



COMMONWEALTH DEPARTMENT OF
**TRANSPORT AND REGIONAL
DEVELOPMENT**

15

Economics

Proposal for a Second Sydney Airport
at Badgerys Creek or Holsworthy Military Area

Technical Paper

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DEVELOPMENT**

GPO Box 594
Canberra ACT 2601

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Explanatory Statement

This technical paper is not part of the Draft Environmental Impact Statement (EIS) referred to in paragraph 6 of the Administrative Procedures made under the Environment Protection (Impact of Proposals) Act 1974.

The Commonwealth Government is proposing to construct and operate a second major airport for Sydney at Badgerys Creek. This technical paper contains information relating to the Badgerys Creek airport options which was used to assist the preparation of the Draft EIS.

The technical paper also assesses the impacts of developing a major airport at the Holsworthy Military Area. On 3 September 1997, the Government eliminated the Holsworthy Military Area as a potential site for Sydney's second major airport. As a consequence, information in this technical paper relating to the Holsworthy Military Area is presented for information purposes only.

Limitations Statement

This technical paper has been prepared in accordance with the scope of work set out in the contract between Rust PPK Pty Ltd and the Commonwealth Department of Transport and Regional Development (DoTRD) and completed by PPK Environment and Infrastructure Pty Ltd (PPK). In preparing this technical paper, PPK has relied upon data, surveys, analyses, designs, plans and other information provided by DoTRD and other individuals and organisations, most of which are referenced in this technical paper. Except as otherwise stated in this technical paper, PPK has not verified the accuracy or completeness of such data, surveys, analyses, designs, plans and other information.

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Acknowledgments

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. The document is predominantly based on 1996 and 1997 data.

To ensure clarity on some of the figures, names of some suburbs have been deleted from inner western, eastern, south-eastern and north-eastern areas of Sydney. On other figures, only 'Primary' and 'Secondary' centres identified by the Department of Urban Affairs and Planning's Metropolitan Strategy, in addition to Camden, Fairfield and Sutherland, have been shown.

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Part A

Introduction

1

OVERVIEW OF THE PROPOSAL**1.1 INTRODUCTION**

This technical paper addresses the potential economic impacts of the previously proposed development of the Second Sydney Airport at either Badgerys Creek or Holsworthy Military Area. It contains information used to prepare the Draft Environmental Impact Statement (EIS) which addresses the overall environmental impacts of the Badgerys Creek airport options.

1.2 A BRIEF HISTORY

The question of where, when and how a second major airport may be developed for Sydney has been the subject of investigation for more than 50 years. The investigations and the associated decisions are closely related to the history of the development of Sydney's existing major airport, located at Mascot.

The site of Sydney Airport was first used for aviation in 1919. It was acquired by the Commonwealth Government in 1921, and was declared an International Aerodrome in 1935. In 1940 the first terminal building and control tower were opened.

In 1945 the airport had three relatively short runways. A major expansion began in 1947, and by 1954 the current east-west runway was opened. The north-south runway was first opened in 1954 and was extended to its current length in 1972. The present international terminal was opened in 1970.

Planning and investigations for a site for a second Sydney airport first started in 1946. A large number of possible sites both within and outside the Sydney Basin have been investigated.

The *Second Sydney Airport Site Selection Program Draft Environmental Impact Statement* (Kinhill Stearns, 1985) re-examined all possible locations for the second airport and chose 10 for preliminary evaluation. Two sites, Badgerys Creek and Wilton, were examined in detail and an EIS was prepared. In February 1986 the then Commonwealth Government announced that Badgerys Creek had been selected as the site for Sydney's second major airport.

The Badgerys Creek site, which is about 46 kilometres west of Sydney's Central Business District and is 1,700 hectares in area, was acquired by the Commonwealth between 1986 and 1991. A total of \$155 million has been spent on property acquisition and preparatory works.

Since 1986, planning for Sydney's second airport has been closely linked to the development of the third runway at Sydney Airport. In 1989 the Government announced its intention to construct a third runway. An EIS

was undertaken and the decision to construct the runway was made in December 1991.

At the same time as investigations were being carried out on the third runway, detailed planning proceeded for the staged development of the second airport at Badgerys Creek. In 1991 it was announced that initial development at Badgerys Creek would be as a general aviation airport with an 1,800 metre runway.

The third runway at Sydney Airport was opened in November 1994. In March 1995, in response to public concern over the high levels of aircraft noise, the Commonwealth Senate established a committee in March 1995 to examine the problems of noise generated by aircraft using Sydney Airport and explore possible solutions. The committee's report, *Falling on Deaf Ears?*, containing several recommendations, was tabled in parliament in November 1995 (Senate Select Committee on Aircraft Noise, 1995).

