terminals and long-term car parks. Such a system could eventually replace the buses transporting passengers and visitors between the various car parks and terminals.

This system could also serve to connect Airport Central Station to the many businesses in other parts of the estate, particularly those in the southern portion of Airport Central and Airport South.

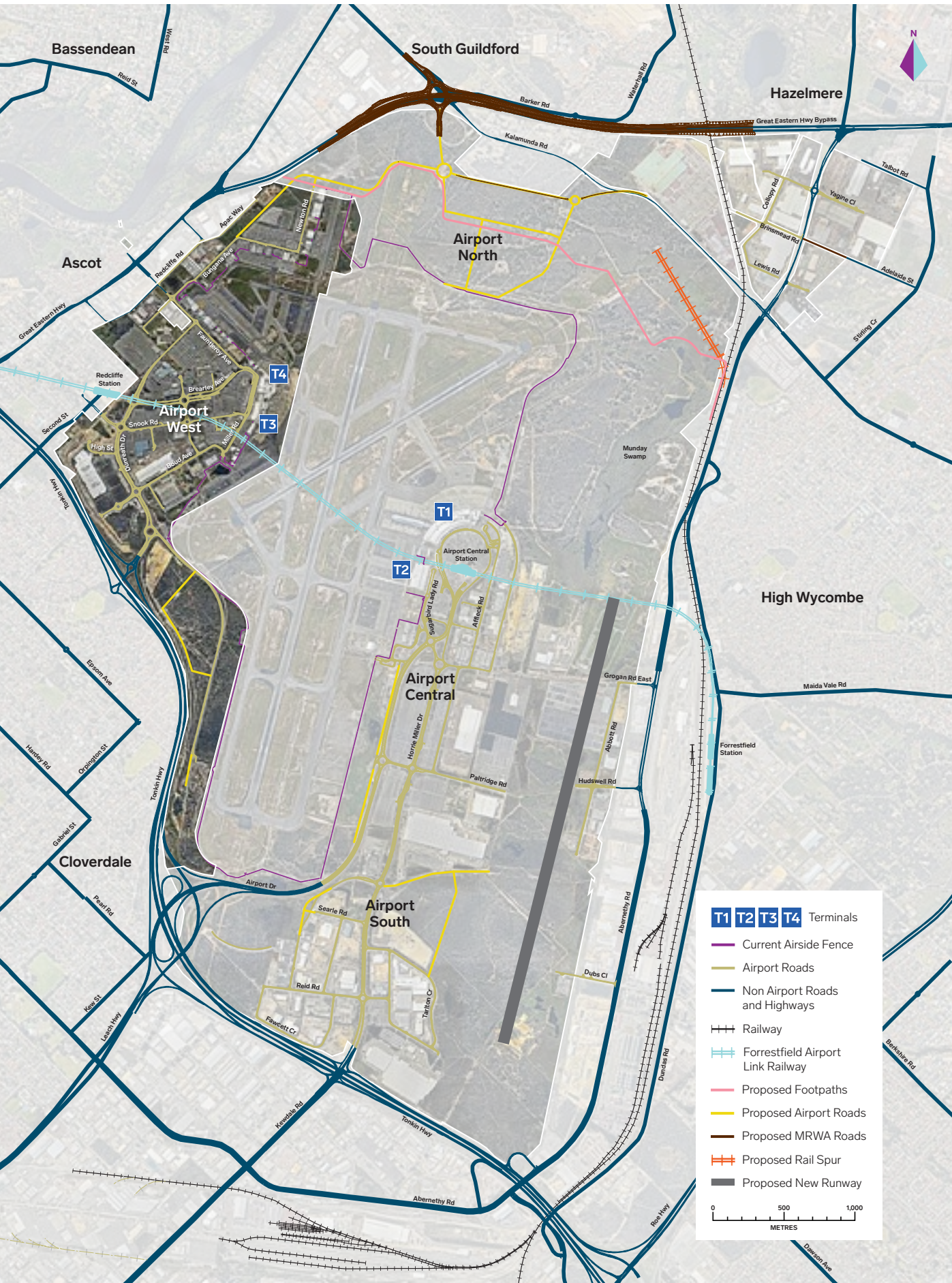


Figure 6-9 Proposed five year ground transport plan concept for Airport West
 (Road layout to be confirmed during MDP development)
 Source: Perth Airport

6.7 Airport West Precinct

The construction of Gateway WA in 2016 has dramatically changed the way Airport West is accessed. Where previously the main access was via Brearley Avenue off Great Eastern Highway, this road was closed in 2017 to make way for Redcliffe Station. The Tonkin-Dunreath interchange is now the primary access to the precinct with secondary access from Fauntleroy Avenue via Great Eastern Highway. To accommodate the terminal traffic that previously used Brearley Avenue, Perth Airport constructed three new roundabouts on Dunreath Drive at Fauntleroy Avenue, Snook Road and Boud Avenue, with this becoming the new route leading to T3 and T4.

The concept for the ground transport network over the next five years within the Airport West Precinct is shown in Figure 6-9 (road layout to be confirmed during MDP development).

Currently the Airport West road network is focused on through-traffic to facilitate access to T3, T4 and the GA Area.

The ground transport plan for Airport West will evolve as land use changes in this precinct. The consolidation of all commercial air services to Airport Central will occur by 2025, and the closure of T3 and T4 will greatly decrease demand on the road network and car parking facilities within the precinct. The modes of transport required will change as priorities for ground transport shift from ensuring passenger access to T3 and T4 to becoming a transit-oriented development that meets the needs of the GA Area and the future business and retail park that is planned. At this time, the road network will be assessed to identify opportunities for repurposing roads and improve amenity in the precinct. For instance, Brearley Avenue may not require four lanes when it no longer facilitates terminal access and two of the lanes could be converted into a linear park retaining the existing spine of established trees in the median strip. Similarly, the roundabouts on Dunreath Drive may be replaced by traffic signals to reflect the changing needs of those accessing the precinct and improve connectivity to the GA Area, nearby businesses, residences and public transport.

The Direct Factory Outlet (DFO) and Costco in Airport West are the first steps towards the development of this precinct into a retail and business park post-consolidation. To reduce the impact on terminal traffic of the DFO commercial development, temporary traffic management was implemented on opening days as well as other high use sale-days. These measures will be maintained in the coming years.

Development Area 6 (DA6) is located in Redcliffe and includes land within the City of Belmont and the Perth Airport estate. It is bounded by Tonkin Highway, Great Eastern Highway, Coolgardie Avenue, Redcliffe Road, Fauntleroy Avenue and the Airfield Precinct. DA6 has been identified as a significant redevelopment area and has been investigated for development by the City of Belmont since 2003. With the construction of the Forrestfield-Airport Link, strategic planning is progressing to maximise the access benefits of Redcliffe Station. Perth Airport will continue to collaborate with the City of Belmont, the PTA and METRONET to ensure good connection between the public transport node at Redcliffe Station, the residential community in DA6 and any proposed developments in the area.

In addition to Perth Airport, METRONET and City of Belmont plans for this precinct and surrounding areas, Main Roads has undertaken a planning review for the portion of Great Eastern Highway to the northwest of this precinct; between Tonkin Highway and the Great Eastern Highway Bypass. Consolidation represents an opportunity to engage with all of these stakeholders to ensure overall ground transport and land use planning is undertaken harmoniously.



6.8 Airport North Precinct

The Airport North Precinct is currently being developed to provide industrial and mixed-use businesses. It is serviced by Kalamunda and Abernethy Roads, both of which form part of the metropolitan regional road freight network.

The portion of land to the south and west of Kalamunda Road, within the Airport North Precinct, will be developed as an industrial, freight and logistics area. Perth Airport will be progressing developments in this area within the next five years as outlined in Section 5 (subject to approval).

Three access points off Kalamunda Road are planned, with the locations to be determined as a part of a broader project re-aligning Kalamunda Road.

Perth Airport has worked with the State Department of Planning, Lands and Heritage, Main Roads, the City of Swan and the City of Kalamunda, as well as the Metropolitan Cemeteries Board, to establish a road layout plan that meets the needs of all stakeholders. This is important to limit the exposure of the nearby residential communities of Hazelmere and High Wycombe to through-traffic. The plan shown in Figure 6-10 is a starting point for a possible future layout, which will be confirmed through the MDP process. The layout shown broadly services the interests of each of the key stakeholders, including:

- Main Roads, to facilitate a high wide load corridor to service heavy industrial businesses on Great Eastern Highway,
- the Cities of Swan and Kalamunda, to facilitate local businesses and to segregate industrial traffic from their nearby residential areas,
- the Metropolitan Cemeteries Board, to remove the bisection of South Guildford Cemetery, and
- Perth Airport, to facilitate RAV7 traffic to service the industrial, freight and logistics developments planned in Airport North.

Perth Airport will continue to work with all stakeholders to develop and evolve the road network options in this area to achieve a mutually beneficial outcome.

Perth Airport will also continue to support the role of Adelaide Street (as identified in the State Government's Hazelmere Enterprise Area Structure Plan) to provide a separation function between future industrial and existing residential/rural-residential areas, subject to an appropriate arrangement being reached.

Access to the Airport North precinct will be further improved by the planned Lloyd Street southbound extension from Midland by the City of Swan which will intersect with the Great Eastern Highway Bypass at Abernethy Road to ultimately form a diamond interchange in line with current State Government planning. Main Roads is also currently undertaking a detailed road planning study to determine the ultimate layout for Great Eastern Highway Bypass between Great Eastern Highway in South Guildford and Roe Highway in Hazelmere. This concept includes a raised interchange at Kalamunda Road, with Great Eastern Highway Bypass travelling above Kalamunda Road. Perth Airport is continuing to work closely with Main Roads to ensure that the intersection does not constrain the proposed extension to the main runway.

An important consideration for ground transport infrastructure for this precinct is the proximate location of the residential areas of Hazelmere and High Wycombe, and in particular, access to future developments.

The extension of Bungana Avenue to form a new intersection with Kalamunda Road, will provide access to the Airport North Precinct as well as improve the traffic flow in the GA Area and reduce demand on Fauntleroy Avenue and its intersection with Great Eastern Highway within Airport West. The attractiveness of this route to provide an alternative through-route for non-airport traffic is recognised and will be factored into the ultimate design and road layout. This access point will be complemented by two additional access points off Kalamunda Road that will be required for the long-term development of the precinct.

The Midland Freight Rail line currently runs along the eastern boundary of the estate and provides the opportunity for a future private rail access spur for the direct delivery of freight by rail into the eastern portion of Airport North. While Master Plan 2014 identified that the future aviation fuel facility was likely to be located within the southern aviation support precinct, further planning is progressing on an alternate potential site in Airport North. The potential rail spur is an opportunity to diversify the modes by which fuel is delivered, further improving the resilience in the fuel supply system to the airport. Although the existing pipeline will remain the primary source of fuel for the airport, a fuel facility in Airport North that can be serviced by road and rail via the intermodal facility would ensure redundancy in the delivery of this vital commodity. Planning for a potential rail spur will include consultation with the PTA and Arc Infrastructure who are the current lessee for operating the WA freight network. The final decision on the preferred location for the future aviation fuel facility is anticipated in late 2019.

Other than the planned access arrangements outlined above and as endorsed by the Local Government and Main Roads, there will be no additional direct lot access onto Kalamunda or Abernethy Roads, which are designated as Other Regional Roads in the Metropolitan Region Scheme, without prior approval.

In the longer term, as Airport North develops, road access will be provided to the GA Area.

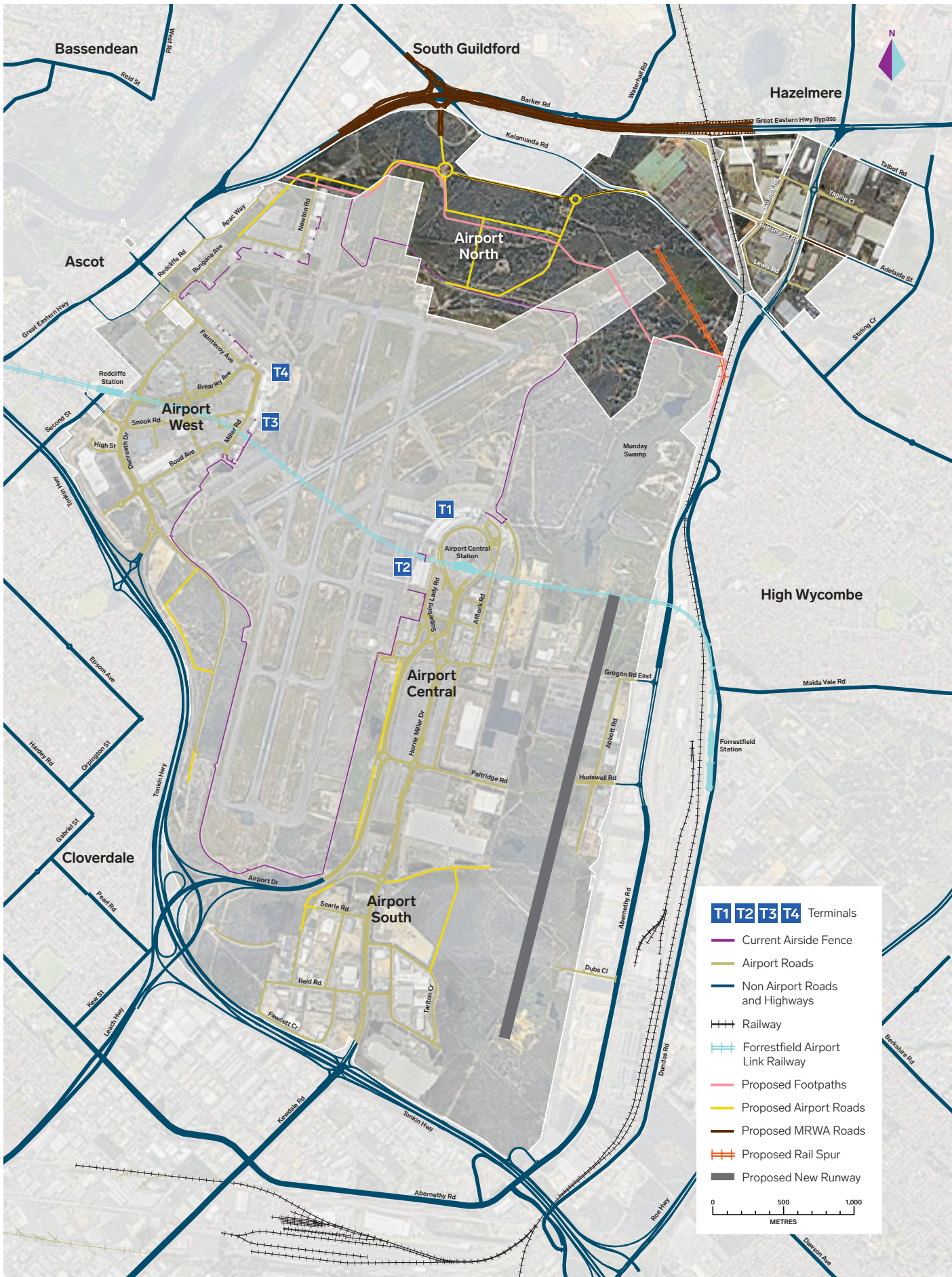


Figure 6-10 Proposed five year ground transport plan concept for Airport North
 (Road layout to be confirmed during MDP development)
 Source: Perth Airport



Figure 6-11 Five-year ground transport plan concept for Airport South
 (Road layout to be confirmed during MDP development)
 Source: Perth Airport

6.9 Airport South Precinct

The Airport South Precinct is primarily accessed via Horrie Miller Drive from the intersection with Tonkin Highway and Kewdale Road. Dunreath Drive previously provided secondary access, connecting this precinct to Airport West, but following the Gateway WA project this road now terminates at the public viewing area to the west of the main runway. Airport South and Airport West are now well connected by Tonkin Highway and Airport Drive with highway-to-highway connections. Perth Airport maintained the precinct connectivity previously provided by Dunreath Drive by extending Anderson Place to connect with Horrie Miller Drive, with a further link proposed to complete the internal road network.

Horrie Miller Drive is a dual carriageway with two lanes in each direction and roundabouts at intersections. Following the construction of Airport Drive, it now functions as the main access for Airport South and as the route for the long-term car park shuttle buses. The long-term plan along Horrie Miller Drive includes the conversion of the current at-grade car parks to multi storey car parking, potentially with integrated commercial development and the increased use of Horrie Miller Drive as a transit spine to the terminals and the Airport Central Station.

In the eastern portion of Airport South, Hudswell Road and Dubs Close will continue to provide freight vehicle access from Abernethy Road, with the remaining portion of Grogan Road also providing access to Abbott Road.

The Transperth 380 bus route runs along Airport Drive. There are currently no Transperth bus stops on Horrie Miller Drive to serve the Airport South Precinct. Perth Airport will work with the Public Transport Authority to establish better public transport connections to this area as it develops into an employment hub, including exploring how the catchment of Airport Central Station could be extended to this area and more remote parts of the estate.

The five year ground transport plan for Airport South can be seen in Figure 6-11.



6.9.1 Re-Closure of Grogan Road

Early planning for the future new runway identified the desire to maintain an eastern access to Airport Central. This was via a tunnel under the new runway, aligned with Grogan Road.

During concept design for the new runway project, the alignment of the tunnel was moved further south to allow for the construction of the future passenger terminal and apron for Qantas operations, and to achieve the necessary runway clearances and tunnel approach and exit gradients. This route, shown in Figure 6-12, makes the route less attractive to the traffic accessing the terminals, being more than 3.1 kilometres longer than the current route along Grogan Road. The associated infrastructure and management requirements for the tunnel also increased significantly. Traffic modelling identified that the performance of the wider regional road network would be similar to that without the tunnel constructed, and the cost-benefit for construction of a tunnel to serve the low volume of traffic bound for locations on the airport estate that would use it could not be justified.

Monitoring and modelling of traffic shows that during the metropolitan road network peak traffic times, the majority (more than 60 per cent) of vehicles using Grogan Road are not bound for destinations on the airport and are instead using the airport road network to access Tonkin and Leach Highways in preference to the regional road network. The alternative to using Grogan Road involves the use of Abernethy Road and Kewdale Road or Roe Highway and Tonkin Highway, depending on the point of origin and ultimate destination. As regional roads, these are all designed to accommodate higher volumes of traffic and are designed for higher speeds.

Many of the businesses that are accessed by this portion of Grogan Road are due to be relocated either when the new runway or the new terminal are constructed, further reducing the airport related traffic demand for such a road connection.

Although the intersection of Roe and Tonkin Highways is currently partially managed by traffic signals, a further upgrade to a full highway to highway interchange is planned for the future. Perth Airport strongly supports this project to further improve access to Welshpool, Forrestfield, Kewdale and the airport estate for those vehicles coming from the eastern suburbs.

A second option being investigated for a permanent alternative to Grogan Road instead of a tunnel, is for an extension of Abbott Road to form a loop-road around the southern end of the new runway. This road would need to be sunk below ground level to avoid interference with the High Intensity Approach Lighting utilised by aircraft approaching the new runway from the south. This route however, presents an even longer route to access Airport Central and the terminals than the tunnel and is not considered to be a viable route to access the terminal from the east. Figure 6-12 shows the options considered.

Perth Airport recognises the importance of the route for network connectivity for regional traffic, but notes that any of the options for replacing Grogan Road would primarily benefit external traffic travelling through the airport, rather than traffic related to terminals or other tenants on the estate. Perth Airport will continue to work with Main Roads WA to investigate the provision of an alternative connection to the east to Abernethy Road.





Figure 6-12 Options considered following the future re-closure of Grogan Road
Source: Perth Airport

6.10 Car Parking

Between 2010 and 2014, Perth Airport significantly expanded the number of car parking bays available to passengers, staff and visitors across the estate. However, the end of the resource sector construction peak and the increase in rideshare services in recent years has seen demand for car parking decline, as shown in Figure 6-13.

Perth Airport has more than 26,000 car parking bays for passengers, visitors and staff across the estate. Current car parking options are shown in Figure 6-14 and Figure 6-15 and include:

- Perth Airport and airline partner valet parking,
- fast track parking, which is premium, covered, extra-wide bays located a one-minute walk from the T3 and T4 check-in areas,
- short-term parking, located immediately outside each terminal, and
- long-term parking, with free regular bus services to each terminal.

With the increasing use of rideshare, automated vehicles and improved public transport connection through the Forrestfield-Airport Link and other potential services, the future demand for car parking is difficult to forecast. Current modelling predicts that by 2040 between 15,000 and 24,000 additional car parking bays could be required, depending on which mode share scenario eventuates.

Although it is consistent with proper planning to restrict parking supply to encourage the use of public transport, this is not always possible for terminal facilities which operate 24/7. However, Perth Airport will consider management of supply and price to optimise and respond to changes in mode share, particularly for purely commercial developments.

The Airport Central Precinct development plans includes a combination of car parking facilities. Car parks servicing the precinct will be located broadly in the same locations as the existing at-grade car parks. It is envisaged that these existing at-grade car parks will be progressively replaced with multi-storey car parks over time to meet demand, with two MMTIs (including two multi-storey car parks) planned to support the consolidation of terminals to Airport Central. These car parks will function as ground transport facilities that also provide space for ground transport service operators, pick-up and drop-off, buses, rideshare and taxis. Where feasible, the MMTIs will be linked to

the terminal buildings with elevated walkways. Underground walkways may be considered in the longer term. The remote long-term parking will be connected to the passenger terminals initially by bus and ultimately by the Automated Mass Transit system. A premium long-term car parking product will continue to be available close to terminals, with (non-premium) long-term parking to be located further from the terminals, possibly in Airport South serviced by connecting buses and the Automated Mass Transit system. Opportunities to install electric car charging in both short and long term parking will be investigated during any parking upgrade project.

Car rental facilities are currently located proximate to the terminals and may eventually be provided within the future MMTIs. In the longer term, traffic levels and demand for car parking may trigger relocation of car rental pick-up and drop-off facilities to a location closer to the highway interchanges, at which point they may also be serviced by the Automated Mass Transit system.

The Airport West development plans include the continuation of at-grade car parks within the precinct to meet the needs of any commercial developments, but may ultimately require multi-storey car parks. There is sufficient parking available within the GA Area.

Developments within the walkable catchment of the Redcliffe Station will not be provided with the same number of spaces as those in locations more remote from public transport.

After consolidation of commercial air services to Airport Central by 2025, it is expected that the demand for car parking proximate to T3 and T4 will be significantly lower. The extent to which existing car parks within Airport West are decommissioned will depend on:

- activities that will ultimately be located in this area as Airport West develops,
- the impact that the Forrestfield-Airport Link has on private car travel mode share, and
- the demand for car park sites.

As shown in Figure 6-16, Perth Airport will continue to develop and provide a range of car parking products to meet passenger, visitor and employee needs and preferences. This range of car parking products will continue to include hourly, premium short-term, short-term, premium long-term and long-term car parking bays.

Land may be progressively converted from car parking to facilitate property development as demands change.

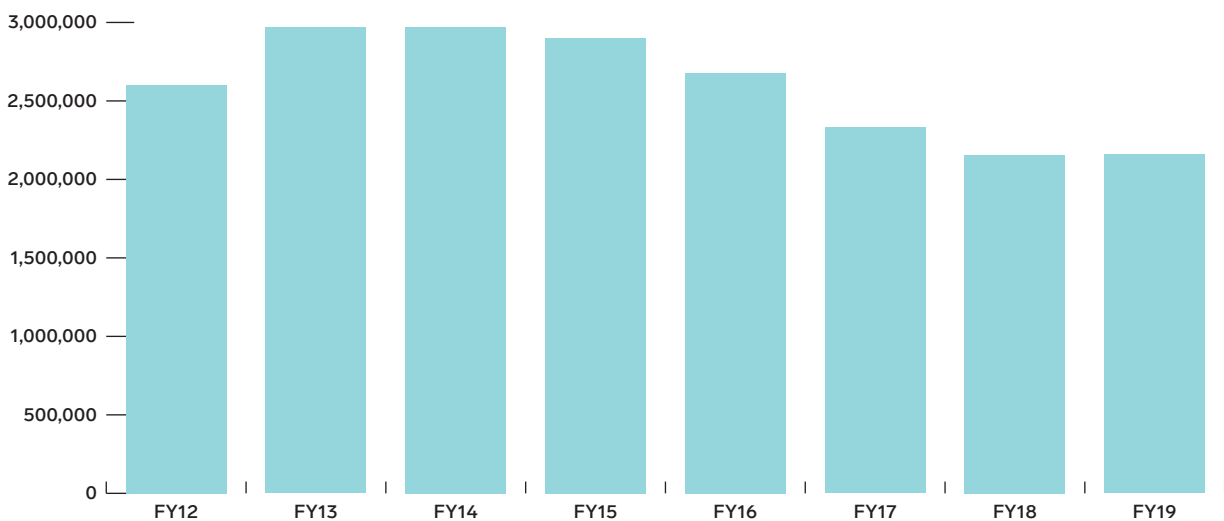


Figure 6-13 Annual Car Parking Transactions
Source: Perth Airport

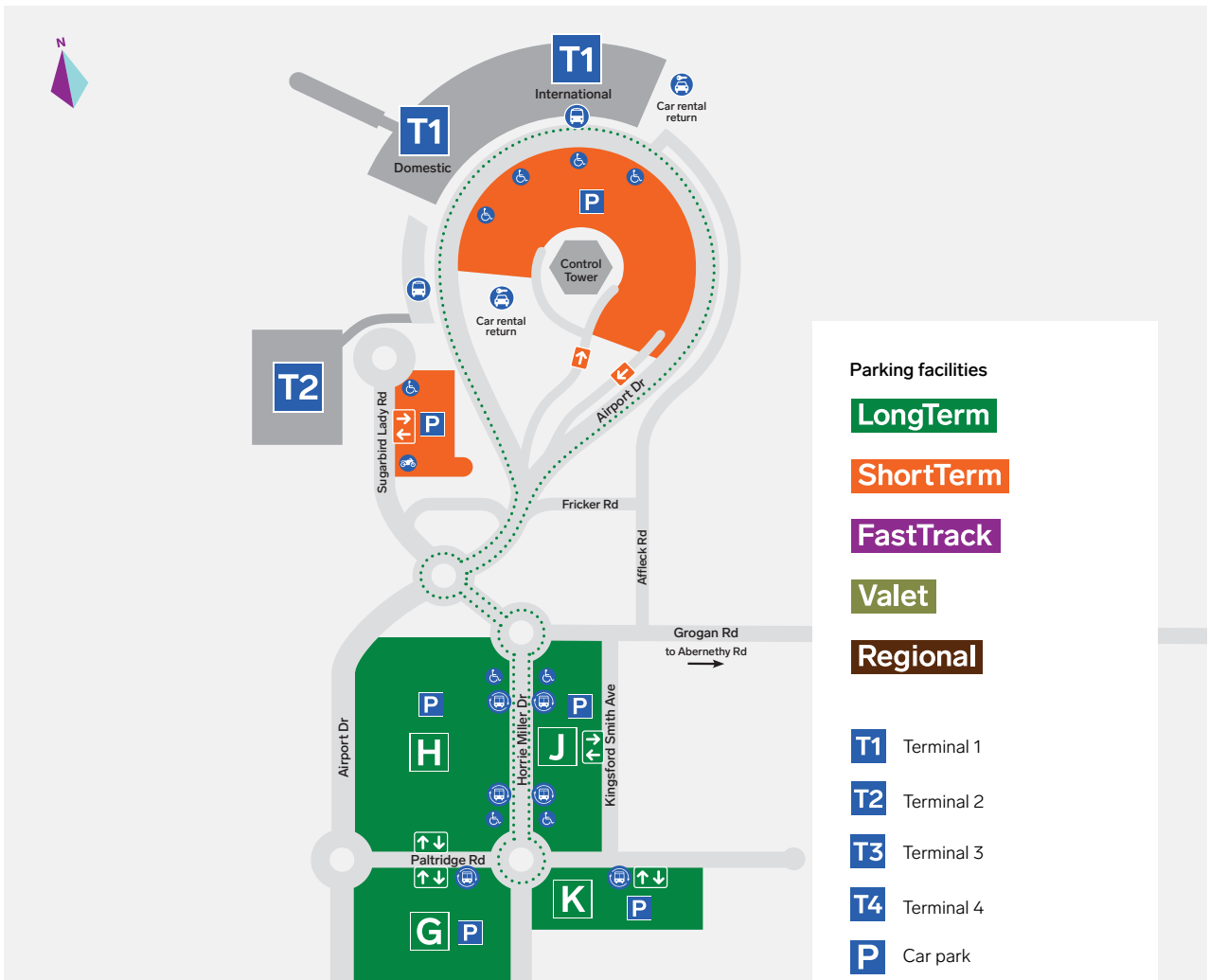


Figure 6-14 T1 and T2 Parking and Transport
Source: Perth Airport

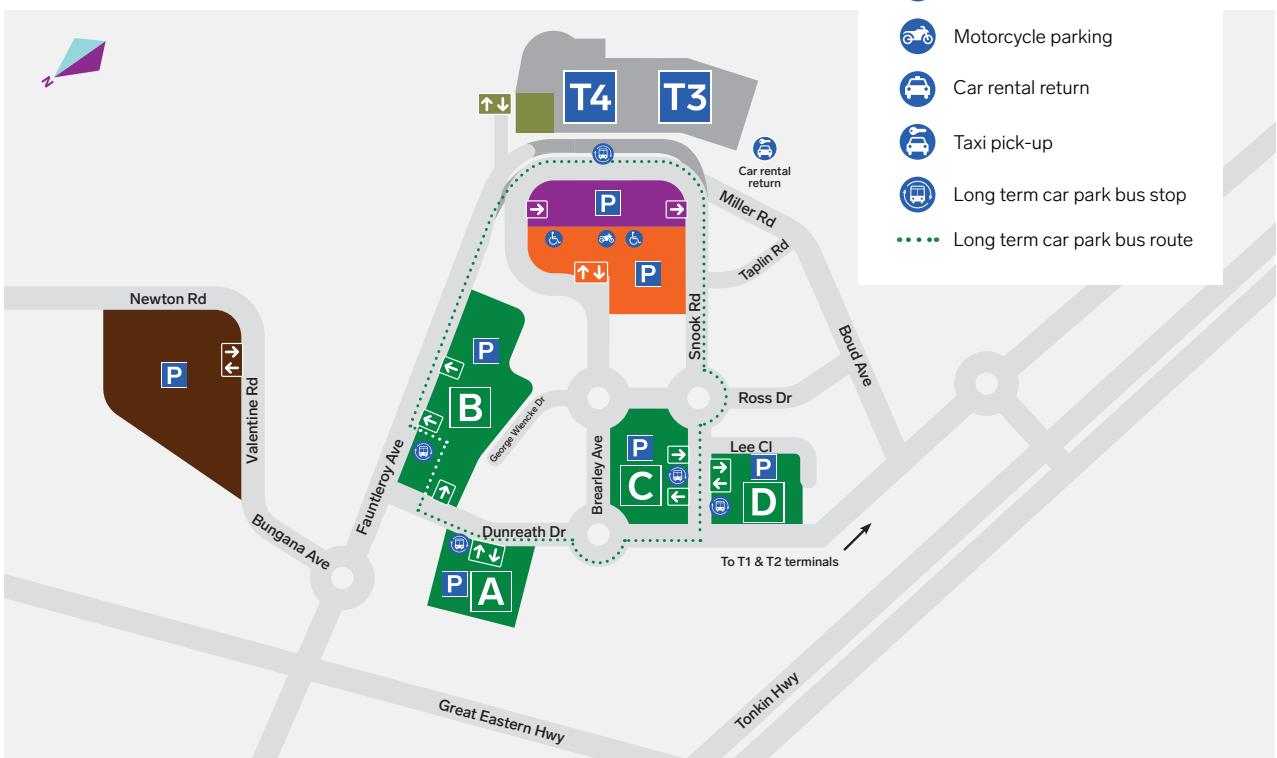


Figure 6-15 T3 and T4 Parking and Transport
Source: Perth Airport

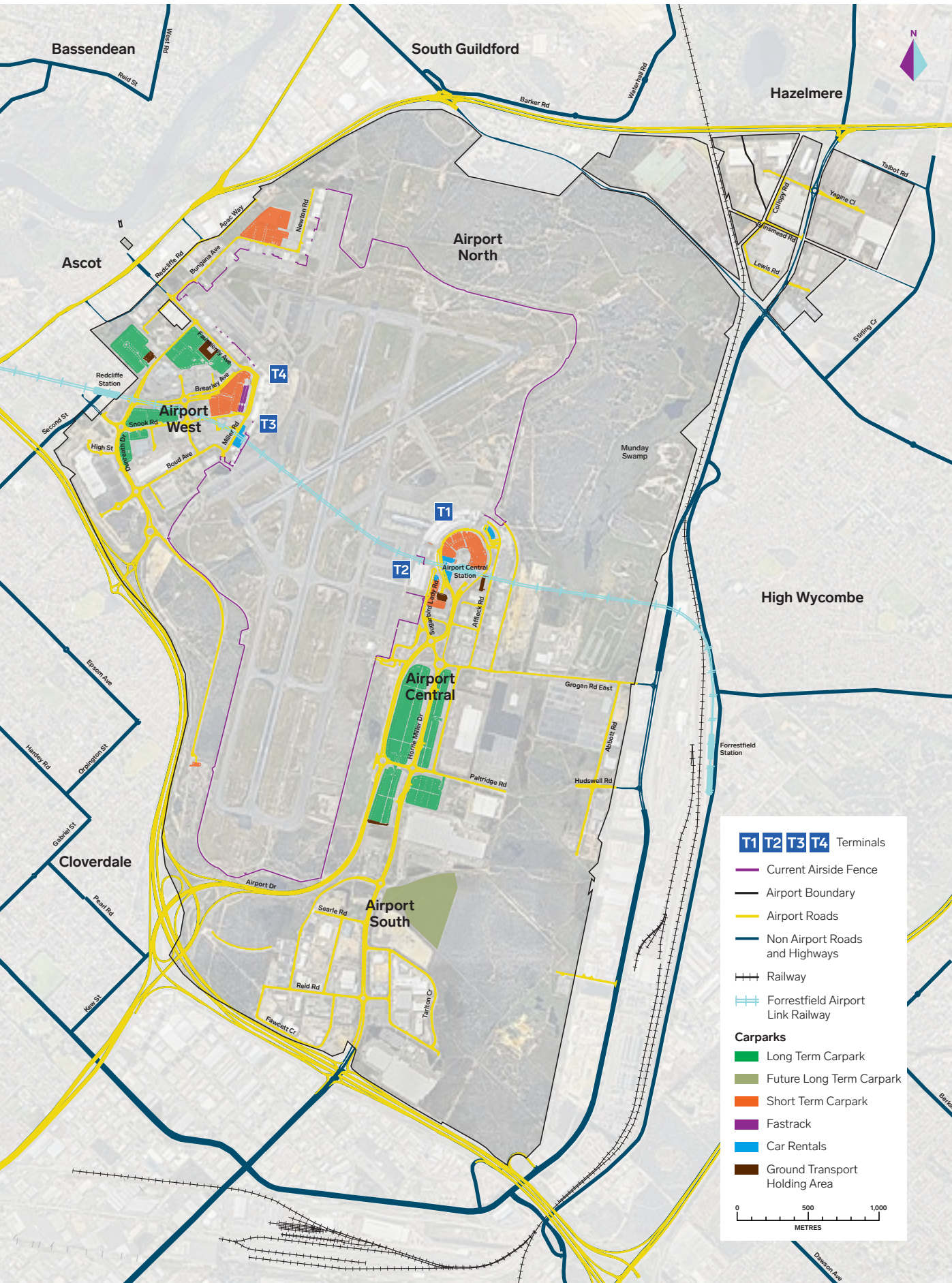


Figure 6-16 Projected car parking across the Perth Airport estate
Source: Perth Airport

6.11 Commercial Vehicle Facilities

Designated areas within the short-term car parks, proximate to each of the terminals, are currently provided for commercial vehicles. Construction of the planned MMTs in Airport Central will allow upgraded commercial vehicle facilities

6.12 Taxi Facilities

Each of the terminal buildings are serviced by taxis and rideshare services. The taxi facilities include pick-up ranks, dedicated traffic lanes, and staging and assembly areas. The planning principles for the taxi facilities are to provide:

- taxi ranks servicing T1 International, T1 Domestic, T2 and the future new terminal for Qantas operations,
- taxi forward staging areas, and
- remote taxi holding areas.

The taxi facilities required will undertake a significant change when consolidation of Qantas operations to Airport Central occurs, with new taxi pick-up ranks provided within the ground transport facilities.

6.13 Rideshare Facilities

In 2016, Perth Airport implemented measures to provide better facilities for rideshare services to the airport. These include rideshare waiting areas and designated drop-off and pick-up areas at terminal forecourts, similar to those provided for taxi services. The rideshare waiting area for T1 and T2 has 70 bays and is located at the end of long-term car park G, accessible via Horrie Miller Drive. The T3 and T4 rideshare waiting area is located on Fauntleroy Avenue within long-term car park A and has 148 bays.

Perth Airport monitors levels of rideshare usage to ensure appropriate facilities are available.





Figure 6-17 Pedestrian and cycle access
 Source: Perth Airport

6.14 Shared Path and Cycleway Facilities

Cycling and walking facilities are predominantly used by employees working within the estate and these facilities will continue to be provided, including end-of-trip facilities in commercial developments.

T1 and T2 are serviced by a principal shared path that runs along Airport Drive before connecting to the shared path along Tonkin Highway. The Airport South Precinct is accessed by a shared path that connects to the principal shared path that runs along Tonkin Highway and terminates at Reid Road. This cycleway will eventually be extended to intersect with the principal shared path on Airport Drive. Both of these cycleways were constructed as part of the Gateway WA project.

Airport West is also served by bicycle routes, with access provided to T3, T4, the GA Area, and retail and commercial areas.

Perth Airport will continue to improve its pedestrian and cycle networks to promote active transport modes as seen in Figure 6-17.





Figure 6-18 Regional road directional signs for terminal access
Source: Perth Airport

6.15 Wayfinding

Wayfinding is important to ensure the effective movement of vehicles, pedestrians and cyclists within the estate as part of a passenger's journey. Wayfinding will continue to be provided across the estate.

Within the estate, Perth Airport will review opportunities to install advanced car park and forecourt vacancy signs on key roads to allow passengers to select the most appropriate car park and have visibility of where there is vacancy for drop-off and pick-up. The car park bus service will continue to have active signs at bus stops to advise passengers of the arrival time for the next bus.

Perth Airport will continue to work with Main Roads to provide intelligent signage on key road access routes to inform traffic leaving the airport of any incidents off airport to allow drivers to modify their journey, if required. There are opportunities to provide similar information for public transport services that Perth Airport will explore with the Public Transport Authority. Wayfinding for the FAL will be provided within the terminals and Skybridge.

The existing messaging for road directional signs to the airport is shown in Figure 6-18.



6.16 Five Year Ground Transport Implementation Plan

The projects associated with the ground transport implementation plan over the next five years are provided in Table 6-2 and shown in Figure 6-19.

With Airport Drive providing access for passenger-related traffic, Horrie Miller Drive will continue to be dedicated to commercial traffic accessing the passenger terminals, freight handlers and non-aviation commercial developments located within Airport South and Central. This Ground Transport Plan proposes to retain this segregation of passenger and commercial traffic on Airport and Horrie Miller Drives respectively. However, resilience will be built into the road network by improving the connection between Horrie Miller and Airport Drives to ensure network redundancy and business continuity in the event of an incident.

Works within the Airport West Precinct are associated with the completion of the Redcliffe Station in 2021 and improved connection to the business and retail developments.

Precinct	Project	Responsible Authority	Expected Delivery Period
All	Investigate options for implementing smart traffic management	Perth Airport	2020 onwards
Central	Investigate a new bus route to link Airport Central Station with the Armadale rail line	Public Transport Authority	2020 onwards
Central	Construct Skybridge linking Airport Central station to terminals	Perth Airport	2020
West	Upgrade Tonkin Highway Dunreath interchange	Main Roads WA	2020
Central and West	Forrestfield-Airport Link constructed and operating	Public Transport Authority	2021
West	Improve shared path connection to Redcliffe Station	Perth Airport	2021
Central	Construct a Multi-Modal Transport Interchange incorporating pick-up and drop-off facilities	Perth Airport	2022
Central	Construct Southern Aviation Support Access Road	Perth Airport	2023
Central	Upgrade intersection of Airport and Sugarbird Lady Drive	Perth Airport	2023
South	Extension of Airport south cycleway	Perth Airport	2023
Central	Construct a second Multi-Modal Transport Interchange, incorporating pick-up and drop-off facilities	Perth Airport	2025
North	New internal commercial development roads	Perth Airport	2025
North	Lloyd Street extension	City of Swan	2025
North	Kalamunda Road Realignment	Perth Airport	2025
Central	Re-closure of Grogan Road	Perth Airport	2023-2028 (dependent on new runway project)
Central	Eastern Connection to Abernethy Road	Main Roads WA	2023-2028 (dependent on new runway project)
North	Adelaide Street	Main Roads WA, City of Kalamunda, City of Swan	2021

Table 6-2 Five-year Ground Transport Implementation Plan

Source: Perth Airport

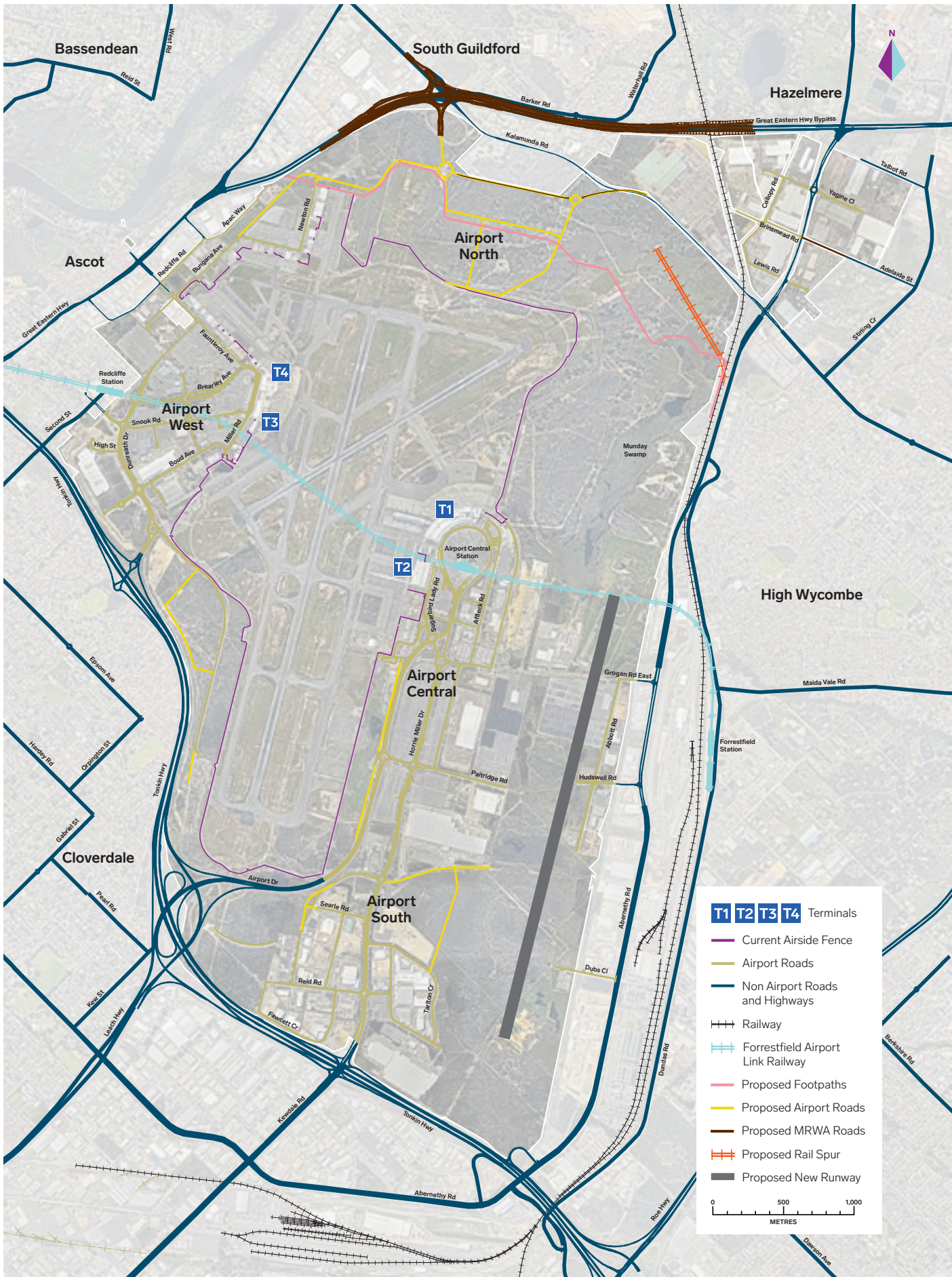


Figure 6-19 Perth Airport estate five-year ground transport plan concept
 Source: Perth Airport

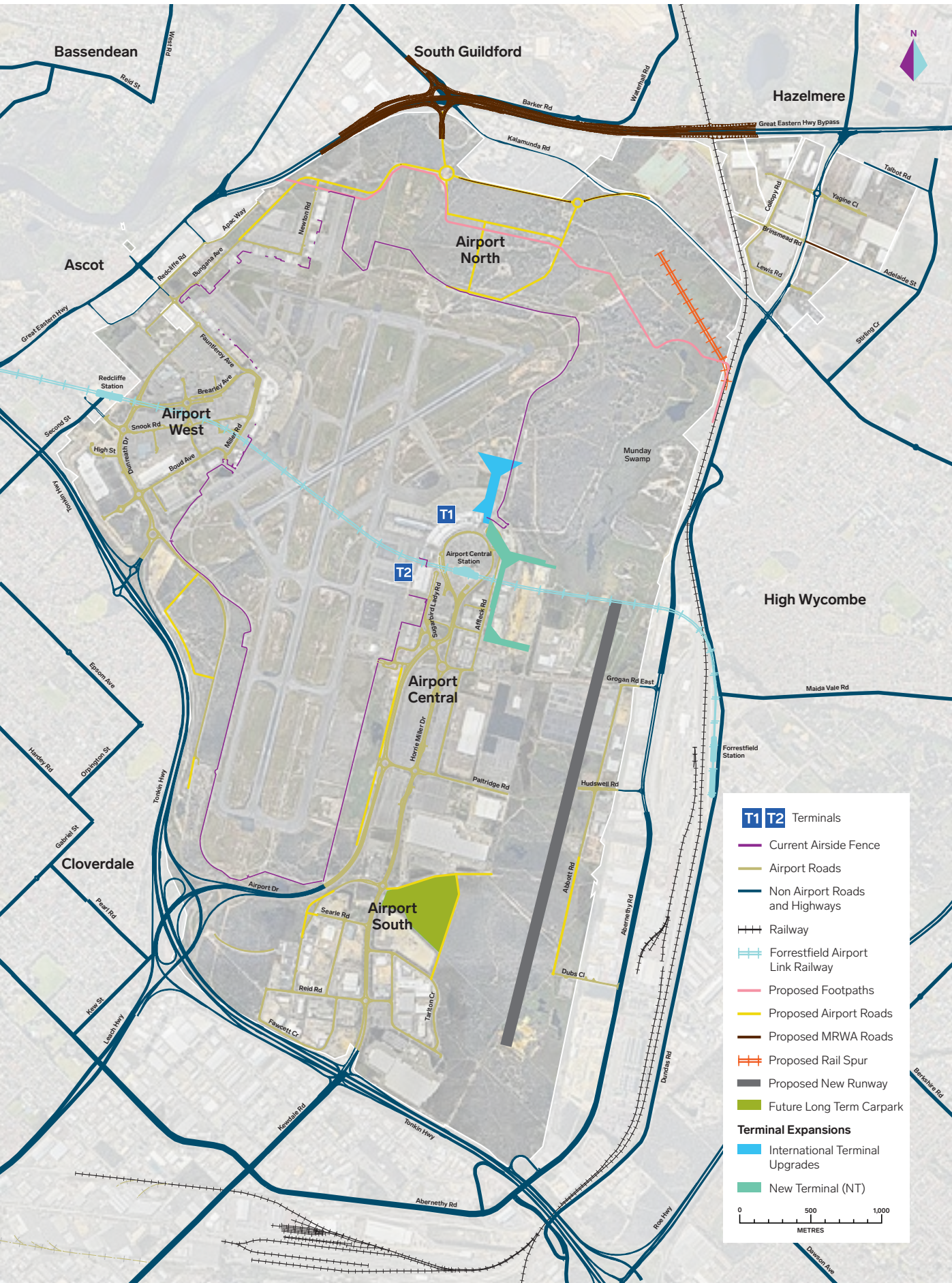


Figure 6-20 Perth Airport estate twenty-year ground transport plan concept
Source: Perth Airport

6.17 Twenty-Year Ground Transport Implementation Plan

The projects associated with the ground transport implementation plan over the next twenty years are provided in Table 6-3 and shown in Figure 6-20.

The segregation of passenger and freight traffic within Airport Central will be maintained. Demand on Airport and Horrie Miller Drives will be monitored to ensure appropriate timing of intersection upgrades and the possibility of using both roads as a one-way loop for passengers. Under this scenario a separate road will be constructed to maintain segregated freight access.

Changes will occur in Airport West following the closure of T3 and T4 by 2025, when Qantas operations relocate to the Airport Central Precinct. Changes to the ground transport network will be made to reflect the change in road use and future development of the terminal site.

Precinct	Project	Responsible Authority	Expected Delivery Period
Central	Additional multi storey car parks if required	Perth Airport	2030-2040
Central	Expand pick-up and drop-off in Multi-Modal Transport Interchanges if required	Perth Airport	2030
Central	Relocation of non-essential transport services out of Multi-Modal Transport Interchanges if required	Perth Airport	2030
South	Construction of satellite pick-up and drop-off	Perth Airport	2030
Central	Further upgrade Airport Drive Sugarbird Lady Road and Grogan Road intersections	Perth Airport	2035
Central	Construction of eastern freight road	Perth Airport	2035
Central	Upgrade Horrie Miller Road intersections	Perth Airport	2035
Central and South	Automated Mass Transit to service remote terminal facilities	Perth Airport	2035
Central	Implement one-way loop of Airport and Horrie Miller Drive	Perth Airport	2040

Table 6-3 Twenty-year Ground Transport Implementation Plan

Source: Perth Airport







Section 7: **Airport Safeguarding**

Safeguarding the safety, viability and growth of aviation operations is vital today and in the future.



