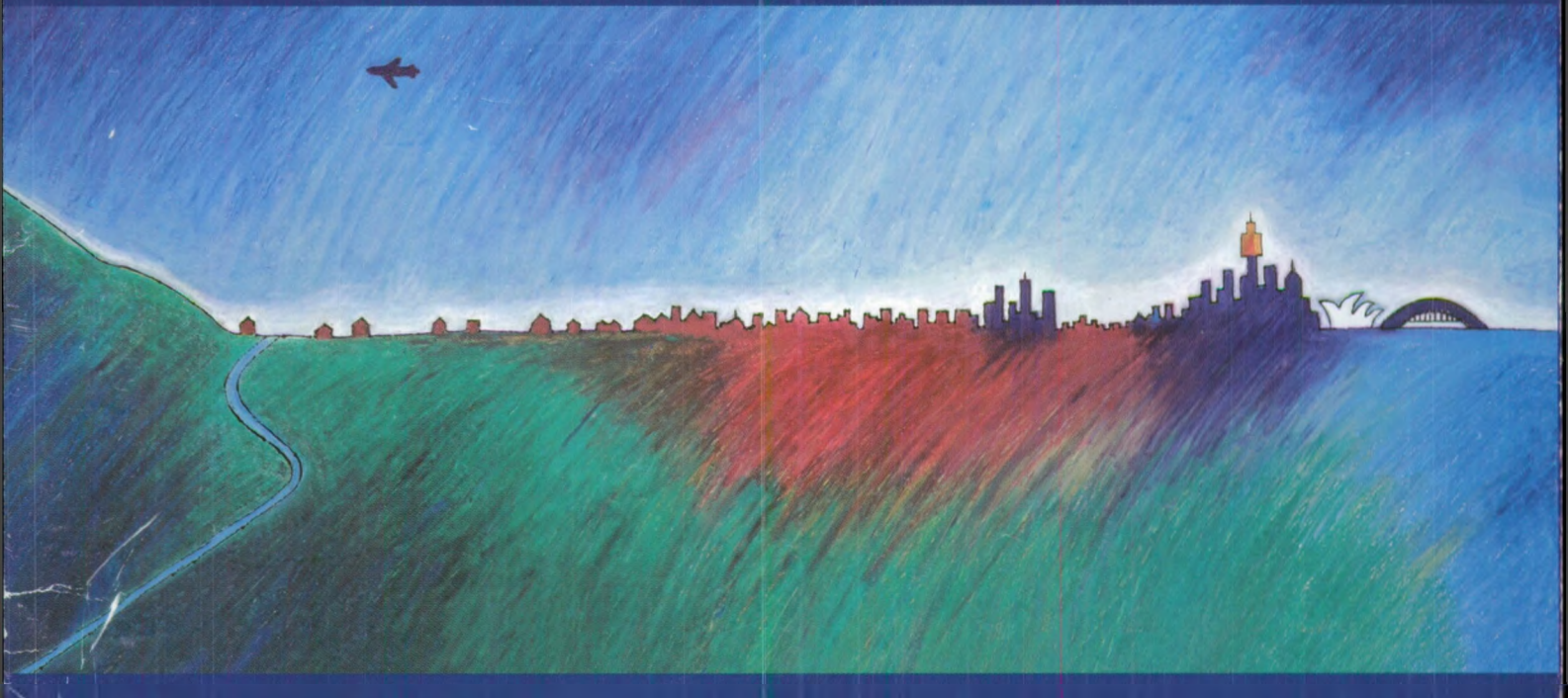
COMMONWEALTH DEPARTMENT OF
TRANSPORT AND REGIONAL SERVICES

SUMMARY



SUMMARY OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED SECOND SYDNEY AIRPORT AT BADGERYS CREEK

PPK
Environment & Infrastructure

Photograph 1 **Sites of Badgerys Creek Airport Options (from south-west looking north-east)**

Approximate Boundaries
Option A
Option B
Option C

Approximate


Abbotsbury
Edensor Park
Cecil Park
Cecil Hills
Green Valley
Hinchinbrook
Hoxton Park
Prestons
Carnes Hill
Austral
Rossmore
Badgerys Creek Road
Bringelly

Contents

A Decision on the Second Sydney Airport

The debate about a second major airport for Sydney has been long and controversial. Over the years many possible sites have been suggested and as many as 20 have been examined in detail. Few, if any, transport infrastructure proposals have been studied in more detail or attracted the same level of public interest.

The proposal is to build a domestic and international airport at Badgerys Creek in western Sydney. The key questions are whether a second airport should be built at Badgerys Creek and, if so, in what directions should the runways be aligned, how many aircraft should the airport handle, when should it be built, what would be the environmental impacts of the proposal, and how should they be managed?

The environmental assessment process is designed to help answer these and other questions. It requires the proponent of the proposal, in this case the Commonwealth Department of Transport and Regional Services, to prepare a Draft Environmental Impact Statement (EIS) for public exhibition and then respond to the comments received by preparing a Supplement to the Draft EIS. The Draft EIS and the Supplement together make up the Final EIS. The EIS is prepared under guidelines released by Environment Australia.

A range of options for the future development of the airport was considered in the EIS process to assist with the development of the proposal and to help identify community opinion on EIS issues. The EIS highlighted the potential impacts of constructing and operating an airport capable of handling 30 million passengers per year, about the capacity of an airport with two parallel runways servicing regional, domestic and international traffic in Australia. However, the impacts of a first stage development based on one runway and facilities for about 10 million passengers per year were also examined. Different roles for the airport, runway alignments and modes of operation were also considered.

The EIS is a source of detailed information on the environmental (including social and economic) impacts of the options. The EIS does not, however, rank the options or make recommendations: the process is designed to assist decision makers, rather than to make decisions. The decisions on the second airport will be made by the Commonwealth Government, based on the results of the EIS and other considerations.

While the second airport has been planned for 30 million passengers per year, it is likely that it would be developed in a series of stages to match the growth in demand. Under the Airports Act 1996, the approval process for major developments on the airport would require the Minister for Transport and Regional Services to consider the environmental impacts of each stage. Any proposed development that might cause significant environmental impacts would be assessed in accordance with the provisions of the Environment Protection (Impact of Proposals) Act 1974. It follows that, as the airport develops over time, there would be a series of decisions on the need for further environmental assessments.

This document is a summary of the Final EIS; that is a summary of the outcomes of the work undertaken for the Draft EIS and the Supplement to the Draft EIS. It will be distributed to those who lodged submissions on the Draft EIS and also made generally available. It reflects the considerable analysis undertaken of the proposal, including the extensive work undertaken for the EIS Supplement. Further details are in the Draft EIS and the Supplement to the Draft EIS, which are available from public libraries, community organisations and the Australian Government Information Service.

Introduction

What is this document?
What previous decisions have been made?
How does the environmental assessment process work?
What was the response to the Draft EIS?
What further work was undertaken for the Supplement to the Draft EIS?

What is this Document?

This is a summary of the Final Environmental Impact Statement (EIS) on the proposal to construct and operate a major domestic and international airport for Sydney at Badgerys Creek. It focuses on the environmental and economic impacts of the proposal, rather than on the process that was followed.

What Previous Decisions Have Been Made?

Badgerys Creek, 46 kilometres west of Sydney's central business district, was chosen as the site for the city's second major airport in 1986, and a site of 1,700 hectares was acquired subsequently by the Commonwealth. *Figure 1* shows the location of the airport site relative to major centres in Sydney (a more detailed regional map is shown as *Figure 29*, inside the back cover of this Summary).

Figure 1 **Location of Badgerys Creek Airport Sites**

In 1989 it was announced that the first stage of development would be a general aviation facility, but in 1995 it was decided to accelerate the development of the airport and build facilities capable of handling domestic and international traffic. This decision triggered the Commonwealth's environmental assessment procedures and in January 1996 it was announced that an EIS would be prepared for the construction and operation of the new airport.

In May 1996 the scope of the assessment was broadened to include sites at both Badgerys Creek and in the Holsworthy Military Area. Following a detailed review of these sites, Holsworthy was eliminated in September 1997 on the grounds that it was environmentally unacceptable for the development of a major airport.

The then Commonwealth Department of Transport and Regional Development lodged a proposal for the Second Sydney Airport at Badgerys Creek in September 1997 and Environment Australia issued Guidelines for the EIS in October 1997.

PPK Environment and Infrastructure Pty Ltd was contracted to assist with the preparation of the EIS and a consortium led by Airport Planning Pty Ltd (Airplan) was engaged to assist with the planning for the proposed airport.

How Does the Environmental Assessment Process Work?

The EIS process was conducted in accordance with the Administrative Procedures of the *Environment Protection (Impact of Proposals) Act 1974* (as shown in *Figure 2*). The Commonwealth EIS process consists of four basic steps:

- Guidelines are prepared by Environment Australia following public review;
- a Draft EIS is prepared on the basis of the Guidelines;
- the Draft EIS is released for public review; and
- a Supplement is prepared, which is the proponent's response to the comments received on the Draft EIS.

Extensive consultation was undertaken during the preparation of the Draft EIS and particularly in the initial phase, which examined both the Badgerys Creek and Holsworthy sites. It included identifying the interests of communities, distributing information, consulting with the community and seeking feedback. The issues raised then provided important input to the studies conducted as part of the Draft EIS.

Ten separate information documents were released during this initial consultation period and over 400,000 copies distributed to the communities. More than 140 advertisements were placed in metropolitan and local newspapers. In addition, documents were produced in 16 languages. Direct contact and two-way exchanges of information with the community occurred through meetings, information days, displays at shopping centres, a telephone information line, the Internet and by responding to written submissions.

Photograph 2 **Information Day at Penrith**

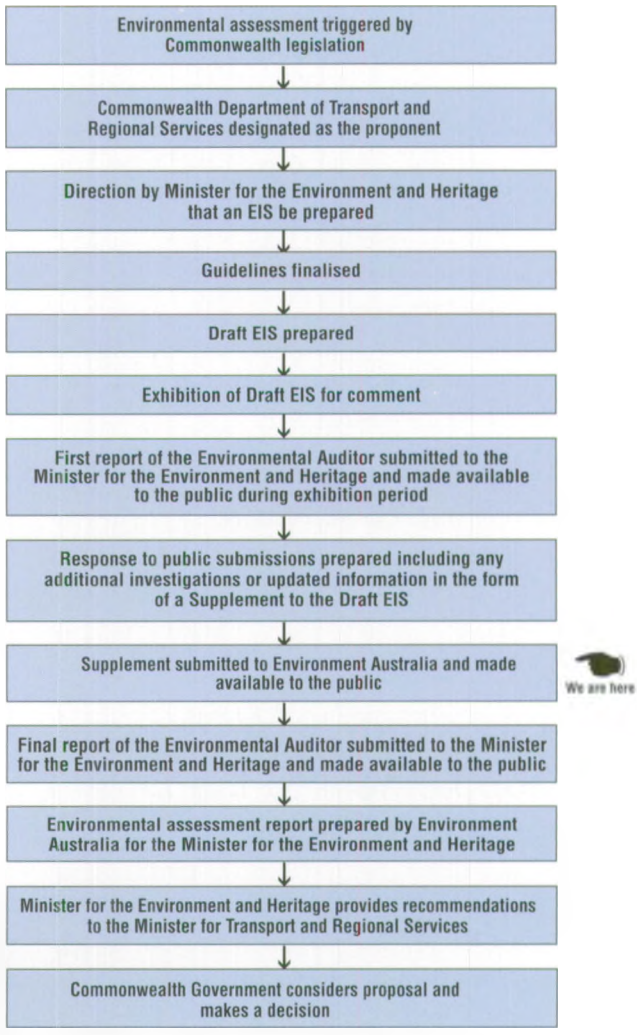


Figure 2 **Environmental Assessment Process**

The Draft EIS and the Supplement make up the Final EIS (referred to as *the EIS* in this Summary). The Final EIS is reviewed by Environment Australia and an Assessment Report is prepared. The Minister for the Environment and Heritage will then make recommendations on the proposal to the responsible Minister, in this case the Minister for Transport and Regional Services.

In addition to the procedures required by the Act, the EIS was subject to an independent environmental audit, the first time such an approach has been used for a Commonwealth proposal. The Auditor, appointed by the Minister for the Environment and Heritage, was required to assess the appropriateness and adequacy of the data and methodologies used in the EIS. The Auditor released a report on the Draft EIS and will prepare a report on the Final EIS. The Final Audit Report, and the Assessment Report prepared by Environment Australia, will be made available to the public.

What was the Response to the Draft EIS?

The Draft EIS was released for a 14 week public exhibition period on 23 December 1997. It was supported by 15 technical papers which were also made available to the community and other stakeholders.

11,240 people or organisations lodged submissions on the Draft EIS with Environment Australia. 15,650 submissions were recorded.

Less than one percent of the authors of submissions supported an airport at Badgerys Creek. Issues most frequently mentioned by the community, summarised as common themes, were the:

- need to consider alternative airport sites outside the Sydney basin;
- effects of aircraft noise on the health and well-being of the community, and in particular disturbance to sleep and learning;
- impacts on air quality in western Sydney and the implications for asthma, respiratory illness, cancer, heart disease and other illnesses;
- impact of air emissions from the airport and related motor vehicle traffic on the quality of drinking water;
- impact on the quality of water in local creeks, South Creek and the Hawkesbury Nepean River system;
- increased congestion from road traffic generated by the airport, and the related air quality and health implications;
- economic benefits and costs of the proposal and whether the benefits would be greater than the environmental costs; and
- hazards and risks to people and major infrastructure associated with aircraft overflights and whether they would be unacceptable.

The Auditor's Report on the Draft EIS was released in January 1998. It found that, while the Draft EIS was adequate or even well executed in some areas, there were some concerns and deficiencies, including the need to more precisely define the proposal and for further work relating to noise impacts and their management, hazards and risks, air quality, health impacts, flooding and water quality. Deficiencies in the assessments of visual impacts, waste and energy issues, economic assessment and cumulative impacts were also identified.

What Further Work was Undertaken for the Supplement to the Draft EIS?

All submissions on the Draft EIS and the findings of the Auditor were taken into account in the preparation of the Supplement to the Draft EIS. This involved an extensive program of research and analysis designed to respond to both recommendations made in the Draft EIS and comments received during its exhibition. For example, further work was undertaken to:

- update the forecasts for Sydney's aviation demand;
- define and analyse the 'do nothing' option in greater detail;
- estimate the economic benefits and costs of the proposal and its financial viability;
- investigate ways to reduce aircraft noise impacts by adjusting flight paths;
- review the aircraft noise impacts from a whole of Sydney perspective;
- reanalyse the air quality issues using better meteorological data;
- estimate health impacts with greater accuracy;
- survey the sites for flora and fauna in more detail;
- model flooding and water quality impacts; and
- develop a detailed environmental management strategy.

Need and Alternatives

What will be the demand for air travel in the future?
Why not use Bankstown Airport?
Why not build a fourth runway at Sydney Airport?
Would very high speed trains reduce demand for air travel?
What is the need for a second major airport for Sydney?
Why is Badgerys Creek the preferred site?
Are there any other suitable sites within the Sydney basin?
Are there suitable sites outside the Sydney basin?

Does Sydney Need a Second Airport?

What Will be the Demand for Air Travel in the Future?

The need for additional airport facilities for Sydney is created both by the expected strong growth in the number of passengers wanting to fly into and out of Sydney and the limited capacity of Sydney Airport.

In 1997-98 21.3 million aircraft passengers flew into and out of Sydney. This is expected to increase to 35 million in 2009-10 and 49 million in 2021-22 as shown in *Figure 3*. In 1997-98 there were 276,300 aircraft movements at Sydney Airport. This demand is expected to grow to 381,000 in 2009-10 and 480,000 in 2021-22 as shown in *Figure 4*. Although these forecasts take account of the regional economic downturn beginning in the mid-1990s, the overall growth in demand for air travel is still substantial.

Estimating the exact year in which Sydney Airport will reach capacity is difficult. For example, Sydney Airport's capacity to handle aircraft movements would be reduced if more stringent noise management practices were introduced. On the other hand, it might be possible to increase passenger throughput at Sydney Airport if the airlines used larger aircraft, decreased the number of empty seats on each flight and reduced the number of passengers using Sydney Airport to transfer to other flights.

Assuming current trends in aircraft size and loading continue, Sydney Airport will reach capacity in 2006-07, when demand is forecast to be 31 million passengers per year. Alternatively, if it was assumed that, in the longer term, regional passengers will be carried in larger aircraft, allowing more room for domestic and international services, capacity would be reached in 2010-11, when demand is forecast to be 36 million passengers.

If the forecast demand for air travel is to be met, it is very likely that Sydney will need new major airport facilities in the latter part of the next decade.

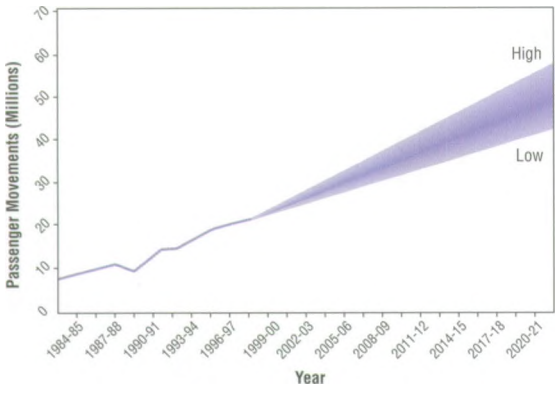


Figure 3 **Forecasts of Total Passenger Movements for the Sydney Basin to the Year 2021-22**

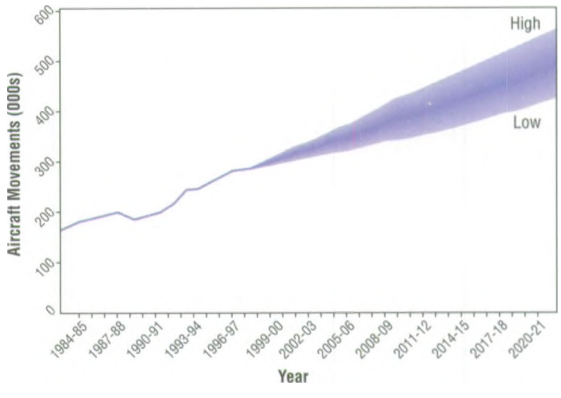


Figure 4 **Forecasts of Total Aircraft Movements for the Sydney Basin to the Year 2021-22**

Why Not Use Bankstown Airport?

Bankstown is not capable of handling major jet services, but could handle small volumes of regional traffic without adversely affecting the operation of Sydney Airport.

Introducing scheduled services at Bankstown would have a significant impact on the existing general aviation activities at the airport and would raise environmental issues for the communities near both Bankstown and Sydney Airports.

Better facilities and improved road access would be required before passengers using regional services would be attracted to Bankstown Airport. However, it is likely that regional passengers would prefer to use Sydney Airport, where they currently have guaranteed access through the slot scheme.

Changes to the operation of Bankstown Airport could improve the capacity of Sydney Airport in the short-term, but would not assist in satisfying long-term air travel demand.

Why Not Build a Fourth Runway at Sydney Airport?

Expansion of Sydney Airport is severely constrained by the airport's layout and by off-site residential and commercial developments. Even if a suitable location for a fourth runway could be identified, access by aircraft to terminal facilities and to the airspace could severely compromise the overall efficiency of the airport. It is therefore doubtful whether, even in theory, a fourth runway would add greatly to the capacity of Sydney Airport. Given current practice the question is of little relevance, as the capacity of the airport is limited by legislation to 80 movements per hour.

Expansion of Sydney Airport would raise a wide range of adverse environmental impact issues.

Would Very High Speed Trains Reduce Demand for Air Travel?

There has been considerable interest in the potential development of a very high speed train system to link major urban centres on the east coast of the country. The issue is whether this would delay, or even replace, the need for additional airport facilities in Sydney.

Even with optimistic (for rail) assumptions about the diversion of passengers from aviation to high speed rail, there would likely be only a modest extension to the life of Sydney Airport if a very high speed train system linking Sydney with Melbourne, Brisbane and Canberra was introduced.

What is the Need for a Second Major Airport for Sydney?

The forecasts of air travel demand and the future constraints on Sydney Airport's capacity indicate that there are no prudent and feasible alternatives to building a second major airport for Sydney if long-term demand is to be satisfied.

On the basis of the most recent demand forecasts for the Sydney basin, that Sydney Airport will reach capacity in the latter part of the next decade and that the use of a second airport would be based on the overflow from Sydney Airport, then a second airport would need to handle about ten million passengers per year about ten years after opening. On the same basis, a second airport with an annual capacity of 30 million passengers might not be required until much later, possibly about 2030.

Are there Feasible Alternative Sites for the Airport?

Why is Badgerys Creek the Preferred Site?

The search for a suitable site for a second airport for Sydney has been going on for many years. *The Second Sydney Airport Site Selection Programme Draft Environmental Impact Statement* re-examined all potentially feasible alternative airport sites. Sites at Badgerys Creek, Bringelly, Darkes Forest, Goulburn, Holsworthy, Londonderry, Scheyville, Somersby, Warnervale and Wilton were chosen for closer evaluation.

A site selection process was then undertaken by dividing the Sydney sites into two groups: a group of closer sites and a group of mid-distance sites. Goulburn was considered separately, but was eliminated early on the grounds of distance and travel time to Sydney. A preferred site was selected from each group. Badgerys Creek was considered to be the best of the closer sites, and Wilton the best of the mid-distance sites.

Both Badgerys Creek and Wilton were subject to an EIS completed in December 1985. In February 1986, the then-Commonwealth Government announced that

Badgerys Creek had been selected as the site for the Second Sydney Airport because it was closer to the markets it was intended to serve; would involve a lower development cost; and would have less effect on the natural environment. The Badgerys Creek site was progressively acquired by the Commonwealth between 1986 and 1991 at a cost of $125 million.

Are There Any Other Suitable Sites Within the Sydney Basin?

Holsworthy was considered and rejected in 1996-97. It is unlikely that a detailed review now of the other three 'greenfield' sites identified in 1985 (Scheyville, Londonderry and Bringelly) would rank them superior to Badgerys Creek.

Other sites within the Sydney basin, including RAAF Base Richmond and the Kurnell Peninsula, have been suggested as possible alternatives to Badgerys Creek. Each of these has serious deficiencies as sites for a major airport, as discussed in Chapter 5 of the Supplement.

It has also been suggested by private sector interests that a major airport could be built off the coast of Botany Bay to reduce the impacts of aircraft noise over Sydney suburbs. The proposed off-shore airport is designed to replace Sydney Airport and it would not overcome the need for a second airport.

Are There Suitable Sites Outside the Sydney Basin?

It is often suggested that Sydney's second airport should be built outside the Sydney basin. Some of the alternative sites put forward in submissions on the Draft EIS include Goulburn, Lithgow, Newcastle/ Williamtown and Wilton (although the Supplement noted that Wilton is on the boundary of Sydney's air drainage basin). A private sector proposal has also been announced for the location of a major airport on Kooragang Island at Newcastle.

The major difficulty with all of the sites that lie outside the Sydney basin is their distance from Sydney. Each of these sites would make travel to and from the airport time consuming, costly and inconvenient for airport users. Accessibility to Sydney's central business district and Sydney Airport, an important advantage for sites within the Sydney basin, would be significantly reduced. Most major airports around the world are located within 50 kilometres of the central business district; they need to be close to the markets they serve.

While a very high speed train is a commonly suggested solution for providing surface access to outlying sites, there are serious doubts about whether this would be a practical solution. There are no international precedents for accessing an outlying airport primarily by a very high speed train.

The Proposal

What would be the role of the Second Sydney Airport?
How would the airport be developed and operate?
How much would the airport cost?

What Would be the Role of the Second Sydney Airport?

The airport's role would evolve over time in response to a wide range of economic, environmental, policy and operational considerations. Private sector interests would probably play an important part in defining the role of the second airport.

Reflecting the need for planning flexibility, three air traffic scenarios were used in the EIS to assess the potential impacts of the proposal:

- *Air Traffic Scenario 1*, in which the Second Sydney Airport would handle overflow traffic from Sydney Airport with the proportion of international and domestic air traffic assumed to be similar at both airports;
- *Air Traffic Scenario 2*, in which the capacity of Sydney Airport would be restricted to 25 million passengers per year and all subsequent growth in the Sydney basin would be directed to the second airport; and
- *Air Traffic Scenario 3*, in which a greater proportion of international flights (using larger and consequently noisier aircraft) would be directed to the Second Sydney Airport. The capacity of Sydney Airport would be capped at 20 million passengers per year.

These three scenarios were used in different ways in the EIS. The third scenario was used extensively, for example, in the noise and air quality analyses because it represents a 'worst case' situation for western Sydney. This scenario assumed that the second airport would develop quickly to an operating level of 15 million passengers per year by 2006 and develop to the master plan level of 30 million passengers per year by 2016.

The first or 'overflow' scenario reflected the situation in which demand for the second airport would only develop once Sydney Airport reached capacity. Variants of this 'overflow' model formed the basis for the economic and financial analyses undertaken for the EIS.

It is not possible to define precisely the role of the second airport at this stage in the planning process. The time-scales are too long, the commercial possibilities too diverse and the stakeholders too numerous.

How Would the Airport be Developed and Operate?

To provide the community and decision makers with the opportunity to examine the relative merits of more than one option for the design of the airport, three options were developed and assessed in the EIS. The master plan for each option was based on accommodating up to 30 million passengers per year, and includes general features such as parallel runways with the majority of facilities located between the runways. *Figures 5* to *7* show the master plans for each option. *Photograph 3* shows the runway alignments on an aerial photograph of the airport sites.

The airport options considered were:

- Option A which is generally consistent with the planning for this site since 1986. The airport would be developed within land presently owned by the Commonwealth (1,700 hectares) with two parallel runways constructed on an approximate north-east to south-west alignment;
- Option B which adopts an identical runway alignment to Option A, but has a greater distance between the parallel runways, an expanded land area (additional 1,200 hectares), and also a cross wind runway; and
- Option C which provides two main parallel runways on an approximate north to south alignment in addition to a cross wind runway. The land area would also be expanded (additional 1,150 hectares) above that already owned by the Commonwealth.

A possible Stage 1 development for each of the options was also prepared, adopting a single 3,600 metre runway and supporting facilities for 10 million passengers. *Figures 8* to *10* show the Stage 1 development plans for each option. It would also be possible to develop the Stage 1 of each option in a number of phases to match air traffic growth.

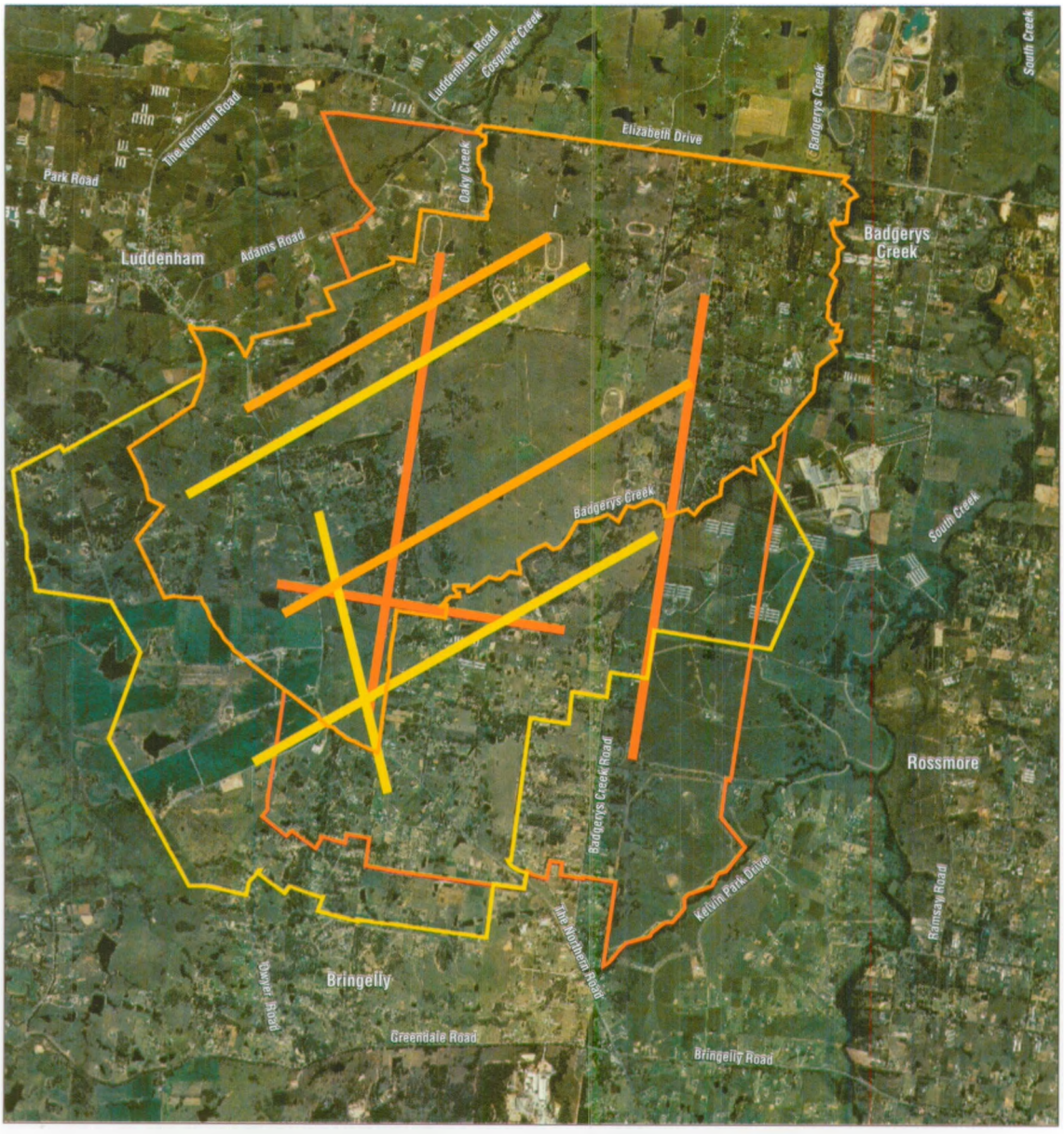
To ensure that the likely range of possible impacts of the airport options are identified in the EIS, a number of

different assumptions about how the airport options would operate were adopted. These different assumptions related to the number and types of aircraft that may operate from the airport, the flight paths used and the direction of take-offs and landings. The preliminary flight paths used in the EIS represent the range that may be used if any of the airport options were developed, taking into account existing management of Sydney's airspace and the need to ensure safe and efficient aircraft operations.

