

Jandakot Airport

Master Plan 2005

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Requests should be addressed to:

**Jandakot Airport Holdings Pty Ltd
16 Eagle Drive Jandakot Airport
Western Australia 6164**

This document was prepared for JAH by:

Anne Watson	Airport General Manager Plans
Darryl Evans	Operations Manager and Technical Manager
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FOREWORD

This Master Plan has been prepared in accordance with the *Airports Act 1996* and indicates the airport planning for the next 20 years. A requirement of the Act is the preparation of a Master Plan every 5 years and this Master Plan is a review of the approved December 2000 Master Plan and incorporates various changes that time and experience has brought. This Master plan was approved by the Minister for Transport and Regional Services on 3 January 2006.

Jandakot Airport remains Western Australia's major General Aviation Airport and in the past few years despite a slight fall in average aircraft movements remains the busiest airport in Australia. The majority of movements and economic activity on the airport relate to pilot training, supplemented by operations of essential service organisations such as the Royal Flying Doctor Service, Calm Forrest and Bushfire Patrol, WA Police Air Support Unit, and the FESA emergency rescue helicopter service.

JAH's mission statement for Jandakot Airport is to manage, maintain and develop the airport in a safe and environmentally sustainable manner in order to enhance the economic vitality and community service needs of Western Australia. To achieve this vision JAH will ensure that the proposed development of the airport will bring about the creation of new business opportunities and the further development of aviation facilities.

JAH is keen to work closely with its neighbours and airport users to manage and develop the Airport in a professional and responsible manner.

JAH encouraged all stakeholders to contribute their views on the airports development through the consultation and public comment process, since the development of Jandakot Airport as a major infrastructural asset of Western Australia in the best possible way, is in everyone's interest.

John Fraser

Managing Director

EXECUTIVE SUMMARY

Jandakot Airport is the principal general aviation airport in Western Australia. Jandakot Airport is therefore strategically important to the growth and development of Western Australia's tourism, business and leisure industry. The State Government recognises and supports the Commonwealth's requirement that Jandakot Airport must remain as a fully functioning general aviation airport, supporting Perth and Western Australia.

The primary function of Jandakot Airport is "air work" aviation rather than passenger transportation. Flying training accounts for about 63% of the total aircraft movements. Other functions provided by Jandakot Airport include:

Charter Operations

Royal Flying Doctor Service – Western Australian Headquarters and service facility

WA Police Air Support Unit

Fire and Emergency Services Authority (FESA)
Emergency Helicopter

Department of Conservation and Land Management (CALM) forest and bush fire patrol – maintenance base flights

Aerial photography, surveying, mapping and inspection

Recreational flying

Jandakot Airport is an important training base for foreign airline pilots with the establishment of the Singapore Flying College and the China Southern West Australian Flying College.

Master Plan

This Master Plan (MP) is a review of the approved 2000 Jandakot Airport Master Plan and has been prepared by JAH accordance with Part 5 Division 3 of the *Airports Act 1996*. The 2000 Master Plan was approved by the Minister for Transport and Regional Services on the 24th October 2000.

This review retains the primary concepts of the 2000 Master Plan while incorporating various updates.

The most significant variation is the provision of a fourth parallel 12/30 touch and go runway. The additional runway will not greatly increase annual capacity, rather it will improve safety and efficiency

on days when the crosswinds on the 06/24 runways exceed 12 knots forcing operations on to the existing 12/30 single runway.

The 476,000 aircraft movements forecast for the next 20 years determined the 2025 Airport Development Plan. (refer to **Figure ES.1**) The Master Plan recognises that it will be necessary to construct a fourth runway within the next 5 years to cater for an expected increase of student pilot training due to a global shortage of airline pilots. The development of aviation support facilities, aprons, airport access and commercial sectors will also occur over the 20 year planning period.

The Master Plan (MP) provides a framework within which the airport's future development can take place. It provides a plan for the airport for the next 20 years taking into account associated land use, environmental, ground access and engineering service issues.

Forecast Growth

Existing statistics show that for the 2003 calendar year, Jandakot Airport conducted 324,308 aircraft movements. Forecasts for the Master plan indicate by the year 2025 the total annual aircraft movements conducted at Jandakot Airport is expected to be 476,000.

Since Jandakot Airport is capable of handling about 514,650 aircraft movements per year, the annual aircraft movements are not expected to exceed the current airport's capacity within the 20-year planning horizon.

Airside

The analysis indicates that the existing airport runway capacity could reasonably handle the forecast demand at the end of the master planning period of 20 years (year 2025) of about 476,000 movements per annum.

The provision of an additional parallel runway does not increase annual capacity at a General Aviation Airport Procedure (GAAP) such as Jandakot Airport. Only one runway direction can be operated at a time as training circuits would intersect and conflict.

The 06/24 runways are useable for about 93% of the time during which the maximum crosswind is less than 12 knots. When the crosswinds on the 06/24 runways exceed 12 knots operations must be switched to the single 12/30 runway. The capacity of the single 12/30 runway is theoretically about half that of the dual 06/24 runways. On days when the 12/30 runway is used severe curtailments of flying training and normal aircraft movements occur along with congestion. There are consequential delays to other operators with financial penalties to both pilots and aircraft operators and potentially increased risks when operating to the maximum crosswind limit which impacts on overall safety.

The Master Plan needs to protect the ability to provide for a fourth runway and to ensure maximum safety for operations.

Runway Options

Several options for the fourth runway have been considered these include:

Do nothing option

Option 1 – New parallel 12R/30L (990m x 18m) touch and go runway north of the existing 12/30 runway

Option 2 – New parallel runway (1390m x 30m) south of the existing 12/30 runway.

Do-nothing Option

The 'do-nothing' option is defined as not providing additional runway capacity at Jandakot Airport. However to provide additional runway capacity a solution would be to develop a new touch and go runway at a satellite airport on approximately a 12/30 alignment in reasonable proximity to Jandakot Airport. Several studies have investigated the possibility of a new general aviation airport to serve the Perth Region. To date a site has not been identified, acquired nor protected. A new general aviation aerodrome with a touch and go runway located within 30 nautical miles south of Jandakot Airport near the existing flying training area would provide an ideal situation.

JAH is working in cooperation with the Western Australian Government to further investigate this option.

Preferred Runway Option

Aircraft noise is the issue most likely to be of greatest concern to the majority of people. Residents are more likely to complain if the present operations were to be significantly altered.

Option 2 is discarded on the basis of aircraft noise impacts over new areas, natural environment impacts, and the high capital cost.

Option 1 effectively retains the existing runway 12/30 for departures and arrivals. This runway could be extended from 990m to 1390m to alleviate weight restrictions currently placed on heavier aircraft on very hot days.

The new parallel circuit runway will permit a small increase in operations in the runway 12/30 directions. The main benefits of option 1 include:
Reduced noise impacts since the majority of repetitive circuits will be conducted in an easterly direction and contained within the airport boundary

The retention of an additional 20ha of natural bushland with siting adjacent to existing infrastructure

Increased safety and efficiency for airport users and operators

Support Facilities

To meet forecast demand for larger hangars with apron frontage, the majority of new sites will be located at the north - eastern end of the existing building line and adjacent to taxiway alpha. A dedicated helicopter precinct is also being developed in this area.

Provision has been made at the south- western end of the existing building area to expand multi user hangar facilities.

A central aviation precinct located west of the current building line will provide premium sites for aviation support facilities such as avionics, aeronautical design, aircraft and component sales.

Ground Access

The existing access road system will be greatly improved with the extension of the Roe Highway which is currently being constructed along the east-west alignment north of the airport. It is proposed that the works will include a road bridge above the freight rail line with an off ramp feeding directly into the main entrance of the airport. These modifications will provide more convenient and direct access to the airport entrance and easier access to the regional road network.

Commercial Property Development

The airport has substantial land within its boundaries that is not required for airfield facilities such as the runways, taxiways, aprons, utilities, roads and other aviation support facilities. About 24% of this land has significant commercial development potential.

Jandakot Airport is located 18km south of the Perth City Centre. The land is central to the rapidly growing metropolitan area, adjoining the Kewdale-Kwinana railway and is a short distance from direct access points to the Kwinana Freeway and the proposed Roe Highway.

During off-peak periods travel time by car is 12-20 minutes to Perth CBD and 35 minutes to Perth's east, west and northerly suburbs and industrial areas.

There is a wide range of existing land use functions in the areas surrounding the airport. In particular:

The site is well placed in relation to industrial development with, availability of large sites, good access and ease of movement for goods with minimum conflict with adjoining land uses. Vacant industrial land in the industrial estates of Canning Vale, Jandakot, Bibra Lake and Henderson is diminishing

The site offers opportunities for small scale airport related retail given the relative isolation of the airport population to convenience stores

The site has existing recreational activities on site

The commercial property development area is distinctly separated from existing urban areas to the north by the existing and proposed highway and rail corridors. The rural residential area to the west and north are buffered by the airport conservation area

Land Use Categories

The land use recommendations are as follows:

Precinct 1. Movement Area and Facilities

This precinct contains the entire essential aviation infrastructure including runways, taxiways and aprons. Also included is the airport building area for hangars, flying training schools, dormitories and lettable sites.

Precinct 2. Conservation Areas

Areas of high priority conservation value with regard to the natural environment are identified. Airport development has been sited to minimise the direct impact (i.e. clearing of land) on these high conservation areas. It is JAH's intent that these areas, where possible, will remain undeveloped and appropriate environmental management has been implemented.

Precinct 3. Non-Aviation Development Area.

This area has been identified as an area that is not required for aviation related development, is compatible with noise and height restrictions and is suitable for development consistent with a balanced approach to the planning for the airport.

The MP proposes that this precinct would be developed as a mixed business and light industrial area in conjunction with the market demands. Land use zones are proposed to be compatible with the City of Cockburn's Town Planning Scheme No. 3 land use classes.

Aircraft Noise Management

Figure 13.1 shows the Australian Noise Exposure Forecast (ANEF) for 2025. The 30 ANEF contour extends outside the airport boundary in areas to the north-east and south-west. These areas of the ANEF contour are clear of existing residential areas.

A comparison is also made with the 2003 Australian Noise Exposure Index (ANEI) prepared by Perth Airport (December 2004). The successful management of aircraft noise impacts involves several organisations.

JAH provides the on ground facilities including the runways, taxiways and visual aids. The airport operator however has little control over the way aircraft operate once they have taken off or on approach to the airport.

Airspace management is controlled by Airservices Australia, however JAH has taken take a lead role in developing and fostering good aircraft noise management. Noise management strategies include:

Establishing the Jandakot Airport Community Consultative Committee

Implementation of a “Fly Neighbourly” Programme

Reviewing Noise Abatement procedures

Development of a Noise Information Package for Jandakot Airport

The Western Australian Department for Planning and Infrastructure, Local Authorities, Community bodies, aircraft operators, Airservices Australia and JAH formulated the Jandakot Airport Flight Paths and Procedures Review. The final report was prepared in December 1999 containing 62 recommendations addressing flight paths, circuit procedures and alternative locations for circuits, managing aircraft operations and consultation. JAH has maintained an active role in seeking further consideration and eventual implementation (as appropriate) of these recommendations.

Management of Impacts on Natural and Indigenous Environment

Jandakot Airport site and its surrounding areas are situated on the northern margin of the Jandakot Ground Water Mound, a source of public water supply for the Perth Metropolitan Region. It also covers an extensive area of Banksia woodlands and a variety of damplands, which have conservation value. The south eastern corner of the airport is located in a dune system.

Mitigation of potential on-site impacts will be achieved by:

Actively managing conservation precinct bushland located on the airport

Optimal siting of development to minimise disturbance to bushland conservation areas

Implementing environmental management plans for various land use zones

Consultation and Public Comment

The *Airports Act 1996* specifies that a full consultation programme is required prior to submission of the draft Master Plan to the Minister. This includes:

Newspaper advertisements

Circulation of draft plans for inspection and/or purchase

90 day comment period

A wide range of stakeholders were consulted in January 1999 through workshops held during the course of preparing the approved 2000 Master Plan. In subsequent years and during the preparation of this MP, JAH conducted formal consultations with airport operators, users and tenants, community groups, Federal, State and Local government authorities.

The public comment period commenced on 1 July 2005. Submissions were invited from the public, stakeholder groups and State and Local Government agencies. The last date for written submissions was 29 September 2005.

In accordance with the requirements of Section 79 and 80 of the *Airports Act 1996*, the draft version of the Master Plan was submitted to the Minister accompanied by;

A written Statement of Consultation signed on behalf of the company containing:

A list of names of persons consulted; and

A summary of the views expressed by the persons consulted

A written Certificate of public Comment signed on behalf of the company containing:

A list of the names of members of the public who have made comments

A summary of those comments

A statement stating that the company has had due regard to those comments in preparing the draft Master Plan; and

Setting out such other information (if any) about those comments as specified in the regulations

SECTION 1 - INTRODUCTION

Jandakot Airport is Western Australia's principal major General Aviation Airport and the only one serving the Perth metropolitan region. The airport is located approximately 18 km south of the Perth City Centre and covers approximately 622ha of land. Its growth is closely linked to the economic development of Western Australia.

2005 Master Plan Review

This Master Plan (MP) is a review of the approved 2000 Jandakot Airport Master Plan and has been prepared by Jandakot Airport Holdings Pty Ltd (JAH) in accordance with the *Airports Act 1996*.

This MP retains the principal concepts of the approved December 2000 Master Plan incorporating the following updates:

- Aviation and commercial precincts area revision
- 12/30 Parallel Touch and Go Runway
- Aircraft movement forecasts to 2025
- New airspace protection plan
- New ANEF (Australian Noise Exposure Forecast)

Purpose of the Master Plan

This approved Master Plan (MP) provides the framework for the future development of the airport, taking into account associated land use, environment, engineering services and ground access issues.

The purpose of the approved MP is summarised as follows:

- To assist and guide the responsible development of existing and proposed airport land uses and facilities
- To comprise a Master Plan that is compatible with local and regional planning objectives thereby ensuring a harmonious interface between the airport's operations and its adjacent communities
- To provide for future general aviation traffic, ground traffic and various commercial functions, within acceptable social, economic and environmental constraints.
- To reflect in its preparation, consultation with all stakeholders from both the public and private sector who may be impacted upon by the ongoing development of the airport

Master Plan Objectives

The principal objectives of the Master Plan are:

To facilitate aviation market growth by providing timely provision of airport infrastructure requirements

To reduce and/or remove constraints to demand through the establishment of appropriate planning procedures and aviation development strategies

To develop infrastructure scenarios to maintain and enhance operational safety and stimulate appropriate advanced pilot training and charter aviation activity

To undertake appropriate development of non-aeronautical land into commercial business estates

To achieve these objectives the Master Plan:

Outlines a framework for the provision of future facilities and services to achieve optimum airport use

Incorporates planning considerations and management guidelines to ensure the airport is developed and managed in a socially and environmentally responsible manner recognising regional planning requirements and the compatible goals of Local, State and Federal Government agencies

Identifies opportunities for the development of aviation and non-aviation businesses

Is a flexible document to facilitate the ultimate development of airport infrastructure and business

Environment Strategy

The Minister for Transport and Regional Services approved the 2004 Jandakot Airport Environment Strategy (ES) on 29 November 2004.

The ES acts as a functional guide for environmental management of airport operations for the next five years.

Environmental impacts that could result from development of the airport described in this MP are addressed in section 13 – Environment.

Major Developments

The development foreshadowed in the Master Plan does not constitute a development proposal. The *Airports Act 1996* sets a process for the consideration and approval of “major development” proposals.

The definition is wide ranging and includes developments such as runways, taxiways, passenger terminals, major road works which exceed financial criteria (\$10 million) or add substantially to airport capacity, or is a development of a kind that is likely to have significant environmental or ecological impact. Individual development proposals will be subject to separate environmental assessments.

New Airport Development since the approved December 2000 Master Plan

- Taxiway Delta 1
- Compass Swing Bay
- 12 Aircraft Hangar Complexes
- 2 Aviation Support Facilities
- 2 Mobile Phone Towers
- Upgrade to BP Refuelling Facility
- Aviators Café
- Shell refuelling depot
- Singapore Flying College accommodation expansion
- Royal Flying Doctor Service WA Section building
- Provision of north-eastern aviation precinct

Consultation and Public Comment

The PDMP was subject to a consultation process prior to being advertised for public comment. JAH believes it is important to understand stakeholder and community views on the future planning and development of the airport. Stakeholder input was evaluated and where appropriate the PDMP was modified.

The act provides that the airport lessee company must undertake certain activities in relation to public comment on the PDMP, including making copies available for inspection and purchase for a period of 90 days and inviting members of the public to give written comments within the 90 day period.

The PDMP was released on 1 July 2005 for a period of 90 days. During this period copies were made available for examination at the venues listed below:

- Office of Jandakot Airport Holdings
- Libraries and offices of City Cockburn, City Of Melville and City of Canning
- State Library – Alexander Library

The document could also be viewed on our website:

www.jandakotairport.com.au

Adoption and Implementation

A Draft Master Plan (DMP) was prepared following the public comment period and submitted to the Commonwealth Minister for Transport and Regional Services for review and approval.

The approved Master Plan is now the policy framework to guide the future planning and development of Jandakot Airport.

The Jandakot MP will remain in force for 5 years unless a replacement plan is approved beforehand.

SECTION 2 - DEVELOPMENT OBJECTIVES

Airport Vision

JAH's mission statement for Jandakot Airport is to manage, maintain and develop the airport in a safe and environmentally sustainable manner in order to enhance the economic vitality and community service needs of Western Australia. The vision encompasses a wide perspective of commitments to the people of Western Australia. To achieve this vision, JAH will ensure that the development of Jandakot Airport brings about the creation of new business opportunities and the development of high standard of airport facilities. As a result, Jandakot Airport will be a highly reputable general aviation airport serving the needs of its customers and an internationally recognised centre for excellence for flying training.

Development Objectives

The following objectives have been established to meet the needs of key stakeholders while preparing the MP:

Safety and Security

Achieve highest practical safety standards for airport operations by:

Improving the airport movement area to reduce congestion particularly when wind conditions force operators onto the single 12/30 runway

Developing a dedicated helicopter precinct in the north-eastern aviation precinct to provide separation of fixed wing and rotary operations

Improving airside security by erecting a 2.4m security fence area with electronically operated personal and vehicular access gates at selected airside access points

Capacity and Operating Efficiency

Provide the infrastructure necessary to satisfy the forecast operations by:

Building a parallel 12/30 touch and go runway

Improving the taxiway system, including the provision of interconnecting taxiways to the proposed parallel runways 12/30 where practicable avoiding the need for ATC clearances and delays

Improving facilities to encourage further flying training, charter and aerial work at Jandakot Airport

Working cooperatively with the Western Australian Government with its Aviation Policy to develop Jandakot Airport as an internationally recognised centre for excellence for flying training

Environmental Compatibility

Avoid, minimise and manage adverse environmental inputs by:

Working with the Western Australian Government to identify a satellite touch and go runway remote from urban areas to minimise impacts at Jandakot Airport

Ongoing education and promotion of the "Fly Neighbourly" approach to airport users

Working with the airport users and local community through consultative meetings to regularly review current noise abatement procedures and address operational issues.