7.1 Introduction

The safety of air services arriving and departing Perth Airport daily and the capacity of Perth Airport to expand to meet aviation demand can be compromised by inappropriate land use and activities in the vicinity of the airport.

The Commonwealth Government recognises that the current and future viability of aviation operations at Australian airports can be impacted by inappropriate developments in areas beyond the airport boundary. The National Airports Safeguarding Advisory Group (NASAG), comprising high-level Commonwealth, State and Territory transport and planning officials, prepared and released the National Airports Safeguarding Framework (NASF) in May 2012. The NASF aims to safeguard airports and the communities in their vicinity, and to develop, with State, Territory and Local Governments, a national land-use planning regime. The purpose of the Framework is to enhance the current and future safety, viability and growth of aviation operations at Australian airports, by supporting and enabling:

- the implementation of best practice in relation to land use assessment and decision making in the vicinity of airports,
- assurance of community safety and amenity near airports,
- better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions,
- the provision of greater certainty and clarity for developers and land owners,
- improvements to regulatory certainty and efficiency, and
- the publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

The NASF currently comprises nine guidance documents:

- Guideline A: Measures for Managing Impacts of Aircraft Noise,
- Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports,
- Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports,
- Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation,
- Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports,
- Guideline F: Managing the Risk of Intrusions into the Protected Airspace of Airports,
- Guideline G: Protecting Aviation Facilities — Communications, Navigation and Surveillance (CNS),
- Guideline H: Protecting Strategically Important Helicopter Landing Sites (not applicable to Perth Airport), and
- Guideline I: Managing the Risk in Public Safety Areas at the ends of Runways.

Not all the NASF Guidelines listed above are addressed within this Master Plan as they may not be applicable to a large airport. However, Perth Airport encourages the implementation of all the safeguarding measures into the State planning framework.

The term 'safeguarding' refers to measures taken to prevent or minimise inappropriate uses and activities. Safeguarding Perth Airport is a shared responsibility of Perth Airport and all levels of government. Working together is important to maintain and protect current and future aviation operations at Perth Airport.

7.2 Aircraft Noise

Noise from aircraft approaching and departing Perth Airport and from their operations on the airfield is an unavoidable consequence of the provision of critical and safe air services.

From time to time, aircraft from Perth Airport – as well as Jandakot Airport and the Royal Australian Air Force (RAAF) Base Pearce – will fly over most of the Perth metropolitan region.

7.2.1 Aircraft Noise Management

Perth Airport works with Airservices Australia (Airservices), government and the aviation industry to actively manage aircraft noise exposure and its effect on the community while balancing the need for critical and safe air services. This has the benefits of:

- enabling the community to make informed decisions about aircraft noise exposure,
- providing guidance for achieving appropriate land-use outcomes around the airport,
- managing, mitigating and, where possible, working towards reducing the impacts of aircraft noise, and
- protecting Perth Airport's 24-hour seven days a week operation.

Perth Airport has adopted the International Civil Aviation Organization's (ICAO) 'balanced approach' to aircraft noise management for managing noise in the vicinity of the airport. This involves identifying an airport's noise and then analysing the various measures that may be available to reduce noise. The four principal elements of the ICAO balanced approach are:

- **Reduction of noise at source** – aircraft being manufactured today, such as the Airbus A350 and Boeing 787 Dreamliner, are generally quieter than the aircraft types they replace. Australian airlines have amongst the most modern aircraft fleets in the world,
- **Noise-abatement operational procedures** – noise-abatement procedures, such as preferred runways and the design of flight paths that direct aircraft over less populated areas and at higher altitudes when possible, are implemented at Perth Airport and are published by Airservices. Additionally, new operating procedures such as Continuous Descent Approaches and Smart Tracking are being introduced, which may provide some safety, environment and noise benefits,
- **Operating restrictions** – restrictions that limit or ban older and noisier ICAO Standard Chapter 2 aircraft, such as the Boeing 727, have been implemented in Australia. These aircraft no longer operate at Perth Airport, and
- **Land-use planning and management** – this is one of the most critical elements of the balanced approach. Advances in aircraft noise management made by implementing the first three elements of the balanced approach can be lost through inappropriate land use planning and management by State and Local authorities. Incompatible land uses, such as residential development, should be directed away from areas projected to be exposed to aircraft noise, while land uses that are less sensitive to aircraft noise, such as industrial developments, should be encouraged in the areas surrounding the airport. Perth Airport will continue its practice of objecting to new or increased density residential development close to the airport to minimise exposure to aircraft noise.

7.2.2 Roles and Responsibilities

The management of aircraft noise is the responsibility of several organisations.

Perth Airport has limited control over the management of ground-based aircraft noise. Airservices are responsible for managing the airspace around Perth Airport, including designing flight paths as well as managing noise generated from airborne aircraft. CASA is responsible, under the Airspace Act 2007, for the administration and regulation of Australian-administered airspace.

Perth Airport acknowledges that there are communities which are exposed to aircraft noise, however, this exposure is balanced against the broader community and economic benefit that arises from the 24-hour, seven days a week operations. In recognition of aircraft noise impacts, Perth Airport is committed to working with Airservices, airline partners, Commonwealth, State and Local Governments to identify opportunities for improvement. The range of organisations and groups with roles and responsibilities in relation to aircraft noise management is provided in Table 7-1.

Organisation	Roles and Responsibilities
International Civil Aviation Organization (ICAO)	<ul style="list-style-type: none"> Establishes strict noise certification standards for new aircraft Provides guidance on noise management strategy Australia is a member state of ICAO
Civil Aviation Safety Authority (CASA)	<ul style="list-style-type: none"> Independent statutory authority with responsibility for regulation of civil aviation operations in Australia Provides overriding consideration to air safety Responsible for airspace regulation through the Office of Airspace Regulation
Department of Infrastructure, Transport, Regional Development and Communications	<ul style="list-style-type: none"> Advises the Commonwealth Government on the policy and regulatory framework for Australian airports and the aviation industry Provides policy advice to the Minister on the management of aircraft noise Provides regulatory oversight of the Air Navigation (Aircraft Noise) Regulations 1984, including application to aircraft which do not meet Australian aircraft noise standards
Airservices Australia	<ul style="list-style-type: none"> Provides Air Traffic Control services Manages and maintains aircraft navigation, surveillance, and noise monitoring infrastructure Establishes flight paths, including at Perth Airport Manages noise complaints and enquiries through the Noise Complaints and Information Service Provides information on aircraft movements, runway and flight path usage and noise impacts using a range of noise descriptors Conducts noise monitoring in communities surrounding Perth Airport Reviews and endorses the Perth Airport associated Australian Noise Exposure Forecast (ANEF) for technical accuracy Implements Noise Abatement Procedures Considers environmental impacts (including noise) of air traffic management
Airlines and aircraft operators	<ul style="list-style-type: none"> Operate and maintain aircraft that meet the ICAO noise certification requirements Implement Noise Abatement Procedures principles for flight operations
Aircraft Noise Ombudsman (ANO)	<ul style="list-style-type: none"> Oversees the handling of aircraft noise issues by Airservices and the Department of Defence Conducts independent reviews of noise complainants and complaint handling Makes recommendations for improvements and changes where necessary and feasible
State and Local Government	<ul style="list-style-type: none"> State Government develops land use planning frameworks to prevent developments that are inappropriate having regard to aircraft noise Local Governments implement State Government land use planning frameworks
Perth Airport	<ul style="list-style-type: none"> Manages operations at the airport Develops and maintains infrastructure to support aircraft operations Publishes a master plan with ANEF at least every five years Develops a management plan for managing aircraft noise intrusion in areas forecast to be subject to exposure above significant ANEF levels Applies an engine ground run management plan Engages with the Perth Airport Community Forum, Planning Coordination Forum, Perth Airport Aircraft Noise Technical Working Group and broader community
Perth Airport Community Forum (PACF)	<ul style="list-style-type: none"> Works collaboratively to consider issues of importance to the community and airport in the context of recognising and enhancing: <ul style="list-style-type: none"> the long-term sustainability and growth of Perth Airport, Perth Airport's role as a responsible corporate citizen within the local and broader community, and Perth Airport's role as a major economic contributor for Western Australia
Planning Coordination Forum (PCF)	<ul style="list-style-type: none"> Supports effective engagement between Perth Airport and Commonwealth, State and Local Government agencies on strategic planning issues, including land use and aircraft noise impacts
Perth Airport Aircraft Noise Technical Working Group (PAANTWG)	<ul style="list-style-type: none"> Enables industry to initiate and evaluate operational changes while ensuring that the noise impact of those changes is considered and opportunities to improve noise outcomes are explored

Table 7-1 Organisations responsible for aircraft noise management

Source: Perth Airport

7.2.3 Aircraft Noise Management Strategy

Perth Airport’s commitment to managing aircraft noise is guided by the Aircraft Noise Management Framework as shown in Figure 7-1.

This framework takes into account aircraft taking off, departing, approaching, landing and manoeuvring on the airfield, including engine testing, within the airport site. This framework includes six key themes that guides Perth Airport’s effective management of the impacts of aircraft noise on surrounding communities, and includes community consultation and engagement, and appropriate infrastructure planning, as principal elements.

7.2.3.1 Theme 1 – Identify Opportunities

Perth Airport works with Airservices, aircraft operators, industry stakeholders and the community to identify opportunities for improvement and achieve better outcomes where possible.

Noise improvement proposals can arise from a variety of sources, such as Airservices internal analysis, the Aircraft Noise Ombudsman, aviation industry and community feedback. Each initiative is assessed first and foremost for its impact on safety. If there are no safety implications, further assessment determines whether it provides an overall benefit to the Perth community. For example, a change may be considered if it exposes a smaller number of people to noise but not if it merely moves the noise from one group to another of a similar size. A proposal may also be unworkable because of airspace constraints, such as the proximity of RAAF Base Pearce’s restricted areas preventing a route being moved further north.

Where an initiative is deemed to provide an improvement for the community, a trial of the proposal may be conducted to verify the initial findings. This involves advertising and widespread consultation with all stakeholders, including the community.

The results of the trial, including community feedback, are assessed and a decision made on whether to permanently

implement the procedure or discard it. If implemented, a post implementation review is usually conducted to verify the success of the change. Post implementation reviews are published by Airservices on its website, airservicesaustralia.com.

Preferred runways are selected by air traffic control in accordance with the published Noise Abatement Procedures (NAPs). Following a review by Airservices, in May 2015 the preferred runway selection criteria for Perth Airport was amended. At Perth, operational reasons, such as wind direction, runway availability and the military restricted airspace around Perth, often preclude the use of preferred runways. However, for the times when air traffic control has a choice of runway selection, the preferred runway change was found to have provided incremental noise improvements, particularly for areas to the south of Perth Airport that experience aircraft departures.

In September 2015, Airservices introduced a Smart Tracking flight path for suitably equipped aircraft arriving from the north and east and landing onto Runway 03 (southern end of the main runway). In addition to improved safety, fuel burn and emissions outcomes, the Smart Tracking procedure was designed to maximise opportunities for a more gradual descent with less throttle and engine noise. The procedure uses Required Navigation Performance – Authorisation Required (RNP-AR) satellite navigation, coupled with the performance characteristics of an aircraft’s autopilot system, to allow the aircraft to fly along a precise flight path with high level of accuracy. RNP-AR is a reasonably new technology and requires the aircraft be fitted with highly sophisticated equipment. New aircraft have this equipment, but for older aircraft it is expensive to install and, in some aircraft, it cannot be installed for technical reasons. It will be many years until all aircraft at Perth are equipped to make these approaches. Currently approximately 30 per cent of aircraft operating at Perth are capable of flying RNP-AR approaches.

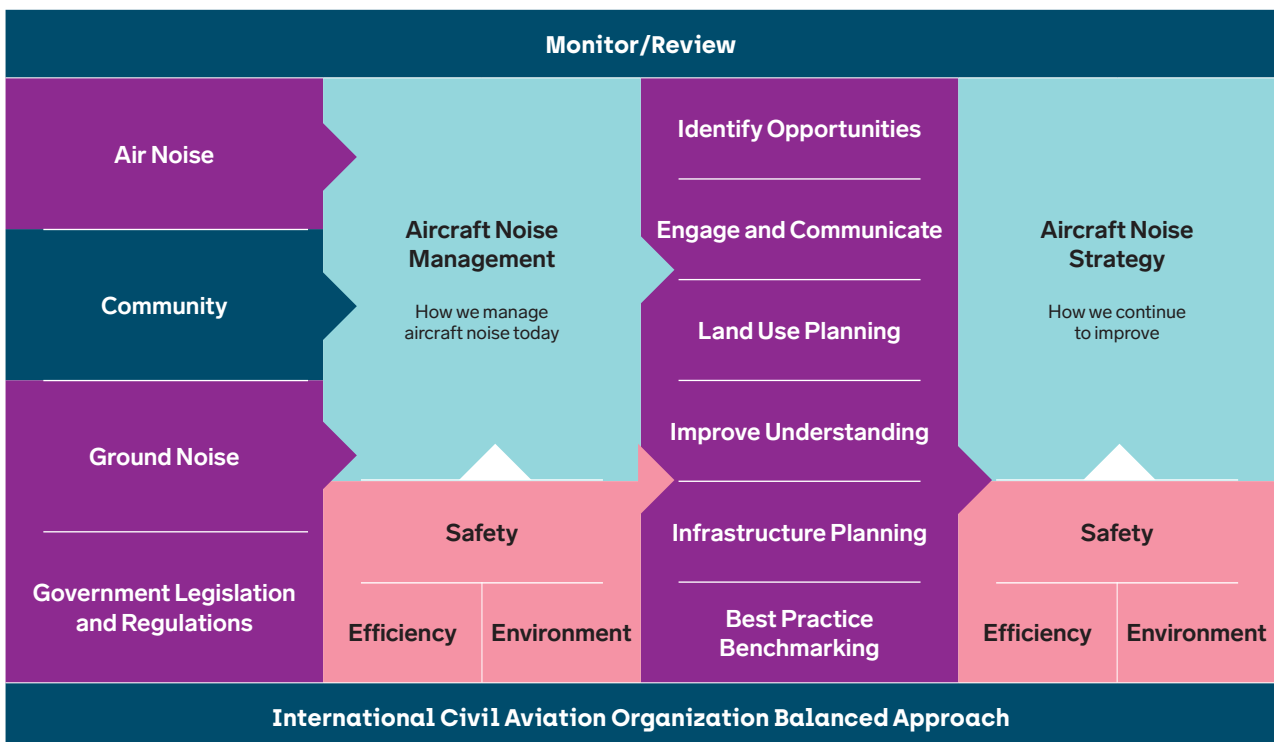


Figure 7-1 Perth Airport Aircraft Noise Management Framework
Source: Perth Airport

7.2.3.2 Theme 2 – Land Use Planning

Perth Airport works with Airservices, CASA and Commonwealth, State and Local Governments to coordinate land-use planning and management. This facilitates change to land-use planning and a policy that directs inappropriate land uses away from the airport, while encouraging compatible land uses in the intervening areas to protect operational flexibility and 24/7 operations.

Perth Airport supports a 'push-pull' strategy. This means incompatible land uses – such as residential development – are directed away from areas that are, or will be, exposed to significant aircraft noise, while land uses that are less sensitive to aircraft noise, such as industrial developments – are encouraged in areas surrounding the airport estate.

Local Government guidance regarding development in the vicinity of Perth Airport is provided by the State Planning Policy 5.1 Land Use Planning in the Vicinity of Perth Airport (described in Section 2). It adopts Perth Airport's ANEF to determine the acceptability of various development types within each of the ANEF contours. The intention is to restrict, or require building treatment, for noise-sensitive developments in areas forecast to be exposed to aircraft noise. Perth Airport developed its first ANEF as part of the Master Plan 1985, nearly 35 years ago. Since that initial noise forecast, which included the future new runway, the overall footprint of the ANEF contours has remained relatively the same. However, since 1983, there has been considerable residential development and infill within the ANEF contours.

Perth Airport supports the Western Australia Planning Commission (WAPC) and Local Governments in their statutory role of managing residential land uses within aircraft noise exposed areas. Perth Airport continues to advocate for the Western Australian Government to follow the Queensland Government in adopting the NASF guidelines, including the N-above contours, through its State planning framework.

7.2.3.3 Theme 3 – Engage and Communicate

Perth Airport is committed to ensuring the community is fully informed and that their concerns and priorities are considered in guiding aircraft noise management outcomes. A key focus of this engagement is to communicate aircraft noise information in an uncomplicated and easy to understand manner.

Perth Airport therefore provides a range of material to inform and engage the community about noise implications and flight paths. This includes the ANEF contours, N-above contours (described in Section 7.3.6), published material on aircraft noise, and an online Aircraft Noise Informational Portal.

Launched in 2014, the web-based interactive Aircraft Noise Information Portal was developed by Perth Airport to provide information on flight paths, the ANEF and N-above contours and how they apply to a property a person resides in or may be looking to purchase. The portal, shown in Figure 7-2, provides information on current and future operations at Perth Airport and is available at perthairport.com.au/aircraftnoise.

Since 2015, the Perth Airport ANEF and N-Above (N65) contours have been made available through Landgate Property Interest Reports.

Section 10 details Perth Airport's ongoing consultation and education mechanisms. They include a Planning Coordination Forum to foster planning discussions with Commonwealth, State and Local Government, the Perth Airport Community Forum which gives members of the public the opportunity to meet with representatives from Perth Airport as well as guests, such as Airservices and the Aircraft Noise Ombudsman.

In mid-2017, Perth Airport invited community members to participate in a number of focus groups to understand how information on flight paths and aircraft noise is perceived. This has assisted Perth Airport to provide clear, concise and meaningful information which assists the community in making informed decisions.

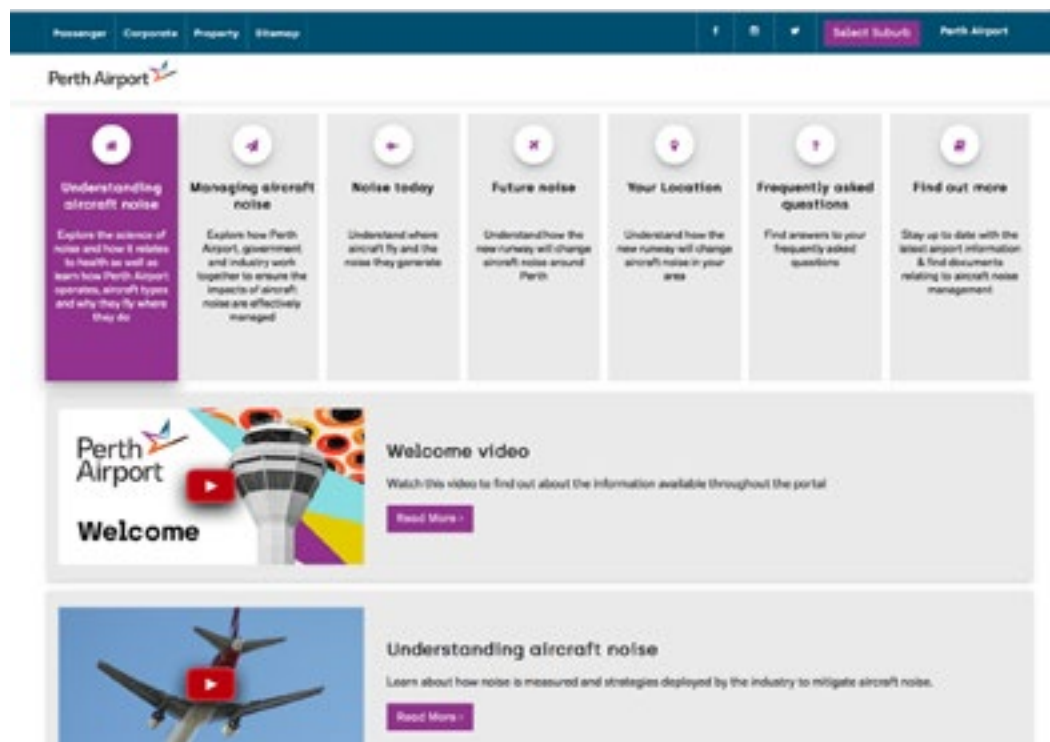


Figure 7-2 Perth Airport Aircraft Noise Information Portal
Source: Perth Airport

7.2.3.4 Theme 4 – Improve Understanding

Perth Airport continually seeks to improve understanding of aircraft noise and its impacts to ensure effective noise management.

In 2018, Perth Airport commissioned a review of relevant literature relating to the health impacts of aircraft noise, including research, reviews and guidelines. The assessment considered 168 articles published between 1993 and 2017, including large research projects undertaken in areas close to some of the major international airports, such as Heathrow and Munich airports. While nearly every study suggested that further research into potential health impacts was needed, the review has encouraged Perth Airport to focus on noise management strategies which can assist in reducing the health consequences of aircraft noise exposure. These include appropriate land planning around airports, careful route planning, noise abatement procedures, provision of clear and comprehensible information about the likely exposure to aircraft noise, as well as information to assist those affected by the noise to undertake amelioration measures that can reduce noise penetration into homes.

Perth Airport continues to invest in understanding aircraft noise, impacts and ways to engage and communicate. Perth Airport also participates in a number of national forums and working groups focussed on aircraft noise.

7.2.3.5 Theme 5 – Infrastructure Planning

Perth Airport applies best practice aircraft-noise management practices where relevant in the development of new airport infrastructure, including through design and community consultation. The design of airport infrastructure, including runways, taxiways and engine run up facilities can impact on the aircraft noise exposure around an airport. The design of the new runway and associated infrastructure has considered best practice aircraft noise management practices.

Designing flight paths for new infrastructure is a complicated process. Airservices design flight paths through extensive consultation – often over many years – with airports, aircraft operators, government, CASA, and the local community.

The final flight paths for the future parallel runway system will be designed by Airservices during the detailed design phase before the new runway opens. This phase also includes the development of both air traffic management procedures and noise abatement procedures. Opportunities to minimise noise impacts on communities will be considered in developing the final flight paths.

The *Airservices Act 1995* states that Airservices must make safety of air navigation its most important consideration. Subject to this, Airservices must perform its functions so that, as far as practicable, the environment is protected from the effects associated with the operation and use of aircraft. Consideration is given to approach and departure paths that minimise noise over residential areas, fuel consumption and emissions.

Flight paths for Perth Airport are constrained by military airspace to the north, west and south, and Jandakot Airport airspace to the south. These constraints increase with the introduction of a new runway as new procedures are developed and existing procedures modified to facilitate parallel runway operations. A draft Airspace Management Plan, based on a preliminary airspace design, has been completed by Perth Airport in consultation with Airservices and the Department of Defence, and was presented in the Preliminary Draft Major Development Plan for the New Runway Project that was released for public comment in mid-2018. In determining the proposed flight corridors for parallel runway operations, current and emerging technologies were considered to explore whether there can be improved outcomes for implementation in the detailed design stage.

7.2.3.6 Theme 6 – Best Practice Benchmarking

Perth Airport seeks to understand what best practice is and learn lessons from other airports and industries on how to manage the impacts of aircraft noise and community engagement.

By participating in forums such as the Perth Aircraft Noise Technical Working Group and the National Industry Noise Forum, Perth Airport can discuss and consider aircraft noise-management initiatives both in Australia and at airports around the world.

In 2016, an Australian initiative was led by Perth Airport and resulted in the publication of a booklet called 'Reducing Aircraft Noise in Existing Homes'. The booklet provides information about practical modifications that can reduce noise levels and is available from perthairport.com.au/aircraftnoise.

7.3 Aircraft Noise Metrics

A range of metrics are available to describe the level of aircraft noise in an area, each being useful for a different purpose. Those relevant for an assessment of aircraft noise associated with airport infrastructure, are described in the sections below.

7.3.1 Australian Noise Exposure Forecast System

The ANEF system comprises the following three noise exposure indicators that, although they use the same noise metric for calculation, are based on different inputs and vary in purpose:

- Australian Noise Exposure Forecast (ANEF) – ANEF noise contours show the anticipated noise contours for the most likely or preferred development and forecasts for an airport. Only one ANEF can be promulgated for any particular airport at one time and is the basis for Australian Standard 2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction,
- Australian Noise Exposure Concept (ANEC) – ANEC noise contours are a planning tool used to test changes to noise exposure resulting from proposed changes to airport operations. Several ANECs may be produced based on a range of scenarios, and
- Australian Noise Exposure Index (ANEI) – ANEI noise contours are based on historical aircraft movement data and show actual noise exposure for a previous period, generally a year. The ANEI is mostly developed to compare with ANEF and ANECs to highlight differences in anticipated noise exposure.

While all previous ANEF contours for Perth Airport were produced using the Integrated Noise Model (INM) software, the ANEF system contours shown in this Master Plan 2020 were produced using the Airport Environmental Design Tool (AEDT) software, developed by the US Federal Aviation Administration.

AEDT is the most modern software package used for aircraft noise modelling. The AEDT is more comprehensive than the INM and can model a greater range of current and new aircraft types, such as the Boeing 737 MAX and Airbus A320neo. AEDT also predicts noise levels to a much greater level of accuracy than was previously output using INM, this is evidenced by the fact that the Perth Airport AEDT predictions more closely aligned with noise levels recorded by Airservices Noise and Flight Path Monitoring System (NFPMS).

Similar to the INM, input data for the AEDT noise model includes the following variables:

- selection of aircraft types (aircraft fleet mix),
- numbers of aircraft operations (including departures and arrivals),
- runway dimensions and allocation to respective operations,
- flight track descriptions and flight track dispersal to consider the spread on the track by aircraft operations,
- aircraft destinations or origins (stage lengths) to take into consideration track allocation,
- day/night split of operations,
- terrain data, and
- normalised wind velocity and temperature information.

7.3.2 Australian Noise Exposure Forecast

The *Airports Act 1996* (Airports Act) requires a master plan to provide an ANEF for the areas surrounding the airport. In addition, the master plan must specify the airport's plans, developed through a consultative process with airline partners and Local Government authorities in the vicinity of the airport, for managing aircraft noise intrusion in areas forecast to be subject to exposure above significant ANEF levels. Significant ANEF levels are defined as the 30 ANEF contour and above.

The ANEF is a forecast of future aircraft noise exposure and shows the concentration of noise around a particular airport, based on the:

- expected aircraft movement numbers,
- types of aircraft,
- daily distribution by time period of arrivals and departures,
- configuration of the runways, and
- arrival and departure tracks flown, along with ascent and descent profiles.

An ANEF must be formally endorsed for technical accuracy by Airservices.

7.3.2.1 Use of ANEF for Land Use Planning

For land-use planning in Australia, the accepted metric for aircraft noise exposure is the ANEF. The ANEF is central component of the Australian Standard 2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction (AS2021). AS2021, in conjunction with the ANEF contours, provides guidance to development control authorities (such as State and Local Government) on the acceptability of certain types of land use or development in areas near airports, based on the ANEF level in the area. Further to its role as a guidance document for determining land use and development, AS2021 also provides detail regarding construction methods and materials to minimise noise intrusion to development within ANEF contours.

For example, residential development is considered 'acceptable' in areas with ANEF lower than 20, 'conditionally acceptable' in areas with ANEF between 20 and 25 and 'unacceptable' in areas with ANEF greater than 25. In conditionally acceptable areas, AS2021 recommends that new buildings should incorporate acoustic treatment to achieve specified internal noise levels. The building type acceptability for ANEF zones is shown in Table 7-2.

Building Type	Forecast Noise Exposure Level (ANEF)		
	Acceptable	Conditionally Acceptable	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF	20 to 25 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 30 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Table 7-2 Building site acceptability table based on Australian Noise Exposure Forecast contours

Source: Australian Standard 2021:2015

Standards Australia also published a handbook, SA HB 149:2016, Acoustics—Guidance on producing information on aircraft noise, on how to meaningfully present information on the impact and nature of aircraft noise to the public, and to assist in land use planning and building assessments.

7.3.3 Aircraft Noise Contours

Forecasts outlined in Section 2.11 indicate that at the end of the 20-year planning period, Perth Airport would not be operating at or near its capacity in terms of aircraft movements.

The 'Manner of Endorsement for Australian Noise Exposure Forecasts' released by the Department of Infrastructure, Transport, Regional Development and Communications outlines the projected timeframes that an ANEF can cover. The document describes the following ANEFs:

- a standard ANEF – forecast noise exposure levels up to a maximum of 20 years,
- a long-range ANEF which specifies a year – forecast noise exposure levels up to or beyond 20 years, or
- an ultimate practical capacity ANEF – forecast noise exposure level likely if an airport was operating at its ultimate practical capacity.

If land use planning near Perth Airport was based on a 20-year ANEF (a smaller contour) rather than the ultimate ANEF, this could result in inappropriate development in areas surrounding the airport.

Therefore, from 2004 to 2014, an ultimate ANEF based on 350,000 annual aircraft movements was developed in consultation with State and Local Governments. This level of annual aircraft movements was consistent with anticipated levels of activity once the airport was starting to reach capacity during the peak periods. Further technical analysis of Perth Airports ultimate capacity concluded the airfield was capable of reaching 362,000 annual aircraft movements. As a result, the 2020 Ultimate ANEF was developed using this updated ultimate capacity.

Perth Airport adopted a 'composite' ANEF for the Master Plan 2014 which reflected a combination of three ANECs that are based on the existing and potential future runway operating modes. A composite ANEF has also been adopted for this Master Plan 2020 and comprises two ANEC scenarios.

The Master Plan 2014 ANEC 1 (current runways) and ANEC 2 (current runways with extensions) have been combined into one noise contour for this master plan, forming a new ANEC 1. The reduction in ANEC's from three in 2014 to two in 2020 was made after considering the worst case contours for the existing runway system. This also means ANEC 2 now considers the parallel runway system and there is no longer an ANEC 3. The two ANEC scenarios are detailed as follows and shown in Figure 7-3 below:

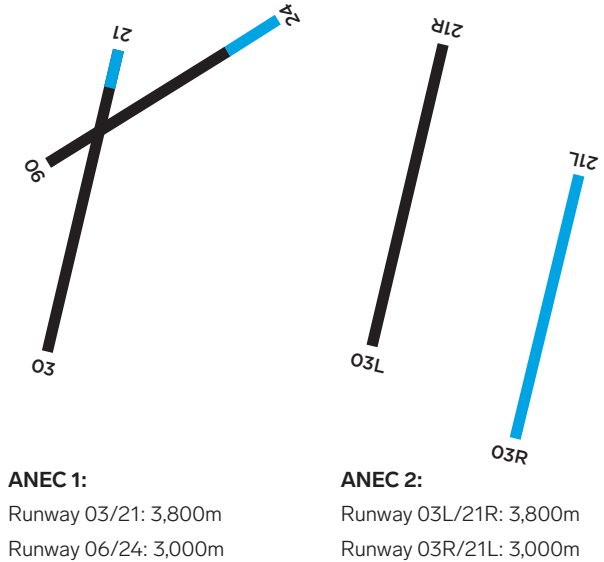


Figure 7-3 ANEC scenarios
Source: Perth Airport

Existing Airfield with Extended Runways Maximum Capacity ANEC (ANEC 1)

The first ANEC (ANEC 1) reflects the existing runway system, considers future extensions of the main (03/21) and cross runway's (06/24) and looks at when this operating mode would reach capacity. This ANEC provides a capacity of approximately 190,000 aircraft movements per annum which is the maximum movements on this system.

Parallel Runway Maximum Capacity ANEC (ANEC 2)

The second ANEC (ANEC 2) is based on the long-term airfield layout including the construction of the proposed new runway (03R/21L) parallel to the existing main runway (03L/21R), which is subject to approval. This scenario can accommodate approximately 362,000 annual aircraft movements and is consistent with the anticipated level of activity once the airport is again starting to reach capacity during the peak periods.

The 'composite' ANEF is created by taking the worst case (outer contour lines) of the two ANECs.

The Perth Airport 2020 Ultimate ANEF, endorsed by Airservices for technical accuracy, is shown in Figure 7-4.

Associated aircraft movement tables for ANEC 1 and ANEC 2 are shown in Table 7-3 and Table 7-4.

This ANEF represents where most aircraft will fly, however all areas of Perth will have aircraft from Perth Airport, Jandakot or RAAF Base Pearce flying overhead from time to time.



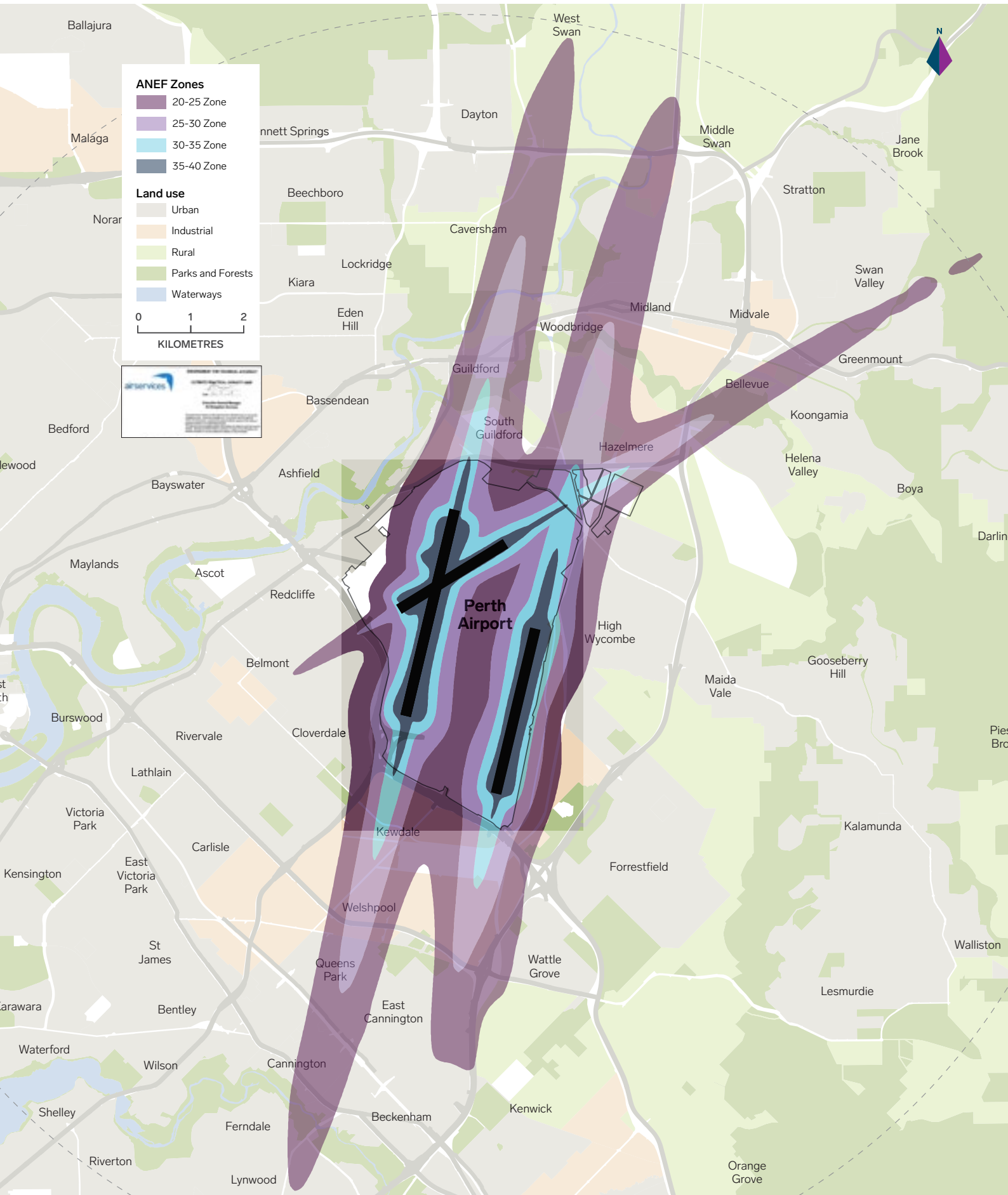


Figure 7-4 2020 Ultimate ANEF
Source: Perth Airport

SECTION 7: AIRPORT SAFEGUARDING

Runway	Aircraft Type	Arrivals			Departures			Grand Total
		Day	Night	Total	Day	Night	Total	
03	1900D	0.37	0	0.37	0.23	0.09	0.32	0.68
03	717200	1.06	0.21	1.27	0.63	0.33	0.96	2.23
03	737800	3.17	0.5	3.67	0.92	1.32	2.24	5.91
03	7378MAX	4.24	2.13	6.37	2.68	1.13	3.81	10.18
03	7878R	3.19	1.75	4.94	1.85	0.73	2.58	7.52
03	A221	9.68	1.79	11.47	4.46	3.39	7.85	19.32
03	A223	1.04	0.22	1.26	0.64	0.33	0.97	2.23
03	A319NEO	1.09	0.22	1.31	0.63	0.35	0.99	2.3
03	A320NEO	6.01	1.19	7.2	3.07	1.7	4.77	11.97
03	A321NEO	2.88	3.72	6.6	2.21	1.75	3.96	10.56
03	A338	2.5	0.83	3.33	1.33	0.62	1.95	5.28
03	A351	0	0.41	0.41	0.15	0.09	0.24	0.65
03	A359	4.72	2.1	6.81	2.45	1.34	3.78	10.6
03	A380-861	0.38	1.16	1.55	0.12	0.88	1	2.55
03	B7379MAX	3.09	5.17	8.26	2.5	2.62	5.13	13.39
03	B779	0	0.52	0.52	0	0.28	0.28	0.8
03	B781	0	0.42	0.42	0.14	0.09	0.23	0.66
03	B797	10.79	6.25	17.04	6.64	3.39	10.02	27.07
03	BD-700-1A11	0.63	0.25	0.88	0	0.24	0.24	1.11
03	BEC58P	0.57	0.28	0.85	0.49	0.19	0.68	1.53
03	CNA441	0.13	0.11	0.24	0.17	0	0.17	0.42
03	DHC6	0.37	0	0.37	0.22	0.09	0.31	0.69
03	DHC830	3.55	0.13	3.68	1.74	0.69	2.44	6.12
03	F10062	4.95	0.79	5.74	2.11	1.84	3.95	9.69
03	F10065	5.03	0.76	5.79	2.2	1.78	3.98	9.77
03	HS748A	0.71	0	0.71	0.42	0.11	0.53	1.24
03	SF340	0.7	0	0.7	0.42	0.12	0.54	1.24
03 Total		70.84	30.91	101.76	38.43	25.5	63.93	165.69
06	1900D	0.03	0	0.03	0.22	0.09	0.31	0.34
06	717200	0.08	0.02	0.09	0.55	0.37	0.92	1.01
06	737800	0.22	0.03	0.26	0.74	1.43	2.18	2.43
06	7378MAX	0.34	0.23	0.57	2.32	1.13	3.44	4.01
06	7878R	0.25	0.17	0.42	1.68	0.79	2.47	2.89
06	A221	0.67	0.13	0.8	3.73	3.74	7.47	8.27
06	A223	0.08	0.02	0.09	0.54	0.37	0.9	1
06	A319NEO	0.08	0.02	0.1	0.55	0.39	0.94	1.04
06	A320NEO	0.43	0.11	0.54	2.65	1.82	4.48	5.02
06	A321NEO	0.22	0.43	0.64	1.98	1.84	3.83	4.47
06	A338	0.19	0.1	0.29	1.15	0.66	1.81	2.09
06	A351	0	0.04	0.04	0.15	0.1	0.25	0.29
06	A359	0.35	0.23	0.57	2.14	1.39	3.52	4.1
06	A380-861	0.02	0.19	0.21	0.09	0.9	0.99	1.2
06	B7379MAX	0.22	0.6	0.82	2.21	2.86	5.07	5.89
06	B779	0	0.05	0.05	0	0.3	0.3	0.35
06	B781	0	0.04	0.04	0.15	0.1	0.25	0.29
06	B797	0.82	0.58	1.41	6.03	3.49	9.51	10.92
06	BD-700-1A11	0.05	0.04	0.09	0	0.17	0.17	0.26
06	BEC58P	0.04	0.02	0.06	0.48	0.22	0.69	0.76
06	CNA441	0.01	0.01	0.02	0.15	0	0.15	0.17
06	DHC6	0.03	0	0.03	0.23	0.09	0.32	0.35
06	DHC830	0.24	0.01	0.25	1.53	0.75	2.28	2.54
06	F10062	0.35	0.05	0.4	1.81	2	3.81	4.22
06	F10065	0.35	0.05	0.4	1.86	1.93	3.79	4.19
06	HS748A	0.05	0	0.05	0.41	0.12	0.53	0.58
06	SF340	0.05	0	0.05	0.38	0.12	0.51	0.56
06 Total		5.17	3.16	8.33	33.73	27.17	60.89	69.22

Runway	Aircraft Type	Arrivals			Departures			Grand Total
		Day	Night	Total	Day	Night	Total	
21	1900D	0.36	0	0.36	0.32	0.08	0.4	0.76
21	717200	0.94	0.36	1.3	1.44	0.31	1.75	3.05
21	737800	1.72	0.92	2.63	2.77	1.28	4.04	6.68
21	7378MAX	3.57	2.11	5.69	6.73	2.97	9.69	15.38
21	7878R	2.11	0.88	2.98	3.88	1.59	5.48	8.46
21	A221	6.97	3.14	10.12	11.19	3.26	14.45	24.57
21	A223	0.94	0.36	1.3	1.43	0.33	1.76	3.05
21	A319NEO	0.98	0.37	1.35	1.48	0.33	1.81	3.16
21	A320NEO	4.45	1.67	6.12	7.33	2.42	9.75	15.87
21	A321NEO	2.59	3.12	5.71	5.38	3.98	9.37	15.08
21	A338	1.74	0.74	2.48	2.91	1.29	4.2	6.67
21	A351	0	0.22	0.22	0.12	0.23	0.35	0.57
21	A359	3.31	1.54	4.85	5.6	2.83	8.43	13.27
21	A380-861	0.71	0.7	1.42	0.62	1.57	2.2	3.61
21	B7379MAX	3.15	4.07	7.22	6.04	5.4	11.44	18.66
21	B779	0	0.16	0.16	0	0.26	0.26	0.42
21	B781	0	0.22	0.22	0.13	0.22	0.35	0.57
21	B797	7.54	5.23	12.77	13.83	7.41	21.24	34
21	BD-700-1A11	0.31	0.16	0.47	0	1.27	1.27	1.74
21	BEC58P	0.6	0.21	0.81	0.77	0.18	0.95	1.76
21	CNA441	0.22	0.08	0.29	0.44	0	0.44	0.74
21	DHC6	0.36	0	0.36	0.32	0.08	0.4	0.75
21	DHC830	3.02	0.21	3.23	3.84	0.99	4.83	8.05
21	F10062	3.67	1.39	5.06	5.36	1.78	7.14	12.2
21	F10065	3.65	1.39	5.04	5.44	1.69	7.13	12.17
21	HS748A	0.64	0	0.64	0.7	0.11	0.82	1.46
21	SF340	0.64	0	0.64	0.73	0.1	0.83	1.47
21 Total		54.2	29.24	83.43	88.8	41.96	130.77	214.2
24	1900D	0.29	0	0.29	0.02	0	0.02	0.31
24	717200	0.78	0.28	1.05	0.08	0.01	0.09	1.14
24	737800	1.37	0.71	2.08	0.14	0.04	0.18	2.26
24	7378MAX	2.91	1.58	4.5	0.26	0.05	0.31	4.8
24	7878R	1.71	0.65	2.35	0.14	0.02	0.16	2.52
24	A221	5.66	2.45	8.1	0.61	0.1	0.71	8.81
24	A223	0.79	0.27	1.06	0.08	0.01	0.09	1.15
24	A319NEO	0.79	0.29	1.08	0.08	0.01	0.09	1.17
24	A320NEO	3.52	1.29	4.81	0.35	0.06	0.41	5.21
24	A321NEO	2.06	2.42	4.47	0.19	0.07	0.26	4.73
24	A338	1.44	0.59	2.03	0.15	0.02	0.18	2.21
24	A351	0	0.17	0.17	0	0	0.01	0.18
24	A359	2.65	1.14	3.79	0.25	0.05	0.3	4.09
24	A380-861	0.57	0.48	1.05	0.01	0.03	0.04	1.1
24	B7379MAX	2.58	3.11	5.68	0.24	0.1	0.34	6.03
24	B779	0	0.12	0.12	0	0.01	0.01	0.12
24	B781	0	0.17	0.17	0.01	0	0.01	0.18
24	B797	6.24	4.04	10.29	0.59	0.13	0.72	11.01
24	BD-700-1A11	0.25	0.11	0.36	0	0.02	0.02	0.38
24	BEC58P	0.48	0.15	0.63	0.03	0.01	0.04	0.67
24	CNA441	0.17	0.06	0.23	0.02	0	0.02	0.25
24	DHC6	0.29	0	0.29	0.01	0	0.02	0.31
24	DHC830	2.43	0.17	2.61	0.2	0.02	0.23	2.83
24	F10062	2.95	1.09	4.04	0.29	0.05	0.34	4.38
24	F10065	2.93	1.08	4.02	0.29	0.05	0.34	4.36
24	HS748A	0.52	0	0.52	0.04	0	0.04	0.56
24	SF340	0.53	0	0.53	0.04	0	0.04	0.57
24 Total		43.9	22.42	66.32	4.12	0.88	5	71.31
Helipad	Aircraft Type	Arrivals			Departures			Grand Total
		Day	Night	Total	Day	Night	Total	
PER	EC130	1.29	0.08	1.37	1.29	0.08	1.37	2.74
PER		1.29	0.08	1.37	1.29	0.08	1.37	2.74

Table 7-3 ANEC 1 aircraft movement data

Source: Perth Airport

SECTION 7: AIRPORT SAFEGUARDING

Runway	Aircraft Type	Arrivals			Departures			Grand Total
		Day	Night	Total	Day	Night	Total	
03L	1900D	0.39	0.07	0.47	0	0	0	0.47
03L	737800	1.58	0.32	1.89	1.24	1.72	2.97	4.86
03L	7378MAX	4.06	0.4	4.46	1.29	1.6	2.89	7.36
03L	7878R	4.97	3.26	8.23	4.71	4.43	9.14	17.37
03L	A221	2.96	0	2.96	2.58	2.68	5.26	8.22
03L	A223	6.31	0.94	7.25	4.8	4.65	9.45	16.69
03L	A319NEO	6.33	0.94	7.27	4.76	4.65	9.41	16.68
03L	A320NEO	5.34	0.75	6.09	2.53	3.4	5.93	12.02
03L	A321NEO	5.04	4.2	9.24	3.8	1.33	5.13	14.37
03L	A338	2.5	1.14	3.64	0.37	0.57	0.93	4.57
03L	A351	5.43	3.63	9.07	4.3	4.82	9.12	18.18
03L	A359	5.57	3.35	8.92	3.5	3.14	6.64	15.56
03L	B7379MAX	8.25	7.88	16.12	2.87	1.32	4.19	20.32
03L	B779	2.13	2.22	4.35	2.14	2.51	4.66	9
03L	B781	3.86	1.63	5.49	3.36	2	5.37	10.86
03L	B797	9.9	4.38	14.27	5.3	2.28	7.57	21.84
03L	BD-700-1A11	0.74	0.29	1.03	0	0.42	0.42	1.45
03L	BEC58P	1.08	0.11	1.19	0.51	0	0.51	1.7
03L	CNA441	0.3	0.02	0.32	0.16	0	0.16	0.48
03L	DHC6	0.38	0.07	0.46	0	0	0	0.46
03L	DHC830	4.75	0.35	5.1	1.39	0.12	1.52	6.61
03L	HS748A	0.23	0.05	0.28	0	0	0	0.28
03L	SF340	0.23	0.05	0.28	0	0	0	0.28
03L Total		82.32	36.05	118.37	49.6	41.66	91.27	209.63
03R	1900D	0	0	0	0.26	0.52	0.78	0.78
03R	737800	1.01	0.24	1.25	0.63	0.43	1.06	2.31
03R	7378MAX	3.32	0.66	3.98	4.7	2.52	7.22	11.19
03R	7878R	1.62	0.02	1.64	1.39	0.14	1.52	3.16
03R	A221	5.2	0.99	6.19	3.28	3.37	6.65	12.84
03R	A223	6.58	1.59	8.17	5.96	4.84	10.8	18.97
03R	A319NEO	6.55	1.6	8.15	6.02	4.83	10.85	19
03R	A320NEO	4.35	0.93	5.27	5.46	2.87	8.33	13.61
03R	A321NEO	3.55	1.89	5.44	7.23	6.22	13.44	18.89
03R	A338	2.52	0.49	3.01	3.2	3.27	6.48	9.48
03R	A359	2.69	0.51	3.2	3.34	3.47	6.81	10.01
03R	B7379MAX	9.23	4.88	14.1	18.6	15.9	34.5	48.61
03R	B797	17.32	6.13	23.44	25.06	9.24	34.3	57.74
03R	BEC58P	0	0	0	0.51	0.45	0.95	0.95
03R	CNA441	0	0	0	0.11	0.21	0.31	0.31
03R	DHC6	0	0	0	0.27	0.51	0.79	0.79
03R	DHC830	0	0	0	3.29	2.15	5.44	5.44
03R	HS748A	0	0	0	0.24	0.46	0.7	0.7
03R	SF340	0	0	0	0.24	0.46	0.69	0.69
03R Total		63.93	19.92	83.85	89.79	61.84	151.63	235.49

Runway	Aircraft Type	Arrivals			Departures			Grand Total
		Day	Night	Total	Day	Night	Total	
21L	1900D	0.45	0	0.45	0.25	0.27	0.52	0.96
21L	737800	1.26	0.75	2.01	0.86	0.2	1.06	3.07
21L	7378MAX	8.33	2.09	10.42	6.38	2.19	8.57	18.98
21L	7878R	2.22	0.1	2.32	2.54	0.1	2.63	4.95
21L	A221	8.48	2.72	11.2	4.31	1.7	6.01	17.21
21L	A223	10.32	4.55	14.87	7.74	2.45	10.19	25.06
21L	A319NEO	10.28	4.52	14.81	7.76	2.43	10.19	25
21L	A320NEO	9.5	3.22	12.72	7.14	2.36	9.5	22.22
21L	A321NEO	8.7	7.55	16.25	8.64	4.62	13.26	29.51
21L	A338	5.14	2.46	7.6	4.48	2.45	6.93	14.53
21L	A359	5.52	2.63	8.16	4.7	2.61	7.31	15.46
21L	B7379MAX	22.33	19.3	41.63	22.43	11.88	34.3	75.93
21L	B797	26.96	17.73	44.68	30.87	9.66	40.53	85.21
21L	BD-700-1A11	0.6	0	0.6	0	0	0	0.6
21L	BEC58P	0.54	0	0.54	0.6	0.23	0.83	1.37
21L	CNA441	0.25	0	0.25	0.23	0.11	0.34	0.59
21L	DHC6	0.45	0	0.45	0.25	0.26	0.51	0.96
21L	DHC830	3.11	0.37	3.48	4.06	1.53	5.59	9.07
21L	HS748A	0.25	0	0.25	0.11	0.23	0.34	0.59
21L	SF340	0.25	0	0.25	0.11	0.23	0.34	0.59
21L Total		124.94	68	192.93	113.45	45.5	158.95	351.88
21R	1900D	0.2	0.18	0.38	0	0	0	0.38
21R	737800	1.65	0.83	2.49	1.65	0.9	2.55	5.04
21R	7378MAX	1.61	0.8	2.41	1.71	0.81	2.53	4.94
21R	7878R	6.32	5.15	11.47	6.51	3.85	10.37	21.83
21R	A221	2.43	0	2.43	3.49	1.37	4.86	7.3
21R	A223	5.67	2.73	8.39	5.88	2.36	8.24	16.64
21R	A319NEO	5.71	2.74	8.45	5.86	2.37	8.23	16.68
21R	A320NEO	3.34	1.48	4.82	3.31	1.76	5.07	9.9
21R	A321NEO	3.29	2.97	6.26	3.79	1.82	5.61	11.87
21R	A338	0.29	0.64	0.93	0.52	0.32	0.84	1.77
21R	A351	6.12	4.36	10.48	5.9	4.53	10.43	20.91
21R	A359	4.77	3.43	8.2	4.88	2.8	7.68	15.88
21R	B7379MAX	2.26	2.97	5.23	2.97	1.8	4.77	10
21R	B779	4.09	2.23	6.31	4.08	1.93	6.01	12.32
21R	B781	3.26	1.91	5.17	3.31	1.98	5.3	10.47
21R	B797	5.37	3.94	9.31	7.14	2.17	9.31	18.62
21R	BD-700-1A11	0	0.3	0.3	0	1.36	1.36	1.66
21R	BEC58P	0.83	0.36	1.18	0.62	0	0.62	1.8
21R	CNA441	0.32	0.08	0.4	0.16	0	0.16	0.56
21R	DHC6	0.2	0.19	0.38	0	0	0	0.38
21R	DHC830	3.88	0.49	4.37	0.39	0	0.39	4.77
21R	HS748A	0.39	0.12	0.51	0	0	0	0.51
21R	SF340	0.39	0.12	0.51	0	0	0	0.51
21R Total		62.38	38.01	100.39	62.2	32.12	94.32	194.71
Helipad	Aircraft Type	Arrivals			Departures			Grand Total
		Day	Night	Total	Day	Night	Total	
PER	EC130	2.59	0.15	2.74	2.59	0.15	2.74	5.48
PER Total		2.59	0.15	2.74	2.59	0.15	2.74	5.48

Table 7-4 ANEC 2 aircraft movement data

Source: Perth Airport

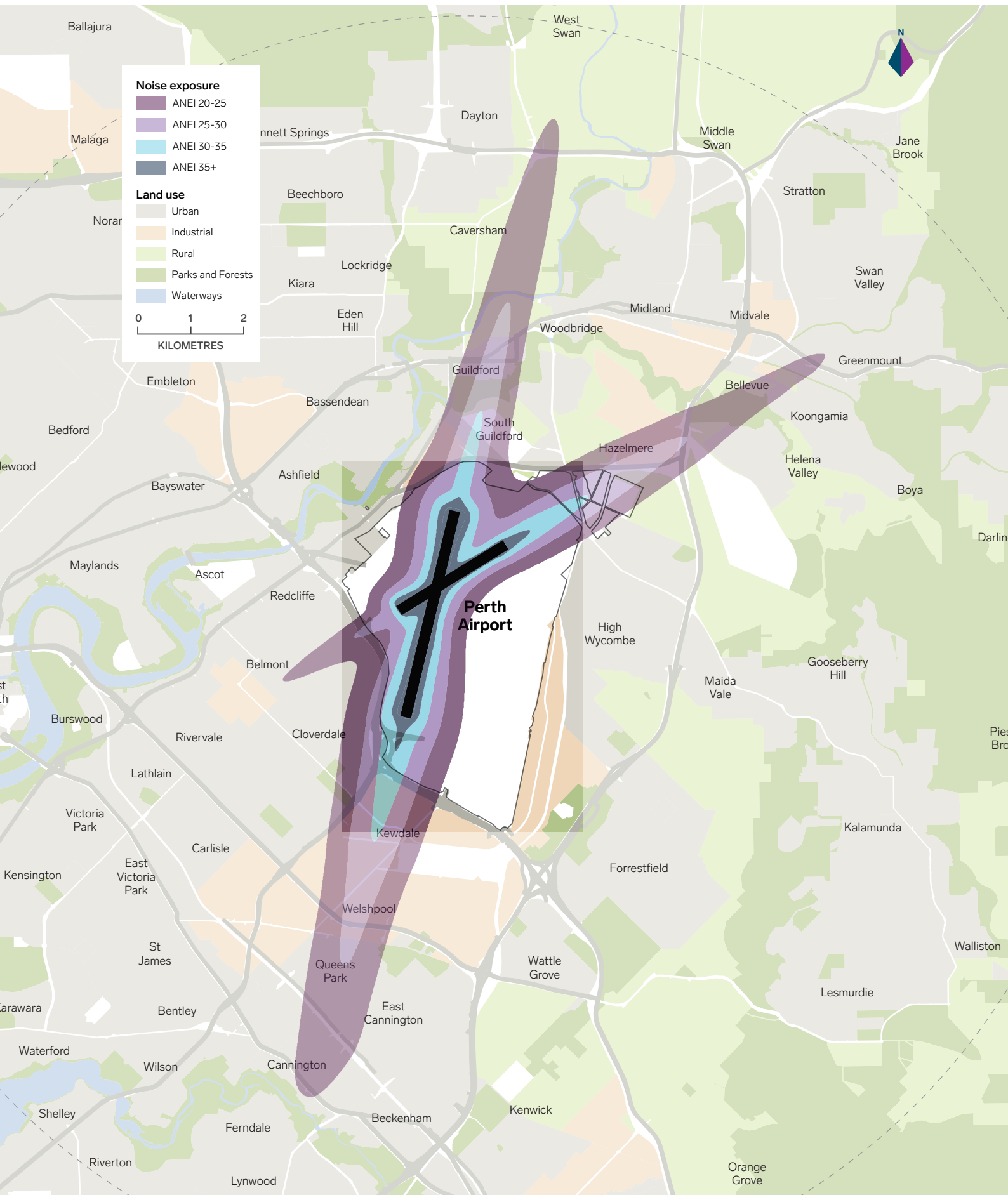


Figure 7-5 2016 ANEI
Source: Perth Airport

7.3.3.1 ANEI

The ANEI is provided in Figure 7-5. The ANEI shows the average daily aircraft noise exposure based on aircraft movements for the year 2016.