How Much Would the Airport Cost?

Each stage of the development of the airport would involve substantial investment. It was estimated that it would cost between $1.4 billion and $2.4 billion to build an airport capable of handling 10 million passengers per year, and $600 million to build off-site infrastructure such as roads, rail line and other services. The cost of constructing an airport capable of handling 30 million passengers per year would be between $3 billion and $4.8 billion, with a further $1 billion required for off-site infrastructure to service the airport.

About 9,000 person years of on-site labour and 17,000 person years of off-site employment would be required to construct the master plan development, which would take about six years.



Photograph 3 **Aerial Photograph of Sites of Badgerys Creek Airport Options**

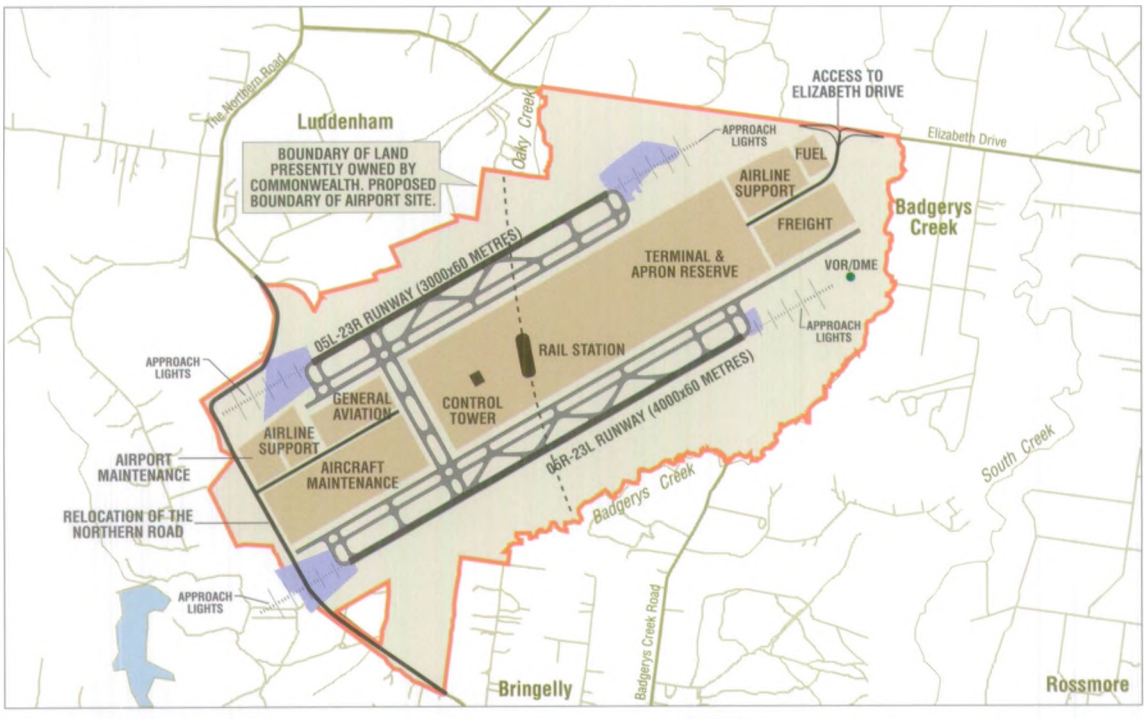


Figure 5 **Master Plan of Option A**

Note: Detailed designs would include a number of environmental management measures such as stormwater detention/ retention basins which are not shown on the above master plan.

Land presently owned by Commonwealth

Area which would require clearing and/or earthworks to comply with Obstacle Limitation Surfaces

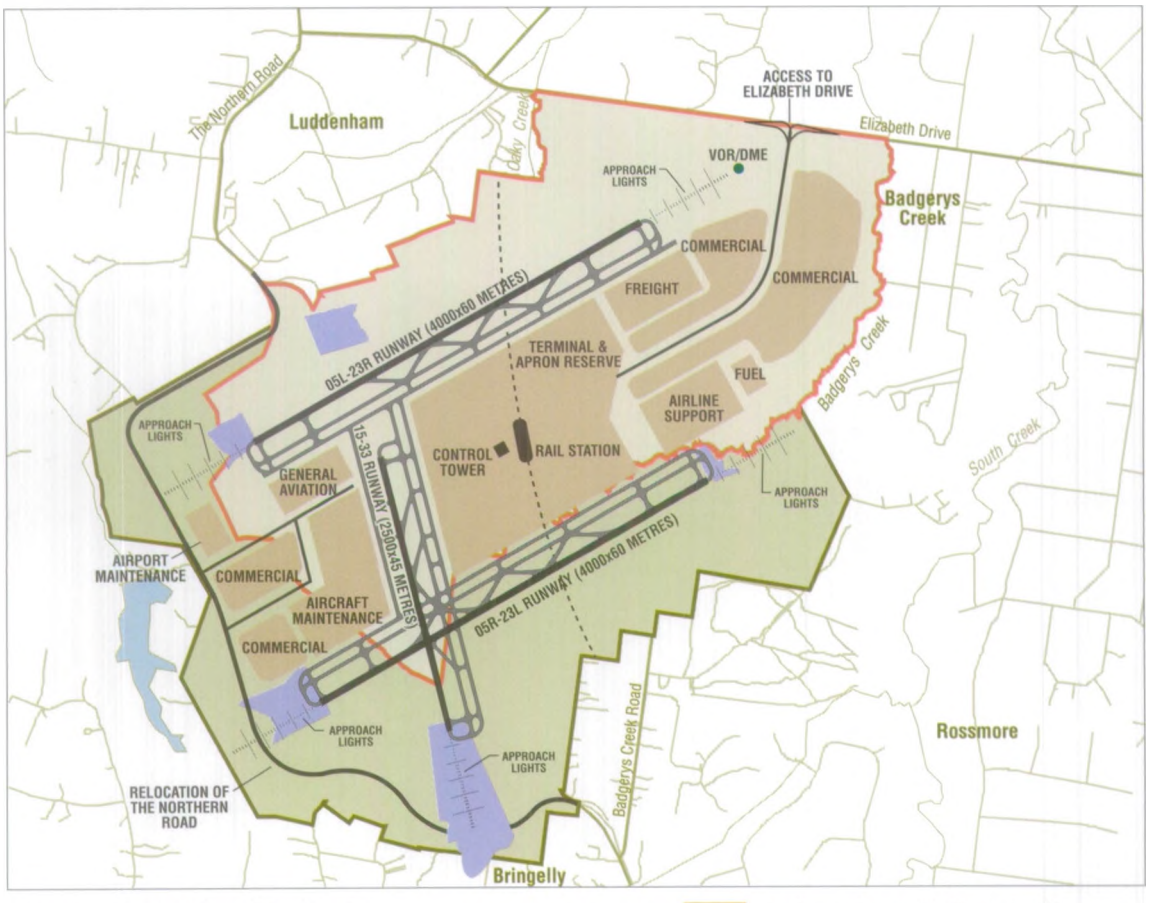


Figure 6 **Master Plan of Option B**

Note: Detailed designs would include a number of environmental management measures such as stormwater detention/ retention basins which are not shown on the above master plan.

Land presently owned by Commonwealth

Additional land required for Airport Option

Area which would require clearing and/or earthworks to comply with Obstacle Limitation Surfaces

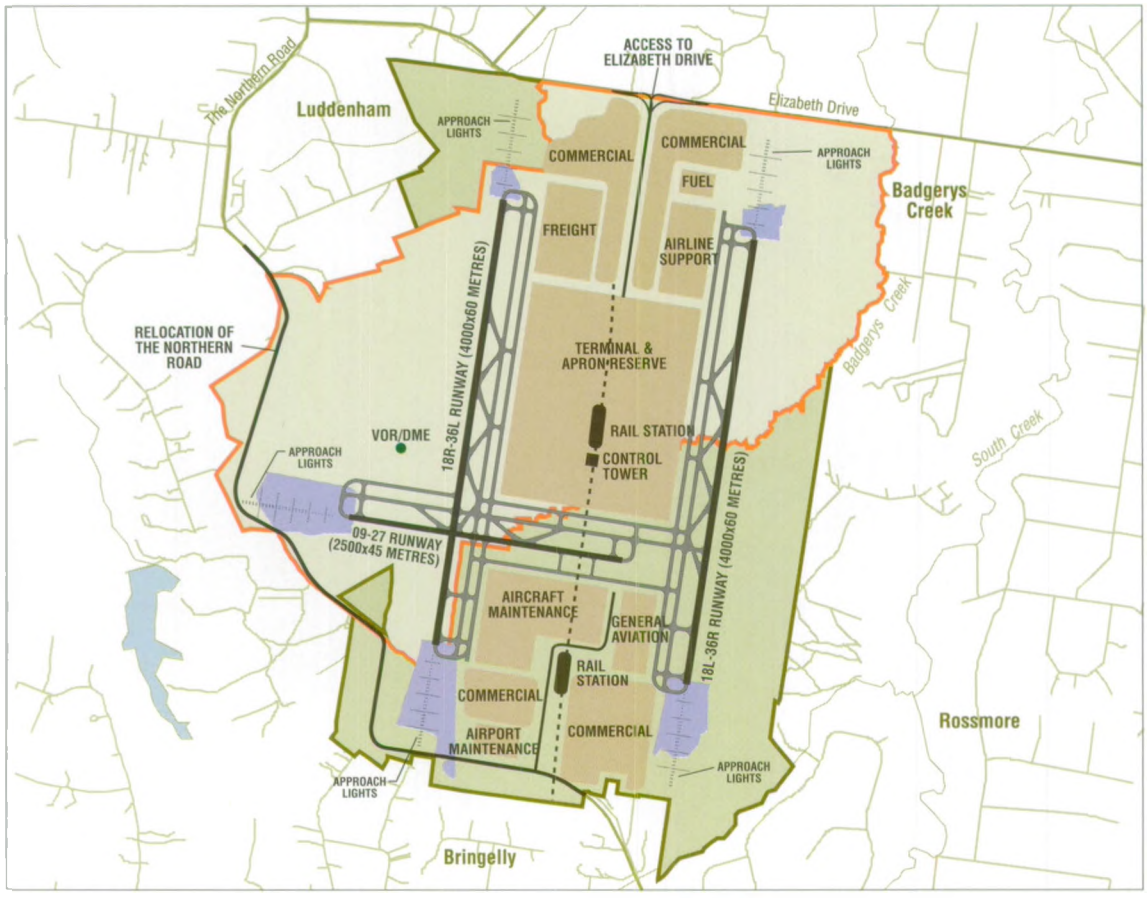


Figure 7 **Master Plan of Option C**

Note: Detailed designs would include a number of environmental management measures such as stormwater detention/ retention basins which are not shown on the above master plan.

Land presently owned by Commonwealth

Additional land required for Airport Option

Area which would require clearing and/or earthworks to comply with Obstacle Limitation Surfaces

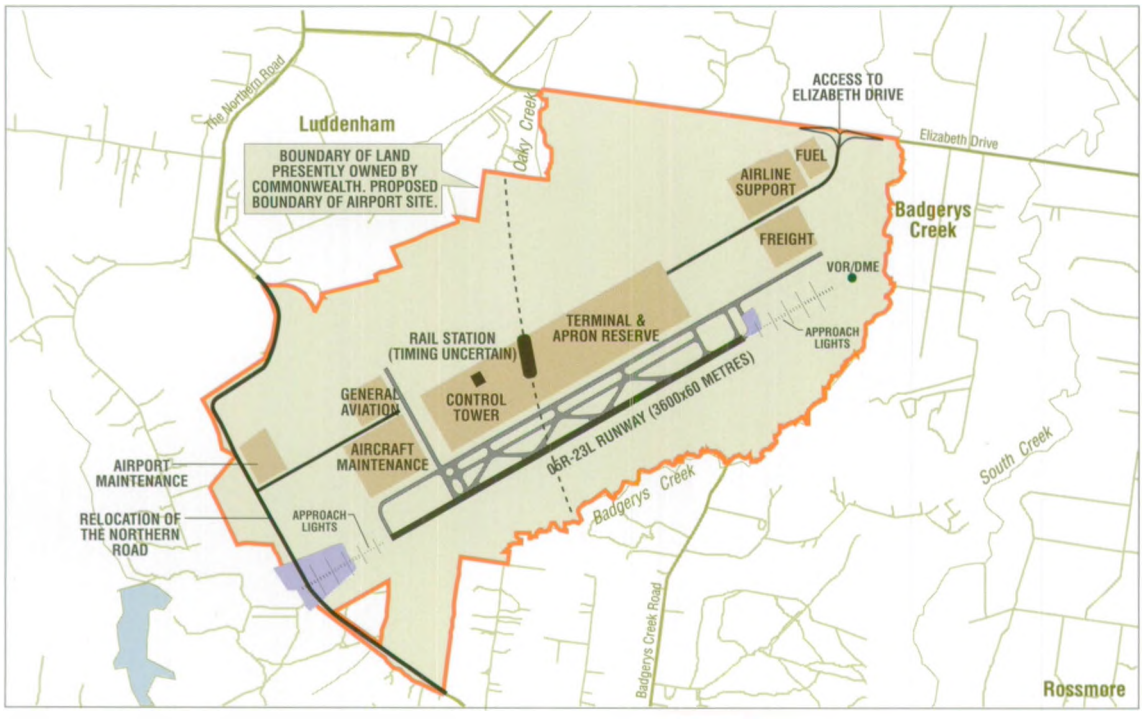


Figure 8 **Stage 1 Development of Option A**

Note: Detailed designs would include a number of environmental management measures such as stormwater detention/ retention basins which are not shown on the above Stage 1 plan.

Land presently owned by Commonwealth

Area which would require clearing and/or earthworks to comply with Obstacle Limitation Surfaces

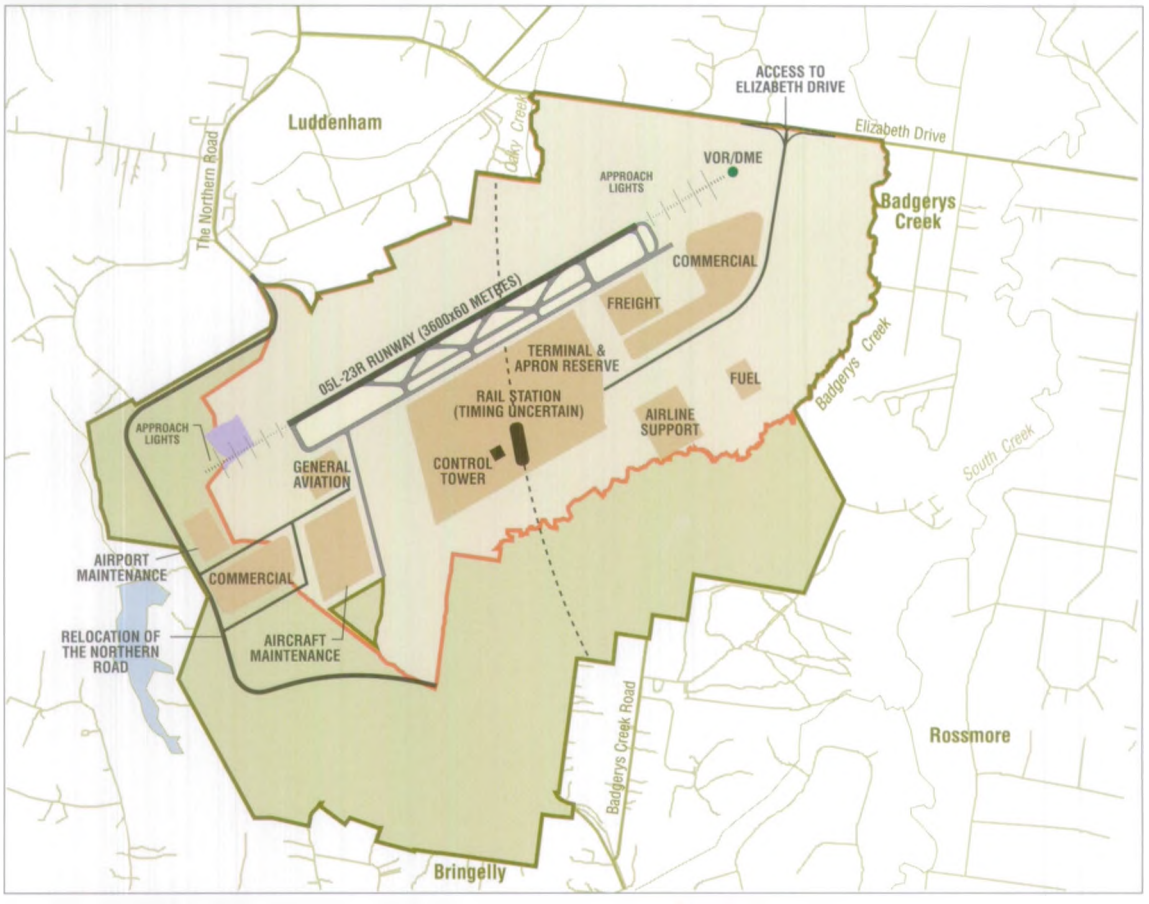
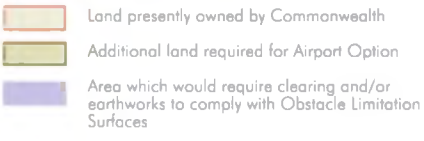


Figure 9 **Stage 1 Development of Option B**

Note: Detailed designs would include a number of environmental management measures such as stormwater detention/ retention basins which are not shown on the above Stage 1 plan.



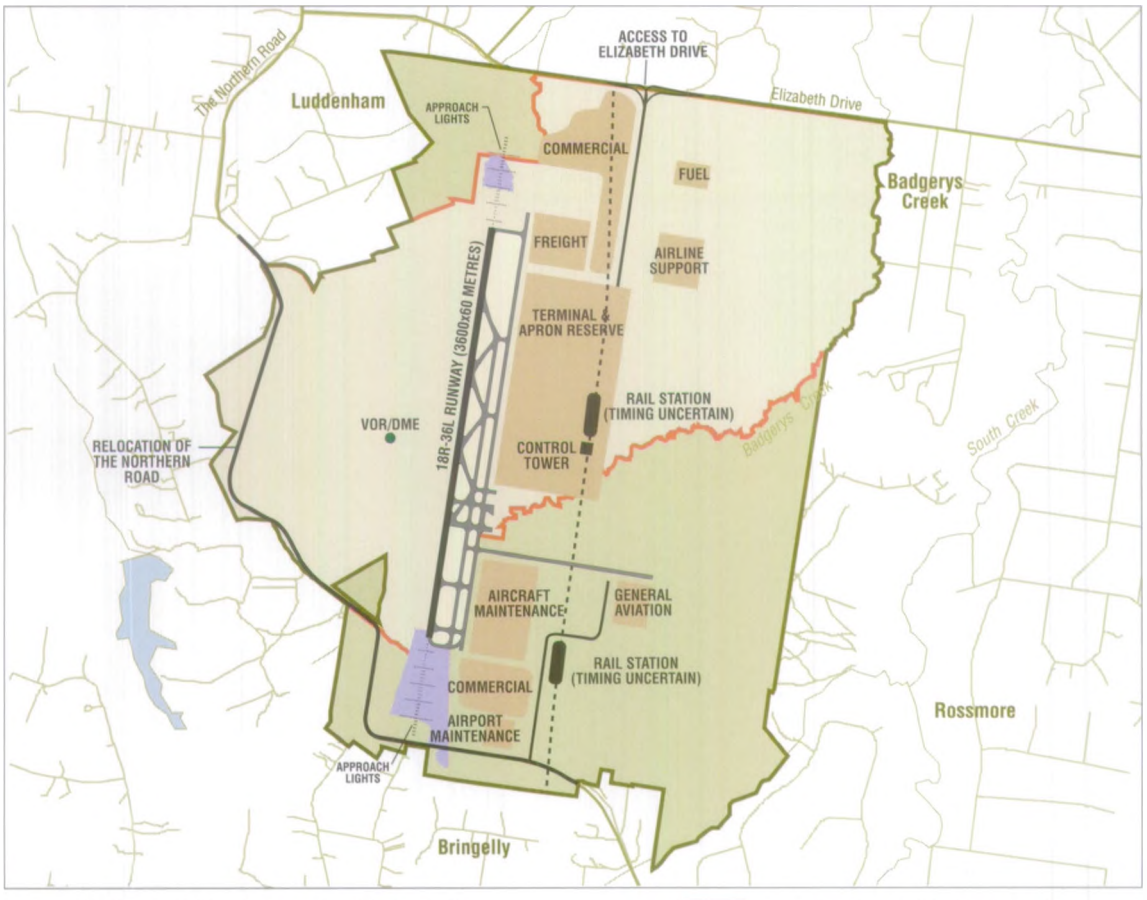
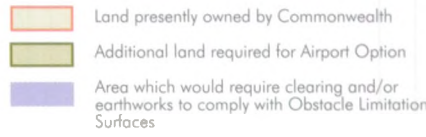


Figure 10 **Stage 1 Development of Option C**

Note: Detailed designs would include a number of environmental management measures such as stormwater detention/ retention basins which are not shown on the above Stage 1 plan.



Environmental Impacts

Planning and Land Use

Would the proposed airport result in more urban development in western Sydney? What land use assumptions were used in the EIS?

The future development and character of western Sydney would be greatly influenced by the Second Sydney Airport and its associated infrastructure. The airport would stimulate employment and economic growth, residential and commercial development, and associated human and physical services. Existing and currently planned land uses in the region surrounding the Badgerys Creek site are shown in *Figure 11*.

Should the Second Sydney Airport proceed, metropolitan planning strategies and regional environmental measures would need to be developed to reduce the impact of the Second Sydney Airport on the State Government's desired planning outcomes for western Sydney.

The planning response to the Second Sydney Airport could occur in a number of ways. Two broad land use strategies, and a number of refinements of those strategies, were examined in the EIS. The first strategy assumed the development of urban villages adjacent to a potential rail line to the airport from Edmondson Park through Bringelly or Rossmore. It was assumed that 26,000 people would live in these villages by 2016, with further substantial growth possible after that time. Advantages of this strategy include the opportunity for new residential communities to be located adjacent to rail services, thereby reducing dependence on private motor vehicles, and close to a large number of jobs at the airport. It is acknowledged, however, that the development of such urban villages is not consistent with NSW metropolitan planning strategies, would require higher residential densities to be achieved than are currently being achieved in western Sydney, and that regional air and water quality issues would need to be resolved.

The second land use strategy assumed no further urban development within the South Creek Valley and that the rail line to the airport could be directed through the urban release areas west of Liverpool. Advantages of this strategy include avoiding significant urban development within the South Creek Valley catchment, and encouraging a higher density of development within already identified urban release areas close to established communities, facilities and services.

These potential future land use strategies were developed to indicate the changes to the character of western Sydney that might occur and provide a reasonable basis for estimating the environmental impacts of the airport in future years, especially noise and air quality impacts.

Land use planning around the airport would be the responsibility of the NSW and local Governments, although there would clearly be a need for co-ordination with the airport operator. It is proposed that the airport operator and the Department of Transport and Regional Services would participate in a regional planning co-ordination body.

The acquisition of land for the airport would have a direct impact on some locally significant agricultural enterprises, including a poultry farm, a 1,500 head dairy farm, beef grazing, horse agistments and intensive vegetable cropping operations. The value of the loss of agricultural production at the local level would be significant, but would be minimal compared to the overall production of the Sydney region.

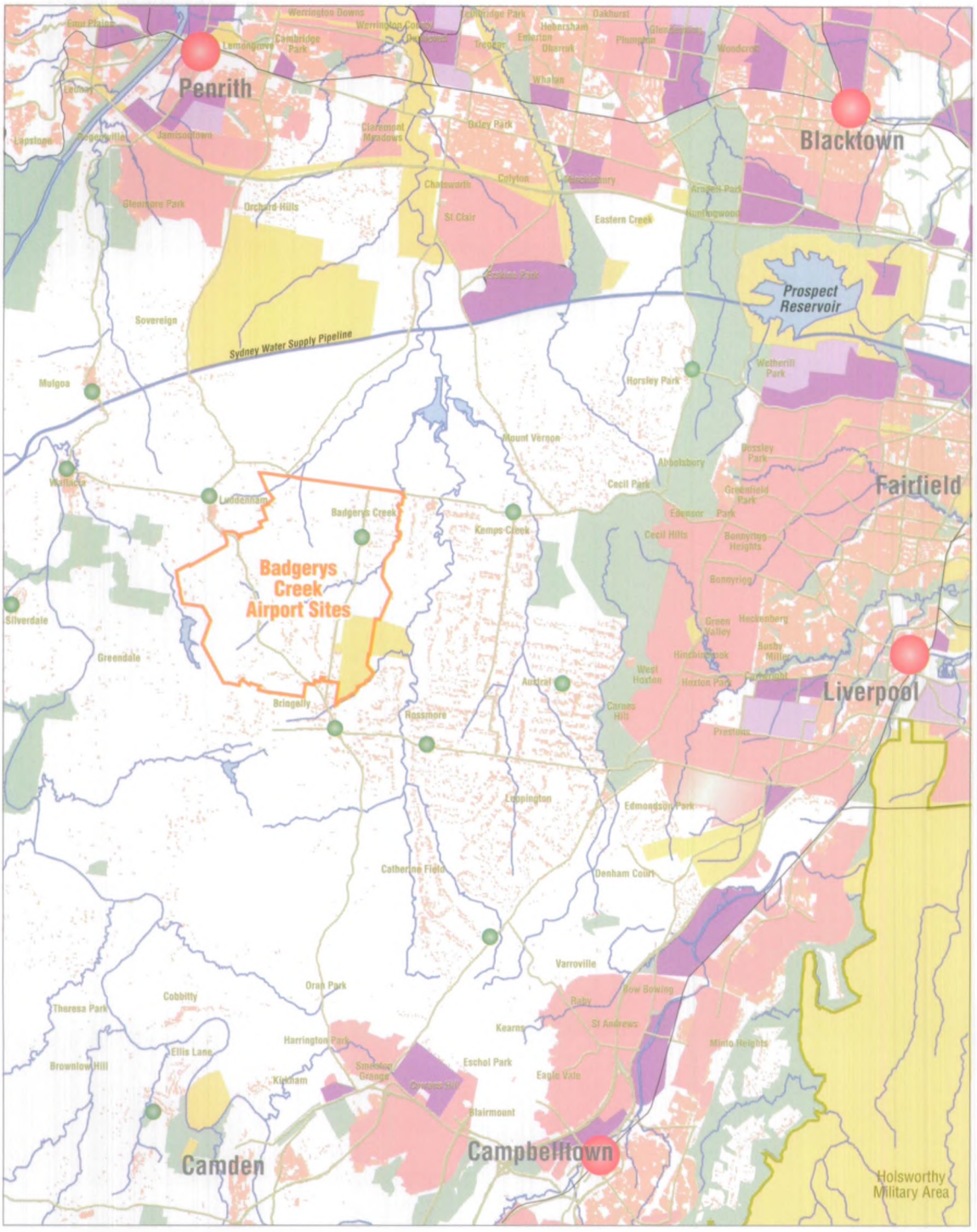


Figure 11 **Existing and Potential Future Regional Uses**
Source: Department of Urban Affairs and Planning and Local Government

Aircraft Noise

How many people would be exposed to aircraft overflight noise?
How loud and how frequent would the aircraft overflight noise be?
How would the noise impacts from the second airport compare with the impacts from Sydney Airport?