During 1994 and 1995 the Government announced details of its proposed development of Badgerys Creek, and of funding commitments designed to ensure the new airport would be operational in time for the 2000 Olympics. This development included a 2,900 metre runway for use by major aircraft.

The decision to accelerate the development of the new airport triggered the environmental assessment procedures in the *Environment Protection (Impact of Proposals) Act 1974*. 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 present Commonwealth Government decided to broaden the environmental assessment process. It put forward a new proposal involving the consideration of 'the construction and operation of a second major international/ domestic airport for Sydney at either Badgerys Creek or Holsworthy on a site large enough for future expansion of the airport if required' (Department of Transport and Regional Development, 1996). A major airport was defined as one 'capable of handling up to about 360,000 aircraft movements and 30 million passengers per year' (Department of Transport and Regional Development, 1996).

The Government also indicated that 'Badgerys Creek at this time remains the preferred site for Sydney's second major airport, subject to the favourable outcome of the EIS, while Holsworthy is an option to be considered as an alternative' (Minister for Transport and Regional Development, 1996). The two sites considered in this technical paper are shown in *Figure 1.1*.

Following the substantial completion of a Draft EIS on the Badgerys Creek and Holsworthy airport options, the Government eliminated the Holsworthy Military Area as a potential site for Sydney's second major airport. The environmental assessment showed that the Badgerys Creek site was significantly superior to the Holsworthy Military Area. As a result a Draft EIS was prepared which examines only the Badgerys Creek site. While this technical paper examines both the Badgerys Creek and Holsworthy airport options, only the parts of the assessment relating to the Badgerys Creek airport options were used to assist the preparation of the Draft EIS.

1.3 THE PROPOSAL

The Commonwealth Government proposes the development of a second major airport for Sydney capable of handling up to 30 million domestic and international passengers a year. By comparison, Sydney Airport will handle about 20 million passengers in 1997. The *Second Sydney Airport Site Selection Program Draft Environmental Impact Statement* anticipated the airport would accommodate about 13 million passengers each year (Kinchill Stearns, 1985).

A stated objective of the Government is the building of a second major airport in the Sydney region to a full international standard, subject to the results of an EIS. In the Government's view, Sydney needs a second major airport to handle the growing demand for air travel and to control the level of noise experienced by Sydney residents (Coalition of Liberal and National Parties, 1996).

Government policy indicates:

- that Sydney's second airport will be more than just an overflow airport and will, in time, play a major role in serving Sydney's air transport needs; and
- a goal of reducing the noise and pollution generated by Sydney Airport as much as possible and that the Government would take steps to ensure that the noise burden around Sydney Airport is shared in a safe and equitable way.

The assumptions made on how the Second Sydney Airport would operate and the master plans which set out the broad framework for future physical development of the airport are based on an operational limit of 30 million passengers a year. The main features include parallel runways, a cross wind runway and the provision of the majority of facilities between the parallel runways.

Consideration has also been given to how the airport may be expanded in the future and the subsequent environmental implications. Such an expansion could not proceed, however, unless a further detailed environmental assessment and decision making process were undertaken by the Government.

Five airport options are considered, as well as the implications of not proceeding with the proposal. Three of the airport options are located at Badgerys Creek and two are located within the Holsworthy Military Area. The airport options are:

- Badgerys Creek Option A which has been developed to be generally consistent with the planning for this site undertaken since 1986. The airport would be developed within land presently owned by the Commonwealth with two parallel runways constructed on an approximate north-east to south-west alignment;

- Badgerys Creek Option B would adopt an identical runway alignment to Option A, but provides an expanded land area and also a cross wind runway;
- Badgerys Creek Option C would provide two main parallel runways on an approximate north to south alignment in addition to a cross wind runway. Again the land area required would be significantly expanded from that which is presently owned by the Commonwealth;
- Holsworthy Option A would be located centrally within the Holsworthy Military Area and would have two main parallel runways on an approximate north to south alignment and a cross wind runway; and
- Holsworthy Option B would be located in the south of the Holsworthy Military Area and would have two main parallel runways on an approximate south-east to north-west alignment and a cross wind runway.

To ensure that the likely range of possible impacts of the airport options are identified a number of different assumptions about how the airport options would be developed and operate have been adopted. These different assumptions relate 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 number of flights into and out of the proposed Second Sydney Airport would depend on a number of factors including the types of aircraft that would use the airport and the associated numbers of passengers in each aircraft. The proposal put forward by the Government anticipates a major airport handling 30 million passengers and up to 360,000 aircraft movements per year.