7.3.4 Flight Paths

Flights paths can be considered 'highways in the sky'. They define three-dimensional routes that aircraft use to arrive at or depart from an airport.

Flight paths are often shown as a single line on a map, however, unlike a train on a railway line or a car on a highway, it is not always possible for aircraft to follow precisely along the line depicted. In practice, a flight path can vary up to several kilometres or more. This occurs for a range of reasons, including:

- weather conditions,
- requirement to keep a safe distance between aircraft in the sky, and
- aircraft performance.

For visual presentation of flight paths, the path shown is based on a nominal spread around a central corridor. A flight path diagram illustrates flight paths in two ways:

- as a chart that visually shows:
 - if the flight path is used for arriving or departing aircraft, shown by different colours,
 - the approximate height of the aircraft, shown as a colour gradient, and
 - the potential width of the flight path.
- in a data table below the chart that shows:
 - the average number of times that an aircraft is likely to use the flight path per day, and
 - the average number of day and night aircraft that is likely to use the flight path.

The flight path diagrams are shown in Figure 7-7 to Figure 7-10 for each ANEC scenario and in either south flow or north flow.

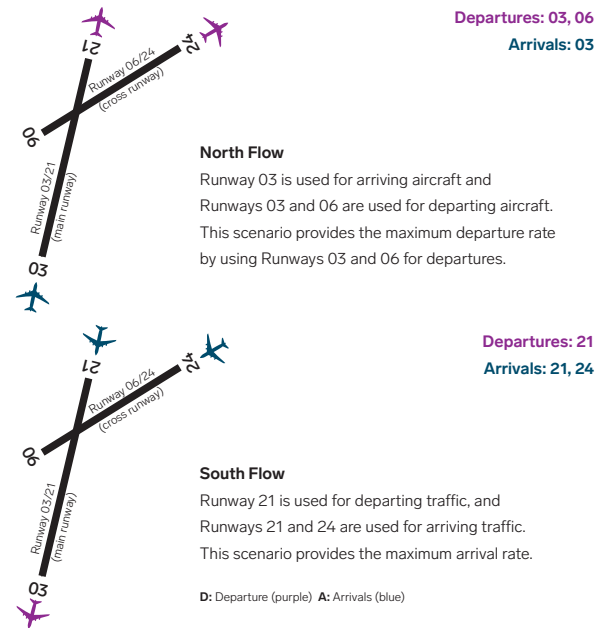


Figure 7-6 Perth Airport Operating Flows

Source: Perth Airport



SECTION 7: AIRPORT SAFEGUARDING

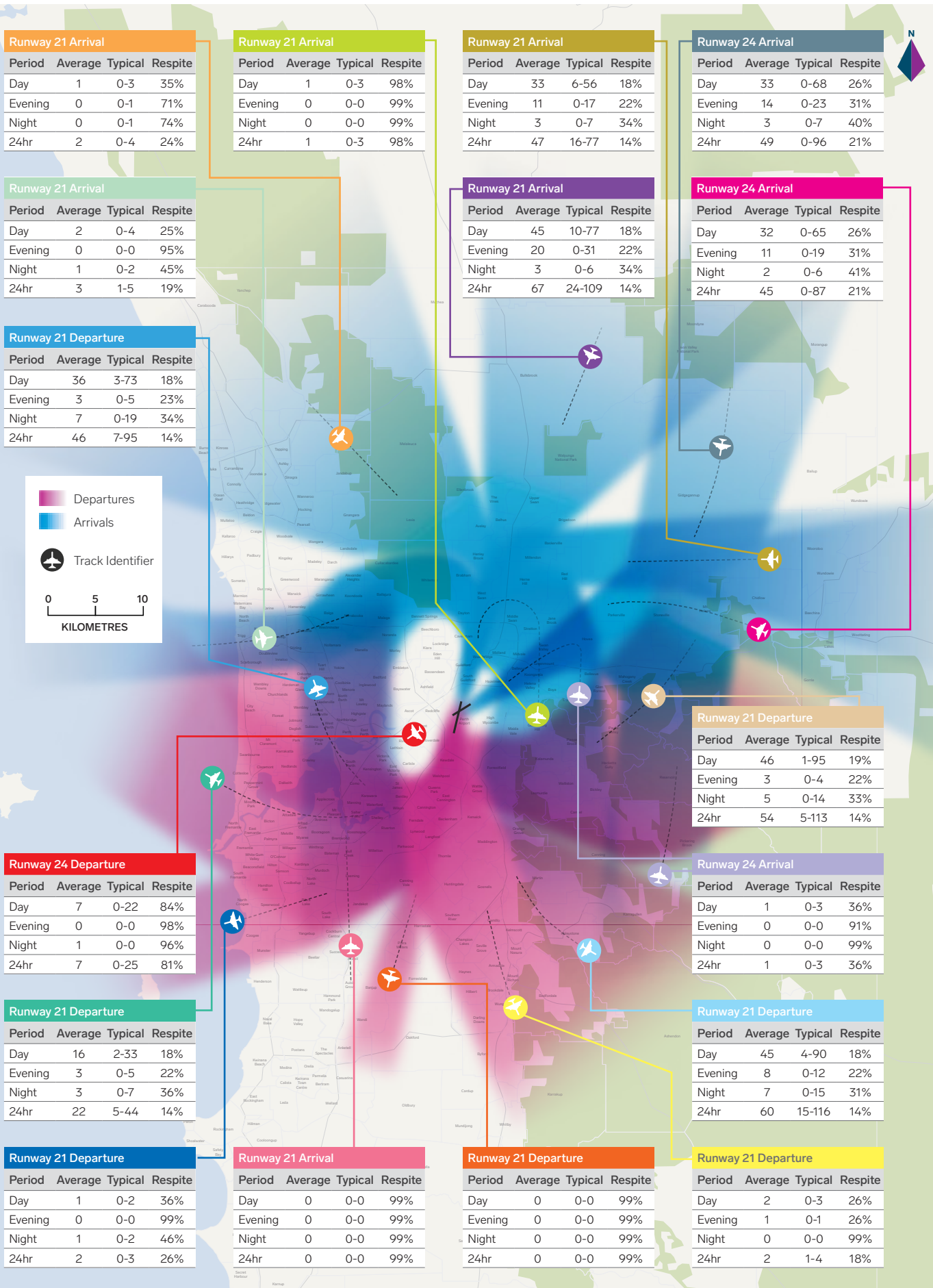


Figure 7-7 ANEC 1 south flow arrivals and departures flight path diagram
 Source: Perth Airport

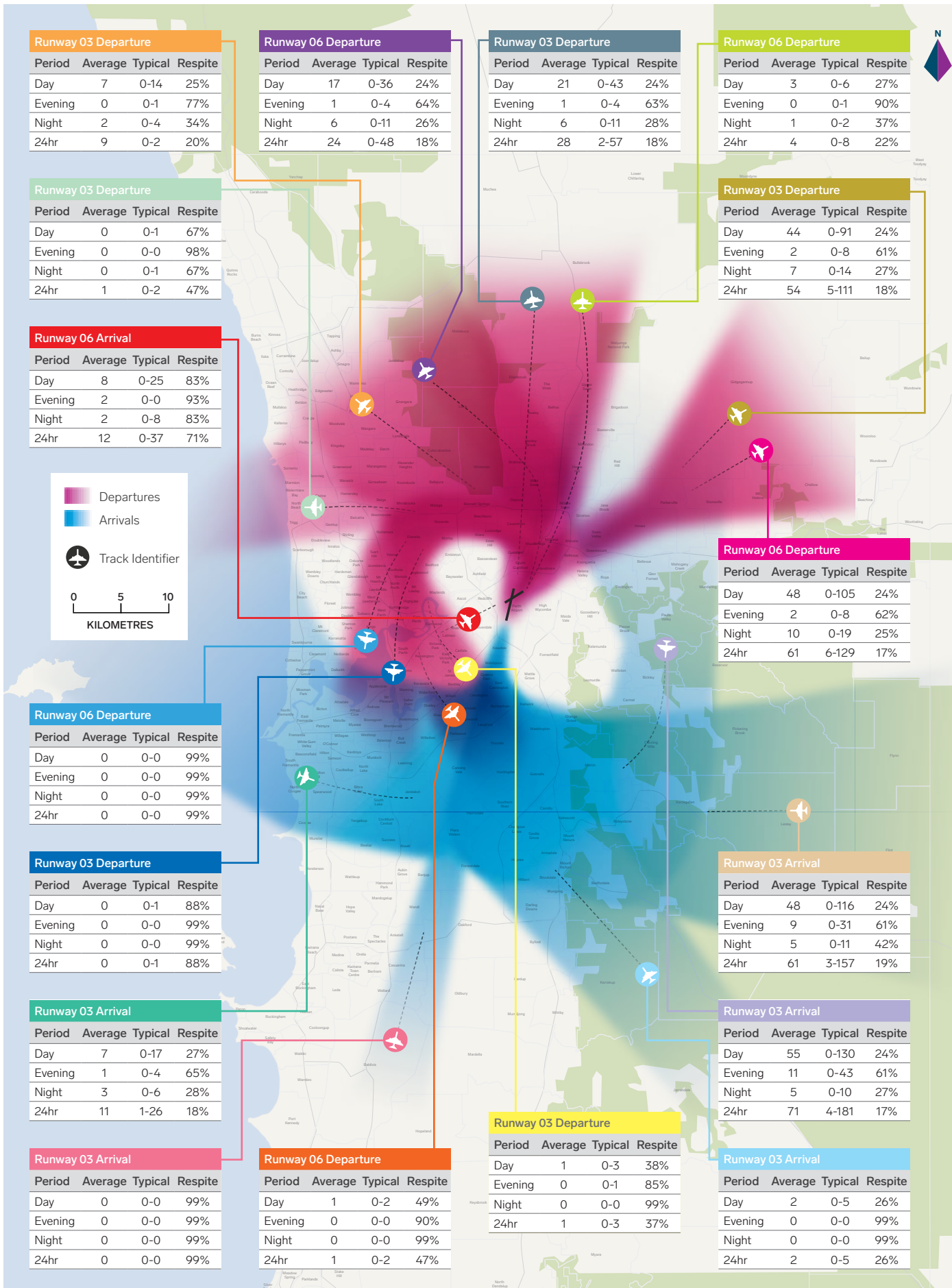


Figure 7-8 ANEC 1 north flow arrivals and departures flight path diagram
 Source: Perth Airport

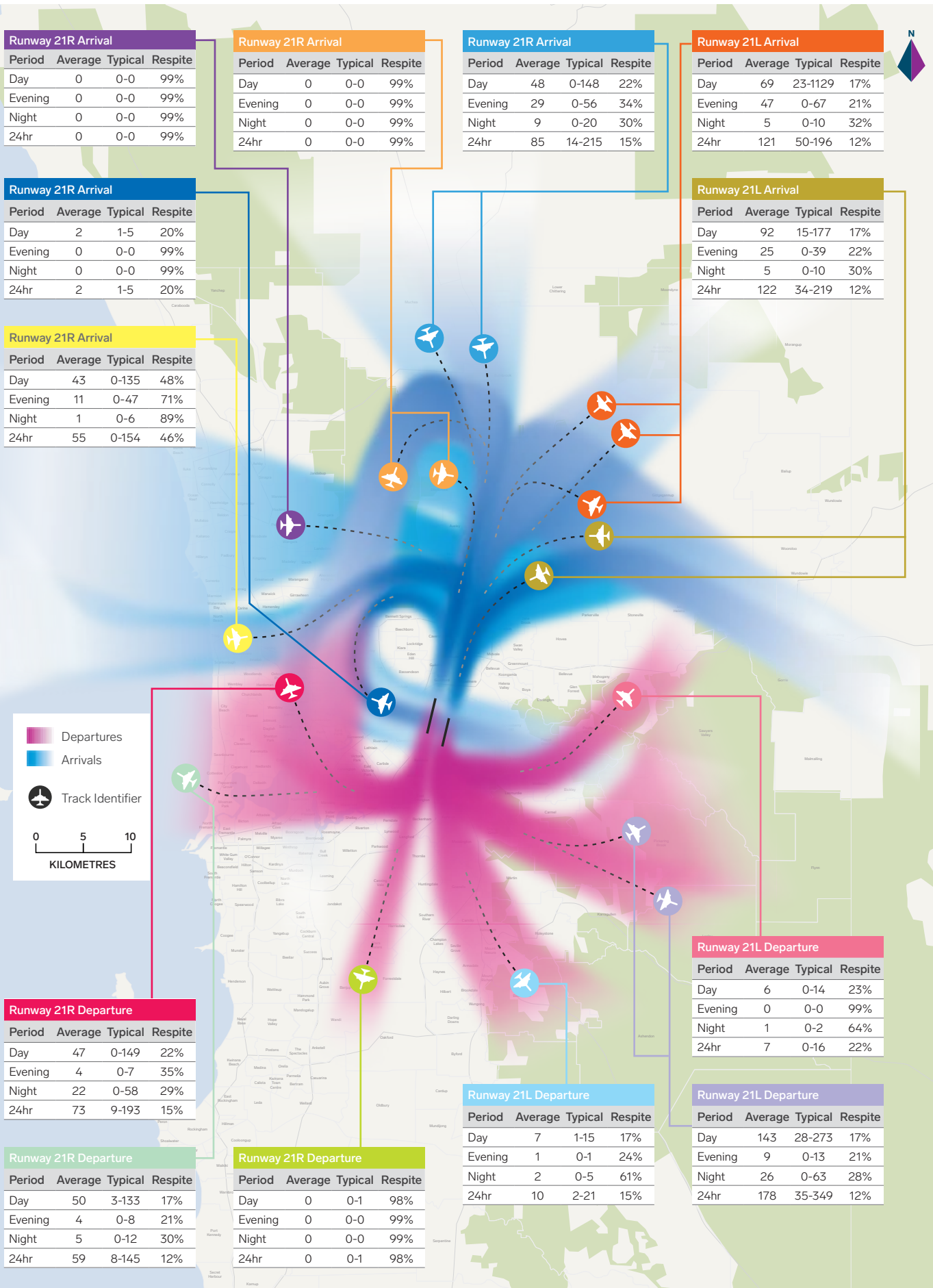


Figure 7-9 ANEC 2 south flow arrivals and departures flight path diagram

Source: Perth Airport

This diagram is based on Perth Airports projected movements at ultimate capacity. Based on the forecasts used in this Master Plan, it is expected Perth Airport will reach capacity around 2080.

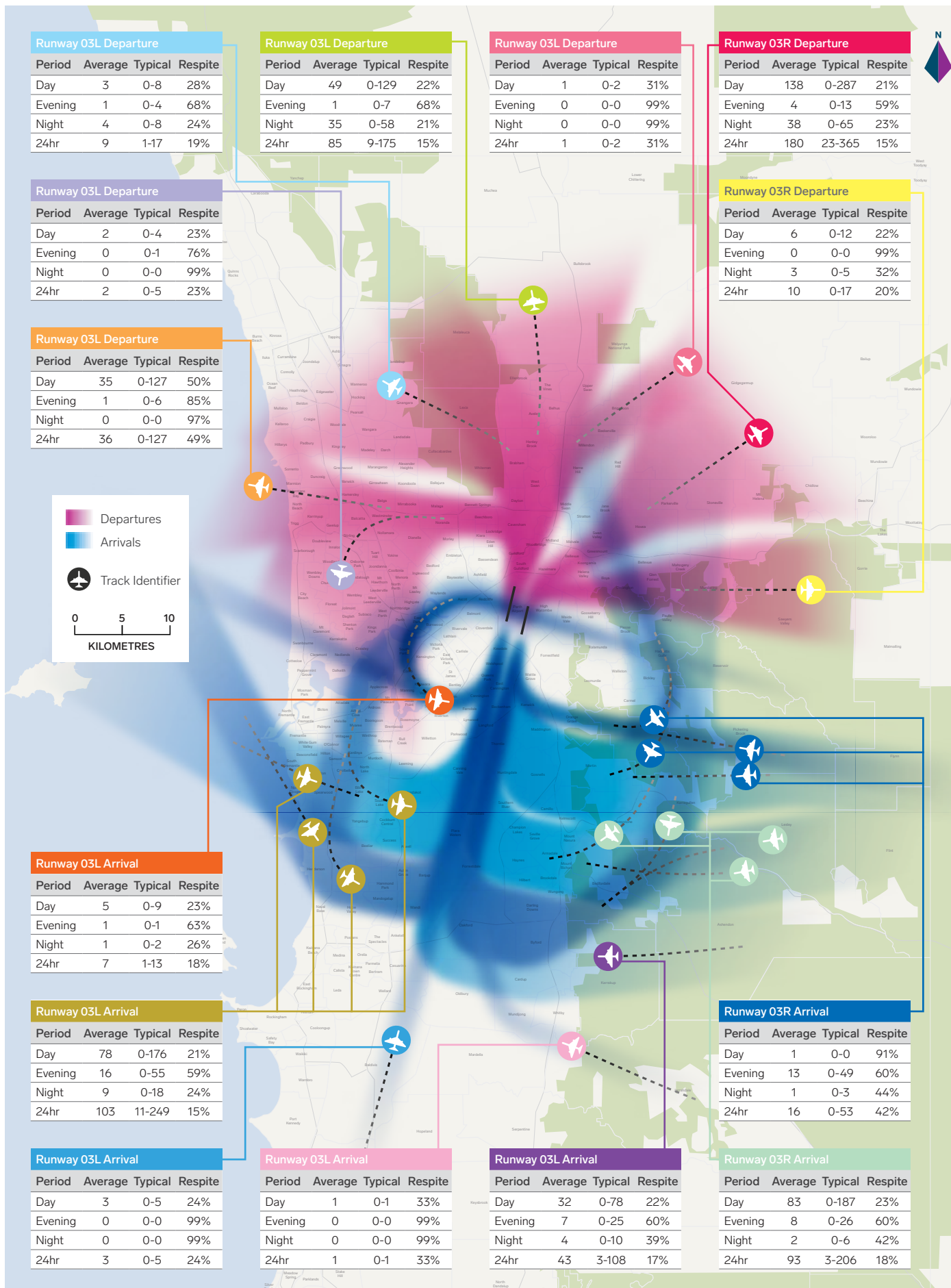


Figure 7-10 ANEC 2 north flow arrivals and departures flight path diagram

Source: Perth Airport

This diagram is based on Perth Airports projected movements at ultimate capacity. Based on the forecasts used in this Master Plan, it is expected Perth Airport will reach capacity around 2080.

7.3.5 Houses within the 30 ANEF Contour

The Airports Act requires a master plan to provide plans, developed in consultation with airlines and Local Government bodies within the vicinity of the airport, for managing aircraft noise intrusion in areas forecast to be above the significant ANEF (30 ANEF) levels.

There are 38 houses in the South Guildford and Guildford area that sit within the 30 ANEF contour.

Overall the net difference between the ANEF charts published in 2014 and 2020 is a decrease of approximately 69 residential properties with exposure above the significant ANEF levels (30 ANEF contour).

These changes are mostly attributed to:

- detailed preliminary design of the flight corridors for parallel runway operations,
- changes to forecast aircraft mix to incorporate quieter new-generation aircraft, and
- the use of AEDT software, a newer aircraft noise modelling tool which is more comprehensive and can model a greater range of current and new aircraft types.

As discussed in Section 7.2, Perth Airport works closely with Airservices, airline partners, Commonwealth, State and Local Governments to manage aircraft noise, with a focus on houses located within the 30 ANEF contour. Specific measures include land use planning controls, noise abatement procedures with preferred runways, and initiatives from the Perth Airport Aircraft Noise Technical Working Group (PAANTWG).

7.3.6 Supplementary Noise Metrics

The ANEF is a land use planning tool and does not necessarily fully convey the impact of aircraft noise and aircraft noise exposure to the community in a suitable manner. The frequency of over-flight and the sound level of a single aircraft are typically the two factors that determine how a person will perceive noise. These are not clearly translated by the ANEF system.

To improve how aircraft noise is communicated to the public, the then Commonwealth Department of Infrastructure and Transport developed 'Number Above' (or 'N' noise) contours. These contours illustrate the average number of events (single aircraft movements) per day that exceed a certain sound level.

The volume (loudness) of a sound depends on its sound-pressure level, which is expressed in decibels (dB). For measurement purposes, A-weighted decibels (dBA) are generally used because they take into account varying sensitivity of the human ear to different frequencies of sound.

Guidelines, including the NASF, suggest that an outdoor sound level of 70 dBA corresponds to an indoor noise level of approximately 60 dBA with the windows open. This is considered the sound level at which conversation and other indoor activities can generally be disturbed.

Perth Airport recognises that residents of the region enjoy an outdoor lifestyle, supported by a mild climate and an abundance of warm weather and sunshine during the summer months, which is often reflected in building construction. As a result, Perth Airport has historically adopted an outdoor sound level of 65 dBA for noise modelling, which correlates to an indoor noise level of approximately 55 dBA and is the sound level at which conversation may be disturbed. The N65 contours represent the average number of events per day over 65 dBA for an area. This is a conservative approach compared to other Australian airports to account for the anticipated prevalence of outdoor living.

For assessment of night-time noise impacts, it is customary to consider N60 values. The N60 describes the number of events exceeding 60 dBA external to a building, which would typically result in a maximum noise level of 50 dBA within a building having windows open to a normal extent. If this were the case in a room where a person is sleeping, a 50 dBA maximum noise level is considered to be close to the point at which noise may cause awakening.

N-above contours are presented for five or more events per period. This threshold is adopted because it represents a level above which aircraft noise would be considered a regular feature of the noise environment (i.e. five events per day). N-above values of five or more are considered appropriate for describing aircraft noise in areas that currently experience aircraft noise, as well as areas which would be newly affected. Furthermore, they provide sufficient resolution to describe the change in aircraft noise for both existing and newly exposed areas.

The Perth Airport N65 and N60 contour plans, based on 2016 aircraft movements and the ultimate capacity forecast, are provided in Figure 7-11 to Figure 7-14.

The 'Number Above' noise contours represent an average day and not a typical day. On a typical day, residents may actually experience more events or less events than the N-above contours suggest. This is because the traffic at Perth Airport varies significantly from weekdays to weekends and depending on the runway being used at any particular time.

As outlined in Section 7.2.3, Perth Airport has developed a web-based portal to allow community members and representatives to more easily understand current and anticipated aircraft noise exposure. The web-based portal is available on Perth Airport's website at perthairport.com.au/aircraftnoise.

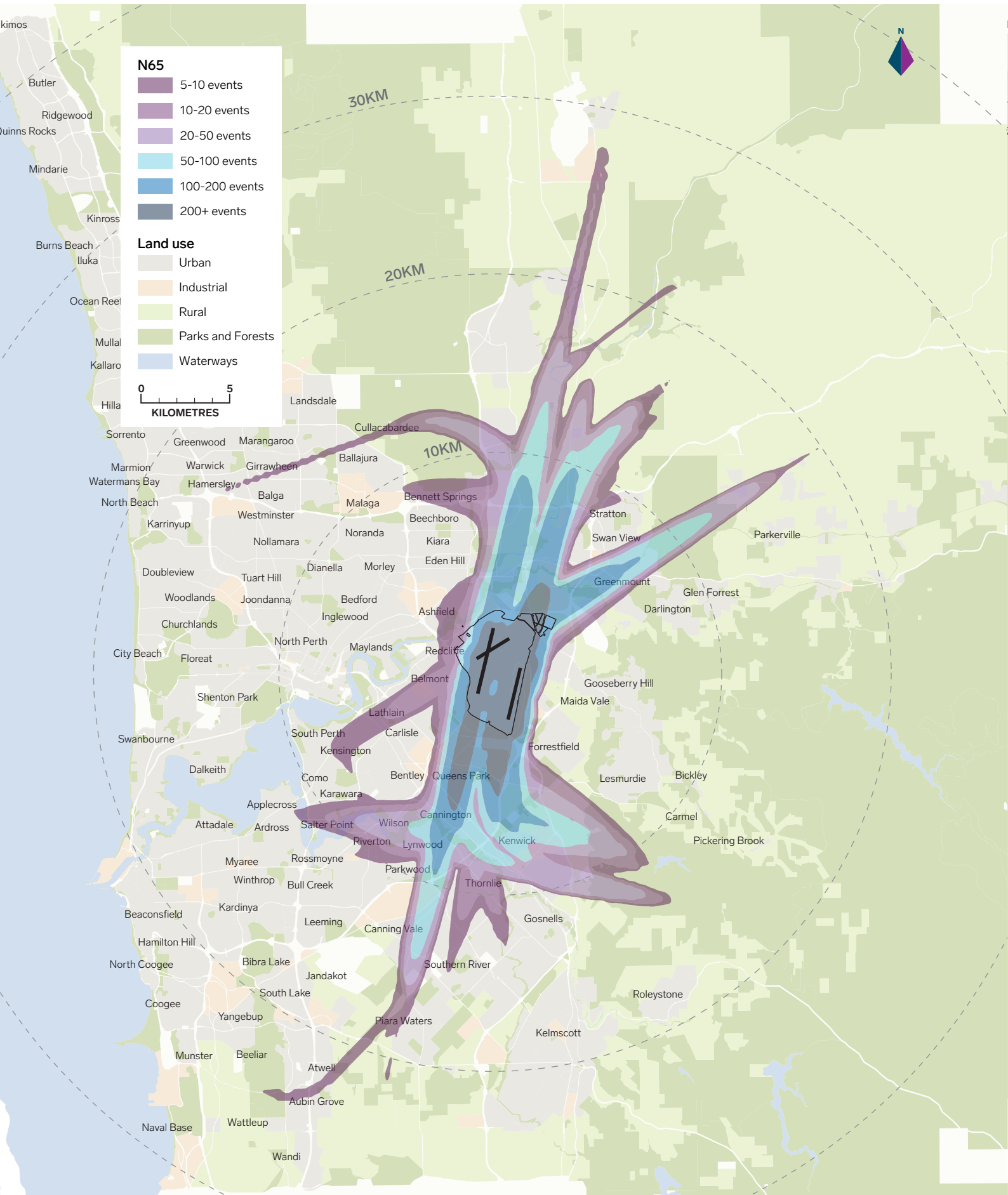


Figure 7-12 Ultimate N65 contour

Source: Perth Airport

This diagram is based on Perth Airports projected movements at ultimate capacity. Based on the forecasts used in this Master Plan, it is expected Perth Airport will reach capacity around 2080.

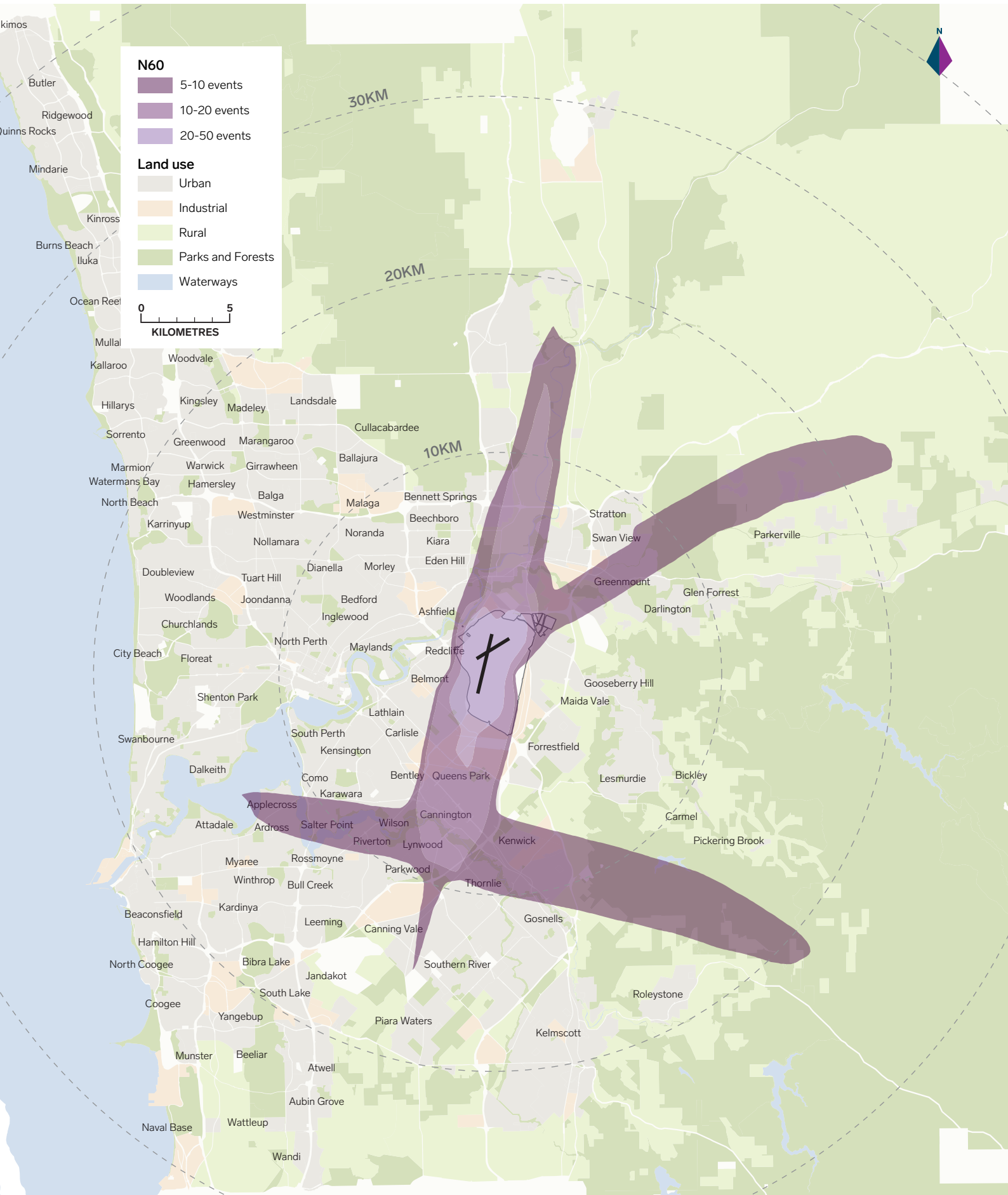


Figure 7-13 2016 N60 contour
Source: Perth Airport

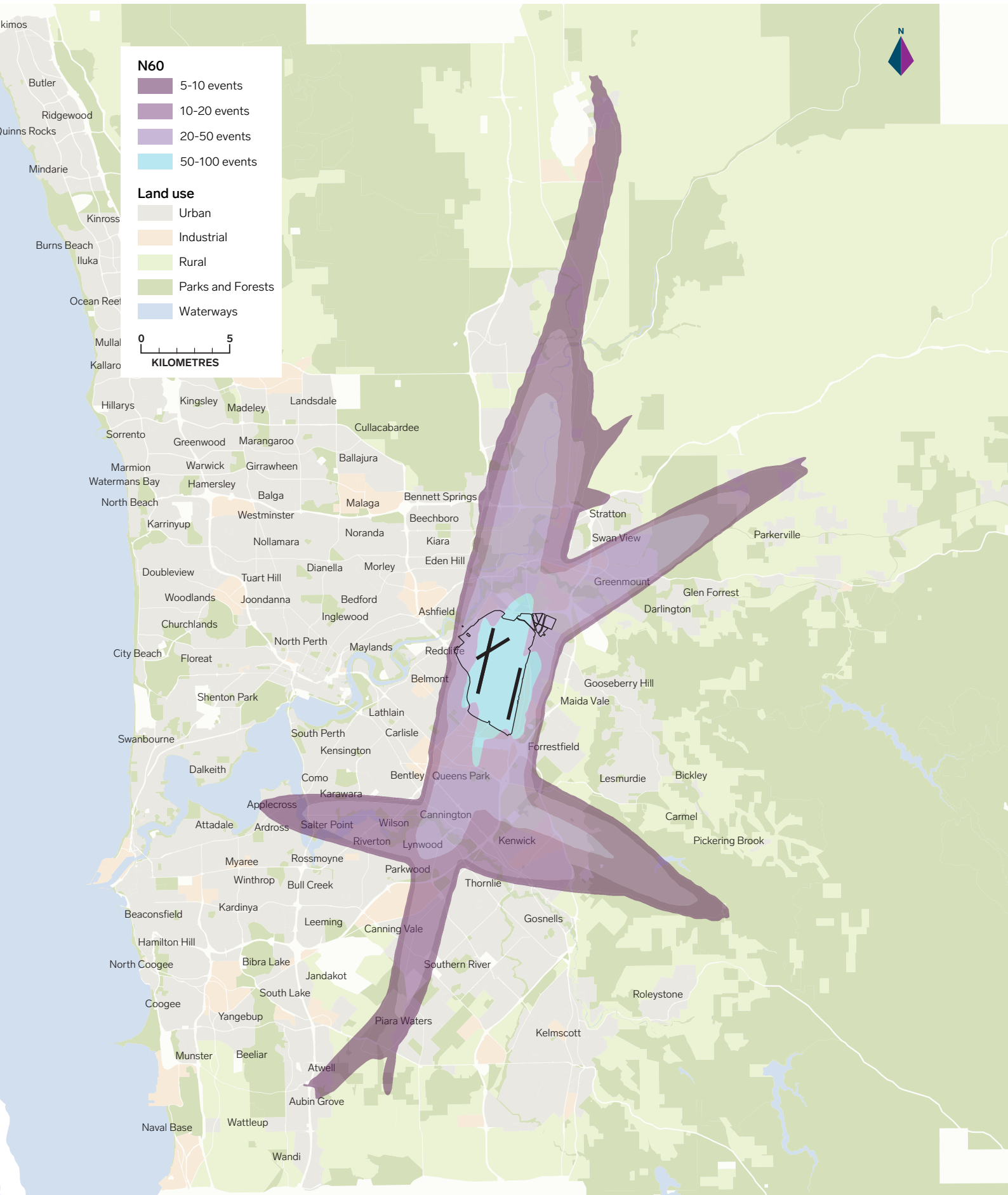


Figure 7-14 Ultimate N60 contour

Source: Perth Airport

This diagram is based on Perth Airports projected movements at ultimate capacity. Based on the forecasts used in this Master Plan, it is expected Perth Airport will reach capacity around 2080.

7.3.7 Ground Based Noise

Perth Airport has limited control of noise generated by aircraft on the ground.

An essential safety measure following maintenance of aircraft is to perform engine testing, known as 'ground running'. Perth Airport does not have major airline maintenance facilities and consequently has less ground running than other major airports. There is, however, a continuing requirement for aircraft operators to carry out engine ground running at Perth Airport.

Perth Airport acknowledges that engine ground running can contribute to the overall noise created at an airport and, as a result, has developed an Engine Ground Running Management Plan. The Management Plan places restrictions on the time, location, and maximum power settings for engine ground runs. Aircraft operators must seek approval from Perth Airport if a proposed engine run cannot be conducted in accordance with the endorsed parameters for time, power and location of ground running.

Although engine ground running is considered the critical factor in the generation of ground-based aircraft noise, there are other ground-based aircraft noise sources on the airfield, such as the use of Auxiliary Power Units which power aircraft while they are on the ground. One measure adopted by Perth Airport to reduce ground noise sources has been the installation of fixed electrical ground power units at aircraft parking positions to minimise the use of auxiliary power units and mobile ground power units.

Perth Airport regularly reviews its Engine Ground Running Management Plan to assess opportunities for improved noise management.

Other sources of ground-based noise are detailed in Section 9.

7.4 Airspace Protection

Protection of airspace required for Perth Airport's current and future needs is essential to provide a safe, predictable environment for the arrivals and departures of aircraft using Perth Airport in all weather conditions.

The Airports (Protection of Airspace) Regulations 1996 (APA Regulations) prescribe airspace around the airports for protection from activities that could pose a hazard to air navigation. These are referred to as controlled activities and include, but are not limited to:

- construction or erection of any building or other structure that may intrude into prescribed airspace, including construction cranes,
- an activity that results in artificial or reflected light that exceeds acceptable light intensities or is capable of blinding or confusing pilots,
- an activity that results in air turbulence, and
- an activity that results in the emission of smoke, dust, or other particulate matter.

Prescribed airspace comprises the airspace above the lower of two sets of defined invisible surfaces above the ground known as the Obstacle Limitation Surfaces (OLS) and Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces.

OLS defines the airspace that should ideally be kept free of obstacles. These surfaces only relate to visual operations or the visual stages of an instrument flight. The purpose of the OLS is not to restrict or prohibit all obstacles but to ensure that existing or potential obstacles are examined for their impact on aircraft operations and that their presence is properly considered.

PANS-OPS surfaces define the airspace related to aircraft operations that are reliant on instrument navigation. PANS-OPS surfaces are not to be permanently infringed in any circumstance.

The APA Regulations require that details of proposed controlled activities are provided to Perth Airport to be assessed against the OLS and PANS-OPS. Perth Airport follows the Processing Applications under the APA Regulations Guidelines for Operations of Federal Airports, published by the then Commonwealth Department of Infrastructure and Transport.

Perth Airport assesses proposed short-term controlled activities against the OLS and PANS-OPS to ensure day to day operations are not impacted by an infringement. Perth Airport also uses the OLS and PANS-OPS to safeguard the planned new runway and its associated airspace against any proposed long-term or permanent development which could cause an infringement.

For proposals within the airport estate, controlled activities are identified and addressed through Perth Airport's development approval and consent processes. For proposals outside of the airport estate, Local Governments should refer applications for developments or structures that may constitute a controlled activity to Perth Airport for assessment.

Any controlled activity that is found to infringe the prescribed airspace is referred to Airservices and CASA for review before being submitted to the Department of Infrastructure, Transport, Regional Development and Communications for approval.

Conditions may be imposed on an approval which will be monitored by Perth Airport, with any breach reported and rectification required. Developments and structures of a short-term basis (up to three months), typically cranes, may be approved by Perth Airport following consultation with Airservices and CASA.

Buildings and structures comprise the majority of potential controlled activity, as well as erection and operation of construction cranes, that need assessment.

Perth Airport has prepared Structure Height Control Contour plans that indicate the height at which a building or structure triggers the need for a referral to Perth Airport for assessment. There are areas identified immediately adjacent to the airport, and particularly in the final approach and take-off areas, where the airport requires all development and structures to be referred for assessment.

Perth Airport has developed an online system for the assessment and management of crane applications and permanent structures. The Protected Airspace Assessment Tool (PAAT) (<https://paat.perthairport.com.au>) will automatically issue a permit if no airspace infringement is detected. Perth Airport receives notification of any assessments that would result in an airspace infringement, and relevant applications are then issued to Airservices, CASA and Department of Infrastructure, Transport, Regional Development and Communications for approval where required.

In 2001, Perth Airport declared the prescribed airspace including the new runway at 2,700 metres long. Following approval of the Master Plan 2014 Minor Variation, which extended the runway length from 2,700 to 3,000 metres as a result of changed design standards for runway approach lighting, Perth Airport has commenced the process of updating the prescribed airspace and declaration in accordance with Part 2 of the Regulations. Perth Airport will ensure notice is issued as per the APA Regulations and new prescribed airspace charts are published, and displayed on the Perth Airport website.

The current long-term OLS for Perth Airport is shown in Figure 7-15. The current long-term critical PANS-OPS surface for Perth Airport is shown in Figure 7-16. Both of these plans consider the future runway infrastructure as outlined in Section 4, which is subject to approval.

7.5 Managing the Risk of Wildlife Strikes in the Vicinity of Perth Airport

Wildlife around aerodromes can present serious hazards to aircraft operations. The most obvious of these is the presence of birds, but other animals can also present a hazard.

Under the Civil Aviation Safety Regulations 1988 Part 139, Perth Airport is required to control the risk of wildlife striking operating aircraft. Perth Airport has a comprehensive Wildlife Hazard Management Plan that incorporates monitoring, assessment, reporting, and control methods for bird and animal hazards. CASA regulates and conducts surveillance and ensures that the risk of wildlife striking aircraft at Perth Airport is being adequately managed.

Perth Airport also manages vegetation and open waterways across the estate to minimise the attraction of species that may pose a risk to aircraft safety. As part of Perth Airport's commitment to managing the risk of wildlife strikes, a project to net open drains throughout the airfield commenced in 2017. This \$1.7 million project resulted in over three kilometres of previously uncovered open drains becoming netted.

Aviation safety regulations do not address the risk of bird strikes that occur outside the airport boundary in the same way as they address on-airport risks. However, there is still a risk of bird strike off-airport. The NASF has guidelines for managing the risk of wildlife strikes in the vicinity of airports to inform State and Local Governments. Perth Airport works with these planning authorities to monitor conflicting land uses or changing waste disposal strategies, such as landfills, that may cause wildlife and birds to pass or roost in the vicinity of the airport.

7.6 Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation

Wind turbine farms can be hazardous to aviation as they are tall structures with the potential to come into conflict with low-flying aircraft. There is also the possibility for wind turbines to cause turbulence which is noticeable up to 16 rotor diameters downwind of the turbine. The NASF Guideline D – Managing the Risk to Aviation Safety of Wind Turbine Installations states that proposed wind turbines that are greater than 150 metres above the ground and within 30 kilometres of an aerodrome should be referred to CASA and Airservices (or the Department of Defence for a military aerodrome).

The probability of a wind farm or turbine of this scale being proposed within 30 kilometres of Perth Airport is very low and the vast majority of aircraft operations at Perth Airport would not be considered low flying. However, Perth Airport will comply with NASF Guideline D and notify CASA if it becomes aware of any proposal for wind farms within 30 kilometres of the airport which could potentially interfere with current or proposed flight corridors.

7.7 Managing the Risk of Distractions to Pilots from Lighting

Glare from ground lights or large reflective surfaces near the runway have the potential to obscure vision or cause confusion and distraction for pilots and air traffic controllers.

Guidance to designers and installation contractors is provided for ground lighting within six kilometres of the estate under Civil Aviation Safety Regulations 1988 Part 139 and Manual of Standards Part 139, which specify maximum ground lighting intensities (measured at three degrees above the horizontal) within four light zones which surround a runway. These zones reflect the degree of interference ground lights can cause as a pilot approaches to land, with the closest zone the most onerous.

The lighting zones for Perth Airport is shown in Figure 7-17.

CASA has the power, through Regulation 94 of the Civil Aviation Regulations 1988, to require interfering lights to be extinguished or modified. Lights within six kilometres of the estate are most likely to be subjected to the provisions of Regulation 94.

The fact that a certain type of light fitting already exists in an area is not necessarily an indication that more lights of the same type can be added to the same area.

Even though a proposed installation is designed to comply with the zone intensities, designers are advised to consult with CASA as there may be overriding factors which require more restrictive controls to avoid conflict.

The regulations pertaining to lighting intensity also address sources of glare that may distract pilots. This has become increasingly significant as the popularity of solar panels continues to grow. Perth Airport will continue to work with CASA in the assessment of relevant solar panel applications.

Further guidance for managing the risk of distractions to pilots from lighting near airports is provided in the NASF Guideline E – Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports.