What are the Effects of Aircraft Overflight Noise?

Aircraft overflight noise can affect people in many different ways. It can, for example, make conversation difficult, disturb those watching television or listening to the radio, or interfere with other forms of communication. Aircraft noise can also result in various forms of sleep disturbance. People can also be annoyed or be frightened by aircraft overflight noise. Other effects include reduction in housing values, impacts on wildlife and reduced enjoyment of recreational and natural areas.

How is Aircraft Overflight Noise Measured?

Consistent with the recommendations of the 1995 Senate Select Committee on Aircraft Noise in Sydney, a wide range of noise indicators was used to measure and assess the potential impacts of aircraft noise. These impacts were examined for a large area of western Sydney as shown in *Figure 12*.

The way the ear responds to different types of noise is usually measured by using the A-weighted decibel (dBA). Because of the way the dBA scale is calculated, a 10 dBA increase in noise is generally equivalent to doubling the loudness of the noise.

A useful way of describing aircraft noise is to use the maximum noise level of the particular aircraft as it flies overhead. This has been measured in dBA and allows an estimate to be made of the level of disturbance to sleep and communication.

Another, and more common, measure of aircraft noise exposure in Australia is the Australian Noise Exposure Forecast (ANEF) System. This system takes into account the noise level of each aircraft passing overhead, the number of movements and the time of day or night. An Australian Standard (AS 2021) has been developed based on this system and provides local authorities with guidelines for planning land uses around airports.

The ANEF system yields a number of measures which are used for different purposes. One of these, the Australian Noise Exposure Concept (ANEC), which is based on indicative data on aircraft types, aircraft operations and flight zones, was used to provide another measure of aircraft noise impacts in the EIS.

Other measures of noise exposure have been designed to assess particular impacts. Included among these is the Sleep Disturbance Index, which uses the number and noise level of flights during the night to provide an indication of the effects of aircraft noise on sleep.

The community-wide response to aircraft noise has been partially assessed in economic terms through an estimate of the potential reduction in property values. There are, however, other impacts that cannot be so precisely defined, such as effects on health and other social impacts on individuals and communities.

The aircraft noise impacts reported in the EIS were based largely on flight-paths designed for efficient air space management. Information is also provided in the EIS, however, to illustrate how the number of people exposed to aircraft noise could be reduced by the careful design of flight-paths. This is only one of a number of initiatives which could be introduced to reduce the impacts of aircraft overflight noise.

Would Aircraft Overflight Noise Disturb Sleep?

One of the issues for Government is whether night-time operations at the Second Sydney Airport should be restricted by a curfew (as are operations at Sydney Airport). This section discusses the disturbance to sleep that would occur if there was no curfew at the second airport.

Table 1 summarises the potential for each airport option to disturb sleep when the airport is operating at 30 million passengers per year. The table provides an estimate of the frequency of awakenings that may occur due to average operations of the airport options. Also provided is the 'worst case' prediction of the number of people affected by noise events exceeding 60 dBA during the night (10.00 pm to 6.00 am). An external noise level of 60 dBA approximates an internal level of 50 dBA with windows open, which is within the range in which sleep can be disturbed.

Figure 12 **Study Areas for Noise Assessment**

Table 1 **Disturbance to Sleep for the Airport Operating at 30 Million Passengers per Year**

Noise Indicator	Population Affected[1]		
	OPTION A	**OPTION B**	**OPTION C**
People that may, on average, be awoken the following times:			
• once a night	less than 100	less than 100	less than 100 to 100
• once every 2 nights	500 to 1,000	300 to 800	400 to 600
• once every 5 nights	6,000 to 8,000	3,500 to 6,000	1,500 to 17,000
People that may experience the following number of noise events greater than 60 dBA on a worst case night:			
• greater than 5 events	18,000 (4,500)[2]	19,000 (4,500)[2]	47,000 (2,000)[2]
• greater than 2 events	124,000 (60,000)[2]	108,000 (39,000)[2]	178,000 (48,000)[2]

Notes: 1. Based on population projections for 2016.

2. Figures in brackets represent impacts with the adoption of potential noise management measures.

3. There are limitations in the accuracy of predicting future populations. Estimates of population greater than 10,000 have been rounded to the nearest 1,000; estimates of population between 1,000 and 10,000 have be rounded to the nearest 500; and estimates of population less than 1,000 have been rounded to the nearest 100. Estimates of population less than 100 are expressed as less than 100.

4. Impacts assume all residential properties within the 35 ANEC contour would be acquired.

The figures in brackets in *Table 1* and the following tables indicate the number of people that might be affected if flight paths were designed to reduce noise impacts. For example, while Option C has the potential to create the greatest disturbance to sleep, it also has the greatest potential for a reduction in impacts with the implementation of noise management measures.

Would Conversations be Disturbed?

Aircraft noise can interfere with communication such as conversation, watching television and listening to the radio. The number of noise events exceeding 70 dBA over a 24-hour period tends to indicate the degree of disruption to normal domestic communications. When outside noise levels are below 70 dBA, communication inside the home is unlikely to be disrupted, while above 70 dBA some interruption is likely. The same comment applies in regard to schools, except that the critical outside noise level is 65 dBA.

Disturbance to domestic communication was therefore measured in terms of N70 data; that is, the number of times in an average day that a location is exposed to external aircraft noise of more than 70 dBA. N65 data were used to assess disturbance to educational facilities.

Table 2 summarises the impacts of aircraft overflight noise from all airport options on communications within domestic situations when the airport is operating at 30 million passengers per year. *Figures 13* to *15* show the maximum extent of the N70 contours for each of the airport options operating at 30 million passengers per year. These contours show the outside extent of a large range of N70 levels which resulted from examining the combinations of assumptions about air traffic movements and the different ways the airport might be operated.

Table 3 summarises the potential impacts on existing educational facilities for each airport option.

Table 2 **Disturbance to Communication for the Airport Operating at 30 Million Passengers per Year**

Noise Indicator	Population Affected[1]		
	OPTION A	OPTION B	OPTION C
People that may experience, on average, the following number of noise events over 70 dBA a day:			
• greater than 100 events	400 to 900 (NR)[2]	300 to 700 (NR)[2]	300 to 500 (NR)[2]
• greater than 50 events	2,500 to 5,000 (1,500)[2]	2,000 to 4,000 (NR)[2]	700 to 1,000 (NR)[2]
• greater than 20 events	8,500 to 9,500 (5,000)[2]	7,000 to 9,500 (NR)[2]	6,000 to 17,000 (NR)[2]
• greater than 10 events	15,000 (10,000)[2]	16,000 to 17,000 (NR)[2]	60,000 to 72,000 (32,000)[2]

Notes: 1. Based on population projections for 2016.
2. Figures in brackets represent impacts with the adoption of potential noise management measures. NR means no reduction in impact.
3. There are limitations in the accuracy of predicting future populations. Estimates of population greater than 10,000 have been rounded to the nearest 1,000; estimates of population between 1,000 and 10,000 have be rounded to the nearest 500; and estimates of population less than 1,000 have been rounded to the nearest 100. Estimates of population less than 100 are expressed as less than 100.
4. Impacts assume all residential properties within the 35 ANEC contour would be acquired.

Table 3 **Aircraft Overflight Noise Impacts on Existing Educational Facilities for the Airport Operating at 30 Million Passengers per Year.**

Noise Indicator	Educational Facilities[1]		
	OPTION A	OPTION B	OPTION C
Educational facilities that may experience, on average, the following number of noise events over 65 dBA between 9.00 am and 3.00 pm:			
• greater than 20 events	15(5)[2]	13(2)[2]	25(3)[2]
• greater than 10 events	20(14)[2]	20(11)[2]	75(26)[2]

Notes: 1. Definition of educational facilities includes child-care centres.
2. Figures in brackets represent impacts with the adoption of potential noise management measures.

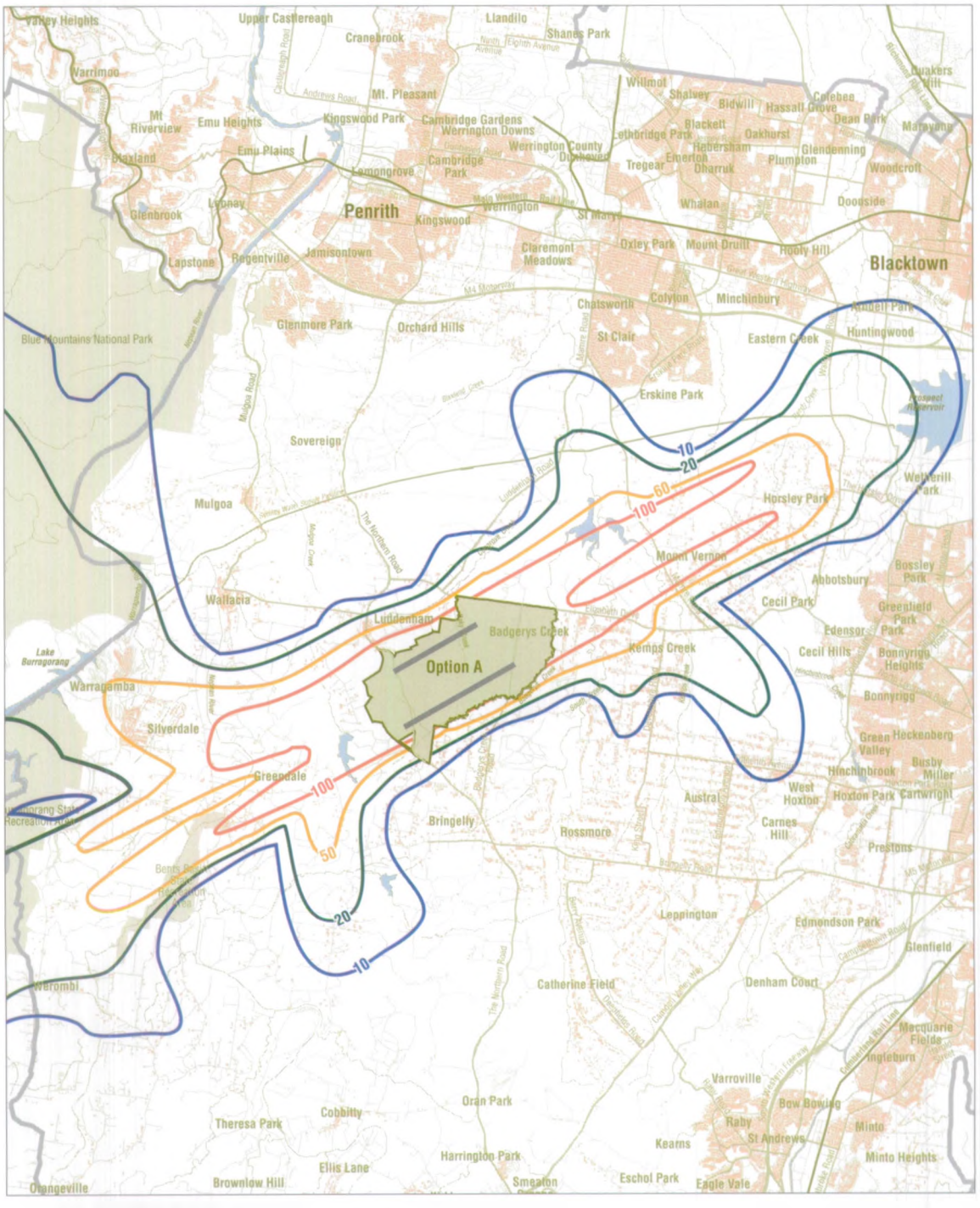


Figure 13 **Modelled Maximum N70 Contours for Option A (30 million passengers per year)**

TN

0Km 5Km

10 — Area within these two contours is estimated to receive between 10 and 20 aircraft overflights louder than 70dBA on an average day

20

20 — Area within these two contours is estimated to receive between 20 and 50 aircraft overflights louder than 70dBA on an average day

50

Extent of Dwelling Data

50 — Area within these two contours is estimated to receive between 50 and 100 aircraft overflights louder than 70dBA on an average day

100

100 — Area within this contour is estimated to receive more than 100 aircraft overflights louder than 70dBA on an average day

Indicates Density of Dwellings in 1996

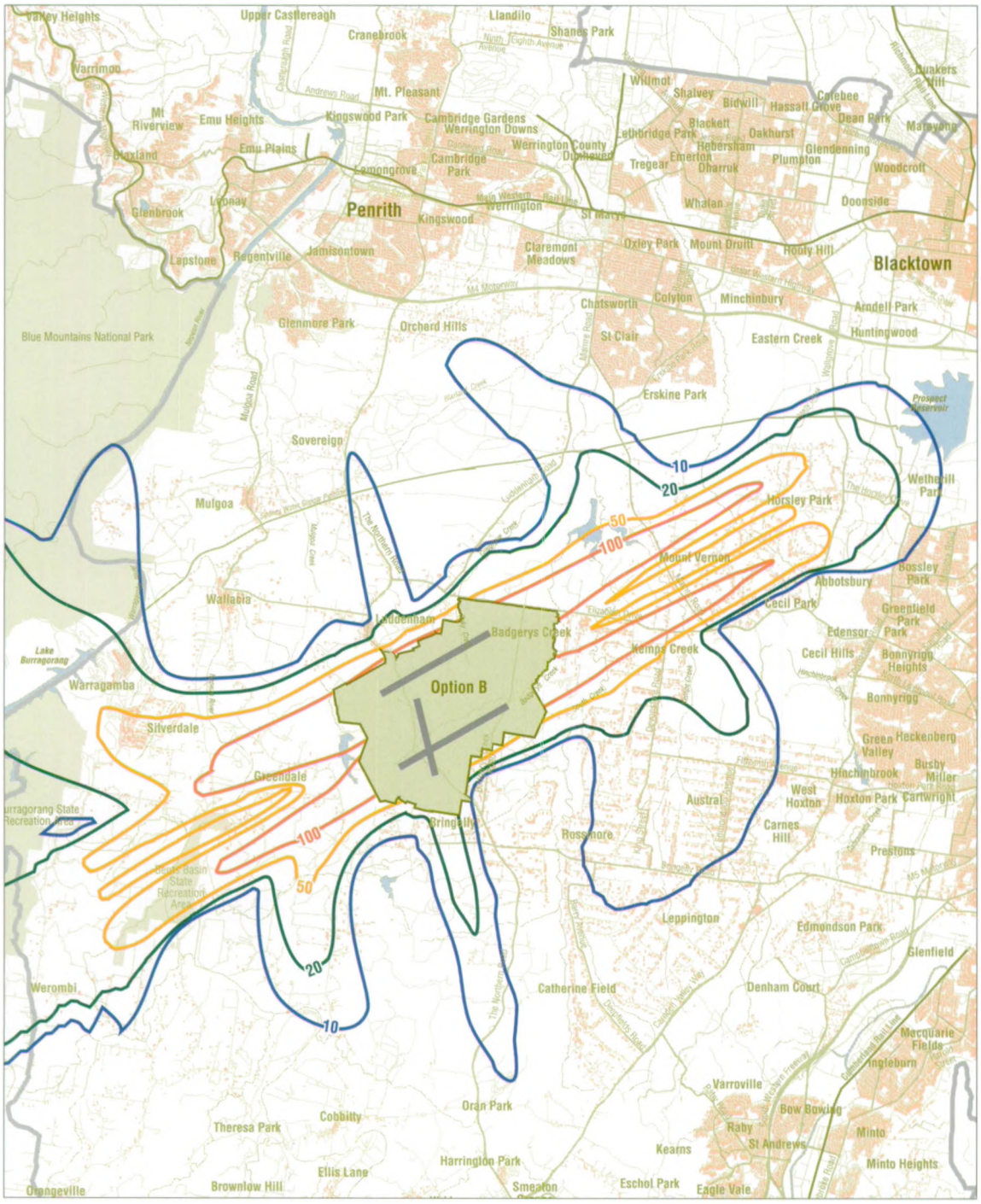


Figure 14 **Modelled Maximum N70 Contours for Option B (30 million passengers per year)**

10 — 20 — Area within these two contours is estimated to receive between 10 and 20 aircraft overflights louder than 70dBA on an average day

20 — 50 — Area within these two contours is estimated to receive between 20 and 50 aircraft overflights louder than 70dBA on an average day

Extent of Dwelling Data

50 — 100 — Area within these two contours is estimated to receive between 50 and 100 aircraft overflights louder than 70dBA on an average day

100 — Area within this contour is estimated to receive more than 100 aircraft overflights louder than 70dBA on an average day

Indicates Density of Dwellings in 1996

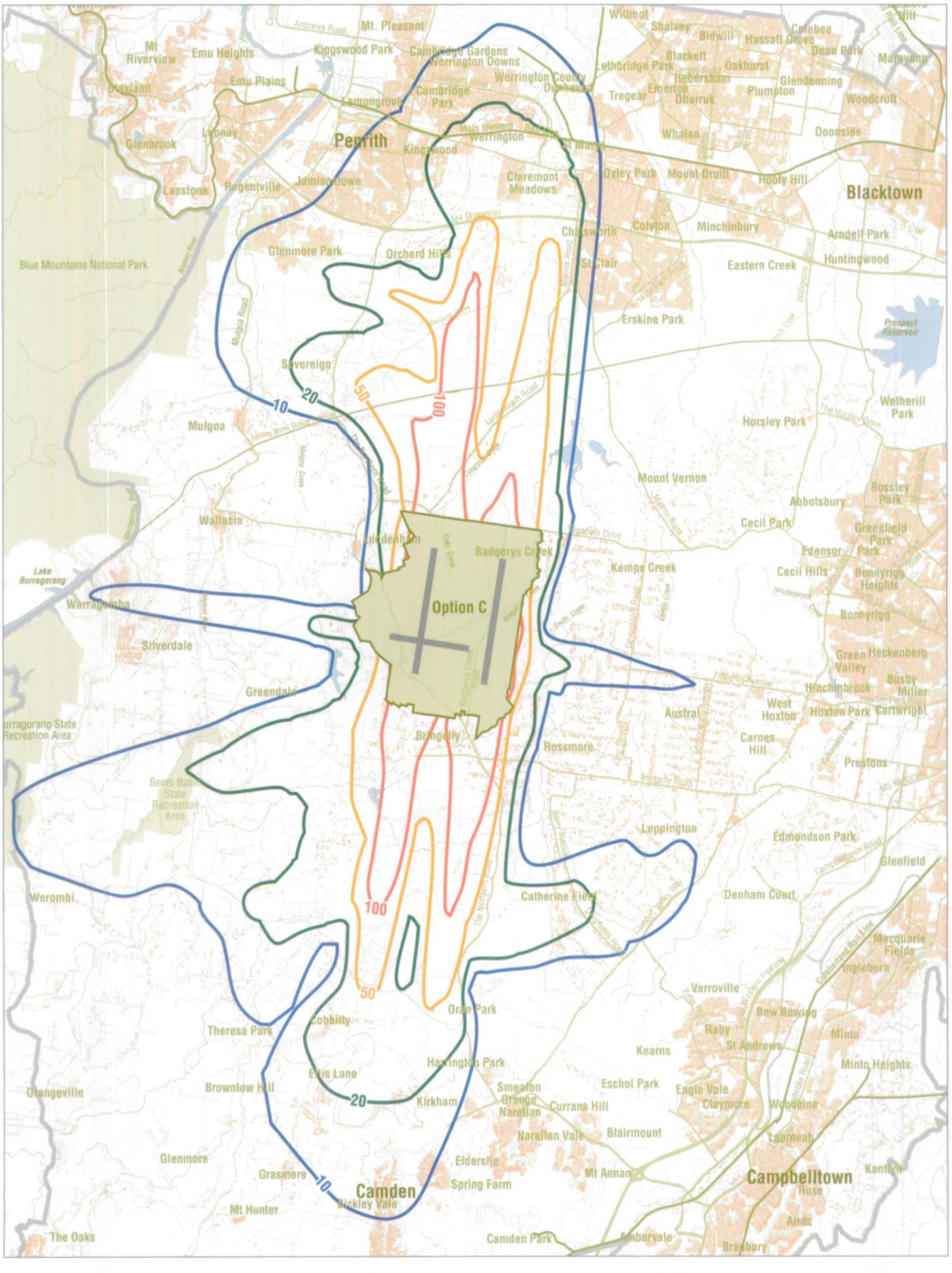


Figure 15 **Modelled Maximum N70 Contours for Option C (30 million passengers per year)**

10 — 20 Area within these two contours is estimated to receive between 10 and 20 aircraft overflights louder than 70dBA on an average day

20 — 50 Area within these two contours is estimated to receive between 20 and 50 aircraft overflights louder than 70dBA on an average day

Extent of Dwelling Data

50 — 100 Area within these two contours is estimated to receive between 50 and 100 aircraft overflights louder than 70dBA on an average day

100 Area within this contour is estimated to receive more than 100 aircraft overflights louder than 70dBA on an average day

Indicates Density of Dwellings in 1996

What are the Impacts on Land Use Planning?

The maximum extent of the ANEC contours for each of the airport options operating at 30 million passengers per year are shown in *Figures 16* to *18*. These contours show the outside extent of a large range of ANEC levels resulting from the examination of the combinations of assumptions about air traffic movements and the different ways the airport might operate.

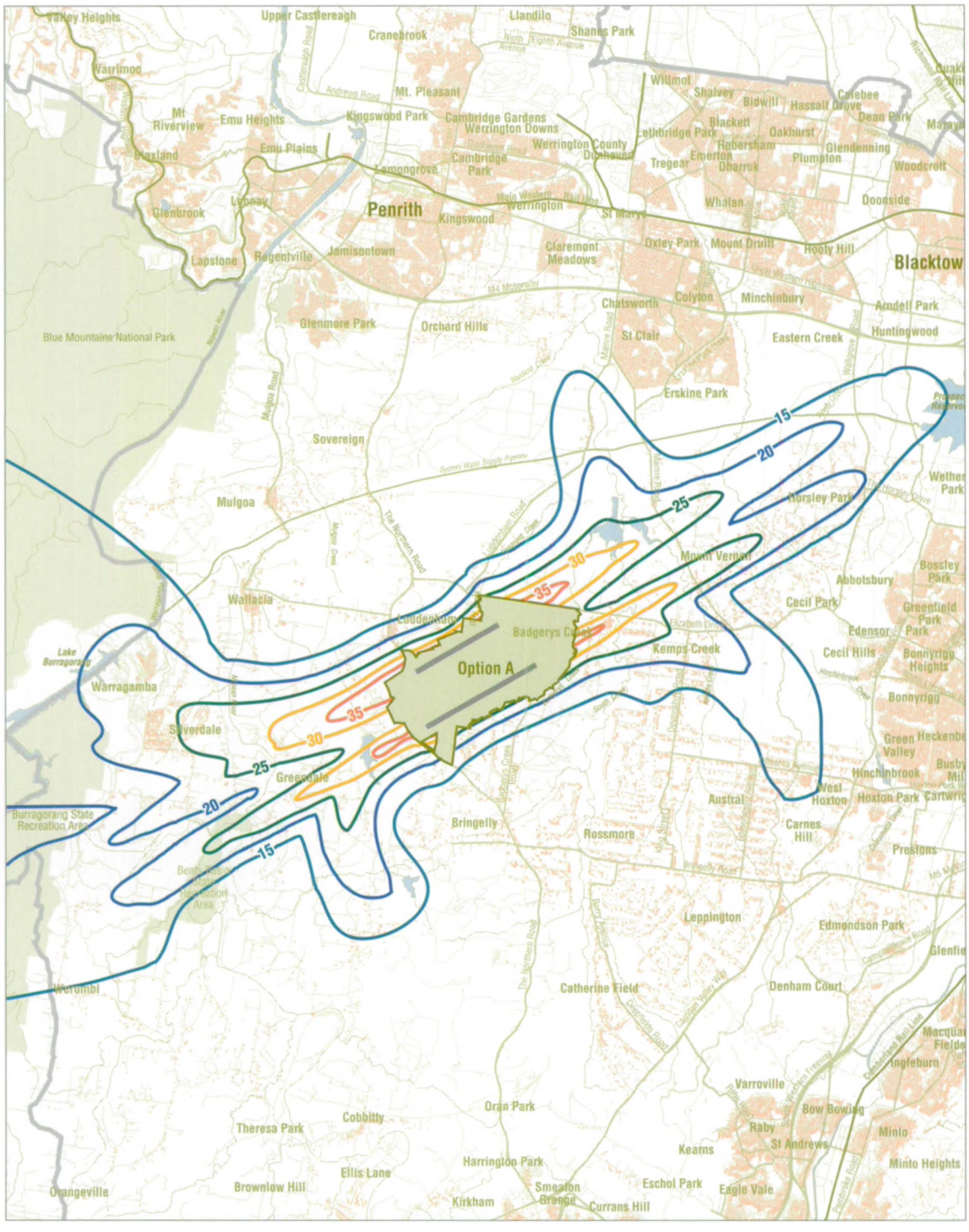


Figure 16 **Modelled Maximum ANEC Contours for Option A (30 million passengers per year)**

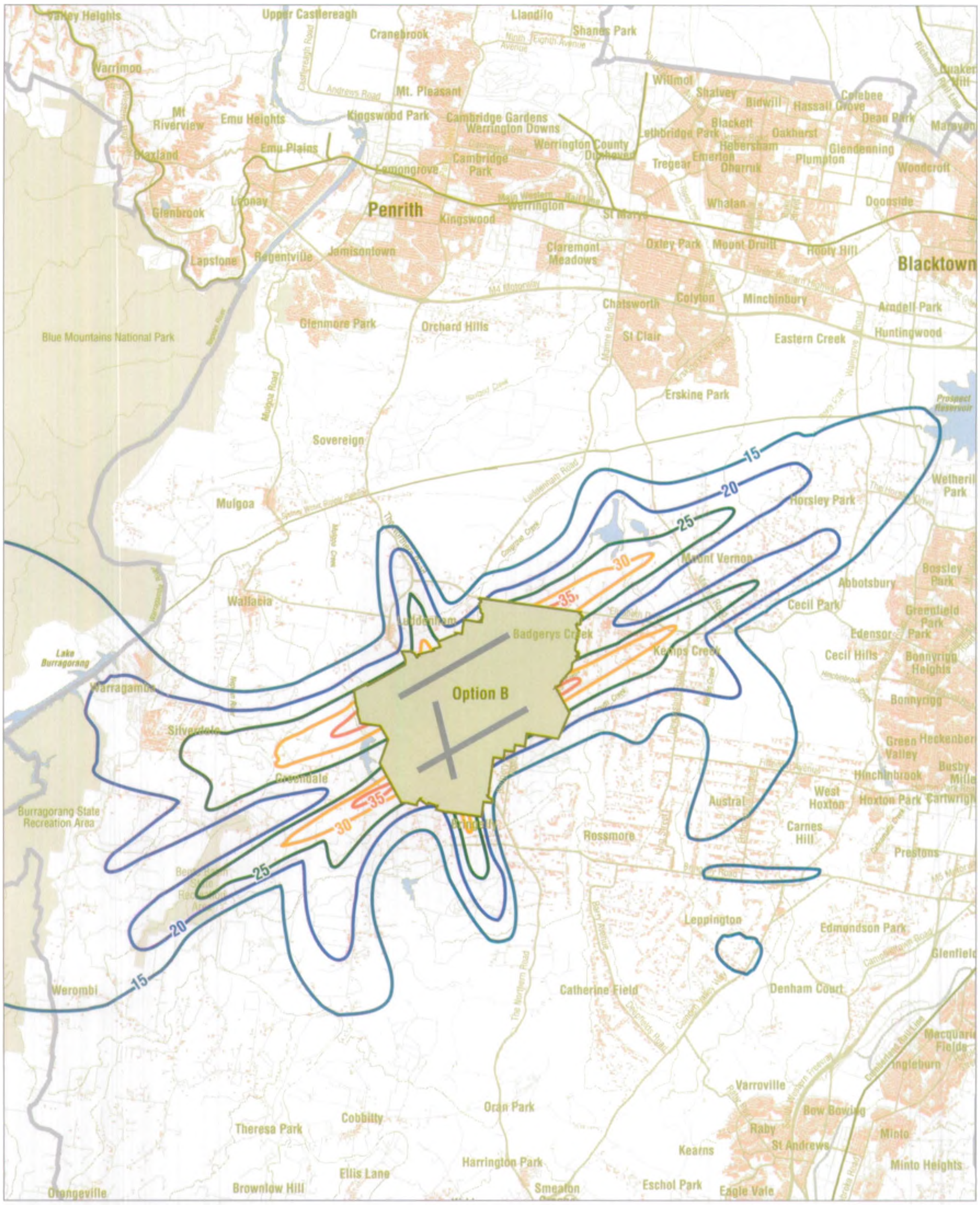


Figure 17 **Modelled Maximum ANEC Contours for Option B (30 million passengers per year)**