Air traffic forecasts have been developed based on an examination of the number and type of aircrafts that would use the airport as it approaches an operating level of 30 million passengers per year. This examination has shown that if the airport accommodated about 245,000 aircraft movements each year, the number of air passengers would approach 30 million. This assumes a relatively high percentage of international flights being directed to the Second Sydney Airport. Therefore it is appropriate for this Draft EIS to assess the airport operating at a level of 245,000 aircraft movements per year, rather than the 360,000 originally anticipated by the Government. It has been assumed that this level of operation could be reached by about 2016.

1.4 AIR TRAFFIC FORECASTS

Cities around the world which have developed second major airports have responded to their particular needs in different ways. For example, the original airport in Dallas, United States, is now used for short range traffic that does not connect with other flights. Second airports in New York and Washington serve as hubs for particular airlines. In Taipei, Taiwan, smaller domestic aircraft use the downtown airport and larger international flights use a newer airport 40 kilometres from the city.

It is clear that each metropolitan area around the world has unique characteristics and the development of multi-airport systems respond to particular local circumstances. The precise role and consequential staging of development of the Second Sydney Airport would be the subject of future Government decisions. To assist in developing a realistic assessment of the potential impacts of the Second Sydney Airport, three sets of air traffic forecasts for the airport were developed. Each forecast assumes a major airport would be developed, however, this may be achieved at different rates of growth.

The three potential air traffic scenarios considered for the Second Sydney Airport are shown in *Figure 1.2*. They are:

- *Air Traffic Forecast 1* where the Second Sydney Airport would provide only for demand which cannot be met by Sydney Airport. This is an overflow forecast, but would nevertheless result in a significant amount of air traffic at the Second Sydney Airport. The proportion of international and domestic air traffic is assumed to be similar at both airports;
- *Air Traffic Forecast 2* where the Second Sydney Airport would be developed to cater for 10 million passengers a year by 2006, with all further growth after this being directed to the second airport rather than Sydney Airport. The proportion of international and domestic traffic is also assumed to be similar at both airports; and
- *Air Traffic Forecast 3* which is similar to Forecast 2 but with more international flights being directed to the Second Sydney Airport. This would result in the larger and comparatively noisier aircraft being directed to the second airport. It would accommodate about 29.3 million passengers by 2016.

1.5 OPERATION OF THE AIRPORT OPTIONS

At any airport, aircraft operations are allocated to runways (which implies both the physical runway and the direction in which it is used) according to a combination of wind conditions and airport operating policy. The allocation is normally performed by Air Traffic Control personnel.

Standard airport operating procedures indicate that a runway may not be selected for either approach or departure if the wind has a downwind component greater than five knots, or a cross wind component greater than 25 knots. If the runway is wet, it would not normally be selected if there is any downwind component. This applies to all aircraft types, although larger aircraft would be capable of tolerating relatively higher wind speeds. Wind conditions at the airport site therefore limit the times when particular runways may be selected. However, there would be a substantial proportion of the time, under low wind conditions, when the choice of runways would be determined by airport operating policy.

For the environmental assessment, the maximum and minimum likely usage for each runway and runway direction was estimated and the noise impact of each case calculated. The actual impact would then lie between these

values and would depend on the operating policy which is applicable at the time.

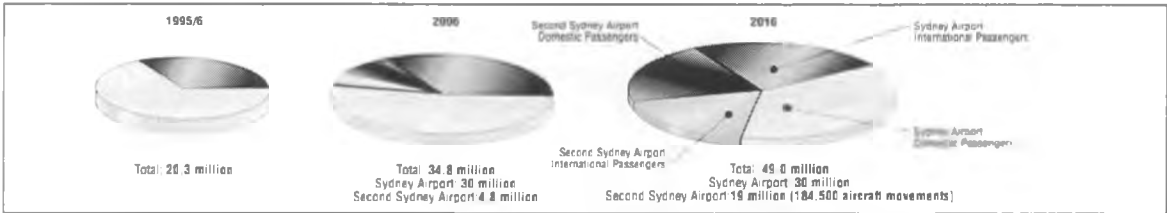
Three airport operation scenarios were adopted for the environmental assessment, namely:

- *Airport Operation 1* shown in *Figure 1.3*. Aircraft movements would occur on the parallel runways in one specified direction (arbitrarily chosen to be the direction closest to north), unless this is not possible due to meteorological conditions. That is, take offs would occur to the north from the parallel runways and aircraft landing would approach from the south, travelling in a northerly direction. Second priority is given to operations in the other direction on the parallel runways, with operations on the cross wind runway occurring only when required because of meteorological conditions;
- *Airport Operation 2* shown in *Figure 1.4*. As for Operation 1, but with the preferred direction of movements on the parallel runways reversed, that is to the south; and
- *Airport Operation 3*. Deliberate implementation of a *noise sharing* policy under which seven percent of movements are directed to occur on the cross wind runway (equal numbers in each direction) with the remainder distributed equally between the two parallel runway directions.