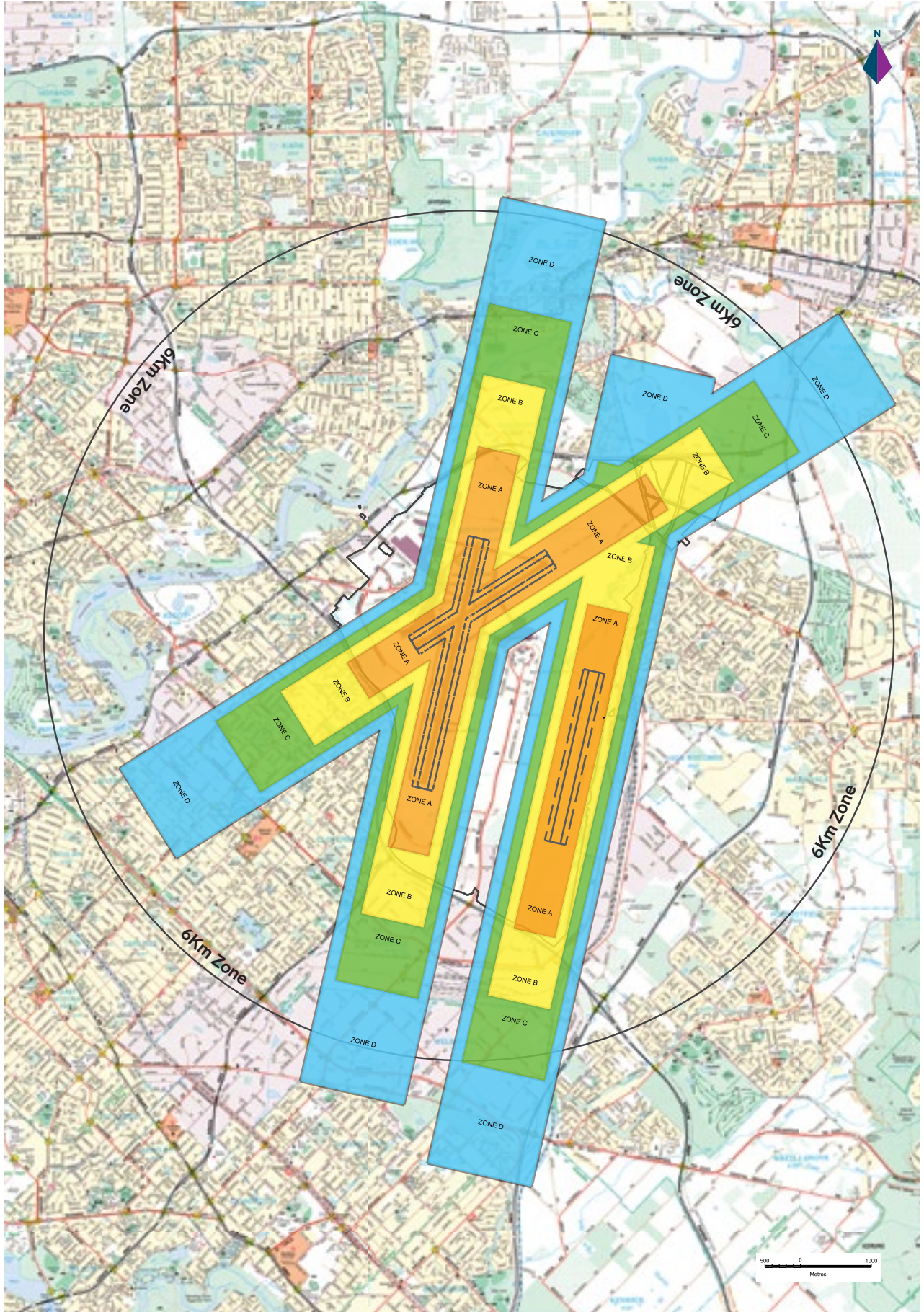


Figure 7-17 Perth Airport Lighting Control Zones
Source: Perth Airport

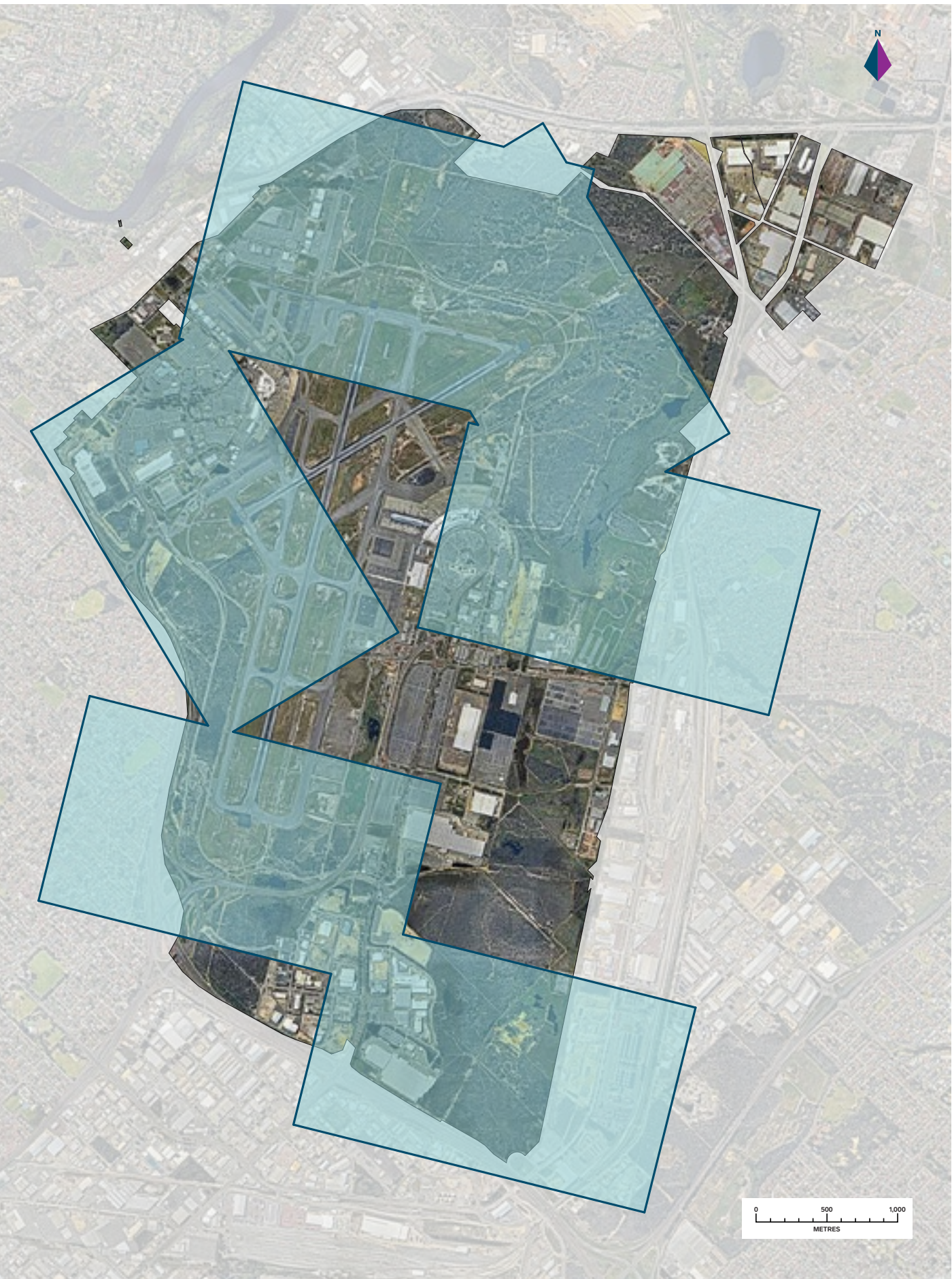


Figure 7-18 Windshear Trigger Assessment Areas
Source: Perth Airport

7.8 Managing the Risk of Building Generated Windshear and Turbulence

The risk of windshear (a change of wind speed and/or direction over a relative short distance) created from a large building or terrain located in the vicinity of a runway is a critical consideration for safe airport operations.

Windshear poses the greatest risk on approach, landing and take-off when an aircraft's speed is low and the pilot's ability to respond is more limited.

Building-generated windshear becomes critical to safety when a significant obstacle, such as a building, is upwind of the approach path to an operational runway. In such circumstances, wind flow may be diverted around and over the building, causing the wind speed and direction to vary along the approach path.

Perth Airport's development approval process considers NASF Guideline B. Guideline B does not attempt to regulate the assessment process or mitigation of risks, but rather provide a framework for preliminary assessment of individual risks so that they can be either discounted or made the subject of more detailed analysis.

Guideline B outlines a staged process for the assessment of buildings and obstacles near airports with regards to building generated windshear and turbulence. Firstly, Guideline B defines an area based on distances from the extended runway centreline and runway ends within which buildings and other obstacles are considered to pose a safety risk in terms of windshear and turbulence. This area is referred to as the 'assessment trigger area'. The second stage of assessment is to test whether single buildings or obstacles within the assessment trigger area infringe the 1:35 surface. The 1:35 surface is a defined invisible surface that originates at the runway centreline and rises 1m for every 35m perpendicular to the runway centreline (i.e. at 350m perpendicular from the runway centreline this surface has risen 10m). Any buildings or structures that penetrate this surface should be further assessed and aerodynamic modelling may be required. This rule is noted as being very conservative and any building that does not penetrate the 1:35 surface is considered not to create unsafe wind effects.

The windshear assessment trigger areas as described in the Guideline are shown in Figure 7-18. The assessment trigger areas shown consider the existing runway layout as well as the new runway and the potential future extensions of the main and cross runways. When determining the siting of buildings within the trigger assessment areas, the prevailing wind conditions are considered to gain an understanding of how often they will be upwind of the approach path to the runway. The height of the buildings is also considered.

7.9 Protecting Aviation Facilities – Communications, Navigation and Surveillance

There are a number of communication, navigation and surveillance systems (CNS) on or near Perth Airport that are critical to the safe and efficient operation of aircraft. Airservices typically installs and maintains these systems at Perth Airport. Such systems currently in operation at Perth Airport include:

- Instrument Landing System (ILS) (localiser/glideslope),
- VHF Omnidirectional Range (VOR) / Distance Measuring Equipment (DME),
- microwave link path, and
- Terminal Area Radar (TAR).

Objects such as aircraft, buildings, vehicles and other facilities emitting electromagnetic energy can interfere with these systems.

Development and construction proposals on the airport estate, or referred to Perth Airport by surrounding Local Governments, are assessed in consultation with Airservices to ensure the performance of such facilities remains acceptable and that current and future anticipated systems are suitably protected in accordance with the Civil Aviation Safety Regulations 1988.

This involves the protection of land for equipment installations (including protection for required services such as a fibre optic communication systems) and any potential airspace required for its operation.

Perth Airport works with Airservices to assess, and when appropriate, introduce new technologies that may improve safety, performance, economics and efficiency of Perth's air traffic and airspace.



7.10 Public Safety Areas

Public Safety Areas (PSA) are areas of land at the ends of the runways, identified by quantifiable risk contours, within which development is restricted in order to control the number of people on the ground at risk of death or injury in the event of an aircraft accident on take-off or landing. PSA risk contours are developed based on runway use statistics correlated against international crash data and provide an objective basis for precautionary planning decisions in those areas of highest risk.

Perth Airport has adopted the United Kingdom (UK) approach to public safety as detailed in NASF 'Guideline I – Managing the Risk in Public Safety Areas at The Ends of Runways'.

Under the UK model, the PSA is generally broken into two areas representing 1-in-10,000 and 1-in-100,000 probabilities of being killed or injured per year from an aircraft accident. Although the boundary of a PSA generally corresponds with the 1-in-100,000 contours, the predicted level of risk within this area may be higher. The model considers the maximum tolerable level

of individual third-party risk of being killed as a result of an aircraft accident as 1-in-10,000 per year. Any occupied residential properties, or commercial and industrial properties occupied as normal all-day workplaces, within the 1-in-10,000 are not recommended.

In the remaining PSA between the 1-in-10,000 and 1-in-100,000 individual risk contours, developments which involve a low density of people working or congregating is considered acceptable. For example, this may include car parking, open storage or certain types of warehouse development. According to the NASF Guideline I, new residential buildings should not be permitted within this area of the PSA, however existing developments may remain. The compatibility for new developments is shown in Table 7-5.

Perth Airport has developed PSA contours that reflect the ultimate development and demand of the airport at approximately 362,000 movements per year of which the 1-in-10,000 and 1-in-100,000 areas are shown in Figure 7-19.

PSA	Compatible uses	Incompatible uses/activities
INNER AREA – 1 in 10,000	<ul style="list-style-type: none"> • Long stay and employee car parking (where the minimum stay is expected to be in excess of six hours) • Built development for the purpose of housing plant or machinery and would require no people on site on a regular basis, such as electricity switching stations or installations associated with the supply or treatment of water • Golf courses, but not club houses (provided appropriate mitigation measures are in place to reduce wildlife attraction risk - see NASF Guideline C) 	<ul style="list-style-type: none"> • Accommodation activities: This includes dwelling houses, multiple dwellings, resort complexes, tourist park, hostels, retirement villages or other residential care buildings • Community activities: educational establishment, community centres, hospitals, theatres, child- care and playgrounds, detention facilities, place of worship • Recreation activities: This includes parks, outdoor recreation and sport, major sport and entertainment facilities • Entertainment and centre activities: Shopping centres, service stations, showrooms, markets, hotels, theatres, tourist attraction, garden centres • Industrial and commercial uses involving large numbers of workers or customers: Intensive uses such as high impact, medium and low impact industry, warehousing, services industry • Manufacture or bulk storage of flammable, explosive or noxious materials • Public passenger transport infrastructure: This includes bus, train and light rail stations
OUTER AREA – 1 in 100,000	<ul style="list-style-type: none"> • Long stay and employee car parking (where the minimum stay is expected to be in excess of six hours) • Shorter stay car parking (with a safety case – depends on intensity of use) • Built development for the purpose of housing plant or machinery and would require no people on site on a regular basis, such as electricity switching stations or installations associated with the supply or treatment of water • Golf courses, but not club houses (provided appropriate mitigation measures are in place to reduce wildlife attraction risk) • Open storage and types of warehouses with a very small number of people on site. The planning authority could consider imposing conditions to prevent future intensification of the use of the site and limit the number of people to be present on the site • Developments which require few or no people on site on a regular basis such as buildings housing plant or machinery • Low intensity public open space 	<ul style="list-style-type: none"> • Accommodation activities: This includes dwelling houses, multiple dwellings, resort complexes, tourist park, hostels, retirement villages or other residential care buildings • Community activities: educational establishment, community centres, hospitals, theatres, child- care and playgrounds, detention facilities, place of worship • Recreation activities: This includes parks, outdoor recreation and sport, major sport and entertainment facilities • Entertainment and centre activities: Shopping centres, service stations, showrooms, markets, hotels, theatres, tourist attraction, garden centres • Industrial and commercial uses involving large numbers of workers or customers: Intensive uses such as high impact, medium and low impact industry, warehousing, services industry • Manufacture or bulk storage of flammable, explosive or noxious materials • Public passenger transport infrastructure: This includes bus, train and light rail stations

Table 7-5 Public Safety Area compatibility for new and proposed developments

Source: National Airports Safeguarding Framework Guideline I

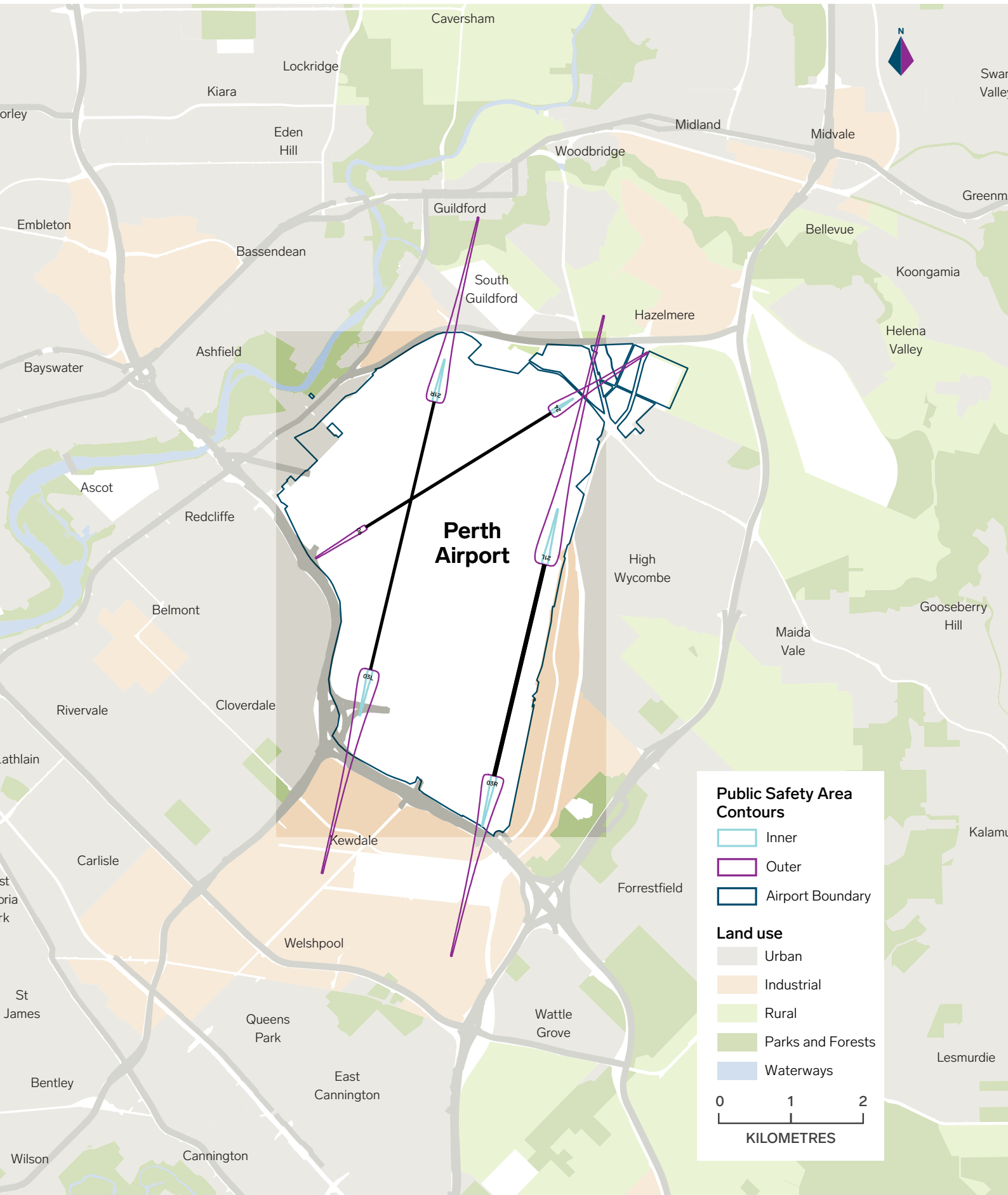


Figure 7-19 Public Safety Areas at Ultimate Capacity
Source: Rehbein

7.11 Managing the Risk of Exhaust Plumes

Exhaust plumes of significant vertical velocity (plume rise) can emanate from ground activities, such as vents and stacks, and can interfere with aircraft operations in various stages of flight.

Civil Aviation Safety Regulations 1988 Part 139 provides that CASA may determine that an exhaust plume, having a velocity in excess of 4.3 metres per second, is or will be a hazard to aircraft operations because of the velocity or location of the efflux.

Information regarding the velocity, temperature, composition of the effluence and any particulate matter must be provided in any application for development on the estate where an exhaust plume is present. After review by Perth Airport, the exhaust plume information is provided to CASA for assessment if required.

Perth Airport works with local planning authorities to ensure they are informed of the risk from exhaust plumes and encourages information about off-airport developments that include exhaust plume(s) to be submitted to Perth Airport for assessment.

7.12 Improving Airport Safeguarding

Perth Airport believes that NASF considers a broad range of important safety matters and supports the framework. As a critical element of public infrastructure to Western Australia, Perth Airport must be appropriately safeguarded against inappropriate land development and continues to advocate for the implementation of the safeguarding measures into the State planning framework.

In 2018, the Western Australian Planning Commission commenced a review of planning policy in relation to land use in the vicinity of airports. The review included an assessment of how the NASF Guidelines could be integrated into the State's planning system. Perth Airport participated in stakeholder workshops and will continue to work with the State Government on policy and guideline changes to provide appropriate safeguarding for the safe and effective operation of the airport.







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Perth Airport



Section 8: **Services**

The safe, effective and efficient operation of the Perth Airport estate depends on a reliable and adaptable network of power, water, sewerage, gas and communications infrastructure.



8.1 Introduction

The safe, effective and efficient operation of Perth Airport and the activities within the estate depend upon having reliable access to services including power, water, drainage and telecommunications. Perth Airport has developed strategies to ensure these services are reliable and available to meet current requirements as well as being adaptable to the growing needs of the airport as demand increases.

Perth Airport operates its own internal power, water, waste water and communications networks, integrating with the State's systems at the estate boundary. Perth Airport also controls stormwater drainage running through the estate. Gas and commercial telecommunications are provided throughout the estate by external suppliers. The power supply is sourced from the Western Power grid, supported by emergency power backup units to ensure that the airport can continue to operate during external power supply interruptions.

8.2 Stormwater Drainage

Stormwater management is required to minimise storm and flood risks that include personal harm, environmental harm, physical damage to infrastructure, and interruption or cancellation of aviation and non-aviation operations.

Perth Airport is responsible for the provision and management of stormwater infrastructure, both piped and open channel, within the estate.

Subject to the suitable management of inflows into the estate to the legacy 1997 levels, Perth Airport also controls outflows from the estate into external infrastructure to the peak flow rates as they were in 1997.

As development occurs, infrastructure will be provided to meet the inflows and peak stormwater storage requirements from upstream sources, for 1997 levels, and provide transmission and relevant peak stormwater storage for runoff from all new development and infill within the estate, again to the 1997 legacy levels.

Perth Airport has undertaken detailed stormwater modelling of the current network. With the 1997 levels providing the baseline for monitoring peak flows from the estate, an ultimate concept network has been prepared for the future development of the estate.

Careful planning and control of stormwater will allow Perth Airport to manage associated safety and environmental outcomes, while also managing potential impacts and risks to aviation and non-aviation activities.

8.2.1 Stormwater Management

There are two open drainage channels that run through the airport estate. Prior to Perth Airport taking over management of the airport in July 1997, the Water Corporation administered the drainage infrastructure. Perth Airport now manages these drains within the estate, along with all other stormwater infrastructure.

Perth Airport liaises with the Water Corporation and surrounding Local Governments about long-term planning and proposed changes to common stormwater infrastructure.

8.2.2 Existing Stormwater Network

Perth Airport is located on a coastal plain that sits between the Darling Scarp (Perth hills) and the Indian Ocean. The coastal plain covers over 100,000 square kilometres and has 30 major stormwater runoff catchments that ultimately drain into the ocean via the Swan River. The airport estate sits within two of those major catchments, with local stormwater draining to a main drain in each catchment that ultimately flows into the Swan River.

The two drainage channels within the airport estate are referred to as the Northern Main Drain (NMD) and the Southern Main Drain (SMD).

The NMD catchment (2,332 hectares) and the SMD catchment (2,355 hectares) both extend from the top of the Darling Scarp down to the Swan River. The airport estate is sited as close as 450 metres from the Swan River and makes up 43 per cent of the total NMD catchment and 35 per cent of the total SMD catchment. There are two other smaller catchments on the estate, referred to as the Fauntleroy Avenue and North Eastern catchments, which are mostly piped.

The stormwater catchments within the estate are shown in Figure 8-1.

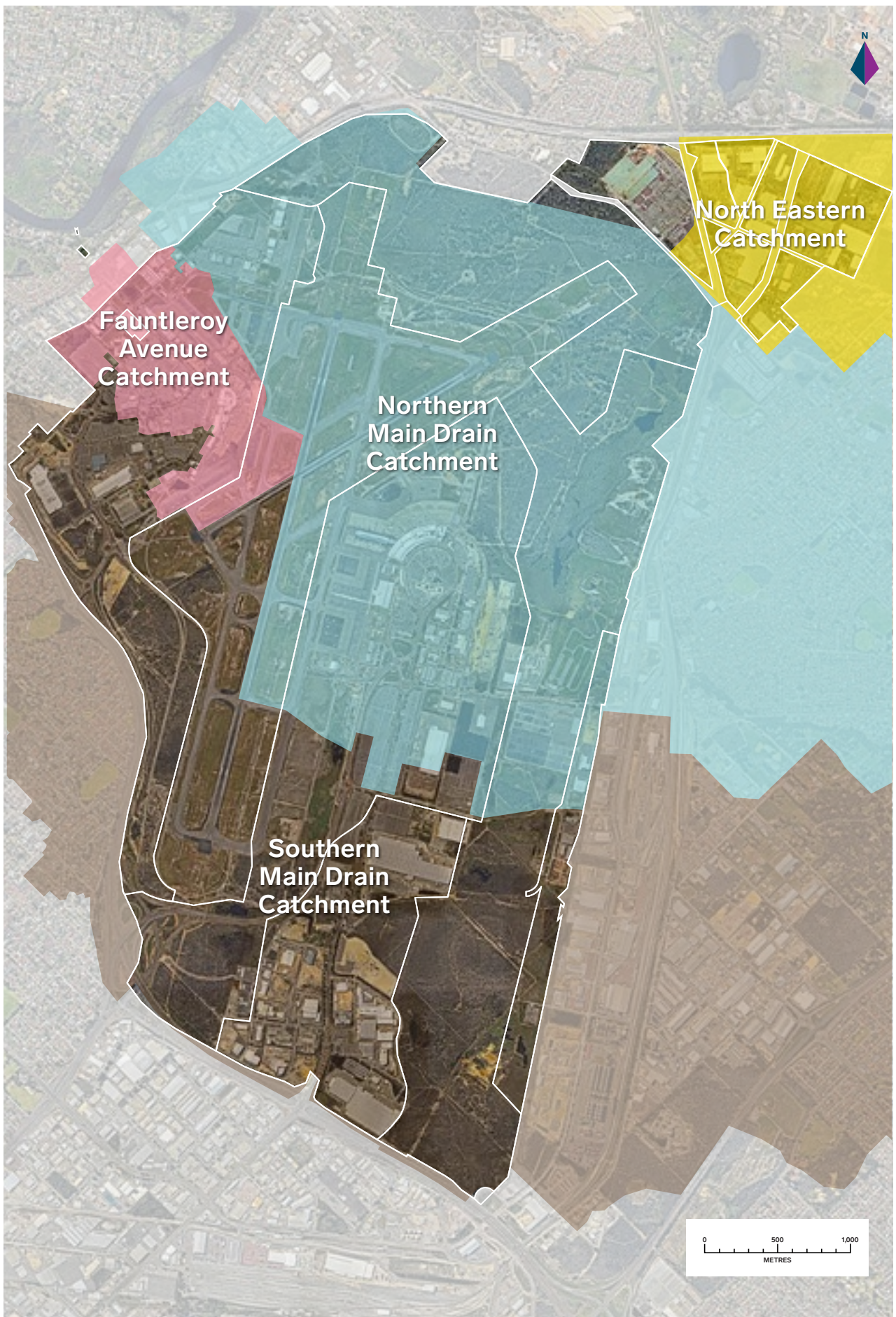


Figure 8-1 Perth Airport water catchment boundaries
Source: Perth Airport

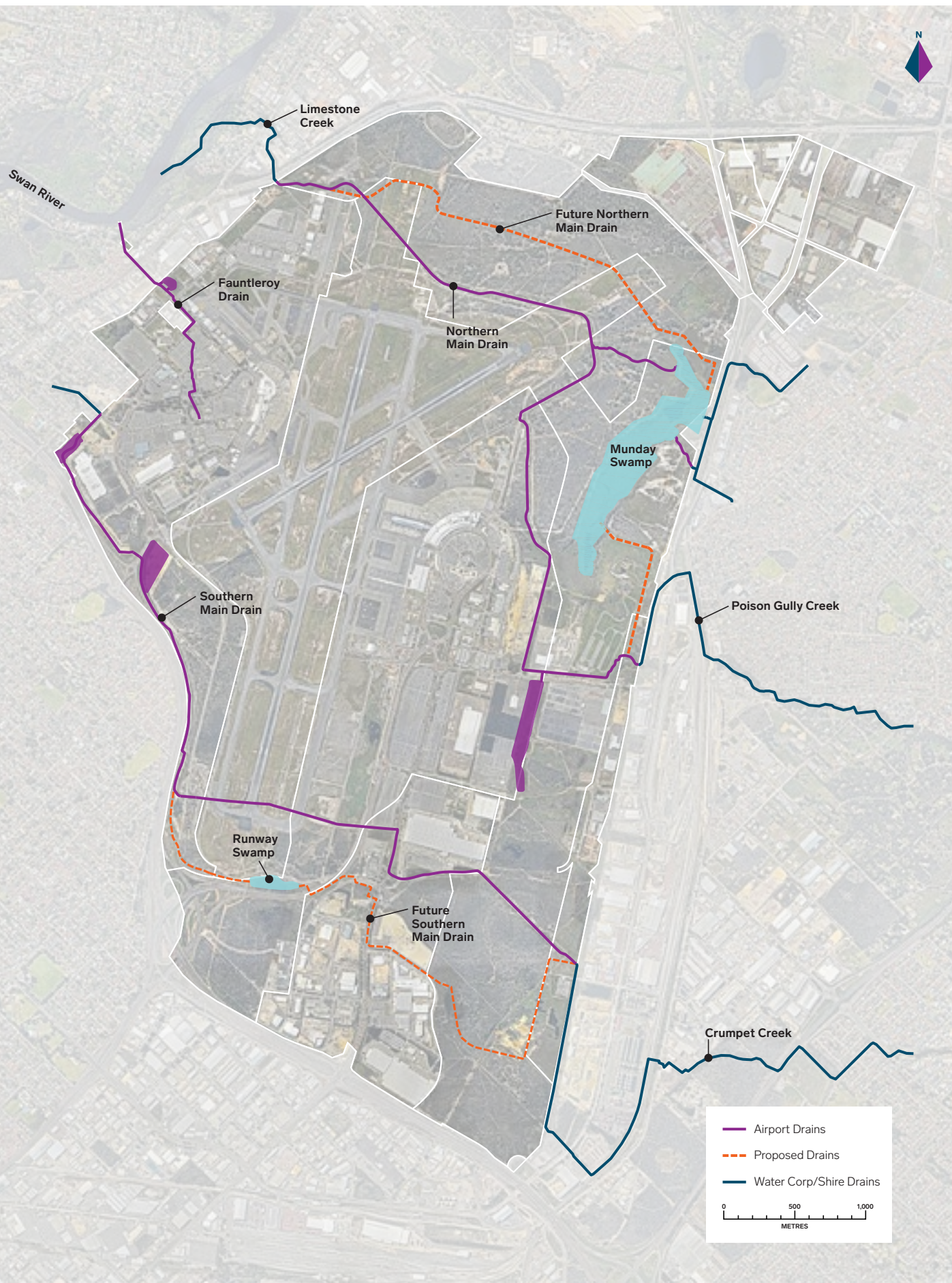


Figure 8-2 Perth Airport major stormwater drainage systems
 Source: Perth Airport

Upstream of the estate, the NMD catchment consists primarily of residential areas, while the SMD catchment is also primarily residential but with an industrial area just outside the estate to the east. Downstream of the estate, the areas for both catchments are a mix of residential, commercial and light industry.

The major stormwater drainage systems within the estate are shown in Figure 8-2.

8.2.2.1 Northern Main Drain

The NMD is an open unlined channel for most of its length through the airport estate. It drains three open channels that cross the eastern boundary: Poison Gully, which has its source near the top of the Darling Scarp, and two Water Corporation scheme drains. The two Water Corporation scheme drains that enter the estate discharge directly into Munday Swamp. During times of high flow, the NMD on the airport reaches capacity and overflows into the southern end of Munday Swamp. When Munday Swamp reaches capacity, it overflows at its northern end and drains into the NMD.

Within the estate, the NMD drains the majority of the Airport Central Precinct, the majority of the existing cross runway (06/24), just under half of the existing main runway (03/21), a small portion of the Airport West Precinct, and the Airport North Precinct south of Kalamunda Road.

Perth Airport administers the drain within the estate, the Water Corporation administers its two scheme drains and the City of Kalamunda manages Poison Gully upstream of the estate. The City of Swan manages the NMD downstream of the estate (where it is known as Limestone Creek).

8.2.2.2 Southern Main Drain

The SMD is an open unlined channel for most of its length through the estate. It drains Crumpet Creek which has its source near the top of the Darling Scarp.

The SMD drains the Airport South Precinct, just over half of the existing main runway (03/21), the majority of the Airport West Precinct, some areas of Tonkin Highway and small areas of the neighbouring suburbs of Redcliffe and Cloverdale. It traverses the airside area and runs under the south end of the existing main runway (03/21).

Perth Airport manages the drain within the estate, the Water Corporation manages it downstream of the estate, and the City of Kalamunda manages the drain upstream (where it is known as Crumpet Creek).

Within the past five years, three projects have been undertaken on the SMD which have provided upgraded capacity and additional storage detention basins to cater for the one-in-100 year storm events. In 2015, a 1,700 metre section was realigned along the western boundary (adjacent to Tonkin Highway) as part of the Gateway WA project and vegetated as a living stream. In 2016, a new downstream outlet was constructed at Central Avenue to replace the Brearley Avenue outlet that was closed as part of the Forrestfield-Airport Link project. A 200 metre section of the SMD within the estate that connects to the Central Avenue outlet is managed by the Water Corporation. Works associated with the Direct Factory Outlet construction in the Airport West Precinct, which was completed in 2018, required the realignment of a 1,000 metre section of the SMD, with 700 metres constructed as a vegetated living stream.

8.2.2.3 Fauntleroy Avenue Catchment

The Fauntleroy Avenue Catchment is a small catchment within the estate. It is an underground piped network for the majority of its length. The network starts in the vicinity of Terminal 3 and Terminal 4 and drains directly to the Swan River in a pipeline managed by Perth Airport.

This catchment drains Terminal 3, Terminal 4, part of the terminal aprons, the nearby car parks and part of the General Aviation Area, all of which are in the Airport West Precinct.

8.2.2.4 North East Catchment

The North East Catchment is an underground piped network which has its upper reach located mostly within the estate. The catchment drains the part of the Airport North Precinct north of Kalamunda Road. This area is an industrial area, with some flows entering the estate from an adjacent industrial area and a nearby residential area.

The downstream estate boundary is the Great Eastern Highway Bypass. From the airport discharge point, the stormwater drains north into the Helena River which in turn drains into the Swan River.

Perth Airport manages the catchment within the estate, the City of Kalamunda manages the small section upstream, and the City of Swan manages a small section upstream and also the downstream section outside of the airport estate.

8.2.2.5 Gate 4 Catchment

The Gate 4 catchment is a small piped network that drains to a retention basin where water is infiltrated into the ground or evaporates.

8.2.3 Drainage System Considerations

The development of the drainage system within the estate takes into consideration:

- external system capacity (upstream and downstream),
- internal system capacity,
- modifications required for future land uses,
- design criteria to manage a one-in-100 year storm event for the existing runways (main runway 03L/21R and cross runway 06/24), the proposed new runway (03R/21L), taxiways and the terminal buildings,
- design criteria to manage a one-in-50 year storm event for major access roads, aprons and short-term car parking,
- suitable service levels for other infrastructure and land development, based on stormwater industry standards, and
- managing environmental impact from airport and commercial development operations.

8.2.3.1 External System Capacity

Prior to the privatisation of the airport in 1997, the Water Corporation administered the NMD and SMD. As part of this management, land within the estate was used for the detention of stormwater due to stormwater infrastructure limitations downstream of the airport. Perth Airport now administers this legacy of detaining stormwater volumes generated upstream, based on 1997 levels.

Construction of the new runway (03R/21L), together with the planned development of the airport estate, will result in alternative uses for some of the land that has historically been used for stormwater detention purposes. It is therefore essential that upstream authorities continue to increase detention volumes to provide suitable storage for all stormwater volume increases generated by off-airport developments since 1997.

Alternatively, approval would need to be obtained to increase outfall capacity to match inflow from upstream catchments as a minimum, and ideally allow for a reasonable proportion of run-off generated on the airport site to be disposed of in the main drains. Perth Airport will continue to work with the Water Corporation and the surrounding Local Governments to achieve the required outcomes through increased upstream compensation and/or downstream outfall capacity to reduce the amount of compensation required on the airport estate.

8.2.3.2 Internal System Capacity

Extensive stormwater modelling has been undertaken to develop the Perth Airport Master Drainage Strategy. This Strategy is used to inform land use planning decisions and detailed stormwater designs to help ensure that the network is integrated and keeps peak flow discharge off the estate to the 1997 values, subject to inflows remaining the same.

The NMD has a number of limitations which contribute to the potential for localised flooding in peak flow events, including:

- limited open channel capacity based on size,
- gradient of the drain being as flat as one in 3,300,
- various culverts along the drain have insufficient capacity for the larger flows,
- the drain downstream of the airport has several restrictive culverts and bends, and
- maintenance of the drain downstream of the estate is not under Perth Airport control.

The SMD has a number of limitations which contribute to the potential for localised flooding in peak flow events, including:

- limited open-channel capacity based on size,
- gradient of the drain being as flat as one in 2,500,
- the 1,200 millimetre diameter pipe under the main runway (03L/21R) and Horrie Miller Drive has insufficient capacity for the larger flows,
- the drain downstream of the airport has several restrictive culverts and bends, and
- maintenance of the drain downstream of the estate is not under Perth Airport control.



8.2.4 Drainage Network Development Plan

The Perth Airport Master Drainage Strategy has been updated to include changes to land use on the estate based on the 2014 Perth Airport Master Plan. The 2017 version of the Strategy identifies the modifications that will be required for the NMD, SMD and major pipe networks to enable the planned and future development of the estate.

Previous work by the Water Corporation assumed that, in addition to the run-off generated on site, Perth Airport would accommodate a substantial amount of stormwater on the airport estate as part of the legacy 1997 arrangements.

The Master Drainage Strategy identifies possible infrastructure works including:

- various options for flood mitigation on the airport estate,
- the need for detention basins,
- realigning parts of the NMD and SMD, and
- constructing a 'living stream' as part of the realignment works for the NMD and SMD.

The living stream is an open channel that mimics the characteristics of natural streams with suitable tree canopy, understorey and in-stream vegetation. Local provenance vegetation is used where suitable. Water quality improvement is achieved by aquatic vegetation and natural biological processes helping to oxygenate the water and removing nutrients plus non-nutrient contaminants. The development of living streams within the estate supports the natural surface water management and control of peak flows, as well as improving water quality prior to discharge of the stormwater off the estate. Living streams also improve the general amenity of the area.

The run-off created by Perth Airport's ongoing development needs to be managed. The option of upgrading infrastructure downstream of the airport estate relies on the co-operation and timeliness of other parties. Initial system upgrades are likely to be undertaken on the airport estate, however discussions with State and Local Government authorities will continue to achieve the best overall outcome.

8.2.4.1 Northern Main Drain

Modifications to the alignment and the configuration of the NMD are planned to facilitate Perth Airport's ongoing development. The current NMD alignment passes through land required for:

- the new runway (03R/21L),
- extensions of terminals and a new terminal in the Airport Central Precinct,
- proposed extension of the cross runway (06/24), and
- development of the Airport North Precinct.

As detailed in Section 4, Perth Airport is currently seeking Commonwealth approvals for the construction and operation of the new runway. The new runway (03R/21L) is planned to be operational between 2023 and 2032, subject to demand.

As part of the new runway project, the NMD will need to be realigned to facilitate the safe operation of the new runway and to provide adequate drainage capacity during storm (1 in 100) and flood events. The realignment of the drainage network includes key design features of a pollution capturing basin, an infiltration basin, and measures to control the velocity and quality of existing water flow into Munday Swamp. The design of the new infrastructure also ensures that the peak water levels and inundation times will remain close to the existing scenario and within tolerance levels of the wetland flora and fauna.

Aboriginal Traditional Custodians have indicated that Poison Gully historically drained into Munday Swamp. The drainage works planned as part of the new runway project will realign and restore the original natural water flows, with a restored connection of Munday Swamp upstream to Poison Gully Creek (through the eastern hills area) and downstream to Limestone Creek (which connects to the Swan River).

Additional stormwater storage is planned for the development of the Airport North Precinct.

8.2.4.2 Southern Main Drain

Modifications to the alignment and the configuration of the SMD will be required to allow Perth Airport's ongoing development.

The current SMD alignment passes through land required for:

- the new runway (03R/21L), and
- development of the Airport South and Airport West precincts.

The planned development of these areas will incorporate a realignment of the SMD. Provision for additional storage is planned for the Airport Central, Airport South and Airport West precincts. The continued detention of the legacy 1997 storage volumes will be incorporated into the SMD network.

8.2.4.3 Fawcett Avenue Catchment

As consolidation of commercial air services continues, with the relocation of Qantas operations to the Airport Central Precinct in 2025, land uses in the Airport West Precinct will change and complementary upgrades to the drainage system will be progressively undertaken.

8.2.4.4 North East Catchment

The stormwater network within the North East Catchment consists of a pit and pipe system with three detention storage basins. The development of the network in this area was completed in 2015.

8.2.4.5 Environmental Considerations

Realignment of both the NMD and SMD as living streams through the airport estate will further provide a valuable function in flood control, opportunities for biodiversity management and protection, and an improved level of ambience for visitors and employees of the airport estate.

8.2.4.6 Wetlands

There are several wetland areas within the airport estate, including Munday Swamp which is part of the current hydrological regime at the airport.

For most of the time, wetland areas only obtain surface water from their own localised catchments or rising ground water following winter rains. However, in times of high flow, wetland areas may receive varying amounts of overflow water from the NMD or SMD.

The airport drainage design endeavours to minimise adverse impacts on the wetlands on the airport estate resulting from changes to the hydrological regime, and potential contamination from stormwater. The redirection of the high flows of the NMD through Munday Swamp, as part of the new runway project, has been designed to keep peak water levels and inundation times close to the existing scenario and within tolerance levels of the wetland flora and fauna.

8.2.4.7 Pollution Control

Pollution control is an integral part of any drainage system. All developments at Perth Airport must satisfy the requirements of the Airports (Environment Protection) Regulations 1997.

The greatest potential source of pollution related to airport operations has been identified as oil and fuel spills during aircraft servicing and refuelling. Hydrocarbons from these areas are intercepted prior to reaching the main drains or the Fauntleroy Avenue catchment outlet. Hydrocarbon interceptors are specified on all new apron construction projects that provide bays for aircraft refuelling operations. All apron constructions include these measures. Regular monitoring and maintenance are undertaken to ensure operational efficiency is continued.

Pollution control is also required to be implemented directly by tenants. This may be in the form of ensuring appropriate spill kits are available, hydrocarbon interceptors or the installation of water-quality protection infrastructure and procedures. These requirements are administered through tenant Environmental Management Plans and tenant audits.

8.2.4.8 Water Quality

Management of water quality is a requirement of Perth Airport under the AEP Regulations. Management measures will continue to be implemented to mitigate any impact on water run-off and quality resulting from development on the airport estate.

Water quality at Perth Airport is monitored on a quarterly basis. Perth Airport has a large groundwater monitoring bore network and surface water monitoring locations that are consistently sampled during each monitoring event. Results are compared to the AEP Regulations and a quarterly monitoring report is provided to Department of Infrastructure, Transport, Regional Development and Communications.

Estate tenants also undertake water quality monitoring, and this is reported to Perth Airport as part of each tenant's Annual Environment Report. Further information on Perth Airport's water quality monitoring program is provided in Section 9.

The original main drains were designed and constructed for conveyance of stormwater with limited improvements in water quality. The concept for the SMD and NMD is to construct them on new alignments as living stream vegetated open channels. The aim is to provide a healthy ecosystem for microbes to perform bioremediation and biotransformation of environmental pollutants such as hydrocarbons (e.g. oil), nutrients and various metals. This will provide further opportunity to improve water quality.

Perth Airport design guidelines require most individual lots on the estate to retain and infiltrate the first 15 millimetres of rainfall from each storm. This helps to provide at-source pollution control and therefore provides ecological protection for receiving water ways. This is in line with the State guidelines for stormwater management in urban areas.

8.2.4.9 Hydrogeology

Perth Airport is located over the Cloverdale groundwater flow system. The groundwater beneath the estate is an unconfined water table within the Bassendean Sand (the surface geological unit) and within the mostly unconfined Guildford Formation geological unit below that sand.

The general direction of the groundwater flows is north-west, towards the Swan River. The groundwater level sits at a shallow depth (surface to four metres below ground level) across the estate. Soil conditions vary, and seasonal changes are generally experienced, with various areas of the airport estate becoming inundated or water logged in the winter months.

Site specific assessment of groundwater conditions will be required when proposed developments are likely to be impacted by groundwater.

8.3 Water Supply

The Water Corporation provides potable water to the majority of the airport estate through three main connections. These connections feed the requirements of the internal airport water ring main system. The ring main provides redundancy to the supply network for upgrade works, maintenance and unplanned events.

The land north of Kalamunda Road, within the Airport North Precinct, is serviced directly from the Water Corporation network to the individual tenants. Within the Airport North Precinct there are multiple connections to the Water Corporation network, providing redundancy for this area.

Works carried out to replace all valves and water meters for the three incoming main water lines were completed in 2018 in conjunction with the Gateway WA project and the Direct Factory Outlet construction. Backflow devices were also fitted to achieve conformance with required standards. Upgrades to main line services were achieved in conjunction with work for the Terminal 1 forecourt and the preliminary works for the Airport Central Train Station, completed in 2016.

8.3.1 Water Supply Development Strategy

A Water Supply and Waste Water Planning Study has identified and characterised future demand and considers water supply options including mains, groundwater and wastewater reuse. The study included a 30-year upgrade works program, guided by development demands which are based on growth in passenger numbers, proposed land developments and asset end-of-life replacement.

Perth Airport will continue to work with the Water Corporation to provide potable water to the airport estate. The works required to fulfil the preliminary development strategy are shown in Figure 8-3 and will involve the creation of a series of additional ring mains within the airport estate to improve the continuity of supply and water pressure.

Perth Airport is investigating opportunities for the reuse of stormwater to alleviate the reliance upon scheme water.

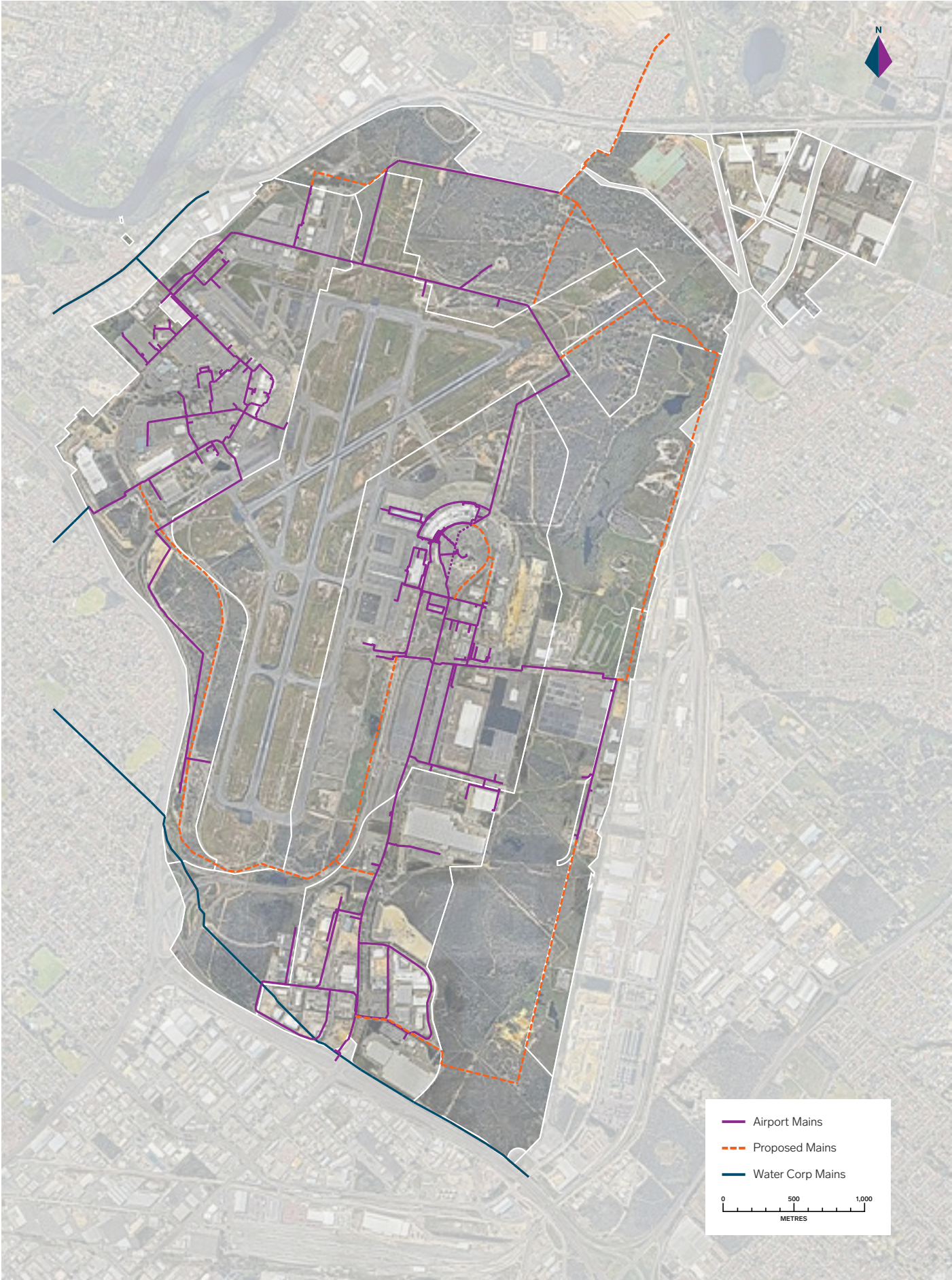


Figure 8-3 Perth Airport potable water mains
Source: Perth Airport

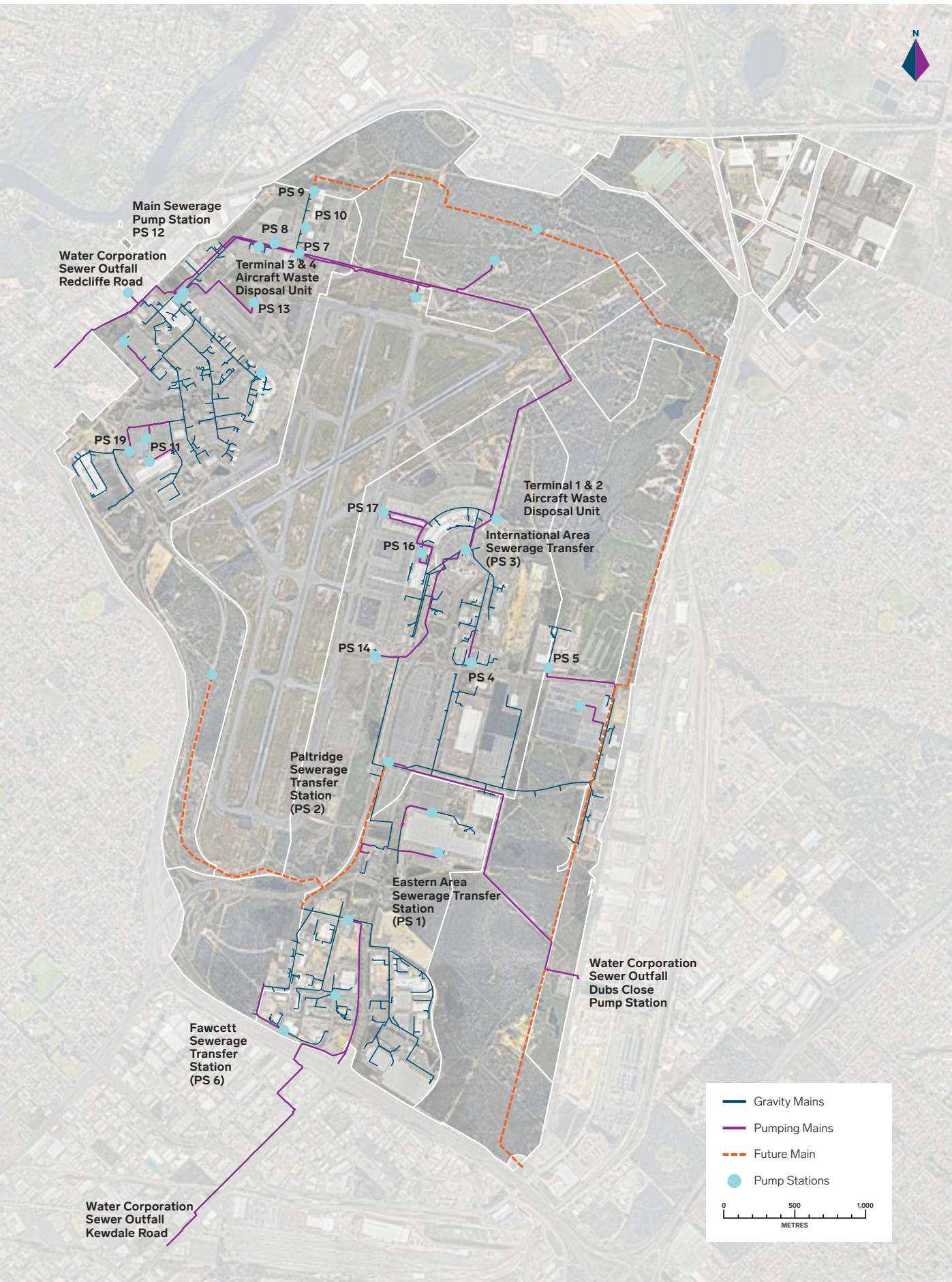


Figure 8-4 Perth Airport sewerage systems
Source: Perth Airport

8.4 Sewerage System

The Perth Airport sewerage system consists of a mixed network of gravity and pumping mains (see Figure 8-4), the majority of which discharges into the Water Corporation network at three locations around the estate. Waste water from the land that is north of Kalamunda Road, in the Airport North Precinct, is conveyed to the Water Corporation network via a combination of gravity and pumping mains, while the other three discharge points use pumping infrastructure.