- 15 ANEC
- 20 ANEC
- 25 ANEC
- 30 ANEC
- 35 ANEC
- Indicates Density of Dwellings in 1996
- Extent of Dwelling Data

TN

N

0Km 5Km

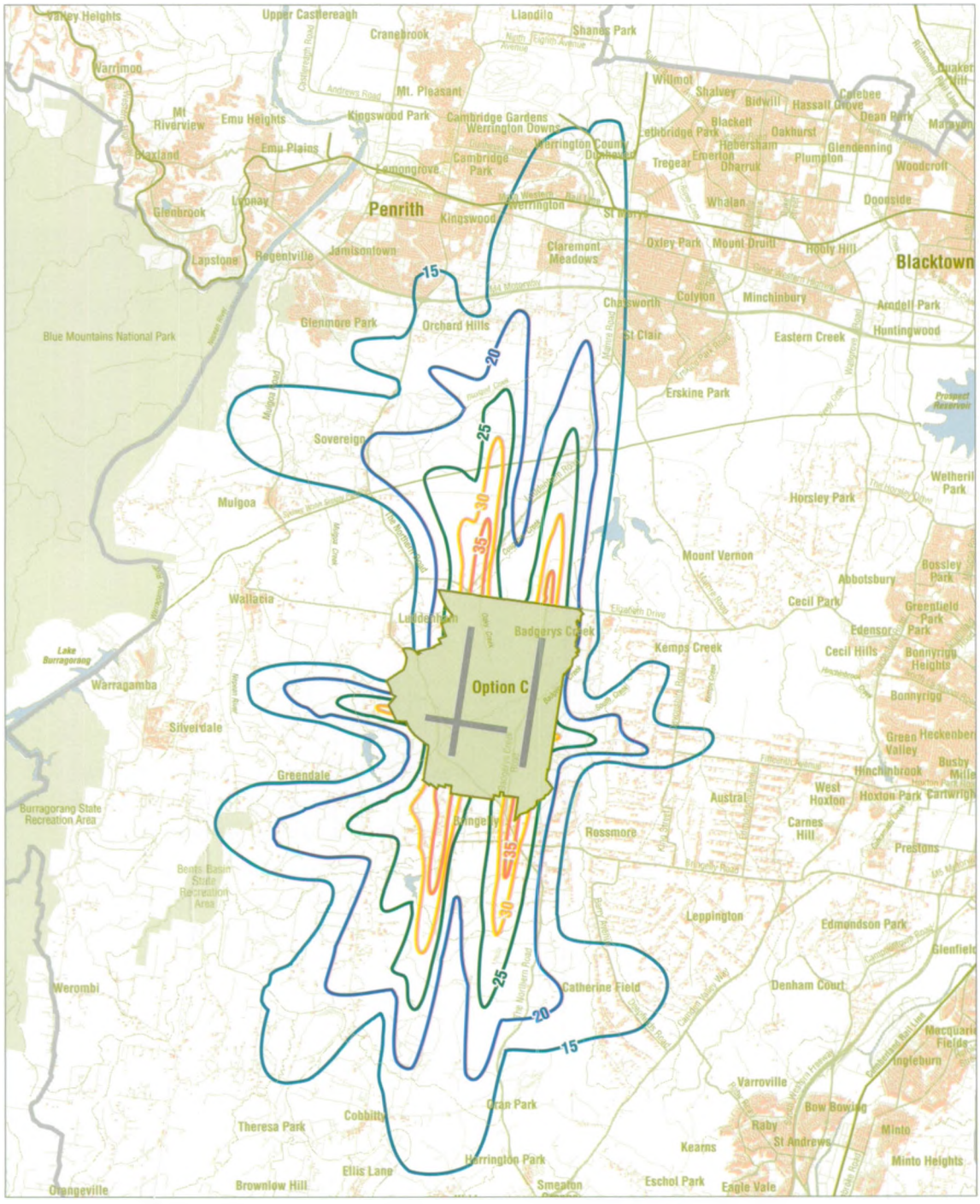


Figure 18 **Modelled Maximum ANEC Contours for Option C (30 million passengers per year)**

15 ANEC
20 ANEC
25 ANEC
30 ANEC
35 ANEC
Indicates Density of Dwellings in 1996
Extent of Dwelling Data

Table 4 provides a summary of predicted populations impacted by ANEC levels when the airport is operating at 30 million passengers per year. It also shows the populations that might be affected if noise management measurements are adopted. In estimating likely levels of noise reaction from these values, allowance must be made for the additional reaction to the introduction of a new noise source.

Table 4 **Populations Impacted by ANEC Levels for the Airport Operating at 30 Million Passengers per Year**

Noise Indicator	Population Affected[1]		
	OPTION A	OPTION B	OPTION C
People that may experience the following ANEC levels:			
• greater than 30	200 (NR)[2]	less than 100 to 200 (NR)[2]	less than 100 to 300 (NR)[2]
• greater than 25	700 to 1,000 (NR)[2]	500 to 800 (400)[2]	300 to 700 (NR)[2]
• greater than 20	4,500 to 6,000 (2,500)[2]	3,500 to 5,000 (2,000)[2]	900 to 1,500 (NR)[2]
• greater than 15	11,000 to 14,000 (8,000)[2]	11,000 to 14,000 (7,500)[2]	15,000 to 19,000 (10,000)[2]

Notes: 1. Based on population projections for 2016.

2. Figures in brackets represent impacts with the adoption of potential noise management measures. NR means no reduction in impact.

3. There are limitations in the accuracy of predicting future populations. Estimates of population greater than 10,000 have been rounded to the nearest 1,000; estimates of population between 1,000 and 10,000 have be rounded to the nearest 500; and estimates of population less than 1,000 have been rounded to the nearest 100. Estimates of population less than 100 are expressed as less than 100.

4. Impacts assume all residential properties within the 35 ANEC contour would be acquired.

What are the Impacts on Property Values?

Research has shown that high levels of aircraft overflight noise can reduce residential property values in areas affected by high levels of aircraft overflight noise. The potential reductions in property values resulting from the operation of the Second Sydney Airport would range from zero for residential properties within the zero to 15 ANEC band to 20 percent for residential properties in the 30 to 35 ANEC band.

The effect of aircraft noise on residential property values provided a basis for comparing the airport options. It does not provide a precise measure of possible devaluation of individual properties.

The analysis addressed only the direct impacts on dwellings in areas potentially affected by noise of greater than 15 ANEC. There is also likely to be more indirect impacts on property values such as the impacts of construction of off-airport site infrastructure and changes to land use planning controls.

The estimated net direct residential property devaluation was within the range $25 million to $67 million, depending on the airport option. Further details are provided in *Table 9*. Property values might also be affected positively by changes to the future development potential of land in the region surrounding the airport.

Would There be More or Less Noise Impacts Surrounding Badgerys Creek Compared to Sydney Airport?

If the volume and type of aircraft traffic were the same at Sydney Airport and the Second Sydney Airport, then the number of people affected by aircraft noise at the second airport would be much smaller than the number of people affected by noise from Sydney Airport. The difference is due to the distribution of population around each site, as shown in *Figure 19*. For example, about 840,000 people live within 10 kilometres of Sydney Airport, but 18,000 people live within the same distance of the proposed Second Sydney Airport.

Overview of Aircraft Overflight Noise Impacts

Individual communities would be affected in different ways by each of the three airport options. Information in Appendix D of the Draft EIS provided an indication of potential impacts, such as disturbance to communication and sleep, on residents living in particular communities.

The impacts of aircraft noise from each airport option could be reduced by the adoption of noise management measures. The most effective measures would be to refine flight paths and restrict some types and times of

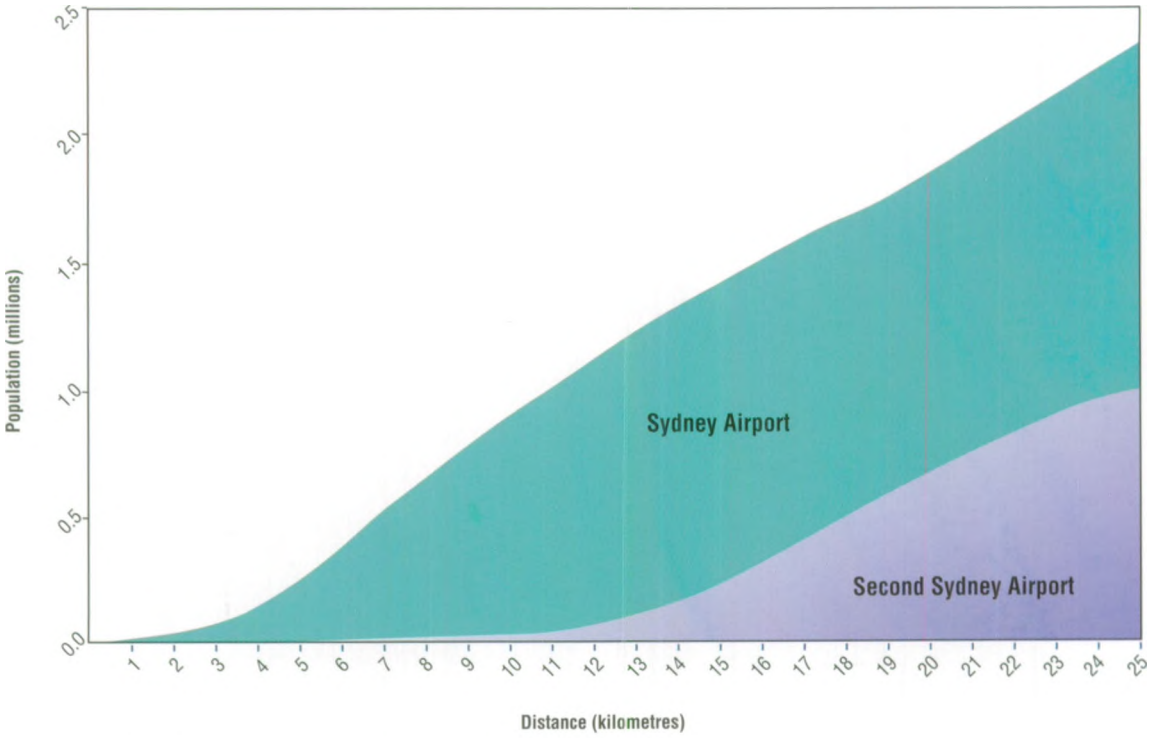


Figure 19 **Populations Living Near Sydney Airport and the Second Sydney Airport Sites**

runway and flight path use to minimise overflying of residential areas, particularly at night. A noise management plan would be developed as part of the environmental management framework for the airport.

The relative performance of the three airport options in terms of aircraft overflight noise would vary depending on which noise indicator is examined. The implementation of noise management measures could also have varying results depending on the airport option. Consequently it is has not been possible to provide a definitive ranking between airport options.

Other Noise Impacts

Would residents be disturbed by noise during airport construction? Would noise from testing jet engines be a problem?

People living around the airport could be affected by noise generated at the airport itself as a result of such activities as taxiing, the application of reverse thrust and ground test running of aircraft engines. Relevant criteria for the generation of noise for the operation of aircraft located on the ground would probably be exceeded within an area extending up to approximately seven kilometres from the airport boundary as shown in *Figure 20*.

The noise from engine test running has the greatest potential to affect the surrounding area, particularly during high power run-up and at night-time, when background noise levels are low and noise can be readily transmitted as a result of probable temperature inversions. The noise impact from engine test running could be reduced by careful orientation of the aircraft during this activity (where practicable), implementation of a night-time curfew for such activity and/or providing noise shielding around aircraft run-up bays.

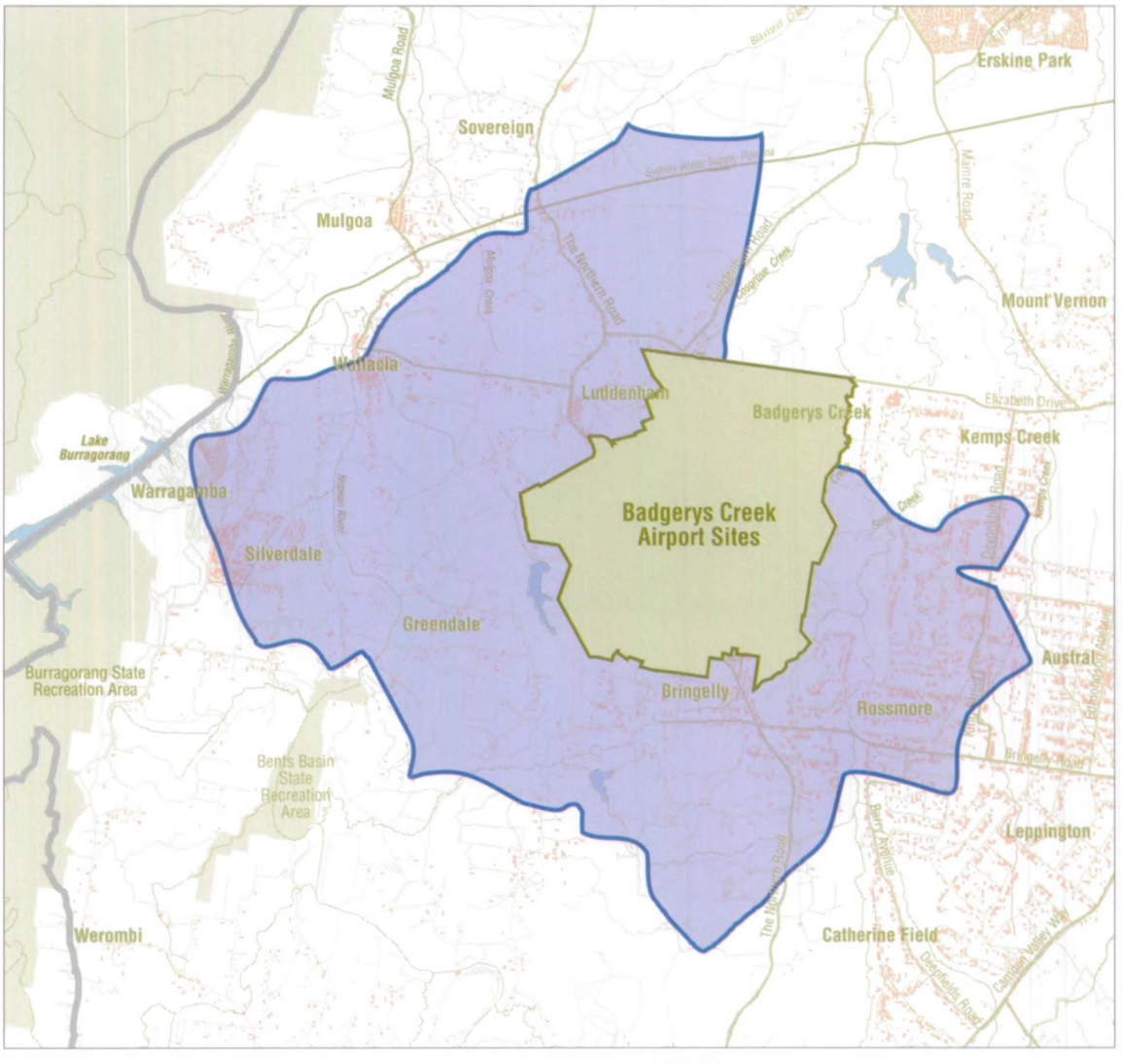


Figure 20 **Ground Operation Noise Assuming Adoption of Management Measures (Temperature Inversion Conditions)**

There would be noise disturbance from the construction of the airport. Relevant criteria for daytime and night-time construction noise could be exceeded in an area extending up to approximately 1.5 and three kilometres respectively from the airport boundary. Noise from construction traffic may impact on residents living near major roads, especially adjacent to parts of Bringelly Road and The Northern Road. Measures to reduce this impact would be available.

The increase in traffic generated by an operating airport would require the upgrading of a number of associated roads. People living next to a number of these roads would be affected by a significant noise impact as a result of the increased traffic, unless noise control measures were incorporated within the road upgrade. A quiet road surface or roadside noise barriers could reduce the noise impacts.

If a rail link were constructed to the Second Sydney Airport, increased rail movement might result in a noise impact on those people living adjacent to the East Hills Line. People living more than 50 metres from the new airport rail link would not be affected by rail noise. Noise control measures would be required to reduce noise impacts on people living closer than 50 metres to the new rail link.

Meteorology

How would airport operations be influenced by weather conditions?
Should more weather data be collected before the airport opens?

Meteorological factors such as wind speed and direction, rainfall, and inversion layers would influence airport operations, the dispersion of air pollutants and the transmission of aircraft noise.

Cross winds would only slightly restrict runway use. Runway useability for larger aircraft would exceed the Australian planning goal of 99.8 percent for capital city airports, but the operation of smaller aircraft would be slightly restricted for all airport options.

Because of its proximity to the Blue Mountains, an airport at Badgerys Creek might experience thunderstorms with relatively little warning. Hazardous low altitude wind shear is likely in the vicinity of thunderstorms.

Available records show that fogs at Badgerys Creek reduce visibility to less than 1,000 metres on ten days per year on average. While this could be an underestimate of the incidence of fog at Badgerys Creek, it is unlikely that airport operations would be affected significantly by fog.

It is likely that wind shear and mechanical turbulence will develop at Badgerys Creek when there is strong westerly wind flow over the Blue Mountains and when surface winds are strong. The possible influence of these conditions on airport operations is unknown at this stage and further work is required. The technology to monitor wind shear and mechanical turbulence is available and, if required, would be used to minimise safety risks and to help manage airport operations.

Further meteorological studies and monitoring would be required once the final runway configuration has been selected and before airport operations begin.

Air Quality

What pollutants are likely to influence air quality?
Would people be exposed to air pollutant concentrations above the guidelines?

Recent Sydney-wide scientific study and regular air quality monitoring have given a better understanding of the characteristics of air quality problems in Sydney and some recommendations have been put forward to address them. In the case of some pollutants, such as those from motor vehicles, this is already having beneficial effects.

The Sydney region's major air quality problems are photochemical smog and brown haze. Ozone, nitrogen dioxide and fine particulates are considered to be *regional* air pollutants and contribute to these problems. The Second Sydney Airport would contribute to the emissions of these regional air pollutants as well as more *local* air pollutants such as sulphur dioxide.

Currently in Sydney, there are occasional exceedances of the air quality goal for ozone (for example, 11 events between July 1996 and June 1997) and fine particulates (usually only occurring during bushfires). It is recognised, however, that the influence of local topography and air currents tends to carry pollutants towards western Sydney, where they can be slow to disperse under certain weather conditions.

Several sophisticated modelling tools were used to analyse the impacts of the proposed airport on local and regional air quality. The modelling for the EIS took account of emissions from the airport site, from aircraft in flight and from road vehicles travelling to and from the airport.

Increased concentrations of nitrogen dioxide, fine particulates, carbon monoxide and sulphur dioxide are predicted due to airport operations. In the cases of carbon monoxide and sulphur dioxide, the modelling indicated that the goals set by the National Environment Protection Council would not be exceeded. Exceedances of goals set by the National Environment Protection Council for nitrogen dioxide and fine particulate matter are predicted outside the airport boundary for worst case conditions. The predicted increases in peak hourly nitrogen dioxide and 24-hour particulate concentrations are shown in *Figures 21* and *22* respectively.

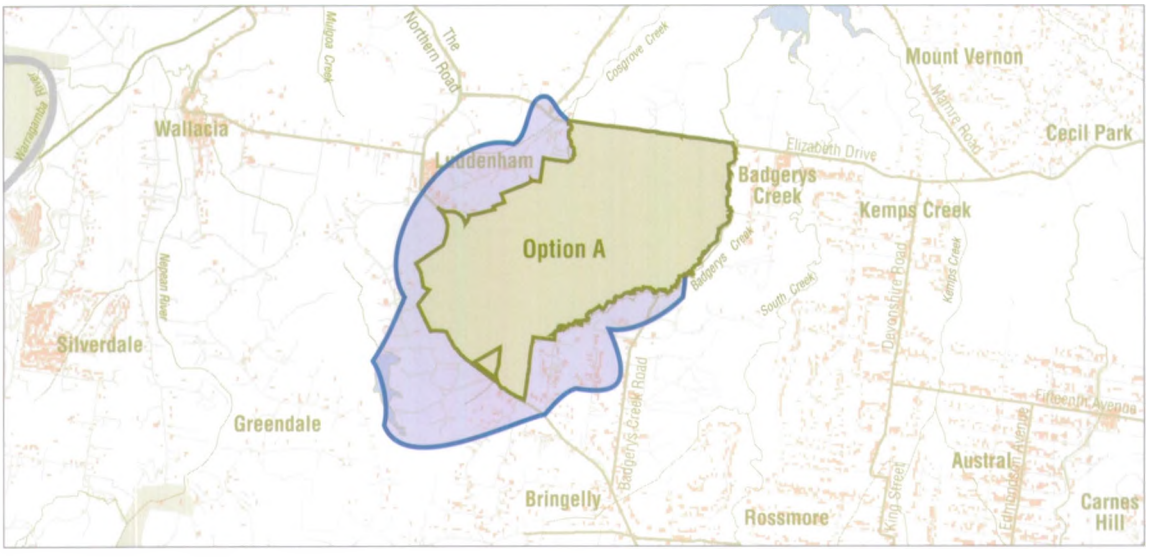


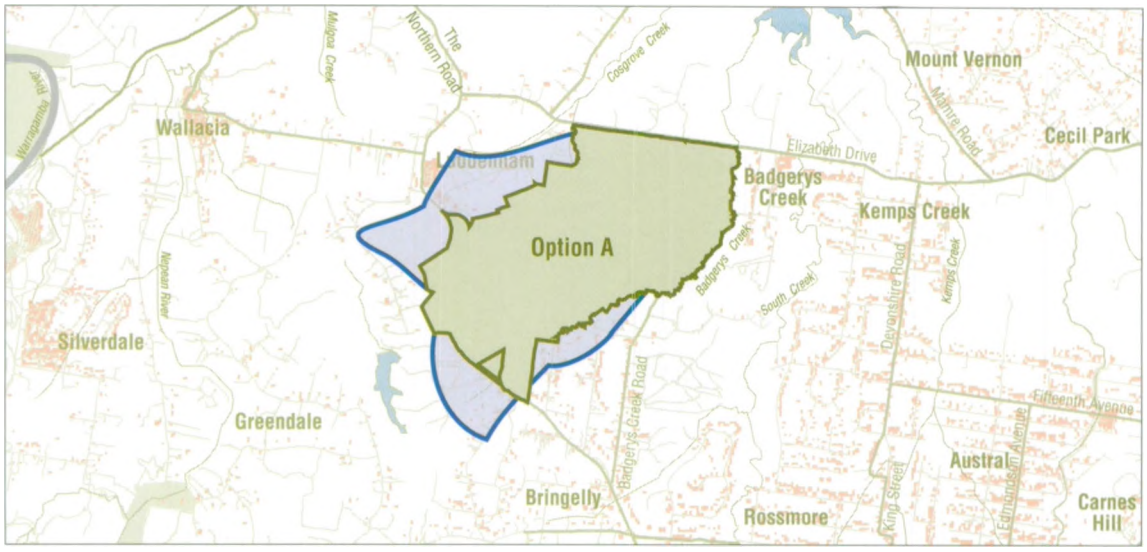
Figure 21 **Area Predicted to Exceed Peak One Hour Nitrogen Dioxide Goal for Options A, B and C (30 million passengers per year)**

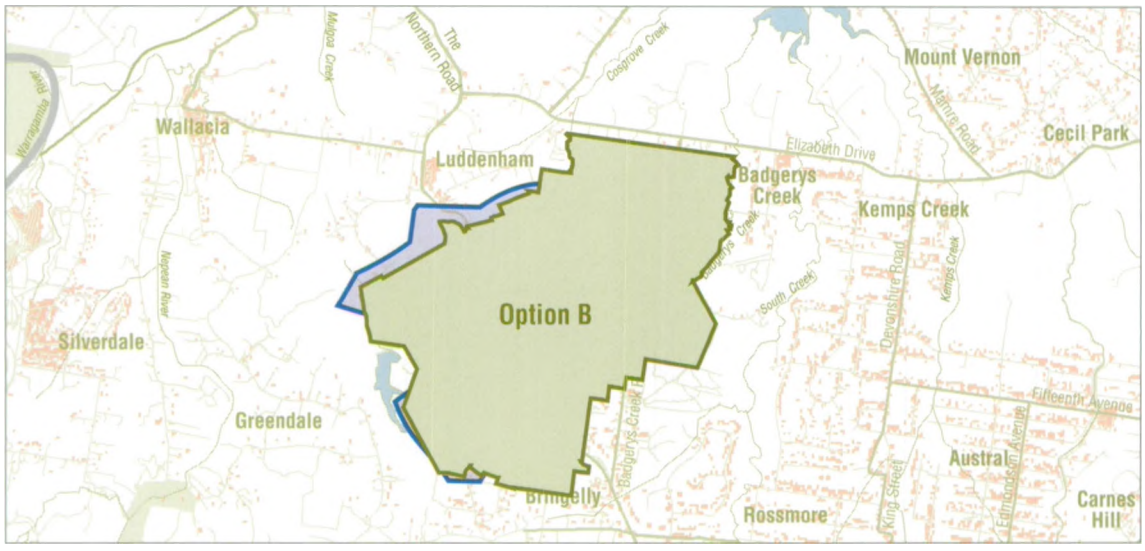
Area predicted to experience exceedence of goal of 12 parts per 100 million (National Environment Protection Council, 1998)

Indicates Density of Dwellings in 1996

TN N

0Km 5Km





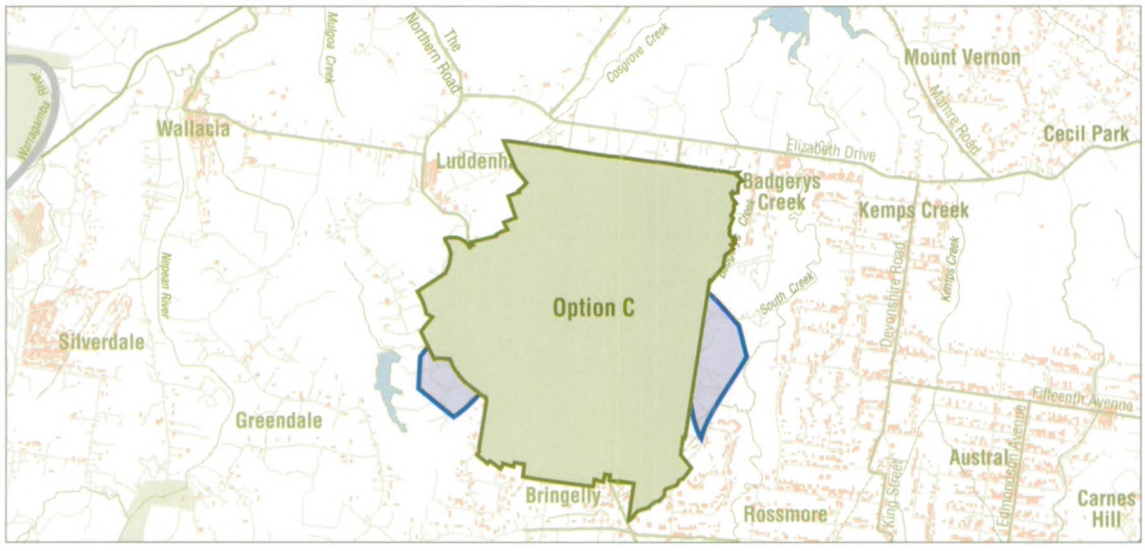


Figure 22 **Area Predicted to Exceed Peak 24-Hour Particulates Goal for Options A, B and C (30 million passengers per year)**

Area predicted to experience exceedence of goal of 50 micrograms per cubic metre (National Environment Protection Council,1998)

Indicates Density of Dwellings in 1996

0Km 5Km

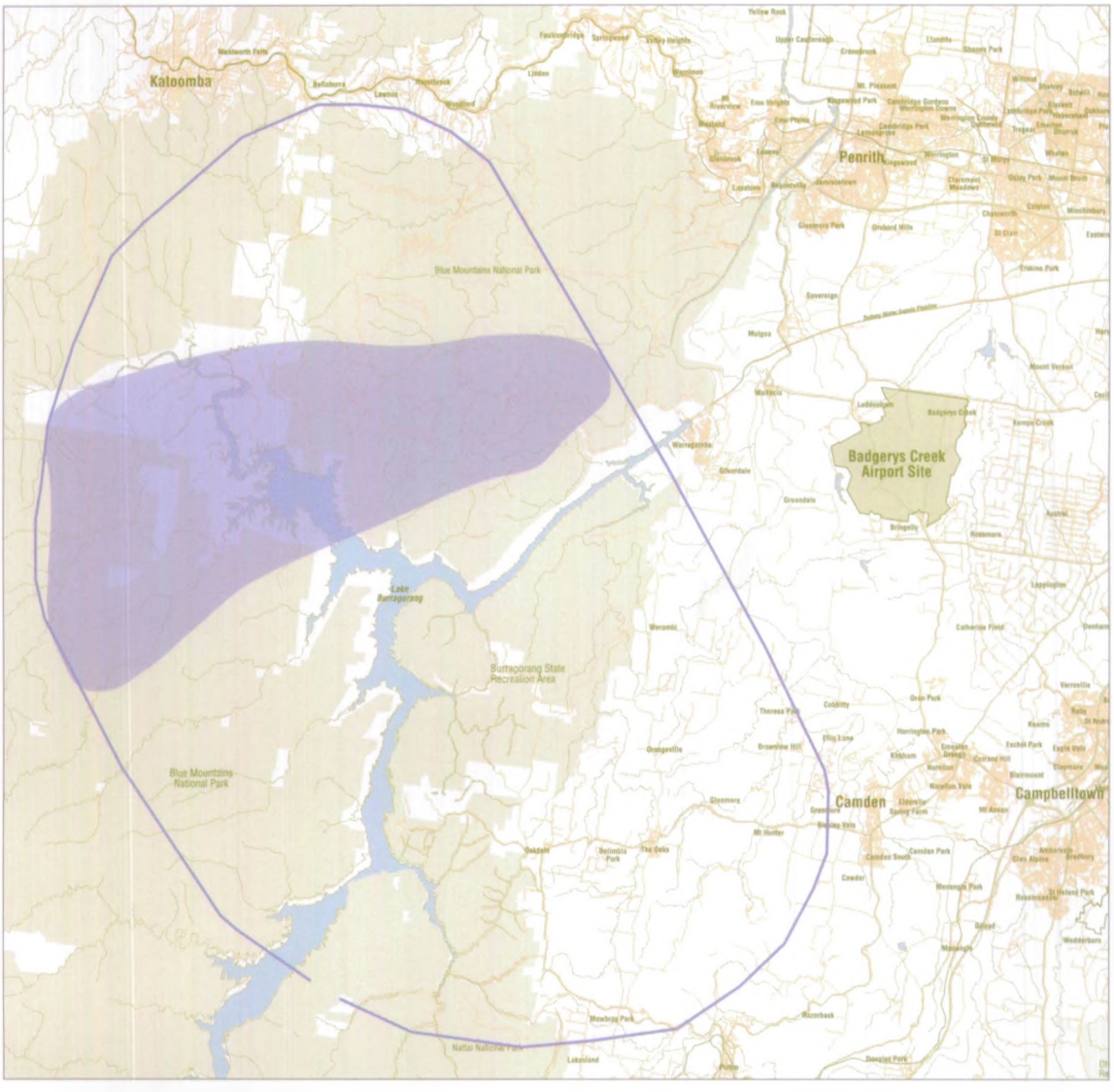


Figure 23 **Area of Predicted Ozone Increase for Options A, B and C (30 million passengers per year)**

All airport options would increase peak ozone concentration in areas where ozone levels occasionally exceed the NSW Environment Protection Authority goal of ten parts per hundred million. The area of predicted ozone increase when any of the airport options are operating at 30 million passengers per year is shown in *Figure 23*. This would occur when weather conditions cause high ozone events in western Sydney, on average about 25 times per year.