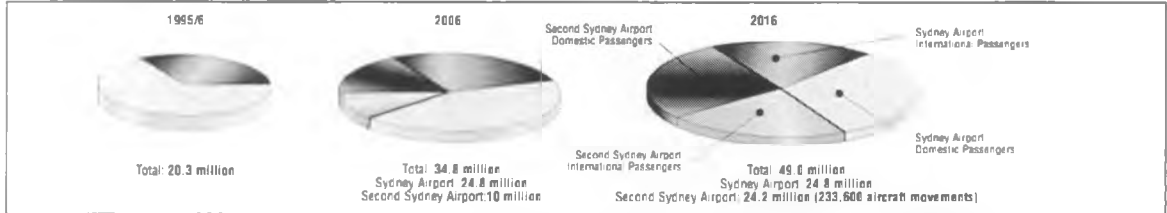
Since a cross wind runway was not proposed at Badgerys Creek Option A, only Operations 1 and 2 were considered for that option.



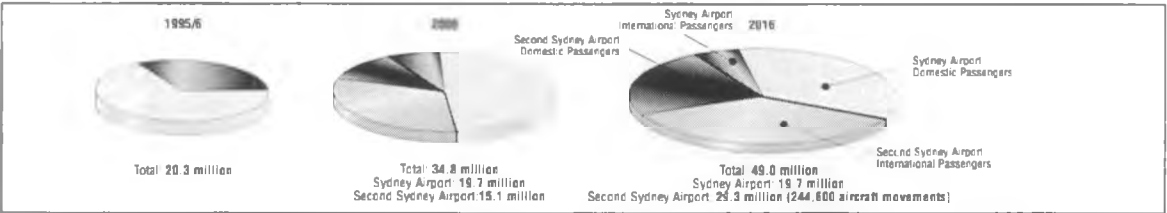
Figure 1.1
Potential Airport Sites Considered in the Draft EIS



Assumptions about Passenger Movements for Air Traffic Forecast 1



Assumptions about Passenger Movements for Air Traffic Forecast 2



Assumptions about Passenger Movements for Air Traffic Forecast 3

Figure 1.2
Summary of Passenger Movement Forecasts Used for Environmental Assessment

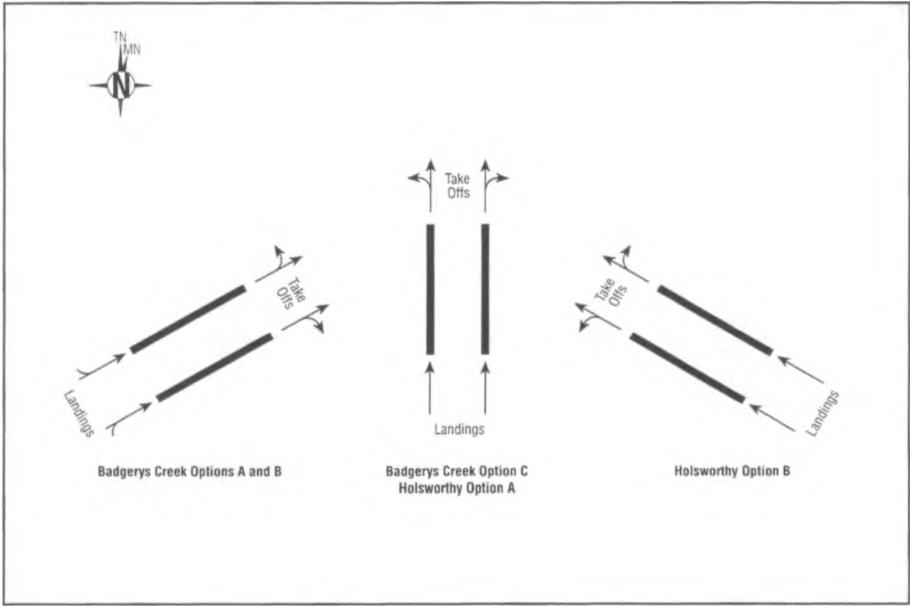


Figure 1.3
Predominant Directions of Movement of Aircraft for Airport Operation 1
Note: Cross wind runway used only when required because of meteorological conditions