The land that is south of Kalamunda Road currently has minimal development. Developments in this area currently pump their waste water to the Airport West Precinct.

The Airport West Precinct has a sewerage system with a single discharge point, however the Water Corporation has placed a maximum limit on that outflow. Perth Airport is working with the Water Corporation to manage outflows and develop a long-term strategy.

The Airport Central Precinct has a series of linked pumping stations that discharge via a pumped main to the Water Corporation discharge point adjacent to the eastern airport boundary at Dubs Close.

The Airport South Precinct has two separate sewerage networks: the southern industrial area discharges to the south, and the rest of the precinct discharges to the east via the Airport Central pumped main.

There are also various lease holders that have private pumping mains discharging into Perth Airport's system. Some lease holders within the Airport North Precinct maintain onsite sewerage treatment systems as they do not have the ability to connect to the main network.

Upgrading of infrastructure has begun, with works in 2015 increasing storage capacity at the International Area Sewer Transfer in the Airport Central Precinct and the Helicopter Sewer Pump Station servicing the General Aviation Area. An upgrade of the pumping main between Pump Station 3 and the Paltridge Pump Station 2 was also completed in 2015. Installation of flow metering on the principal sewer pump stations in 2016 has provided monitoring of peak flows and enhanced real time management.

8.4.1 Sewerage System Development Strategy

A sewerage system development strategy has been developed by Perth Airport. The strategy includes an upgrade works program based on projected demand, which is guided by passenger numbers, proposed land developments and asset end-of-life replacement.

Perth Airport will continue working with the Water Corporation on capacities and quality of sewage being discharged from the estate.



8.5 Power Supply

The Perth Airport power distribution system operates as an embedded network. The electricity distribution network is managed by Perth Airport.

The main portion of the airport estate is currently supplied by two Western Power grid connections and internal generation as follows:

- Western Power's Belmont Zone substation to the west supplies power to the Dunreath substation in the south of Airport West Precinct,
- Western Power's Munday Zone substation on the airport eastern boundary, which supplies power into the Airport Central Precinct, and
- a natural gas fired co-generation power plant with waste heat recovery providing electrical power generation, space heat and cooling services to Terminal 2 and the Terminal 1 Domestic pier.

The Eastern Metropolitan Regional Council (EMRC) waste to energy wood pyrolysis power generation plant, located one kilometre north of the estate, is due to commence operations in 2020 and will supply power into the airport grid.

Perth Airport is also undertaking a feasibility assessment of future solar power from the introduction of photovoltaic cells (solar farm) within the Airfield Precinct and/or Airport North Precinct. The installation of solar power for Perth Airport facilities, and increased use on tenanted facilities, will become increasingly important to supplement power from the Western Power grid.

The area of the Airport North Precinct that is north of Kalamunda Road is supplied directly from Western Power's distribution network.

A ring main distribution around the airport estate provides a high level of redundancy in that a single section of faulted network can be switched out and power restored to most customers by additional switching.

Emergency backup power to the terminal and essential airfield operations is provided by:

- a co-generation power plant which provides back-up power to the Terminal 2 and Terminal 1 Domestic,
- Terminal 1, Terminal 3 and Terminal 4 have backup diesel generators,
- backup generators maintained for airfield lighting, and
- car park areas which have backup generators.

Extensive work on the High Voltage power supply system resulted in installation and commissioning of five new ring main units across the estate to support the aviation and commercial developments.

In 2013, Perth Airport constructed a co-generation plant in the Airport Central Precinct to support Terminal 1 International, the Terminal 1 Domestic pier and Terminal 2. To continue capacity enhancement for the Airport Central Precinct, between 2016 and 2018 Perth Airport installed a further seven ring main units, seven major transformers, new feeder connections and an additional diesel-powered back-up generator.

Perth Airport is progressively replacing all airside and landside lighting with highly energy efficient LED light fittings.

8.5.1 Power Supply Development Strategy

A High Voltage Electrical Master Plan has been completed to consider an upgraded works program out to 2044 based on projected passenger growth, proposed land developments and asset end-of-life replacement as shown in Figure 8-5.

Electrical load growth associated with Perth Airport estate development will be supplied through the Western Power grid and by new embedded generation.

Option planning with Western Power for additional grid power supply has commenced.

Feasibility studies for embedded generation such as solar PV, a green waste bio-gas plant and grid storage batteries are underway.

An Energy Strategy may also be affected by WA Energy Strategy Transformation Reform process that will provide network and market guidance on distributed energy resources.

The proposed new parallel runway will require relocation of existing Western Power 132kV powerlines on the eastern boundary of the airport. Option planning for this relocation has commenced.

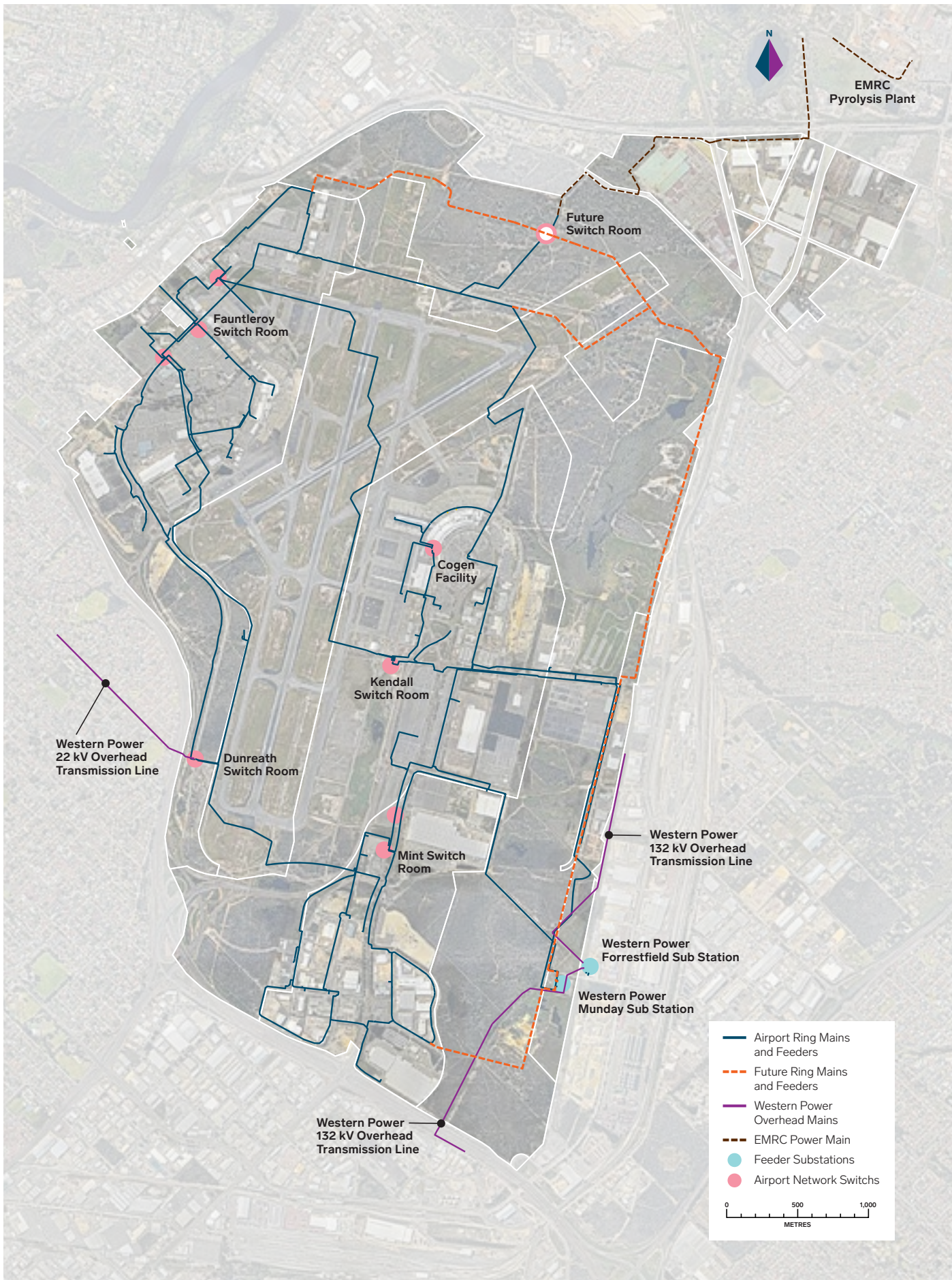


Figure 8-5 Perth Airport high voltage power supply network
 Source: Perth Airport



Figure 8-6 Perth Airport irrigation bores
Source: Perth Airport

8.6 Irrigation

The majority of irrigation within the estate is sourced from groundwater. As well as irrigating landscaped areas, groundwater is used for some construction activities. Perth Airport recognises that groundwater supplies in the area are limited and therefore seeks to rationalise its use.

The Water Supply and Waste Water Planning Study (Jan 2017) has considered the future irrigation demands, including groundwater monitoring data, resource assessments and future uses of groundwater.

Figure 8-6 identifies the current and future groundwater bores within the airport estate. The extent of current groundwater usage by Perth Airport is approximately equivalent to irrigating 70 hectares of grassed playing fields per year in the Perth area.

Irrigation systems were extended and re-routed to support landscaping in the ongoing development areas, in particular the Terminal 1 forecourt and Airport Drive (completed in 2016) and Dunreath Drive in the Airport West Precinct (completed in 2018). Additional bores were established to support the extended landscaping regime.

8.7 Gas Supply

Gas supply to the airport is currently provided by Synergy through a piped network mostly owned and maintained by ATCO Gas Australia. The existing system includes gas reticulation mains along Horrie Miller Drive, Brearley Avenue and Fautleroy Avenue.

A high-pressure gas main runs along the western side of Horrie Miller Drive and services the Airport South Precinct, Airport Central Precinct and surrounding developments. This line is reticulated from a gas main running adjacent to Tonkin Highway at the southern end of the airport and may need to be upgraded at some time in the future as demand dictates. A further gas pressure main supplies airport tenants located north of Kalamunda Road.

There are two high-pressure gas transmission lines that run through dedicated easements on the estate. These are known as the:

- Parmelia Pipeline, which passes through a portion of the Airport North Precinct to the north of Kalamunda Road, and
- Dampier to Bunbury Natural Gas Pipeline, which runs from north of Kalamunda Road in the Airport North Precinct and then along the entire length of the eastern airport boundary.

Incoming gas supply lines were relocated as a result of the Gateway WA project in 2015 and Redcliffe Station construction, as part of the Forrestfield-Airport Link project, in 2018. Throughout 2018, internal gas distribution was extended to service the Direct Factory Outlet and adjacent development sites in the Airport West Precinct.



8.7.1 Gas Supply Development Strategy

In the longer term, additional natural gas capacity will be required on the airport estate as the planned consolidation of commercial air services to the Airport Central Precinct proceeds, more commercial development occurs, and if additional on-site gas-powered generation is installed.

To service this projected demand an additional gas main will be required. Discussions will be conducted with the relevant providers to ensure this additional service is correctly sized and delivered within required timeframes to support the airport development plans.

As shown in Figure 8-7, connections have been proposed by ATCO Gas to support the future development of the estate and enhance diversity of supply.

8.8 Communications

Reliable communication systems are necessary to ensure safe and efficient aircraft navigation and airport operations. Communications infrastructure within the airside boundary are primarily the responsibility of Perth Airport, although a substantial network of airside communication cables for control of navigational aids and associated communications is owned by Airservices Australia.

Perth Airport has an extensive network of communications systems consisting of air-to-ground and point-to-point radio communications utilising:

- high frequency transmitter and receiver stations,
- satellites,
- microwave links, and
- land-line communications via underground cables and optic fibre.

Commercial telecommunications are provided throughout the airport estate by various third-party service providers, such as Telstra, Optus and NBN Co Ltd, whose distribution utilises the Perth Airport duct networks or their own dedicated containment.

In recent years, Perth Airport's communication systems have been strengthened with the upgrading of data lines across the estate that support the monitoring of various systems in terminal, landside and airside locations.

In 2017, Airservices Australia completed an upgrade of its monitoring, control, navigation and surveillance systems across the airfield and linking to the Air Traffic Control tower and Air Traffic Services Centre.

In 2017, works commenced to establish the national broadband network (NBN) within the airport estate. The network became available to Perth Airport and estate tenants in 2019.

8.8.1 Communication Development Strategy

Communications systems will be upgraded as required to maintain or increase capacity and effectiveness in line with Perth Airport's IT Fixed Infrastructure Strategy. The Strategy considers development of communications across the airport through the establishment of additional cable/fibre containment, equipment rooms and integration with Fibre Distribution Centres. Perth Airport is also considering the benefits of wireless communications networks for connectivity to a wider range of facilities, including airport operations, facility monitoring and for some commercial applications.

8.9 Sustainability

Perth Airport has developed a Sustainability Strategy which references the water supply, wastewater, IT Fixed Infrastructure, drainage, power supply and environment strategies which have all been developed to reflect current requirements and anticipate future demand. The strategies include measures for Perth Airport to become more sustainable in the use of all major services. This will also have the benefit of limiting the impact that airport developments have on demand for service infrastructure outside the airport estate. Measures considered include:

- increased on site power generation, including options from more sustainable sources such as solar photovoltaic system, grid batteries, and airport waste to energy such as biogas generation,
- increased 'fit for purpose' water use, including the collection and reuse of storm water and reduction of ground water use from water sensitive landscaping and planting regime, and
- shared resources, such as large-scale power storage and co-generation plants (power, hot and cold water) will be explored.

Ongoing commercial development together with construction of new terminals and terminal expansions within the Airport Central Precinct will provide opportunities to include water, energy saving initiatives and incorporate renewable power generation, while innovative design features can be used to reduce service demand.

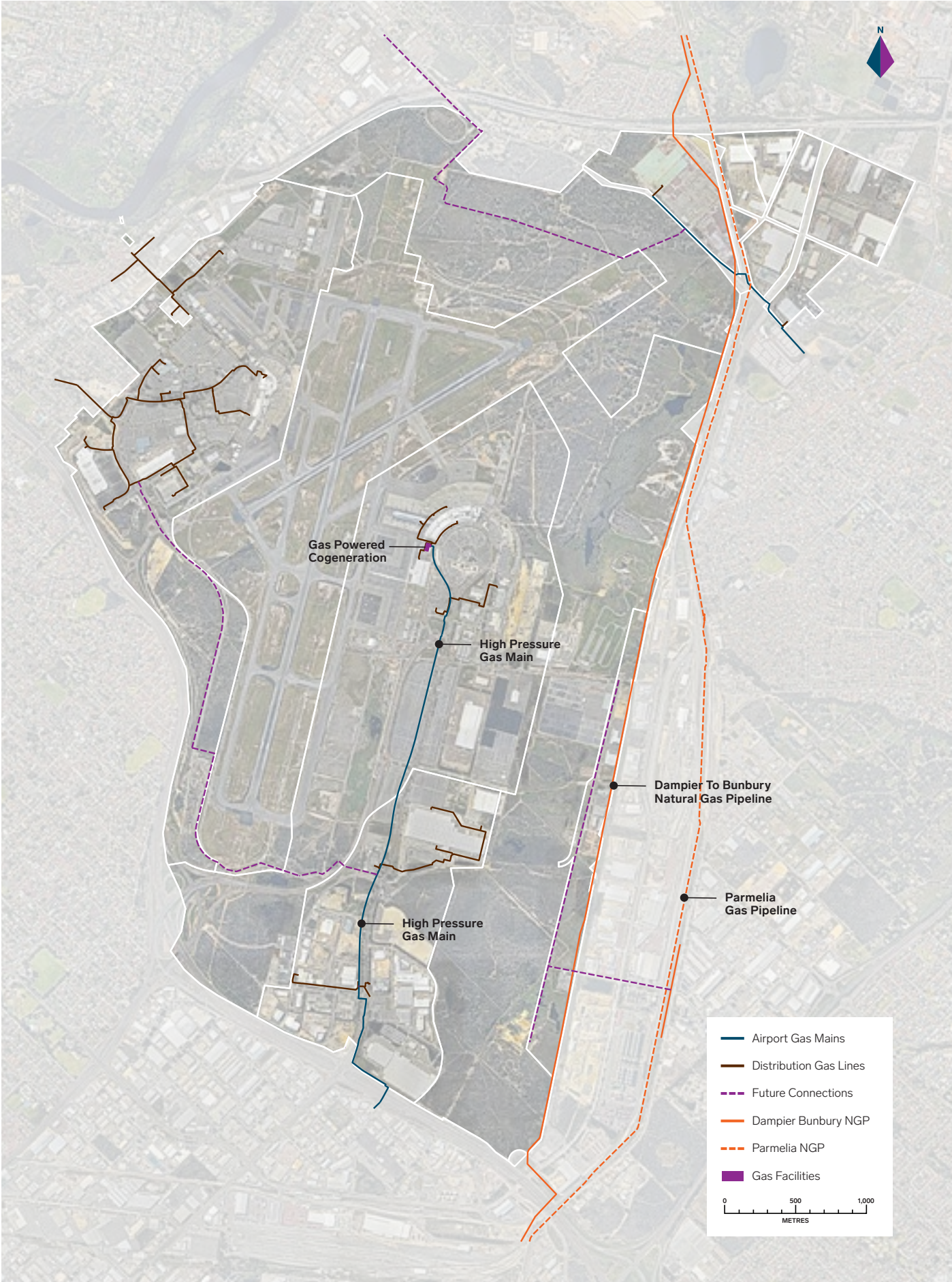


Figure 8-7 Perth Airport gas supply network
Source: Perth Airport





Section 9: **Environment Strategy**

Perth Airport is committed to ensuring that our services are delivered to the community and our business partners in a sustainable manner to deliver positive outcomes for today and the future.



9.1 Introduction

Perth Airport’s approach to environmental management and sustainability is outlined in the Environmental and Sustainability Management Framework (ESMF), which also incorporates measures to meet the airport’s obligations under Commonwealth and State legislation (where applicable). The Environment Strategy presented in this Master Plan 2020 builds on Perth Airport’s ESMF.

Similarly, Aboriginal heritage and engagement is addressed through Perth Airport’s Aboriginal Heritage Management Framework.

Perth Airport continually reviews its environmental processes, seeking to minimise environmental impacts from airport operations and improve sustainability outcomes.

The Environment Strategy details Perth Airport’s areas of environmental, sustainability and heritage focus and outlines actions, improvements and initiatives in a five-year action plan. In accordance with the *Airports Act 1996* (Airports Act) requirements, it includes assessment of, and strategies for, the management of identified issues over the 20-year planning period of this Master Plan 2020.

This Environment Strategy replaces the Perth Airport Environment Strategy 2014-2019, which was incorporated in the Perth Airport Master Plan 2014.

9.2 Responsibilities

Environmental management, sustainability and heritage management are the responsibility of Perth Airport, airline partners, business partners, tenants, contractors and consultants.

Perth Airport’s tenants and companies conducting activities on the estate must take all reasonable and practicable measures to prevent pollution and must comply with relevant legislation and this Environment Strategy.

In accordance with Perth Airport’s ESMF, tenants and companies conducting activities on the airport estate are required to develop an Environment Management Plan (EMP) that demonstrates how they will comply with the Commonwealth Airports (Environment Protection) Regulations 1997 (AEP Regulations). The EMP must be developed to the satisfaction of Perth Airport and be consistent with the Perth Airport Environment Management Plan Guidelines (published on the Perth Airport website, perthairport.com.au). Tenants operating under an EMP are required to provide an Annual Environment Report to Perth Airport. Tenants identified as posing minimal risk to the environment may be exempted by Perth Airport from the requirement to develop an EMP.

Where construction activities have environmental risks, an EMP must be developed and implemented by the contractor or consultant, to the satisfaction of Perth Airport, and be consistent with Perth Airport’s EMP Guidelines. This requirement applies equally to construction activities undertaken by Perth Airport and third parties.

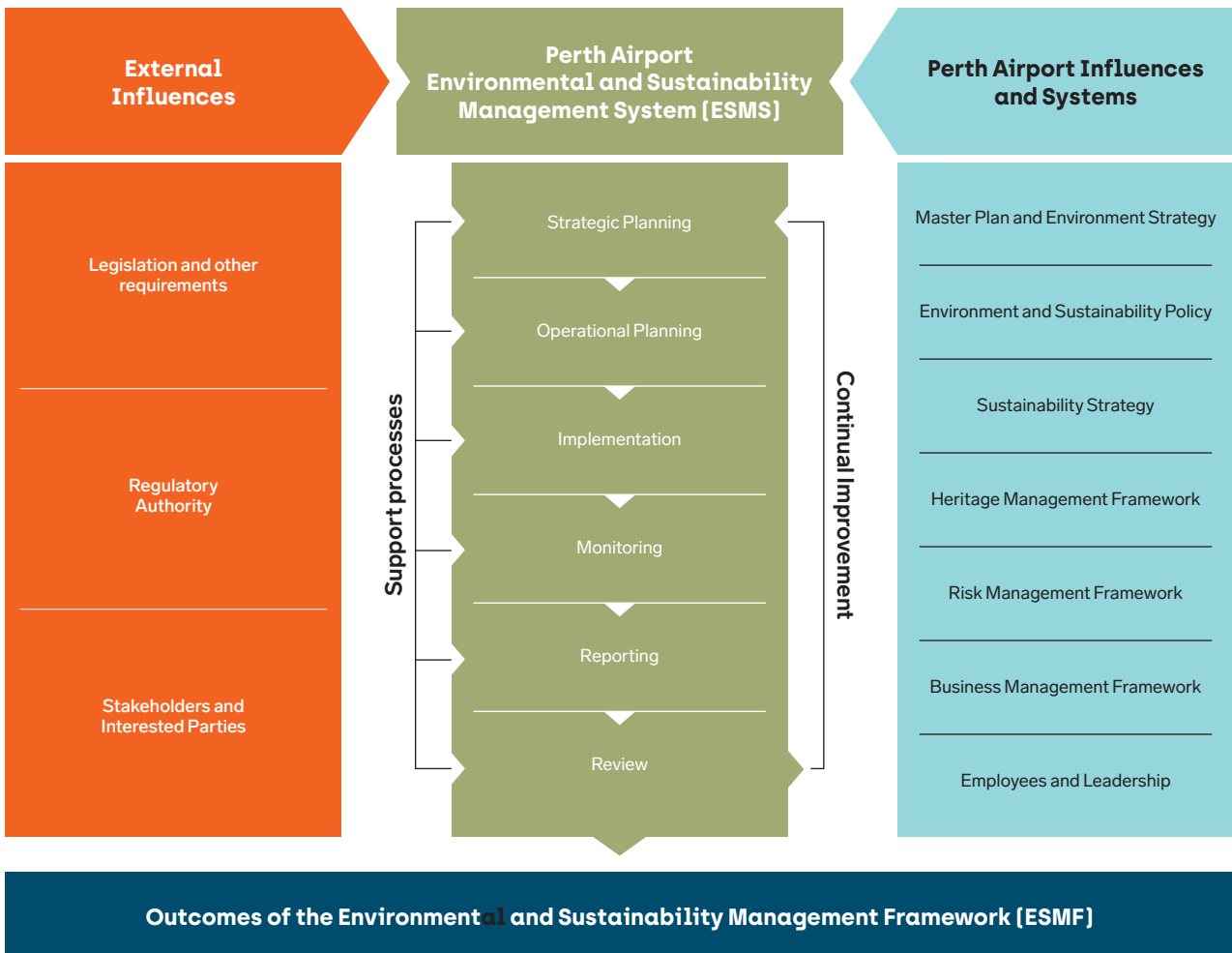


Figure 9-1 Environmental and Sustainability Management Framework
Source: Perth Airport

9.2.1 Training

To promote effective environmental, sustainability and heritage management, all Perth Airport employees are made aware of their roles and responsibilities, including conformance with policies and procedures. Training and communication processes and systems have been established, including an induction program for new employees.

Perth Airport environmental staff have appropriate industry recognised qualifications, training and experience.

9.3 Environmental and Sustainability Management Framework

Perth Airport has adopted a risk-based approach to environmental management and sustainability and implements this through the ESMF, incorporating an Environmental and Sustainability Management System (ESMS) as well as other relevant Perth Airport strategic policy and planning documents. The ESMF is presented in Figure 9-1 and describes the various external and internal interfaces and considerations. Key components of the ESMF include the following, with further details provided in the subsequent sections of this Master Plan 2020:

- Environment and Sustainability Policy,
- Sustainability Strategy,
- Heritage Management Framework,
- Environmental Management System, and
- Continuous Improvement.

9.3.1 Environment and Sustainability Policy

The Environment and Sustainability Policy outlines Perth Airport's intentions, commitments and principles in relation to environmental management and sustainability. The Policy outlines Perth Airport's commitment to requirements of the Airports Act and AEP Regulations, including continuous improvement, monitoring of environmental values on the airport, pollution prevention and providing an Annual Environment Report to the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications.

The Policy is reviewed every five years by Perth Airport to ensure it is current with industry standards and appropriate for the activities undertaken at the airport. The Environment and Sustainability Policy is published on the Perth Airport website, perthairport.com.au.

9.3.2 Sustainability Strategy

Perth Airport has had a Sustainability Strategy in place since 2008. The Sustainability Strategy describes Perth Airport's commitment to operating in a sustainable manner to deliver positive outcomes for today and the future. The Sustainability Strategy provides a focus on responsible use of resources, maintaining regulatory compliance, including sustainability considerations in business practices and demonstrating and promoting sustainable practices.

In 2018, Perth Airport revised the Strategy to align with the current goals and vision for sustainability on the estate. A range of sustainability themes considered significant to Perth Airport's operations were identified in the updated Strategy. In particular, Perth Airport recognises the importance of energy and carbon emissions, waste and water management, and is prioritising action in these areas through implementation of the Sustainability Strategy.

A component of Perth Airport's proposed development and expansion includes extensive infrastructure projects, such as the new runway and a new terminal to support the consolidation of all commercial passenger services to the Airport Central Precinct by 2025. Perth Airport is committed to deliver these key projects in keeping with its Sustainability Strategy and will consider suitable frameworks for assessment and development, including the Green Building Council of Australia's Green Star framework and the Infrastructure Sustainability Council of Australia (ISCA). Additionally, Perth Airport is committed to incorporating practical sustainability initiatives into planning, procurement, construction and operation of infrastructure assets across the estate.

9.3.3 Heritage Management Framework

Perth Airport has implemented a Heritage Management Framework to guide the management of Aboriginal cultural heritage within the estate. Through the Framework, shown in Figure 9-2, Perth Airport is committed to proactively engaging with members of the Noongar community in relation to:

- projects and developments on the estate,
- management of Aboriginal sites,
- suitable storage for artefacts found on the estate,
- cultural awareness activities,
- ongoing compliance with the *Aboriginal Heritage Act 1972 (WA)*,
- facilitating economic opportunities,
- recognition of country,
- land management, and
- continued access to on-airport estate heritage sites for cultural activities.



Figure 9-2 Perth Airport Heritage Management Framework

Source: Perth Airport

9.3.4 Environmental Management System

The Environmental Management System (EMS) describes how Perth Airport plans, implements, monitors, reports and reviews environmental management and sustainability related issues across all aspects of the airport estate and operations. Through this process, Perth Airport identifies environmental and sustainability risks, opportunities and constraints. The EMS, consistent with the relevant Australian and International standards, incorporates five key management processes.

Strategic Planning

Perth Airport's overall objectives and approach to environment and sustainability are defined in the Environment and Sustainability Policy, Environment Strategy and Sustainability Strategy.

Operational Planning

Several operational planning tools are used, including business plans, development approvals, risk assessments and training processes.

Implementation

Implementation of plans are achieved through systems and procedures defined in documents such as Environmental Management Plans, the Aerodrome Manual, standard work procedures and action plans.

Monitoring and Reporting

A wide range of monitoring and reporting processes are in place to satisfy Commonwealth and State regulatory requirements, and to measure the extent to which Perth Airport's environment and sustainability objectives are being met. Processes include:

- auditing – every EMP, for either construction or operational phases, is assessed to ensure Perth Airport's environment and sustainability objectives and requirements are maintained for all works on the airport estate,
- environmental monitoring – monitoring is undertaken for flora and fauna, surface and ground water, contaminated sites and ground-based noise,
- Annual Environment Report - Perth Airport submits an annual report to Department of Infrastructure, Transport, Regional Development and Communications,
- tenant management activities - tenants with an EMP are required to submit an Annual Environment Report to Perth Airport within 30 days of the end of the financial year,
- emissions reporting – Perth Airport reports as required under the National Pollution Inventory and National Greenhouse and Energy Reporting Scheme,
- environmental and heritage incident reporting and investigation,
- collection and collation of environmental incident and hazardous material spill data and reporting to the Airport Environment Officer (AEO, employed by Department of Infrastructure, Transport, Regional Development and Communications),
- regular meetings with the AEO, and
- management of the Environmental Site Register.

Table 9-1 provides a summary of the monitoring activities and the frequency undertaken by Perth Airport.

Review

Operations and activities are reviewed annually through the business improvement plan process, with the annual performance of the EMS assessed and improvement opportunities identified.



Environmental management aspect	Monitoring type	Frequency
Environmental management	Reporting to Managing Responsibly Forum	Monthly
	Internal EMS Conformance Audit	Annually
	External EMS Conformance Audit	3-yearly
Sustainability in planning and design	Qualitative review of the implementation of the ESD principles in new developments	Ongoing
	Water use	Annually
Energy and carbon	Gas use	Annually
	Fuel use	Annually
	Electricity use (overall)	Annually
	Electricity use (multiple submeters)	Annually
	Fuel usage (ground vehicles)	Annually
Hazardous materials	Underground storage tank integrity testing	As required
	Inspections of hazardous materials storage areas	Regular and ongoing – as part of tenant EMS audits
Cultural heritage	Aboriginal monitors	As required, generally project based
Tenants	Review of tenant risk ratings	Annually based on audits
	Review of tenant operational environmental management plans (OEMP)	As required
	Audit of tenants for compliance against OEMP commitments and site monitoring where required (groundwater, air emissions etc.)	Every 1-3 years based on tenant risk ratings
	Ensure environmental assessment is conducted prior to end of lease	As required
Projects	Review of construction environmental management plans (CEMP), and Acid Sulfate Soils and Dewatering Management Plans (if required)	Prior to major construction activities
	Assessment of site conditions prior to commencing major projects, including soil, groundwater and surface water (if applicable)	As required
	Audit of projects for compliance against CEMP commitments	During major construction activities
	Ensure compliance with clearing permits, soil management guidelines	As required
Estate Management	Weed management	Annually
	Feral animal control	Annually
	Dieback monitoring and treatment	Annually
Bushfire Management	Maintaining fire breaks and paddock slashing	Annually
	Prescribed burns to reduce fuel load	As required
Soil and water management	Soil quality testing	Prior to moving excavated soil
	Stormwater quality	Quarterly
	Groundwater quality	Quarterly
Biodiversity and conservation	Airside wildlife monitoring	Daily
	Flora and fauna monitoring	Prior to major construction activities
Air quality and ground-based noise	Air quality	Annually
	Ground-based noise	As required
Waste management	Bin room inspections	Regular and ongoing
	Triple interceptor traps inspections	2 yearly or following spills. Clean out as required
	Trade/greasy waste discharge monitoring	Reported annually by tenants
	Bin inspections	Ad-hoc, as part of CEMP / OEMP audits

Table 9-1 Perth Airport Monitoring

Source: Perth Airport

9.3.5 Continuous Improvement

Perth Airport's EMS adopts a continuous improvement process to ensure plans and practices are current, in line with regulatory requirements, and adequate to manage identified risks.

Perth Airport conducts regular audits, monitoring, incident investigations, risk reviews and management reviews of the EMS. Through these processes, opportunities for improvement are identified and acted upon via system changes, updates and revisions. This process ensures regular and systematic continuous improvement of environmental management and sustainability at Perth Airport.

9.4 Environmentally Significant Areas

In accordance with the Airports Act, Perth Airport has identified areas on the estate that may be considered as being environmentally significant. These areas are mapped in Figure 9-3 and include habitat for listed threatened flora shown in Figure 9-7.

Perth Airport recognises that airport expansion and other developments on the estate may result in disturbance of environmental and cultural values. Potential impacts to these values will require consideration under the EPBC Act, AH Act and assessment under the Airports Act if the impact is deemed significant. The Federal Government will consider the baseline investigations conducted, impact assessment and management programs, prior to granting approvals in accordance with the Airports Act, AH Act and EPBC Act.

Perth Airport will continue to undertake studies and consider the environmental values of each precinct (described in Section 3), taking into account:

- aviation-related protection zones and restrictions,
- environmental values,
- Aboriginal heritage,
- drainage and flooding impact,
- potential contamination,
- environmental offset (either onsite or offsite) costs, and
- potential development costs.

This analysis will determine the suitability and capacity of land to be developed for either aviation or non-aviation uses. An assessment will be made to determine the viability of developing the land and, where development is proposed, the environmental impact will be assessed. Consistent with the Commonwealth's EPBC Act Environmental Offsets Policy (2012), Perth Airport will consider avoidance, minimisation and mitigation measures prior to considering offset measures. Projects with a high risk to environmental values are required to have a Construction Environment and Heritage Management Plan which is approved by Perth Airport and is in line with relevant approvals (if any) prior to construction commencing. Likewise, high risk tenants are required to develop, implement and maintain an Environmental Management Plan (EMP) to mitigate their risks.

Each of the measures combine to minimise environmental impacts of airport development and operations. Furthermore, to minimise ecological footprint, Perth Airport will focus on better waste management, reducing carbon footprint, energy and water efficiency.

9.5 Environmental Aspects

Perth Airport has determined the following environmental aspects as being potentially impacted by airport development and operations:

- soil,
- groundwater and surface water,
- biodiversity, including flora, fauna and wetlands,
- carbon and energy,
- water,
- waste,
- air quality,
- ground-based noise,
- contamination and hazardous materials, and
- Aboriginal heritage and engagement.

Each aspect is addressed in this Strategy, detailing:

- key objective/s to be achieved during the five-year strategy period,
- overview and relevant current environmental context at Perth Airport,
- activities and circumstances arising from development and operations at Perth Airport that have the potential to impact the environmental aspect,
- description of the existing environmental management approach,
- specific achievements related to the Environment Strategy 2014-2019, as well as independent environmental initiatives and achievements since 2015, and
- the program of actions that will be implemented in the next five years, as part of the current management framework to achieve the overarching objective/s.

General environmental management initiatives to be undertaken by Perth Airport between 2020 and 2024 are:

Initiative	
1	Certify the Environmental Management System to ISO 14001
2	Engage with tenants and airport operators to promote and improve sustainability performance across the estate
3	Develop and publish an annual report on sustainability performance
4	Develop and publish a sustainable procurement policy to guide Perth Airport purchasing and contracting
5	Review and update the Precinct Development Guidelines to incorporate: <ul style="list-style-type: none"> • water, waste, carbon and energy objectives, • biodiversity and land management guidance, and • environmental, social and governance.

A summary of the five-year Environment Strategy Implementation Plan is provided in Section 9.16, with details provided in the following sections.

9.6 Soil Management

9.6.1 Objectives

- Prevent contamination of soil within the Perth Airport estate.
- Manage and investigate known or potentially contaminated sites in accordance with relevant legislation.

9.6.2 Overview

The Perth Airport estate is located on the Bassendean Dunes and Guildford Formations of the Swan Coastal Plain. The sand of the Bassendean Dunes on the airport estate has an average depth of four metres and is underlain by clayey sand, silty sand,

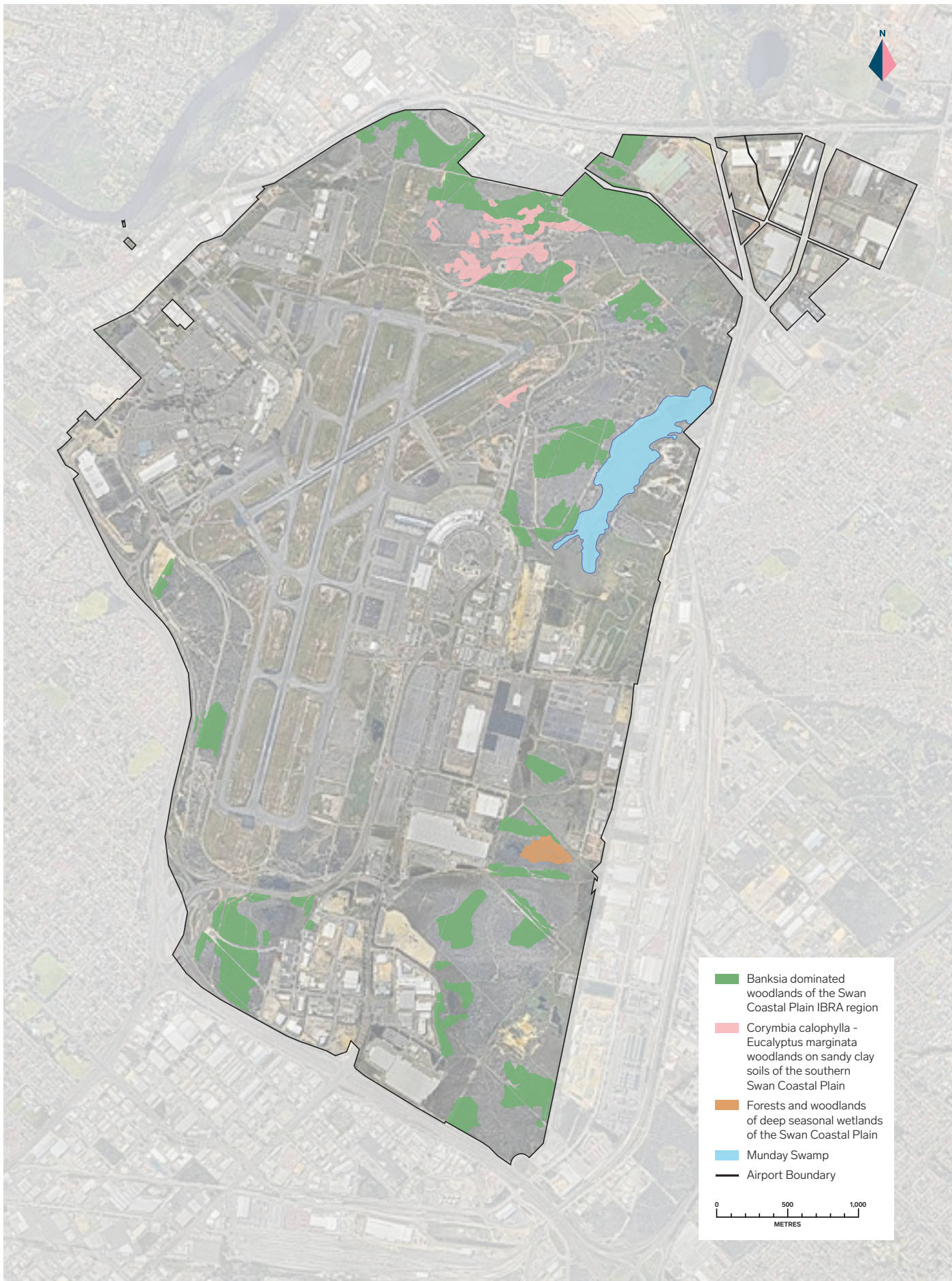


Figure 9-3 Environmentally Significant Areas
Source: Perth Airport

sand and clays of the Guildford Formation. The nature of the landform and geology of the estate has the potential to impact the immediate and surrounding environment if appropriate management is not in place. Any surface contamination event has the potential to permeate into the overlying sand and potentially impact groundwater.

The majority of the soil within the estate is free from contamination. Contamination has been identified as a result of landfill, aviation, fuel storage and industrial activities, as well as natural causes such as the fungus *Phytophthora cinnamomi* (dieback). A number of these sites require active management to ensure impacts are minimised.

As commonly encountered in the Swan Coastal Plain, potential acid sulfate soils are known to be present on the estate.

Construction activities that have the potential to disturb acid sulfate soils material include:

- excavations to groundwater depth,
- disturbance of peaty materials, and
- removal of groundwater (dewatering).

Subsequently, the management of soils on the estate requires consideration of several aspects including; soil type, soil quality, surface water and groundwater.

9.6.3 Current Management

As part of the design and approval process for projects, Perth Airport undertakes a preliminary assessment to determine the potential for environmental impact from construction and operation activities. If additional investigations are required to determine soil quality (for example, contamination assessment or acid sulfate soil investigations), these are required to be undertaken prior to works commencing. Based on this information, soil management measures are determined and management plans developed to reduce the risk of degradation to soil values on the estate.

9.6.3.1 Acid Sulfate Soils

Acid sulfate soils are naturally occurring soils, sediments and peats that contain iron sulphides. In an anaerobic state, these materials remain benign and do not pose a significant risk to human health or the environment. However, disturbing acid sulfate soils and exposing them to oxygen has the potential to cause the release of acidity and dissolution of metals into groundwater.

The risk of contamination is considered minimal until activities are proposed that disturb acid sulfate soil materials. Prior to any ground disturbing works being undertaken, Perth Airport uses the acid sulfate soil risk map on its Geographic Information System (GIS), produced in association with Bulletin 64 by the Western Australian Planning Commission (WAPC), as a tool to assess whether acid sulfate soil is a risk in any proposed work area. The mapping indicates that the airport estate predominately poses a moderate to low risk of acid sulfate soils occurring in the soils beneath the estate, however small areas of high to moderate risk are located in low-lying wetlands and dune swales. Where the risk of acid sulfate soil disturbance is likely, an acid sulfate soil investigation will be conducted prior to works commencing and, where applicable, an Acid Sulfate Soil Management Plan developed and implemented.

9.6.3.2 Contaminated Sites

Measures are put in place to prevent contamination of soil. Measures can include the implementation of Standard Work Procedures, construction or operational EMP, and the control of fill material being relocated and imported onto the estate

through appropriate guidelines and approvals. Detailed information on specific sites, management responses and progress are provided in Perth Airport's Annual Environment Report submitted to Department of Infrastructure, Transport, Regional Development and Communications. To ensure compliance with the AEP Regulations, Perth Airport:

- maintains an Environmental Site Register, detailing all known areas of contamination on the estate,
- collaborates with the AEO and tenants in the investigation, management and remediation of known contaminated sites, and
- monitors and reports annually on all known sites of soil contamination.

Site environmental management is also addressed in sub-leases between Perth Airport and its tenants. Site operations must be undertaken in accordance with sub-lease agreements, the Airports Act, AEP Regulations and this Environment Strategy.

The management of per- and poly-fluoro alkyl substances (PFAS) is detailed in Section 9.14.

9.6.4 Potential Impacts – Development

Construction activities that may create disturbance to soil or soil impacts include:

- clearing of vegetation,
- earthmoving and excavations, and
- the importation and relocation of fill material.

These construction activities also have the potential to:

- impact known or unknown contaminated sites,
- disturb acid sulfate soils, and/or
- introduce dieback (*Phytophthora cinnamomi*) to previously unaffected areas.

9.6.5 Potential Impacts – Operations

Operational activities on the estate, including those of non-aviation tenants, have the potential to impact soil and cause contamination through the use, storage and spillage of chemicals and fuels, or through inappropriate waste or contaminated soil disposal. Spillage and contamination risks include:

- underground storage tanks,
- refuelling and bulk fuel-handling stores,
- manufacturing, distribution and industrial activities conducted by tenants, and
- sewerage leaks and spills.

9.6.6 Recent Achievements

Over the period of the Environment Strategy 2015-2019, a range of soil management commitments were achieved, including:

- baseline contamination assessments were undertaken for all greenfield developments to inform appropriate site management,
- in 2015, a new procedure was documented and implemented for 'end of lease' site environmental evaluation. This process informs appropriate site remediation, if required, and any identified potential contamination is reported to the AEO,
- testing and mapping of the soil fungus *Phytophthora cinnamomi* (dieback) across the airport estate was conducted in 2017 to inform dieback management and priority areas for the annual treatment program,
- the Perth Airport Fill Material Management Guidelines were updated in 2017 to include consideration of dieback, and
- continued collaboration with tenants on management and remediation actions for identified contaminated sites, with remedial works resulting in a reduction in identified contamination levels at some sites.

9.6.7 Five-Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for soil management are as follows. It should be noted that this initiative is in addition to the regular business as usual monitoring outlined previously in Table 9-1.

Initiative

1	Undertake further dieback assessment
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9.7 Groundwater and Surface Water Management

9.7.1 Objectives

- Manage operational and development activities such that groundwater levels are maintained and groundwater quality on the estate is protected.
- Maintain, protect and improve the environmental value of surface water and surface water features across the estate.

9.7.2 Overview

The estate is located on the Swan Coastal Plain. It is relatively flat and is near the base of the Darling Scarp, extending to within 500 metres of the Swan River. Groundwater beneath the estate sits at a shallow depth (surface to four metres below ground level) as an unconfined water table within the highly permeable sands of the Bassendean Dunes and as a semi-confined aquifer in the Guildford Formation.

Groundwater flows in a north-westerly direction across the estate. Surface water features are interspersed across the estate in the form of wetlands (seasonal, permanent and constructed), the Southern Main Drain (SMD) and the Northern Main Drain (NMD) (described in Section 8). The main drains generally flow in an east to west direction, discharging into the Swan River, and have been constructed as extensions and modifications to naturally occurring water bodies.

The surface water features on the estate relate directly to, or interface with, the shallow groundwater. The main drains and the wider arterial drain network intersect the groundwater table at various locations, partially draining the site, limiting maximum groundwater levels. This provides surface flow in the main drains throughout most of the year.

Wetlands present on the estate are also partially or wholly a surface expression of the groundwater table. Constructed wetlands are discussed in this section and naturally occurring wetlands of identified environmental value are discussed in Section 9.8. Historically, the presence of the SMD and NMD, and the topographical and geological features of the estate have acted to moderate the local catchment, retaining water on site during times of high rainfall and flood. This results in a positive impact on water quality as it flows from east to west through the estate, before discharging into the Swan River.

Catchment conditions impact the quality of water entering the estate. Typically, water entering the estate has elevated levels of nutrients and metals, and broadly reflects regional water quality. This is a consequence of current and past upstream land uses and management practices in adjacent areas. These upstream catchment conditions have a direct impact on the quality of groundwater and surface water conditions encountered at the estate.

9.7.2.1 Groundwater

Historic land uses, the quality of surrounding catchments which flow onto the estate and naturally occurring conditions are reflected in long-term groundwater monitoring results. As a result, concentrations of nutrients and heavy metals regularly exceed the acceptance criteria detailed in the AEP Regulations. Nutrient concentrations tend to represent historic land uses such as agriculture, industrial and residential uses, while metal concentrations are indicative of the conditions on the Swan Coastal Plain.

There are isolated instances of groundwater contamination primarily associated with areas of soil contamination. Modelling and monitoring indicate the majority of contamination plumes are restricted to areas directly under or adjacent to the original source and represent limited risk to the environment on the basis of appropriate management. Monitoring indicates that superficial groundwater levels on the estate have not declined over the last 10 years, despite a continued decline in rainfall during this period. Superficial groundwater levels appear to be maintained by inter-aquifer relationships, whereby deeper aquifers are partially recharging the superficial aquifer.

9.7.2.2 Surface Water

Water quality within the drains, at the point where it first flows into the estate, frequently exceeds the acceptance criteria detailed in the AEP Regulations for a variety of chemical pollutants. In addition, developments outside the estate and within the upstream catchments have increased the rate of runoff, increasing the volume of water flowing through the estate. Historically, undeveloped land on the estate has been used as storage to compensate for these increased flows. The water quality entering the estate in the NMD and SMD reflects the land uses of the upstream catchment, which includes:

- the Forrestfield Rail marshalling yards,
- former and current agricultural and horticultural uses, and
- commercial, industrial and residential developments.