Some people living near the airport would at times be able to smell kerosene odours from the airport.

Table 5 summarises the predicted number of people that would be exposed to air quality impacts that exceed relevant goals.

Table 5 **Summary of Air Quality Impacts for the Airport Operating at 30 Million Passengers Per Year**[1]

Predicted Impact	Population Affected[2]		
	OPTION A	OPTION B	OPTION C
Number of people exposed to peak hourly ozone concentrations of more than 10 parts per 100 million	6,000	6,000	6,000
Number of people exposed to peak hourly nitrogen dioxide concentrations of more than 12 parts per 100 million	500	100	less than 100
Number of people exposed to peak 24-hour particulate matter[3] concentrations of more than 50 micrograms per cubic metre	300	100	less than 100
Number of people able to detect kerosene odours for more than 44 hours per year	1,500	1,000	1,000

Note: 1. Effects of motor vehicles are included in the figures in this table.
2. Based on population projections for 2016.
3. Particulate matter less than 10 microns.
4. There are limitations in the accuracy of predicting future populations. Estimates of population greater than 10,000 have been rounded to the nearest 1,000; estimates of population between 1,000 and 10,000 have be rounded to the nearest 500; and estimates of population less than 1,000 have been rounded to the nearest 100. Estimates of population less than 100 are expressed as less than 100.

Construction of the airport options would generate dust and fine airborne particles. It was estimated that relevant goals for the generation of dust and fine particles (less than 10 microns) during construction of the airport might be exceeded during worst case conditions within an area extending up to approximately 1.5 and five kilometres respectively from the airport boundary. This impact would be likely to be significantly reduced through the implementation of environmental management measures.

Water

Would the airport increase pollution in waterways such as South Creek and the Hawkesbury Nepean River system?
How would sewage from the airport be dealt with?
Would the airport cause flooding of adjoining lands?
How would erosion and impacts from earthworks be managed during construction?

Streams flowing through and near the airport sites are generally nutrient enriched. Algal growth is excessive and macroinvertebrate levels suggest poor ecological water quality. This is primarily caused by the existing intensive rural activities carried out on the sites.

Modelling was conducted to determine local and regional water quality impacts and any potential changes to the characteristics of flooding that would be caused by construction and operation of the airport.

Surface water discharge from the airport would be of a better quality than existing run-off, due to the use of procedures to prevent contaminants entering the drainage system and the treatment of all surface water in water quality control ponds prior to discharge. This would have beneficial impacts on the ecology of receiving waters, primarily Badgerys Creek, South Creek and the Hawkesbury Nepean River system. There would be no significant impact on the quantity and quality of groundwater.

Sewage from at least the Stage 1 development of the airport would be treated at an on-site plant to produce a high quality effluent which would be re-used as a non-drinkable water supply for the airport. Some effluent might be discharged to Badgerys Creek during extended periods of wet weather. However, this would be of a high quality with low levels of nutrients. Such events would be infrequent and discharges would be highly diluted. A number of options exist for the treatment of sewage when the airport develops past Stage 1.

An airport at Badgerys Creek would increase the volume and rate of stormwater run-off from the site. Basins would be used to collect all stormwater run-off in order to control peak flows from the site to adjoining creeks. There would be no increase in flooding.

The increase in volume of stormwater run-off would have the potential to increase stream scouring (erosion) and could impact on aquatic flora and fauna. This would be examined in detail prior to construction, at which time recommendations to minimise bank erosion and aquatic plant dislocation would be adopted.

Water cycle management would form part of the environment strategy required for the operation of the airport under the *Airports Act 1996*. This would require that stormwater discharge from the airport be controlled so that peak stream flow rates did not exceed existing levels to avoid increasing downstream flood risks, existing stream water quality conditions would be improved and water conservation and wastewater reuse would be maximised.

The construction of the airport could result in soil erosion, saline water discharges, spillage of polluting substances associated with construction activities and increased rates of stormwater run-off.

An environmental management plan would be developed before construction of the airport to mitigate these impacts. Key water management strategies would include careful design of the airport to minimise the length of streams/creeks requiring filling, the construction of the permanent stormwater detention basins and water quality control ponds before any other major earthworks on site, the need to locate any perched saline groundwater affected by construction to ensure that it drains to evaporation basins and the need for pre-construction monitoring and planning in order to monitor impacts during the construction phase.

Photograph 4 **Badgerys Creek within Airport Sites**

Photograph 5 **Oaky Creek within Airport Sites**

Health

Are there health risks from aircraft noise?
How would the air pollutants from the airport affect people's health?
Would drinking water storage dams and rainwater tanks be contaminated?

What Are the Noise-Related Health Risks?

Aircraft overflight noise generated by the operation of the Second Sydney Airport would cause disturbance to sleep, and interference with communication and performance of tasks. There is widespread community concern that these impacts could lead to a range of health impacts, such as loss of hearing, stress and heart disease.

With the implementation of a policy of voluntary acquisition of residential properties within the 35 ANEC, no residents would be exposed to levels of noise that would cause hearing loss. Nevertheless some people might experience discomfort if exposed to relatively high noise events (80 to 110 dBA), especially those who may have hearing problems and require hearing aids.

Existing knowledge of the extent of noise-related health risk does not make it possible to quantify impacts on psychological health. It is also not possible to estimate the number of people who may be frightened or otherwise inconvenienced by aircraft overflight noise.

Recent research suggests that relatively high levels of aircraft overflight noise might result in the potential for increased incidence of heart disease and increased stress amongst school children. These levels of noise would generally occur in areas close to the airport boundary, and in which homes would either be insulated or voluntary Government acquisition would be available. For each airport option, one school would be subject to noise levels that are suggested by the research could lead to increased stress for the students.

What Are the Air Quality-Related Health Risks?

The operation of the Second Sydney Airport would create potential health risks from pollutants from the airport, aircraft in flight and vehicle traffic. The analysis contained in the EIS, whilst acknowledging the limitations of the methodology used, attempted to quantify the effect on hospitalisation and death rates of increased levels of ozone, particulates and sulphur dioxide that would be caused by the operation of the airport. Quantification of the health impacts of sulphur dioxide emissions was particularly difficult. Further discussion of this issue is provided in Chapter 23 of the Supplement. An estimation of the increased lifetime risk of cancer as a result of predicted air toxic emissions was also calculated.

The research undertaken for the EIS was based on a statistical analysis of short-term effects of pollution on hospitalisation and death rates. The analysis allowed quantification of the number of hospital admissions or deaths predicted to occur one or more days earlier than they otherwise would. Unfortunately, it is not possible to know how premature these events would be (days, months or years) or even whether there would be any overall increase in these events over time.

Table 6 gives a guide to the health impacts of air quality changes due to the operation of the airport. To assist in understanding the scale of health impacts estimated it is useful to compare them to the overall level of deaths or hospitilisation in the general community. For example, *Table 7* provides the number of corresponding health events in the general population compared to the impacts of particulates generated by the airport.

Despite a comprehensive review of relevant literature, the available information placed significant limitations on the conclusions that can be drawn on the potential health impacts of sulphur dioxide emissions from the airport.

The results shown in *Tables* 6 and 7 indicate that the probabilities of premature or additional hospitalisations and premature deaths due to air quality changes from the Second Sydney Airport are low. Events such as episodes of coughing and episodes of decline in lung function in people with asthma would occur rarely within the affected population due to the operation of the airport. Data from both the National Health Survey and the NSW Health Survey indicate that the prevalence of asthma in western and south-western Sydney is not higher than average for NSW.

What Are the Water Quality-Related Health Risks?

Strictly controlled water cycle management at the Second Sydney Airport, including the reuse of sewage effluent within the airport and treatment of stormwater in water quality control ponds, would generally result in improvements to the quality of water currently being discharged from the airport sites. Water discharged from the Second Sydney Airport would meet the Australia-New Zealand Environmental Conservation Council guidelines for the protection of fresh waterways.

It is expected that the airport development would result in a slight improvement in the quality of downstream

waterways. With this reduction in contamination of surface waters there would be an associated reduction in surface water related health risks.

The concentration of aircraft emitted particulates in the water of Lake Burragorang would be approximately equal to the permitted health-related levels in drinking water quality guidelines. The Prospect Water Filtration Plant, which treats water from Lake Burragorang before it is delivered to consumers, is designed to remove 99 percent of particles in the size range expected from aircraft emissions.

It was estimated that in dry weather the concentrations of benzene and other volatile compounds in Lake Burragorang would be lower than the relevant guideline values. In wet weather, benzene would also combine with rainfall and enter waterways. However, even with this additional conduit, levels of benzene would be less than the drinking water guidelines.

The CSIRO confirmed that there would be no threat to human health from the deposition of emissions from aircraft engines into rainwater tanks.

The Second Sydney Airport would create pressure for changes to metropolitan planning strategies. Such changes might result in further urban development of South Creek Valley. Regional water quality and associated health impacts would be likely consequences of such development.

Table 6 **Summary of Air Quality-Related Health Impacts for the Airport Operating at 30 Million Passengers Per Year**

	Population Affected[1]		
Predicted Impact	**Option A**	**Option B**	**Option C**
Short Term Health Effects of Ozone			
Deaths per 100 years (one or more days earlier than expected)	3	3	3
Hospitalisation for respiratory disease per 100 years (additional or one or more days earlier than expected)	9	9	9
Short Term Health Effects of Particulates Below 10 Microns in Size			
Deaths per 100 years (one or more days earlier than expected)	3	2	3
Hospitalisation for respiratory disease per 100 years (additional or one or more days earlier than expected)	16	13	15
Coughing (additional person-days per year)	585	479	552
Clinically important decline in lung function (additional person-days per year)	78	64	73
Health Effects of Air Toxics			
Number of additional cancer cases per 100 years	9	9	8

Table 7 **Comparison of Health Impacts of Particulates Generated by the Airport and Corresponding Health Events in the General Population**

	Short-Term Health Effects of Particulates Below 10 Microns in Size[1]	Overall Annual Health Events in General Population of Study Area[2]
Deaths per 100 years	up to 3	120,000[3]
Hospitalisation for respiratory diseases per 100 years	up to 16	260,000[3]
Coughing (person-days per year)	up to 585	1,830,000[4]
Clinically important decrements in lung function (person-days per year)	up to 78	730,000[5]

Note: 1. Refer Table 6. Based on population projections for 2016.
2. Based on a population projection of 167,000 persons within the study area of population potentiallly affected by particulates generated by the airport.
3. Derived from baseline data obtained from NSW Health, 1990 to 1994.
4. Derived from Schwartz et al, 1994.
5. Derived from Peat et al, 1995 and Hoek et al, 1998.

Flora and Fauna

What is the conservation significance of the airport sites?
How would the airport affect flora and fauna?
What measures are being proposed to avoid or reduce impacts?

What is the Conservation Significance of the Airport Sites?

The sites of the airport options are considered to be of State significance for flora and fauna based on:

- remnants of the endangered ecological communities Cumberland Plain Woodland and River-flat Forest, that are considered to be of regional conservation significance;
- a population of the endangered plant *Pultenaea parviflora* that is considered to have regional conservation significance;
- a population of the threatened Cumberland Plain Large Land Snail considered to be of State conservation significance; and
- a wildlife corridor along Badgerys Creek of regional significance.

Areas of ecological significance on the sites of the airport options are shown in *Figure 24*.

How Would Flora be Affected?

Opportunities would be available to reduce the potential impacts on endangered ecological communities. Retention and regeneration of vegetation remnants, together with revegetation of some areas to link ecological communities, would be undertaken. Further, investigations would be undertaken into the possible conservation of areas of similar habitat off-site as an additional compensatory measure. The areas of endangered ecological communities proposed for protection and management in this way are comparable to the existing areas of vegetation on the airport sites.

Taking into consideration the proposed management measures, development of the proposal would require the removal of 124, 143 and 150 hectares of endangered ecological communities, under airport options A, B and C, respectively. In addition, one plant species is listed as nationally endangered *(Pultenaea parviflora)* and up to 37 species of regional significance would be directly affected by the proposal. All three options would involve the removal of a regionally significant population of the endangered plant *Pultenaea parviflora*.

Seed and stock of *Pultenaea parviflora* would be introduced into similar habitats within on-site conservation areas as part of the ongoing off-site conservation program at the Mount Annan Botanic Gardens. Long-term monitoring of the ecological health of retained vegetation and re-introduced *Pultenaea parviflora* populations would be undertaken.

Photograph 6 ***Pultenaea parviflora***
(plant of national significance recorded within the sites of the airport options)

How Would Fauna be Affected?

Construction of the Second Sydney Airport would directly affect the habitat of up to 22 terrestrial fauna species of conservation significance, including three species of State significance and 19 species of regional significance. The proposal might also affect the habitat of a further 70 significant species that have been recorded in the region and are potential transitory visitors to the sites. These include two species of national significance, 13 species of State significance, 48 of regional significance, five bird species listed under international agreements and two aquatic species.

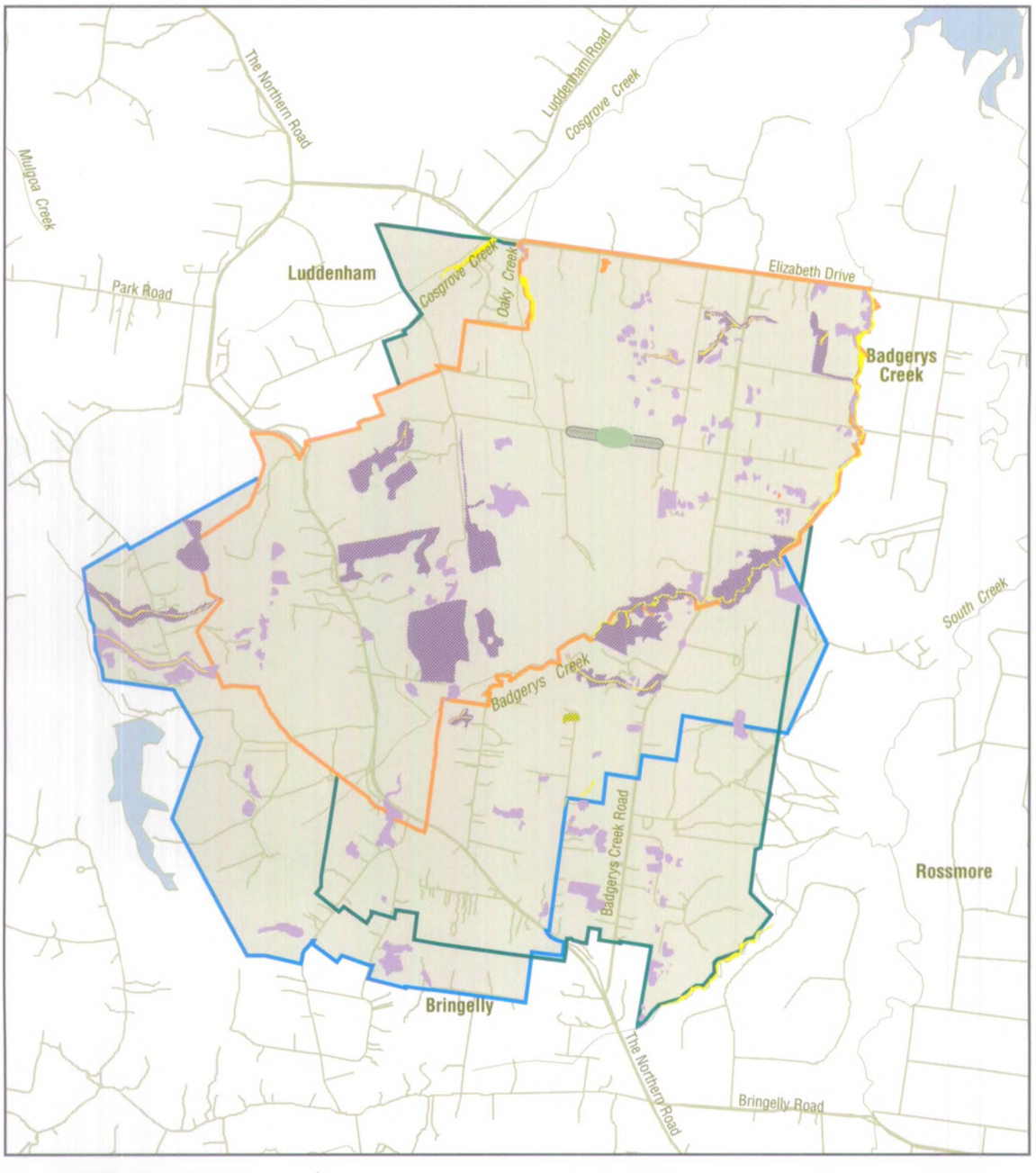


Figure 24 **Areas of Ecological Significance**

- Boundary of Airport Option A
- Boundary of Airport Option B
- Boundary of Airport Option C
- Cumberland Plain Woodland
- River-flat Forest
- Approximate Location of *Pultenaea parviflora* Population
- Non-native Vegetation
- Remnants Containing Cumberland Plain Large Land Snail

Photograph 7 **Cumberland Plain Large Land Snail**
(Meridolum corneovirens -invertebrate of State significance recorded within the sites of the airport options)

Photograph 8 **Common Bent-wing Bat**
(Miniopterus schreibersii- mammal of State significance recorded within the sites of the airport options)

Populations of Cumberland Plain Large Land Snail at the sites of the airport options are considered to be of State significance. All three airport options would involve partial removal of the Cumberland Plain Woodland remnants which support these populations.

Environmental management of the potential impacts to the Cumberland Plain Large Land Snail would involve retention of remnant Cumberland Plain Woodland known to contain the snail and the potential relocation of snails to suitable on-site conservation areas. These measures should contribute to the continued viability of the local snail populations.

Given the existing degraded stream conditions and the associated low conservation value of streams, the predicted major stream impacts from the airport options are unlikely, in an absolute sense, to result in profound deleterious changes to the stream biota. It is likely that fish would become even more dominated by the pollution tolerant species and therefore be subject to an even greater decrease in the biodiversity of native fish species. The scale of impacts expected from each airport option is considered to be local; however, Option A would result in fewer impacts to fewer streams than Options B and C.

The impacts of aircraft noise on wildlife inhabiting the area of the Greater Blue Mountains World Heritage Nomination are not likely to be significant.

What Would be the Benefits of Management Measures?

In the short to medium-term the impacts of construction would be high as a result of clearance of regionally significant endangered ecological communities and a regionally significant population of the endangered *Pultenaea parviflora*. In the long-term, however, the conservation significance of the remaining habitats would be enhanced through regeneration and rehabilitation works. The area of remnant vegetation to be retained and the area of regeneration would contribute to the long-term viability of the endangered ecological communities at the airport sites. Similarly, the proposed management of *Pultenaea parviflora* would ensure its long-term conservation within the sites of the airport options.

Of the three Badgerys Creek Airport options, Option A would have the least impact on flora and fauna. This is primarily due to the retention and proposed enhancement of the regionally significant Badgerys Creek wildlife corridor. Option C would be preferable to Option B, as the remnants retained are of higher conservation value and provide higher quality habitat for the Cumberland Plain Large Land Snail.

Figure 25 provides an example of the recommended approach to flora and fauna management, in this case for Option B. The recommended management measures include areas of Cumberland Plain Woodland and River-flat Forest to be retained; revegetation proposals both within and outside the airport boundary; and relocation of the Cumberland Plain Large Land Snail and habitat enhancement.

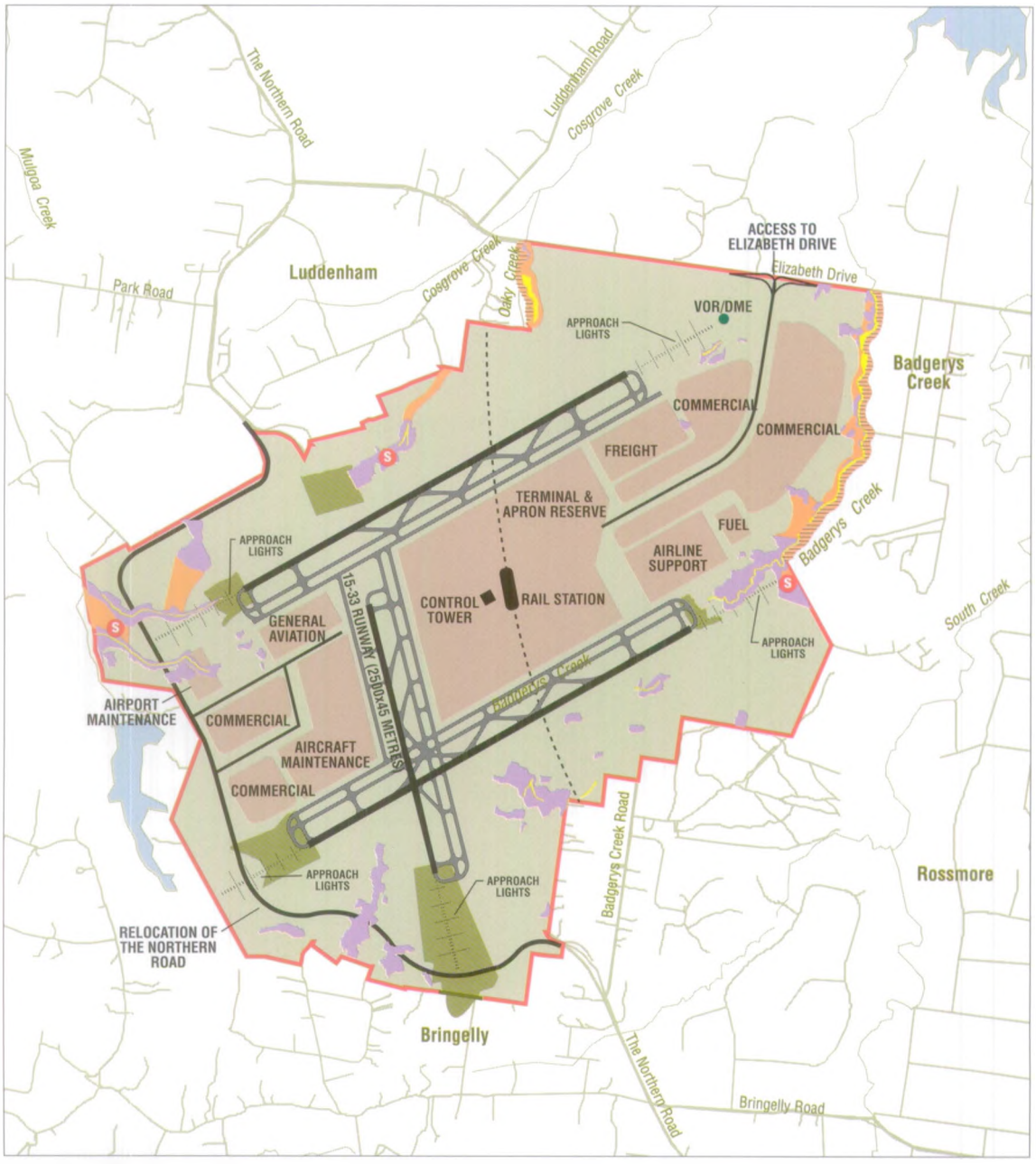


Figure 25 **Recommended Flora and Fauna Management for Option B**

Hazards and Risks

What is the potential for aircraft crashes? What are the risks for major water and electricity infrastructure?

An operating airport has the potential to create hazards and risks both to people and to the environment in which they live. The EIS assessed the hazards and risks associated with aircraft crashes, adverse meteorological and seismic activity, the interaction of birds and bats with aircraft movements, fuel supply and storage, and the potential for contaminated sites to be located in the area of construction of the airport and bushfire hazards. It also assessed risks to individual facilities such as Defence Establishment Orchard Hills and Sydney's water supply and electricity infrastructure.

The most common risk associated with airports is of aircraft crashing. This risk can be expressed in a number of ways, including individual fatality risk and overall societal risk. Societal risk is the probability over a one year period of a certain number of people being killed as a result of an aircraft accident. Societal risk calculations take into account the density of population in the study area. Individual fatality risk is the risk of death to a person located within a particular area on the ground because of an aircraft crash.

The risk of an individual dying can be expressed as a probability or chance of dying over a certain time period, such as a year. For example, individuals in Sydney, on average, have a 10 in one million chance of dying in a fire each year or a three in one million chance of dying from electrocution each year. The chance of dying as a result of being struck by lightning is one chance in 10 million each year.

The NSW Department of Urban Affairs and Planning suggests that the individual fatality risk experienced in residential areas from the operation of a hazardous facility should be no greater than a one in one million chance of a fatality a year. The estimated number of people living near the airport options (future population predicted for 2016) who would be exposed to a risk greater than this when the airport is operating at 30 million passengers per year would be 2,500 for Options A and B and 9,000 for Option C. Another way of expressing this risk is the number of fatalities that might be caused by the operation of each airport option every 100 years. This would range from 2.2 fatalities every 100 years for Option B to five fatalities every 100 years for Option C.

The NSW Department of Urban Affairs and Planning also suggests that people in schools and hospitals should not be exposed to a risk of more than 0.5 in a million chance of a fatality each year from the operation of a hazardous facility. Up to four childcare facilities and seven schools might be exposed to greater than this level of risk.

The societal risks that would occur from the operation of any of the three airport options would be lower than the societal risks for Sydney Airport because of the lower population density near Badgerys Creek.