Limit the operations of noisy aircraft conducting adventure flights to specific times and routes through formalised "Fly Neighbourly Agreements"

Conserving high priority areas of the natural environment

Protecting the Jandakot Ground Water Mound

Applying control inputs to meet the requirements of the Environmental Protection Regulations associated with the Airports Act

Financial Viability

Ensure the control of financial viability of Jandakot Airport by:

Marketing the airport's attractiveness and competitive advantages to its aviation customers

Increasing revenues through commercial activities

Reducing operating costs and carefully implementing capital investments

SECTION 3 - ECONOMIC SIGNIFICANCE

Jandakot Airport is an integral part of the region's economic activity. As with all major transport facilities its contribution to the economy arises through the improvement it affords in the efficiency of provision of service to local and overseas users.

In Western Australia its role is particularly important because of the relative isolation of Perth from the other major cities in Australia and major towns in Western Australia, and also its close proximity to Asia to provide flying training and general aviation facilities.

As the only General Aviation Airport in Perth, Jandakot Airport is a significant infrastructural asset of the state of Western Australia and is essential for the local and regional economy of the state.

The Economic Impact of Jandakot Airport

There are 125 tenanted businesses situated at Jandakot Airport. They employ approximately 650 staff and contribute in excess of \$200 million dollars annually into the local economy in terms of wages/salaries and supplies purchased locally.

The airport also generates \$50 million dollars annually in exports through substantial foreign exchange earnings from flying training and the supply of engineering and avionics parts to South East Asia (Stochastic Consulting International, 2001).

Economic Injection and Employment

The development of Jandakot Airport will result in an increase in direct and indirect employment opportunities in the local area and will provide a substantial economic injection into both the local and regional community, as well as increasing export earnings.

By applying appropriate multipliers, to the data collected by Stochastic International in 2001, it is predicted that by the year 2025, aviation related businesses at Jandakot would directly employ approximately 1,275 personnel. This translates to an annual injection of around \$500 million annually into the West Australian economy in terms of wages/salaries and supplies purchased locally.

Foreign earnings from flying training and the supply of engineering and avionics parts, is expected to reach in the region of \$80 million by that time.

The economic benefit to Western Australia generated from the development of the commercial estate is decidedly significant. The scale will be dependent upon the final business mix and the number of facilities to be established.

There will also be a number of direct and indirect employment opportunities associated with this development, both at the construction and operational stages. Using appropriate multipliers it is estimated that the workforce employed on the estate could reach 4,700 when completed.

Intangible Benefits

There are intangible benefits generated from the provision of aviation services at Jandakot Airport, which cannot be measured in monetary terms. These benefits include the ease of accessibility by the Royal Flying Doctor Service, the WA Police Air Support Unit, FESA's emergency rescue helicopter and Calm's forest and bushfire patrols.

Jandakot Airport's close proximity to Perth Central Business District, Perth Airport, Port of Fremantle and the Kwinana Heavy Industrial area provides synergistic benefits to the general public, mining, agriculture and industrial sectors of Western Australia.

SECTION 4 - REGIONAL DEVELOPMENT

Regional Setting

Jandakot Airport is situated in the City of Cockburn, 18 km south of the City of Perth and 13 km east of the Port of Fremantle, in an area of mixed land uses. (see **Figure 4.1**) The airport is an integral part of the region and is vital to the local and regional economy of Western Australia. Its role is particularly important because of the relative isolation of Perth from regional towns and its close proximity to Asia, to provide flying training and general aviation facilities.

The growing demand for general aviation in the late fifties resulted in the relocation of general aviation from Maylands north-east of Perth to Jandakot. The Airport construction commenced in 1962 and by middle of 1963 two gravel runways 12/30 and 06/24, one gravel parallel taxiway and gravel apron area were completed. The airport was opened on 1 July 1963.

Western Australian Government

The Western Australian Governments "Aviation Training Strategy for Western Australia" published in 1998 assessed Jandakot Airport as having the greatest potential to sustain flying training after Pearce and Perth airports. An extensive multi-criteria assessment was conducted considering a range of criteria such as existing aviation infrastructure, supporting aviation infrastructure, supporting regional facilities, climate and weather conditions, airspace requirements and restrictions, environmental impact and training providers.

The seven highest ranking for high potential sites were:

Pearce

Perth

Jandakot

Geraldton

Port Hedland

Albany

Kalgoorlie/Boulder

Flying training is not feasible at Pearce or Perth Airports due to their current military and airline operations, respectively. Jandakot Airport was perceived to have limitations due to congestion and environmental constraints associated with aircraft noise. Since the report was prepared traffic levels have fallen.

Jandakot Airport was also considered to have a number of comparative advantages for flying training including:

Rated "High Potential" for the potential to sustain aviation training after Pearce and Perth in the report on Aviation Training Strategy for Western Australia

Has significant investment in sealed runway development, taxiways and hangar facilities

Has NDB navigational aid, PAPI and runway lighting

Has controlled airspace for training requirements

Has significant investment in aviation training facilities

Is close to regional infrastructure supporting education, accommodation and recreational facilities

Metroplan

Jandakot Airport is the major general aviation airport in the Perth Region and the main facility catering for aviation training. It is a significant land use in the metropolitan region occupying some 622 ha of land.

Metroplan, released by the Western Australian Government in 1990 to provide the broad strategy for guiding Perth's growth to 2021 also provides the framework for the major regional planning tool, the Metropolitan Regional Scheme (MRS) which controls the general zoning and reservation of land. Metroplan recognises the need for Jandakot Airport to grow to meet Perth's General Aviation requirements. Metroplan states that "Jandakot Airport will be planned for as a general aviation airport in accordance with air traffic projections and associated noise forecasts".

Network City

"Network city: community planning strategy for Perth and Peel" was published in 2004 by the Western Australian Planning Commission. The strategy highlights key elements of planning for the future of Perth, Mandurah and Murray.

Jandakot Airport is identified in the plan as a public purpose area, but unlike Perth Airport is not identified as an activity centre. The nearby Canning Vale Industrial Area is, with Ranford

Road nominated as a primary activity corridor. Roe Highway bordering the Jandakot Airport is nominated as a primary activity corridor.

Network City recognises the need to ensure aviation and airport infrastructure is protected and developed.

The strategy acknowledges the forecast increase of aircraft activity at Jandakot Airport. A Statement of Planning Policy (SPP) - Land Use Planning in the vicinity of Jandakot Airport is currently being prepared. The SPP identifies the impact of increases in aircraft movements on adjoining residential areas.

The scheme identifies future capacity issues for Jandakot Airport and proposes the preparation of a general aviation strategy to resolve these constraints in the Perth Metropolitan region.

Local Government

The airport lies entirely within the boundary of the City of Cockburn. The northern boundary of the airport forms the southern boundary of the City of Melville and the City of Canning abuts the northeast airport border as shown in **Figure 4.2**

Residential land and light industrial activities are concentrated to the north, west and northeast of the airport. Remnants of previous sand extraction activities are evident in the south and east whilst rural activities also occur in these areas.

The *Airports Act 1996* encourages the airport to adopt a planning philosophy consistent with State and Local Government. The management of JAH has consulted with the surrounding Local Government authorities and the development of non-aeronautical commercial sites will conform to the policies and standards applicable in the adjacent local government areas.

SECTION 5 - HISTORIC AND FUTURE GROWTH

This section of the MP presents historic aircraft traffic patterns at the airport. It discusses the key factors affecting future aircraft traffic, summarises the forecast methodology, and presents the baseline annual forecasts of aircraft movements used for planning purposes.

Historic Aircraft Traffic

National Trends

There has been a downturn in general aviation activity at Australia's privatised GAAP aerodromes over the past 7 years. Although the industry has experienced several key events such as the 1999 fuel crisis, introduction of the GST in 2000, the collapse of Ansett and the September 11 attacks in 2001, the downturn in GA is mainly attributed to higher operating costs for flying schools and aerodrome users. These include:

- Fuel prices
- Aerodrome usage charges
- New security measures
- Compliance charges
- Airservices charges
- Maintenance costs

Flying training and charter work continue to make up the largest categories activity in the general aviation sectors, whilst other flying activities such as private flying and aerial work have remained relatively flat over the past 10 years. This trend is expected to remain so in the future.

Jandakot Airport Aircraft Movements

Jandakot Airport is defying the national trend and is now the busiest airport in Australia conducting an average of 310,000 movements annually. Flying training (circuit training operations) accounts for 63% of the total aircraft movements. 57% of this training activity comes from locally based companies with the balance from international flying colleges.

The Royal Aero Club accounts for the majority of the domestic local flying training activity. The demand for the pilot training is expected to increase in the future.

Charter operations for agriculture, mining, aerial work, tourism related activities and rural services have been estimated to contribute about 16% of the total aircraft movements at Jandakot Airport. Flights related to mining are mainly those that fly out to remote areas not travelled by major airline routes. Aerial works services include Royal Flying Doctor Service as well as aerial spraying and surveying. Other operations relate to private flying and helicopter operations.

Table 4.1 shows the total annual general aviation movements for the last 10 years for Jandakot Airport.

Table 4.1: Total Annual Aircraft Movements 1995 - 2004

Year	Total Annual Movements	% Increase
1995	371,507	
1996	404,576	9%
1997	378,042	-7%
1998	416,895	10%
1999	261,869	-37%
2000	289,389	10%
2001	338,411	17%
2002	332,910	-1%
2003	308,030	-7%
2004	323,028	5%

Source: 1999 to 2004 JAH data, pre 1999 Federal Airports Corporation Annual Reports

Future Growth

Forecast Methodology

In the longer term the fundamental driving forces behind changes in aviation activity at Jandakot Airport are expected to be the airport's ability to expand its role as a premium flight training centre.

The methodology used in preparing the forecasts of traffic at the airport combined statistical analyses of historical data with consideration of other factors that will influence future demand. Forecasts prepared by others were also considered.

Flying Training Schools

As noted above, 63% of aircraft movements conducted at the airport over the past seven years were associated with flight training (circuit training). An increase in the number of major flying training schools at the airport would be expected to have a major impact on total movements.

Forecasting this market segment involved an assessment of the likelihood of any major changes occurring. Key assumptions were:

No new large scale fixed wing flight training schools are expected to be established at Jandakot during the forecast period

The projected increase in pilot training activity over the next five years indicates flying training will remain the most important activity at Jandakot Airport

Domestic flight training has not been quantified by Jandakot Operators and this could impact on the forecast 40% increase in movements.

Previous forecasts for Jandakot Airport such as those in METROPLAN (1990) sourced from the then FAC indicated “High” scenario movements of 425,000 and “Medium” scenario movements of 360,000 for the year 2005. These are significantly greater than the current forecasts, which are closer to the “Medium” or “Low” growth scenario.

Forecast Aircraft Movements

The forecast aircraft movements for Jandakot Airport are indicated in **Table 4.2**

Table 4.2: Total Annual Aircraft Movement Forecasts

Year	Total Annual Aircraft M'ments	% inc	Year	Total Annual Aircraft M'ments	% inc
2004/05	324,000	0.3	2015/16	414,588	1.25
2005/06	335,340	3.5	2016/17	419,771	1.35
2006/07	347,077	3.5	2017/18	425,437	1.35
2007/08	359,225	3.5	2018/19	431,606	1.45
2008/09	371,797	3.5	2019/20	437,865	1.45
2009/10	384,810	3.5	2020/21	444,214	1.45
2010/11	389,620	1.25	2021/22	451,987	1.75
2011/12	394,491	1.25	2022/23	459,897	1.75
2012/13	399,422	1.25	2023/24	467,945	1.75
2013/14	404,415	1.25	2024/25	476,134	1.75
2014/15	409,470	1.25			

The total expected growth rate in movements over the 20 year period is 40%. This will be mainly due to the establishment of a new international helicopter pilot training facility and predicted increases in trainee pilot numbers by Singapore Flying College and China Southern West Australian Flying College.

SECTION 6 - LAND USE IN THE AIRPORT ENVIRONS

Jandakot Airport land abuts the City of Melville on the northern boundary and the City of Canning on the north-eastern boundary (see **Figure 4.2**). Residential land and light industrial activities are concentrated to the north, west and northeast of the airport. Remnants of previous sand extraction activities are evident in the south and east whilst rural activities also occur in these areas.

Current land use zoning in the vicinity of Jandakot Airport is shown on **Figure 6.1** these include:

Public Purposes

Urban

Rural

Parks & Recreation

Industrial

Rural – Water Protection

Urban Residential

The major centres of residential development in the vicinity of Jandakot Airport are the suburbs of Jandakot, South Lake and North Lake within the City of Cockburn, Leeming in the City of Melville, and Canning Vale in the City of Canning. Residential usage in the Cities of Cockburn and Canning are likely to increase, however residential development should not rise in the City of Melville since it has now been fully developed.

Special Rural/ Rural-Residential

There are a number of special rural and kennel areas to the east, south and west of the airport. An extensive rural and special rural area exists to the southwest. In the rural zones the uses include home occupation, plant nurseries, veterinary hospitals, stables and rural pursuits.

Industrial and Commercial Areas

There are several industrial estates in close proximity to Jandakot Airport. They are located at Canning Vale (600 ha), Jandakot (200 ha) and Bibra Lake (540 ha).

The Canning Vale estate lies close to the Roe Highway and the Kewdale-Kwinana railway line. The Jandakot estates are situated near the Kwinana Freeway and along Yangebup Road.

Recreation and Parks

There are a number of recreational and leisure facilities in the vicinity of the airport including golf courses and driving ranges, indoor sporting and leisure centres, parks and gardens.

Mining and Rural

There are no sand mining activities being conducted on airport land, however remnants of sand quarrying operations adjacent to the airport boundary is evident. It is likely that some of these sites will be revegetated in the future. Agricultural activities that take the form of horticultural and animal husbandry are conducted near to the boundaries of the airport. There are also market gardens in the rural areas to the southwest of the airport.

Public/Special Purposes

The major public and special purpose land uses in the area, as defined by the Metropolitan Regional Scheme, are:

Jandakot Airport

Western Power Sites

Hakea Prison

Crown Reserve held by State Department of Planning and Infrastructure

Canning Council Landfill Site

Major Regional Roads

Jandakot Airport is well located with regard to the regional and district road network, which provide a direct access to Perth as shown on **Figure 10.1**

Kwinana Freeway, the major north-south metropolitan freeway, is located 1 km to the west of the airport. The closest on/off ramps are located at Berrigan Drive and Farrington Road (northbound only).

Main Roads WA has commenced construction of Roe Highway Stage 7 from South Street through to the Kwinana Freeway. The proposed road bridge over the freight rail line and alterations to the Hope Road/Karel Avenue/Berrigan Drive/intersections will rationalize access to the airport. (refer to **Figures 10.2** and **10.3**)

SECTION 7 - AIRPORT LAND USE

Jandakot Airport occupies a 621hectare site. There are currently three runways plus associated taxiways and aprons serving the airport. The airport has adequate land to cater for extensions to these runways and the construction of a new 12/30 parallel touch and go runway and associated taxiway facilities. Land is also available for aviation support facilities, non-aviation commercial developments and natural environment conservation precincts.

For existing airport detail refer to the 2005 Aerial Photograph at **Figure 7.1** and the existing airport plan layout at **Figure 7.2**. For airport land use refer to **Figure 7.3**

Most of Jandakot Airport is reserved “Public Purpose – Commonwealth Government” in the MRS although a small section north of Hope Road is zoned “Rural” as illustrated in **Figure 6.1**

Airport land has been divided into three general land uses:

1. Airport Movement Area and Facilities
2. Conservation Areas
3. Non-Aviation Development

The principles for Jandakot Airport’s future development were approved in the 2000 Master plan and are continued in this review.

Airport Movement Area and Facilities

Runways and Taxiways

The MP contains forecasts of aviation demand to help define the physical requirements of airport development over the next 20 years. Responding to forecast and demand and the need to meet the development objectives identified in section 2, the Master Planning process has determined that several important changes to the airport land use plan are necessary.

The most significant issue is the provision of a fourth runway and associated taxiway system. Additional aircraft facility support areas may also be created.

Extension of Aviation Sector

The airport has adequate land to cater for the future expansion of aviation facilities. Expansion of these

facilities is concentrated in 3 main areas. The northern development, which is currently under construction, includes the extension of Harvard Road and the creation of new hangar sites. The southern area will provide additional hangar rows for private use. A central site has also been identified for specialist aviation support businesses.

Non Aviation Development

The airport has substantial land within it’s boundaries that are not required for airfield facilities such as runways, taxiways, aprons, utilities, roads and other aviation support facilities. About 24% of this land has significant commercial development potential.

The December 2000 Master Plan identified broad types of development, which are comparable. Further discussion of the commercial development, proposed for the airport is included in Section-12 Non Aviation Property Development.

Conservation and Heritage Areas

There are areas within the airport boundary that contain remnant Banksia woodland in good condition and a good variety of dampland types. These areas have been entered in the Register of the National Estate.

In an attempt to manage Jandakot Airport in a sustainable manner, JAH has identified approximately (45%) of the airport property as a conservation precinct. This area encompasses the majority of *Banksia* woodland at the airport and provides connection between Ken Hurst Park and Jandakot Regional Park.

Fourth Runway

Jandakot Airport is Western Australia’s major general aviation airport and the busiest in Australia in regard to annual aircraft movements. It is an important base for both local and international pilots with 14 schools including Singapore Flying College, China Southern Western Australian Flying College and the Royal Aero Club of Western Australia. Flying training at Jandakot accounts for approximately 80% of the

annual aircraft movements conducted at the airport 63% being circuit operations.

The most significant planning issue for Jandakot Airport is the consideration of the provision for a fourth runway. This section discusses that rationale for an additional runway and an evaluation of alternatives.

Runway Capacity

For planning purposes an airport runway capacity is usually defined in terms of its hourly capacity (movements per hour) and maximum annual service volume (movements per annum). At a general aviation airport the capacity of parallel runways can be very high due to the number of aircraft in the circuit conducting 'touch and go' movements. The number of aircraft handled in the circuit can be affected by the proportions of single and twin-engine aircraft.

There is however high variability in demand profiles. **Tables 7.1 and 7.2** show aircraft movements recorded for the months of February 2003 (representative of summer wind conditions), and July 2003 (representative of winter wind conditions). Note that in February 2003 the peak daily movements handled were 1410 (5 February) and the lowest daily movements handled were 326 (7 February).

The airport runway capacity when wind conditions suit the parallel runway directions (06/24) is obviously much higher than when wind conditions force operations on the single runway direction (12/30). Compare for example the following:

Runways 06/24

5 February	1410 movements/day
10 February	1081 movements/day
14 February	1120 movements/day
21 February	1168 movements/day

Runway 12/30

24 February	866 movements/day
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Airservices Australia increased the permissible crosswind component on runways 06/24 from 10 knots to 12 knots at which time operations are switched to the 12/30 runway. This enables the 06/24 runway directions to be used for 93% of

operations and for 12/30 directions to be used for 7% of operations.

Assuming that the peak levels of operations actually achieved in February and July 2003 were sustainable and that there is sufficient demand to fill the available slots implies that a theoretical maximum airport capacity can be calculated as follows:

Operations on runways 06/24 (assume 1410 movements handled in average peak per day)
 $1,410 \text{ movements/day} \times 365 \text{ days} \times 93\% = 478,624 \text{ movements per annum}$

Operations on runway 12/30 (assume 866 movements handled in average peak per day)
 $866 \text{ movements/day} \times 365 \text{ days} \times 7\% = 22,126 \text{ movements per annum}$ or total operations of 500,750 movements per annum. In reality it is unlikely that this level of operations would be reached as the demand is not consistent for all hours of the day or for all days of the week.