Much of the upstream catchment remains un-sewered, and the historic and ongoing use of septic tanks and other onsite wastewater treatment is a major contributor to the level of nutrients recorded. The SMD receives surface flow from Crumpet Creek, which flows through the Forrestfield Rail marshalling yards and a number of residential suburbs. The NMD receives surface flow from the overflow of Munday Swamp and Poison Gully. Munday Swamp is also fed by the High Wycombe Branch Drain and Macao Road Branch Drain. These drains convey water from the northern end of the Forrestfield Rail marshalling yards and residential areas in the City of Kalamunda.

Water flows from built infrastructure (such as roads, car parks, tarmac areas and roofing) within the airport estate are directed into the drainage system. This consists primarily of open drains and is formalised in developed areas through piping and associated water quality management mechanisms.

Extensive monitoring since 1998 has demonstrated that activities across the estate do not generally degrade the existing regional surface water quality. This may be attributed to the availability of land that has acted to detain water and interaction with the shallow groundwater aquifer, allowing natural processes to improve water quality. However, as the estate continues to be developed, less land will be available for this purpose.

9.7.3 Potential Impacts – Development

The potential for development activities to impact groundwater and surface water on the estate include:

- increased abstraction due to greater demand for groundwater resources with the commencement of development works on the estate, along with associated maintenance and upkeep of resulting developed areas (for example reticulation of grassed areas around new developments). Should groundwater levels change significantly, acid sulfate soil has the potential to be exposed to air, which may mobilise heavy metals and acid contaminants into the groundwater beneath the estate. Changes to groundwater levels may impact groundwater-reliant ecology,
- increased development will have an impact on groundwater infiltration, which may increase groundwater levels on the estate. Drainage management changes have the potential to alter infiltration patterns and groundwater mobilisation. Removal of vegetation may impact infiltration levels through the reduction in transpiration, and
- construction and operation of developments may adversely impact water quality through contamination or mobilisation of suspended solids.

9.7.4 Potential Impacts – Offsite Water Migration

Long-term monitoring has shown that nutrient levels in ground and surface water from upstream sources entering the estate are higher than levels in water exiting the estate. Currently, undeveloped land on the estate may improve water quality, along with drainage projects such as the Living Stream. As the availability of undeveloped land decreases and interaction with the groundwater table increases, the potential exists for higher nutrient loads in ground and surface water to migrate offsite and impact the Swan River.

9.7.5 Potential Impacts – Operations

Activities within the estate, including the operations of tenants, have the potential to impact groundwater and surface water. This risk will increase as the airport estate continues to be developed. Potential sources of impact are:

- unsustainable use of groundwater,
- substance spills (including fuels, oils and other hazardous substances),
- infiltration of materials (used in airport operations) through the soil and into groundwater. This could also include materials being washed into drains and onto unsealed soil and grassed areas, as well as leachable materials being stored on unsealed areas,
- discharge of hazardous materials and fuels,
- increased operations and number of tenants on the estate, leading to increased risk and frequency of spills, and
- poorly maintained drainage management infrastructure, such as interceptor pits and gross pollutant traps.

9.7.6 Current Management

Perth Airport currently manages ground and surface water through a range of integrated approaches detailed below.

9.7.6.1 Monitoring

Monitoring is undertaken and reported in accordance with the AEP Regulations. Perth Airport has implemented a comprehensive water monitoring program since 1998, which provides data on surface and groundwater levels and water quality. Figure 9-4 identifies the groundwater and surface monitoring sites. Monitoring is typically undertaken quarterly.

Water quality monitoring results are compared to the acceptance criteria outlined in Schedule 2 of the AEP Regulations. Results are also compared to the National Environment Protection Measures (NEPM Contaminated Sites, 2013) and the Swan Canning Water Quality Improvement Plan to determine water quality and the extent of any potential contamination.

9.7.6.2 Project Assessment and Environmental Management Plans

Perth Airport's project assessment and management plans for construction and ongoing operations reduce the risk of degradation to water values on the estate. Examples of these include:

- project delivery system – all projects are assessed through an environmental screening checklist to determine the potential for environmental impact,
- construction EMP – development activities with moderate to high risk of adverse impacts to environmental and/or heritage values are required to be supported by an EMP. Perth Airport reviews each EMP prior to works being permitted to commence, and
- operational EMP - tenants and contractors are required to develop an EMP to demonstrate how environmental risks and potential impacts will be managed during ongoing operational phases.

The Construction and Operational EMPs must contain a risk assessment identifying risks and management measures, including pollution control systems and monitoring programs. The EMPs are reviewed by qualified Perth Airport employees and external auditing is undertaken to monitor compliance.

9.7.6.3 Perth Airport Estate and Catchment Management

Perth Airport has developed a Master Drainage Strategy which:

- identifies the surface water management requirements up to and including the full development scenario of the estate,
- considers water volumes likely to be received from upstream catchments, noting Perth Airport will provide detention storage based on the legacy 1997 peak flow levels entering the airport estate from upstream,
- informs Perth Airport's decision making regarding flood management and water conveyance on the estate, as well as limiting water discharged from the estate to legacy 1997 peak flow rates, and
- facilitates land use planning and design decisions for drainage infrastructure on the estate.

Perth Airport has implemented the principles of a 'living stream' approach, focusing on water quality and water storage capacity improvements to the SMD. The project recognises the potential for improving the water quality of the SMD and ensuring the development and operations of the estate do not negatively impact the water quality. The living stream project commenced construction in 2014, with recent works completed in 2018. Additional works will be undertaken with future development activities.

Perth Airport continues to engage with State and Local Governments on catchment management matters. When atypical water quality results are detected on the estate boundary, relevant catchment authorities are notified and, where appropriate, action plans are developed.

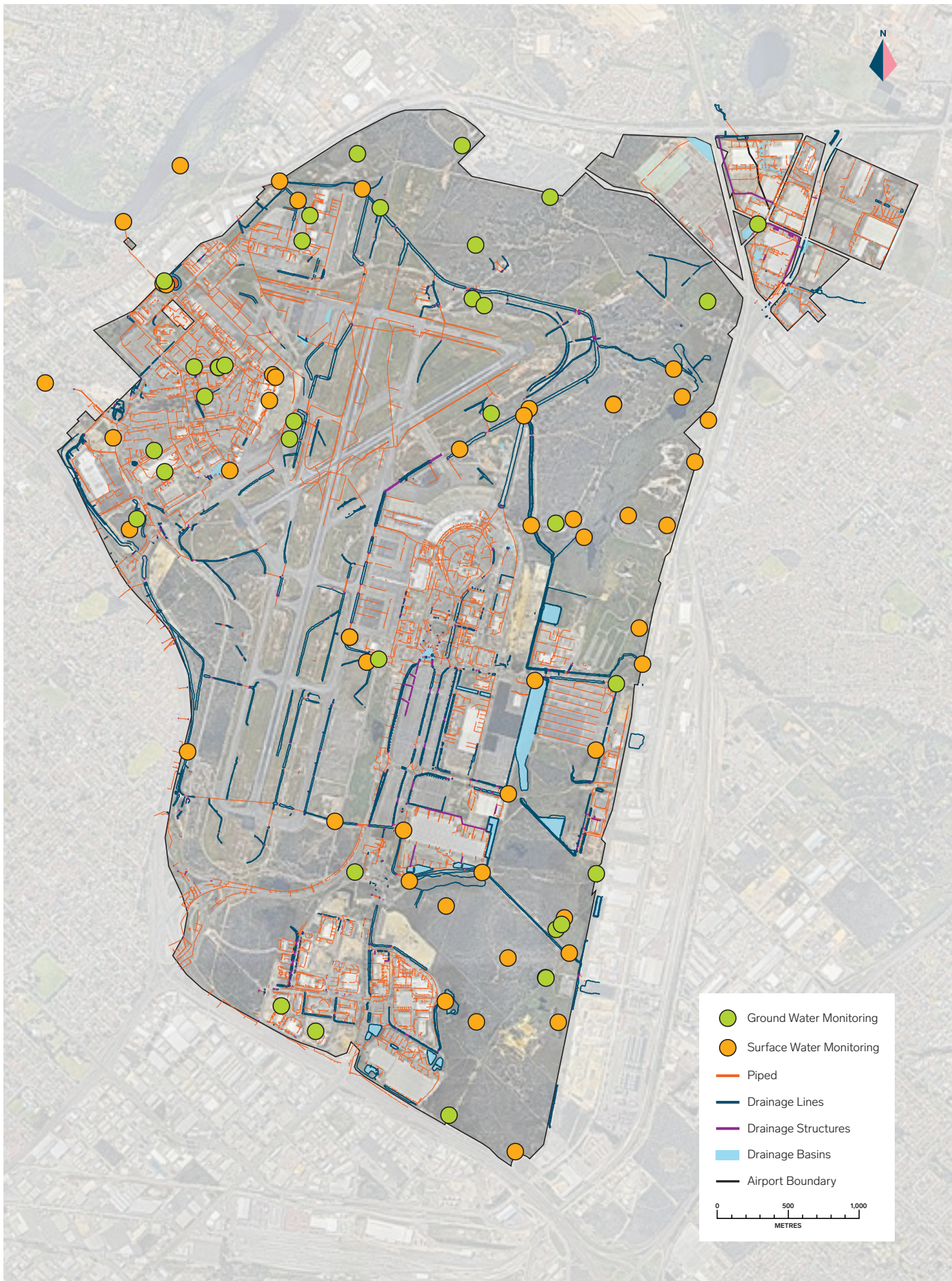


Figure 9-4 Groundwater and surface water monitoring sites
Source: Perth Airport

9.7.7 Recent Achievements

Over the period of the Environment Strategy 2015–2019, a range of groundwater and surface water management commitments were achieved including:

- since December 2015, AEP Regulations and Western Australian Department of Water and Environment Regulation (DWER) criteria have been adopted and incorporated into water quality site assessment evaluations and a new environmental monitoring database,
- between 2015 and 2018, three key projects were undertaken on the SMD to provide upgraded capacity and additional storage detention basins to cater for one-in-100 year storm events,
- extensive groundwater and surface water monitoring and assessment was undertaken throughout the entire period,
- the Perth Airport Master Drainage Strategy was reviewed in 2017 to identify modifications required to the NMD and SMD to enable the planned and future development of the estate,
- aquatic macro-invertebrate fauna sampling undertaken in Munday Swamp, Kwenda Malark Wetland and the airport's stormwater drainage infrastructure in 2017,
- a formal airside drainage interceptor pit management regime, that defines the inspection and maintenance programme, commenced in 2017,
- a Catchment Management Group was established in 2018, comprising representatives from the City of Kalamunda, City of Belmont, Water Corporation, Department of Biodiversity Conservation and Attractions, Department of Water and Environment Regulation and Perth Airport, to discuss catchment planning and management, and
- ongoing quarterly water quality management activities, which are revised annually and ensure effective evaluation and management across the estate.

9.7.8 Five-Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for ground and surface water management are detailed below and are in addition to the business as usual ongoing approval and operational management of ground and surface water, such as review and approvals of construction environmental management plans prior to commencement of works and tenant audits for example.

Initiatives

- | | |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Develop and implement a Groundwater Extraction Management Plan (including surface water where appropriate) for monitoring and management of Perth Airport and tenant groundwater extraction |
| 2 | Undertake monitoring of macroinvertebrates in natural water bodies to coincide with international terminal upgrades, new terminal and/or New Runway Project |
| 3 | Incorporate water sensitive urban design principles in Design Guidelines for on estate developments |

9.8 Biodiversity Management

9.8.1 Objective

- Maintain and protect environmental values onsite or, where agreed with regulatory authorities, provide offsite offsets for listed environmental values as appropriate.

9.8.2 Overview

The Perth Airport estate is situated on the Swan Coastal Plain at the base of the Darling Scarp, within the Drummond Botanical Subdistrict. The natural environment of the estate has been significantly disturbed by historic uses, however there are areas of vegetation that remain intact, albeit in variable condition as shown in Figure 9-5.

Flora surveys have been periodically undertaken across the estate since 1983. Vegetation associations present on the estate include the Southern River Complex, Guildford Complex and Bassendean Complex, as shown in Figure 9-6. The Southern River Complex is the dominant vegetation complex represented on the estate, comprising open woodlands of Marri-Jarrah-Banksia species in elevated areas, and fringing woodlands of Flooded Gum and Swamp Paperbark.

Surveys have indicated the presence of over 450 vascular plant taxa from 267 plant genera and 73 families. Two flora species, *Conospermum undulatum* and *Macarthuria keigheryi* are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as vulnerable and endangered respectively. These species are also listed as Threatened Flora under the *Biodiversity Conservation Act 2016* (WA) (BC Act).

Nine of the flora species are Priority listed flora species by the State Department of Biodiversity, Conservation and Attractions (DBCA). Priority flora lists are maintained by the DBCA to identify flora species which are considered to be potentially under threat or poorly understood and do meet criteria to be listed as Threatened Flora. Threatened Flora species on the estate are shown in Figure 9-7.

A total of fourteen vegetation community types have been mapped on the estate. Figure 9-8 shows the vegetation community types present on the estate and Table 9-2 shows the description of each vegetation community types.

Threatened ecological communities listed by the Commonwealth and the State are mapped by the DBCA as being present on the estate, however verification of the data used for mapping is required in order to definitively determine the presence of vegetation communities. Figure 9-9, shows the actual threatened ecological communities mapped on the estate as determined during a 2018 spring survey.

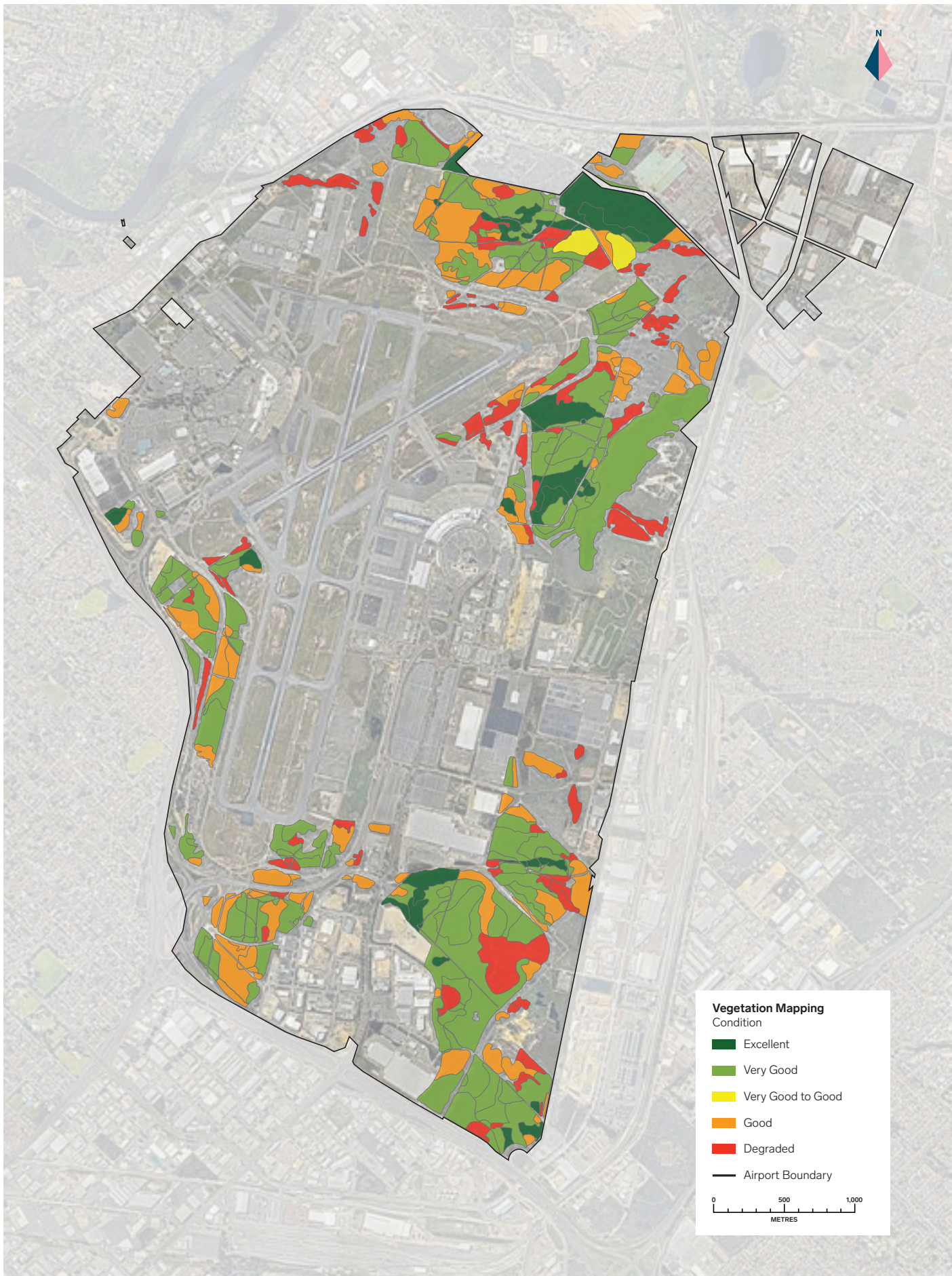


Figure 9-5 Vegetation Condition
Source: Woodman Environmental 2019

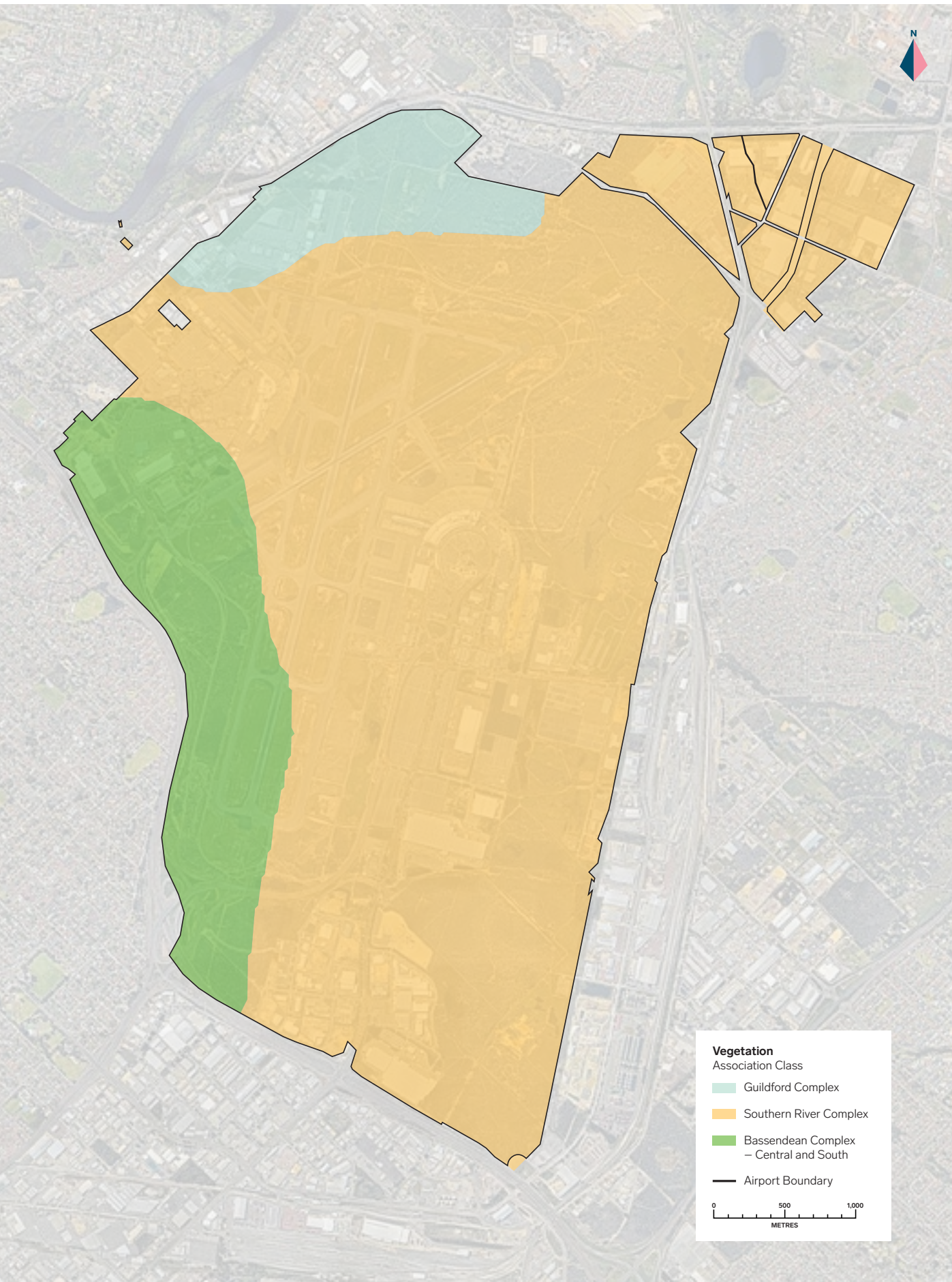


Figure 9-6 Vegetation Association Class
Source: Department of Biodiversity, Conservation and Attractions



Figure 9-7 Threatened Flora within the Perth Airport estate
Source: Woodman Environmental 2019

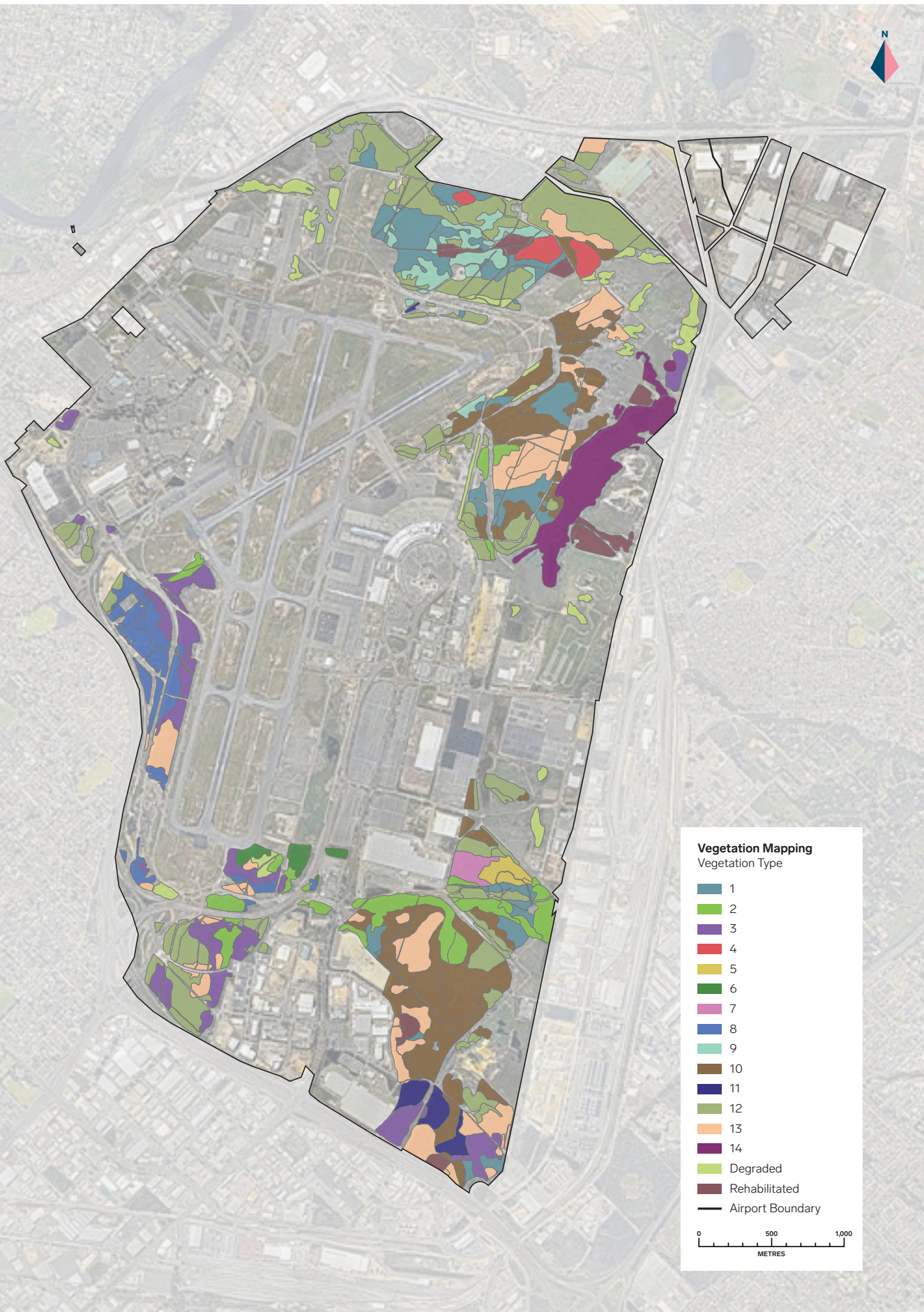


Figure 9-8 Vegetation Community Types
Source: Woodman Environmental 2019

VT	Description
1	Low isolated trees of <i>Melaleuca preissiana</i> over mid to low shrubland of mixed species dominated by <i>Hakea varia</i> , <i>Melaleuca seriata</i> , <i>Pericalymma ellipticum</i> var. <i>floridum</i> , <i>Verticordia densiflora</i> var. <i>densiflora</i> and <i>Astartea affinis</i> over low open rushland dominated by <i>Leptocarpus decipiens</i> , <i>Lyginia imberbis</i> , <i>Hypolaena exsulca</i> and <i>Cytogonidium leptocarpoides</i> over low sparse forbland of mixed species including <i>Aphelia cyperoides</i> , <i>Centrolepis aristata</i> , <i>Hyalosperma cotula</i> , <i>Tribonanthes australis</i> and <i>Siloxerus humifusus</i> in depressions or on flats that are seasonally waterlogged, on grey-brown or grey-black sandy loam.
2	Low woodland to forest dominated by <i>Melaleuca rhapsiophylla</i> over tall to mid open to sparse shrubland of mixed species including <i>Astartea affinis</i> , <i>Melaleuca lateritia</i> , <i>Hakea varia</i> and <i>Pericalymma ellipticum</i> var. <i>floridum</i> over low rushland and sedgeland to open rushland and sedgeland dominated by <i>Leptocarpus decipiens</i> and occasionally <i>Lepidosperma longitudinale</i> over low sparse forbland of mixed species including <i>Centrolepis aristata</i> , <i>Isolepis stellata</i> , <i>Juncus capitatus</i> , <i>Siloxerus filifolius</i> and <i>Isolepis cyperoides</i> on flats or in basins that are seasonally inundated, on grey or brown sand or sandy loams.
3	Low woodland to open woodland dominated by <i>Melaleuca preissiana</i> over mid open shrubland of mixed species including <i>Astartea affinis</i> , <i>Hypocalymma angustifolium</i> subsp. Swan Coastal Plain (G.J. Keighery 16777) and <i>Pericalymma ellipticum</i> var. <i>floridum</i> over low sedgeland and rushland to open sedgeland and rushland of mixed species dominated by most often dominated by <i>Lepidosperma longitudinale</i> , <i>Schoenus efoliatus</i> and occasionally <i>Dielsia stenostachya</i> in depressions or drainage lines that are seasonally inundated, on grey or brown sandy loams.
4	Tall sparse shrubland of <i>Melaleuca rhapsiophylla</i> over mid shrubland of <i>Melaleuca lateritia</i> over low forbland and tussock grassland of mixed species dominated by <i>Lachnagrostis filiformis</i> , <i>*Lotus subbiflorus</i> , <i>Liparophyllum capitatum</i> , <i>*Vulpia myuros</i> forma <i>megalura</i> and <i>Isolepis marginata</i> in basins that are seasonally inundated, on grey-black sandy clay.
5	Tall closed shrubland of <i>Melaleuca viminea</i> subsp. <i>viminea</i> over low sparse rushland of <i>Leptocarpus decipiens</i> over low open forbland of mixed species dominated by <i>Isolepis cernua</i> var. <i>setiformis</i> in deep depressions that are seasonally inundated, on grey brown sandy clay.
6	Tall closed shrubland dominated by <i>Melaleuca rhapsiophylla</i> and occasionally <i>Melaleuca teretifolia</i> and <i>Melaleuca viminea</i> subsp. <i>viminea</i> over mid sedgeland and rushland of mixed species including <i>Leptocarpus coangustus</i> , <i>Baumea articulata</i> , <i>Lepidosperma longitudinale</i> , <i>Schoenus subfascicularis</i> and <i>Leptocarpus decipiens</i> over low sparse forbland of mixed species including <i>Cynogeton lineare</i> and <i>Isolepis cernua</i> var. <i>setiformis</i> in basins that are seasonally inundated, on brown sandy loam.
7	Low woodland dominated by <i>Melaleuca rhapsiophylla</i> and occasionally <i>Melaleuca viminea</i> subsp. <i>viminea</i> over low sedgeland and rushland dominated by <i>Baumea juncea</i> and <i>Leptocarpus coangustus</i> on lake edges that appear semi-permanently inundated, on grey sandy loam.
8	Mid to low woodland to open woodland of <i>Corymbia calophylla</i> , <i>Eucalyptus marginata</i> and <i>Melaleuca preissiana</i> over mid to low open shrubland of mixed species dominated by <i>Xanthorrhoea brunonis</i> subsp. <i>brunonis</i> , <i>Gompholobium tomentosum</i> and <i>Calytrix fraseri</i> over low sedgeland and rushland dominated by <i>Phlebocarya ciliata</i> , <i>Alexgeorgea nitens</i> , <i>Dasyogon bromeliifolius</i> , <i>Patersonia occidentalis</i> var. <i>occidentalis</i> and <i>Hypolaena exsulca</i> on seasonally moist flats on grey sand.
9	Mid forest of <i>Corymbia calophylla</i> over mid to low shrubland of mixed species dominated by <i>Xanthorrhoea brunonis</i> subsp. <i>brunonis</i> , <i>Babingtonia camphorosmae</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> and <i>Bossiaea eriocarpa</i> over low sedgeland and forbland dominated by <i>Tetraria octandra</i> , <i>Opercularia vaginata</i> , <i>Mesomelaena tetragona</i> and <i>Desmocladius fasciculatus</i> on lower to mid slopes of broad rises on grey sandy loam.
10	Isolated mid trees of <i>Corymbia calophylla</i> over open low woodland of <i>Melaleuca preissiana</i> over mid to low open shrubland to shrubland of mixed species dominated by <i>Hypocalymma angustifolium</i> subsp. Swan Coastal Plain (G.J. Keighery 16777), <i>Jacksonia gracillima</i> , <i>Pericalymma ellipticum</i> var. <i>floridum</i> , <i>Melaleuca seriata</i> and <i>Daviesia physodes</i> over low rushland and sedgeland to open rushland and sedgeland of mixed species dominated by <i>Cytogonidium leptocarpoides</i> , <i>Dasyogon bromeliifolius</i> , <i>Patersonia occidentalis</i> var. <i>occidentalis</i> , <i>Phlebocarya ciliata</i> and <i>Schoenus efoliatus</i> on lower slopes of broad rises and flats that are seasonally waterlogged, on grey or white sand or sandy loam.
11	Mid to low shrubland of mixed species dominated by <i>Hypocalymma angustifolium</i> subsp. Swan Coastal Plain (G.J. Keighery 16777), <i>Pericalymma ellipticum</i> var. <i>floridum</i> , <i>Melaleuca seriata</i> , <i>Euchilopsis linearis</i> and <i>Lechenaultia floribunda</i> over low open rushland and sedgeland dominated by <i>Cytogonidium leptocarpoides</i> , <i>Lyginia imberbis</i> , <i>Hypolaena exsulca</i> , <i>Dasyogon bromeliifolius</i> and <i>Phlebocarya ciliata</i> on lower slopes of broad rises and flats that are seasonally waterlogged, on brown sand.
12	Mid woodland of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> over low woodland of <i>Allocasuarina fraseriana</i> , <i>Banksia menziesii</i> and <i>Banksia attenuata</i> over mid open to sparse shrubland of mixed species dominated by <i>Jacksonia floribunda</i> and <i>Calytrix fraseri</i> over low open shrubland of mixed species dominated by <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Bossiaea eriocarpa</i> , <i>Eremaea pauciflora</i> var. <i>pauciflora</i> and <i>Stirlingia latifolia</i> over low open to sparse sedgeland and rushland of mixed species including <i>Alexgeorgea nitens</i> , <i>Desmocladius flexuosus</i> , <i>Mesomelaena pseudostygia</i> and <i>Lyginia imberbis</i> on dunes and low rises on grey sand.
13	Low woodland to open forest of <i>Banksia menziesii</i> , <i>B. attenuata</i> and occasionally <i>Eucalyptus todtiana</i> over tall sparse shrubland dominated by <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> over mid open to sparse shrubland of mixed species dominated by <i>Jacksonia floribunda</i> and <i>Melaleuca seriata</i> over low open shrubland of mixed species dominated by <i>Eremaea pauciflora</i> var. <i>pauciflora</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Scholtzia involucreta</i> and <i>Bossiaea eriocarpa</i> over low open to sparse sedgeland and rushland of mixed species dominated by <i>Alexgeorgea nitens</i> , <i>Dasyogon bromeliifolius</i> , <i>Patersonia occidentalis</i> var. <i>occidentalis</i> , <i>Desmocladius flexuosus</i> and <i>Lyginia imberbis</i> on dunes and low rises on grey sand.
14	Low forest of <i>Melaleuca rhapsiophylla</i> and <i>Eucalyptus rudis</i> over low sparse forbland dominated by <i>Lemna disperma</i> in basins that are apparently semi-permanently or permanently inundated, on black sandy clay.

Table 9-2 Vegetation Type Description

Source: Woodman Environmental 2019

The estate supports a diverse assemblage of vertebrate and invertebrate fauna. Numerous fauna surveys have recorded a total of 139 species of vertebrate fauna comprising three fish, eight frogs, 23 reptiles, 95 birds and ten mammals (including five introduced species). Surveys of the estate invertebrate assemblage revealed the presence of 92 species, comprising 59 taxonomic families.

The fauna species identified as Commonwealth or State listed environmental value that occur on the airport estate are:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), Forrest Red-tailed Black Cockatoo (*Calyptorhynchus banksii*) are regular visitors to the estate and Baudin's Black Cockatoo (*Calyptorhynchus baudini*) are irregular visitors. Foraging habitat is widespread across the estate as indicated in Figure 9-10 and Figure 9-11,
- Southern Brown Bandicoot, or Quenda (*Isodon obesulus fusciventer*), is listed as Priority 4 in Western Australia. The Quenda is abundant across the estate,
- Water Rat (Rakali – *Hydromys chrysogaster*), is listed Priority 4 in Western Australia and is an occasional visitor to the estate as individuals disperse along drains from nearby wetlands, and
- Native Bee (*Hyaleus globuliferus*), is listed as Priority 3 in Western Australia. Suitable habitat for the species is present on the estate and therefore it is likely to occur.

Additionally, potential habitat for the Western Swamp Tortoise (*Pseudemydura umbrina*) was previously identified on the Estate within the State's species recovery plan. However, investigations have indicated that engineered modification of the habitat would be required to render the site suitable. The latest studies indicate that the Western Swamp Tortoise is considered locally extinct.

Wetlands present on the estate vary from ephemeral to perennial, natural to artificial, and groundwater fed to surface water fed. State Government mapping indicates that wetlands of variable quality are present over the majority of the estate. Munday Swamp, the largest of all the wetlands present on the estate (approximately 20 hectares), is listed on the Commonwealth Directory of Important Wetlands in Australia. This wetland provides a permanent water source and, as such, supports an array of invertebrate and vertebrate fauna.

Northern Wetlands to the west of Munday Swamp are classified as sumplands. These sumplands are seasonally inundated and are also listed on the Commonwealth Directory of Important Wetlands in Australia. Other wetlands of note on the estate include Runway Swamp and the Kwenda Marlark Wetland (man-made) to the south.

Figure 9-12 shows the wetlands mapped on the estate following vegetation mapping in 2018.



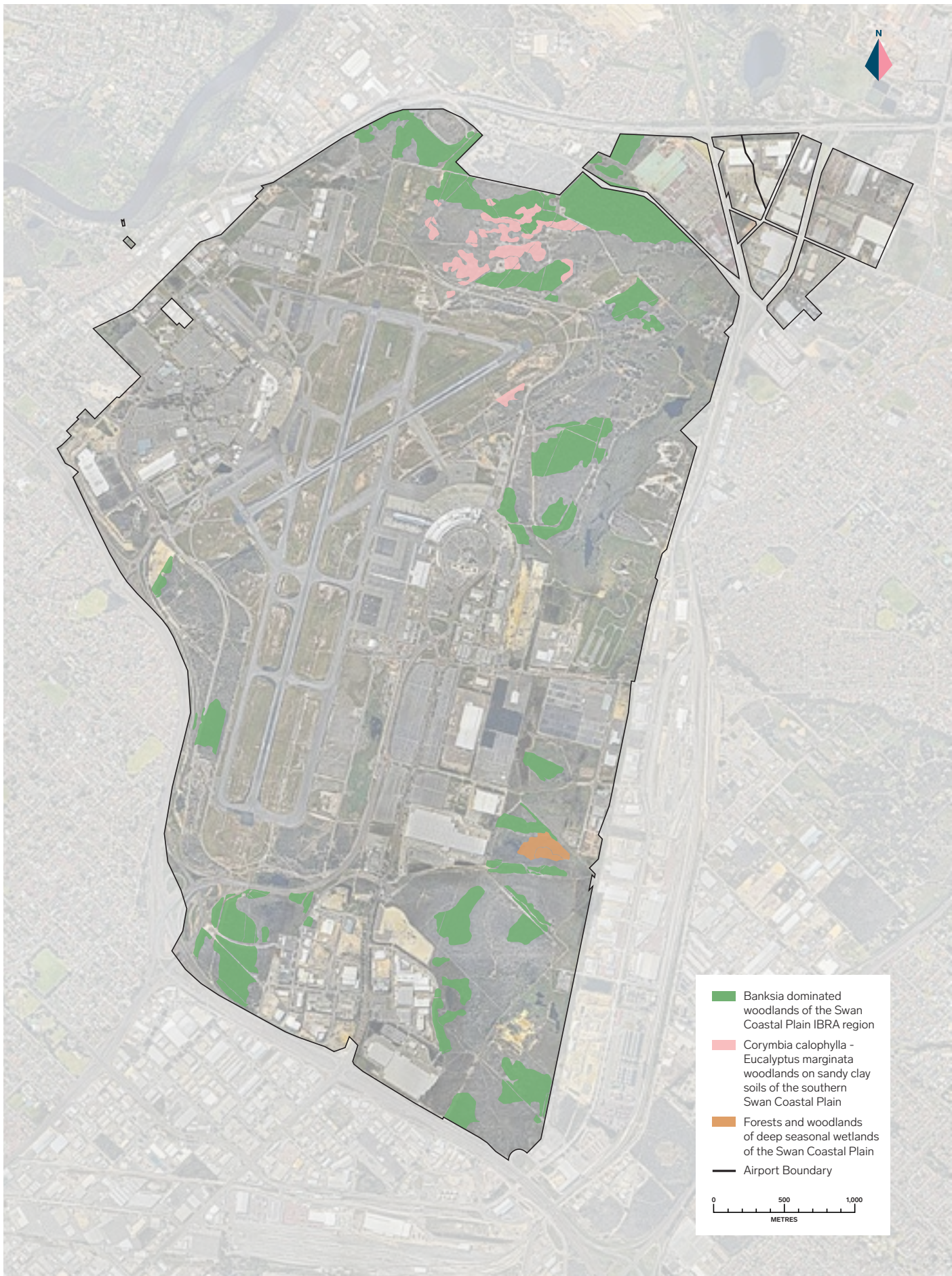


Figure 9-9 Threatened Ecological Communities
Source: Woodman Environmental 2019

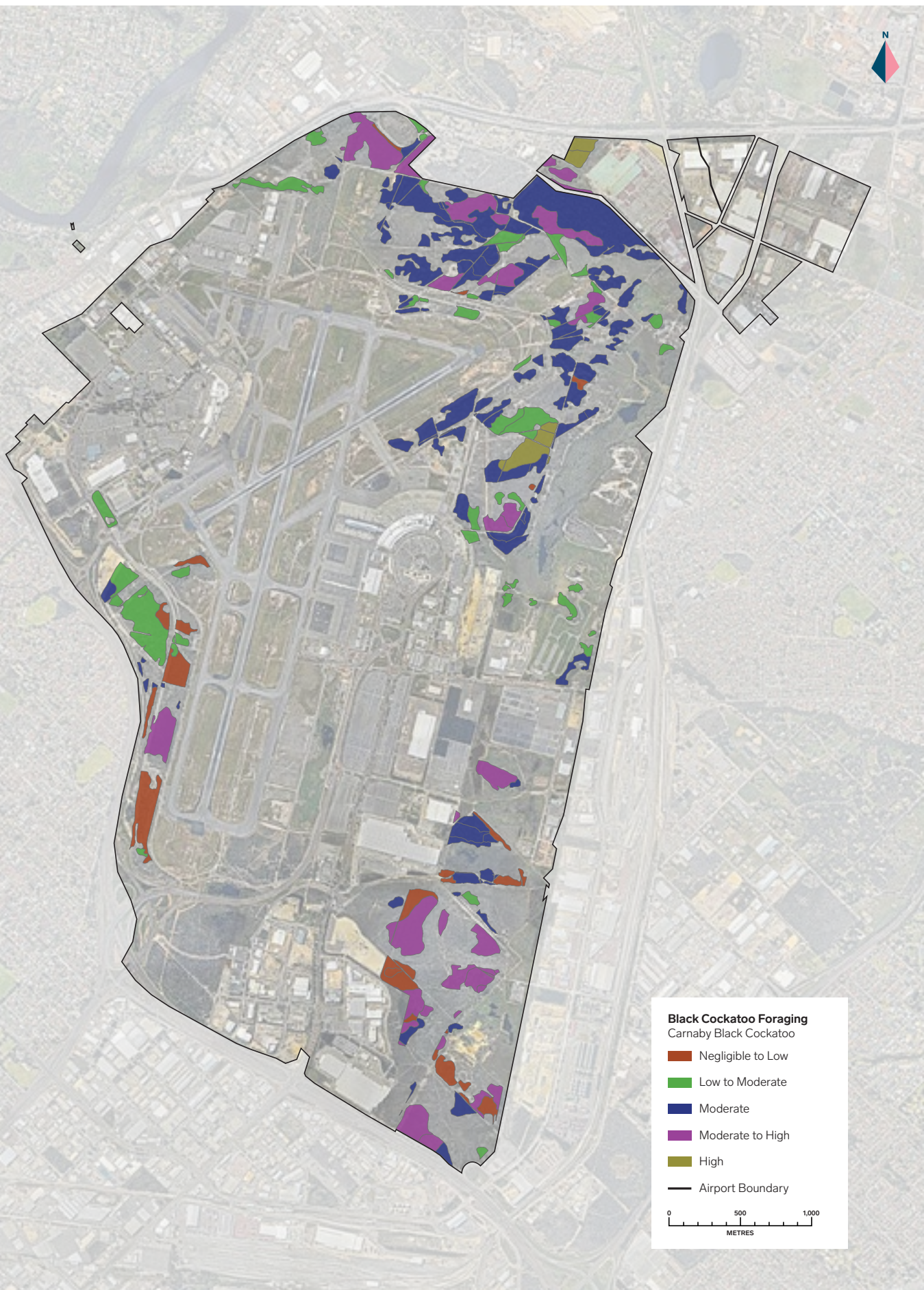


Figure 9-10 Black Cockatoo Foraging Habitat (Carnaby's)
Source: Bamford 2019

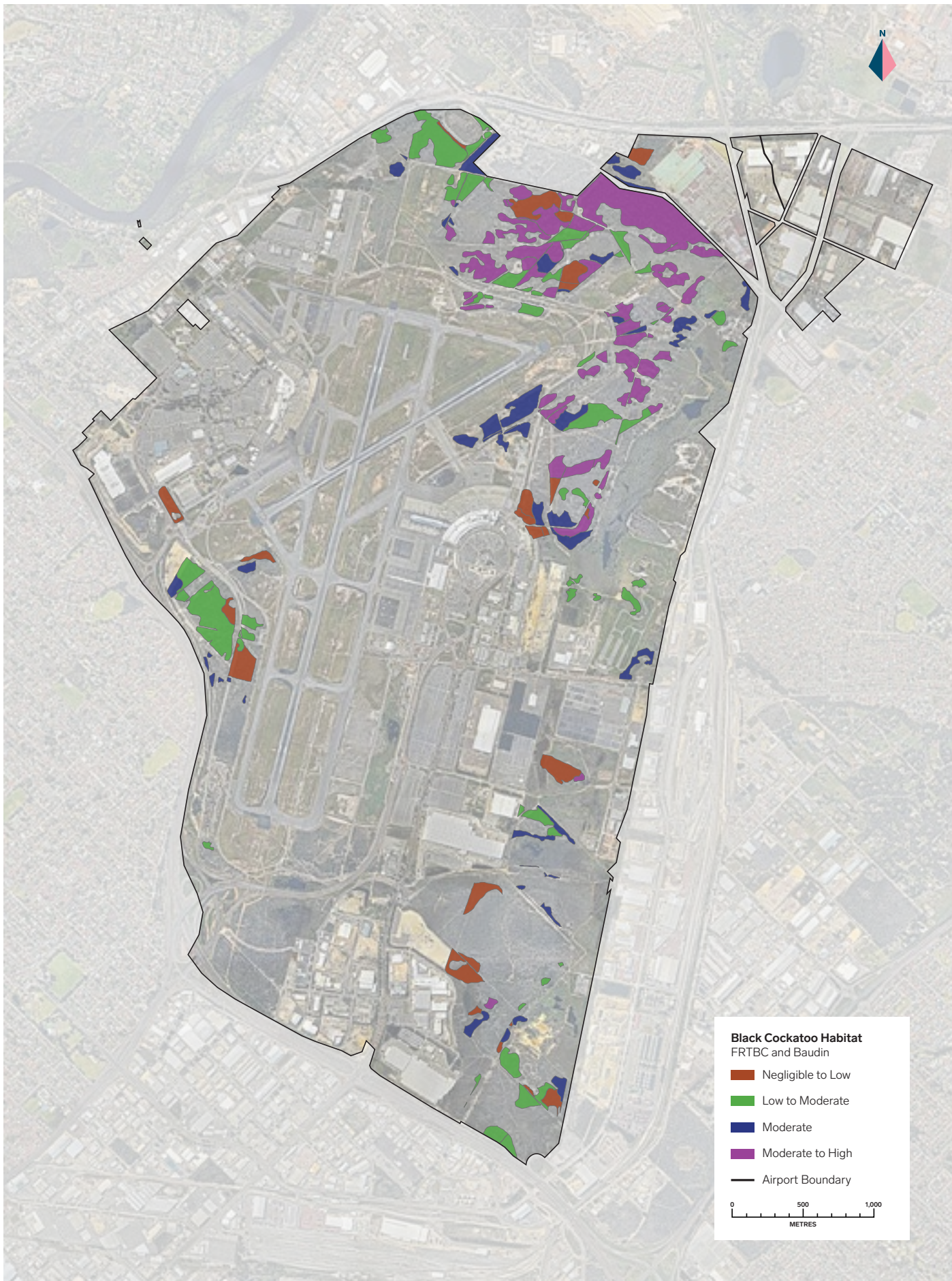


Figure 9-11 Black Cockatoo Foraging Habitat (Forrest Red-tail (FRTBC) and Baudins)
Source: Bamford 2019

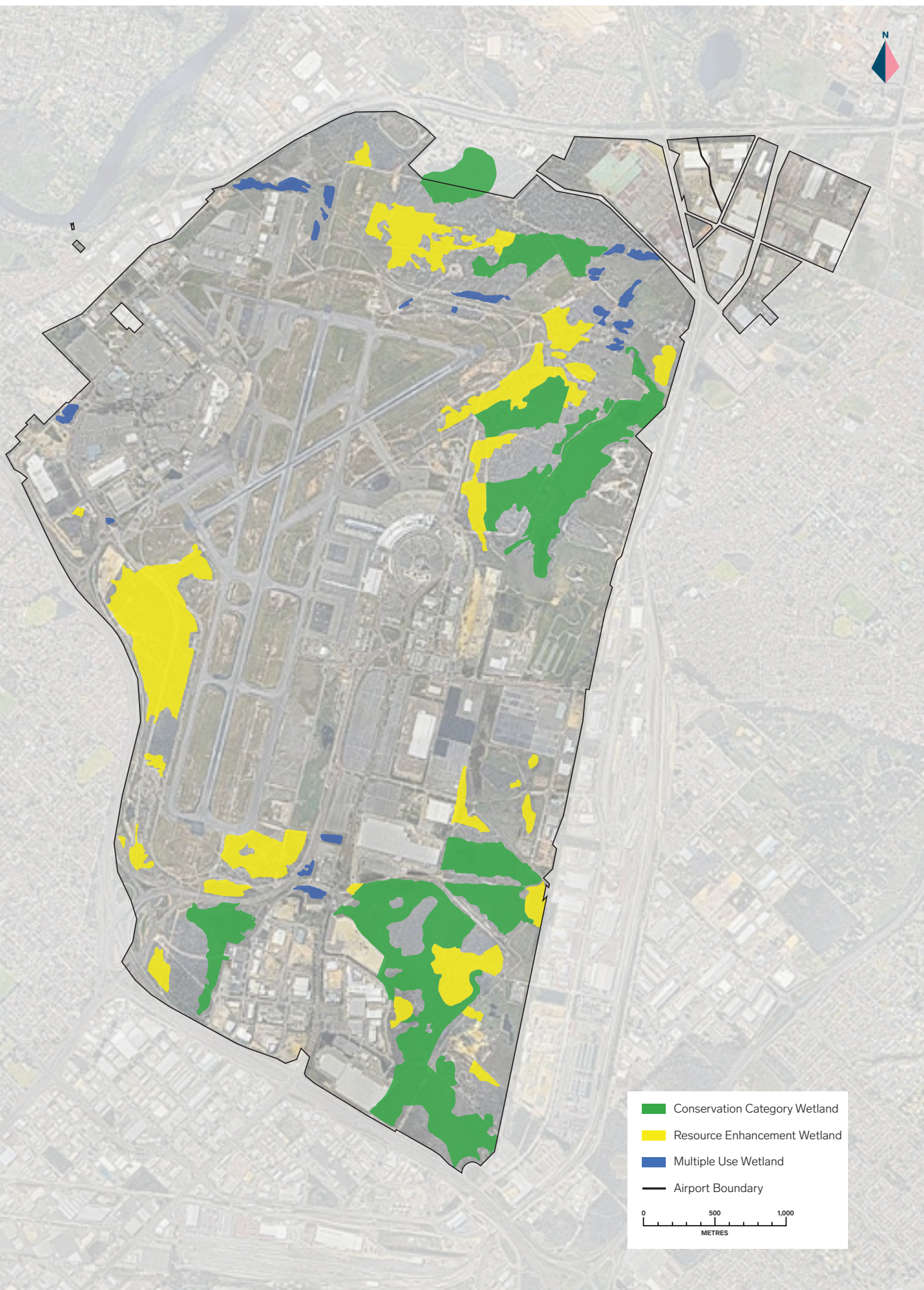


Figure 9-12 Wetlands within the Perth Airport estate
Source: Eco Logical Australia 2019

9.8.3 Environmental Values

The legislation and policies that define the environmental values on the airport estate include:

Commonwealth

- *Environment Protection and Biodiversity Conservation Act 1999*,
- *Airports Act 1996* and Airports (Environment Protection) Regulations 1997, and
- Directory of Important Wetlands in Australia.