Other conclusions of the hazards and risks study include:

- adverse meteorological conditions such as high intensity rainfall, thunderstorms, low cloud and fog would be unlikely to be a significant constraint to aircraft operations because of modern navigation aids, safety standards and operational practices;
- birds would present a moderate, but manageable, risk to the operations of aircraft; and
- the operation of any of the airport options under consideration would result in a low level of risk to critical elements of water supply and electricity infrastructure. The highest level of risk would be, in Option C, to the water supply pipeline connecting Warragamba Dam and Prospect Reservoir. Modifying flight paths, where possible, to minimise this risk would be considered.

Cultural Heritage

How many cultural heritage items would be affected by the airport options?
What is the significance of these items?
What management measures are proposed to avoid or reduce impacts?

What Would be the Impacts on Aboriginal Cultural Heritage?

The collective value of Aboriginal archaeological resources on the airport sites was assessed as low, since most of the sites and isolated finds have low local significance (68 percent) and only 30 percent have moderate local significance, with two percent thought to have high local significance. The Gandangara Local Aboriginal Land Council has, however, described the impacts as significant under all airport options.

Figure 26 indicates the zones and sites of moderate to high Aboriginal archaeological potential within the sites of the airport options. Option A would impact on 60 known (119 predicted) Aboriginal sites or isolated finds; Option B would impact on 85 known (196 predicted) sites or isolated finds; and Option C on 94 known (205 predicted) sites or isolated finds.

Potential off-site impacts include erosion or siltation of sites downstream, effects on scarred trees from changes in air quality, increased visual and noise impacts to the contextual landscape of Bents Basin to the south of the proposed airport sites and potential impacts from increased land development.

Management measures to avoid or reduce impacts on Aboriginal cultural heritage would be implemented. These would include the selective salvage of physical materials and collection of information prior to construction. Other measures might include further survey and recording, pre-construction modelling, sub-surface testing, large-scale salvage, development of management plans and subsequent monitoring of construction and operational phases.

What Would be the Impacts on Non-Aboriginal Cultural Heritage?

There were 24 non-Aboriginal cultural heritage items identified, with 14 assessed as having local significance, nine regional significance and one State significance. The collective value of these heritage items was assessed to have historic, aesthetic, research and social significance.

The airport options would impact on between 14 and 18 non-Aboriginal heritage items of local and regional significance. Alternatives for mitigating impacts on non-Aboriginal heritage items are available for all airport options including, in some cases, the possibility of retention, archaeological excavation and archival recording.

Each of the heritage items and sites affected by the proposed airport options has National Estate values and nine items were identified as having sufficient cultural significance to warrant entry onto the National Estate Register. Any proposal to destroy any item with National Estate value would be referred to the Australian Heritage Commission. These items would be subject to a site specific evaluation, including preparation of a heritage impact statement that identifies all prudent and feasible alternatives.

Land Transport

How much traffic would be generated by the airport?
How would the roads need to be improved to cope with the airport traffic?
What would be the volumes of construction traffic?
Would there be a rail service to the airport?

By the time the airport is handling 30 million passengers per year, up to 139,000 people would travel to and from the airport each day. This would result in between 66,000 and 77,000 vehicle trips to and from the airport. The lower figure assumes an airport rail link would be built, while the higher figure assumes that no rail link is provided. The greatest numbers of people travelling to and from the airport are projected to travel by car, followed by taxis, coaches and buses. Potential road and rail access to the airport is shown in *Figure 27*.

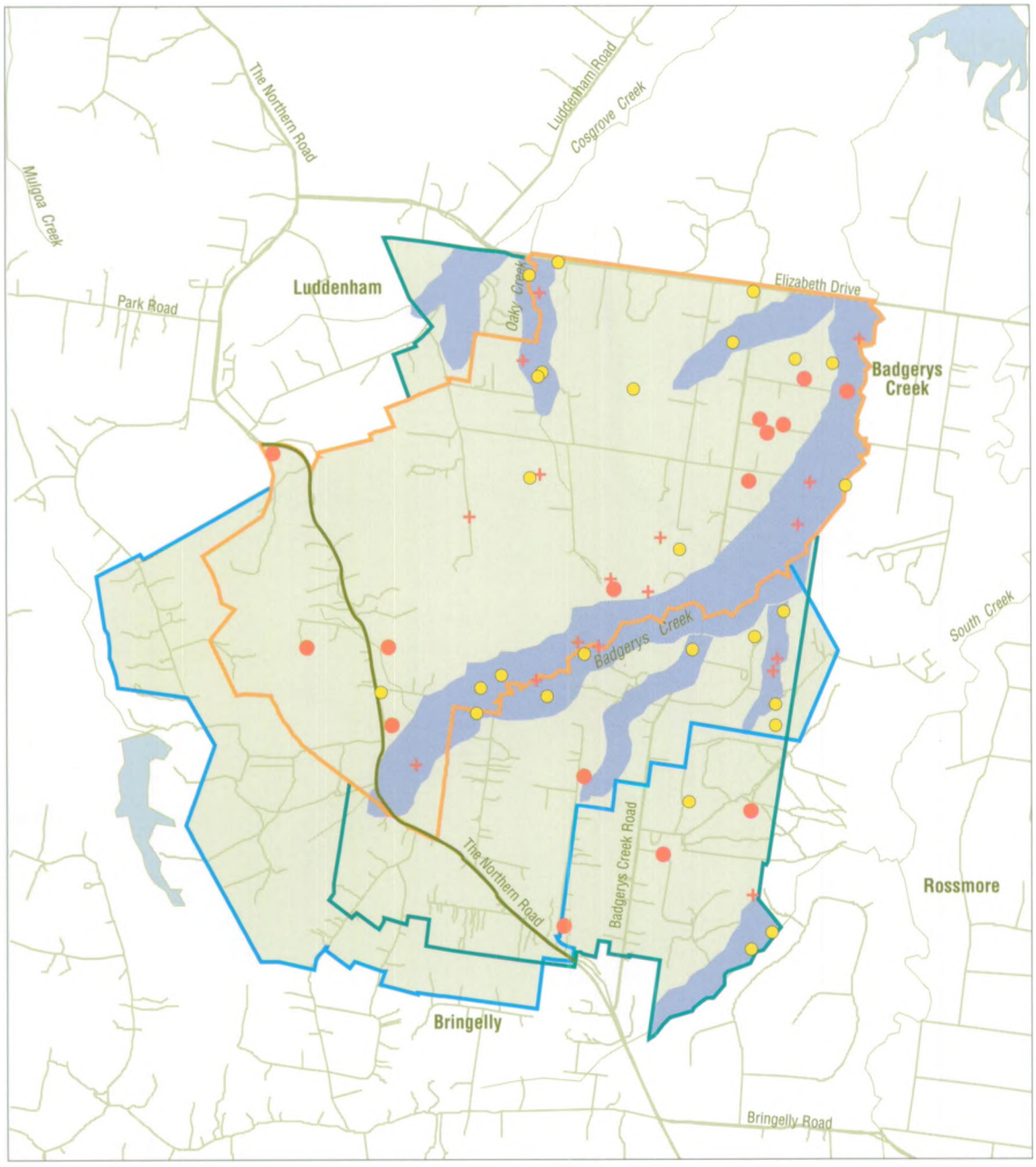


Figure 26 **Aboriginal and Non-Aboriginal Cultural Heritage**

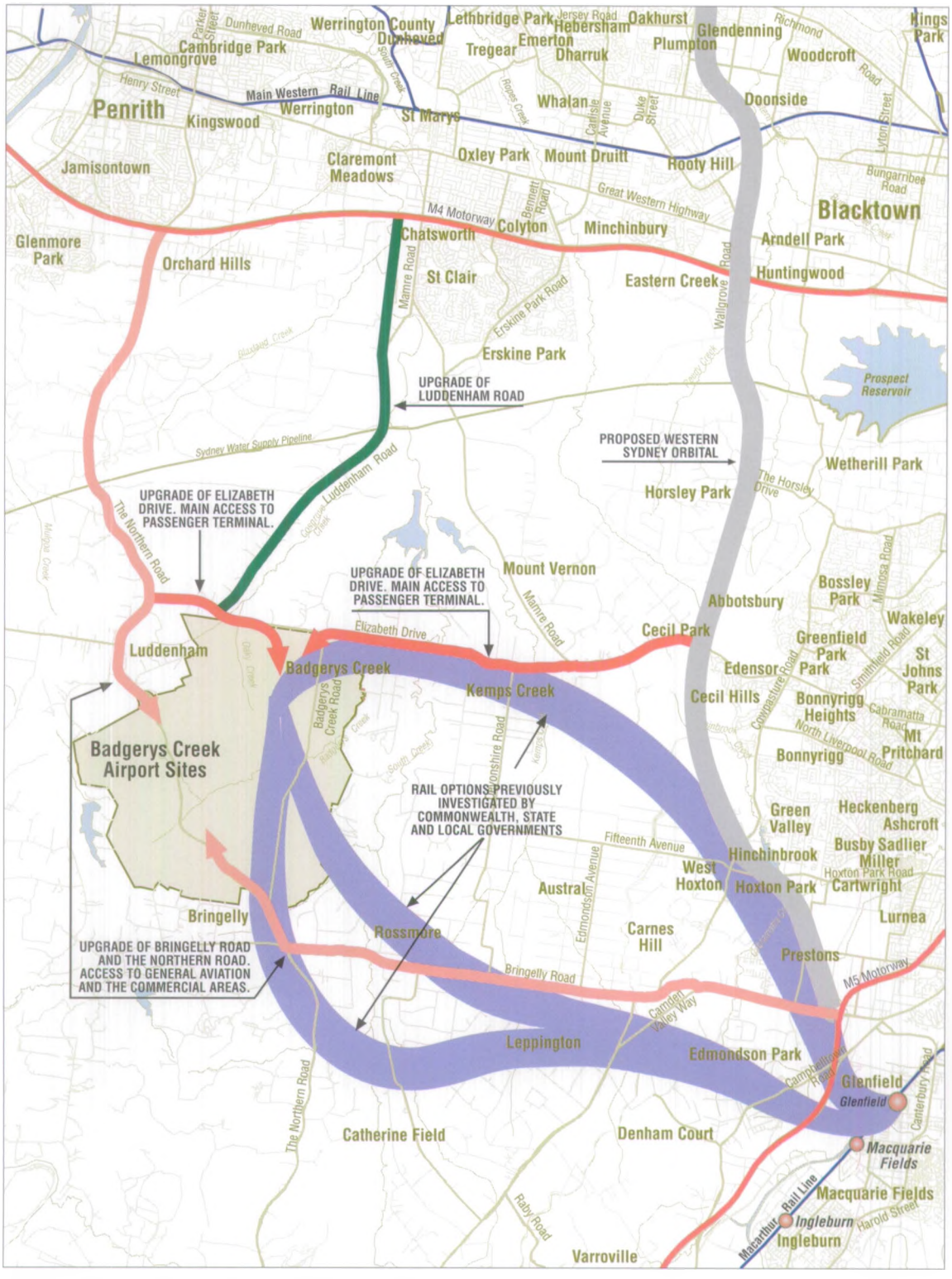


Figure 27 **Potential Road and Rail Access to the Airport Sites**

Note: Access corridors are indicative only and not drawn to scale.

Up to 22,000 persons per day would use a rail link by the time the airport was handling 30 million passengers per year. Alternative ways of providing rail access to an airport at Badgerys Creek have been the subject of investigation by the State and Commonwealth Governments over recent years. The rail link would connect the airport to the Cumberland and East Hills rail lines at Glenfield, although detailed route selection, feasibility, operational and environmental impact assessment studies would need to be carried out prior to any decision to proceed.

Travel times by road and rail to the airport were calculated and these are summarised in *Table 9*.

The main routes which would be used by traffic gaining access to the airport site are:

- Mamre Road/Luddenham Road/Elizabeth Drive or the Western Sydney Orbital and Elizabeth Drive from the north;
- The Northern Road or Mulgoa Road from the north-west;
- M5 Motorway/Western Sydney Orbital/Elizabeth Drive from the east; and
- South-Western Freeway/Bringelly Road/The Northern Road from the south-east.

Substantial improvements to the road system would be required, including:

- the construction of the Western Sydney Orbital motorway;
- the establishment of a direct access route from the airport site to the M4 Motorway of four-lane divided carriageway standard. This could connect with the M4 Motorway at either Mamre Road or at the site of the future Werrington Arterial to the west of Mamre Road;
- upgrading Elizabeth Drive between The Northern Road and Wallgrove Road to, initially, a four-lane divided carriageway standard and eventually to six lanes;
- relocating and upgrading The Northern Road north of Bringelly Road to the M4 Motorway to provide four lanes;
- upgrading Bringelly Road between The Northern Road and its junction with Camden Valley Way to four lanes; and
- providing appropriate traffic controls at critical intersections.

During the peak construction period, there would be about 900 trucks a day travelling to and from the airport site with up to 3,800 vehicle trips per day by construction workers. A series of traffic management measures and some road upgrading would be required to accommodate this increase in traffic during the construction phase.

Aviation

What is the preferred runway orientation for efficient airspace management? How would the capacity and operations of Sydney Airport be affected? How would the second airport impact on the users of Bankstown, Hoxton Park and Camden airports?

The management of Sydney's airspace affects the operation of all airports in the region and the management of aircraft noise.

In the case of Badgerys Creek Options A and B, the paths of aircraft to the north-east of the airport would cross the paths of aircraft using the parallel runways at Sydney Airport. Although air traffic management procedures would be devised to separate the air traffic from each airport, there would probably be a reduction in the capacity of each airport. The extent of this reduction cannot be quantified at this stage in the airport development process and would have to be considered in detail in the operating arrangements for the second airport.

Under Option C, airspace management would be simpler and more efficient because the runways would be almost parallel with those at Sydney Airport. Option C is the preferred option from an airspace management perspective and is more consistent with the Long Term Operating Plan for Sydney Airport.

The operation of Option C would, however, be adversely affected if the Defence Establishment Orchard Hills continues to impose current restrictions on airspace use.

Aircraft using Bankstown Airport would be disrupted because of the airspace requirements for Badgerys Creek and new access lanes would need to be devised. Flying

training activities in the circuits at Bankstown would not be affected by the development of a major airport at Badgerys Creek.

Hoxton Park Airport would close because of potential conflicts with operations of the Second Sydney Airport. The timetable for the closure would depend on the option chosen and whether or not a staged development of the Second Sydney Airport was undertaken.

Flying operations at Camden Airport would be seriously affected, but the airport could continue to operate. Options A and B would have less of an impact on Camden Airport than Option C.

Depending on which airport option was selected and whether a staged development takes place, flying at Camden might not be affected during the initial operations of the Second Sydney Airport.

Fuel dumping during emergency situations and fuel venting are extremely rare occurrences. While no specific records on fuel dumping are kept, anecdotal evidence suggests it occurs infrequently (about twice a year) and in controlled situations over the ocean. Deliberate dumping has never been reported to occur over built-up areas of Sydney. New regulations being developed will minimise the already low incidence of inadvertent fuel venting.

Visual and Landscape

Would the airport change the visual character of the local area?

Development of the Second Sydney Airport would replace the existing rural visual character of the sites with a more urban, built-up commercial and industrial landscape. The proposal would be a catalyst for further urban development, which would generate infrastructure and commercial activity in areas outside the airport sites. These too, would change the existing rural and semi-rural visual and landscape character of the area.

Specific visual impacts were identified in the EIS, including the impacts on the visual quality of the proposed Greater Blue Mountains World Heritage Nomination, due to the occurrence of aircraft flying overhead. In addition, operational lighting would lead to sky-glow from infrastructure lights which would likely be visible to viewers in mid-distant (five to 10 kilometres) locations, particularly those at higher elevations.

Measures available to reduce these impacts would be limited to landscaping proposals that maximise the retention and provision of vegetation. Where possible, species common to the endangered ecological communities such as the Cumberland Plain Woodland and River-flat Forest, would be used to landscape the airport sites. Appropriate shielding of infrastructure lights and the tower identification light would reduce potential lighting impacts to low levels.

Social

What would be the main social impacts? How would communities change?

People living within and surrounding the airport sites would be affected directly by changes in land use, displacement of population, changes to land values, access restrictions, construction and operation of a potential rail line and changes to economic activity. There would also be consequential changes on the surrounding region, including increased demand for residential, commercial and industrial lands, construction of utility infrastructure, displacement of population, loss of agricultural production, construction of new and upgrading of existing roads, potential construction of a new rail link, upgrading of public transport systems and the closure of Hoxton Park Airport.

Changes in existing social structures would occur as well as modifications to future urban development proposals. These changes, in addition to potential impacts on residential amenity, would result in a sense of dislocation and alienation among some members of some communities.

Conversely, the airport would have the capacity to support some urban and social structures, either through direct generation of employment or through benefits that might accrue from the investment in urban infrastructure that would be required to support the airport.

The communities immediately surrounding the airport, including Kemps Creek, Bringelly, Luddenham, Greendale, Austral, Rossmore and Badgerys Creek would experience significant impacts which would change the character of those areas and the rural lifestyle which residents enjoy. This would arise from the general increase in human activity and aircraft movement, major upgrading of roads, pressure for land use change and development, increases in traffic and the degradation of the environmental quality of these areas. Resultant impacts might include a deterioration for some individuals in their health, their economic well-being and inconvenience due to severance and disruption to access to and within each community. An imbalance in the supply and demand for services and facilities in the short-term within these areas could also arise.

Other local communities are not expected to experience the same degree of change, although some would still experience significant increases in noise. For example, the villages of Warragamba and Silverdale are likely to experience noise impacts which would result in communication difficulties in homes and schools, but would not be directly impacted by the provision of off-airport infrastructure.

Communities located further away from the airport sites form part of the Sydney urban area, where lifestyle expectations and character is different from the local areas. As a result, the social impacts of the airport would be more easily absorbed as part of the urban fabric.

Cumulative

What is meant by 'cumulative impacts'? What would the cumulative impacts be on western Sydney?

A proposal of the scale of the Second Sydney Airport would influence many other activities in the Sydney region and potentially other activities throughout NSW and Australia. These changes to other activities would result in a variety of environmental impacts, both adverse and beneficial. The additive effects of the direct impacts of the Second Sydney Airport and many other related and unrelated developments are termed cumulative impacts.

Key conclusions of the cumulative impact assessment include:

- the construction of the Second Sydney Airport would contribute to short-term degradation of biodiversity and water quality in Sydney through the clearing of vegetation and construction-related water impacts. Through the adoption of appropriate management measures, however, the proposal would contribute to the rehabilitation and long-term protection of important vegetation communities and would make a positive contribution to improving water quality in the South Creek Valley and in the wider Hawkesbury Nepean River system;
- the operation of the Second Sydney Airport and the motor vehicle traffic generated by the airport would be significant contributors to emissions of air pollutants in Sydney. At its peak level of activity (30 million passengers per year) the airport and generated motor vehicle traffic would emit approximately the following amount of Sydney's emissions (1992 estimate) of air pollutants: six percent of oxides of nitrogen; three percent of carbon monoxide; two percent of sulphur dioxide; two percent of hydrocarbons; and three percent of total suspended particulates. Relevant goals for nitrogen dioxide, fine particulates and ozone would be exceeded on occasions;
- it is possible that the most significant bio-physical and social regional cumulative impacts that would arise indirectly from the development of the airport would be modifications to metropolitan planning strategies. Such modifications could include further urban development of South Creek Valley; and
- in terms of the overall cumulative impacts of aviation activities in Sydney, the development of an airport at Badgerys Creek would result in a range of lower impacts compared to the potential further development of Sydney Airport. This is because the population densities surrounding each airport site are very different; for example, over 40 times more people live within ten kilometres of Sydney Airport than

within the same distance of Badgerys Creek. It follows that, if the volume and type of aircraft traffic were the same at Sydney Airport and the Second Sydney Airport, then the number of people exposed to risk and aircraft noise from the second airport would be much smaller than the number of people affected by the operation of Sydney Airport.

A decision to proceed with the Second Sydney Airport would, over time, significantly alter the character of western Sydney. Gradual changes to the noise environment, air quality and the rural character of the region would occur. Positive changes would be measured in terms of increases in employment, economic activity and the provision of transport and other urban services. These benefits would, however, bring with them pressure to alter land use patterns and allow additional urban development which could potentially result in further biophysical and social impacts.

The principles of ecologically sustainable development were adopted in the preparation of the EIS and opportunities were identified where the application of the principles could be successfully applied to the development of the Second Sydney Airport. Specific examples include:

- adoption of a precautionary approach to environmental assessment through the use of conservative assumptions which resulted in probable worst-case impacts being identified;
- improved valuation of resources in the decision making process through extensive consultation and an economic assessment;
- identification of areas in which varying levels of irreversible environmental damage might occur and the development of environmental management measures to ensure an equitable outcome for future generations; and
- identification of measures that would contribute to the long-term protection of important vegetation communities and would make a positive contribution to improving water quality in the Hawkesbury Nepean River system.

Economic Impacts

Would the benefits of the Second Sydney Airport exceed the costs? Would the airport be profitable for the owner?

The main benefits of the second airport would come from the economic activity generated by the passengers and freight which would pass through the airport and the revenue which these activities would generate for the airport owner. The main costs would be in terms of noise and other environmental impacts and the costs of airport construction and related off-site infrastructure.

A benefit cost analysis was undertaken to assess whether the economic benefits of the proposed airport would outweigh the costs. Both the Stage 1 (10 million passengers per year) and a master plan (30 million passengers per year) development were considered.

The results of the analysis should be treated with caution because of uncertainties about the accuracy of some of the data: for example, it was not possible to quantify some of the environmental costs because of methodological difficulties and lack of data.

Despite the qualifications, it was concluded that both the Stage 1 and master plan proposals would have a net economic benefit, and that there would be major benefits to Australia, NSW, Sydney and the Badgerys Creek region. A summary of the results of the analysis is given in *Table* 8, where it can be seen that the economic benefit of the proposal would be about double the quantifiable costs and its net value would be between $3 billion and $4 billion.

Table 8 **Economic Viability of the Second Sydney Airport**

Second Sydney Airport Development	Sydney Airport Capacity (million passengers per year)	Benefit Cost Ratio	Net Present Value
Stage 1 (10 million passengers per year)	34	2.4	$3.7 billion
	38	2.3	$2.8 billion
Master Plan (30 million passengers per year)	34	2.2	$4.3 billion
	38	2.1	$3.2 billion

Notes: 1. Price elasticity of demand assumed to be –0.8.
2. Discount rate of 7 percent (real) was assumed.
3. The 'central' passenger demand forecast was used.
4. Modelling based on staged development of Badgerys Creek Option C with off-site infrastructure costs included.
5. Two scenarios for the future capacity of Sydney Airport were used (34 and 38 million passengers per year, including international transit passengers).

It follows from the results in *Table* 8 that the environmental and other impacts which were not included would have to cost at least $3 billion in discounted present values, or an average annual cost of more than $200 million, to make the master plan proposal economically non-viable (benefit cost ratio less than one).

An analysis was also undertaken of the financial viability of Stage 1 of the airport proposal. This was designed to answer the question – would the airport be profitable for the owner? The financial analysis included airport revenue and capital and operating costs, but external infrastructure costs such as roads were not included as the airport operator typically does not fund such expenditure.

As with the economic analysis, the results of the financial analysis need to be qualified. Nevertheless, it was concluded that, if charges placed on aircraft and passengers were to be based on those that currently apply at Sydney Airport, the airport would not be financially viable. However, relatively small increases in airport revenue (or substantial decreases in construction costs) could make the Stage 1 development profitable. For example, a passenger charge of about $1 to $2 on all passengers departing through either Sydney Airport or the Second Sydney Airport would cover the costs of constructing and operating the Stage 1 development of Option A.

Total employment generated in the Badgerys Creek region by the operation of the Second Sydney Airport would be about 10,000 when annual aircraft passengers reached 10 million and about 19,000 when annual aircraft passengers reached 30 million. These figures represent increases in employment of about two percent and three percent respectively.

Environmental Management

What are the key issues requiring environmental management?
Are there statutory requirements to enforce environmental management at the airport and what are they?
What management measures are proposed?
Who would be responsible for environmental management?

What are the Key Management Issues?

Environmental management would be required both during the construction and operational phases of the Second Sydney Airport.

In addition, the overall issue of appropriate land use planning for the region would need to be considered by Commonwealth, State and local governments.

During construction, the key management issues would be dust control, noise, ground vibration, visual impacts, water quality and the conservation of flora and fauna. When the airport became operational, similar issues would apply, in addition to which the issue of aircraft overflight noise would also be a consideration.

What are the Statutory Requirements for Environmental Management?

The *Airports Act 1996* (the Act) establishes a Commonwealth environmental management regime at leased Commonwealth airports. This includes regulations, standards and duties in relation to environmental pollution, environment strategies and responsibilities for ensuring the monitoring and remediation of pollution.

Provisions of the Act would apply to the initial and subsequent construction of the Second Sydney Airport. Regulations under the Act set out processes for building and works approvals that enable the inclusion of environmental conditions and provide a framework for environmental management and pollution control. Other Commonwealth regulations apply to aircraft emissions and noise.

Waste disposal, disposal of hazardous materials, ozone depleting substances, the use and sale of pesticides and occupational health and safety issues are, however, not covered by Commonwealth regulations. They are regulated by State legislation and through the relevant State authority where the airport is situated.

What is the Framework for Ongoing Management?

An environmental management framework for the airport is shown in *Figure 28*. It would be developed to include:

- an *Environmental Management System* for construction consistent with the requirements of the Act;
- the preparation of an *Airport Environment Strategy* as required by the Act dealing with operational environmental issues; and
- the development of a *Noise Management Plan* to minimise aircraft noise impacts.

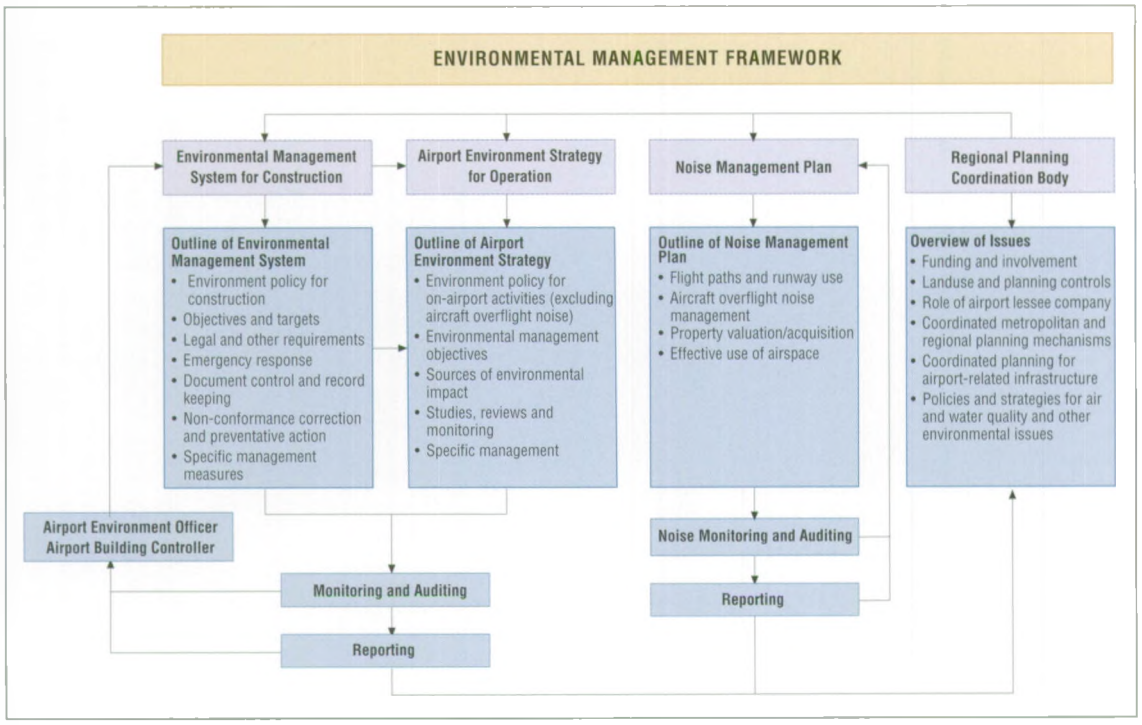


Figure 28 **Environmental Management Framework**

The environmental management of the airport would be consistent with relevant Australian and international standards (that is, ISO14000 Series).

The *Environmental Management System* for construction would contain details on environmental policy, organisational commitment, objectives and targets, legal and other requirements, management plans for specific issues, responsibilities and reporting structures, training and awareness, document control and record keeping, emergency response, non-conformance, correction and preventative action, environmental monitoring (including compliance and review audits) and communications, including community consultation.