The analysis does indicate that the existing airport capacity could reasonably handle the forecast demand at the end of the master planning period of 20 years (year 2025) of about 476,000 movements per annum.

Unfortunately, while the usage of runway 12/30 is known to be only for 7% of the total annual movements, those operations occur on a seasonal basis. Comparison of the percentage of usage of each runway for the summer and winter months shows about 0.12% use of runway 12/30 in July 2003 but relatively high use of about 12.30% in February 2003.

The wind conditions requiring the use of the 12/30 runway can occur all day and even for several concurrent days. Several days of operations on runway 12/30 severely impacts on the flying training programme, causing collective financial losses of around \$1million annually to operators, creates congestion and impacts on overall safety.

Table 7.1 - Jandakot Airport Runway Movements – February 2003

Runway Date	06L	24R	12	30	06R	24L	Total	ITIN Helicopters	CCT
1	169	48	46	65	389	163	880	11	21
2	0	103	0	0	0	223	326	7	13
3	0	317	0	0	0	863	1180	35	70
4	0	310	0	0	0	757	1067	18	35
5	155	195	0	0	600	460	1410	27	55
6	0	389	0	0	0	973	1362	9	18
7	127	0	631	0	193	0	951	13	27
8	219	106	0	0	393	253	971	7	13
9	126	31	0	157	269	31	614	4	8
10	0	314	0	0	0	767	1081	20	39
11	0	281	0	0	0	547	828	4	8
12	0	305	142	0	0	643	1090	5	10
13	148	263	115	0	407	387	1320	3	6
14	75	352	0	0	193	500	1120	5	11
15	43	286	0	0	49	451	829	5	10
16	14	169	0	0	100	390	673	2	3
17	81	139	0	142	330	267	959	11	21
18	0	278	0	0	0	653	931	15	29
19	0	322	0	0	0	653	975	5	9
20	0	380	0	0	0	757	1137	9	17
21	125	250	0	0	460	333	1168	7	15
22	0	319	0	0	0	713	1032	5	11
23	0	167	388	0	0	207	762	4	8
24	0	0	505	0	0	361	866	22	43
25	144	158	225	0	353	183	1063	33	65
26	89	128	98	0	257	340	912	6	12
27	0	0	570	0	0	0	570	15	29
28	6	0	558	0	13	0	577	16	33
Totals	1521	5610	3278	364	4006	11875	26654	323	639
% of Total	5.71%	21.05%	12.30%	1.37%	15.03%	44.55%	100.00%	1.21%	2.4%

Source: Jandakot Airport Holdings Pty Ltd

Table 7.2 - Jandakot Airport Runway Movements - July 2003

Runway Date	06L	24R	12	30	06R	24L	Total	ITIN Helicopters	CCT
1	370	23	0	0	940	0	1333	27	53
2	248	0	0	90	660	0	998	25	49
3	17	25	0	108	73	0	223	5	10
4	102	23	0	330	243	20	718	10	20
5	0	31	0	88	0	80	199	1	3
6	5	151	0	0	35	648	839	5	11
7	183	158	0	0	590	200	1131	13	25
8	255	13	0	50	323	17	658	10	21
9	94	63	0	0	267	67	491	1	3
10	0	52	0	8	0	83	143	7	15
11	0	422	0	0	0	1067	1489	7	14
12	483	0	0	0	983	0	1466	9	19
13	106	0	0	222	200	0	528	11	22
14	0	46	0	0	0	0	46	4	9
15	188	213	0	0	547	450	1398	21	42
16	445	0	0	0	1034	0	1479	11	23
17	398	0	0	0	1087	0	1485	17	33
18	515	0	0	0	1123	0	1638	18	36
19	386	71	0	0	820	80	1357	15	31
20	0	203	0	0	0	333	536	20	41
21	19	63	0	165	63	107	417	1	3
22	0	197	0	0	0	269	466	14	28
23	250	178	0	0	867	250	1545	7	15
24	91	277	0	0	310	713	1391	25	49
25	272	116	0	0	687	160	1235	14	29
26	147	23	0	256	583	17	1026	19	38
27	0	178	0	0	0	481	659	11	22
28	263	0	35	0	688	0	986	13	26
29	181	0	0	11	512	0	704	10	20
30	0	113	0	58	0	170	341	7	15
31	0	314	0	0	0	847	1161	12	23
Totals	5018	2953	35	1386	12635	6059	28086	370	748
% of Total	17.87%	10.51%	0.12%	4.93%	44.99%	21.57%	100.00%	1.32%	2.66%

Source: Jandakot Airport Holdings Pty Ltd

The natural preference to continue operations on the greater capacity 06/24 runway directions artificially increases usage in this direction. On days of high crosswinds it should be noted that the winds are much stronger at higher altitudes than at ground level. The consequence is that the flying training circuits tend to widen, affecting residents further from the airport.

The construction of a parallel 12/30 runway would not dramatically increase the airport's total capacity assuming that preference is given to parallel runways 06/24 up to a crosswind component of 10 knots (the crosswind component applied prior to the reduction in Jandakot Tower staff in December 1998).

Assuming that equal movements per day could be achieved in both 06/24 and 12/30 runway directions imply a total theoretical capacity of:

1,410 movements per day x 365 days = 514,650 movements per annum. This equates to an additional 23,000 movements per annum over the existing assumed capacity.

The provision of an additional parallel runway does not greatly increase capacity at a General Aviation Airport Procedure (GAAP) aerodrome since only one direction can be operated at one time, as the training circuits would intersect and conflict.

Alternative Development Options

In considering the possibility of the development of a fourth runway the following options were considered:

"Do nothing" Option

Option 1 - New parallel 12/30 runway (1000m x 18 m) unlit north of the existing 12/30 runway

Option 2 - New parallel 12/30 runway (1000m x 30m) unlit south of the existing 12/30 runway.

Options 1 and 2 outlined above were selected from several concepts developed by JAH in 1999 in consultation with airport users, local authorities, community groups and Airservices Australia. They have been reviewed and modified to meet forecast demands whilst considering operational, economical and environmental factors.

Both scenarios have been selected with the intention of retaining the existing 12/30 runway for

departures and arrivals. The advantages of retaining this runway are:

Existing runway lighting already installed to MOS139 standards.

It is a code 2 runway, 30m wide with a pavement strength designed to cater for larger aircraft with a Pavement Concession Number (PCN) of 11.

Has current crash road alignment and therefore minimises the need for further clearing of Priority 1 vegetation for emergency vehicle access.

Maintains a larger natural buffer between airport and adjacent rural and residential development

The existing 12/30 runway could also be extended to approximately the same length (1390m) as the 06L/24R runway for take off and full stop operations. This measure would permit the complete transfer of operations from the 06/24 to 12/30 directions including those that require the longer runway length.

'Do-nothing' Option

The 'Do-nothing' option does not require development of Jandakot Airport but requires the development of another aerodrome with at least one runway aligned similarly to the 12/30 runway at Jandakot.

Aircraft engaged in training fly to south of Jandakot Airport to a designated training area. Student pilots are taught to fly straight and level, to conduct turns and to be ready to commence take off and landing training which involves circuit flying with many touch and go operations.

A touch and go runway near the flying training area, within 30 nautical miles of Jandakot Airport would provide an ideal situation. Flying schools with training facilities, dormitories etc could still be located at Jandakot, and a significant proportion of circuit training could be re-located away from urban areas.

There are two existing airports within the designated training area, Murray Field and Serpentine Airport. The Royal Aero Club of Western Australia operates the Murray Field Airport. At present this airport is subject to Department of Environmental Protection (DEP) restrictions because of an adjacent land use.

Serpentine Airport is operated by the Sporting Aircraft Association with a long term lease. The Shire of Serpentine-Jarrahdale considers that the airport should remain as a recreational airport and is opposed to its commercial use.

The Western Australian Government and the Commonwealth Government have at various stages investigated the development of a new general aviation airport for the Perth Region, including studies in 1991 and 1994. Unfortunately a site has not been formally identified, acquired or protected.

Given the level of uncertainty with the do nothing option, JAH needs to protect alternatives for the future construction of a parallel runway on Jandakot Airport. JAH will continue working in co-operation with the Western Australian Government to further investigate the option for a touch and go runway, however it appears that the “do nothing option” is not an alternative.

Options Evaluation Criteria

The siting of a parallel runway 12/30 has been investigated to achieve an optimum operation for the following criteria:

Lowest aircraft noise

Maximum conservation of bushland

Maximum operational benefit

Lowest capital cost

Highest safety

Evaluation of Options 1 and 2

Lowest Aircraft Noise

Figure 7.4 illustrates options 1 and 2

The proposed runway locations north and south of the existing 12/30 runway will only have a marginal effect on the location of noise contours generated by for each option i.e. by the physical differences between sites. The more significant impact relates to how the new runway would be operated.

The assumed mode of operation is that the preferred use would remain the 06/24 runway directions and only using the 12/30 runway directions when this is more closely aligned with the prevailing winds. If there were a parallel 12/30 runway, use of the 12/30 runways would probably be higher than that of the existing single 12/30

runway. This is because the direction would be used more often when the cross wind exceeds 10 knots on 06/24 runways. The implication is that the 12/30 runway direction would be used for 12 to 15% of the time but occasionally for consecutive days. The location of the circuit for flying training also has an impact on noise levels and annoyance external to the airport. An evaluation has been made of the overflight of residential areas by aircraft involved in circuit training for each of the options. Currently circuit training on runway 12 and 30 involve left hand circuits. This means that the runway 12 circuits are to the north and runway 30 circuits are to the south.

Option 1

Training circuits for this option would be to the north of the runway and mostly contained within the airport boundary. Arrivals and departures will affect residential areas to the south and south west of Jandakot.

Option 2

It would be necessary for circuits on runway 12R to be right hand i.e. to the south to avoid conflicts with aircraft operating on the existing 12/30 runway. This would result in more aircraft overflying South Lake, Atwell and Glen Iris and would affect more residents than option 1.

Airservices Australia Environmental Principles prefers that where the option is to affect existing residential areas as compared to affecting new residential areas, flight paths should remain over the already impacted residential areas. From an aircraft noise criterion, option 1 is preferred as overflights are generally over areas already affected by operations on the existing 12/30 runway and 06L/24R runway

Maximum Conservation of Bushland

Option 1

The proposed runway and taxiway system and clearing for approach and takeoff areas impact on Priority 1 and Priority 2 vegetation areas. This option has the least direct impact on the clearing of high priority vegetation, requiring only 20ha in comparison to 40ha as required for Option 2.

Option 2

This option requires the clearing of at least 40 ha of priority 1 Banksia bushland for the proposed runway and taxiway system and approach and takeoff areas. It also impacts on the dampland area located at the south-eastern end of runway 12L/30R. The linkage with areas of remnant vegetation south of the airport is maintained similarly, the narrow corridor between the northern and southern conservation areas is also retained.

Maximum Operational Benefit

Option 1 has several operational advantages over Option 2 these include:

The taxiing distance for operators from the centre of the building line to the runway ends is considerably shorter and less congested.

Reduces the amount of aircraft /vehicles needing clearance to cross an active runway en route to runway 30L/12R (option 2), resulting in less delays for operators whilst reducing ATC workload and increasing safety.

Initial discussions with Airservices Australia have indicated that the runway to the north (Option 1) would place the tower in the circuit area giving a greater appreciation of the traffic situation.

The angle between the tower and runway to the north would be less than the runway to the south (Option 2) allowing more accurate monitoring of traffic on final for the parallel runways.

Lowest Capital Cost

The capital costs of Options 1 and 2 differ vastly. Option 2 will be significantly more expensive than Option 1 requiring 20 ha of more bushland to be cleared and mulched. This option also requires the construction of an additional 23,518m² of paved taxiways, in comparison to Option 1 that can make use of the existing 06R/24L non-duty runway and associated taxiway infrastructure.

Highest Safety

Safety is the most critical aspect of the evaluation process. During the development of options in 1999, an aircraft operator expressed concern with the location of a solid row of hangars and other buildings directly across the northern flight tracks for Option 1, on the basis of in the event of an engine failure a pilot could have difficulty in finding a safe location to put down.

During recent discussions held with industry consultants and airport planning engineers in regard to one engine out operations, it was determined that there would be 519.3 metres from the runway end to the building line to effect reasonably safe roll through braking operations.

If an aircraft had one engine out after rotation the existing 12/30 crash road cleared areas would be accessible for aircraft to use in an emergency.

As part of the evaluation process for the MP JAH engaged specialist consulting engineers to conduct a risk assessment on the proposed location of Option 1.

Key assumptions considered were:

Runway positioned as per JAH plan, i.e. runway threshold commences at southern edge runway 06R/24L

Levels based on those contained in JAH plan
Flying club building, 2 stories high - assume roof height is 38.0m AHD (2 levels at 5m each plus ground level of 28 AHD).

Conclusions

OLS

The consultant applied code 2 Instrument, non-precision approach (3.3% 2500m) departure (4% 2500m) OLS model to the proposed runway 12L/30R.

The initial results (final location plans of thresholds will determine the exact clearance from the takeoff and approach gradient) determined a clearance between the approach and takeoff gradient and the existing building line of 4.55m (15^{ft}).

With building height within this area controlled to prevent blocked vision from the Jandakot Tower to the 12 threshold it is envisaged building heights existing in this area will remain at or below this level.

The intent is to use the runway primarily for circuit training and touch and go operations.

OLS Infringements

Based on the generated approach OLS from runway end 12L, no infringement (by flying club building) on the OLS will occur - OLS level at eastern corner of building would be RL38.0 (OLS is 6.2m above top of building). A runway positioned as per layout would meet current MOS 139 requirements.

Preferred Option

Option 2 is discarded on the basis of environmental issues, noise impacts and high capital costs.

Option 1 is preferred in most regards including, reduced impacts on conservation areas, noise, operational benefits, safety and cost.

OLS Clarification

GHD during initial investigation work made some assumptions.

GL at RACWA building @ 33m.

Assumed 2 storey's @ 5m each.

GHD clearance between RACWA and OLS .600m.

JAH Clarification

Based on the following information:

GL @ RACWA site 29.473m.

RACWA building height @ 9.3m.

Total combined height of 38.773m.

JAH used the criteria from MOS 139 chapter 7 Obstacle Restriction and Limitation to design an OLS for the proposed Rwy 12L/30R. Using the table 7.1-1 Instrument Non – Precision Code 2 the following determination was made.

OLS height over nearest corner of RACWA building is 15.722.

OLS height over nearest corner of RACWA building is 9.3m.

Clearance between RACWA building and OLS surface is 6.422m.

Concerns raised in discussion of 30R/12L being the new Runway instead of 30L/12R

Increased risk from "student pilots" overflying building line.

Current Factors to be considered:

Overrun threshold of 30R is 532m from the building line. A C172 has an accelerate stop distance of approximately 576m which is almost half the length of the runway.

A C172 taking off on 30R would be approximately 400ft or higher (based on the aircraft being at MTOW) by the time it has reached the building line.

The extended centre line of 30R is 20m from RACWA building line and proceeds between hangars along a taxiway, it does not actually impede on any buildings

Twin aircraft are not flown solo by students. SFC and CSWAFC fly the twins dual.

Runway 30 currently accounts for only 3.23% of 324K movements = 10,465 movements per annum.

In the last 7 years there have been 6 incidents involving the overshoot or undershoot of a runway: 2 aborted takeoffs by twins and 4 aircraft not making the runway to land. All of these were off RWY 24 L and R. There have been nil incidents on 12/30 where aircraft have failed to make the runway or had an engine failure after take-off.

The last 7yrs has seen a total of 2,168,648 movements equating to 1 incident per 361,441 movements on average. This would equate to 1 incident on Rwy 30 every 34 years.

Mitigating Factors that can be considered:

Displacing threshold to Runway 12L which would put aircraft at a higher approach altitude over the building line.

Move Rwy 30R/12L further east putting aircraft at a higher altitude over the building line for both take off and landing.

Twins only to conduct operations on current existing Rwy 30/12.

Installation of a PAPI to assist with aircraft maintaining correct glide slope.

No installation of lights on the new Rwy, current 30/12Rwy to be used for night flying.

No simulated engine failure after take-off to be conducted on Rwy 30R.

An aircraft having an engine failure is able to land either straight ahead or off to the left where there is a run off and access track at the end of the existing Runway 30.

Improvements to be made to ground area SW of the RACWA parking area, this will make the ground less hazardous to an aircraft having to over-run the area.

An Impromptu meeting was held with a couple of the key stakeholders of the airfield on Wednesday 14th December. All indicated that any risk to having a new runway north of the current is minimal and by adding some or all of the above mitigators more than makes any risk acceptable.

All indicated that they would welcome the new runway in the proposed position north of the current runway citing that there were huge benefits to the industry both operationally and economically.

As a part of the review of this option JAH investigated other airfields around the country, looking at the location of runway thresholds in relation to building lines, both on the airport and off the airport. The following was established which are from thresholds to actual buildings;

Essendon Airport has 4 runways with 3 having a distance of less than 300m to a building line. (283m, 177m, 236m).

Parafield Airport has 8 runways with 2 being less than 500m from a building line and one at just over 600m (403m & 499m).

Archerfield Airport has 8 runways with 3 being less than 400m and one being just over 600m from a building line (342m, 330m, 399m & 627m).

Bankstown has 6 runways with one being just over 650m to a building line (657m).

Coolangatta Airport has 4 runways with 2 being less than 600m from a building line (569m & 540m).

Jandakot will have a distance of 532m from threshold to a building line, the extended centre line does not actually conflict with any actual buildings.

SECTION 8 – AIRSIDE and AIRSPACE PROTECTION

This section of the MP addresses the airfield and airspace protection. The airfield facilities consist of runways, taxiways, aprons and the air traffic control tower and navigational and approach aids. The airspace addresses the controlled airspace, Obstacle Limitation Surfaces and PANS-OPS Surfaces Protection.

Figure 8.1 illustrates the recommended configuration of the airfield system for the year 2025 and for the ultimate development of the airport. Primary facilities include the retention of the existing main Runways 06L/24R and 06R/24L, the existing Runway 12/30 and the proposed fourth runway 12L/30R, apron areas, additional taxiways, and aircraft support facilities.

Planning Standards

The International Civil Aviation Organisation (ICAO) determines international standards and recommended practices for aviation operations. These are published in Annexes to the Convention on International Aviation, which Australia is a signatory. However, Australia also has its own regulatory requirements pertaining to the operation of aerodromes.

Australia's Civil Aviation Safety Authority (CASA) is responsible for developing and promulgating appropriate safety standards under the *Civil Aviation Act 1998*. The aerodrome operator is responsible for the safety of the aerodrome in accordance with *Civil Aviation Safety Regulations (CASR) part 139 – Aerodromes*. A Manual of Standards (MOS) 139 supports the regulations – Aerodromes, which prescribes the technical standards for aerodromes. The specifications contained in MOS 139 are generally similar to the ICAO standards except with amendments for some specifications to cope with local conditions.