State

- *Biodiversity Conservation Act 2016*, and
- Priority Species List.

Consultation with Commonwealth and State conservation bodies has been undertaken to confirm the boundaries of mapped values and methodologies for technical assessments. Further consultation on the methodology and outcomes will be undertaken with relevant conservation bodies.

The listed environmental values identified on the Perth Airport estate are summarised in Table 9-3.

Listed Environmental Value	Commonwealth Listing	State Listing	Perth Airport Precinct
Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain – SCP20b ¹	EPBC Act (endangered - Banksia Woodland)	Endangered	Absent
Banksia attenuata woodlands over species rich dense shrublands – SCP20a ¹	EPBC Act (endangered – Banksia Woodland)	Endangered	Absent
Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region – Various FTCs ^{1,2}	EPBC Act (endangered – Banksia Woodland)	Priority 3	Airport West, Airport North, Airport Central, Airport South, Airfield
Herb rich saline shrublands in clay pans – SCP07 ¹	EPBC Act (critically endangered)	Vulnerable	Absent
Eucalyptus calophylla – Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain – SCP 3b ²		Vulnerable	Airport North
Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain – SCP 15 ²		Vulnerable	Airfield
Conospermum undulatum ^{1,2}	EPBC Act (vulnerable)	Threatened	Airport North, Airfield
Macarthuria keigheryi ^{1,2}	EPBC Act (endangered)	Threatened	Airfield
Carnaby's Black Cockatoo ^{1,2}	EPBC Act (endangered)	Endangered	Airport West, Airport North, Airfield, Airport Central, Airport South
Forrest Red-tailed Black Cockatoo ^{1,2}	EPBC Act (vulnerable)	Vulnerable	Airport West, Airport North, Airfield, Airport Central, Airport South
Baudin's Black Cockatoo ^{1,2}	EPBC Act (endangered)	Endangered	Airport West, Airport North, Airfield, Airport Central, Airport South
Nationally Important Wetlands ¹	Directory of Important Wetlands in Australia	Conservation, Resource Enhancement and Multiple Use	Airport West, Airport North, Airfield, Airport Central, Airport South
Priority Flora ^{1,2}		Priority	Airfield, Airport North and Airport South
Quenda ^{1,2}		Priority 4	Airport West, Airport North, Airfield, Airport Central, Airport South
Rakali ^{1,2}		Priority 4	Airport North, Airfield
Native Bee (<i>Hyaleus globuliferus</i>) ¹		Priority 3	Airport West, Airport North, Airfield, Airport Central, Airport South
Cricket (<i>Austrosaga spinifer</i>) ¹		Priority 3	Locally Extinct
Cricket (<i>Throscodectes xiphos</i>) ¹		Priority 1	Locally Extinct
Western Swamp Tortoise habitat ¹ (requires substantial modification)	EPBC Act (critically endangered)	Critically Endangered	Locally Extinct

Table 9-3 Listed Environmental Values on Perth Airport estate

Source: Department of Biodiversity, Conservation and Attractions and Perth Airport

¹ Identified from desktop analysis of government databases

² Identified from surveys conducted on Perth Airport estate

9.8.4 Potential Impacts – Development

Development of the estate may directly or indirectly impact listed environmental values. Direct impacts may include the clearing or removal of environmental values while indirect impacts may include habitat fragmentation, creation of unviable areas of habitat, alteration of hydrological regimes and increased edge effects through weed incursion and dieback infestation.

Wildlife corridors, vegetation connectivity and environmental values will be key considerations in detailed land use and precinct planning to mitigate these impacts where possible.

9.8.5 Potential Impacts – Operation

The operation of Perth Airport may impact on listed values through pollution events, and alteration of the hydrological regime through activities such as over abstraction. Threatening processes such as weed incursion, dieback infestation, bush fire, feral animal predation, illegal access, and fly tipping (unauthorised dumping of waste) are an ongoing potential impact to natural areas and environmental values on the estate.

9.8.6 Current Management

Perth Airport undertakes land management activities such as weed control, dieback treatment and feral animal control to manage the listed environmental values on the estate.

Rehabilitation has been undertaken across the airport estate, including for the Living Stream project (open vegetated drainage channel).

9.8.7 Recent Achievements

Over the period of the Environment Strategy 2015–2019, a range of biodiversity management commitments were met including:

- extensive revegetation and planting work in association with the Living Stream project,
- ongoing bushfire management initiatives, including a fire fuel load survey for all bushland across the estate in 2017, fuel reduction burns (as required, based on the fuel load assessment and asset risk) and annual slashing and maintenance of firebreaks,
- as part of Perth Airport's commitment to managing the risk of wildlife strikes, a \$1.7 million project to net over three kilometres of open drains throughout the airfield commenced in 2017,
- detailed flora and fauna surveys undertaken across the estate during 2017 and 2018,
- review and update of the Perth Airport Bushfire Management Plan in 2019, and
- formulation of a precinct development guideline.

9.8.8 Five-Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for biodiversity management are:

Initiatives

- 1 Develop and implement a Land and Biodiversity Management Plan, including weed, pest and dieback
- 2 Develop and implement a Conservation Significant Flora and Vegetation Management Plan

9.9 Carbon and Energy Sustainability

9.9.1 Objectives

- Increase energy efficiency of non-aviation operations and ground-based aviation operations across the estate.
- Investigate the use of renewable and low emission sources in the overall electricity mix, including tenant uptake of low emission technologies.
- Review and monitor energy usage and develop an energy strategy that includes low emissions energy options.

9.9.2 Overview

In 2008, aviation leaders signed the Global Aviation Industry Commitment to Action on Climate Change, demonstrating the industry's commitment to reducing its impact on the environment. Aviation accounts for around two per cent of total global carbon dioxide emissions and this is expected to increase to three per cent by 2050. Direct aircraft emissions are difficult for Perth Airport to reduce because fuel and combustion are required for flight and are beyond Perth Airport's control.

As a result, Perth Airport concentrates reduction and efficiency efforts on its own energy emissions and indirect emissions associated with airport operations. Perth Airport's energy use is predominantly electrical, natural gas and fuel (diesel and petroleum) based. Fuel is used to power Perth Airport's fleet of vehicles. Electricity supplied from the State grid and internally from Perth Airport's gas co-generation facility is used for lighting, heating and cooling of buildings, including airport terminals. Electricity is also used for activities such as airfield lighting (runway, taxiway and aprons), car parks and street lighting, and is also used by Perth Airport and tenants across the estate.

9.9.2.1 Transport and Fuel

Fossil fuel combustion is the largest contributor to air pollution in the world. Pollution emitted from vehicles can include:

- particulate matter,
- hydrocarbons,
- nitrogen oxides,
- carbon monoxide,
- sulphur dioxide,
- volatile organic compounds,
- benzene,
- methane, and
- other greenhouse gases.

In 2018, road transport accounted for 18 per cent of Australia's total greenhouse gas emissions and transport emissions have the highest rate of growth of any sector. Trends and travel patterns in Perth indicate that vehicle travel is the preferred method of transport. As Perth Airport continues development of the estate, there is an opportunity to integrate other modes of transport, including the new Forrestfield-Airport Link and other forms of public transport, walkable catchments and the possible future introduction of an Automated People Mover.

9.9.2.2 Electricity Use

Perth Airport estate is a large consumer of energy from the WA state grid, and the airport also develops and operates electricity supply infrastructure across the estate to service internal and tenant requirements. Perth Airport also generates its own power supply through a gas fired co-generation facility. In 2018, approximately 13 per cent of Perth Airport's total energy supply was provided by the co-generation facility, and 87 per cent was supplied by the WA state grid.

Perth Airport is committed to increasing the proportion of renewable energy and low emission energy sources in its energy mix, to reduce the environmental impacts of energy use and emissions which contribute to climate change. Through investigation of opportunities for renewable energy supply on the estate, such as solar power, and bioenergy fuels, Perth Airport will continue to focus on clean energy supply and energy efficiency increases in the development of the estate.

9.9.3 Potential Impacts - Development

Construction activity is expected to increase the rate of energy use at new development areas, however this is expected to reduce once construction is completed. Energy efficient measures have the potential to reduce operational costs as well as improve environmental and sustainability outcomes. Investigating energy efficient measures, as well as reducing use and adopting energy savings initiatives, presents a cost-reduction opportunity for Perth Airport.

9.9.4 Potential Impacts - Climate Change

Energy use and associated emissions have been identified as a major contributor to climate change. The estate is a large consumer of energy in Western Australia, and therefore Perth Airport has an obligation to reduce greenhouse gas emissions.

9.9.5 Current Management

Perth Airport's management of energy use is addressed through plans, strategies and initiatives outlined below.

9.9.5.1 Building Management System

Energy management in Perth Airport operated terminals is undertaken through the Building Management System (BMS). The BMS controls lighting, ventilation, heating and cooling, with the ability to sense and respond to changes in temperature. This system enables Perth Airport to continually identify and implement energy efficiency measures. The BMS is subject to consistent review and upgrades.

9.9.5.2 Green Star Building Design

Green Star is a voluntary, national environmental rating system that evaluates the environmental design and construction of buildings throughout all stages of a project. It assigns points for initiatives against defined categories, including site selection, design, construction, operation and maintenance. Ratings are assigned as 4 Star (Best Practice), 5 Star (Australian Excellence) or 6 Star (World Leader). Perth Airport currently has one building rated 4 Star (Bravo Building) and two rated 5 Stars (the Echo 1 & 2 Buildings) and specific ratings will be further considered as part of building approvals across Perth Airport.

9.9.5.3 Carbon Management Plan

In 2018, Perth Airport developed a Carbon Management Plan (CMP) as part of its Airports Carbon Accreditation (ACA) certification process. The CMP outlines Perth Airport's goals and performance objectives for renewable energy uptake, emissions reductions targets, and implementation plan for achieving these goals. The CMP is reviewed annually as part of the accreditation process and is subject to third party approval by the certifying body.

9.9.6 Recent Achievements

Over the period of the Environment Strategy 2015-2019, the energy related achievements included:

- construction of a gas-fired co-generation plant, as an alternative energy source, in the Airport Central Precinct in 2015 to support Terminal 1 International, the Terminal 1 Domestic pier and Terminal 2,
- annual energy use reporting under the National Greenhouse and Energy Reporting (NGER) since 2016,
- ongoing investigations into alternative energy opportunities, including waste to energy and geothermal heating and cooling, as well as reviewing options through the Airport North Zero Carbon Project (2016 – 2019),
- achievement of Level 1 'Mapping' accreditation in 2017 under the Airport Carbon Accreditation programme, and achievement of Level 2 'Reduction' accreditation in 2019. The accreditation required the development of a Carbon Management Plan, emissions reductions targets and renewable energy goals,
- progressive replacement of airside and landside lighting with highly energy efficient LED light fittings,
- the sourcing of energy from the Eastern Metropolitan Regional Council's waste to energy wood pyrolysis power generation plant, located one kilometre north of the estate (due to commence operations in 2019), and
- energy use and carbon guidelines for third party commercial developments and Perth Airport buildings to be published in Design Guidelines for each planning precinct (Airport North, Airport West, Airport South and Airport Central) in 2019.

9.9.7 Five-Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for carbon and energy management are:

Initiatives

- | | |
|---|---------------------------------------------------------------------------------------------------------------------------|
| 1 | Undertake an energy efficiency audit for all Perth Airport buildings |
| 2 | Implement carbon reduction target of 15 per cent for Perth Airport activities |
| 3 | Install Ground Power Units for the new terminal and international terminal upgrades, subject to airline partner agreement |
| 4 | Investigate opportunities to offset PAPL Scope 1 greenhouse gas emissions and staff air travel emissions |

9.10 Water Management

9.10.1 Objectives

- Increase water efficiency of non-aviation operations and ground-based aviation operations across the estate.
- Include water efficiency requirements in future developments and investigate water sensitive urban design principles for precincts on the estate.

9.10.2 Overview

Perth, and the greater south of Western Australia, has been experiencing an extended dry period since 1975. Resulting water shortages have caused Western Australian water suppliers to launch initiatives and campaigns to reduce water use across the State. Perth Airport (including its tenants and other users on the estate) is a large consumer of water in the metropolitan area. Perth Airport (and airport estate users) source scheme water and groundwater abstraction in its operations.

Perth Airport's current scheme water use between 2013 and 2018 has averaged approximately 721,000 kilolitres per year for terminals, offices, tenanted buildings etc. Additionally, approximately 650,000 kilolitres of groundwater are used for irrigation and non-potable purposes.

9.10.3 Potential Impacts – Development

Potential impacts to groundwater across the estate are predominantly associated with development and are described below. Development at the airport has the potential to impact groundwater levels, through use and abstraction of groundwater and dewatering activities. Changes to groundwater levels have the potential to impact on flora and fauna within the estate, through reduced access to water and/or inundation.

Developments at the airport are also expected to increase consumption of scheme water. This increase will result from more users on the airport estate in the form of passengers, construction staff, airport staff, contract staff and tenants. The impacts from this are the potential for inappropriate use of potable water for activities that can be alternatively sourced from non-potable resources (such as the use of scheme water for dust suppression), which leads to greater costs and waste of scarce resources.

9.10.4 Potential Impacts – Operations

The main impact of increased scheme water consumption is the increased costs to Perth Airport and potential for waste of a scarce natural resource. Increased use of scheme water results in greater pressure on the existing natural water catchments and water sources to provide more water despite decreased rainfall trends.

9.10.5 Current Management

Perth Airport's water consumption is managed through plans, strategies and initiatives as outlined below. Although located on Commonwealth land and subject to Commonwealth legislation, Perth Airport adheres to the principles of State-mandated limits on sprinkler use, and limits watering in winter, and only on allocated days where applicable.

9.10.5.1 Groundwater Metering

Groundwater abstraction and use is monitored across the estate. The network of production bores is managed to ensure that groundwater abstraction is not concentrated in any particular area, avoiding heavy drawdown and spreading the abstraction load across the estate.

9.10.5.2 Water Efficiency Management Plan

The State Government (through the Water Corporation) requires businesses using more than 20,000 kilolitres of scheme water per annum to participate in a Waterwise Business Program, which includes the production of a Water Efficiency Management Plan. Perth Airport's Water Efficiency Management Plan improves water efficiency by:

- assessing current water use on site,
- identifying inefficiencies and potential water savings, and
- identifying opportunities where other sources of water could potentially be used to substitute current scheme water use.

9.10.5.3 Landscape Master Plan

This plan incorporates water-wise principles such as the use of native water-wise plants in landscaping, as well as water saving measures such as restricting the installation of irrigation areas and reticulation design.

9.10.5.4 Irrigation Operating Strategy

This strategy commits Perth Airport to the Water Corporation sprinkler restrictions.

9.10.6 Recent Achievements

Over the period of the Environment Strategy 2015-2019, a range of commitments were met including:

- submission of an annual Water Efficiency Management Plan (WEMP) to the Water Corporation, including integration of the Water Corporation's 'Freshwater Thinking' program and the completion of potable network modelling and tenant water consumption monitoring,
- since 2017, water flow meters have been installed for all new construction projects to monitor water use,
- water efficiency guidelines for third party commercial developments and Perth Airport buildings to be published in Design Guidelines for each planning precinct (Airport North, Airport West, Airport South and Airport Central) in 2019, and
- continued engagement with the Water Corporation to investigate options for improving Perth Airport and tenant water use across the estate.

9.10.7 Five Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for water management are:

Initiatives

- | Initiatives | |
|-------------|----------------------------------------------------------------------------------------------------------------------------------|
| 1 | Develop targets and implement measures where feasible to reduce total potable water use in Perth Airport buildings and terminals |
| 2 | Conduct a water use audit of the Perth Airport estate |
| 3 | Investigate the use of alternative water sources for irrigation and dual reticulation for key development projects |
| 4 | Engage with the top 10 water users on the estate to develop and implement individual water efficiency plans |

9.11 Waste Management

9.11.1 Objectives

- Reduce waste, increase reuse and recycling through Perth Airport's operations and to manage the remainder in the most sustainable way.
- Develop a Waste Management Plan to drive improvement in the waste management practices across operations and projects and to promote improvement in tenant practices.
- Decrease waste generation and increase efficiency in waste stream processing across the estate.

9.11.2 Overview

The Perth Airport estate produces waste from everyday operations. A wide range of waste types are generated by various businesses and tenants on the estate. Perth Airport is responsible for waste generated from Perth Airport owned and operated buildings and from estate management.

The majority of this waste ends up in landfill. Ambitious waste management targets have been proposed by the State Government in the Waste Strategy 2030 for Western Australia (in draft as at March 2019), including reducing waste by 20 per cent by 2030, and increasing material recovery to 70 per cent by 2025 and 75 per cent by 2030. Implementation of improved waste management at Perth Airport, to support the State Government's proposed strategy, will provide positive environmental outcomes.

9.11.3 Potential Impacts - Development and Operations

Development and related activities have the potential to increase the amount of waste generated across the estate. The anticipated increase would be related to increased passenger numbers and aircraft movements, increased construction activities and the associated waste products due to these increases. Disposal of waste is a material cost in the operation of the airport. Reducing use and adopting waste reduction initiatives present a cost-reduction opportunity for Perth Airport. Additionally, waste generation and disposal have indirect links to climate change such as increased methane and landfill by-products, and increased emissions from manufacturing.

9.11.4 Current Management

Perth Airport's management of waste is achieved through plans, strategies and initiatives including:

Waste Management Review

During FY2017/18 an external review of the waste management system was completed for Perth Airport's operations, with a primary focus on the domestic and international terminals. The review indicated a number of areas where improved waste management practices were required, along with additional data collection and planning requirements. The outcomes of the review provide the basis for team planning and operational review.

Recycling

Recycling is undertaken in airport terminals as well as in Perth Airport office buildings. Materials recycled include cardboard, paper, glass, aluminium and plastic drink containers (comingled waste). In addition to recycling of general waste, Perth Airport also reuses road and other construction related materials for pavements and other airfield and estate purposes.

Surveillance

Bins on the estate are under surveillance to discourage unauthorised disposal of materials.

9.11.5 Recent Achievements

The waste management initiatives that were achieved over the period of the Environment Strategy 2015-2019 include:

- investigation of technologies and behaviour change strategies to reduce paper use by Perth Airport, with grey-scale and double-side defaults and 'follow me' printing functionality implemented in 2015,
- in 2016, waste management was included as a requirement for tenants and contractors to address in construction and operational Environment Management Plans,
- improved waste sorting and increased waste recovery and diversion of waste from landfill, facilitated by a new Cleanaway offsite recycling facility opened in 2017,
- completion of a waste systems review in 2018, to identify current waste management and existing waste management contracts,
- launch of the Perth Airport Sustainability Strategy in 2018, with Perth Airport committing to the development of a Waste Management Plan to drive improvement in waste management practices,
- regular discussions with airport tenants about waste reduction opportunities through the quarterly Airport Consultative Environmental and Sustainability (ACES) group forums and the tenant environmental audit programme, and
- waste reduction and recycling measures implemented and promoted across the airport estate, including the increased use of recyclable coffee cups in food and beverage outlets and voluntary implementation of the single-use plastic bag ban by the majority of retail tenants.

9.11.6 Five Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for waste management are:

Initiatives

- | | |
|---|------------------------------------------------------------------------------------------|
| 1 | Develop and publish construction and demolition waste reduction targets |
| 2 | Undertake a feasibility study for a container deposit scheme to align with State targets |

9.12 Air Quality Management

9.12.1 Objective

- Manage non-aviation air emissions across the Perth Airport estate consistent with relevant legislative requirements.

9.12.2 Overview

Air quality encompasses dust, particulates, odour and gaseous emissions. Aircraft emissions are governed by the Air Navigation (Aircraft Engine Emissions) Regulations and are the responsibility of the aircraft operators. As such, they are not covered within the scope of this Environment Strategy. Air quality on the estate is assessed against the AEP Regulations.

Perth Airport is required to report emissions from operational activities and energy use as part of the National Pollutant Inventory (NPI). Emissions calculated under the NPI are compared to the closest local monitoring station. This station is operated by the State Department of Water and Environmental Regulation and is situated in Caversham, approximately ten kilometres from Perth Airport.

The Caversham station has been verified as a relevant and appropriate real-time monitoring location for Perth Airport. A number of National Environment Protection Measures (NEPMs), produced by the National Environment Protection Council (NEPC), are directly relevant to Perth Airport. Perth Airport's activities are currently below the reporting threshold for the National Greenhouse and Energy Reporting System (NGERS).

Additionally, State regulations and best practice guidelines are used as a tool to monitor and manage air emissions. Perth Airport recognises that the ground-based activities undertaken on the airport estate, including those of tenants, have the potential to impact air quality. Sources of emissions and air quality impacts from Perth Airport and tenant ground-based activities include dust generation, odour and point source emissions.

9.12.3 Potential Impacts - Development

Air quality has the potential to be impacted by various stages of development on the estate. Increased use of construction equipment can affect the local air quality through direct emissions from machinery, as well as a potential increase in dust emissions from vegetation clearing and soil disturbance. Increases in vehicle movements on the estate will also result in an increase of combustion emissions.

9.12.4 Potential Impacts - Operations

Airport estate operations have the potential to impact air quality. This may be through dust generation or odour emissions above levels associated with standard operations. Aircraft painting activities and fire-fighting training exercises also have the potential to affect local air quality through release of fumes and smoke. Storage and handling of fuels have the potential to impact air quality. There are also emissions to air from spillages of aviation fuel, which also have the potential to emit odour-causing vapours.

9.12.5 Current Management

Air emissions from non-aeronautical activities at Perth Airport are monitored through the AEP Regulations and other Commonwealth Government mechanisms, such as Ministerial conditions to an MDP. Perth Airport undertakes a risk assessment of impacts to local air quality from all proposed developments. Prior to construction activities, the potential for dust, other air and environmental emissions is considered in the risk assessment process. Measures to minimise the potential for dust and contingencies are outlined in a construction EMP and then implemented during construction activities.

The estate also contains industry types that have the potential to impact air quality. These industries are required to monitor air quality, with some having continuous monitoring in place to detect any potential exceedances that may need to be investigated and rectified. This management of tenant emissions is addressed through operational EMPs. Tenant air quality monitoring data is also reviewed for compliance with the AEP Regulations and commitments within EMPs and/or MDP conditions. If exceedances of the AEP Regulations occur from tenant activities, Perth Airport will work with the tenants and Department of Infrastructure, Transport, Regional Development and Communications to ensure appropriate corrective actions are implemented.

9.12.6 Recent Achievements

Over the period of the Environment Strategy 2015-2019, a range of commitments were met including:

- through the Perth Airport development application and consent process (detailed in Section 11), new development and project proposals are assessed to ensure any significant new emission source complies with the AEPR and relevant Western Australian air quality guidelines,
- Perth Airport completes annual emission reporting to the National Pollutant Inventory (NPI), and since 2016, the National Greenhouse and Energy Reporting Scheme (NGERS),
- through working with a key tenant on air quality monitoring results, improvements to the tenant's emissions control equipment were implemented in 2017, and
- in 2017, air quality, odour and greenhouse gas assessments were completed for current (2016) operations, and forecast for 2025 without the new runway, 2025 with the new runway (subject to approval), and at 2045. Findings of the assessments, and identified mitigation measures, were published in the Preliminary Draft Major Development Plan for the New Runway Project.

9.12.7 Five Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for air quality management are:

Initiatives

- 1 Install short-term air quality monitor(s), or conduct monitoring as required to evaluate the current baseline and update air quality model/s
- 2 Create inventory of ozone-depleting substances used by Perth Airport and phase out substances with high ozone depletion and global warming potential

9.13 Ground-based Noise Management

9.13.1 Objective

- Manage and minimise noise levels associated with ground-based airport operations and development.

9.13.2 Overview

Perth Airport recognises the importance of appropriate ground-based noise management. Aircraft noise during flight, including take-off and landing, is managed directly by the Department of Infrastructure, Transport, Regional Development and Communications through the *Air Navigation Act 1920* (Cth) and *Air Navigation (Aircraft Noise) Regulations 1984* (Cth) and is outside the scope of this Environment Strategy.

Perth Airport recognises that aircraft noise is an important issue for the community. Perth Airport works closely with Airservices Australia, airline partners, and Commonwealth, State and Local Governments to manage the impacts of aircraft noise on the community. Aircraft noise management is detailed in Section 7.

This Environment Strategy addresses ground-based noise impacts (that is, noise not generated by aircraft during flight, take-off and landing) which are managed at federally leased airports through the *Airports Act* and the *AEP Regulations*. The *AEP Regulations* include a general duty to prevent offensive noise. Where prevention is not practical, the duty to minimise the generation of offensive noise applies.

Schedule 4 of the *AEP Regulations* provides Excessive Noise Guidelines which establish a set of indicators to determine if noise is excessive and provides guidance for consideration of sensitive and commercial receptors. Perth Airport considers *Environmental Protection (Noise) Regulations 1997 (WA)* for development related projects that have the potential to impact sensitive receptors.

9.13.3 Potential Impacts

The following impacts have been identified, including risks and influences, relevant to ground-based noise during the period of this Environment Strategy.

Aviation and non-aviation operation sources of ground-based noise that may be experienced include:

- ground-based aviation noise:
 - aircraft ground-running,
 - maintenance on engines, including ground testing,
 - movement of passengers and goods on/off aircraft,
 - aircraft refuelling and operational activities, and
 - operation of aircraft auxiliary power units.
- ground-based non-aviation noise:
 - road traffic,
 - construction and demolition activities, and
 - tenant plant and operational activities.

9.13.4 Current Management

Noise arising from engine ground-running is managed through an Engine Ground Run Management Plan. Constraints on conducting engine ground-running above idle are implemented by Perth Airport including time of day, power setting and location. Aircraft operators must seek approval from Perth Airport if a proposed engine run cannot be conducted in accordance with the defined constraints.

Construction EMPs address noise pollution caused by construction activities and are a key control for noise exposure during development at Perth Airport. Operational activities of tenants which pose a risk of emitting offensive noise are required to incorporate noise minimisation strategies in the operational EMPs. Where considered necessary, noise modelling is undertaken to assess potential noise impacts. Monitoring of ground-based noise is not conducted routinely by Perth Airport, however monitoring may be conducted in association with commitments made through EMPs and MDPs.

9.13.5 Recent Achievements

Over the period of the Environment Strategy 2015-2019, the following commitments were met:

- annual examination of noise complaints, to determine patterns on surrounding communities and consider the impact of meteorological weather conditions on ground run noise events,
- in 2018, the Engine Ground Running (EGR) Management Plan was amended to introduce restrictions on ground runs between 11:00pm and 5:30am, with dispensations only granted in exceptional circumstances,
- ground-based noise modelling was undertaken, for the first time, in 2017. To establish a baseline, real-time noise loggers were placed at six residences around the airport estate. Forecasts were published in the Preliminary Draft Major Development Plan for the New Runway Projects for both typical and worst-case meteorological conditions for 2016, 2025 without the new runway, 2025 with the new runway, and 2045.

9.13.6 Five Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for ground-based noise management are:

Initiative	
1	Undertake further short-term monitoring of ground-based noise exposure and identify opportunities for improvement

9.14 Contamination and Hazardous Material Management

9.14.1 Objectives

- Implement best practice environmental controls for the prevention and management of spills and release of hazardous materials.
- Prevent contamination of soil within the estate.
- Manage and investigate known or potentially contaminated sites in accordance with relevant legislation.

9.14.2 Overview

Perth Airport estate operations require the storage, handling and use of various hazardous materials and chemicals. The most significant hazardous material used on the estate is aviation fuel. There are two main fuel distribution depots on the estate:

- the Joint Operations Supply Facility (JOSF), located in the Airport West Precinct (in proximity to Terminal 3 and Terminal 4 and the General Aviation Area), and
- the Joint User Hydrant Installation (JUHI), which is located in Airport Central (in proximity to Terminal 1 and Terminal 2).
- Other activities involving the use of hazardous materials include:
 - maintenance facilities operated by airport tenants,
 - material used for fire-fighting,
 - construction and related activities, and
 - the storage and use of fuels and oils (other than aviation fuel), solvents, paints, pesticides and herbicides.

Asbestos has also been identified on the estate, an asbestos register is maintained to manage the risk of exposure and guide remedial activities. Incorrect use, handling, or transport of hazardous materials and chemicals can impact the environment and human health. Regulatory tools, such as the AEP Regulations, *Dangerous Goods Safety Act 2004* (Cth) (DG Act) and other requirements, are in place to assist with the management of hazardous materials and other chemicals.

9.14.3 Potential Impacts

Spills of hazardous materials have the potential to impact adversely on the environment if not captured and managed appropriately. They can impact the receiving environment via:

- soil,
- surface and groundwater,
- vegetation and flora,
- fauna, and
- human health.

9.14.4 Current Management

Management measures currently in place for hazardous material use, storage and transport on the estate are described below.

Prior to the approval of development activities on the estate, assessments are undertaken on the historical use of the area to determine if hazardous materials have the potential to remain on the site. This assessment is then used to ensure appropriate management of the site during development activities which may include remediation or ongoing monitoring. A site asbestos register is maintained by Perth Airport for the management of asbestos within buildings. During construction activities, measures are put in place to ensure any asbestos contaminated soil and materials are handled, managed and disposed of appropriately, in accordance with regulations and best practice guidance.

Responsibility for prevention of spills on the estate during fuel transportation (pipes) and refuelling of aircraft lies with the refuelling companies and the airlines. In the event of a spill, Perth Airport implements spill management procedures. Management of spills on tenants' premises are the responsibility of tenants, however Perth Airport provides advice and assistance to tenants, and ensures appropriate management and remedial action is undertaken.

9.14.5 Per- and Poly-Fluoro Alkyl Substances (PFAS) Management

Perth Airport is committed to the appropriate assessment, management and remediation of PFAS on the estate to ensure the safety of our people and communities and protection of the environment. PFAS management on the airport estate will be informed by a detailed site investigation to be completed in late 2019. It is recognised that PFAS needs to be managed in a variety of ways defined within a whole of estate PFAS Management Plan, with site appropriate actions implemented on a project by project basis.

Perth Airport recognises consideration of holistic and multi-disciplinary approaches to achieve its PFAS management objective. This PFAS Management Strategy is represented in Figure 9-13 and outlines key areas of focus which will be addressed to meet the overall objective including:

- governance,
- evaluation and monitoring,
- risk management,
- management and remediation,
- stakeholder communication and engagement, and
- innovation and research.

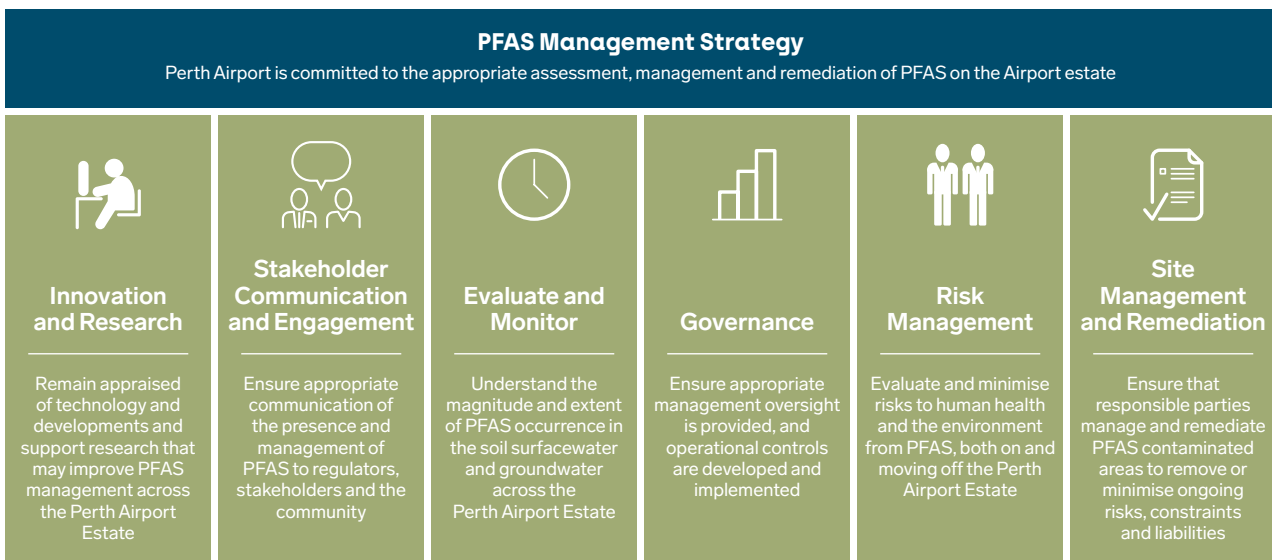


Figure 9-13 Perth Airport PFAS Management Strategy
Source: Perth Airport

9.14.6 Recent Achievements

Over the period of the previous Environment Strategy 2015-2019 a range of commitments were achieved, including:

- since 2015, PFAS assessments through groundwater and surface water monitoring have been reported quarterly to Department of Infrastructure, Transport, Regional Development and Communications, in line with PFAS National Environmental Management Plan (published January 2018) (and the prior PFC Guideline for Environmental Management GEM-002),
- an audit of underground and above ground fuel storage tanks was completed in 2016 for Perth Airport and key tenant buildings and facilities, to clarify potentially hazardous material activities across the estate,
- a review of dangerous goods storage and the use of PFAS in fire suppressant systems was undertaken across the estate in 2017 to inform a risk assessment and management plans for potential contaminating activities,
- in 2017, Perth Airport developed a PFAS Management Strategy to guide and inform the airport's approach to PFAS governance, evaluation and monitoring, risk management, remediation, stakeholder communication and engagement, and innovation and research,
- PFAS intervention trials were undertaken in the Northern Main Drain, with a passive in-stream granular activated carbon (GAC) trial in 2017, and active pump and GAC treatment trial in 2018,
- an on-site spill response contractor was engaged by Perth Airport in 2018 to improve response to airside and landside spills, and
- management by Airservices Australia of areas impacted by the historic use of aqueous film forming foams by Aviation Rescue and Fire Fighting Services has progressed, with Airservices completing a preliminary site investigation (released in 2019).

9.14.7 Five Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for contamination and hazardous material management are:

Initiatives

1	Engage with regulators and Airservices Australia to determine appropriate remedial options for PFAS within the estate
2	Develop a PFAS Management Plan for the Perth Airport estate
3	Undertake an audit of dangerous goods storage across the estate

9.15 Aboriginal Heritage and Engagement

9.15.1 Objectives

- Proactively engage with members of the Aboriginal community to promote cultural awareness within Perth Airport estate and users of Perth Airport.
- In consultation with members of the Aboriginal community, identify and implement initiatives that promote Aboriginal culture and reconciliation.
- Manage listed Aboriginal sites in a culturally sensitive manner and in accordance with relevant legislation.

9.15.2 Overview

The land on which Perth Airport is located forms part of the traditional network of communication routes, meeting places and camping sites of the Noongar people. As the Traditional Custodians of the land, the Noongar people maintain a strong interest in the airport land and its management.

A number of archaeological and ethnographic sites have been identified within the airport estate. These sites are registered on the State Department of Planning, Lands and Heritage (DPLH) Register of Aboriginal Sites, as shown in Figure 9-14. The Western Australian *Aboriginal Heritage Act 1972* (AH Act) provides for the preservation, on behalf of the community, of places and objects customarily used by the original inhabitants of Australia or their descendants. All Aboriginal heritage sites that meet the definition of Section 5 of the AH Act are protected, whether or not they are included in the Register of Aboriginal Sites.

The strong connection between members of the Aboriginal community and the land on which Perth Airport is situated is recognised in a Partnership Agreement reached in 2009 between Perth Airport, Traditional Custodians of the land and other Aboriginal Elders. The agreement was made in a spirit of cooperation and commitment to fostering cultural heritage as the development of Perth Airport proceeds. Signatories to the Agreement meet regularly to discuss airport planning, cultural awareness activities, sponsorship opportunities and cultural history.

9.15.3 Governance

Generally, Australia's State and Territory Governments are responsible for the protection of Aboriginal heritage places and objects. The AH Act is the key State legislation applicable to Aboriginal heritage in Western Australia.

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* can protect areas and objects that are of particular significance to Aboriginal people. This Act enables the Commonwealth to respond to requests to protect areas and objects that are under threat, if it appears State laws have not provided effective protection.

Changes to State and Commonwealth legislation, policy and approaches to managing Aboriginal heritage have the potential to both positively and/or negatively impact how Perth Airport is required to, or is able to, engage with members of the Aboriginal community on matters of Aboriginal heritage.

9.15.4 Potential Impacts

Developments on the Perth Airport estate have the potential to impact Aboriginal heritage and engagement, such as:

- an increase in ground disturbing activity that may either directly or indirectly impact on known and unknown sites, and
- altering natural values with the removal or disturbance of wetlands and vegetation that may impact the Aboriginal community's connection to the land.

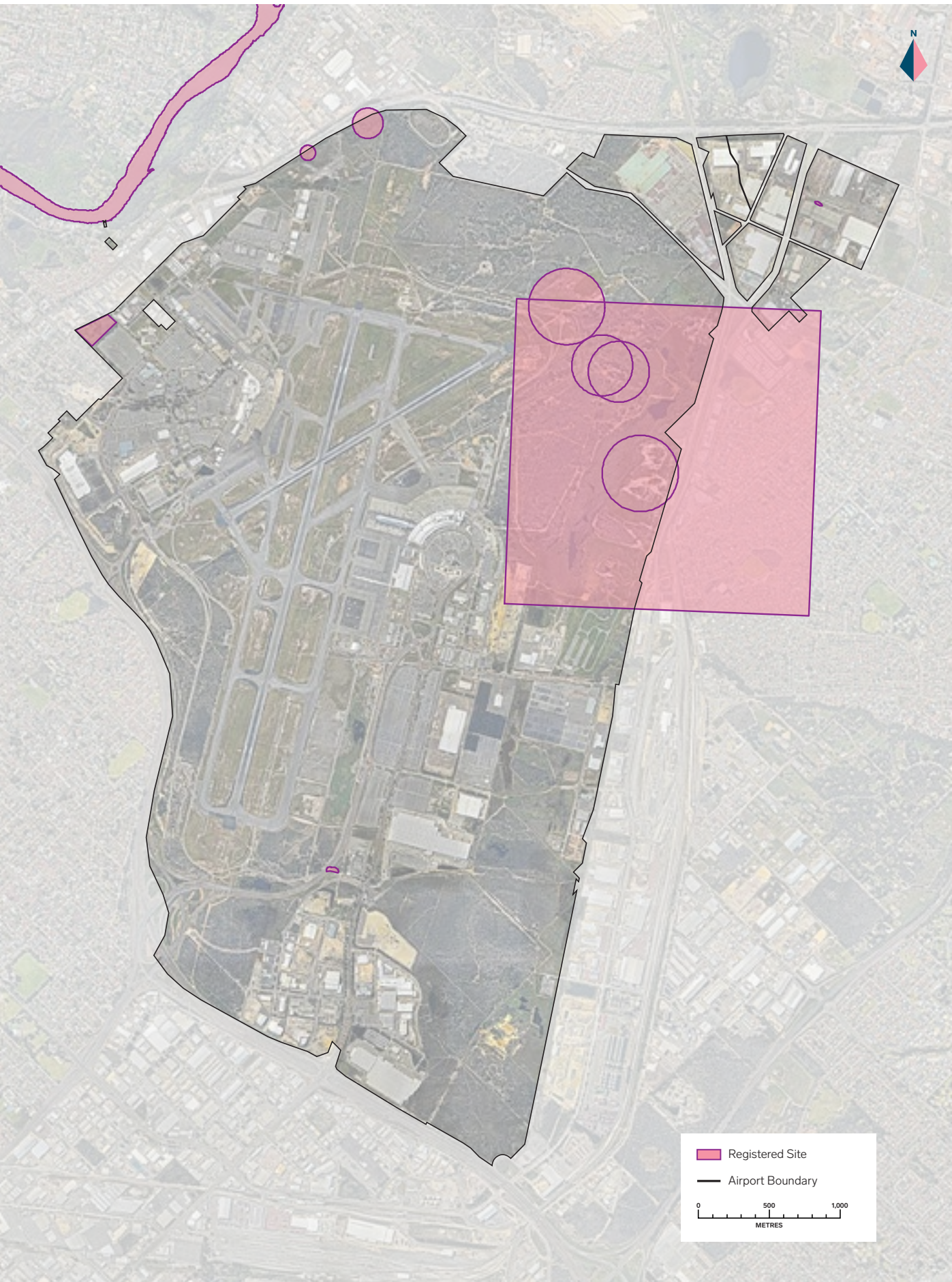


Figure 9-14 Registered Aboriginal Sites
Source: Department of Planning, Lands and Heritage 2019

9.15.5 Current Management

Perth Airport's Heritage Management Framework, which guides the management of Aboriginal cultural heritage within the estate, is underpinned by a Heritage and Engagement Policy and a Cultural Heritage Management Plan.

The Perth Airport Heritage and Engagement Policy is focused on identifying opportunities and developing a sense of place that recognises the Noongar people as the Traditional Custodians of the land on which Perth Airport is located. Future projects will identify and implement initiatives that focus on creating an environment that acknowledges and celebrates Aboriginal culture while enriching passenger experience.

In 2009, Perth Airport entered into a Partnership Agreement with Traditional Custodians and other Aboriginal Elders who have a longstanding association with the airport estate. The Agreement was signed by seven Noongar families (represented on Perth Airport's Partnership Agreement Group (PAG) and recognises the willingness of the signatories to engage in good faith for the ongoing development of the airport and Aboriginal heritage. Through the Partnership Agreement, Perth Airport has committed to a range of initiatives to recognise and promote cultural heritage on the estate, including:

- establish and facilitate a high-level Aboriginal heritage steering group to facilitate ongoing communication, with meetings held at least three times per year,
- include the Traditional Custodians and other Aboriginal Elders in the land use planning process as part of the regular steering group,
- implement an annual schedule of events to celebrate and enhance awareness of Aboriginal heritage and culture at Perth Airport,
- continue to undertake activities in a manner that complies with the AH Act, including consultations where required,
- continue to have Munday Swamp available for cultural activities,
- sponsor projects to benefit the local Aboriginal community,
- employ members of the Aboriginal community in cultural heritage awareness and land management planning activities, and
- annually, provide two three-year scholarships for Aboriginal students undertaking university study.

Through consultation with PAG and other cultural knowledge holders, Perth Airport is currently developing a cultural narrative and engagement framework that is modelled on the leading work completed by the WA Government and the Metropolitan Redevelopment Authority. The framework promotes the integration of a heritage narrative into the development of projects. A key project currently being considered is a cultural audio soundscape being designed for the Forrestfield-Airport Link 'Skybridge' pedestrian walkway linking the Airport Central rail station to Terminal 1, to be completed in 2020.

The Cultural Heritage Management Plan provides a strategy to protect and manage Aboriginal and State cultural heritage on the Perth Airport estate. The Plan aims to:

- ensure compliance with relevant State and Commonwealth heritage and Aboriginal heritage legislation, policy and guidelines,
- outline measures to be taken before, during and after an activity in order to protect Aboriginal cultural heritage in an activity area,
- acknowledge and respect the connection Traditional Custodians have to the land and waters on which Perth Airport operates,
- identify opportunities to meaningfully engage with Traditional Custodians,
- strengthen the relationships with the local Noongar community, and
- promote and recognise heritage across the Perth Airport estate.

Heritage assessments and consultation with the PAG and other cultural knowledge holders ensure that potential impacts to Aboriginal heritage values from development and ongoing operation of the airport are considered, managed and mitigated where possible. The results obtained from consultations, heritage assessments and subsequent archaeological and ethnographic investigations continue to be used by Perth Airport to inform the short and long-term planning, operation and development of the estate.

9.15.6 Recent Achievements

Over the period of the Environment Strategy 2014-2019, a range of heritage management and engagement commitments were achieved, including:

- the Aboriginal Heritage Framework, which guides the management of Aboriginal cultural heritage within the estate, was updated in 2016. The revised Framework has been developed in accordance with the Aboriginal Heritage Due Diligence Guidelines published by the State Government,
- outcomes from the Aboriginal Oral History Project, which recorded historical stories from Aboriginal persons who lived in the vicinity of the airport estate, have been incorporated into project design elements. A key initiative has been the installation of a Welcome to Country message, in Noongar and English, in the T1 International arrivals concourse and in the T4 arrivals area in 2019,
- key Perth Airport staff completed cultural awareness training in 2018,
- a heritage consultant was engaged in 2018 to identify options to archive and house artefacts recovered from heritage sites on the estate, and
- following the establishment of a dedicated Procurement Team in 2017, Perth Airport identified voluntary tender selection criteria and the use of special measures as sensible procurement practice likely to influence the increased engagement of Aboriginal people within the supply chain.

9.15.7 Five Year Action Program

Initiatives to be undertaken between 2020 and 2024 as part of Perth Airport's five-year action program for heritage management and engagement are:

Initiatives

1	In consultation with Traditional Custodians, install a Welcome to Country message in Noongar and English in all terminals
2	In consultation with Traditional Custodians, develop a list of culturally appropriate Noongar words for the naming of new roads within the estate
3	In consultation with Traditional Custodians, develop and implement a Heritage Site Land Management Plan for heritage sites within the estate
4	Engage Aboriginal businesses and/or groups to undertake land management works at Kwenda Malark, Redcliffe Wetlands and/or Munday Swamp
5	In consultation with Traditional Custodians, complete the concept design for an interpretive walking trail linking Munday Swamp to the Swan River
6	Implement cultural awareness training for all Perth Airport employees
7	Develop and implement a Reconciliation Action Plan
8	Conduct a historical heritage assessment of the estate

9.16 Five Year Environment Strategy and Heritage Management and Engagement Implementation Plan

The following implementation plan brings together the individual initiatives outlined in previous sections, with the nomination of completion timeframes for each initiative.

	Completion Timeframe
Environmental Management Initiative	
1 Certify the Environmental Management System to ISO 14001	2023
2 Engage with tenants and airport operators to promote and improve sustainability performance across the estate	Ongoing
3 Develop and publish an annual report on sustainability performance	2021 onwards
4 Develop and publish a sustainable procurement policy to guide Perth Airport purchasing and contracting	2020
5 Review and update the Precinct Development Guidelines to incorporate: <ul style="list-style-type: none"> • water, waste, carbon and energy objectives, • biodiversity and land management guidance, and • environmental, social and governance. 	2021
Soil Management Initiative	
1 Undertake further dieback assessment	2024
Groundwater and Surface Water Management Initiative	
1 Develop and implement a Groundwater Extraction Management Plan (including surface water where appropriate) for monitoring and management of Perth Airport and tenant groundwater extraction	2020
2 Undertake monitoring of macroinvertebrates in natural water bodies to coincide with international terminal upgrades, new terminal and/or New Runway Project	2023
3 Incorporate water sensitive urban design principles in Design Guidelines for on estate developments	2024
Biodiversity Management Initiative	
1 Develop and implement a Land and Biodiversity Management Plan, including weed, pest and dieback	2022
2 Develop and implement a Conservation Significant Flora and Vegetation Management Plan	Develop 2021 Implement 2023
Carbon and Energy Management Initiative	
1 Undertake an energy efficiency audit for all Perth Airport buildings	2020
2 Implement carbon reduction target of 15 per cent for Perth Airport activities	2023
3 Install Ground Power Units for the new terminal and international terminal upgrades, subject to airline partner agreement	2023
4 Investigate opportunities to offset PAPL Scope 1 greenhouse gas emissions and staff air travel emissions	2020
Water Management	
1 Develop targets and implement measures where feasible to reduce total potable water use in Perth Airport buildings and terminals	2020-2024
2 Conduct a water use audit of the Perth Airport estate	2020
3 Investigate the use of alternative water sources for irrigation and dual reticulation for key development projects	2020-2024
4 Engage with the top 10 water users on the estate to develop and implement individual water efficiency plans	2022
Waste Management Initiative	
1 Develop and publish construction and demolition waste reduction targets	2021
2 Undertake a feasibility study for a container deposit scheme to align with State targets	2020

Air Quality Management Initiative		
1	Install short-term air quality monitor(s), or conduct monitoring as required to evaluate the current baseline and update air quality model/s	2020
2	Create inventory of ozone-depleting substances used by Perth Airport and phase out substances with high ozone depletion and global warming potential	2023
Ground-based Noise Management Initiative		
1	Undertake further short-term monitoring of ground-based noise exposure and identify opportunities for improvement	2021
Contamination and Hazardous Material Management Initiative		
1	Engage with regulators and Airservices Australia to determine appropriate remedial options for PFAS within the estate	2021
2	Develop a PFAS Management Plan for the Perth Airport estate	2020
3	Undertake an audit of dangerous goods storage across the estate	2024
Aboriginal Heritage and Engagement Initiative		
1	In consultation with Traditional Custodians, install a Welcome to Country message in Noongar and English in all terminals	2020-2024
2	In consultation with Traditional Custodians, develop a list of culturally appropriate Noongar words for the naming of new roads within the estate	2020
3	In consultation with Traditional Custodians, develop and implement a Heritage Site Land Management Plan for heritage sites within the estate	2021
4	Engage Aboriginal businesses and/or groups to undertake land management works at Kwenda Malark, Redcliffe Wetlands and/or Munday Swamp	2020-2024
5	In consultation with Traditional Custodians, complete the concept design for an interpretive walking trail linking Munday Swamp to the Swan River	2022
6	Implement cultural awareness training for all Perth Airport employees	2020 and ongoing
7	Develop and implement a Reconciliation Action Plan	2020
8	Conduct a historical heritage assessment of the estate	2020







Section 10: **Consultation**

Perth Airport's relationship with the Western Australian community is an essential part of company values and plays a key role in the continued transformation of Perth Airport.



10.1 Introduction

Safe, reliable, convenient and affordable air services are vital to the economic, cultural and social development of Western Australia.