The *Airport Environment Strategy* would be the key mechanism for controlling all operational impacts and would include policies and targets for a number of items, but in particular:

- identification and conservation of items of natural, indigenous or heritage value;
- involvement of the local community and airport users;
- the quality of air at the airport site;
- the regional airshed as it is likely to be affected by airport activity;
- water quality, including groundwater;
- soil quality, including any land already known to be contaminated;
- generation and handling of hazardous waste;
- the use of renewable or non-renewable natural resources; and
- the generation of noise.

The *Noise Management Plan* would consider a range of noise management measures including the determination of flight paths, determination of runway use, potential curfew periods, numbers of aircraft overflights, loudness of noise events, insulation and/or acquisition of buildings exposed to high noise levels, imposition of a noise levy to fund noise amelioration works and the interaction with operations of other civil and military aircraft from other airports.

It is also proposed that the airport operator and the Department of Transport and Regional Services would participate in a regional planning co-ordination body. Such a body would help facilitate regional environmental management measures initiated by Commonwealth, State and local governments and provide appropriate environmental guidance to planning and development initiatives that might occur in the airport sub-region.

What Organisations Would be Responsible for Environmental Management?

Several organisations would be responsible for administering and implementing environmental management procedures during construction and operation of the airport. During construction, an airport environment officer and airport building controller would be appointed under the Act. These individuals would be responsible for regulating the management of on-airport environmental impacts associated with construction. The overall environmental management plan for the construction phase would clearly assign responsibilities for specific management plans and actions to the lead authority/airport operator responsible for the construction of the airport.

Responsibility for preparing and implementing the *Airport Environment Strategy* would rest with the airport operator. A preliminary draft of the *Airport Environment Strategy* would be placed on display for public comment for a period of 90 days. A summary of these comments and a revised draft *Airport Environment Strategy* would then be sent to the Minister for Transport and Regional Services for approval. The airport operator would then have to ensure that every person who is a sub-lessee or licensee at the airport is aware of the *Airport Environment Strategy*.

The *Noise Management Plan* would be prepared by the airport operator in conjunction with Airservices Australia and in accordance with a consultation and communication strategy.

What Measures Would be Used to Reduce Environmental Impacts?

There is a commitment to an extensive set of management measures for the construction and operation of the airport. Some measures, however, the proponent cannot commit to at this stage in the project development because they involve policy and/or funding matters yet to be considered by the Government.

Some of the key environmental management measures for the airport would be:

- establishing a community liaison forum to discuss environmental issues relating to airport construction and operation;
- managing and controlling noise and air emissions during construction;
- constructing detention basins and water quality control ponds before other construction activities to control the quantity and quality of run-off from the site;
- implementing a water cycle management plan to conserve water;
- retaining and regenerating endangered ecological communities such as Cumberland Plain Woodland, together with revegetation of some areas to link ecological communities. *Pultenaea parviflora* would be introduced into suitable habitats in on-site conservation areas. Communities of the Cumberland Plain Large Land Snail would be relocated to suitable on-site conservation areas;
- in conjunction with Aboriginal community organisations, selective salvaging of physical materials and collection of information before construction, and possibly further survey work and recording;
- referring all heritage items and sites to the Australian Heritage Commission. These items would then be subject to site specific evaluation, including preparation of a heritage impact statement that would identify all prudent and feasible alternatives;
- designing airport facilities in accordance with energy efficiency principles; and
- maximising the reuse and recycling of wastes produced during construction and operation, and where necessary, ensuring the appropriate disposal and storage of wastes.

Comparison and Conclusions

What are the Differences Between the Airport Options?

Table 9 presents a comparison of the airport options. The option considered to perform best against each criterion is coloured blue. Where two options are coloured blue, this indicates that there was no significant difference in their assessment. Where there is no significant difference between all three options, no ranking is shown.

It is not appropriate for the number of 'best performances' to be added together to make up a single 'best performance overall' as some issues and criteria may be more or less important than others. For example, some people may value potential hazards and risks as being more important than noise impacts. Others might have a different opinion.

The assessment of many environmental issues did not allow a clear distinction to be made between the options. These issues included the requirements for off-airport site infrastructure; the overall impacts of high and mid-range levels of aircraft overflight noise; water quality impacts; effects on land transport systems; and economic benefits.

The environmental issues that demonstrated a significant difference between the airport options included:

- **Airport Sites** - the sites and subsequent designs and operations of Options B and C would be more flexible and efficient than Option A, and more capable of future expansion;
- **Aircraft Noise** - the three options would produce different aircraft overflight noise levels in the various communities surrounding the airport. Option C has the potential to create the greatest level of disturbance to sleep, however, it is likely that the implementation of noise management measures would reduce this impact to a level similar to Options A and B. At the lower range of noise impacts examined (10 noise events a day greater than 70 dBA) Option C is likely to impact more people than Options A and B. The potential implementation of noise management measures could again significantly reduce the level of this impact, however, it would still be likely to be greater than for Options A and B;
- **Air Quality** - due to the smaller site area of Option A, more people are likely to be impacted by levels of nitrogen dioxide and fine particulates (less than 10 microns) that exceed air quality goals than for Options B and C. An area immediately to the west of the boundary of Option A could also be potentially exposed to air toxic compounds above desirable levels;
- **Flora and Fauna** - Option A would have the least impact on flora and fauna. This is primarily due to the retention and proposed enhancement of the regionally significantly Badgerys Creek wildlife corridor. Option C is preferred to Option B, as the remnant vegetation that would be retained are of higher conservation value and provide higher quality habitat for the Cumberland Plain Large Land Snail;
- **Hazards and Risks** - Option C would potentially create a higher risk of fatality from aircraft crashes than Options A or B;
- **Airport Operations** - Option C would be more compatible with the operation of Sydney Airport than Options A or B, although the extent of this constraint in the case of Options A and B cannot be quantified at this stage; and
- **Costs** - Option A would be between $400 million and $700 million cheaper to build than Options B or C because of the smaller scale of airport infrastructure proposed.

What Are the Conclusions of the EIS?

Is the Second Sydney Airport Needed?

Sydney Airport will reach capacity in the latter part of the next decade unless there are significant changes to noise management and other policy settings and to airline operating practices. While some initiatives, such as the use of Bankstown Airport for regional services, could reduce the demand for Sydney Airport, they offer only short-term solutions. In the long-term, new airport facilities for domestic and international services will be required if the expected demand for air travel to and from Sydney is to be met. Failure to meet demand for air travel to and from Sydney would have a major economic impact on Australia in general and NSW in particular.

A review of potential alternative sites confirmed that Badgerys Creek remains the most feasible site for a second major airport.

What Would be the Environmental Impacts?

Noise

The EIS documents anticipated levels of aircraft overflight noise for communities located in a large area surrounding the airport site. The three airport options considered would result in different aircraft noise levels for individual communities. Investigations carried out for the Supplement indicated that the impacts of aircraft overflight noise could be reduced by modifying flight paths and airport operations. A curfew is another option.

Accordingly, the extent of aircraft overflight noise impacts would vary depending on the airport option selected, how it would operate and the noise management measures adopted. For example, the number of people who would be affected by the higher range of noise impacts examined of more than 50 aircraft movements a day over 70 dBA (the level at which conversations within homes would be disturbed) could vary from 700 people for Option C to 4,000 people for Option B. For the lower range of noise impacts examined of more than 10 aircraft movements a day over 70 dBA, the number of people affected could vary from 10,000 for Option A to 72,000 people for Option C.

A comparison of Sydney Airport and a potential second airport at Badgerys Creek showed that for the same level and type of aircraft traffic, significantly fewer people would be exposed to aircraft noise from an airport at Badgerys Creek than from Sydney Airport. This is due to the much lower population density near the proposed second airport site.

Noise impacts would also occur because of construction activities and ground operation of aircraft. Relevant criteria for daytime and night-time construction noise could be exceeded in an area extending up to approximately 1.5 and three kilometres respectively from the airport boundary. Relevant criteria for the generation of noise from the operation of aircraft located on the ground would probably be exceeded within an area extending up to approximately seven kilometres from the airport boundary.

Air Quality

Comprehensive modelling of potential air quality impacts was undertaken. This included construction-related impacts and the air quality impacts of the operation of the airport and airport-related motor vehicle traffic.

It was estimated that relevant goals for the generation of dust and fine particulates (less than 10 microns) during construction of the airport might be exceeded during worst case conditions within areas extending up to approximately 1.5 and five kilometres respectively from the airport boundary. This impact could be significantly reduced through the implementation of environmental management measures.

During the operation of the airport it was estimated that relevant goals for nitrogen dioxide and fine particulates would be exceeded within areas of approximately two and 1.5 kilometres respectively from the airport boundary. The operation of the airport and airport-related motor vehicle traffic would increase ozone concentrations in areas eight to 43 kilometres to the west of the airport. This would occur during high ozone events in western Sydney, on average about 25 times per year.

Hydrocarbon odours would be generated by the operation of the airport and were predicted to exceed the relevant goal in an area of up to approximately 3.5 kilometres from the airport boundary.

Water Quality

Through the use of water management measures the quality of stormwater discharged from the site was predicted to generally improve when compared to the existing situation (for all water quality indicators examined with the exception of suspended solids - refer

Table 9). No significant impacts on groundwater or drinking water supplies were predicted.

The Second Sydney Airport would create pressure for changes to metropolitan planning strategies. Such changes might result in further urban development of the South Creek Valley. Regional water quality impacts would be a likely consequence of such development.

Health

While there is some uncertainty about the exact relationship between changes in air quality and health impacts, studies undertaken for the EIS indicated a low probability of any serious adverse health impacts such as premature hospitalisations and deaths attributable to air quality changes arising from the Second Sydney Airport. Events such as episodes of coughing or decline in lung function in people with asthma were projected to occur rarely within the affected population.

Existing knowledge of the extent of noise-related health risks did not make it possible to quantify the levels of noise-related health impacts that may arise from the operation of the Second Sydney Airport. Nevertheless, examples of specific impacts may include the potential for increased stress amongst children, the potential for increased prevalence of heart disease and the potential for hearing damage. Generally, these impacts might occur within the most severely noise affected areas located close to the airport boundary and directly under flight paths. Noise management measures would be considered for these areas.

Flora and Fauna

The short to medium-term impacts of the construction of the Second Sydney Airport on flora and fauna would be high as a result of clearance of regionally significant endangered ecological communities and endangered plant and animal species. In the longer term, however, the conservation significance of the remaining remnants would be enhanced through regeneration and rehabilitation works. The area of remnant vegetation to be retained, combined with the areas proposed to be regenerated, would contribute to the long-term viability of the endangered ecological communities at the airport sites.

Cultural Heritage

Aboriginal sites and features located on the airport sites are of low scientific value and considered to have local significance. Adverse impacts would be mitigated through the adoption of processes and procedures in accordance with the *Airports (Environment Protection) Regulations*.

Nine of the non-Aboriginal heritage items and sites identified on the airport site have National Estate values. Their management would be undertaken in accordance with the procedures set out in the *Australian Heritage Commission Act 1975* and any proposal to destroy one or more of these items would require further site specific evaluation and assessment.

Land Transport

As the operations of the airport increase, significant improvements would be progressively required to both roads and public transport systems to cater for land transport demands. While the EIS did not assess in detail the environmental impacts of off-site infrastructure required to support the airport, the scale of land transport improvements identified would be of a similar scale to other major transport infrastructure improvements currently proposed or likely to be required to service western Sydney over the next 20 or 30 years.

Substantial benefits would arise from the provision of such infrastructure in western Sydney and proven methods to mitigate the environmental impacts of the infrastructure would be available.

Hazards and Risks

Levels of risk associated with operation of the Second Sydney Airport would be consistent with levels of risk commonly experienced around other airports. The overall societal risk from operation of the Second Sydney Airport would be lower than the societal risk for Sydney Airport, but a greater risk of aircraft crashing would be introduced to an area of western Sydney where the current level of risk from hazardous developments is considerably lower.

Economic Impacts

An economic benefit cost analysis of a major airport at Badgerys Creek was undertaken. The benefits were compared with the environmental and other costs which could be measured in dollar terms, including the noise and health costs.

The results should be treated with caution due to data limitations, but it was concluded that a major airport would have net economic benefits for Australia, NSW and Sydney. The economic benefits would be about double the quantifiable costs.

From the perspective of a potential airport owner, airport charges would have to be greater than those currently levied at Sydney Airport for the Second Sydney Airport to be financially viable.

The proposed airport would be a significant generator of jobs in western Sydney.

Cumulative Impacts

A decision to proceed with the Second Sydney Airport would, over time, significantly alter the character of western Sydney. Gradual changes to the noise environment, air quality and the rural character of the region would occur. On the other hand, benefits would come from economic activity (including employment) and the provision of transport and other urban services. These benefits would, however, bring with them pressure to alter land use pattens and allow additional urban development which could potentially result in further biophysical and social impacts.

Development of an airport at Badgerys Creek would reduce some of the potential environmental impacts of satisfying expected demand for air travel to and from Sydney, compared to the potential further development of Sydney Airport. This is because the population densities surrounding each airport site are very different; for example, over 40 times more people live within ten kilometres of Sydney Airport than within the same distance of Badgerys Creek. It follows that, if the volume and type of aircraft traffic were the same at Sydney Airport and the Second Sydney Airport, then the number of people exposed to risk and aircraft noise from the second airport would be much smaller than the number of people affected by the operation of Sydney Airport.

Environmental Management

An environmental management system would be developed and implemented for the Second Sydney Airport project to ensure effective ongoing implementation of measures to control and reduce the potential environmental impacts of the Second Sydney Airport. The management system would include issue-specific environmental management plans. In addition to project-specific environmental management measures, Commonwealth, State and local government-initiated regional environmental management measures would be beneficial. Such measures should respond to issues such as the appropriate land use planning response to the airport and related cumulative air quality, water quality and biodiversity issues.

It is likely that the Second Sydney Airport would be developed in a series of stages and would not reach its planned operating limit of 30 million passengers per year until at least the 2020s or 2030s. Therefore, many but not all of the impacts of the airport would result in gradual changes to the human and biophysical environments. This gradual onset of the environmental impacts would improve the capacity of governments, the aviation industry and the community to manage adverse consequences and take advantage of potential benefits.

What Happens Next?

Together, the Draft EIS and Supplement form the Final EIS. Environment Australia is required to examine the Final EIS, taking into account any public comments received on the Draft EIS and the findings of the Auditor. Environment Australia will then provide an Assessment Report to the Minister for the Environment and Heritage, which will address the impacts of the proposal and the adequacy of measures proposed for the protection of the environment.

After examining the Assessment Report, the Minister for the Environment and Heritage may make any comments, suggestions or recommendations to the Minister for Transport and Regional Services that are considered necessary for the protection of the environment.

The Minister for Transport and Regional Services and the Commonwealth Government must take into account any such recommendations or advice in making a decision on whether or not a Second Sydney Airport is developed at Badgerys Creek.

The report of the Auditor and the Assessment Report will be made available to the public.

Table 9 **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

Assessment Criterion Performance Measure/Indicator	Option A	
Airport Planning and Development (Chapters 8 and 9 of Draft EIS/Chapter 6 of Supplement)		
Airfield Efficiency and Layout		
Efficiency and flexibility in design and operation	Inflexible for alternative terminal configurations; location of airport support facilities split; limited land for commercial development	
Construction		
Ease of construction	27 million cubic metres of earthworks; 6 year construction program; transmission line to be relocated; flexibility for staging	
Air Traffic Demands		
Capacity to satisfy long term demand for air travel	Planned to satisfy operational objective of 30 million passengers a year; potential limitations because of airspace conflicts with Sydney Airport	
Expandability		
Ease of future expansion	No capability for expansion within existing airport boundary	
Planning and Land Use (Chapter 10 of Draft EIS/Chapter 7 of Supplement)		
Metropolitan and Regional Planning		
Compliance with current metropolitan and regional planning	Supports a range of metropolitan planning objectives and creates opportunity for self contained new urban communities, close to employment opportunities and serviced by public transport; site accessible to existing employment centres; no significant changes to Urban Development Program	
Support of employment centres	Airport site would be accessible to existing employment centres, and land surrounding site could be available for employment uses	
Off Airport Site Infrastructure		
Benefit of off airport site infrastructure to regional planning	Road, rail and other services required for airport would also benefit existing and planned communities	
Acquisition of Properties		
Numbers of properties to be acquired to allow airport development	1 (part of public road)	
Defence Activities		
Impact on armaments logistic support	Low[2]	
Relocation costs	No costs	
Aircraft Overflight Noise (Chapters 11 and 12 of Draft EIS/Chapter 8 of Supplement)		
Land Use Planning[3,4, 5, & 6]	**Potential Impact Without Noise Management**	**Potential Impact With Noise Management**
People (2016 estimate) who may experience the following ANEC levels:		
- greater than 30 ANEC	200	No reduction
- greater than 25 ANEC	700-1,000	No reduction
- greater than 20 ANEC	4,500-6,000	2,500
- greater than 15 ANEC	11,000-14,000	8,000
Communication Disturbance[3, 4, 5, & 6]		
People (2016 estimate) who may experience, on average, the following number of noise events over 70 dBA a day:		
- greater than 100 events	400-900	No reduction
- greater than 50 events	2,500-5,000	1,500
- greater than 20 events	8,500-9,500	5,000
- greater than 10 events	15,000	10,000
Sleep Disturbance[3,4, 5, & 6]		
People (2016 estimate) who may, on average, be awoken at night the following number of times:		
- once a night	<100	Not calculated
- once every 2 nights	500-1,000	Refer Table 1
- once every 5 nights	6,000-8,000	
Disturbance to Learning[3, 5 & 6]		
Existing educational facilities (including child care centres) which may experience, on average, the following number of noise events over 65 dBA between 9am and 3pm:		
- more than 20 events	15	5
- more than 10 events	20	14

Comparative Assessment[1]

Option B	Option C
Flexibility for alternative terminal configurations; efficient layout of airport support facilities; sufficient land for commercial development	Flexibility for alternative terminal configurations; efficient layout of airport support facilities; sufficient land for commercial development
36 million cubic metres of earthworks; 6.5 year construction program; transmission line to be relocated; flexibility for staging	29 million cubic metres of earthworks; 6 year construction program; transmission line to be relocated; flexibility for staging
Planned to satisfy operational objective of 30 million passengers a year; potential limitations because of airspace conflicts with Sydney Airport	Satisfies operational objective of 30 million passengers a year
Good capability for expansion	Good capability for expansion
Supports a range of metropolitan planning objectives and creates opportunity for self contained new urban communities, close to employment opportunities and serviced by public transport; site accessible to existing employment centres; no significant changes to Urban Development Program	Supports a range of metropolitan planning objectives and may create the potential for self contained new urban communities, close to employment opportunities and serviced by public transport: (this potential may be more limited than for Options A or B); site accessible to existing employment centres; no significant changes to Urban Development Program
Airport site would be accessible to existing employment centres, and land surrounding site could be available for employment uses	Airport site would be accessible to existing employment centres, and land surrounding site could be available for employment uses
Road, rail and other services required for airport would also benefit existing and planned communities	Road, rail and other services required for airport would also benefit existing and planned communities
194	206
Low[2]	Moderate to High
No costs	Not available[2]

Potential Impact Without Noise Management	Potential Impact With Noise Management	Potential Impact Without Noise Management	Potential Impact With Noise Management
<100-200	No reduction	<100-300	No reduction
500-800	400	300-700	No reduction
3,500-5,000	2,000	900-1,500	No reduction
11,000-14,000	7,500	15,000-19,000	10,000
300-700	No reduction	300-500	No reduction
2,000-4,000	No reduction	700-1,000	No reduction
7,000-9,500	No reduction	6,000-17,000	No reduction
16,000-17,000	No reduction	60,000-72,000	32,000
<100	Not calculated	<100-100	Not calculated
300-800	Refer Table 1	400-600	Refer Table 1
3,500-6,000		1,500-17,000	
13	2	25	3
20	11	75	26

Table 9 (cont) **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

Assessment Criterion Performance Measure/Indicator	Option A
Noise-Induced Vibration	
People (2016 estimate) who may experience one noise event per 30 days capable of causing vibration to buildings (that is over 90 dBA)	700–1,000
Direct Property Devaluation	
Cost of direct property devaluation from noise impacts (1996$)	$49–67 million
Noise Management	
Cost of voluntary acquisition for dwellings affected by more than 35 ANEC (1997$)	$6–11 million
Cost of acoustical treatment for dwellings affected between 25 and 35 ANEC (1997$)	$12–19 million
Cost of acoustical treatment for dwellings affected between 30 and 35 ANEC (1997$)	$3 million
Other Noise Impacts (Chapter 13 of Draft EIS/Chapter 9 of Supplement)	
Construction Noise[6]	
People (2016 estimate) affected by noise levels over 45 dBA during the day without noise management measures	1,000
People (2016 estimate) affected by noise levels over 40 dBA during the night without noise management measures	2,500
Ground Operation Noise - During Neutral Conditions[6 & 7]	
People (2016 estimate) affected by noise levels over 50 dBA	2,500
Ground Operation Noise - During Temperature Inversion (Night-time) Conditions[6 & 8]	
People (2016 estimate) affected by noise levels over 50 dBA with and without orientation control	21,000 (14,000 with noise management)
Meteorology (Chapter 14 of Draft EIS/Chapter 10 of Supplement)	
Runway Use	
Usability of runways due to wind conditions	94.15% for aircraft with 10 knot cross wind capability; 97.25% for 13 knot cross wind capability; 99.84% for 20 knot cross wind capability
Air Quality (Chapter 15 of Draft EIS/Chapter 11 of Supplement)	
Ozone	
People (2016 estimate)[6] exposed to 1 part per 100 million increase in peak hourly ozone concentrations during high background ozone events	6,000
Nitrogen Dioxide	
People (2016 estimate)[6] exposed to peak hourly nitrogen dioxide concentrations of more than 12 parts per 100 million	500
Particulates	
People (2016 estimate)[6] exposed to peak 24-hour particulate matter concentrations of more than 50 micrograms per cubic metre	300
Odours	
People (2016 estimate)[6] who would be able to detect kerosene odours for more than 44 hours per year	1,500

Comparative Assessment[1] Option B	Option C
500–2,500	6,000–8,000
$52–60 million	$25–31 million
$0	$12–27 million
$7–9 million	$6–12 million
$1–3 million	$2–5 million
1,000	1,000
2,500	2,500
1,500	1,500
21,000 (14,000 with noise management)	16,000 (13,000 with noise management)
97.75% for aircraft with 10 knot cross wind capability; 99.30% for 13 knot cross wind capability; 99.96% for 20 knot cross wind capability	99.23% for aircraft with 10 knot cross wind capability; 99.91% for 13 knot cross wind capability; 99.99% for 20 knot cross wind capability
6,000	6,000
100	Less than 100
100	Less than 100
1,000	1,000

Table 9 (cont) **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

Assessment Criterion Performance Measure/Indicator	Option A
Mineral Resources (Chapter 16 of Draft EIS/Chapter 12 of Supplement)	
Mineral Resources	
Sterilisation of mineral resources	57-63 million tonnes of medium ash thermal coking coal
Water (Chapter 16 of Draft EIS/Chapter 13 of Supplement)	
Stream Habitat and Biota	
Length of stream habitat to be removed	2.2 kilometres
Increase in total average run-off post airport development	4 percent
Aquatic Ecosystem Water Quality	
Percentage of time total phosphorus concentrations in South Creek comply with water quality guideline value at 0.05 milligrams per litre	Existing 26 percent ; post airport development 34 percent
Percentage of time total nitrogen concentrations in South Creek comply with water quality guideline value of 0.5 milligrams per litre	Existing 76 percent; post airport development 78 percent
Percentage of time suspended solids concentrations in South Creek comply with water quality guideline value of 20 milligrams per litre	Existing 69 percent; post airport development 64 percent
Flooding	
Capability of managing flooding impacts	High
Flora and Fauna (Chapter 17 of Draft EIS/Chapter 14 of Supplement)	
Fauna	
Area of habitat for Cumberland Plain Large Land Snail removed	89 hectares of low to high quality habitat
Extent of fragmentation and barriers to fauna corridors	Corridor of regional significance retained
Disturbance to adjacent terrestrial habitat	None
Significant terrestrial fauna species potentially affected by airport site construction	2 species national significance, 16 species State significance; 67 species regional significance; 5 species listed under international agreements; 2 aquatic species
Flora	
Area of endangered ecological communities cleared	124 hectares
Area to be managed in long-term by regeneration and revegetation of endangered ecological communities	222 hectares
Significant flora species directly affected by airport construction	33 species of regional significance; one species (*Pultenaea parviflora)* listed under the Commonwealth *Endangered Protection Act, 1992*
Potential impacts of weeds and fire	Low
Environmental Management	
Ability to manage adverse impacts on significant flora species	Area of endangered ecological communities to be regenerated and revegetated in the long-term would exceed area to be cleared; area of *Pultenaea parviflora* increased
Ability to manage adverse impacts on significant fauna species	Area of potential snail habitat to be managed in the long-term greater than Options B and C. Relocation program for Cumberland Plain Large Land Snail proposed; potential for success of relocation program to be determined

Comparative Assessment[1] Option B	Option C
64-84 million tonnes of medium ash thermal coking coal	63-84 million tonnes of medium ash thermal coking coal
6.5 kilometres	7.9 kilometres
4 percent	7 percent
Existing 26 percent ; post airport development 34 percent	Existing 26 percent ; post airport development 36 percent
Existing 76 percent; post airport development 78 percent	Existing 76 percent ; post airport development 77 percent
Existing 69 percent; post airport development 64 percent	Existing 69 percent ; post airport development 63 percent
High	High
93 hectares of low to high quality habitat	94 hectares of low to moderate quality habitat (remnant of highest quality retained)
Barrier across corridor of regional significance created	Barrier across corridor of regional significance created
None	None
2 species national significance, 16 species State significance; 67 species regional significance; 5 species listed under international agreements; 2 aquatic species	2 species national significance, 16 species State significance; 67 species regional significance; 5 species listed under international agreement; 2 aquatic species
143 hectares	150 hectares
303 hectares	273 hectares
34 species of regional significance; one species (*Pultenaea parviflora)* listed under the Commonwealth *Endangered Protection Act, 1992*	37 species of regional significance; one species (*Pultenaea parviflora)* listed under the Commonwealth *Endangered Protection Act, 1992*
Low	Low
Area of endangered ecological communities to be regenerated and revegetated in the long-term would exceed area to be cleared; area of *Pultenaea parviflora* increased	Area of endangered ecological communities to be regenerated and revegetated in the long-term would exceed area to be cleared; area of *Pultenaea parviflora* increased
Relocation program for Cumberland Plain Large Land Snail proposed; potential for success of relocation program to be determined	Area of potential snail habitat to be managed in the long-term greater than Option B. Relocation program for Cumberland Plain Large Land Snail proposed; potential for success of relocation program to be determined

Table 9 (cont) **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

Assessment Criterion Performance Measure/Indicator	Option A
Agriculture, Energy and Waste (Chapter 18 of Draft EIS/Chapter 15 of Supplement)	
Agriculture	
Direct loss of agricultural productivity due to land acquisition	$0.6 million per year
Energy	
Fuel consumption during construction	90 million litres
Waste	
Waste production during operation	15,000 tonnes
Hazards and Risks (Chapter 19 of Draft EIS/Chapter 16 of Supplement)	
Aircraft Crashing	
Maximum predicted fatality risk (persons per 100 years)	2.5
People (2016 estimate) on the ground exposed to a risk of fatality from aircraft crashes greater than one chance in 1 million per year	2,500
Number of schools and hospitals exposed to a risk of fatality from aircraft crashes greater than 0.5 chance in 1 million per year	One childcare facility; four schools; no hospitals
Exposure of Major Infrastructure	
Major Infrastructure exposed to predicted maximum risk of aircraft crashes per square kilometre of:	
- 1 crash per 1,000 years	None
- 1 crash per 10,000 years	Prospect Reservoir; Warragamba Dam; Sydney Water Supply Pipeline; two electricity sub-stations
- 1 crash per 100,000 years	As above; Defence Establishment Orchard Hills; Moomba to Sydney gas pipeline (part)
Bushfire	
Risk of bushfire to airport operations	Low
Bird and Bat Strike	
Risk of bird strike to aircraft operations	Manageable risk
Risk of bat strike to aircraft operations	Manageable risk
Land Contamination	
Environmental and health risks of existing land contamination	Low
Cultural Heritage (Chapters 20 and 21 of Draft EIS/Chapters 17 and 18 of Supplement)	
Aboriginal Cultural Heritage	
Number of known sites and isolated finds of local and regional significance affected	60
Number of predicted sites and isolated finds of local and regional significance affected	119
Collective value of resource	Low
Expressed Aboriginal values	Site is subject to Native Title claim; Aboriginal sites, locations and natural environment are culturally important to Aboriginal people; Local Aboriginal Land Council opposes development of second airport in Sydney basin
Area of potentially significant archaeological resource disturbed	2.0 square kilometres; less than one percent of surviving regional resource
Proportion of known archaeological resource within Cumberland Plain region lost	7.8 percent
Ability to manage adverse impacts on Aboriginal cultural heritage	Limited scope for in situ conservation; salvage may be possible