Critical Aircraft

The aerodrome reference facility code (ARFC) provides a simple method of determining critical dimensions for movement areas such as runway and taxiway widths and separation distances between taxiway centrelines and adjacent obstacles. Critical aircraft provide a guide to the design of the airfield facilities by ensuring that adequate

clearances are provided for the future expansion of the airfield system

The aerodrome facility code reference code (ARFC), also known as the aerodrome reference code, is a two element, alphanumeric notation (for example 1B, 3C) derived from the critical aircraft for that aerodrome facility. The code number is based on the aeroplane reference field length and the code letter is based on the aeroplane wingspan and the outer main gear wheel span.

The ARFC provides a method of grouping aeroplanes with different characteristics, which behave similarly when landing, taking off, or taxiing. This in turn enables standards for aerodrome facilities such as runways to be set in terms of a small number of aeroplane groups rather than individually for a large number of separate aeroplanes.

For aircraft planning purposes data is also provided on the overall aircraft length, maximum takeoff weight and pressure of main wheel tyres. Data is indicative only, for instance factors such as engine type or flap settings can result in different aeroplane reference field length. Exact values of a particular aeroplane's performance characteristics should be obtained from information published by the aeroplanes manufacturer.

A critical aircraft code 2B has been selected for the master planning exercise at Jandakot Airport over a planning horizon of 20 years.

Runways

The existing length of Runway 06L/24R of 1392m and width of 30m are adequate for the current needs of most operators. Some operators may experience weight restrictions on very hot days. No change to the runway 06L/24R length or width is proposed. The existing length and width of Runway 06R/24L are adequate for touch and go circuit training by current types of aircraft used for training. Runway 12/30 length and width is also adequate for most operations. Aircraft requiring more than 990m can generally use 24R/06L safely since they can usually tolerate a higher crosswind component.

Runway widths of 30m permit non-precision approaches using global positioning systems by aircraft. Pavement strengths will be designed primarily for aircraft with a maximum take-off weight of 5700 kg with the capacity to accommodate occasional movements by heavier aircraft.

Taxiways

Parallel taxiways are proposed for runways 06L/24R and 06R/24L. The taxiway system will include frequent exit taxiways for each runway. Holding and passing bays will be provided at strategic locations.

Connecting taxiways between the two sets of parallel runways will be provided to facilitate improved movement area circulation and increase taxiway capacity.

Aprons

Sealed aprons will be constructed in front of the aircraft hangar building areas where necessary.

Aircraft Parking Areas

Parking areas for aircraft will be designated for long and short term aircraft and helicopter parking. Tie down facilities are provided on some hardstand areas.

Air Traffic Control Tower

No Change to siting of the tower is expected at this stage, but this would require verification through a siting survey.

Navigational Aids

Relocation of the non directional beacon will be required once construction of the parallel runway 12L/30R commences. This may necessitate a review of the NDB-A and NDB-B approach procedures, the ARMAD and MANTL departure procedures, the TEEVE arrival procedure and the 25NM and 10NM Minimum Safe Altitudes.

GPS approaches to runway 06L/24R and runway 30 enable non-precision approach operations by arriving aircraft such as the Royal Flying Doctor Service.

Controlled Airspace

Controlled airspace is established around and between airports to provide for safe, orderly and expeditious flow of air traffic. It has defined dimensions within which air traffic control services are provided to Instrument Flight Rules (IFR) flights and Visual Flight Rules (VFR) flights in accordance with the airspace classification.

The controlled airspace boundaries are depicted in the ASA publications such as the Perth Visual Terminal Charts (VTC) and the Australia Terminal Area Charts (TAC) - Perth

Jandakot Airport is within a 3 nautical mile radius General Aviation Airport Procedure (GAAP) control zone to 1,500 ft. (**see Figure 8.4**) The Jandakot Airport control zone is immediately south of the Perth Airport Control Zone. There is controlled airspace over the Jandakot GAAP controlled zone from 1,500 ft to 60,000 ft.

There is a large flying training area to the south of Jandakot Airport designated D104 from ground level to 6000 ft.

Light aircraft lanes are shown on the Visual Terminal Charts. These VFR flight tracks are used to facilitate aircraft arriving and departing the Jandakot control zone.

Protection of Airspace

Obstructions in the vicinity of an airport have the potential to create air safety hazards and to seriously limit the scope of aviation operations into and out of the airport.

Runway directions are normally selected to provide for approaches and departures clear of obstacles including terrain and man-made structures such as radio masts, tall buildings and transmission lines. Objects as far away from the airport as 15 km can have an effect on airport operations.

Whilst the protection of airspace is applied to all stages of flight, it is most critical for landings and departures at airports. During these stages, the aircraft is close to the ground, the pilot's workload is greatest and the aircraft is least

manoeuvrable. Since the majority of aircraft accidents occur during these stages, the objective is to provide a safe, predictable environment in which aircraft can land and take-off.

The presence of an obstacle in a critical position may increase the operational minima of cloud base and visibility resulting in reduced useability of the airport in poor weather and the commercial viability of air services.

International and national standards have been adopted which define two sets of invisible surfaces, which delineate these airspace requirements.

Obstacle Limitation Surfaces (OLS)

The control of obstacles in prescribed airspace at federally leased airports is regulated under the *Airports (Protection of Airspace) Regulations 1996*.

The OLS are a number of reference surfaces in airspace, which determine when an object may become an obstacle to aircraft manoeuvring in the vicinity of an airport. An obstacle is defined as an object or exhaust plume that infringes the OLS. These surfaces are defined by reference to the existing and proposed runway ends and the aerodrome reference point.

Figure 8.2 shows the Obstacle Limitation Surface for the Ultimate Development of the airport. The OLS defines a volume of airspace in proximity to an airport, which 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 to ensure that existing or potential obstacles are examined for their impact on aircraft operations and that their presence is properly taken into account.

PANS-OPS Surfaces

Figure 8.3 shows the PANS-OPS for ultimate development. ICAO defines standards for the safe navigation of aircraft. These standards stipulate clearance requirements known as Procedure for Air Navigation Services – Aircraft Operations.

Aircraft manoeuvring for departure on arrival in the vicinity of an airport in Instrument Meteorological Conditions (IMC) are required to be kept clear of obstacles for reasons of safety and aircraft useability

and efficiency. Imaginary surfaces in the airspace are defined to provide the required clearances between aircraft and objects in Instrument Meteorological Conditions. When visibility is poor the imaginary surfaces are referred to as PANS-OPS surfaces. The prescription of PANS-OPS surfaces will protect the existing flight procedures and, if so planned, protect airspace from obstacle intrusion for future development.

The height of the terrain or man-made obstacle determines the elevation of the overlaying PANS-OPS surface. New and higher structures directly affect the design on PANS-OPS surface.

As aircraft operate within these surfaces relying only on instruments the height restrictions imposed by PANS-OPS cannot be infringed in any circumstances.

The following PANS-OPS surfaces have been designed at Jandakot Airport

Radar One/NDB

VOR/DME (using Perth navigational aids)

NDB or Radar Two/NDB

Runway 06L/24R and 30 GPS

Circling Area

SECTION 9 - SUPPORT FACILITIES

As Jandakot Airport grows, so does the need for support facilities. These include aircraft maintenance, aircraft storage, aircraft sales and spare parts, flying training premises, fuel depots, aircraft and vehicle wash down bays.

Figure 9.1 indicates the recommended siting of the support facilities for 2025 and outlines the land reserved for additional support facilities at ultimate development.

The site development has been prepared with the following objectives:

To achieve operational efficiency

To avoid high priority conservation areas

To avoid the Jandakot Ground Water Mound

The following provides a general description each facility.

General Aviation Aircraft Facilities

The demand for maintenance hangars for general aviation depends more upon economic growth than the demand for increased services.

To meet forecast demand for larger hangars with apron frontage, the majority of new sites will be located west of Mustang Road at the north - eastern end of the existing building area and adjacent to taxiway alpha. The south-eastern side of Mustang Road provides for smaller building sites with apron frontage, aircraft parking areas and central access taxiway.

A dedicated helicopter building and operation precinct is also being developed in this area north of Bell Court.

Provision has been made at the south- western end of the existing building area to expand hangar facilities. It is anticipated that there will be a demand for multi user hangars. Traditionally these buildings consist of four to ten individual hangars within the one complex.

A central aviation precinct located west of the current building line will provide sites for aviation technology such as avionics, aeronautical design, aircraft and component sales. It will also allow for the relocation of current airport tenants.

Aviation Fuel

Jandakot Airport currently has two aviation refuellers, Air BP and Shell Aviation operating at the airport.

Jet A -1 and AVGAS fuel is mainly provided to aircraft by mobile refuelling vehicles. Although both operators have separate depots, Air BP also has storage and dispensing facility located within their existing site.

Sufficient land is available for an additional fuel facility to service the north-eastern building area extension if required.

Flying Training Facilities

JAH will actively seek to encourage existing flying training establishments to expand the range of training conducted (eg. to provide for ground training as well as pilot training). The plans allow for the expansion of the existing sites to support these facilities.

Compass Swing Bay

A Compass swing bay is provided at the northern end of, off taxiway Bravo. Presently this facility doubles as truck mounted engine run up bay.

Ground Run-Up

Following a review in 1999, JAH implemented new Standard Operating Procedures for Aircraft Ground Running. The procedures include the use of the non-duty taxiways (Sierra, Charlie) for any aircraft requiring a ground running period of 5 minutes or longer.

Taxiway golf has a purpose built tie down point for ground running high powered aircraft (especially tail wheel aircraft)

Aircraft Wash Bays

The existing aircraft wash bays will be supplemented at a future date as demand grows. The facilities will satisfy environmental controls.

Navigational Aids

JAH has an existing Non Directional Beacon (NDB). This facility is used by various aircraft en-route to Jandakot Airport.

Airport Lighting and Movement Area Guidance Signage System

Jandakot Airport has two lit runways 06L/24R and 12/30. An extensive taxiway and apron lighting network is also provided. Runway 24R has a Precision Approach Path Indicator (PAPI). Holding point lights will be installed at all holding point positions.

Jandakot Airport also has extensive Movement Area Guidance Signage.

Air Traffic Control

Air Traffic Control service at Jandakot Airport is provided by Airservices Australia. The control tower hours of operation are between:

8.00 am and 6.00 pm weekends

8.00 am and 8.00 pm week days (June to August)

8.00 am and 9.00 pm week days (Sept to May)

SECTION 10 - GROUND ACCESS SYSTEM

This section of the MP addresses the needs of the airport in terms of ground access from the perspective of the regional road network, the internal road network potential freight rail, and public transport access.

Requirements for Airport Access

A general aviation airport such as Jandakot Airport differs from a major passenger handling airport such as Perth International Airport. The traffic volumes are much less, currently only 3500 vehicles per day. There is not the need (nor viability) for a sophisticated public transport system and the origin and destinations of airport users are more diverse.

To maximise the potential commercial land uses for developments at the airport, good road links to industrial and commercial centres in the Perth Metropolitan Region is essential. The major opportunities and constraints relevant to ground access for Jandakot Airport in the long-term beyond 20 years may be summarised as follows:

Provision of a good standard road network to service not only airport generated traffic but local and regional transport needs

Improvements to the airport access with the construction of the Roe Highway stage 7

Road traffic impacts on surrounding areas from airport and non-airport related traffic

Capital cost and availability of land to upgrade surface access networks servicing the airport

Existing road and traffic characteristics formed the basis for estimating future network requirements. These trends together with the estimated road traffic generated from future aviation and non-aviation developments at the airport determined the surface access requirements.

Road Access

Existing and potential traffic

Jandakot Airport is very well located with regard to the regional and district road network with good links to the main State highways to provide a direct access to Perth as shown on **Figure 10.1**.

Kwinana Freeway, the major north-south metropolitan freeway, is located 1 km to the west of the airport. The closest on/off ramps are located at Berrigan Drive and Farrington Road (northbound only).

Roe Highway stage 7 currently under construction is located just north of the airport in an east-west alignment, is the extension of Roe Highway from South Street to the Kwinana Freeway. JAH has worked closely with the Roe 7 Alliance and the City of Cockburn to effect a connection with the Roe Highway/Karel Avenue interchange to the main entrance to the airport.

The proposed works include major modifications to the Hope Road/ Karel Avenue/Berrigan Drive intersections, a road bridge above the freight rail line with an off ramp directly into the main entrance of the airport. (**See Figure 10.2**) These improvements will create opportunities for non-aviation development, and accommodate the future development of Jandakot Airport.

Inevitably the expansion of Jandakot Airport will result in an increase in traffic volumes of both light and heavy vehicles. The direct access onto Roe Highway should however minimise any increased traffic into local areas, as the only other road to give access will be Berrigan Drive.

Based on proposals outlined in Section 12 – Non Aviation Development future traffic flows have been developed. At this stage very little detail has been developed regarding the land use proposals consequently traffic levels are purely indicative of the development that may occur.

Most of the land uses envisaged as suitable for this for this area have comparatively low generating traffic characteristics. Using normal yields and a 65% plot ratio the area could accommodate 620,000m² of gross floor area (single storey). This level of floor area combined with the airport traffic could generate in the order of 15,000 – 20,000 vehicle movements per day when fully developed. Traffic volumes would be spread over the day with some increases occurring during peak hour.

Public Transport

The public transport system servicing Jandakot Airport is currently minimal as users of the airport generally commute via private vehicles. However, as Jandakot Airport is developed there may be a need for a comprehensive public transport network for the airport and surrounding regional centres.

Bus Service

Jandakot Airport is internally serviced by one bus (route 189) that operates on a Saturday between the airport and Murdoch Park and Ride. Frequent services operate daily to Fremantle and Perth, via Jandakot. The closest bus stop that services Jandakot Airport is located 20m west of the Berrigan Drive and Hope Road intersection.

Rail

The southern corridor passenger railway line will provide a direct link from Perth to Mandurah with a 48 minute journey down the centre of the Kwinana Freeway. Rail services are expected to begin late 2006. Transit interchanges with park and ride facilities close to Jandakot Airport will be built at South Street and Thompson's Lake.

The Kenwick to Kwinana Freight Rail Line runs beside the northern boundary of the airport. The railway is the link between the industrial areas located on the coast at Kwinana, Cockburn and South Fremantle and the interstate rail facilities at Kewdale.

Internal Road Network

The internal road system has been designed to achieve the following:

- A 'gateway' focus at the main airport entrance on Hope Road

- A 2 lane boulevard on Hope Road

- A well defined route to the main airport area

- Slip lanes leading into the commercial development areas on and off Hope Road

The intention is to separate the airport traffic from commercial and industrial traffic. Appropriate signage and landscaping will reinforce the hierarchy of the roads. The internal road network is illustrated in **Figure 10.2**.

Aviation Access

The development of hangar and maintenance facilities is constrained by the existing runways and the areas that have been earmarked for conservation. The extension of existing internal road system will be towards the northern and south-western sectors of the airport.

Car park facilities for aviation related industries are normally provided within the individual facility sites. This policy will continue for future development of new hangars and maintenance facilities.

Commercial and Industrial Areas

A clearly identified intersection should be provided at the entrance on Hope Road. This entrance will lead into the Commercial/Industrial Estate. A suitable gateway entrance will be used to emphasise the feeling of entering the commercial/Industrial precinct.

Adequate provision for vehicle parking will be made within individual commercial/industrial facilities.

SECTION 11 - UTILITIES AND SPECIAL SYSTEMS

For the airport to function effectively, utility services need to be able to meet future demand. These services include potable and fire water, sewage, gas, drainage and stormwater, power supply, communication systems and fuel.

Objectives

The objectives of these services are as follows:

Provide adequate capacity to meet peak demands

Ensure reliability

Provide a safe system

Ensure protection and safeguards

Water Supply System

The water supply to the airport is currently provided from the Hamilton Hill Reservoir through the following network of mains:

South Street 760 mm main

Beasley Road 200 mm main

Dundee Road 200 mm main

Marriot Road 150 mm main

The connection to South Street main is the only mains water connection to the site. A 600 mm main has been laid parallel to the existing 200 mm main in Beasley Drive however it terminates adjacent to Phillip Jane Park.

In the past, there has been some interruption to the water supply as a result of housing development around the airport. In the future as development occurs on the airport it may be necessary to augment the supply to guarantee an uninterrupted service.

Discussions with the Water Corporation have indicated the most likely way to up-grade the supply would be to increase the size of the service from Beasley Road and Dundee Road. Depending on the development this could require a 200 mm or 300 mm main. Should a 300 mm main be required it would be necessary to connect to the existing 600 mm main in Beasley Road.

It is anticipated the new distribution main for the airport would follow Marriott Road and Hope Road extending under the rail and controlled access highway reserve to Karel Avenue and

connecting to the existing service at Sylvan Crescent in Leeming. Details of the existing and proposed future water supply are shown in **Figure 11.1**.

Jandakot Airport also operates a number of ground extraction bores, which it uses to provide reticulation to airside grassed parking areas and landscaping around the airport. Some bores can be used as a source of water to be used to supplement fire fighting for the airport. Fire fighting water sources are currently being derived from mains water supply.

Sewerage System

The airport is not currently connected to the deep sewer system. Disposal is via the discharge septic tank and effluent trench system and aerobic treatment units (ATU) for larger developments.

The Western Australian Government's sewerage policy for the Perth metropolitan region requires the following:

All subdivision or density developments to be provided with reticulated sewerage except where discretionary provision may apply.

Unsewered subdivision or density development not to exceed R12.5 within the inner metropolitan area

Subdivision or density development exceeding R5 in the outer metropolitan area to be subject to the provision of reticulated sewer except in certain circumstances set out in the policy

In the short to medium term the options for connection to the existing Water Corporation sewerage system are limited and carry an exorbitant capital cost. The Water Corporation has advised the sewer system in adjacent residential areas such as Leeming cannot accept additional effluent flows.

The only short term option for JAH is to construct a new pump station and pressure main to discharge into the Bibra Lake main sewer in Bibra Drive, a distance of approximately 3.5 km.

Discussions with the Water Corporation and Consulting Engineers, have put a construction cost of \$2 million and with a \$3.8 million head-works fee payable to the Water Corporation, connection is not feasible.

A longer term option may be to construct a pump station and pressure main to connect a future main sewer in Berrigan Drive. However, this option is in the very early planning stages and therefore the connection is uncertain.

In the short to medium term JAH proposes to continue with small developments using on site disposal and larger developments using aerobic treatment units (ATU).

JAH will consider the establishment of an on site sewerage treatment plant depending on demand for the proposed commercial development area.

Gas System

There is currently no gas reticulation system at the airport. Adequate demand for a gas supply could be created by the proposed non-aeronautical commercial developments in the north-western sector of the airport.

Drainage System

There is no defined natural surface drainage on the airport land. Intensive rainfall may produce surface run-off but due to very porous nature of the ground surface this would be localised and of short duration. A drainage basin currently exists at the north-eastern corner of the airport. The basin rarely contains water, generally only after significant rainfall events.

At present drainage from paved areas falls to a series of interconnected open unlined drains (OUD) and extensive pip network aligned parallel to the main aprons. The drain discharges to the drainage basin on the north side of the airport. As noted above most runoff percolates into sandy soil before reaching the basin. Drainage from washdown bays and refuelling areas is stored or discharged through purpose installed plate separators or via interceptor pits.

Future development of the airport will require increased paved areas which will increase stormwater runoff. The existing system will be maintained and as aviation development proceeds on the northern side of the airport the existing drainage basin will be relocated as shown in **Figure 11.1**.

Parts of the building area and paved movement area are close to the defined boundary of the

Jandakot Ground Water Mound. To ensure that the ground water is not contaminated by airport activities stormwater drainage will be directed away from the ground water mound for future runway apron and parking areas.