Perth Airport, as a 24 hour a day, seven day a week operation, plays a critical role in the provision of air services upon which all Western Australians depend and is arguably one of the most important elements of public infrastructure in the State.

The location of Perth Airport within the Perth Metropolitan Area – just a 40-minute drive from most of the city’s population – is a convenient one. However, it also presents challenges to ensure that the airport is able to continue to grow to meet community needs while, at the same time, it doesn’t inappropriately impact the living standards of those who live near the airport.

Integrating the complex processes of airport and urban planning are vital. Perth Airport therefore devotes significant resources to both airport planning and liaising with State and Local Government authorities, which have broader urban/town planning responsibilities.

One of the objectives of the *Commonwealth Airports Act 1996* (Airports Act) is to ensure there is an appropriate level of vigilance, transparency and scrutiny of airport planning, so that reasonable public interest requirements are met as the airport’s development progresses.

Successful development of Perth Airport therefore depends on productive interactions with a wide range of stakeholders who are impacted by and who may impact the development of the airport.

In October 2012, the Department of Infrastructure and Transport released the ‘Airport Development Consultation Guidelines’ to provide guidance for consultation to be undertaken as part of the master plan process. According to these guidelines, an effective consultation program ensures that a “proposal has been fully explored, concerns identified and alternatives considered”. However, it “does not necessarily mean that all interested parties will be satisfied with the outcome”.

Further, the guidelines note that the goals of a consultation strategy include the following components:

- information – to inform stakeholders about on-airport land use, planning and developments; get input on alternative approaches and options; who will be responsible for making decisions; and what the airport-lessee company has done, is doing and plans to do,
- airport-lessee company – to build and maintain transparent and stakeholder-focused relationships,
- legal – to meet the airport-lessee company’s legal and regulatory obligations, and
- process – to provide stakeholders with the opportunity to influence the views of key decision makers.

10.2 Stakeholder Consultation

Perth Airport is committed to effective and transparent engagement and employs a range of ongoing consultation and education mechanisms to:

- inform stakeholders and the community about on-airport land use planning, developments and potential impacts,
- seek input on alternative approaches and options,
- maintain transparency, accountability and stakeholder-focused relationships,
- provide feedback opportunities and one-on-one information sessions,
- provide a conduit for information exchange between Perth Airport and key stakeholders, including the community,
- meet legal and regulatory responsibilities, and
- provide stakeholders with the opportunity to influence the future of Perth Airport.

Part of Perth Airport’s ongoing consultation process with stakeholders includes the airport’s facilitation of, and involvement in, various forums. These forums enable Perth Airport to engage with Commonwealth, State and Local Government authorities, airlines and the community.

Perth Airport currently engages regularly through the following forums.

Perth Airport Planning Coordination Forum

The Perth Airport Planning Coordination Forum (PCF) aims to foster high level strategic discussions between Perth Airport and Commonwealth, State and Local Government representatives to inform and promote better planning outcomes in relation to airport developments in the context of the broader urban setting. PCF representatives include Airservices Australia, WA Department of Planning, Lands and Heritage, WA Department of Transport, Main Roads WA, Public Transport Authority, City of Belmont, City of Swan, City of Kalamunda, Chamber of Minerals and Energy and, the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications.

Currently the PCF is held quarterly and the input of the PCF remains central to the development of each master plan.

Perth Airports Municipalities Group

Perth Airport actively participates in the Perth Airport Municipalities Group (PAMG) which includes 12 Local Government authorities whose communities have an interest in Perth and Jandakot Airports (Local Government Authorities of Armadale, Bassendean, Bayswater, Belmont, Canning, Cockburn, Gosnells, Kalamunda, Melville, Mundaring, South Perth and Swan). The Group meets quarterly to discuss matters which are of interest to the community such as aircraft noise, flight paths, and off-airport and on-airport development. The PAMG has proven to be an important means of engagement with local communities for more than 30 years. Further information on the PAMG can be found at pamg.com.au.

Perth Airport Community Forum

The Perth Airport Community Forum (PACF), previously referred to as the Community Aviation Consultation Group, is an event held quarterly at various PAMG Local Government venues. The PACF provides the opportunity for members of the public to meet with representatives from Perth Airport and invited guests such as Airservices Australia and the Aircraft Noise Ombudsman.

The PACF provides members of the public with the opportunity to raise and discuss issues relating to the operation and development of the airport.

Its purpose is to recognise and enhance:

- the long-term sustainability and growth of Perth Airport,
- Perth Airport's reputation as a responsible corporate citizen within the local and broader community, and
- Perth Airport's role as a major economic contributor for Western Australia.

Notification of PACF events, including date, time and location, is generally advertised in the West Australian or community newspapers, through Perth Airport social media, and the PAMG website, pamg.com.au.

Perth Airport Aircraft Noise Technical Working Group

The Perth Airport Aircraft Noise Technical Working Group contributes to the successful management of aircraft noise impact at Perth Airport. The Group, chaired by Airservices Australia, meets on an as-required basis determined by Airservices Australia and comprises representatives from Perth Airport, Airservices, and airlines.

Perth Airport Consultative Environmental and Sustainability Group

The Airport Consultative Environmental and Sustainability Group (ACES) currently meets quarterly and is comprised of representatives from Commonwealth, State and Local Governments as well as airport tenants, conservation groups, catchment groups and community members. The Group discusses topics related to the environmental management of the estate. It is also an opportunity for tenants to learn and work together to minimise the environmental impacts of their operations and to facilitate improved environmental outcomes.

Aboriginal Partnership Agreement Group

The Perth Airport Aboriginal Partnership Agreement Group (PAG) was established in 2009 to facilitate active engagement between Perth Airport and the Traditional Custodians. The PAG is a high-level steering group focussed on the cultural heritage management and ongoing development of the airport.

Stakeholder Consultation Review and Assessment

Perth Airport undertakes ongoing review and assessment of each of the above groups to ensure their effectiveness and suitability to meet the engagement needs and requirements as defined by the Commonwealth Airport Development Consultation Guidelines. As such, the structure, composition and terms of reference for the above groups may be varied from time to time to ensure the best model to achieve the required outcomes.

10.3 Master Plan 2020 Consultation

Figure 10-1 shows the four key stages to the development of an airport's master plan.

During the development of this Master Plan 2020 and the current public consultation, Perth Airport undertook and continues to undertake extensive liaison with Commonwealth, State and Local Government departments and community groups as shown in Table 10-1.

5 Year Master Plan Process

Stakeholder	Development	Formal Consultation (Preliminary Draft)	Implementation	Outcome
Community	<ul style="list-style-type: none"> Stakeholder workshop Perth Airport Community Forum (PACF) 	<ul style="list-style-type: none"> Public notice and comment period Community Information sessions PACF 	Ongoing process of engagement and review through various mechanisms including direct briefing, public notice or formal groups.	A process which provides ongoing and detailed opportunity for input and engagement across all sectors to influence the development of the Master Plan within a transparent and collaborative framework.
Aboriginal representatives	<ul style="list-style-type: none"> Partnership Agreement Group (PAG) Direct briefing and engagement 	<ul style="list-style-type: none"> Public notice and comment period PAG Direct briefing and engagement 	All major developments will require relevant approvals under Commonwealth and State legislation and, where required, formal engagement and public notification will be undertaken.	Key stakeholders and community are aware and informed of the timing and impacts of Perth Airport's operations and development.
Environmental groups	<ul style="list-style-type: none"> Consultative Environmental and Sustainability Group (ACES) Stakeholder workshops 	<ul style="list-style-type: none"> Public notice and comment period 		
General industry	<ul style="list-style-type: none"> Planning Coordination Forum (PCF) Industry Briefings Direct briefings and engagement 	<ul style="list-style-type: none"> Public notice and comment period 		
Aviation sector	<ul style="list-style-type: none"> PACF Direct briefings and engagement 	<ul style="list-style-type: none"> Public notice and comment period 		
Local Government	<ul style="list-style-type: none"> PCF PACF Perth Airports Municipalities Group (PAMG) Stakeholder workshops Officer briefings 	<ul style="list-style-type: none"> Public notice and comment period Elected Council briefing PCF 		
State Government	<ul style="list-style-type: none"> PCF PACF ACES Stakeholder workshops Officer briefings 	<ul style="list-style-type: none"> Public notice and comment period Direct briefings when requested PCF 		
Commonwealth Government	<ul style="list-style-type: none"> PCF PACF ACES Stakeholder workshops Officer briefings 	<ul style="list-style-type: none"> Public notice and comment period PCF 		
Members of Parliament (Commonwealth and State)	<ul style="list-style-type: none"> PACF Stakeholder workshops 	<ul style="list-style-type: none"> Public notice and comment period Direct briefing when requested 		

Table 10-1 Master Plan Engagement Process

10.3.1 Development of the Preliminary Draft Master Plan 2020

Consistent with the Airport Development Consultation Guidelines, Perth Airport undertook an extensive consultation process prior to the development of the Draft Master Plan 2020. This included the release, review and engagement on an Exposure Draft version with Stakeholders. Perth Airport undertook the following activities:

- briefings throughout all development phases of Master Plan 2020 to the:
 - Perth Airport Partnership Agreement Group,
 - Perth Airport Planning Coordination Forum, and
 - Perth Airports Municipalities Group,
- release of the Exposure Draft Master Plan 2020 and briefings to Commonwealth Government agencies, including:
 - Airservices Australia,
 - Civil Aviation Safety Authority,
 - Department of the Environment and Energy, and
 - Department of Infrastructure, Transport, Cities and Regional Development,
- release of the Exposure Draft Master Plan 2020 and briefings as requested to State Government agencies, including:
 - Department of Biodiversity, Conservation and Attractions,
 - Department of Water and Environmental Regulation,
 - Department of Planning, Lands and Heritage,
 - Department of Transport (Main Roads WA and Public Transport Authority)
 - Department of Premier and Cabinet,
 - Department of Jobs, Tourism, Science and Innovation
 - Department of Water and Environmental Regulation,
 - Environmental Protection Authority, and
 - Western Australia Planning Commission.
- release of the Exposure Draft Master Plan 2020 and briefings (where requested) to the City of Belmont, City of Swan and City of Kalamunda,
- release of the Exposure Draft Master Plan 2020 to key airlines and Board of Airline Representatives Australia, and
- stakeholder workshops which explored the various elements incorporated within the Exposure Draft Master Plan 2020.

Throughout this comprehensive consultative process, Perth Airport had due regard for feedback and where possible, addressed the initial concerns and issues raised by Stakeholders during the preparation of the Draft Master Plan 2020.

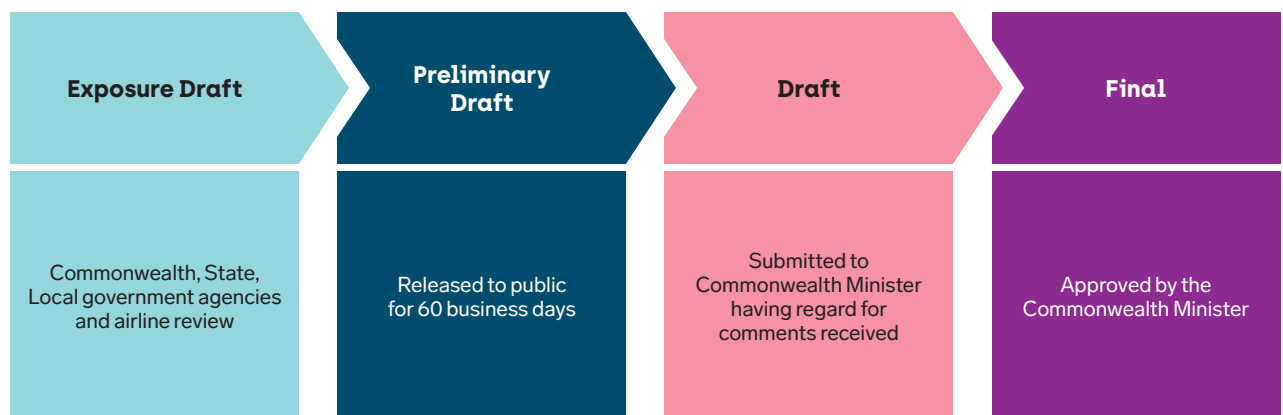


Figure 10-1 Master Plan Stages

Source: Perth Airport

10.3.2 Release of Preliminary Draft Master Plan 2020 for Public Comment

In accordance with Section 79 of the Airports Act, the Preliminary Draft Master Plan 2020 was available for public comment for a period of 60 business days.

Prior to the Preliminary Draft Master Plan 2020 being published for public comment, Section 80 of the Airports Act required Perth Airport to advise, in writing, the following persons of Perth Airport's intention to submit to the Minister the Preliminary Draft Master Plan:

- the Minister of the State in which the airport is situated with responsibility for town planning or use of land,
- the authority of that State with responsibility for town planning or use of land, and
- each Local Government body with responsibility for an area surrounding the airport.

A newspaper advertisement was published advising that the Preliminary Draft Master Plan 2020 was available for members of the public to provide written comments and advising how and where members of the public could obtain a copy of the document.

10.3.2.1 Obtaining a Copy

A copy of the Preliminary Draft Master Plan 2020 was available for download, free of charge, from perthairport.com.au/masterplan. Hard copies were available for viewing at: the Perth Airport Hkew Alpha building, Level 2, 2 George Wiencke Drive, Perth Airport, and at selected public libraries.

10.3.2.2 Engagement Materials and Activities

To ensure that the community had an opportunity to comment on the Preliminary Draft Master Plan 2020, public engagement included a range of activities and the production of additional material.

Advertisement

Announcements about the commencement of the public comment period were made in The West Australian newspaper.

Social Media

Announcements about key milestones, such as the commencement of the public comment period, and information about community briefings and public events were regularly undertaken through the Perth Airport Facebook and Twitter accounts.

Perth Airport website

The Perth Airport website, perthairport.com.au/masterplan, provided online copies of documentation including the Preliminary Draft Master Plan 2020 and supplementary information, community information events, and opening times of the Perth Airport Experience Centre.

Other Communication

Other communication platforms, such as Local Government websites, were used where possible.

Executive Summary & Fact Sheets

The executive summary booklet provided a high-level summary of the Preliminary Draft Master Plan 2020 document. Short form fact sheets provided additional information and context on a range of issues related to the Master Plan 2020. Copies of the executive summary booklet and various fact sheets were published at perthairport.com.au/masterplan, and were available for collection at the Perth Airport Experience Centre, at community information expos and at PCF.

Aircraft Noise Information Portal

Released in 2014, the interactive Aircraft Noise Information Portal enables the community to obtain specific information on a property's location around Perth Airport in relation to:

- anticipated changes associated with the future development of Perth Airport,
- the Australian Noise Exposure Forecast contours, and
- N65 Noise Above contours (refer Section 7 for further information).

The interactive noise portal was updated to include additional information about the future noise exposure modelling undertaken for Master Plan 2020 and could be accessed at perthairport.com.au/aircraftnoise.

The 'Perth Airport Aircraft Noise Management Summary' and 'Reducing Aircraft Noise in Existing Homes' booklets, which provide information on noise impacts relating to Perth Airport operations and associated flight paths, were also available for viewing and download from the noise portal site.

Airport Experience Centre

The Perth Airport Experience Centre located at Hkew Alpha Building, Ground Floor, 2 George Wiencke Drive, Perth Airport, was open at various times, including evenings and weekends, during the public comment period. Visitors had the opportunity to speak to Perth Airport staff at the Experience Centre (free parking was available).

The Perth Airport Experience Centre opening times were published on the Perth Airport website and through Perth Airport social media.

Community Information Expos

Community information expos were held in various Local Government areas, including:

- City of Belmont,
- City of Canning,
- City of Kalamunda,
- Shire of Mundaring, and
- City of Swan.

Notices regarding the times and locations of the information expos were published at perthairport.com.au/masterplan, in The West Australian and/or relevant community newspapers, and through Perth Airport social media.

The Perth Airport Community Forum held during the Master Plan 2020 public comment period was at the City of Armadale on Thursday, 29 August 2019.

10.3.3 Submissions Received During Public Comment Period

The Airports Act requires Perth Airport to have due regard for written comments received during the public comment period. Following closure of the comment period, a number of comments were received.

The key matters raised in these submissions included:

- Aircraft noise management and future operations,
- Environment Strategy and Biodiversity Management,
- Terminal developments and future consolidation,
- Land use and precinct planning, and
- Ground transport planning and infrastructure.

10.3.4 Submission to the Minister

Once all comments were received and reviewed, where possible, Perth Airport incorporated the concerns and issues raised into the Draft Master Plan 2020. Minor amendments and additions were made and the Draft Master Plan 2020 was presented to the Commonwealth Minister for Infrastructure, Transport and Regional Development for consideration on 20 December 2019.

The submission to the Minister was accompanied by the following material:

- copies of comments received during the public comment period,
- a written certificate signed on behalf of Perth Airport, containing:
 - a list of names of the people or organisations that provided written comments to the Preliminary Draft Master Plan 2020,
 - a summary of the comments received, and
 - evidence that Perth Airport has given due regard to those comments in preparing the Draft Master Plan 2020.

The Commonwealth Minister for Infrastructure, Transport and Regional Development, the Hon Michael McCormack MP, approved the Perth Airport Master Plan 2020 on 2 March 2020.

10.3.5 Publication of Final Master Plan

In accordance with Section 86 of the Airports Act, Perth Airport has undertaken the following notifications upon approval of the Master Plan 2020:

- published a newspaper notice advising that the Perth Airport Master Plan 2020 has been approved,
- made copies of the plan available for inspection or purchase at Perth Airport, and
- made a copy of the approved Master Plan 2020 available on the Perth Airport website, perthairport.com.au.





Domestic arrivals





Section 11: **Implementation**

The development of Perth Airport is carefully planned and delivered to meet passenger and stakeholder demand.



This Master Plan 2020 represents the expectation that developments will be realised in a staged manner, largely as a result of an increase in aircraft movements and passenger and commercial demand.

Planning by its nature is a dynamic activity requiring continuous monitoring of changing conditions, standards and technology. Therefore, the implementation of the developments outlined in this Master Plan 2020 will require flexibility that takes into account fluctuations in economic activity, factors that affect air travel and commercial demands, and also regulatory change.

11.1 Approvals Required to Undertake Development

Approval of this Master Plan 2020 does not automatically constitute approval of subsequent airport developments.

Land use planning and building control at Perth Airport is regulated by the Department of Infrastructure, Transport, Regional Development and Communications under the *Airports Act 1996* (Airports Act) and the Airports (Building Control) Regulations 1996 (Regulations).

The Regulations outline the requirement and criteria for approval of all building and/or work activities on the estate. These Regulations require approval to be obtained from Perth Airport as well as from the Airport Building Controller (ABC) prior to commencement of all works, unless a specific exemption is applicable.

Depending on the scope of works, the process can consist of up to four separate approvals:

- Major development plan,
- Development application,
- Perth Airport consent, and
- Airport Building Controller approval.

An overview of the regulatory framework required to undertake development is provided in Table 11-1.

Regulatory Framework	Perth Airport Outcomes
Master Plan	
<ul style="list-style-type: none"> • Approved by the Federal Minister for Infrastructure, Transport, Cities and Regional Development • Includes an Environment Strategy and Ground Transport Plan • Reviewed every five years • Has a 20 year planning period • Requires a 60 business day public comment period 	<ul style="list-style-type: none"> • Identifies Perth Airport development objectives • Identifies the intended land uses on the Perth Airport estate • Enables other planning authorities to develop plans that align with airport planning • Provides information to the public about airport development • Defines the aircraft noise exposure forecast for the airport operations • Defines the flight paths for the airport • Defines a ground transport system for the landside of the airport • Identifies proposed future non-aviation development • Identifies future employment levels at Perth Airport • Provides an Environment Strategy for Perth Airport
Major Development Plans	
<ul style="list-style-type: none"> • Approved by the Federal Minister for Infrastructure, Transport, Cities and Regional Development • Required for: <ul style="list-style-type: none"> – New or extended runways and terminals – New or extended taxiways that add significantly to airport capacity – New buildings with a construction value greater than \$25 million – New or extended surface access that add significantly to airport capacity – Developments that have significant environmental or community impact • Includes a 60 business day public period comment • Development must be consistent with the Master Plan 	<ul style="list-style-type: none"> • Identifies objectives of the proposed development • Provides a detailed outline of the proposed development • Defines the extent to which the future needs of aviation users will be met by the proposed development • Identifies consistency with the Master Plan • Identifies any impacts on flight paths and noise exposure forecast • Identifies consistency with the airport lease • Includes an assessment of environmental impacts and the measures to mitigate them
Building Approvals	
<ul style="list-style-type: none"> • Perth Airport issues Consent • Department of Infrastructure, Transport, Regional Development and Communications appoint an Airport Building Controller (ABC) and an Airport Environmental Officer (AEO) • ABC issues building approvals • AEO monitors and, where necessary places conditions on environmental management • Required for all new works at the airport 	<ul style="list-style-type: none"> • Ensures that buildings are compliant with the National Construction Codes and applicable Australian Standards • Ensures that works do not occur without Perth Airport consent • Ensures that required fire safety measures are addressed

Table 11-1 Perth Airport's regulatory framework for development

Source: Perth Airport

11.1.1 Major Development Plans

Section 88 of the Airports Act requires that, where a major airport development is proposed, a major development plan (MDP) is prepared for public comment and Commonwealth Government approval.

Section 91(1A)(b) requires that an MDP is consistent with the Final Master Plan for the airport. Major airport development is defined by Section 89 and generally includes:

- construction of a new runway, or extensions or significant alterations to an existing runway,
- construction of a new passenger terminal, or extension to an existing terminal,
- construction of a significant new building not principally used as a passenger terminal,
- construction of significant new taxiways, or significant extensions to existing taxiways,
- construction of significant new road or rail access, or significant extensions to existing road or rail access facilities, and
- a development/s which is likely to have a significant environmental impact, or significant impact, on the local or regional community.

The required contents of an MDP are set out in Section 91 and include:

- the objectives of the proposed development,
- an assessment of the extent to which the future needs of civil aviation users of the airport and other users of the airport will be met by the development,
- a detailed outline of the proposed development,
- whether or not the proposed development is consistent with the airport's lease from the Commonwealth,
- whether or not the proposed development is consistent with the final master plan,
- if the proposed development could affect flight paths and noise exposure levels at the airport, and the extent of relevant consultation with airlines and Local Government,
- the effect the proposed development will have on traffic flows at the airport and surrounding the airport, employment levels at the airport, and the local and regional economy, and community (including how the proposed development fits within the local planning schemes for commercial and retail developments in the adjacent area),
- an assessment of environmental and heritage impacts of the proposed development and the plans for dealing with any such impacts, and
- if the development relates to a sensitive development, the exceptional circumstances that would justify the development at the airport.

An MDP is required to be referred to the Minister responsible for the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Federal Minister for the Environment) for their advice, pursuant to Section 160 of the EPBC Act, by the Minister administering the Airports Act (Federal Minister for Infrastructure, Transport, Cities and Regional Development).

In the case of Aboriginal heritage, any proposed works which could impact on a registered heritage site requires approval under the provisions of the *Aboriginal Heritage Act 1972* (WA).

All MDPs are published on the Perth Airport website as required by the Airports Act.

11.1.2 Development Application and Perth Airport Consent

A Development Application is required for all major works within the airport estate. The Development Application must include plans and relevant information of the proposed development. Perth Airport reviews the application to ensure that the proposed construction is consistent with any relevant Perth Airport Design Guidelines, Lease Agreement, the final airport master plan and any applicable MDP. An approval issued by Perth Airport may contain conditions that are required to be complied with. Any requested changes must be made prior to submitting the Perth Airport Consent and Airport Building Controller applications.

All building activity within the Perth Airport estate requires Perth Airport Consent assessment and approval. Perth Airport assesses the proposed activity with regards to:

- Occupational Safety and Health,
- environmental and heritage impacts,
- protected airspace,
- noise impacts,
- utilities and services,
- choice of building materials,
- public access, and
- consistency with the Final Master Plan, relevant Lease Agreement and/or MDP.

The approved Perth Airport Consent may contain conditions that are required to be complied with.

11.1.3 Airport Building Controller

An Airport Building Controller (ABC) and Airport Environment Officer (AEO) are appointed by the Department of Infrastructure, Transport, Regional Development and Communications to administer the building approvals required under the Airports Act and the Airports (Building Control) Regulations 1996.

The Regulations require a Building Permit to be obtained from the ABC (with advice from the AEO) for all developments within the Perth Airport estate.

The ABC assesses the activity under the Airports Act and Regulations, National Construction Codes and applicable Australian Standards. The ABC will also consider any approval conditions of the Perth Airport Consent.

11.2 Review Process

The Airports Act provides for a Final Master Plan to remain in force for five years or until such time that a revised master plan is approved by the Minister. The Airports Act includes additional provision for minor amendments to a master plan, and for the Minister to direct another master plan be prepared.

Welcome to Perth



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Appendices



Appendix A: Airports Act Compliance

Master Plan Section

Airports Act Section 70

The purposes of a final master plan for an airport are:	3
(a) to establish the strategic direction for efficient and economic development at the airport over the planning period of the plan	3
(b) to provide for the development of additional uses of the airport site	3, 5
(c) to indicate to the public the intended uses of the airport site	3, 4, 5, 6
(d) to reduce potential conflicts between uses of the airport site, and to ensure that uses of the airport site are compatible with the areas surrounding the airport	2, 3
(e) to ensure that all operations at the airport are undertaken in accordance with relevant environmental legislation and standards	9
(f) to establish a framework for assessing compliance at the airport with relevant environmental legislation and standards	9
(g) to promote the continual improvement of environmental management at the airport	9

Airports Act Section 71

(a) the airportlessee company's development objectives for the airport	2
(b) the airportlessee company's assessment of the future needs of civil aviation users of the airport, and other users of the airport, for services and facilities relating to the airport	2
(c) the airportlessee company's intentions for land use and related development of the airport site, where the uses and developments embrace airside, landside, surface access and land planning/zoning aspects	3, 4, 5, 6
(d) an Australian Noise Exposure Forecast (in accordance with regulations, if any, made for the purpose of this paragraph) for the areas surrounding the airport	7
(da) flight paths (in accordance with regulations, if any, made for the purpose of this paragraph) at the airport	7
(e) the airportlessee company's plans, developed following consultations with the airlines that use the airport and local government bodies in the vicinity of the airport, for managing aircraft noise intrusion in areas forecast to be subject to exposure above the significant ANEF levels	7
(f) the airportlessee company's assessment of environmental issues that might reasonably be expected to be associated with the implementation of the plan	9
(g) the airportlessee company's plans for dealing with the environmental issues mentioned in paragraph (f) (including plans for ameliorating or preventing environmental impacts)	9
(ga) in relation to the initial period (see subsection (3A) of the master plan—a plan for a ground transport system on the landside of the airport that details:	6
(i) a road network plan	6
(ii) the facilities for moving people (employees, passengers and other airport users) and freight at the airport	6
(iii) the linkages between those facilities, the road network and public transport system at the airport and the road network and public transport system outside the airport	6
(iv) the arrangements for working with the State or local authorities or other bodies responsible for the road network and the public transport system	6
(v) the capacity of the ground transport system at the airport to support operations and other activities at the airport	6
(vi) the likely effect of the proposed developments in the master plan on the ground transport system and traffic flows at, and surrounding, the airport	6
(gb) in relation to the initial period (see subsection (3A) of the master plan—detailed information on the proposed developments in the master plan that are to be used for:	5
(i) commercial, community, office or retail purposes	5
(ii) for any other purpose that is not related to airport services	5
(gc) in relation to the initial period (see subsection (3A) of the master plan—the likely effect of the proposed developments in the master plan on:	1
(i) employment levels at the airport	1
(ii) the local and regional economy and community, including an analysis of how the proposed developments fit within the planning schemes for commercial and retail development in the area that is adjacent to the airport	2

Master Plan Section

(h) in relation to the initial period (see subsection (3A) of the master plan—an environment strategy that details:	9
(i) the airportlessee company's objectives for the environmental management of the airport	
(ii) the areas (if any) within the airport site which the airportlessee company, in consultation with State and Federal conservation bodies, identifies as environmentally significant	9
(iii) the sources of environmental impact associated with civil aviation operations	9
(iv) the studies, reviews and monitoring to be carried out by the airportlessee company in connection with the environmental impact associated with civil aviation operations	9
(v) the time frames for completion of those studies and reviews and for reporting on that monitoring	9
(vi) the specific measures to be carried out by the airportlessee company for the purposes of preventing, controlling or reducing the environmental impact associated with civil aviation operations	9
(vii) the time frames for completion of those specific measures	9
(viii) details of the consultations undertaken in preparing the strategy (including the outcome of the consultations)	9
(ix) any other matters that are prescribed in the regulations	9
(i) such other matters (if any) as are specified in the regulations	9
Airports Act Section 83	
(2) The airportlessee company for the airport must take all reasonable steps to ensure that the environment strategy in the master plan is complied with	9
(3) A person (other than the airportlessee company for the airport) who carries on activities at the airport must take all reasonable steps to ensure that the environment strategy in the master plan is complied with	9
Matters provided by Regulations: Airport Regulations 1997 (Current 2018) Reg 5.02 Contents of draft or final Master Plan	
(1) For paragraphs 71(2) (j) and (3) (j) of the Act, the following matters are specified:	
(a) any change to the OLS or PANS-OPS surfaces for the airport concerned that is likely to result if development proceeds in accordance with the master plan	7
(b) for an area of an airport where a change of use of a kind described in sub-regulation 6.07(2) of the Airports (Environment Protection) Regulations 1997 is proposed:	3
(i) the contents of the report of any examination of the area carried out under regulation 6.09 of those Regulations	
(ii) the airportlessee company's plans for dealing with any soil pollution referred to in the report.	9
(2) For section 71 of the Act, an airport master plan must, in relation to the landside part of the airport, where possible, describe proposals for land use and related planning, zoning or development in an amount of detail equivalent to that required by, and using terminology (including definitions) consistent with that applying in, land use planning, zoning and development legislation in force in the State or Territory in which the airport is located.	3
(3) For subsection 71(5) of the Act, a draft or final master plan must:	
(a) address any obligation that has passed to the relevant airport-lessee company under subsection 22(2) of the Act or subsection 26(2) of the Transitional Act	1
(b) address any interest to which the relevant airport lease is subject under subsection 22(3) of the Act, or subsection 26(3) of the Transitional Act.	1
(4) In sub-regulation (1): OLS and PANS-OPS surface have the same meanings as in the Airports (Protection of Airspace) Regulations.	7

Airport Regulations 1997 5.02A Contents of draft or final master plan - matters to be specified in environment strategy

(1) For subparagraphs 71(2)(h)(ix) and (3)(h)(ix) of the Act, the matters in this regulation must be specified in an environment strategy.	9
(2) The environment strategy must specify any areas within the airport site to which the strategy applies that the airport-lessee company for the airport has identified as being a site of indigenous significance, following consultation with:	9
(a) any relevant indigenous communities and organisations; and	
(b) any relevant Commonwealth or State body.	
(3) The environment strategy must specify the airport-lessee company's strategy for environmental management of areas of the airport site that are, or could be, used for a purpose that is not connected with airport operations.	9
(4) The environment strategy must specify:	
(a) the training necessary for appropriate environment management by persons, or classes of persons, employed on the airport site by the airport-lessee company or by other major employers; and	9
(b) the training programs, of which the airport-lessee company is aware, that it considers would meet the training needs of a person mentioned in paragraph (a).	9

Airport Regulations 1997 5.02B Contents of draft or final master plan - things to be addressed in environment strategy

(1) For subsection 71(5) of the Act, a draft or final master plan must address the things in this regulation.	9
(2) In specifying its objectives for the airport under subparagraph 71(2)(h)(i) or (3)(h)(i) of the Act, an airport-lessee company must address its policies and targets for:	9
(a) continuous improvement in the environmental consequences of activities at the airport; and	
(b) progressive reduction in extant pollution at the airport; and	9
(c) development and adoption of a comprehensive environmental management system for the airport that maintains consistency with relevant Australian and international standards; and	9
(d) identification, and conservation, by the airport-lessee company and other operators of undertakings at the airport, of objects and matters at the airport that have natural, indigenous or heritage value; and	9
(e) involvement of the local community and airport users in development of any future strategy; and	9
(f) dissemination of the strategy to sub-lessees, licensees, other airport users and the local community.	9
(3) In specifying under subparagraph 71(2)(h)(ii) or (3)(h)(ii) of the Act, the areas within the airport site it identifies as environmentally significant, an airport-lessee company must address:	9
(a) any relevant recommendation of the Australian Heritage Council; and	
(b) any relevant recommendation of the Department of Environment regarding biota, habitat, heritage or similar matters; and	
(c) any relevant recommendation of a body established in the State in which the airport is located, having responsibilities in relation to conservation of biota, habitat, heritage or similar matters.	9
(4) In specifying the sources of environmental impact under sub paragraph 71(2)(h)(iii) or (3)(h)(iii) of the Act, an airport-lessee company must address:	9
(a) the quality of air at the airport site, and in so much of the regional airshed as is reasonably likely to be affected by airport activities; and	
(b) water quality, including potentially affected groundwater, estuarine waters and marine waters; and	9
(c) soil quality, including that of land known to be already contaminated; and	9
(d) release, into the air, of substances that deplete stratospheric ozone; and	9
(e) generation and handling of hazardous waste and any other kind of waste; and	9
(f) usage of natural resources (whether renewable or non-renewable); and	9
(g) usage of energy the production of which generates emissions of gases known as 'greenhouse gases'; and	9
(h) generation of noise.	9

Master Plan Section

(5) In specifying under subparagraph 71 (2) (h) (iv) or (3) (h) (iv) of the Act the studies, reviews and monitoring that it plans to carry out, an airport-lessee company must address:	9
(a) the matters mentioned in sub regulation 5.02A (2) and sub regulations 5.02B (3) and (4); and	
(b) the scope, identified by the airport-lessee company, for conservation of objects and matters at the airport that have natural, indigenous or heritage value; and	9
(c) the approaches and measures identified by the airport-lessee company as its preferred conservation approaches and measures; and	9
(d) the professional qualifications that must be held by a person carrying out the monitoring; and	9
(e) the proposed systems of testing, measuring and sampling to be carried out for possible, or suspected, pollution or excessive noise; and	9
(f) the proposed frequency of routine reporting of monitoring results to the airport environment officer (if any) for the airport, or to the Secretary.	9
(6) In specifying under subparagraph 71 (2) (h) (vi) or (3) (h) (vi) of the Act, the measures that it plans to carry out for the purposes of preventing, controlling or reducing environmental impact, an airport-lessee company must address:	9
(a) the matters mentioned in sub regulations (2) to (4); and	
(b) the means by which it proposes to achieve the cooperation of other operators of undertakings at the airport in carrying out those plans.	9
(7) An airport-lessee company, in specifying the company's strategy for environmental management under sub regulation 5.02A (3), must address the matters in sub regulations (2) to (6).	9
(8) In this regulation: Department of Environment means the Department administered by the Minister responsible for administering the Environment Protection and Biodiversity Conservation Act 1999.	9

Airport (Environmental Protection) Regulations 1997 – Reg 6.02 Airport lessee company to monitor pollution levels

(1) An airport-lessee company must monitor, in accordance with its environment strategy:	9
(a) the levels of pollution, if any, present in air, water or soil at the airport; and	
(b) the level of noise generated at the airport.	9
(2) Monitoring must be carried out:	
(a) in a way that is consistent with the specification, in the environment strategy, of studies, reviews and monitoring, as affected by sub regulation 5.02B (5) of the Airports Regulations 1997; and	9
(b) under the direction of a person having the qualifications addressed under paragraph 5.02B (5) (d) of the Airports Regulations 1997; and	9
(c) if it involves testing — in accordance with regulation 1.08; and	9
(d) in a way that is not inconsistent with:	
(i) any international convention, treaty or agreement, relating to environment protection, to which Australia is a party; or	9
(ii) a provision of national environment protection measures made under section 14 of the National Environment Protection Council Act 1994.	

Airport (Environmental Protection) Regulations 1997 – Reg 6.03 – Annual report

(1) The airport-lessee company for an airport must give the Secretary a report for each financial year, or another reporting period that the Secretary determines, containing:	9
(b) details of the company's performance in achieving the policies and targets of the environment strategy and, in particular, of the company's progressive management of enduring environmental pollution problems at the airport.	

Appendix B: Glossary and Acronyms

The following abbreviations are to be used during reporting in either text or figures:

ABC	Airport Building Controller	DA6	Development Area 6
ACA	Airports Carbon Accreditation	DAWE	Department of Agriculture, Water and Environment (formerly DEE)
ACCC	Australian Competition and Consumer Commission	dba	Decibels
ACE	Airport Capacity Enhancement	DBCA	Department of Biodiversity, Conservation and Attractions
ACES	Airport Consultative Environmental and Sustainability	DBNGP	Dampier to Bunbury Natural Gas Pipeline
ADRM	Airport Development Reference Manual	DBP Act	<i>Dampier to Bunbury Pipelines Act 1997</i>
AEDT	Airport Environmental Design Tool	DEE	Department of the Environment and Energy
AEO	Airport Environment Officer	DFO	Direct Factory Outlet
AEPR	Airport (Environment Protection) Regulations 1997	DITRDC	Department of Infrastructure, Transport, Regional Development and Communications (previously known as Department of Infrastructure, Transport, Cities and Regional Development)
AGL	Above Ground Level	DME	Distance Measuring Equipment
AH Act	<i>Aboriginal Heritage Act 1972</i>	DMIRS	Department of Mines, Industry Regulation and Safety
Airports Act	<i>Airports Act 1996</i>	DOT	Department of Transport
Airservices	Airservices Australia	DPLH	Department of Planning, Land and Heritage
AMP	Airspace Management Plan	EMP	Environment Management Plan
AMT	Automated Mass Transit	EMRC	Eastern Metropolitan Regional Council
ANA	All Nippon Airways	EMS	Environmental Management System
ANEC	Australian Noise Exposure Concept	EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ANEF	Australian Noise Exposure Forecast	ESMF	Environment and Sustainability Management Framework
ANEI	Australian Noise Exposure Index	ESMS	Environment and Sustainability Management System
ANO	Aircraft Noise Ombudsman	FAC	Federal Airports Corporation
APARS	Airports (Protection of Airspace) Regulations 1996	FAL	Forrestfield-Airport Link
ARFF	Aviation Rescue Fire Fighting Services	FIFO	Fly-in fly-out
ASQ	Airports Service Quality	FTE	Full Time Equivalent
ASS	Acid Sulfate Soils	GA	General Aviation
ATC	Air Traffic Control	GDP	Gross Domestic Product
ATSIHP Act	<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>	GEHB	Great Eastern Highway Bypass
BGL	Below Ground Level	GIS	Geographic Information System
BMS	Building Management System	GRP	Gross Regional Product
CAGR	Cumulative Average Growth Rate	GSP	Gross State Product
CASA	Civil Aviation Safety Authority	HIAL	High Intensity Approach Lighting
CASR	Civil Aviation Safety Regulation	IATA	International Air Transport Association
CBD	Central Business District	ICAO	International Civil Aviation Organization
CEMP	Construction Environment Management Plan	ILS	Instrument Landing System
CMEWA	Chamber of Minerals and Energy Western Australia	INM	Integrated Noise Model
CMP	Carbon Management Plan		
CNS	Communications, Navigation and Surveillance		
CONOPS	Concept of Operations		

JOSF	Joint Oil Supply Facility	SMD	Southern Main Drain
JUHI	Joint User Hydrant Installation	SWALSC	South West Aboriginal Land and Sea Council
LoS	Level of Service	T1	Terminal 1
LPS	Local Planning Scheme	T2	Terminal 2
MDP	Major Development Plan	T3	Terminal 3
MMTI	Multi-Modal Transport Interchange	T4	Terminal 4
MOS	Manual of Standards	TEC	Threatened Ecological Community
MRA	Metropolitan Redevelopment Authority	TFI	Tourism Futures International
MRO	Maintenance Repair Overhaul	TOD	Transit Oriented Development
MRS	Metropolitan Region Schemes	TRA	Tourism Research Australia
NAP	Noise Abatement Procedure	VET	Vocational Education and Training
NASAG	National Airports Safeguarding Advisory Group	VMS	Variable Message Signs
NASF	National Airport Safeguarding Framework	VOR	VHF Omnidirectional Range
NEPM	National Environmental Protection Measures	VTOL	Vertical Take-Off and Landing
NGER	National Greenhouse and Energy Reporting	WAC	Westralia Airports Corporation
NGERS	National Greenhouse and Energy Reporting System	WAPC	Western Australian Planning Commission
NMD	Northern Main Drain	WEMP	Water Efficiency Management Plan
NPI	National Pollutant Inventory		
NRP	New Runway Project		
OAR	Office of Airspace Regulation		
OEMP	Operational Environmental Management Plan		
OLS	Obstacle Limitation Surface		
PAANTWG	Perth Airport Aircraft Noise Technical Working Group		
PAAT	Protected Airspace Assessment Tool		
PACF	Perth Airport Community Forum		
PADG	Perth Airport Development Group		
PAG	Aboriginal Partnership Agreement Group		
PAMG	Perth Airports Municipalities Group		
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations		
PCF	Planning Coordination Forum		
PFAS	Per- and poly-Fluoroalkyl Substances		
PSA	Public Safety Areas		
PSZ	Public Safety Zones		
PTA	Public Transport Authority		
RAAF	Royal Australian Air Force		
RAV	Restricted Access Vehicles		
RET	Rapid Exit Taxiways		
RNP	Required Navigation Performance		
ROT	Runway Occupancy Times		
RPT	Regular Passenger Transport		
SCV	Small Charter Vehicles		

Glossary of Terms

03/21

Existing main runway designation. May be referred to as 03L/21R when referred to in combination with the new parallel runway.

03R/21L

New runway designation

06/24

Existing cross runway designation

Aerodrome

A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Air Traffic Control

Air Traffic Controllers manage the safe and orderly flow of aircraft into, out of and between airports.

Aircraft Movement

Either a take-off or a landing by an aircraft.

Aircraft Sequencing

The process of air traffic control arranging spacing between aircraft to allow an orderly landing sequence with enough spacing to allow a landing aircraft to vacate the runway prior to the next one being cleared to land.

Airport Lease

The lease agreement between Perth Airport Pty Ltd (formally Westralia Airports Corporation) and the Commonwealth of Australia.

Airport Central

The terminal area between the existing main and new runways which currently houses Terminal 1 and Terminal 2.

Airside

The movement area of an airport, adjacent terrain and buildings or portions thereof, access to which is controlled.

Airspace

The portion of the earth's atmosphere over which a nation exercises jurisdiction over aircraft in flight.

Airspace Management Plan

The Airspace Management Plan is a high-level document that provides the parameters for which detailed flight path planning can be undertaken prior to the construction of the New Runway.

Section 160 of the *Environment Protection and Biodiversity Conservation Act 1999* notes that before the NRP MDP can be approved the Commonwealth Minister for Infrastructure and Transport must consider the advice of the Minister for the Environment and Energy in relation to the adoption of implementation of a plan for aviation airspace management involving aircraft operations that have or will have or are likely to have a significant impact on the environment.

Approaches

The course to be followed by an aircraft in approaching for a landing or in joining a traffic pattern.

Apron

A defined area on a land aerodrome intended to accommodate aircraft for the purpose of loading and unloading passengers, mail or cargo, fuelling, parking or maintenance.

Australian Noise Exposure Concept (ANEC)

Is a planning tool and used to test changes to noise exposure resulting from proposed changes to aerodrome operations.

Australian Noise Exposure Forecast (ANEF)

An Australian Noise Exposure Forecast (ANEF) chart shows contours representing a forecast of future noise exposure around an airport that has been endorsed by Airservices Australia on the basis of approved operational arrangements and air traffic forecasts. In some cases an ANEF chart may be based on the outer envelope of contours from a number of ANEC charts.

Australian Noise Exposure Index (ANEI)

Is the actual noise exposure for some previous time period, generally a year.

Baseline

A specific value or values that can serve as a comparison or control a basic standard or level; guideline.

Building area

An area of an aerodrome, outside the movement area, allocated for the provision of administration, aircraft maintenance and passenger, freight or other facilities. A building area may also contain fuel depots.

Corridor

A representation around an air route that indicates a range of flight paths that may be flown by aircraft as a result of weather diversion or air traffic control intervention. An area that final flight paths may be designed within.

Critical aircraft

The aeroplane or aeroplanes identified from among the aeroplanes the aerodrome is intended to serve as having the most demanding operational requirements with respect to the determination of movement area dimensions, pavement bearing strength and other physical characteristics in the design of aerodromes.

Detention Storage

An area that will temporarily store water until the downstream drainage network has capacity to drain the stored water.

Dewatering

Removal or draining groundwater or surface water from a riverbed, construction site, caisson, or mine shaft, by pumping or evaporation.

Duty Runway

The runway or runways that have been nominated to be used by air traffic control at a given time.

Environmental Incident

Any event or impact on the environment involving Perth Airport and/or its contractor's actions or assets that is capable of:

- Causing harm to the environment or any person or property,
- Causing pollution, and/or
- Coming to the attention of an environmental regulatory agency.

Estate

The grounds and tenancies associated with the Perth Airport land holdings.

Fauna

The animals of a given region or period considered as a whole.

Flight path

The track an aircraft may fly. Flight paths include Air Routes, Departure and Arrival procedures, Approach procedures and flight tracks.

Flora

The plants of a particular region or period, listed by species and considered at a whole.

Fly-in fly-out (FIFO)

Describes the pattern of work where by employees are flown to and from their place of work.

Forrestfield-Airport Link

The new railway line that is being constructed by the State Government to connect Forrestfield and Perth Airport to the Perth Central Business District.

General Aviation (GA)

Refers to all flights other than military and scheduled airline flights, both private and commercial.

Ground Disturbing Works

The disturbance of earth or waters involving machinery including clearing, excavation, backfilling and compacting, but excludes geotechnical investigations, surveying, fencing and rehabilitation works.

Ground-based

Located on the ground as opposed to in an aircraft or in airspace.

HIAL

High Intensity Approach Lighting

Instrument Approaches

An instrument approach is required in poor weather conditions where the pilot cannot see the ground and relies on the pilot receiving guidance to land from instruments located in both the aircraft and on the ground.

Interstate

Activities between States and/or Territories

Intrastate

Activities within a States or Territory

Integrated Noise Model (INM)

The Integrated Noise Model is an aircraft noise modelling software package produced by the United States Federal Aviation Administration.

Landside

That portion of an aerodrome not designated as airside and to which the general public normally has free access.

Living Stream

A constructed or retrofitted vegetated waterway that mimics the characteristics of a natural stream.

Major Development Plan (MDP)

As defined by section 91 (1) of the Airports Act 1996.

Manoeuvring area

That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Master Plan

As defined by section 71 (2) of the Airports Act 1996.

Movement

Either a take-off or a landing by an aircraft.

Movement areas

The part of an aerodrome to be used for the surface movement of aircraft, including the manoeuvring areas and aprons.

N-contours

A term used to describe noise through reporting the number of aircraft noise events louder than the specified dB(A) level.

New Runway Project

The New Runway Project (NRP) includes:

- Construction, including clearing and site preparation, of a new runway up to 3,000 metres in length and with associated infrastructure.
- Development of an airspace management plan that will cater for the changes to current airspace and flight paths to accommodate operations of the new runway.

Noise Abatement Procedures

Every major airport has Noise Abatement Procedures (NAPs), which are designed to reduce the impact of aircraft noise on the community. They include procedures for runway use and flight paths.

Noise Contour

Developed by the [then] Commonwealth Department of Infrastructure and Transport to illustrate the average number of events per day that exceed a certain sound level.

Operator

A person, organisation or enterprise engaged in, or offering to engage in, an aircraft operation.

Obstacle Limitation Surfaces (OLS)

A series of planes associated with each runway of an aerodrome and which define the desirable limits to which objects may project into the airspace around the aerodrome. Obstacles penetrating an OLS may need to be marked and/or lit in accordance with CASA requirements. Definitions of individual OLS are:

- Conical surface: a surface sloping upward and outward from the periphery of the inner horizontal surface to a specified height above that surface,
- Inner horizontal surface: a plane at a specified height above the aerodrome reference elevation datum extending to a specified outer boundary,
- Approach surface: an inclined plane or combination of planes originating at the inner edge associated with each runway threshold,
- Transitional surface: inclined planes which originate from the edges of the runway strip and the side of the approach surface and extend upward and outward at a specified rate to the inner horizontal surface, and
- Take-off climb surface: a plane originating at the end of the clearway, sloping upward and diverging at a specified rate

Pavement

A prepared or semi prepared surface of a given depth for the purpose of providing added bearing capacity to an existing ground surface.

Perth Airport Estate (the estate)

The parcel of land Perth Airport sits upon and that is leased from the Commonwealth Government.

Phytophthora

A group of fungi of the genus *Phytophthora*, which cause a serious plant disease.

Pollution

The direct or indirect alteration of the environment to its detriment or degradation, to the detriment of an environmental value, or is of a prescribed kind from an emission (as defined by the *Environmental Protection Act 1986* (State)).

Precinct

A space or place of definite or misunderstood limits.

Priority Flora

Flora that is recognised by the Department of Biodiversity Conservation and Attractions as being under threat and in urgent need of further study; but is not yet declared rare flora under the *Wildlife Conservation Act 1950* (State). Priority Flora is divided into Priority 1, Priority 2, Priority 3 and Priority 4 listings, with Priority 1 being the flora most under threat.

Regular Passenger Transport (RPT)

Regular Passenger Transport represents passenger services operating to a published schedule.

Receptor

Various devices that receive information, signals etc

Runway

A defined rectangular area on a land aerodrome, prepared for the take-off and landing of aircraft along its length.

Runway Mode

An operating mode is the use of a certain runway or a combination of runways and the mode selected is based on a number of factors and documented selection criteria.

Runway number

The number allocated to a runway end, being that whole number nearest to one tenth of the magnetic bearing of the runway centreline (measured clockwise from magnetic north) when viewed from the approach. Single digit numbers so obtained are preceded by zero and where the final numeral of the bearing is five degrees, the number allocated is the next largest number.

Taxiway

A defined path on an aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

- aircraft stand taxi lane; a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only,
- apron taxiway: a portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron, and
- rapid exit taxiway: a taxiway connected to a runway at an acute angle and designed to allow landing aircraft to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times.

Wetland

Land that is permanently, seasonally or intermittently waterlogged or inundated with water, but excludes watercourses.





Perth Airport

Level 2, 2 George Wiencke Drive
Perth Airport, WA 6105
PO Box 6, Cloverdale WA 6985



perthairport.com.au