Comparative Assessment[1] Option B	Option C
$2.3 million per year	$1.7 million per year
90 million litres	90 million litres
15,000 tonnes	15,000 tonnes
2.2	5
2,500	9,000
Two childcare facilities; two schools; no hospitals	Four childcare facilities; seven schools; no hospitals
None	Sydney Water Supply Pipeline; Defence Establishment Orchard Hills
Prospect Reservoir; Warragamba Dam; Sydney Water Supply Pipeline; two electricity sub-stations	As above
As above; Defence Establishment Orchard Hills; Moomba to Sydney gas pipeline (part)	As above
Low	Low
Manageable risk	Manageable risk
Manageable risk	Manageable risk
Low	Low
85	94
196	205
Low	Low
Site is subject to Native Title claim; Aboriginal sites, locations and natural environment are culturally important to Aboriginal people; Local Aboriginal Land Council opposes development of second airport in Sydney basin	Site is subject to Native Title claim; Aboriginal sites, locations and natural environment are culturally important to Aboriginal people; Local Aboriginal Land Council opposes development of second airport in Sydney basin
3.4 square kilometres; less than one percent of surviving regional resource	3.1 square kilometres; less than one percent of surviving regional resource
10.9 percent	12.3 percent
Limited scope for in situ conservation; salvage may be possible	Limited scope for in situ conservation; salvage may be possible

Table 9 (cont) **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

Assessment Criterion Performance Measure/Indicator	Option A
Non-Aboriginal Cultural Heritage	
Number of identified sites of local, regional or State significance affected	8 local; 5 regional; 1 partial loss (regional); 7 of these items listed by Liverpool Council
Number of identified sites having sufficient cultural significance to warrant entry on National Estate Register	9
Ability to manage adverse impacts on non-Aboriginal cultural heritage	Potential to retain site of Lawsons Inn; able to relocate headstones/ burial remains, etc, removed from two churches
Transport (Chapter 22 of Draft EIS/Chapter 19 of Supplement)	
Construction Traffic	
Impact of construction traffic on road network	Upgrading of The Northern Road between Elizabeth Drive and Adams Road to four lanes; intersection improvements at Elizabeth Drive-Devonshire Road, Bringelly Road-Cowpasture Road and Camden Valley Way, Northern Road-Adams Road
Rail Transport During Operation	
Estimated morning peak travel times between key centres and Second Sydney Airport:	
- Sydney CBD	48 minutes
- Parramatta CBD	33 minutes
- Sydney Airport	41 minutes
- Blacktown	43 minutes
- Campbelltown	30 minutes
- Liverpool	22 minutes
Compatibility with existing and future network	Opportunity for new transit oriented residential development; provides opportunity for creation of loop line to Main Western rail line; links to high frequency services at Glenfield station and East Hills rail line (allowing direct line to Sydney Airport)
Road Traffic During Operation	
Estimated morning peak travel times between key centres and Second Sydney Airport:	
- Sydney CBD	74 minutes from airport; 60 minutes to airport
- Parramatta CBD	42 minutes from airport; 38 minutes to airport
- Sydney Airport	59 minutes from airport; 50 minutes to airport
- Blacktown	35 minutes from airport; 35 minutes to airport
- Campbelltown	28 minutes from airport; 25 minutes to airport
- Liverpool	21 minutes from airport; 23 minutes to airport
Compatibility with existing and future network	Accessible to Western Sydney Orbital which, if constructed, would provide a high level of service to many parts of Sydney; upgrading of Elizabeth Drive already approved; further improvements required on Luddenham Road, The Northern Road, Bringelly Road and Devonshire Road north of Fifteenth Avenue; compatible with the Action for Transport Strategy; environmental constraints to the upgrade of Bringelly Road and The Northern Road; a key road network constraint would be the capacity of the M4 Motorway
Aviation (Chapter 22 of Draft EIS/Chapter 20 of Supplement)	
Aviation	
Compatibility with Sydney Airport in terms of airspace management and airport capacity	Significant impact, potentially reducing capacity of both airports
Impacts on secondary airports	Hoxton Park would close, moderate impacts on Camden and Bankstown
Impacts of restricted airspace	Defence Establishment Orchard Hills would have minor impacts on airport operations
Impacts on other aviation activities	High impacts on parachuting at Menangle and Wilton

Comparative Assessment[1]

Option B	Option C
10 local; 5 regional; 1 partial loss (regional); 8 of these items listed by Liverpool Council	11 local; 6 regional; 1 partial loss (regional); visual impact of security fence on Kelvin Park Homestead (State); 10 of these items are listed by Liverpool Council
9	9
Potential to retain site of Lawsons Inn, 'Evergreen' House, former Badgerys Creek Butchery and original Badgerys Creek school buildings; able to relocate headstones/ burial remains, etc, removed from two churches	Potential to retain site of Lawsons Inn and 'Evergreen' House; able to relocate headstones/burial remains, etc, removed from two churches; can reduce visual impact of security fence on Kelvin Park Homestead (State significance)
Upgrading of The Northern Road between Elizabeth Drive and Adams Road to four lanes; intersection improvements at Elizabeth Drive-Devonshire Road, Bringelly Road-Cowpasture Road and Camden Valley Way, Northern Road-Adams Road	Upgrading of The Northern Road between Elizabeth Drive and Adams Road to four lanes; intersection improvements at Elizabeth Drive-Devonshire Road, Bringelly Road-Cowpasture Road and Camden Valley Way, Northern Road-Adams Road
48 minutes 33 minutes 41 minutes 43 minutes 30 minutes 22 minutes	45 minutes 30 minutes 38 minutes 40 minutes 27 minutes 19 minutes
Opportunity for new transit oriented residential development; provides opportunity for creation of loop line to Main Western rail line; links to high frequency services at Glenfield station and East Hills rail line (allowing direct line to Sydney Airport)	Opportunity for new transit oriented residential development; provides opportunity for creation of loop line to Main Western rail line; links to high frequency services at Glenfield station and East Hills rail line (allowing direct line to Sydney Airport)
74 minutes from airport; 60 minutes to airport 42 minutes from airport; 38 minutes to airport 59 minutes from airport; 50 minutes to airport 35 minutes from airport; 35 minutes to airport 28 minutes from airport; 25 minutes to airport 21 minutes from airport; 23 minutes to airport	74 minutes from airport; 60 minutes to airport 42 minutes from airport; 38 minutes to airport 59 minutes from airport; 50 minutes to airport 35 minutes from airport; 35 minutes to airport 28 minutes from airport; 25 minutes to airport 21 minutes from airport; 23 minutes to airport
Accessible to Western Sydney Orbital which, if constructed, would provide a high level of service to many parts of Sydney; upgrading of Elizabeth Drive already approved; further improvements required on Luddenham Road, The Northern Road, Bringelly Road and Devonshire Road north of Fifteenth Avenue; compatible with the Action for Transport Strategy; environmental constraints to the upgrade of Bringelly Road and The Northern Road; a key road network constraint would be the capacity of the M4 Motorway	Accessible to Western Sydney Orbital which, if constructed, would provide a high level of service to many parts of Sydney; upgrading of Elizabeth Drive already approved; further improvements required on Luddenham Road, The Northern Road, Bringelly Road and Devonshire Road north of Fifteenth Avenue; compatible with the Action for Transport Strategy; environmental constraints to the upgrade of Bringelly Road and The Northern Road; a key road network constraint would be the capacity of the M4 Motorway
Significant impact, potentially reducing capacity of both airports	Operation of airports would be compatible
Hoxton Park would close, moderate impacts on Camden and Bankstown	Hoxton Park would close; moderate impacts on Bankstown; low impacts on RAAF Base Richmond; high impacts on Camden
Defence Establishment Orchard Hills would have minor impacts on airport operations	Conflicts with restricted airspace over Defence Establishment Orchard Hills
High impacts on parachuting at Menangle and Wilton	High impacts on parachuting at Menangle and Wilton

Table 9 (cont) **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

Assessment Criterion Performance Measure/Indicator	Option A
Visual and Landscape (Chapter 23 of Draft EIS/Chapter 21 of Supplement)	
Terrain Modification	
Area of airport site impacted by construction (short to medium term)	1,623 hectares
Scale of earthworks	Up to 16 metres cut and 13 metres fill
Visibility	
Viewing opportunities	Views from The Northern Road, otherwise limited beyond 10 kilometres
Operational lighting impacts (night-time)	Moderate to high within 5 kilometres; moderate between 3 and 10 kilometres due to skyglow
Economic Impacts (Chapter 24 of Draft EIS/Chapter 22 of Supplement)	
Costs	
Construction costs (1997$)[9]	$3–4.1 billion
Costs of infrastructure (1997$)[10]	$1,041-1,096 million
Economic Viability	
Internal rate of return	12 percent
Benefit cost ratio	2.2
Net present value	$4.3 billion
Health (Chapters 11, 12 and 15 of Draft EIS/Chapter 23 of Supplement)	
Short-Term Health Effects of Ozone	
Hospitalisations for respiratory disease per 100 years (additional or one or more days earlier than expected)	9
Deaths per 100 years (one or more days earlier than expected)	3
Short-Term Health Effects of Particulates Below 10 Microns in Size	
Hospitalisations for respiratory disease per 100 years (one or more days earlier than expected)	16
Deaths per 100 years (one or more days earlier than expected)	3
Coughing (additional person-days per year)	585
Clinically important decline in lung function (additional person-days per year)	78
Health Effects of Air Toxics	
Increase in number of cancer cases per 100 years	9
Health Impacts of Aircraft Overflight Noise	
Hearing loss	No impacts on residents
Psychological health	Not possible to quantify impacts
Heath impacts of sleep disturbance	Not possible to quantify impacts
Potential to increase incidence of heart disease	Research suggests potential for relatively high noise levels to cause impacts. These levels would generally occur in areas close to the airport boundary where homes would either be insulated or voluntary Government acquisition would be available
Potential to cause stress in school children	Research suggests potential for relatively high noise levels to cause impacts. Luddenham Public School would potentially be exposed to such high levels

Comparative Assessment[1] Option B	Option C
2,736 hectares	2,727 hectares
Up to 13 metres cut and 10 metres fill	Up to 9 metres cut and 13 metres fill
Views from The Northern Road, otherwise limited beyond 10 kilometres	Views from The Northern Road, otherwise limited beyond 10 kilometres
Moderate to high within 5 kilometres; moderate between 3 and 10 kilometres due to skyglow	Moderate to high within 5 kilometres; moderate between 3 and 10 kilometres due to skyglow
$3.5–4.8 billion	$3.4–4.7 billion
$1,041-1,096 million	$1,041-1,096 million
12 percent	12 percent
2.2	2.2
$4.3 billion	$4.3 billion
9	9
3	3
13	15
2	3
479	552
64	73
9	8
No impacts on residents	No impacts on residents
Not possible to quantify impacts	Not possible to quantify impacts
Not possible to quantify impacts	Not possible to quantify impacts
Research suggests potential for relatively high noise levels to cause impacts. These levels would generally occur in areas close to the airport boundary where homes would either be insulated or voluntary Government acquisition would be available	Research suggests potential for relatively high noise levels to cause impacts. These levels would generally occur in areas close to the airport boundary where homes would either be insulated or voluntary Government acquisition would be available
Research suggests potential for relatively high noise levels to cause impacts. Kemps Creek Public School would potentially be exposed to such high levels	Research suggests potential for relatively high noise levels to cause impacts. Bringelly Public School would potentially be exposed to such high levels

Table 9 (cont) **Conclusions and Comparitive Assessment of Airport Options Operating at 30 Million Passengers a Year**

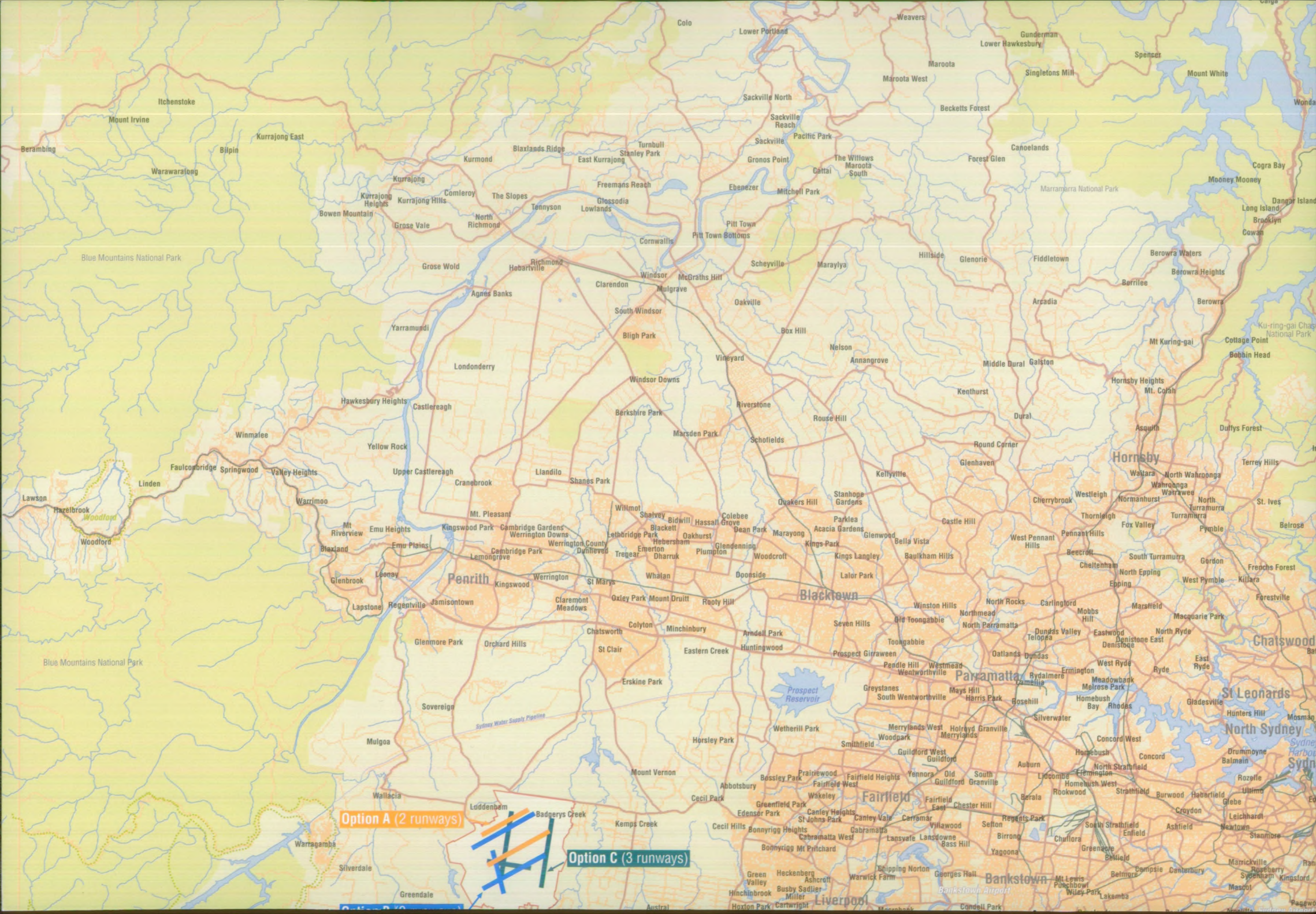
Assessment Criterion Performance Measure/Indicator	Option A
Water-Related Health Impacts	
Potential to exceed ANZECC guidelines for benzene levels in drinking water	Low
Health impacts due to stormwater/treated wastewater discharges	Low
Social and Cumulative Impacts (Chapters 25 and 27 of Draft EIS/Chapter 24 of Supplement)	
Employment and Economic Activity	
Generation of construction jobs	Up to 8,400 person years of labour on-site and 17,000 person years off-site
Generation of jobs during airport operation in region	19,000 jobs in the Badgerys Creek region
Potential to support regional economic benefits	Region has relatively mature industry structure to take advantage of increased economic activity
Community Character and Lifestyles	
Potential to cause severance or alienation of communities	Community alienation would be experienced due to displacement of residents and facilities from within existing airport sites; and due also to the corridors accessing the airport (Kemps Creek, Badgerys Creek, Bringelly and Luddenham)
Potential to significantly change community character and individual lifestyles	Community character likely to change dramatically from rural to urban; overall amenity of nearby communities likely to decline, especially Badgerys Creek, Luddenham, Greendale, Bringelly, Rossmore, Kemps Creek, Mount Vernon, Warragamba, Wallacia, Silverdale and Horsley Park
Community Facilities and Services	
Change to provision of community facilities and support structures	Loss of community facilities (school, store, post office) at Badgerys Creek; breakdown of family and business support structures probable, given the historical development and agricultural industry; long term replacement with new commercial and social structures
Displacement of individuals or communities	Displacement of community at Badgerys Creek (approximately 500 people); displacement of residents due to acquisition of properties in 35 ANEC, individual reaction to noise and other potential environmental impacts

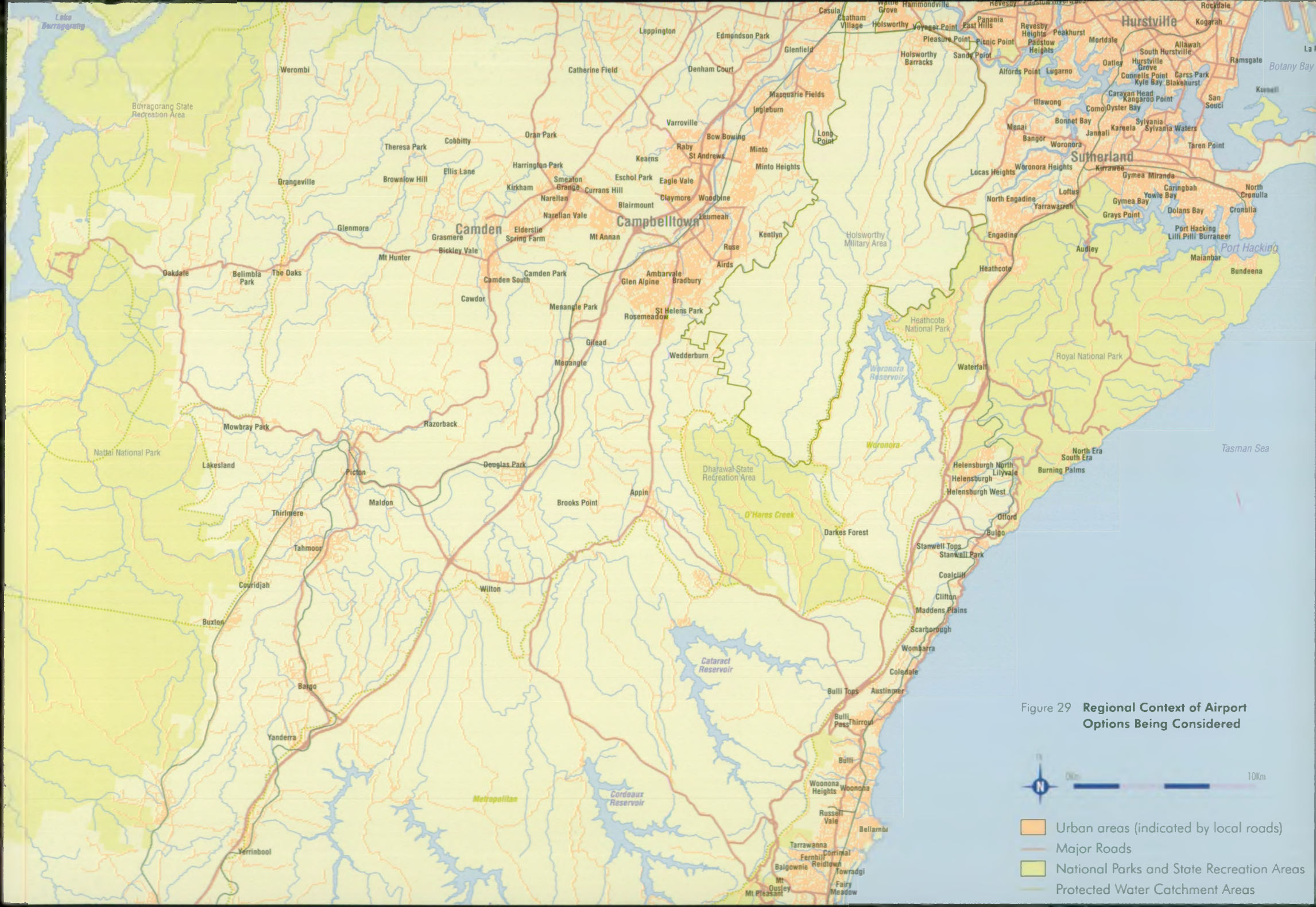
Notes:
1. The airport option considered to perform best against each criterion is shaded blue. Where two options are shaded blue, this indicates that there is no significant difference in performance. Where there is no significant difference between any of the options, no shading is shown.
2. Based on the conclusion that Options A and B could co-exist with defence activities at Orchard Hills. It is uncertain whether Defence facilities at Orchard Hills would have to be relocated if Option C were developed.
3. Estimates of people impacted by noise vary because of the different assumptions made about how the airport may operate.
4. Impacts of noise levels assume all residential properties within the 35 ANEC contour would be acquired.
5. There are limitations in the accuracy of predicting future aircraft noise levels and future population.
6. Population are 2016 estimates. Estimates of population greater than 10,000 have been rounded to the nearest 1000; estimates of population between 1,000 and 10,000 have been rounded to the nearest 500; and estimates of population less than 1,000 have been rounded to the nearest 100. Estimates of population less than 100 are shown as <100.

Comparative Assessment[1] Option B	Option C
Low	Low
Low	Low
Up to 8,400 person years of labour on-site and 17,000 person years off-site	Up to 8,400 person years of labour on-site and 17,000 person years off-site
19,000 jobs in the Badgerys Creek region	19,000 jobs in the Badgerys Creek region
Region has relatively mature industry structure to take advantage of increased economic activity	Region has relatively mature industry structure to take advantage of increased economic activity
Community severance and alienation would be experienced due to acquisition of the airport site and displacement of residents and facilities within existing site; and due also to the corridors accessing the airport (Kemps Creek, Badgerys Creek, Bringelly and Luddenham)	Community severance and alienation would be experienced due to acquisition of the airport site and displacement of residents and facilities within existing site; and due also to the corridors accessing the airport (Kemps Creek, Badgerys Creek, Bringelly, Luddenham and Rossmore)
Community character likely to change dramatically from rural to urban; overall amenity of nearby communities likely to decline, especially Badgerys Creek, Luddenham, Greendale, Bringelly, Rossmore, Kemps Creek, Mount Vernon, Warragamba, Wallacia, Silverdale and Horsley Park	Community character likely to change dramatically from rural to urban; overall amenity of nearby communities likely to decline, especially Badgerys Creek, Luddenham, Greendale, Bringelly, Rossmore, Kemps Creek, Erskine Park, Orchard Hills, Sovereign and Catherine Field
Loss of community facilities (school, store, post office) at Badgerys Creek; breakdown of family and business support structures probable, given the historical development and agricultural industry; long term replacement with new commercial and social structures	Loss of community facilities (school, store, post office) at Badgerys Creek; breakdown of family and business support structures probable, given the historical development and agricultural industry; long term replacement with new commercial and social structures
Displacement of community at Badgerys Creek (approximately 1,000 people); displacement of residents due to acquisition of properties in 35 ANEC, individual reaction to noise and other potential environmental impacts	Displacement of community at Badgerys Creek (approximately 1,200 people); displacement of residents due to acquisition of properties in 35 ANEC, individual reaction to noise and other potential environmental impacts

Notes:

7 Isothermal (neutral) atmospheric conditions occur when temperature is constant above ground level notwithstanding height.
8 Temperature inversions occur when temperature increases uniformly with height above ground level, up to 100 metres.
9 Range of costs provided because of assumed level of accuracy.
10. Estimated costs of infrastructure required to service the airport including roads, a rail line, water supply, fuel pipeline, gas supply, electricity supply, telecommunications and sewage disposal services. Estimates do not include costs of consequential upgradings of other parts of the rail network. A range of costs is shown because of rail alternatives available.


Option A (2 runways)
Option C (3 runways)
Penrith
Blacktown
Parramatta
Fairfield
Liverpool
Bankstown
Hornsby
Chatswood
St Leonards
North Sydney
Prospect Reservoir
Bankstown Airport
Blue Mountains National Park
Marramarra National Park
Sydney Water Supply Pipeline


Lake Burragorang
Burragorang State Recreation Area
Werombi
Catherine Field
Leppington
Edmondson Park
Denham Court
Glenfield
Casula
Cabramatta Village
Hammondville
Holsworthy
Voyager Point
East Hills
Panania
Revesby
Revesby Heights
Peakhurst
Mortdale
Hurstville
Kogarah
Rockdale
Pleasure Point
Picnic Point
Padstow Heights
Holsworthy Barracks
Sandy Point
Allawah
South Hurstville
Oatley
Hurstville Grove
Ramsgate
Botany Bay
Connells Point
Carss Park
Kyle Bay
Blakehurst
Alfords Point
Lugarno
Caravan Head
Kangaroo Point
Kurnell
Illawong
Como
Oyster Bay
San Souci
Bonnet Bay
Menai
Kareela
Sylvania
Sylvania Waters
Jannali
Bangor
Woronora
Taren Point
Sutherland
Lucas Heights
Woronora Heights
Kirrawee
Gymea
Miranda
Caringbah
North Cronulla
Loftus
Yowie Bay
North Engadine
Yarrawarrah
Gymea Bay
Grays Point
Dolans Bay
Cronulla
Port Hacking
Lilli Pilli
Burraneer
Engadine
Audley
Maianbar
Bundeena
Heathcote
Holsworthy Military Area
Heathcote National Park
Royal National Park
Waterfall
Woronora Reservoir
Woronora
Tasman Sea
North Era
South Era
Burning Palms
Helensburgh North
Lilyvale
Helensburgh
Helensburgh West
Otford
Bulgo
Stanwell Tops
Stanwell Park
Coalcliff
Clifton
Maddens Plains
Scarborough
Wombarra
Coledale
Austinmer
Bulli Tops
Bulli Pass
Thirroul
Bulli
Woonona Heights
Woonona
Russell Vale
Bellambi
Tarrawanna
Corrimal
Fernhill
Reidtown
Balgownie
Towradgi
Mt Ousley
Fairy Meadow
Mt Pleasant
Yerrinbool
Metropolitan
Cordeaux Reservoir
Cataract Reservoir
Nattai National Park
Burragorang State Recreation Area
Dharawal State Recreation Area
O'Hares Creek
Darkes Forest
Wilton
Appin
Brooks Point
Douglas Park
Picton
Thirlmere
Maldon
Tahmoor
Lakesland
Mowbray Park
Razorback
Couridjah
Buxton
Bargo
Yanderra
Oakdale
Belimbla Park
The Oaks
Mt Hunter
Cawdor
Camden South
Camden Park
Menangle Park
Menangle
Gilead
Wedderburn
Rosemeadow
St Helens Park
Glen Alpine
Ambarvale
Bradbury
Kentlyn
Ruse
Airds
Campbelltown
Leumeah
Mt Annan
Camden
Elderslie
Spring Farm
Grasmere
Bickley Vale
Glenmore
Orangeville
Brownlow Hill
Ellis Lane
Theresa Park
Cobbitty
Oran Park
Harrington Park
Kirkham
Smeaton Grange
Currans Hill
Narellan
Narellan Vale
Eschol Park
Eagle Vale
Blairmount
Claymore
Woodbine
Kearns
Raby
St Andrews
Minto
Minto Heights
Bow Bowing
Varroville
Macquarie Fields
Ingleburn
Long Point
Figure 29 **Regional Context of Airport Options Being Considered**
N
0Km
10Km
Urban areas (indicated by local roads)
Major Roads
National Parks and State Recreation Areas
Protected Water Catchment Areas

SUMMARY

PPK Environment & Infrastructure
PPK House
PO Box 248
Concord West NSW 2138
ACN 078 004 798
ISBN 0 642 47370 6

Commonwealth Department of
Transport and Regional Services
GPO Box 594
Canberra ACT 2601

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This document provides a summary of the Final EIS. Accordingly, the results of the studies have been simplified. For a more complete understanding of the potential impacts of the Second Sydney Airport proposal, reference should be made to the Final EIS and, if required, the technical papers prepared in conjunction with the Draft EIS.

Data used to develop the figures contained in this document have been obtained and reproduced by permission of the Australian Bureau of Statistics, NSW Department of Land and Water Conservation, NSW National Parks and Wildlife Service (issued 14 January 1997), NSW Department of Urban Affairs and Planning and Sydney Water. Predominantly based on 1996 and 1997 data.