Electrical Power Supply

Western Power provides power from a 22KV supply along Hope Road to a HV switching sub station on the airport's western boundary.

The switching sub station is in good condition and capable of being upgraded. A 22KV overhead distribution line continues along Hope Road to the main sub station on the corner of Marriott Road. The sub station transformer uses 2 x 1.0MVA 22/11KV connecting to an 11KV internal distribution system and 11KV/415V transformers.

The MP includes proposals for significant aviation and non-aviation commercial development. Substantial aviation development would require an additional upgrade of the power facilities, whilst the proposed commercial development area demand would be approximately 30MVA based on 200KVA/ every 1ha.

Future development will require significant upgrading of the power supply infrastructure. The existing 22KV overhead transmission line poles along Hope Road are in poor condition and will need replacement. Development of the proposed commercial area will require a detailed strategy for the power supply. JAH provide and maintain a stand by power supply by way of an emergency generator, however only for essential services. These being Airservices Australia control tower, runway/ taxiway lighting, JAH administration and maintenance facilitates and the emergency gate.

Communication Systems

Telstra provides the landline telecommunication services with external connections. Maintenance of the telecommunications systems is the responsibility of the individual network owners and not JAH.

A significant upgrade to infrastructure by the Telco is seeing the installation of a fibre optic cable network to cater for increased demand within the airport.

SECTION 12 - NON AVIATION DEVELOPMENT

Overview

This section of the MP reviews the approved December 2000 Master Plan and outlines a development strategy for 148ha or 24% of airport property, which is defined as land surplus to long term aviation related and ancillary support requirements.

The purpose of the property development plan is to provide strategic development direction, which is guided by sound on-airport and off-airport planning principles.

This section includes the following components:

Objectives

Development Opportunities

Development Strategy

Recommended Development Plan

The recommended land uses and development plan are meant to be used as a broad framework. Details are subject to change in the future as subsequent detailed structure planning and implementation of the development plan occurs.

Planning Objectives

The planning objectives are to define land uses and a development plan which:

Integrate the airport's overall development strategy and aeronautical requirements

Accommodate the planning constraints unique to airport property such as aircraft noise and obstacle limitation surfaces, clearances to navigational aids and restrictions to lighting which place land use conditions and building height limitations on applicable commercial properties

Address conservation issues on the airport through sensitive planning, integration and preservation of natural bushland areas, improvements to sewerage disposal and site remediation

Respect and supports the current regional and local planning schemes and concerns outlined in the Perth Metropolitan Region Planning Scheme and Local Town Planning Schemes

Respect and support the planning efforts of airport neighbours such as the City of Cockburn, City of Melville, City of Canning, City of Gosnells and the City of Armadale

Foster and support sustainable development within the airport boundary using the latest 'best practice' planning and support the economic development of the region

Implement measures to minimise adverse impacts on the Jandakot Groundwater Mound

Development Objectives

The development objectives are as follows:

Define the areas of airport land available for non-aviation development, which are:

Not required for aeronautical activities in the long term

Compatible with building height restrictions and aircraft noise levels

Suitable for development consistent with balanced conservation objectives

Identify potential uses that will provide optimum commercial returns which:

Are not going to adversely affect the Jandakot Groundwater Mound

Are compatible with the overall objectives of the Metropolitan Region Planning Scheme

Are compatible with the objectives of the local authorities' planning schemes

Are compatible with the airport's safe and efficient operation

Implement a development program of staged growth with:

Appropriate provision of infrastructure improvements (including sewerage, water, power and telecommunications)

Sound environmental management of the development process

Adds maximum value to the airport by:

Acknowledging and resolving reasonable concerns of Government authorities and the local community

Working closely and cooperating with the airport neighbours

Improving access to the airport

Innovative and imaginative marketing

Development Opportunities

Competitive Advantage

Jandakot Airport is located 18 km south of the Perth City Centre. The land is at the periphery of the rapidly growing metropolitan area, adjoining the Kewdale-Kwinana railway and is a short distance from direct access points to the Kwinana freeway and the Roe Highway.

During off-peak periods, travel time by car is 15-20 minutes to the Perth CBD and 35 minutes to Perth's east, west and northerly suburbs and industrial areas.

There is a wide range of existing land use functions in the areas surrounding the airport. In particular the site:

Is well placed in relation to industrial and mixed business development, availability of large sites, good access and ease of movement for goods with minimum conflict with adjoining land uses. Vacant industrial land in the industrial estates of Canning Vale, Jandakot, Bibra Lake and Henderson is diminishing

Offers opportunities for small scale airport related retail given the relative isolation for the airport population to convenience stores

Has existing recreational activities on site, park and picnic areas, volley ball, basket ball and tennis court facilities

Business Opportunities

Business activities on the development areas are most likely to be in the commercial and industrial service sectors. To suit industrial development the land parcels need to range from 2 000 m² upward. Commercial/retail activities will be centred near the main airport entrance.

JAH does not propose to allow major retail development at Jandakot Airport. Small retail facilities will be encouraged to meet demand from the local catchment on airport land.

Infrastructure

There is limited provision for support services to the areas surrounding the airport as discussed in section 11 - Utilities and Special Systems. To achieve the level of service essential for the marketing of the proposed development land it

will be necessary to undertake major improvements to the current infrastructure.

Accessibility

In the medium term the proposed development of the Regional road network including the Roe Highway connection to Kwinana Freeway and the Karel Avenue/Berrigan Drive/Hope Road link will provide excellent ground transport links.

Development Strategy

Jandakot Airports' 622 ha of property have been divided into three land use precincts as shown in **Figure 12.1**. The use of precincts facilitates the identification of specific activities, assists with the development of programming and marketing.

The precincts have been selected with regard to:

Location and access

High priority conservation areas

The boundary of the Jandakot Underground Water Pollution Control Area (UWPCA)

Airport constraints (noise, height, clearance to navigational aids)

Flexibility of use and subdivision

Provision of infrastructure

Land Use Precincts

The land use recommendations are as follows:

Precinct 1 - Airport movement area and facilities

This precinct contains the entire essential aviation infrastructure including runways, taxiways and aprons. Also included is the airport building area for hangars, flying schools, dormitories and lettable aviation business related sites.

Precinct 2 - Conservation areas

The airport conservation areas will form part of a regional network of fragmented remnant vegetation that includes Banksia bushland.

The airport lies immediately north of the Jandakot Botanic Park. The southwest conservation area will provide linkage to areas of remnant vegetation south and east of the airport.

To the east, the airport abuts Acourt Road Bushland (Bush Forever site 389), which forms part of the Jandakot Botanic Park.

The north-eastern conservation area borders Ken Hurst Park, which contains approximately 53 ha of bushland. The park is included within the West Australian Government Bush Forever as site no. 245 and its continued presence assists in the long-term sustainability of the north-eastern conservation area.

Precinct 3 - Non-aviation development

The Non-Aviation Development precinct has the following attributes:

Clear of long term aviation uses

Not significantly affected by airport operational constraints such as building height limits, aircraft noise or restrictions to lighting

Has good future access to the Roe Highway.

Is clear of the Jandakot Ground Water Mound

Occupies an area of low priority conservation bushland

The MP identifies the 148 ha zone proposed for Non-aviation development. In general the area is proposed to be developed for "Mixed Business" and "Light/Service Industry" uses as defined in the City of Cockburn's District Zoning Scheme No.3.

"Mixed Business" use includes buildings designed primarily for:

Office

Showroom

Wholesaling

Service Industrial

Trade and Professional Services

Recreational and Educational Purposes

Reception Centres

It also includes the sale of goods and the provision of services appropriate to developments adjacent to shopping centres and residential neighbourhoods.

"Light /Service Industry" land uses could also include

Commercial Vehicle Parking

Storage and Warehouse Facilities

Distribution Centres

Business/Technology Park

Office/Warehousing

Land uses designated below provide an overall vision for the airports commercial development whilst accommodating flexible resolutions to future opportunities.

10% 15ha Showroom

50% 74ha Warehouse/storage

7% 15ha Professional/office/business/technology

18% 27ha Retail

12% 18ha Roads/parks and gardens

3% 4ha Services and utilities

Land Use Planning

The MP proposes three main land uses on the airport.

Precinct 1 – Airport movement area and facilities

Precinct 2 – Conservation area

Precinct 3 – Non-aviation development

The criterion for selecting these areas has previously been established. In the future it will be necessary to prepare detailed "Structure Plans" for the proposed development areas. These land use plans would be prepared in a sensitive manner to take advantage of the natural attributes of the land, links to transport and the market for business development and industrial land.

Land use zones would be established compatible with the City of Cockburn's District Zoning Scheme No. 3 for "Mixed Business" and "Light/Service" industry zones.

JAH's preference for the non-aviation precincts is for low labour intensive industries utilizing large parcels of land. Noxious industry land use will not be permitted at Jandakot Airport.

Off Airport Land Use Capability

The land use zones surrounding the airport and the proposed "on airport" land use zones are shown at **Figure 12.2**. Although the airport land is coloured "commercial" it is proposed that this area would be as noted above. Particular areas would be established in a future detailed structure plan.

The proposed development area is to the north-west of the existing airfield development. The existing Kewdale – Kwinana freight railway line and the Roe Highway extension will provide an

appropriate buffer to the Leeming residential area.

To the north-east, the off airport land use includes Ken Hurst Park which is zoned as a development precinct by the City of Melville, under its Community Planning Scheme No.5.

To the south-east the area abuts the airport conservation area and rural living areas. Other land uses to the north-east include rural, special rural and public purposes.

The proposed land use for non-aviation development:

Is located in an area buffered from residential areas

Has compatible land uses on all adjoining boundaries

Is well connected to regional transport links

JAH believes that the development of land within the airport boundary proposed in the MP is compatible with the surrounding land use

Development Process

Development on airport land is not subject to normal Western Australian Government or Local Government planning processes, however, JAH believes that it is necessary for State and Local agencies to be involved. Therefore future detailed structure plans necessary for development of the commercial precinct should be prepared in consultation with the Local and state government authorities.

Particular areas to be considered and agreed include:

Traffic Management

Standards for the development of infrastructure

Review and referral processes and procedures

Certification of compliance with established standards

SECTION 13 – ENVIRONMENT

Environmental issues relating to the future development of Jandakot Airport are discussed in this section. Along with potential impacts management proposals are highlighted for each factor.

Airports Act 1996 and Airport Regulations 1997

Jandakot Airport is leased and operated in accordance with the *Airports Act 1996* (the Act) and *Airport Environmental Regulations 1997* (Regulations). Parts 5 and 6 of the Act and the Regulations establish a system of regulation to promote awareness of environmental issues and to ensure that appropriate systems are in place to manage pollution, noise and other environmental impacts associated with airport operations.

The regulations:

- Set standards and impose duties in relation to environmental pollution
- Authorise the monitoring and remediation of breaches of environmental standards
- Support improved environmental outcomes for leased Commonwealth airports

The regulations do not apply to pollution generated by aircraft, nor noise generated by aircraft in flight, landing, taking off or taxiing at the airport. The Commonwealth regulates the pollution and noise effects from aircraft under the Air Navigation Regulations. Conversely, noise generated from ground running of aircraft engines are covered by the regulations and are discussed in this section.

Commonwealth Regulations

The Commonwealth of Australia is bound to consider in its approval process for individual development proposals legislative requirements such as:

- Environmental and Biodiversity Conservation Act 1999
- Aboriginal and Torres Strait Islander Heritage Protection act 1984
- Australian Heritage Council Act 2003
- Native Title Act 1993

These laws protect endangered species, national heritage and matters of indigenous heritage at Jandakot Airport.

The preparation of the Master Plan has proceeded in accord with the principles and strategies specified in the approved 2004 Environment Strategy and with input from, Commonwealth, State and Local Government Authorities, airport tenants and users, community and environmental groups and interested individuals.

Environmentally sensitive areas and issues of concern have been identified. The Master Plan has been designed to avoid and minimise environmental impacts.

The Master Plan offers positive and significant trade-offs between commercial returns, operational needs, and environmental impacts as discussed below.

Master Plan

In accordance with the “*Airports Act 1996*” JAH is required to develop a Master Plan and Environment Strategy for review and approval by the Minister for Transport and Regional Services every 5 Years.

The Master Plan is intended to act as a functional guide towards development of a framework for the planning of the airport integrating relevant land use, environmental and transportation issues. The horizon for the Master Plan is 20 years.

The Master Plan does not constitute a development proposal. The Act sets a process for the consideration and approval of proposals defined as being a “major development”. The definition is wide ranging and includes developments such as runways, taxiways, terminals, major road works, etc which exceed financial criteria or add substantially to airport capacity, or affect environmentally significant sites. Individual development proposals will be subject to separate environmental assessments.

Environment Strategy

The Environment Strategy (ES) is the companion document to the Master Plan. Ordinarily these documents would be prepared in parallel, however they have been prepared separately in this review period due the December 2000 Draft Master Plan being initially rejected by the Minister in September 1999.

The Minister for Transport and Regional Services approved the current Environment Strategy in December 2004.

JAH recognises its responsibility to maintain and protect the environment in and around its operations. The Environment Strategy is the policy framework that guides the management of environmental impacts arising from airport operations. The ES has a horizon of 5 years and sets out how the airport will be operated so that its environmental health is maintained or improved.

The ES establishes:

Jandakot's Environmental Policy

Environmental management objectives

Areas within the airport that are environmentally significant

Sources of environmental impact associated with airport operations

The studies, reviews and monitoring that will be carried out in connection with impacts associated with operations and usage

Timeframes for completions of studies, reviews monitoring and reporting

Specific measures to be carried out for the purpose of preventing controlling or minimising the environmental impacts associated with airport activities

Details of consultations undertaken in the preparation of the strategy

Environmental Management System

JAH has developed an Environmental Management System (EMS) consistent with the International Standard ISO 14001. The EMS provides the implementation framework to enable the objectives and commitments of the environment strategy to be met. The EMS describes Jandakot Airports:

Environmental Policy

Organisational Structure

Environmental responsibilities, practices, procedures processes and:

Resources for developing, implementing, reviewing and maintaining environmental policy and achieving continual environmental improvement

The performance of the EMS is reviewed and updated through:

Annual management review

Internal biennial site audits

Triennial external EMS audits.

This system provides the active structure to identify and control the environmental aspects of the airports operations, ensuring that a systematic, consistent approach is taken across the organisation.

Environmental Management Plans

Environmental issues at Jandakot Airport have been identified through environmental reviews, audits and the development the EMS.

Environmental aspects have been assessed and prioritised for action, in order to manage risk and improve performance. Aspects have been grouped into similar disciplines, subsequently allowing for efficient summary and reporting in Environmental Management Plans. The Environmental management plans are the implementation tool for achieving the objectives and targets of the EMS and the Environment Strategy. Specific environmental management plans address:

Groundwater & Soil Protection

Air Quality

Natural Area Management

Surface Water Quality

Waste Management

Energy & Non renewable Resources

Domestic Waste Water

Noise Management

Specific actions and timing for commitments are contained within the ES. Identifying sources of environmental impact is an ongoing process as the airport develops and management evolves. This process of change is addressed through a review and inspection process.

Potential Environmental Impacts

The major off-airport site impact associated with the development of the airport is noise generated by aircraft operations. The primary on-site impacts associated with the development of the airport are vegetation clearance and the subsequent loss of flora and fauna habitat.

Other potential environmental impacts include issues relating to air, soil, surface and ground water pollution associated with airport operation.

The 2004 ES addresses these issues in detail and proposes comprehensive management action plans to mitigate these potential environmental impacts.

Aircraft Noise

The major environmental impact generated by Jandakot Airport is aircraft noise. For land use planning purposes in Australia, noise impact is illustrated using the Australian Noise Exposure Forecast (ANEF) system. The ANEF is a main aspect of the Australian Standard 2021 -2000 (Acoustics Aircraft noise intrusion – Building siting and construction) that provides land using planning in the vicinity of airports.

There are three types of indicators:

Australian Noise Exposure Index (ANEI), which calculates the actual noise exposure for some previous time period of usually a year

An Australian Noise Exposure Concept (ANEC) which is a planning tool used to test the changes to noise exposure resulting from proposed changes to airport operations

An Australian Noise Exposure Forecast (ANEF) which is the official land use planning document and takes into account likely changes for some time in the future, usually between 10 to 20 years or at the ultimate development. There can only be one ANEF for an airport and it is updated on a regular basis

Development and Forecast

The MP considered options for runway development at Jandakot Airport. These included a “do-nothing” option, which proposed a new touch and go satellite training airport to the south of Jandakot. Since a site has not been identified, acquired or protected the MP has retained the option for a fourth runway at Jandakot Airport.

Two options for the siting of the fourth runway have been considered. The preferred option 1 has been adopted for planning.

From the annual demand capacity it is clear that a fourth runway is not required for capacity. A fourth runway however will provide for improved safety and efficiency by reducing congestion and delays on those occasions when high crosswinds force operators from the 06/24 runway directions onto the 12/30 directions.

The new runway in the 12/30 direction will only be used infrequently and the operations will be

seasonal. During the summer however, there could be some days when the 12/30 runway direction will be utilised fully. On an annual average basis the noise impacts should be relatively slight. However for affected residents the noise impacts associated with the use of the 12/30 direction runways will be intense, at frequent intervals and of relatively short duration.

To minimise impacts it is desirable for circuit operations to be to the east, where there is more open space and where the noise is largely over the airport. Consequently it is desirable for the existing 12/30 runway to be retained for aircraft departures and arrivals and the new parallel runway to be used for circuit training.

Noise Modelling

Calculations of aircraft overflight noise were conducted using the Federal Aviations Administration Integrated Noise Model (INM) version 6.1 software. This model has been developed and is continuously upgraded by the US Federal Aviation Administration.

Aircraft Noise Contours

Forecasts indicate that at the end of the 20 year planning period the airport will conduct 476,000 annual movements, almost its ultimate capacity potential. **Figure 13.1** shows the Australian Noise Exposure Forecast (ANEF) for 2025, which includes the additional runway parallel north of the existing 12/30 runway. The ANEF was submitted to Airservices Australia and has been endorsed for technical accuracy.

ANEF contours are based on outputs from the Integrated Noise Model (INM) computer program. Input data for the model includes the following variables:

- Selection of aircraft types (aircraft fleet mix)
- Numbers of Aircraft (including departures, arrivals and circuit operations)
- Runway dimensions and allocation to respective operations
- Flight Tracks
- Aircraft Destinations or origins (consideration of track allocation)
- Day/Night operations
- Terrain data

While the 20 ANEF is the lowest contour shown, it does not mean that there will be no aircraft

noise outside the contour. At the 20 ANEF approximately 10% of people are “seriously affected” and approximately 45% are “moderately affected” by aircraft noise. Generally ANEF maps only show down to the 20 ANEF contour because the precise positions of the 20 ANEF contour is not known due to uncertainties in flight paths at some distance from airports.

It is important to note that the ANEF represents an average noise exposure over an annual period. Noise levels over shorter periods could vary due to prevailing winds, aircraft traffic and times of operation.