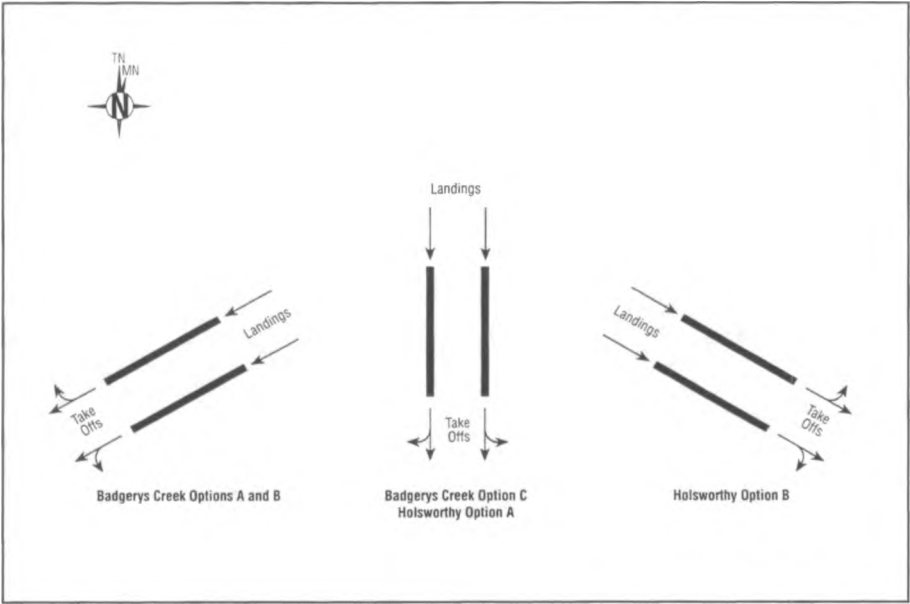


Figure 1.4
Predominant Directions of Movement of Aircraft for Airport Operation 2
Note: Cross wind runway used only when required because of meteorological conditions

2

CONSULTATION

Comments provided on economic issues concerned the potential loss of local businesses and tourism related activities and the methodology for the assessment of economic impacts.

Economic Analysis for the Draft EIS

Commentators considered that the economic impacts brought about by the proposal would be either beneficial or detrimental. Some considered the proposals would be economically beneficial to an area and saw value for the western region of Sydney in locating the airport at Badgerys Creek. It was suggested as a valuable opportunity for new employment generation and a general economic 'kick start' for the region. Other comments noted the loss of small businesses such as restaurants due to overflight noise and suggested the proposals would be economically detrimental.

It was requested that a cost benefit analysis be prepared as part of the EIS with the inclusion of long term costs, such as potential damage to the environment and loss of businesses and jobs, in addition to short term employment, service and construction industry gains. It was commented that valuing income from an airport higher than the loss of natural bushland was not correct.

Secondary Economic Impacts

The impacts of the loss of working days due to health impacts related to aircraft noise were noted. This would arise from sleep deprivation and other impacts and might either reduce the local workforce able to benefit from employment opportunities or cause a population shift away from the area. Businesses mentioned as being affected include private schools, hang gliding activities, recreational activities south of the National Park, retirement villages and restaurants.

Tourism

The potential economic implications of a loss of tourism were noted, with reference being made to activities within and adjacent to the Royal National Park in the Illawarra area (hang gliding and recreational activities). The impacts on tourism and Australia's international reputation (due to loss of bushland and endangered flora and fauna, associated with the Holsworthy options) were also questioned.

Commercial Opportunities

Comments were supportive of an airport at Badgerys Creek, noting benefits in the form of additional jobs, economic activity and improved arterial roads. The potential to attract significant amounts of new global activity and the resulting growth in transport businesses, hotel development, business parks for foreign companies and technology development with high export content were noted. It was commented that as the proposed Sydney West Airport would be within 30 minutes of most greater western Sydney commercial

centres and major industrial estates, it would provide a direct gateway to service greater western Sydney's \$34 billion economy, and would also offer many opportunities for the development of commercial clusters of airport related activities.

Construction Costs and Economic Impacts

The relatively large costs of constructing an airport within the Holsworthy Military Area due to the need to detect and remove unexploded ordnance, difficult topography and associated large scale earthworks, and the relocation of the existing military establishment were noted. It was also suggested that a financial advantage existed in locating an airport at Holsworthy in that the Commonwealth Government would not have to pay to resume the land.

Agricultural Impacts

Comments concerning the future viability of agricultural activities in the vicinity of Badgerys Creek noted:

- considerable amounts of poultry farming would be unable to continue;
- crops would potentially be subject to air and water quality impacts; and
- fish hatcheries would potentially be subject to air and water quality impacts.