A 2003 Australian Noise Exposure Index (ANEI) has been produced by Westralia Airports Corporation for Jandakot Airport (see **Figure 13.2**). The ANEI shows noise exposure contours based on actual aircraft movement data and shows the average daily aircraft noise exposure around the airport for the 2003 calendar year. JAH provided comprehensive and accurate flight records of 324,308 movements for the 2003 ANEI. These records included:

- IFR and VFR arrivals and departures
- Circuits
- Helicopter operations

Flight operations for the ANEI were grown for the ANEF over the 20 year forecast horizon with the reallocation of some 23,000 circuit movements onto the new 12L/30R runway required.

JAH in consultation with Airservices Australia provided the basis of what this allocation would be and the ramifications that would have on existing operations.

Figure 13.3 shows a comparison of the 2025 ANEF and the endorsed 2003 ANEI.

Overall the ANEF extends marginally to the southeast as a result of the proposed 12L/30R parallel runway. The footprint extends slightly past the airport boundary into the Jandakot Regional Park.

The other noticeable changes are the extension of the 2025 ANEF contour to the north-east by approximately 265m and a reduction 20 metres on the northwest 12/30 alignment .

Traffic data imprints are different between the ANEI and ANEF as noted below in **Table 13.1**:

	2003 ANEI	2025 ANEF
Aircraft Traffic	324,308mpa	476,400mpa
Night Operations	8%	7%
Heavy Aircraft	BEC200	BEC200
Travel/Circuit Split	37% -63%	35% -65%
Utilisation of 12/30	13%	18%
Runway Direction		

Table 13.1 ANEI & ANEF traffic comparison

The total traffic in 2003 is relatively low in comparison to the assumed 476,000 aircraft movements per annum by 2025. The combination of:

- A lower proportion of night operations
- Quieter heavy aircraft
- Reduced circuit split
- Lower utilisation of 12/30 runway direction

Comparison 2019 and 2025 ANEF

The 2025 ANEF shows a noticeable reduction of the noise footprint in the southwest 06/24 and northwest 12/30 alignments. This is mainly attributed to lower aircraft movement levels, quieter aircraft, more accurate data analysis and collection methods.

Aircraft Noise Management

The major environmental impact generated by airports is aircraft noise. With the expansion of the Perth metropolitan area, Jandakot Airport is no longer on the urban fringe. Areas located within a 5.5 km (3nm) radius of the airport are in the Jandakot control zone. These localities are frequently impacted by aircraft operating from Jandakot Airport, resulting in a number of noise issues.

Strengthen Land Use Planning

Given that the airport is situated within a growth zone, JAH believe that proactive consultations must be conducted with developers, local councils and state government authorities at the planning and development stages. Potential residents need to be made aware of airport operations and aircraft noise prior to purchasing property within a 5km radius of the airport in order to make informed decisions about the level of noise that they are comfortable with.

It has been found that when memorials have been placed on titles the amount of complaints received is significantly lower, without any devaluation of property value.

The state Department of Planning and Infrastructure has prepared a draft "Statement of Planning Policy - Land Use in the Vicinity of Jandakot Airport" which may address the issue of notification to potential residents.

Aircraft Movements and Noise Complaints

Noise complaints are affected by factors other than the number of aircraft movements. Aircraft movements have remained largely stable over the past five years averaging around 310,000 movements per annum, but complaints vary erratically, peaking over the summer months when more people entertain outdoors and hence become aware of noise.

A number of initiatives and management strategies have been developed in order to minimise the impacts of aircraft operations from existing airport customers as well as any new users created from the development of the airport. These include:

Airservices Australia

Airservices Australia (AA) is currently the regulatory authority responsible for registering and investigating aircraft noise from Australian Airports. The function is intended to transfer to the Department of Transport and Regional Services during the life of this Master Plan. Aircraft noise complaints arising from Jandakot Operations can be registered officially on the Airservices noise complaint line.

Publications

Noise abatement procedures for Jandakot and other Australian Airports are published in the Airservices "En Route Supplement Australia" (ERSA). The aerodrome information depicted in the publication is compiled and provided by the aerodrome operator for use by pilots and operators intending to operate aircraft at or in the vicinity of the aerodrome.

The Civil Aviation Safety Authority produces the Jandakot Airport "Visual Pilot Guide" (VPG). The VPG provides useful and accurate information about flight paths, noise abatement and

operating procedures for pilots flying in and out of Jandakot Airport.

This educational tool has mitigated noise impacts to the surrounding community by reducing the number of aircraft flying on incorrect tracks and ensuring pilots are flying at the right altitude.

Jandakot Airport Consultative Committee

JAH chair the Jandakot Airport Community Consultative Committee, which convenes on a quarterly basis to review noise complaints, flight path issues, land use planning considerations and noise amelioration strategies. The committee comprises representatives from local councils, government authorities, industry members, community action group representatives and JAH staff. Any new noise issues resulting from airport development will be dealt with in this forum.

Fly Neighbourly Campaign

JAH and Jandakot Airport tenants are mindful that the airport is now surrounded by residential development and as a good neighbour has attempted to reduce noise impacts through a "Fly Neighbourly" campaign that was launched in January 2000. A major initiative resulting from the campaign was the reduction of circuit training hours on Sundays to between 8am and 6pm. With the expansion of the aviation precinct, JAH will ensure that existing and new aviation customers are aware of the ongoing campaign by:

Pilot education, targeted through the cooperation of major flying schools

Including the principles of 'Fly Neighbourly' in the Jandakot Airport "Conditions of Access and Use"

Incorporating the principles into tenant lease documentation

Noise Information Package

Providing information on aircraft noise impacts to the surrounding community has proven to be an effective tool in the management of aircraft noise issues. In order to improve the dissemination of information in relation to Jandakot Airport noise, JAH produced a Noise Information Package for community members.

The package contains general information on Jandakot Airport operations, factors influencing aircraft noise impacts and what prospective

residents should do before buying in the area. It also provides contact details for queries or complaints.

This package was endorsed through the Jandakot Airport Community Consultative Committee and the final document has been made available to the public via the JAH website, JAH office and local council offices.

Satellite Touch and Go Airport

There have been previous studies by the Western Australian Government in 1991 and 1994 to investigate and identify future general aviation aerodrome sites in the Perth region. To date a specific site has not been identified for acquisition and development.

A significant proportion of repetitive touch and go circuit training could be relocated to the training aerodrome. Ideally the new aerodrome would be within 30 nautical miles of the Jandakot Airport and within or near the existing flying training airspace south of Jandakot and sited clear of existing and future areas of urban development.

Aircraft Ground Running

Aircraft engines are required to be tested by pilots at 1700 to 1800rpm as part of a pre takeoff safety check. Extended full testing of engines is necessary after maintenance has been conducted. These test result in the transmission of ground based noise. In order to reduce noise impacts from existing operations or new businesses created through airport development, JAH has developed standard operating procedures for aircraft ground running and engine testing. These include:

Pre flight run up checks must be performed in banded holding bays

Engine maintenance testing exceeding 5 minutes must be conducted on the non – duty taxiway

Test vehicle ground running to be conducted in a dedicated banded ground running bay.

Light Aircraft Lanes

For the purpose of this Master Plan the existing light aircraft lanes have been retained.

Perth 03ILS

The Jandakot Airport Community Consultative and RAPAC forums have exhausted all avenues for alternatives to glide slope and intercept procedures for the Perth 03ILS. The glide slope cannot be increased to 3.3° and therefore the additional 100ft circuit height is unattainable at Jandakot Airport.

Existing Natural and Indigenous Environment

Jandakot Airport site and its surrounding areas are situated on the northern margin of the Jandakot Ground Water Mound, a source of public water supply for the Perth Metropolitan Region. It also covers an extensive area of Banksia woodlands and a variety of damplands that have conservation value.

Jandakot Groundwater Mound

The Department of Environment (DoE) manages Western Australia's water resources including the Jandakot Mound. The DoE has the power to protect the mound and to restrict land uses that may pose a threat to the quantity or quality of water available from the mound for public water supply. The Jandakot Mound is gazetted as a Public Water Supply Area (PWSA) and an Underground Water Pollution Control Area (UWPCA).

Public water supplies from the Jandakot Mound are protected by the UWPCA, under the Metropolitan Water Supply, Sewage and Drainage Act 1912. Within the Jandakot UWPCA, a three-level priority system is used. The priority classifications are determined by land tenure, land use and water flow patterns (WRC, 2002).

The Western Australian Planning Commission (1998) has defined the priority protection levels as:

Priority 1: These areas are the most important for public water supplies. Water resource protection has the highest priority in land management and planning. These areas are usually publicly owned and are either undeveloped or under a well-managed land use that does not pose any greater threat to water quality than an undeveloped catchment. Urban developments, agriculture and industry are regarded as unacceptable land uses in these areas. Use of this land for protection of the public water supply outweighs virtually all other

considerations and the object is to ensure that there is no degradation of water resources in this area.

Priority 2: Water protection in Priority 2 areas has a high priority, but this is not necessarily the primary consideration for land use planning. These normally include private rural dwellings, and low risk, low intensity land uses. These areas have a priority for public water supply use. The management objective is to ensure that there is no increased risk of pollution to the water source. Restricted developments may take place under specific guidelines.

Priority 3: These are areas where water supply needs to co-exist with other land uses such as housing, commercial sites and light industry. Priority 3 areas usually cover existing urban areas or areas planned for urban development. Management controls, rather than land use restrictions dominate the water management and protection policy for these areas. The areas are defined to minimise the risk of pollution to the water source. Following the revision of the UWPCA boundaries, much of the airport land is now outside the UWPCA. The area remaining within the UWPCA is the bushland area to the southwest and southeast of the airport. The status of these areas has been upgraded to Priority 1, in line with other remaining bushland over the Jandakot Mound.

Figure 13.4 illustrates the entire UWPCA and the boundary over Jandakot Airport.

Flora and Vegetation

Jandakot Airport is located in the South-West Botanical Province of Western Australia, in the Darling Botanical District and the Bassendean System of the Drummond Botanical Subdistrict (Beard, 1981).

The Bassendean Vegetation System corresponds to the older leached sands of the Bassendean Dune System. This system extends discontinuously for the length of the Swan Coastal Plain, with the overall cover being *Banksia* woodland. In general, this low woodland is dominated by *Banksia attenuata*, *Banksia menziesii*, *Banksia ilicifolia*, *Eucalyptus tottiana* and *Nuytsia floribunda*, with a dense understorey of sclerophyll shrubs. These characteristics are typified at Jandakot Airport.

To date, 317 vascular plants have been recorded at Jandakot Airport, with 291 being

native species. This number has been derived from the comparison and amalgamation of six separate flora lists for the airport.

The studies compared were:

Mattiske Consulting (2001)

Keighery (1995)

Muir Environmental (1993)

Lammont (1990)

Martinick & Associates (1989)

Milewski and Davidge (1981)

Plant Communities

Mattiske Consulting (2001a) mapped the vegetation communities at Jandakot Airport, determining that the area supports five of the communities described on the Swan Coastal Plain by Gibson et al. (1994). These are listed below.

H1 - Woodland of *Eucalyptus marginata* with *Banksia* spp. (similar to 21a – Gibson et al. 1994)

H2 - Open woodland of *Banksia attenuata* and *Banksia menziesii* (similar to 23a – Gibson et al. 1994)

J1 - Woodland of *Banksia ilicifolia* with *Banksia* spp. (similar to 22 – Gibson et al. 1994)

K1 - Disturbed open forest of *Eucalyptus rudis* with *Melaleuca preissiana* (similar to 11 – Gibson et al. 1994)

K2 - Woodland of *Melaleuca preissiana* (similar to 4 – Gibson et al. 1994)

J2 - Heathland of *Beaufortia elegans* and *Hypocalymma* spp. (similar to 5 – Gibson et al. 1994)

Under Bush Forever, a Western Australian State Government initiative that attempts to achieve a minimum of 10% retention of each vegetation complex on the Swan Coastal Plain, Jandakot Airport is listed as site 388 (Government of Western Australia, 2000a). The conservation areas at Jandakot Airport are acknowledged as such in the Bush Forever document, Bush Forever describes Jandakot Airport as having 4 Floristic Community Types (FCTs), as follows:

Subgroup 2: Seasonal Wetlands

FCT5: Mixed Shrub Damplands

Subgroup 3: Uplands Centred on Bassendean Dunes and Dandaragan Plateau

FCT21c: Low-lying *Banksia attenuata* woodlands or shrublands

FCT22: *Banksia ilicifolia* woodlands

FCT23a: Central *Banksia attenuata* – *Banksia menziesii* woodland

A review of the reservation and conservation status of the communities by Gibson *et al.* (1994) suggested that all of the communities at Jandakot Airport are well reserved and have low conservation risk, with the exception of J1, which is poorly reserved but still presents a low conservation risk. English and Blythe (1997) listed community 22 (J1) as proposed for inclusion on the Threatened Ecological Community (TEC) listing however this has not proceeded in view of a lack of data (Mattiske Consulting, 2001a). This community type is well represented at Jandakot Airport.

Condition of Vegetation

The condition and value of the airport bushland has been recognised as being of high quality through the 1983 System 6 Report (Site M94) (Department of Conservation and Environment, 1983), as well as the more recent Bush Forever documents (Site 388).

According to a Bushland Condition Report prepared for JAH by Mattiske Consulting (2001b) the condition of the native vegetation at the airport is generally good to excellent. There are also a number of degraded areas throughout the airport.

The Australian Heritage Council Act, 2003 enables areas with natural or cultural significance to be listed on the Register of National Estate.

The Australian Heritage Commission has, listed a significant portion of the bushland at Jandakot Airport, on the Register of National Estate. The listing comprises all bushland within the airport except vegetated areas that do not meet the threshold for national estate listing due to their degraded state.

The Australian Heritage Council has nominated the Jandakot Bushland for listing on the Register of National Estate based on the following National Estate Criteria (NEC):

NEC A.2: Importance in maintaining existing processes or natural systems at the regional or national scale

NEC A.3: Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features

NEC B.1: Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness

NEC C1: Importance for information contributing to a wider understanding of Australian natural history, by virtue of use as a research site, type locality, reference or benchmark

Declared Rare, Priority and Regional Significant Flora

Four Priority species have been previously identified within Jandakot Airport bushland. Three of these, *Lysinema elegans*, *Phlebocarya filifolia* & *Conostephium minus* have since been removed from the Wildlife Conservation (Rare Flora) Notice WA 2003. The fourth, *Calactasia cyanea*, has undergone a name change to *Calactasia narragarra*. Plants previously identified as *C. cyanea* at Jandakot airport are now considered *C. narragarra*, which is not a priority species (Pers. Comm. Dr Ken Atkins CALM).

A Declared Rare Flora species was identified at Jandakot Airport late 2003, *Caladenia huegglia*, the Grand Spider Orchid. This species is located in scattered areas throughout Perth and has suffered a decline due to habitat loss for land development. The orchid is known to be found in surrounding bushland and was identified at one location in Conservation Precinct 2b at Jandakot Airport (**Figure 13.5**).

JAH has committed to preserve this plant and because the orchid is known to be sensitive to both wildfire and weed competition has closed track access to the site, which is located in a priority bushfire protection area.

Searches conducted by Mattiske Consulting (2001c) and others have located no other significant species on site. Bush Forever (Govt of WA 2000b) lists *Croninia kingiana* (formerly *Leucopogon kingianus*), *Hensmania turbinata* & *Astroloma xerophyllum* as significant species found on site. To date no endangered or vulnerable species pursuant to Section 178 of the Environment Protection and Biodiversity Conservation Act 2000 have been located on site (Mattiske 2001c), excepting *C. huegglia*.

Fauna

Information on the fauna at Jandakot Airport has been compiled through a number of surveys, with the most recent being conducted by Bamford Consulting Ecologists (2002). Other studies include:

Robinson (2000)

How et al. (1996)

Muir Environmental (1993)

Martinick (1989, 1990)

Davidge (1979, 1980)

The total number of species recorded at Jandakot Airport is 117. These species include amphibians, reptiles, birds and mammals. Invertebrates have not been studied in detail on the site. The species recorded within the Jandakot Airport domain are combined in a species list, available from JAH.

Native Mammals

The impact of European settlement has been detrimental to the survival of a number of species of Australian fauna. Native mammals, and in particular marsupials, have been greatly affected by this, with many species historically occurring on the Swan Coastal Plain becoming locally or regionally extinct (PPK, 2000). At Jandakot Airport 10 mammal species are confirmed present of an expected 15. Two of which are regionally significant; the Western Brush Wallaby *Macropus irma* and Southern Brown Bandicoot *Isodon obesulus*.

Birds

Sixty-seven bird species have been recorded at Jandakot Airport, although more are predicted to occur in the area (Bamford, 2002). Some of the birds recorded are vagrant, migratory or nomadic species that do not occur throughout the entire year. The Peregrine Falcon, for instance, is an occasional visitor to open woodland areas like Jandakot Airport, where food sources are supported (CALM, 1998a). Carnaby's Cockatoo (*Calyptorhynchus latirostris*) also utilises Jandakot Airport. This species has experienced a decrease in numbers since the late 1960's, mainly attributed to the clearing of breeding habitats to the north and northeast of Perth for agricultural purposes.

Invertebrates

Invertebrates at Jandakot Airport have not been studied to the same extent as vertebrate fauna. These types of surveys are relatively specialised

in nature and therefore this lack of research is mirrored in many parts of Western Australia. Martinick (1989) did however list *Iridomyrmex conifer*, a locally rare species of ant as present. This ant lives in large colonies in areas where native vegetation is largely undisturbed. It is rare in the Perth region but is still widespread in the Southwest of Western Australia.

Reptiles and Amphibians

The reptile assemblage of the metropolitan Swan Coastal Plain is among the richest documented for any major urban area in the world (How et al, 1993). Thirteen frog species and 64 reptile species are known to occur within the variety of habitats existing in this region (PPK, 2000). The distribution of amphibians and reptiles is characterised on the Swan Coastal Plain by an east to west change in soils and vegetation, with frog species richness higher on the eastern zone and reptile species richness higher to the west (Storr et al, 1978).

Within the airport environs, 5 frog species and 27 reptile species have been recorded during previous surveys. Reptiles are represented by 20 lizard and 7 snake species. Unlike native mammals, this vertebrate group does not appear to have been heavily impacted by European settlement, as many reptiles are able to survive in small areas of native vegetation.

Specially Protected (Threatened) Fauna

Jandakot Airport bushland supports an almost intact faunal assemblage, representative of fauna that previously occurred throughout Perth's southern suburbs (Bamford, 2002). Due to the encroachment of urban development a number of species recorded or expected at the airport have become regionally significant, as they cannot survive in an urban landscape and are at the limit of their distribution.

From the fauna recorded at Jandakot Airport during past surveys 28 species have been classified as having Regional Conservation Significance. Four confirmed and 1 unconfirmed species found at the airport are also of National Conservation Significance. These include bird, mammal and reptile species.

Birds

As previously mentioned, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is recognized as

being of National Conservation Significance. It is listed under Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 1998 and documented as Endangered under the Environment Protection and Biodiversity Conservation Act 1999.

This species is known to occur at Jandakot Airport during seasonal foraging.

The Bush Forever documents (Government of Western Australia, 2000b) list a number of bird species that are significant in the metropolitan area. The regionally significant species recorded at Jandakot Airport include the Painted Button-quail, Splendid Fairy-wren, Western Thornbill, New Holland and White-cheeked Honeyeaters, Western Wattlebird, Scarlet Robin, Brown Goshawk, Grey Shrike-thrush and Black-faced Wood swallow.