3 METHODOLOGY

3.1 OVERVIEW AND SCOPE OF WORK

The methodology for the economic assessment of the Second Sydney Airport covered two areas, the first being a Costing Analysis and the second being a Regional Assessment. The Costing Analysis covers the impact of the project in terms of the quantifiable costs of each of the options while the Regional Assessment covers the impacts on employment and spending across Sydney. Neither assessment claims to be an economic justification of the airport proposals, instead they quantify some of the impacts and enable some comparisons between options.

Table 3.1 summarises the key resource impacts that may result from the proposed Second Sydney Airport and those that were included in the Costing Analysis and Regional Assessment.

TABLE 3.1 KEY RESOURCE IMPACTS

Key Resource Impacts	Elements of Economic Assessment	
	Costing Analysis	Regional Assessment
1. Construction (on-site)		
- Airport Development	✓	✓
- Land acquisition	✓	✓
- Site road access infrastructure	✓	✓
- Site road related improvements	✓	✓
- Unexploded ordnance	✓	x
2. Regional Infrastructure		
- Rail access	✓	✓
- Highway access	✓	✓
- Service provision	✓	✓
3. Mitigation		
- Reducing visual impact	x	x
- Reducing noise impact	✓	x
- Moving/relocating flora/fauna	x	x
- Moving/relocation OR ameliorating the impact on Aboriginal and other heritage sites	x	x
- Impact of reducing OR maintaining water quality, as required	✓	x
4. Secondary Airport Impacts		
- Bankstown	x	x
- Hoxton Park	x	x
- Camden	x	x
- Other Airports	x	x
5. Relocation of Holsworthy Defence Facilitie		
- Defence relocation	✓	x
- Disruption and related costs from moving	✓	x

Key Resource Impacts	Elements of Economic Assessment	
	Costing Analysis	Regional Assessment
6. Operation of New Airport		
- Maintenance	✓	x
- Operations	✓	x
7. User Access/Time Costs		
- Public transport access	x	x
- Highway access	x	x
8. Aircraft Noise		
- Change in property values from noise	✓	x
9. Regional Economic Benefits		
- Employment and consumer spending benefits	x	✓
10. Sterilisation of Mineral Resources		
- Costs of minerals unexplored	x	x
11. Agricultural Productivity		
- Net costs of lost production	x	x
12. Airlines Operating Costs		
- Changes to airline operating costs (air)	x	x
- Changes to airline operating costs (land)	x	x

Notes: x impacts not costed in analysis
✓ impacts costed and/or included in the analysis

3.2 FORM OF THE ECONOMIC ANALYSIS

It would be usual to undertake a cost-benefit analysis for a major public investment such as the Second Sydney Airport and indeed that was the intention when this EIS process commenced. As the study progressed it became apparent that it would not be possible to undertake a cost-benefit analysis for the reasons discussed below. The form that the economic analysis would take evolved over time in discussion with officers from the Department of Transport and Regional Development.

3.2.1 BASE CASE

Inherent in a cost-benefit analysis is the requirement for a Base Case or do nothing option against which the options for improvement are assessed. In this study, the Base Case would be continued operation of Sydney Airport. The form of operation greatly affects capacity of the existing airport and therefore the cost and need for a Second Sydney Airport. It was not possible to select the form of the operation that should apply in the Base Case given that the level of operation is dependent on government policies with respect to the aircraft movement cap, curfew, general aviation and regional airline access, and the proposed slot system management.

The result of current policies is to effectively restrict Sydney Airport to a maximum passenger capacity of around 30 million a year. Whilst an increase in the number of passengers per aircraft movement through a combination of increased aircraft size and improved runway capacity management could increase this maximum, the policy cap on runway movements remains. Policy directions are framed in a political context which can change over the medium to long term, making the definition of a probable Base Case a matter of sophisticated guesswork. To select one set of policies (even if it is the existing set) as the Base Case could give misleading results for a cost-benefit analysis that is incremental to a Base Case.

The Base Case would also be affected by how the Second Sydney Airport developed. Three air traffic forecasts with different mixes of domestic and international traffic at the existing and proposed airports were used because of the uncertainty associated with potential development at the new airport. Airports in cities with two airports exhibit a range of roles, and no cities have similar characteristics to Sydney. The form of the development of the Second Sydney Airport will be affected by Government policy, which has yet to be settled. Chapter 7 of the Draft EIS contains a discussion of the ways that a second airport may develop.

An alternative approach is to adopt a number of Base Case scenarios and so include a range of possible future outcomes. Doing so would only undermine the credibility of the analysis as it is a truism in project evaluation that the definition of the 'right' Base Case can directly affect the outcome of the analysis. We have therefore avoided asking the question what would Sydney Airport look like if there were no Second Sydney Airport?