Mammals

Two species of mammal existing at the airport are classified as National Conservation Significance. These are the Quenda (listed as Priority 4 and Conservation Dependant by CALM) and the Brush Wallaby (Priority 4 species). A third species, the bat *Falsistrellus mackenziei*, is also of National Conservation Significance and is likely but not yet confirmed at the airport. This species is also listed as Priority 4. The Quenda is abundant and widespread throughout the airport site and adjacent area, and the bat also appears to be present and able to move between the airport and nearby areas.

The species of most concern is the Brush Wallaby, as it is sedentary and the small population located at the airport could become vulnerable. It is thought, however, that it is possible to design development to minimize the impacts on this species.

Reptiles

Neelaps (Vermicella) calonotus, or Black-striped Snake, is listed as Endangered by Cogger et al (1993) and is of National Conservation Significance. It is the only reptile species recorded at the airport with this status, however the Southwest Carpet Python and the Perth Lined Lerista are also nationally recognized and are expected on site (Bamford, 2002).

Neither the Black-striped snake nor the Lerista are recognized by CALM or Conservation Acts,

mainly because they have secure populations in reserves outside the metropolitan area. The Carpet Python may be locally extinct, however is known to persist on the northern outskirts of Perth and is abundant on Garden Island (Bush et al, 1995).

None of the amphibian species recorded or expected at Jandakot Airport are of National or Regional Conservation Significance.

Damplands

Within Jandakot Airport there are no natural drainage channels or defined areas of surface water. There are, however, a number of impermeable surfaces such as roads, car parks, runways and apron areas, which concentrate run-off following a very intense rainfall event. Due to the extremely porous nature of soils at the airport, this run-off is localised and ephemeral.

An artificial drainage basin has been created in the north-eastern corner of the airport to collect run-off from sealed surfaces, as the majority are not provided with drainage. Due to the high permeability of the Bassendean soils, run-off generally infiltrates very quickly into sand surrounding the sealed area and tends not to concentrate in the artificial basin. Although there are no areas of permanent surface water at the airport, there are four dampland areas. Damplands are seasonally waterlogged basins that arise as a result of the natural infilling of silt and decaying vegetation that occurs over the lifetime of a wetland or through gradual drying of the climate over time (Balla, 1994).

The location of damplands at Jandakot Airport is illustrated in **Figure 13.5**. Although Hill *et al* (1996) identified 3 damplands, SKM (1999) described 4 naturally occurring and one artificially created dampland at Jandakot Airport. Aerial photograph interpretation is likely to be the reason for dissimilarity between previous studies. Clarke et al (2001) also identified a previously undescribed dampland north of Hope Road (W6). Two of the damplands located on site (W2 and W4) have been identified as conservation wetlands, where management priority is to preserve.

Indigenous Environment

Two applications of Native Title applicable to Jandakot Airport were lodged with the National native Title Tribunal as of June 1999.

These claims are:

WC95/086

WC99/006

Both claims cover the Perth Metropolitan Region. Claim WC95/086 has failed the registration test and therefore has lost the right to negotiate, but remains on the schedule of Native Title Applications.

An extensive ethnographic and archaeological survey for Aboriginal sites was carried out at Jandakot Airport in 1990 (O'Connor et al., 1990). The ethnographic survey reviewed the existing ethnographic database, consulted with Aboriginal people with traditional and current links with the Jandakot region, and visited the site with Aboriginal spokespersons. The conclusions of the study were that there were no previously recorded sites and no new sites of significance to aboriginal people at Jandakot Airport (O'Connor et al., 1990).

The archaeological survey involved a review of the existing archaeological information for the site, and then an extensive site survey, involving access to all sections of the Airport. The results of the investigation were the identification of one new site and one previously recorded site (O'Connor et al., 1990). The sites were both small artefact scatters.

Management of Impacts on Natural and Indigenous Environment

The development of Jandakot Airport will inevitably result in a degree of impact on the existing environment.

Ecosystem disruption is managed by initially reserving areas of high conservation significance and secondly by retaining, where appropriate areas of high conservation value within development zones. As part of the approved December 2000 Master Plan approximately 200 hectares of bushland had been set aside for conservation purposes.

JAH has since increased the conservation precincts to approximately 270 hectares after conducting a review of the development

precincts. The conservation areas include the majority of priority vegetation.

Areas were chosen for precinct use based on the 1993 Muir study of vegetation quality, reflecting their relative value for conservation purposes. **Figure 13.6** illustrates vegetation delineation by Mattiske 2001.

JAH have committed to conserve as much remnant vegetation on Jandakot Airport as possible in its natural state. Bushland within the conservation areas are actively managed by JAH and receive first priority for fire protection; weed, pest and disease control; and for rehabilitation and revegetation.

Specific management plans and activities are expanded upon in the approved December 2004 Environment Strategy.

Optimal Siting of Development

Proposed development has been located outside the conservation areas to minimise the direct impact on areas identified as high conservation priority.

It is JAH's intention this reserve is preserved and appropriate management plans have been implemented to minimise disturbance due to unprecedented actions. The Jandakot Airport land use and layout plans include the consideration of a range of development options.

Preferred options were developed based on the following criteria:

Minimisation of adverse environmental impacts external to the airport

Minimisation of adverse environmental impacts on natural environment within the airport

Achieving required airport capacity to satisfy future air traffic demand

Minimisation of capital expenditures

Maximisation of commercial returns

The application of the above criteria has enabled the siting of airfield facilities to ensure that there is minimal conflict with the natural vegetation in the conservation areas.

Land Use and Environment Management Plans

Environmental management plans have been prepared for each of the precincts shown in **Figure 13.5**, including the conservation zones, land identified for essential aviation related development and land earmarked for potential commercial development. The plans provide a systematic approach to land use and management of all peripheral land around Jandakot Airport outside the operational areas.

The Environmental Management Plans for each precinct have been developed with consideration given to the proposed future uses of the land, as well as current or past uses. Each zone has different management prescriptions based on their conservation value, current status, and future development potential and special management requirements. Bushland at the airport is managed in accordance with the general management directions however, the conservation precincts have received first priority for fire, weed and disease control, and for rehabilitation and revegetation.

Precinct 1 – Airport Movement Area and Facilities

The proposed fourth runway, associated taxiways and part of the existing runway 12L/30R and associated taxiway occurs within the Priority 1 Source Protection Area for Jandakot Groundwater Mound.

As such, there may be the potential for hydrocarbon contamination of the groundwater.

In areas that may be sources of surface hydrocarbon contamination, runoff will be routed through oil/water separation pits before being allowed to soak into the ground. Such areas include washdown bays and some at risk paved areas located within the Priority 1 Source Protection Area for the mound.

Precinct 2 – Conservation Areas

The Conservation Areas, are located in a “u” shape around the movement area. The proposed fourth runway will extend marginally into the conservation reserve. The Conservation areas also include some sections of Priority 1 Source Protection Area for Jandakot Groundwater Mound.

The airport conservation areas form part of a regional network of remnant vegetation including Banksia woodland. The conservation areas are partially linked to neighbouring Bush Forever Sites, Ken Hurst Park (Bush Forever Site 245) to the north and Acourt Road Bushland (Bush Forever Site 389, part of the Jandakot Regional Park) to the east.

These areas are being managed in accordance with the principle of minimal interference. Management plans have been developed to address issues such as weed control and fire management. However, the aim is that the vegetation within the conservation areas will be as close to its original natural state as possible and be able to sustain itself with minimal intervention. Access to the conservation areas is restricted in order to maintain the ecological values of the bushland.

Precinct 3 – Non-Aviation Development

Non-aviation areas are most likely to be developed for light industry and mixed business activities. Future planning of this area will recognise “best practice” planning principles.

The topography is undulating and will need to be cleared to allow the levelling of the development area. Future development guidelines will encourage grouping of development to minimise adverse impacts. Landscaping within these areas will be designed to complement the natural and local landscape values and will require the use of local native plants.

The southern portion Precinct 3-A includes land that has been previously used as car race track and golf driving range and is in generally poorer condition. This area also contains flooded gum woodland with a degraded and disturbed understorey.

The area of Precinct 3-B to the north of Hope Road consists of priority land that contains remnant Banksia woodland in good condition, but has no natural features that do not occur in other parts of the airport. There is a cleared area and an adjacent railway and road that are ongoing sources of disturbance and weeds.

Precinct 3-C to the east of Marriott Road consists of land remnant Banksia woodland in good condition, but it contains no natural

features that are not also found in other areas of the airport. There are areas of severe disturbance present also.

Development will proceed in accordance with the broad principles expressed above (ie to allow fauna to migrate to retained conservation areas and to relocate some vegetation and topsoil from development areas to other areas on the airport prior to clearing.)

Environmental Impacts and Management Vegetation Communities

Clearing

The development of Jandakot Airport will require clearing of land for commercial development, aviation development and associated infrastructure. This clearing is unavoidable and will result in the loss of vegetation communities and fauna habitat.

Mitigating factors would include control of clearing activities to prevent impact on adjoining areas, salvage of floral materials for donation to revegetation projects either on or off-site (this would include seed collection from the site for provenance storage) and cooperation with DEH and other statutory bodies regarding threatened species management.

Weed introduction

Weed introduction and spread can arise as a result of earth moving activities and vehicle movement. Weeds compete with native species and are the major cause of disturbance of native vegetation. Spreading of weeds as a result of development activities at the airport may impact on adjacent conservation areas and will require management.

JAH propose a series of weed mapping events followed by control activities to mitigate this impact. This activity would be reported on in subsequent quarterly and annual reports.

Dust

The main sources of dust for this project would be earth-moving activities during construction stages and destabilization of lots after clearing. Dust impacts on vegetation by accumulating on the leaf surface, reducing the ability of the plant to photosynthesize.

This impact usually occurs on the fringe vegetation within a few meters of the development areas. It is not expected to have an adverse effect on the majority of the conservation area as earthworks will mainly occur in the winter months and soil stabilization of cleared lots will occur. Water carts will be used to dampen soil during movement events.

Disease

Phytophthora cinnamomi, or dieback disease, is the main disease of concern relating to the development. The most significant cause of spread of this fungus is human activities such as road construction, movement of earth and contaminated vehicles within un-diseased areas. JAH are awaiting the report of a recently completed dieback site interpretation (report expected early January 2006 and will be forwarded on receipt), but based upon the results of the last interpretation in November 2000 by Glevan Consulting.

Proposed development precincts North of Hope Road (Blocks 1-7) are believed clean of infection, precincts 48,8,9 and 50 are believed clean, however blocks 41 and 46 are un-interpretable and soil within the vicinity of the current Jandakot recycling site (block 49) must be viewed with suspicion given the soil movement activities of the occupier.

South of Hope Road: Block 45 is currently considered clean, but due to the mosaic within this area of un-interpretable areas, and a known infected block on the corner of block 43 care will need to be taken within this area.

The area in which works for the fourth runway is proposed to be built is currently considered clear of infection. The area surrounding the Non - Directional Beacon remains un-interpretable due to its grassed surroundings but no infections are registered in the surrounding bushland.

Soils within un-interpretable, suspicious or infected blocks must be delineated from other areas during works. Soils from these areas may be moved only around its block of origin or onto known contaminated sites. Machinery and vehicles leaving un -interpretable, suspicious or infected blocks must be washed down before entering clean sites. Similarly vehicles and machinery entering into un-interpretable or suspicious sites must be washed down when leaving known infected sites or other un-

interpretable areas. Only machinery from clean areas may move freely.

In accordance with this floral material from un - interpretable, suspicious or infected sites will not be able to be used for donation purposes and will require disposal. Public access to the works sites will need to be restricted.

A plan for disease management during development activities will be required and would be submitted as part of works applications.

Rare and Priority Flora

At the time of printing the draft Master Plan no Declared Rare or Priority flora were known to exist in the proposed commercial zone but further inspections were being undertaken by CALM officers. As such flora have now been located within this zone, approval for the taking of these for clearing purposes will need to be obtained from DEH in conjunction with CALM.

This requires a negotiation/approval process to be undertaken that would appear best addressed through a Major Development Plan (MDP). JAH are seeking further clarification regarding this currently.

At this stage it is JAH's intention to seek approval for this taking of the *Caladenia huegii* and *Drakaea elastica* flora by use of transplantation, ex-situ conservation through a Botanic Parks and Gardens Project at JAH's expense and if necessary by use of floral reserves.

Terrestrial Fauna Potential Impacts

As a result of clearing and construction of infrastructure required for airport development there are a number of potential impacts on the fauna. These may include the following:

Loss and degradation of habitat, food and shelter resources

Road deaths

Taking of fauna as a result of clearing activities

Death of non-mobile fauna as a result of clearing activities

Reduced abundance and diversity of local fauna

Competition with, and potential displacement of, native fauna by introduced species

Predation of native species by foxes and cats
Loss of faunal corridors

Management Strategies

In order to reduce the impacts on fauna the following management strategies will be implemented.

Collection and translocation of priority mammal fauna *Macropus Irma* & *Isoodon obesulus* from the area under Calm direction.

Reptile collection to occur prior to clearing works in the affected area.

Adopt a 'minimum clearing policy' to reduce the area of habitat lost.

Clearing will be conducted in stages to allow for local migration of mobile fauna into adjacent habitats.

Fragmentation of habitat will be minimised where possible.

Feral animal control will occur, as disturbance is likely to increase existence of introduced fauna. Also, hygienic storage and disposal of food scraps will be maintained to reduce food sources for feral species.

No project staff will be permitted to bring pets into the project area.

Vehicles will maintain safe driving speed to minimize chances of fauna deaths due to road movements.

A Fire Management Plan will be completed to ensure the impact of fire on fauna is minimised.

Specially Protected (threatened) Fauna Potential Impacts

Three fauna species recorded at Jandakot airport have been identified as priority species under the wildlife conservation act (WA) and environmental protection and biodiversity conservation act (Cth) as listed below:

Calyptorhynchus latirostris (Carnaby's or Short-billed Black Cockatoo)

Macropus irma (Brush Wallaby)

Isoodon obesulus (Quenda or Southern Brown Bandicoot)

Carnaby's Cockatoo is listed as Endangered under the Environment Protection and Biodiversity Conservation Act 1999 and as Schedule 1 – Fauna that is rare or likely to become extinct, under the Wildlife Conservation Act 1950. This species is a migratory species

endemic to the Southwest of Western Australia. During the non-breeding season it relies on patches of pine plantation and native vegetation to maintain its presence in the Perth region. It is often observed at Jandakot Airport foraging in the bushland.

As part of the development some of the airport vegetation will be cleared, consisting of mainly Banksia woodland and a Flooded Gum stand. This will reduce the availability of food sources at the airport, however approximately 250ha of native vegetation will remain on site to support Carnaby's Cockatoo feeding habits.

The Brush Wallaby is a Priority 4 species under the Wildlife Conservation Act 1950. Its main habitat is open woodland areas, favouring seasonally wet flats, with low grasses and shrubby thickets. Bamford Consulting (2002) recorded the presence of Brush Wallabies in the proposed commercial zone as well as the conservation reserve. The key threatening processes affecting Brush Wallaby survival are loss and fragmentation of habitat, predation of juveniles by foxes and loss of habitat from fire (CALM, 2002).

With the proposed commercial development a large proportion of the Brush Wallaby habitat will be affected. Preliminary advice from CALM has indicated that translocation of this species at JAH cost is the most likely means of protection, although possibly driven movement across the site could be considered, into the existing conservation reserve. Further research will be required and would be submitted as part of the MDP process.

The Quenda or Southern Brown Bandicoot is also classified as a Priority 4 species and conservation dependant by CALM. Bamford Consulting (2002) suggested that a strong population exists at Jandakot Airport, noting that the species is "clearly abundant and widespread in the area". It was also recorded at all fauna survey sites, with abundance not expected to vary dramatically across different habitats.

Clearing of vegetation may impact on localised populations at the airport, however it is not anticipated that the overall population will be significantly affected. Preliminary advice from Calm is that it is most appropriate for this species to be collected and translocated from

the affected areas. This will be researched and submitted as part of the MDP process.

Another species identified as Nationally Conservation Significant, but is no longer recognized by Conservation Acts, is the Black-striped Snake, *Neelaps (Vermicella) calonotus*. This snake is endemic to Western Australia and restricted to the Banksia sandplain habitat of the Swan Coastal Plain (Storr et al, 2002).

It was identified in the conservation precinct at Jandakot Airport and is known to have a number of secure populations in reserves between Mandurah and Lancelin. Protection for this species would occur as part of the reptile collection prior to clearing works in the commercial precinct.

Management Strategies

JAH recognize the importance of reducing the impacts of the Expansion Project on fauna, particularly Specially Protected (Threatened) Fauna, and have therefore committed to the following strategies:

CALM will be invited to review and assist with planning and translocation of fauna species
Conservation of remaining bushland areas will be a priority to ensure habitat integrity is maintained

Key threatening processes such as Feral cats, Foxes and fire regimes will be managed to minimize impact on fauna species

Public access will be restricted in conservation areas

Drainage System

There is no defined natural surface drainage on the airport land. Intensive rainfall may produce surface run-off but due to the very porous nature of the ground surface this would be localised and of short duration. A drainage basin currently exists at the northeastern corner of the airport.

The basin rarely contains water, generally only after significant rainfall events. At present drainage from paved arrears falls to a series of interconnected open unlined drains (OUD) aligned parallel to the main aprons. The drain discharges to the drainage basin on the north side of the airport. As noted above most runoff percolates into the sandy soil before reaching the basin.

Future development of the airport will require increased paved areas which will increase stormwater runoff. The existing system will be maintained and as aviation development proceeds on the northern side of the airport the existing drainage basin will be extended.

Parts of the building area and paved movement area are close to the defined boundary of the Jandakot Ground Water Mound. To ensure that the ground water is not contaminated by airport activities stormwater drainage will be directed away from the ground water mound for future runways apron and parking areas.

Surface Water Potential Impacts

Due to the porosity of the soils there are no existing bodies of surface water at the airport, however there are 6 known dampland areas. As part of the Jandakot Airport development project, dampland W6 will be destroyed, however all other damplands will remain intact and be preserved within the conservation precinct.

Clearing of vegetation and an increase in run-off generating surfaces, such as rooves and pavements, resulting from development of aviation and commercial facilities will alter surface run-off patterns at the airport. Most of the run-off from these surfaces will be allowed to soak into the ground either directly or via sumps and soak wells. Runoff from potentially contaminated areas such as workshops will be treated prior to discharge to ground or prevented from such.

As there are no natural surface drainage areas there is no potential for sedimentation of waterways or drainage channels at the airport.

Management Strategies

In order to ensure damplands and surface water quality are managed sufficiently, the following strategies will be implemented:

Ensure remaining damplands are protected from future development

Conduct weed management to maintain the integrity of vegetation surrounding damplands

Complete a fire management plan to reduce impacts of fire on wetland flora and fauna

Ensure surface water and groundwater quality is included in EMP's from all tenants

Where required, surface water will be treated prior to discharge to ground to ensure contamination risk is minimised

Ensure all tenants have accidental spill management procedures in place in line with procedures incorporated in the JAH EMS

Carry out regular tenant audits to ensure surface water quality is managed adequately.

Groundwater Levels and Flow

Jandakot Airport is situated on the Jandakot Groundwater Mound and is partially located on the northern section of the UWPCA, therefore requiring stringent controls to reduce the impacts of operations on the groundwater resource.

Potential impacts of the developments on groundwater levels and quality, along with proposed management strategies are described below.