The difficulty of defining a Base Case is not unique to this Environmental Impact Statement. Although the location of a second airport for Sydney has been subject to many studies, a full cost-benefit analysis has never been undertaken. In the first major study in the early 1970s, the difficulty of defining a Base Case also precluded such an analysis. Instead, the differences in costs and benefits between the location options were evaluated, that is, the economic justification of a Second Sydney Airport was not evaluated but only the relative economic case for each of the options. In effect, there was an assumption that there was economic merit in a second airport and only the location of that airport was subject to economic analysis (Brogan et al 1980).

It was not possible to adopt this strategy to assess the economic worth for the current Environmental Impact Statement for other reasons, to which we now turn.

3.2.2 AVAILABILITY OF COSTS AND BENEFITS

An alternative to a cost-benefit analysis is a cost-effectiveness analysis where only costs are included on the assumption that each of the options being assessed has the same or similar benefits (WD Scott & Co. Pty Ltd et al, 1978). The assumption of similar benefits for the options under consideration was not possible in this study because of insufficient data on

some cost and benefit items, and the different level and pattern for those that were known.

All costs and benefits of the options for the location of the Second Sydney Airport were not available for this study. Major items for which no estimates could be made available included the relocation of Defence facilities at Badgerys Creek, the effects on other airports in the Sydney area of a new airport in the west of Sydney, and the operating and user costs of road and rail access to the proposed airports under study.

In either a cost-benefit analysis or cost-effective analysis it is necessary to discount future costs and benefits to a common point in time so that they are expressed in a common numeraire for comparison purposes. This means that the years in which the costs and benefits are likely to occur is required. As discussed above, the timing of increments of airport capacity is uncertain because it is dependent on the operational policies at Sydney Airport. This uncertainty also meant that any cost-effective analysis would be subject to uncertainties and the same deficiencies as a cost-benefit analysis.

In view of the likely significance of the cost estimates that were not available, it would be misleading to total the costs that were available and ignore those that were not. In recognition of the poor data on costs, the Department of Transport and Regional Development has recently commissioned a study aimed at estimating the financial effects of a Second Sydney Airport on the Commonwealth Government and its authorities.

3.2.3 VALUATION OF ENVIRONMENTAL EFFECTS

Economic valuations are generally based on people's willingness to pay for goods and services. Where a market does not exist for goods and services, such as those provided by the natural environment, values need to be determined by some other means. Since environmental economics is a relatively recent branch of economics, the valuation methods are still evolving. Table 3.2 summarises the range of valuation techniques applicable to different types of environmental impact. There are seven principal techniques available, some of which can be used to value a number of different environmental effects.

The types of impact covered in the table include productivity, that is changes in levels of output; health impacts covering a range of medical phenomena; amenity changes to include a range of recreational and any other remaining impacts.

Estimates of the effect of aircraft noise on properties in the vicinity of the proposed airport sites were made as part of the assessment of noise impacts (*Technical Paper No. 4*) and they are included in the Costing Analysis. These estimates used unit values developed from other studies in Australia and overseas. The noise costs provide some indication of the relative impacts of the five airport options, but are subject to the qualification that they use unit costs from other locations which may not be transferable to the properties in the vicinity of Badgerys Creek or Holsworthy.

TABLE 3.2 APPLICATION OF VALUATION METHODS

Type of Impact	Standard Markets ¹	Hedonic Property	Hedonic Wages	Travel Costs	Averting ² Expenditure	Corrective Expenditure	Contingent Valuation
<i>Productivity</i>							
Soil loss	✓	?	X	X	✓	✓	X
Crop damage	✓	?	X	X	✓	✓	X
Forest loss	?	X	X	X	✓	✓	?
Habitat/species loss	?	X	X	?	✓	✓	?
Fisheries depletion	✓	X	X	X	✓	✓	X
Water quality loss	?	X	X	X	✓	✓	X
Property/materials damage	✓	?	X	X	✓	✓	X
Other resource depletion ³	✓	?	X	X	✓	✓	X
<i>Health</i>							
Loss of life	?	X	✓	X	✓	X	✓
Illness							
- work days lost	✓	X	X	X	X	X	X
- restricted activity days	X	X	X	X	X	X	✓
Pain and suffering	X	X	X	X	X	X	✓
Medical expenses	X	X	X	X	X	✓	X
<i>Amenity</i>							
Recreation losses ⁵	X	?	X	✓	?	?	✓
Habitat/species loss	?	X	X	?	✓	✓	✓
Aesthetic damages ⁶	X	✓	X	X	✓	X	✓
Noise	X	✓	X	X	✓	X	✓
<i>Other</i>							
Existence values	X	X	X	X	?	X	✓
Occupational environment	X	X	✓	X	X	X	✓
Access to water supplies	?	?	X	✓	X	X	✓
Sanitation services	?	✓	X	X	X	X	✓

Source: Abelson (1996).