Potential Impacts

Modification and clearing of natural vegetation from the proposed developments will result in increased recharge to the groundwater system. This will occur for a number of reasons including concentration of rainfall through roof and paved area run-off, reduce interception of rainfall by vegetation and increased recharge of the aquifer by imported scheme water used to irrigate lawns and gardens.

Management Strategies

Impacts on the groundwater levels and flow at Jandakot Airport resulting from development will be addressed by implementing the following measures:

Alternative water source options, including grey water reuse, will be sort for irrigation purposes to reduce the use of scheme water and the draw on groundwater resources.

Liaise with the Dept of Environment to monitor groundwater levels from monitoring wells to ensure levels do not significantly change as a result of run-off and irrigation activities, re-assessing irrigation programs if necessary.

Approval of groundwater extraction licenses to be sought from DoE as is currently practiced

Groundwater Quality Potential Impacts

The development of Jandakot Airport may include a number of potential contamination

sources that will impact on groundwater quality. These may result from fixed facilities or accidental spills.

Aviation development may impact on groundwater quality through the following activities:

- Hazardous material tanks and dispensing facilities
- Handling of new and waste oils, solvents and fuels as part of aircraft maintenance operations
- Aircraft washdown practices
- Spillage of hazardous materials, including test fuel disposal and venting spillage
- Sewage
- Fourth runway
- Fertilizer and pesticides used on grassed areas

From the commercial estate possible contaminants may include:

- Industrial and processing chemicals
- Fuel and oil storage facilities
- Solid and liquid wastes
- Sewage
- Fertilizers used in landscaped areas

The commercial development and aviation extensions may result in an increase in the use of existing solvents, fuels and oils, therefore increasing the risk of localised groundwater contamination if adequate measures are not employed to address this.

Management Strategies

Due to the nature of soils at Jandakot Airport and the proximity to the UWPCA, protection of groundwater quality is imperative. JAH recognise this and will implement the following management strategies to ensure this occurs.

All tenants with potentially contaminated run-off will be required to produce and adhere to an EMP under the provisions of the environmental conditions on lease agreements. This will be approved by JAH and the AEO

Restriction of commercial development to businesses that are not classified as having a significant environmental impact

Run-off from washdown bays, workshops and other potential sources of hydrocarbon contamination will be directed through oil/water separators. Inspection and maintenance would be policed via audit questionnaire

Aircraft washdown will only be permitted in designated washdown bays, which are serviced by plate separator systems as a pollution control measure

Installation of monitoring wells will be required in areas of possible contamination risk

Ensure transport, storage, use and disposal of potential contaminants is carried out appropriately, in accordance with applicable Regulations and Standards. This will be addressed as part of the Jandakot Airport tenant environmental audit process

No fuels or other hazardous materials will be stored within 500m of a Water Corporation production bore

No new underground storage tanks will be installed at the airport

Accidental spill management procedures are incorporated into the airport EMS and will be included in tenant EMP's

JAH will not permit on-site disposal of solid or liquid wastes that have the potential to cause groundwater contamination

Sewerage will be installed in the commercial estate. It will be designed, constructed and used in accordance with Water Corporation requirements and the Department of Health Western Australia guidelines. Sewerage facilities will be operated in such a way that significant amounts of nutrients do not enter the groundwater system

Low phosphorus fertilizers will be utilized in landscaped areas to reduce the nutrient loading into the groundwater system. The quantity of fertilizers applied will also be minimised

No pesticides or herbicides will be used in Priority UWPCA areas without consent from WRC

Grey water reuse options will be examined for irrigation purposes in landscaped areas. This will reduce the quantity of scheme water used and the demand on groundwater abstraction

Construction noise Impacts

Construction activity tends to generate noise and vibration, which often interfere with people's amenity. The levels generated by construction depend on the activities being carried out. In terms of noise and vibration emissions, demolition, excavation and construction work can be divided into two phases, demolition and earth works, and building works. Demolition and

excavation works is typically the noisier of the two phases of any construction.

Construction noise generated through the development of Jandakot Airport will mainly impact on existing airport tenants, as the majority of works will be conducted during business hours. It is also possible that residents on the western and northern sides of the airport may experience intermittent noise impacts. This construction noise will be short-term and will be subject to mitigation strategies.

Management Strategies

In order to reduce the noise impacts from construction activities on the local community and airport tenants the following strategies will be implemented:

Prepare a policy specifying noise and vibration strategies

Notify the surrounding community via local media/newspapers of any forthcoming unusual construction activities

Provide a telephone complaint line and develop a procedure for recording and dealing with grievances

Restrict construction to Monday to Saturday, avoiding work being carried out on Sundays

Undertake regular noise and vibration monitoring, to ensure compliance with the set noise and vibration limits where necessary

Traffic Hazards

Impacts

Current traffic volumes on Hope Road indicate the airport as a whole generates approximately 3500 vehicle movement per day. The proposed development will inevitably lead to an increase in traffic volumes, anticipated to be up to 20,000 movements per day once the development is completed. This increase in traffic will incorporate both light and heavy vehicles, which may result in the following impacts.

Increased traffic accidents.

Increased traffic noise.

Management strategies

In order to reduce road noise and the occurrence of traffic accidents, the following management strategies will be employed.

Reconstruct Hope Road as a dual carriage boulevard as part of the Expansion Project.

Construct roundabouts at main intersections to facilitate safer traffic flow and separation.

Provide temporary road access for airport users to allow separation from vehicles and heavy equipment involved in construction activities.

Reconstruct existing internal road network to ensure safe road conditions are maintained.

Provide qualified traffic management personnel and traffic management signage within the airport site during construction stages in accordance with state laws and regulations

SECTION 14 - CONSULTATION AND PUBLIC COMMENT

The “*Airports Act 1996*” specifies that a full consultation program is required prior to submission of the draft Master Plan to the Minister for Transport and Regional services. This should include (as a minimum):

Newspaper advertisements
Circulation of the PDMP for inspection and/or purchase
90 day comment period
Summary of how comments have been addressed

Consultation

During the preparation of the PDMP formal consultations were conducted with key stakeholders through:

A meeting held at Jandakot Airport in February 2005 with airport tenants, airport users and industry representative

Local councils, community groups, State and Federal government agencies at the Jandakot Airport Community Consultative Committee meeting held on 8 March 2005

Airport users, operators and tenant surveys
Separate meetings with Airservices Australia, Western Power, Water Corporation, Main Roads WA and Conservation and Land Management (CALM)

Previous Consultations

The consultation and public comment process in the production of the approved December 2000 Master Plan for Jandakot Airport was conducted in accordance with the provisions of the *Airports Act 1996*. Extensive consultation with a wide range of stakeholders was undertaken in 1998/1999 during preparation of the Master Plan.

Initial letters containing information on the Master Planning process, program and issues, were sent to the key stakeholders listed below:

Airport tenants/users
Local councils
Local community groups
Relevant government departments
Relevant state authorities

Stakeholders were invited to respond identifying any relevant issues they considered for inclusion in the development of the Master Plan.

Public Comment Period

The 90 day, public comment period for the PDMP commenced on 1 July 2005. Submissions were invited from members of the public, stakeholder groups and local, state and commonwealth government agencies. The last date for written submissions was 29 September 2005.

During this period copies of the PDMP were made available for inspection at the following venues:

Office of Jandakot Airport Holdings
Libraries and offices of City Cockburn, City Of Melville and City of Canning
State Library – Alexander Library

The document could also be viewed on our website:

www.jandakotairport.com.au

In addition copies of the document could be purchased through Jandakot Airport Holdings Pty Ltd.

The total number of written submissions received was 8. Submissions were summarised and included a statement about how the comments were addressed. The summaries accompanied the DMP submitted to the Minister for approval. The DMP incorporated changes arising from issues raised in the written submissions received at the conclusion of the public comment period.

Submission to the Minister

In accordance with the requirements of section 79 and 80 of the *Airports Act 1996*, the draft Master Plan was submitted to the Minister accompanied by:

A written statement of consultation signed on behalf of the company containing:

A listing of names of persons consulted; and
A summary of views expressed by the persons consulted

A written certificate of Public Comment signed on behalf of the company containing:

A list of the names of the public who have made written comments

A summary of those comments

A statement verifying that the company has had due regard to those comments in preparing the draft Master Plan and

Setting out such other information about those comments as specified in the regulation.

SECTION 15 - IMPLEMENTATION

This section of the MP describes the formal approval process for the master plan and identifies a policy for implementing specific development proposals.

Review and Approval

Master Plan

The Commonwealth Government has the approval authority for the Jandakot Airport Master Plan. In accordance with the Act, if a draft Master Plan is approved by the Minister for Transport and Regional Services, it becomes a final master plan and will be in force for a period of five years.

Major Development Plans

The development described in this MP is based on the future requirements as forecast at the time of issue. It does not constitute a commitment by JAH to the provision of the features identified, nor is it appropriate to evaluate and justify them at this stage.

The next stage of the planning process is to produce developments plans for precincts or individual developments through the Major Development Plan (MDP) process. These plans will provide a phasing philosophy for the implementation of the master plan and will set out development and improvement programs with broad implementation plans.

Any future major developments projects described in the development plan will require complete review and approval by the Commonwealth Government, prior to their implementation.

Implementation Framework

Economic fluctuations and uncertainty in the aviation marketplace almost always preclude a regimented approach to implementing airport development on a fixed schedule.

This is especially true for Jandakot Airport where the ultimate capacity will not be reached before the 20-years planning horizon. General aviation traffic shows wider fluctuations than for traffic at airports such as Perth served by scheduled airlines services.

Planning Objectives

To help guide the creation of the development plan described above, JAH has established a set of implementation planning objectives as follows:

Achieve maximum utilisation from existing facilities

Provide facilities as necessary to maintain safety and efficiency of operators, and to foster Jandakot Airport as an internationally recognised centre of excellence for flying training.

Seek to stage developments in increments that respond to customers needs.

Defer decisions entailing significant capital investment until sufficient information is available to justify it. Such deferral must not adversely impact needed development.

Balance Jandakot Airport's facilities and systems both functionally and operationally in each implementation phase.

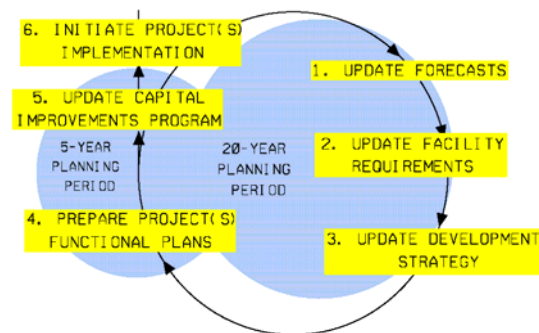
Maintain uninterrupted operations of all existing facilities while further construction is underway in each phase.

Planning Cycle

A master plan is a dynamic and evolving document and therefore will be subject to change. This may be brought about by such factors as market forces, operating conditions, changes in standards, new technology etc. It is therefore prudent to monitor changing conditions and to review the master plan at logical intervals.

A flexible and dynamic approach to implementation is required to respond to these changing conditions in a timely and cost-effective manner.

Figure 15.1 Typical Planning Cycle



Implementation will be a continuous process. The diagram below presents a typical planning cycle for Jandakot Airport, which will assist JAH in coordinating future demand and available capacity, and implementing new construction.

Policy for Development Proposals

JAH acknowledges the importance of Jandakot Airport in the planning of the region. Therefore there is a need for an integrated approach to ensure the development of the airport proceeds in a manner, which does not conflict with the adjacent land uses and development policies.

SECTION 16 - ABBREVIATIONS

AA	Airservices Australia	NDB	Non Directional Beacon
ANEC	Australian Noise Exposure Concept	OLS	Obstacle Limitation Surface
ANEF	Australian Noise Exposure Forecast	ODD	Open Unlined Drains
ANEI	Australian Noise Exposure Index	PANS-OPS	Procedures for Air Navigational Services Aircraft Operations
ARFC	Aerodrome Reference Facility Code	PAPI	Precision Approach Path Indicator
ARMAD	Armadale	PCN	Pavement Concession Number
ATC	Air Traffic Control	PDMP	Draft Master Plan
ATU	Aerobic Treatment Units	PWSA	Public Water Supply Area
CALM	Conservation and Land Management	RFDS	Royal Flying Doctor Service
CAR	Civil Aviation Regulations	SKM	Sinclair Knight Merz
CASA	Civil Aviation Safety Authority	TAC	Terminal Area Charts
CASR	Civil Aviation Safety Regulations	TEC	Threatened Ecological Community
CBD	Central Business District	UWPCA	Underground Water Pollution Control Area
CTA	Control Areas	VFR	Visual Flight Rules
CTR	Control Zone	VTC	Visual Terminal Charts
DOTARS	Department of Transport and Regional Services	WAPC	Western Australian Planning Commission
DPI	Department of Planning and Infrastructure	WRC	Water and Rivers Commission
EMP	Environmental Management Plan		
ERSA	En Route Supplement Australia		
ES	Environment Strategy		
FAC	Federal Airports Corporation		
FESA	Fire and Emergency Services Authority		
GA	General Aviation		
GAAP	General Aviation Airport Procedure		
GPS	Global Positioning System		
HA	Hectare		
HV	High Voltage		
ICAO	International Civil Aviation Organisation		
IFR	Instrument Flight Rules		
INM	Integrated Noise Model		
JAH	Jandakot Airport Holdings Pty Ltd		
KVA	Kilo Volt Amps		
L	Litre		
MANTLE	Fremantle		
M	Metre		
MOS	Manual of Standards		
MP	Master Plan		
MRS	Metropolitan Regional Scheme		
MRWA	Main Roads Western Australia		
MVA	Mega Volt Amps		

SECTION 17 - GLOSSARY

Aerodrome

A defined area on land or water (including and buildings installations, and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome elevation

The elevation of the highest point of the landing area.

Aeroplane reference field length

The minimum field length required for take-off at maximum certified take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aircraft flight manual prescribed by the certification authority or equivalent data from the aircraft manufacturer. Field length for airplane, if applicable, or take-off distances in other cases.

Aircraft landing area

An area of ground suitable for the conduct of take-off and landing and associated aircraft under specific conditions.

Airside

The movement area of an aerodrome, adjacent terrain and buildings or portions thereof, access to which is controlled.

Airspace

That portion of the earth's atmosphere over which a nation exercises jurisdiction over aircraft in flight. The continental division of airspace usually coincides with the national boundaries and the division is determined by mutual agreement of the nation's concerned.

Approach area

A specified portion of the surface of ground or water at the end of the runway strip, defined by the vertical projection of the approach surface. It is an area within which it may be necessary to restrict the creation of new obstacles or remove or mark existing obstacles in order to ensure a satisfactory level of safety for aircraft operations during the approach phase.

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 Height Datum (AHD)

A homogeneous leveling network covering the whole of the Australian mainland, which is based on the mean sea level at 31 tide gauges around the Australian coastline. This datum was adopted by the National Mapping Council in 1971 and provides a standard, accurate leveling reference for scientific, mapping and engineering purposes.

Australia 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)

Shows the anticipated noise contours for the most likely or preferred development and forecast for an airport.

Australian Noise Exposure Index (ANEI)

Is the actual noise exposure for some previous time period, generally one year.

Building area

An area on 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.

Building line

The line of demarcation between the movement area and the building area.

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 bearing strength and other physical characteristics in the design of aerodromes.

Critical obstacle

The obstacle within the take-off climb area and/or approach area, which subtends the greatest vertical angle when measured from the inner edge of the take-off climb/approach surface.

Elevation

In relation to flight, means the vertical distance of a point or level on or affixed to the surface of the earth, measured from mean sea level. (For the purposes of aeronautical information, the measurement of altitude, elevation and height is expressed in units of feet).

Flight path

The airspace connecting two locations and surrounding the actual or proposed track of the aircraft. Flight plan: Specified information provided to air traffic services units, relative to an intended or portion of the flight of an aircraft.

Fuelling facility

A fixed facility for the reception, storage and distribution of liquid fuels for the fuelling of aircraft or ground vehicles.

Global Positioning System (GPS)

A US Department of Defence space based positioning system, velocity and time system composed of space, control and user segments. The space comprises 24 satellites in six orbital planes. The control segment consists of a master control station, monitor stations and ground antennas located around the world. The user segment consists of antennas and receiver-processors that provide positioning, velocity and precise timing to the user.

Helicopter landing site

An aircraft landing area for hover aircraft.

Instrument approach procedure

The approved procedure to be allowed by aircraft in descending from cruising level and landing at an aerodrome. It involves a series of predetermined maneuvers for the orderly transfer of an aircraft by reference to night instruments, from the beginning of the initial approach to a landing or to a point from which a landing may be made visually.

Instrument Flight Rules (IFR)

A set of rules, as outlined in Part XI of the Civil Aviation Regulations, governing the conduct of flight under instrument meteorological conditions.

Instrument Meteorological Conditions (IMC)

Meteorological conditions expressed in terms visibility, distance from cloud ceiling less than minima specified for visual meteorological conditions.

Instrument non-precision approach runway

An instrument runway served by visual aids and a non-visual aid providing at least directional guidance adequate for a straight in approach.

Landside

That portion of an aerodrome not designated as airside and to which the general public normally has free access.

Manoeuvring area

That part of an aerodrome to be used for the take-off, landing and distribution of liquid fuels for the fuelling of aircraft or ground vehicles.

Movement

Either a take-off or a landing by an aircraft

Movement area

That part of an aerodrome to be used for the surface movement of aircraft, including the manoeuvring areas and aprons.

Obstacles

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

Obstruction

An obstacle, which prevents aircraft operations to or from a runway.

Operator

A person, organisation or enterprise engaged in, or offering to engage in, an aircraft operation.

Obstacle Limitation Surface (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 and OLS may need to be marked and/or lit in accordance with CASA requirements.

Pavement

A prepared or semi-prepared surface of a given depth for the purpose of providing added bearing capacity to an existing ground surface.

Runway

A defined rectangular area on a land aerodrome, prepared for the take-off and landing of aircraft along its length.

Runway number

The number allocated to a runway end, being that whole number nearest to one tenth of the magnetic bearing of the runway centerline (measured clockwise from magnetic north) when viewed from the approach. Single digit numbers so obtained are preceded by 0 and where the final numeral of the bearing is 5 degrees, the number allocated is the next largest number.

Runway strip

A defined area including the runway and stopway, if provided, intended; a) to reduce the risk of damage to aircraft running off a runway; and b) to protect aircraft flying it during take-off or landing operations.

Taxiway

A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome from another.

Threshold

The beginning of that portion of the runway useable for landing.

Visual approach

An approach by an aircraft to a runway executed by a visual reference to terrain.

Visual Flight Rules (VFR)

Rules of flight to permit operations on a see and be seen basis in visual meteorological conditions (VMC). These rules are prescribed in Part XI of the Civil Aviation Regulations.

Visual Meteorological Conditions (VMC)

Meteorological conditions equal to or better than those specified in the Civil Aviation Regulations and in the Visual Flight Guide.

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SECTION 19 - CONSULTANCIES

The Master Plan revision was coordinated and prepared by Jandakot Airport Holdings Pty Ltd Resources. Consultants were engaged for specialist elements required for this review.

Consultant	Master Plan Element
Kito ATSS	Air Traffic Analyses and Forecasts
GHD Pty Ltd	Fourth Runway Location Assessment
Westralia Airports Corporation	ANEI and ANEF Noise Contours