- Notes:
1. Including product, property and labour markets, and surrogate prices.
 2. Including averting expenditures required by government, for example, policies to reduce CO₂ emission.
 3. Depletion of energy and mineral resources.
 4. Human capital approach.
 5. Loss of recreational opportunities or quality, for example, in lakes, parks.
 6. Visual, odour (scenery) degradation.

Key: X not applicable, ✓ applicable

Arguably, valuations of other environmental impacts could have been attempted using unit values estimated for similar studies. This was not done for the following reasons:

- relative to aircraft noise, valuations for other environmental impacts have not been subject to such extensive study therefore they are subject to more uncertainty;
- estimating unit costs to value specific environmental impacts of the airport options was outside the scope of the EIS; and
- the environmental impacts of the airport options are significant so using values that are subject to uncertainty may give misleading results as to the preferred option.

There is also debate about whether it is valid to discount the costs and benefits of environmental effects. Discounting places a high value on costs and benefits occurring early on in the period and a low value on future costs and benefits (Abelson, 1996 and Turner et al, 1994). The time value of money and discounting are concepts widely accepted and used in finance and economics but the application to environmental valuation is not universally supported by environmental economists. For example, it has been argued that in the context of a park or forest, which will continue to be appreciated at the same rate over time, discounting is not appropriate. A counter argument is that high discount rates discourage investment and hence development, so discounting may reduce the size of the impact of development on the environment overall. It would be undesirable if a debate about whether discounting was appropriate occurred rather than a debate about whether Badgerys Creek or Holsworthy was the preferred location for the Second Sydney Airport.

Our view is that the state of the art is not sufficiently robust to enable environmental effects to be valued with much certainty. As they are major considerations in an airport evaluation, it is preferable that they are included in physical terms in the *Environmental Impact Statement* and not included as a quantified item in the economic analysis.

In the approach adopted, the economic analysis does not identify a preferred airport option but is one component of the *Environmental Impact Statement* that will inform policy makers in the decision process. We now describe the economic analyses undertaken.

3.3 COSTING ANALYSIS

The Costing Analysis provides estimates of resource impacts relating to the proposal, both capital and annual costs, and summarises them. As noted above, the available items are not comprehensive and aggregating them may lead to misleading conclusions on preferred options in economic terms.

The approach adopted was to concentrate on the impacts of the proposed Second Sydney Airport options and give no attention to the impact on Sydney Airport in quantitative terms. The justification for this is that the impacts at Sydney Airport from the development of a second airport are unlikely to vary between the airport options. The development of additional airport capacity resulting from the opening of the Second Sydney Airport would relieve congestion and other Sydney Airport disbenefits irrespective of the airport option.

The Costing Analysis enables a limited comparison between the airport options. It is limited because not all the costs are included and the timing of costs is not directly taken into account. The construction costs assume that the Second Sydney Airport will be developed to 30 million passenger capacity immediately, while in practice the development is likely to be staged. Plans for staged development and costs will not be prepared until a preferred location is identified by the EIS. The timing of other regional infrastructure costs will be similarly affected by the staged development of the proposed airport.

The Costing Analysis covers the site related costs for which estimates were available. The following summarises the main items included:

- the main difference between the proposed airport options is the on-site costs which include land acquisition, site preparation and construction of infrastructure. In the case of the Holsworthy options, the costs of removing unexploded ordnance are also included;
- changes in the costs of incremental increases in road and rail capacity to provide for the forecast passenger throughput. The transport model used for the land transport access study provided data used to estimate the transport capacity required;
- the costs of regional infrastructure for services such as electricity, water and telecommunications;
- impacts on agricultural production;
- sterilisation of the known coal reserves at Badgerys Creek and Holsworthy;
- changes in property values as a result of operational noise impacts. The property valuation changes were used as a measure of the noise disbenefit arising from the proposed airport options;
- the costs of relocating Defence facilities from Holsworthy and the increased operating costs associated with the relocation. No costs were available for relocation of the military facilities affected by the Badgerys Creek options; and
- airport operating and maintenance costs on an annual basis. Costs were estimated based on the current operating costs of the major Federal Airports Corporation airports, in relation to size and passenger movements.

3.4 REGIONAL ASSESSMENT

The second stream of the economic analysis was an assessment of regional economic effects of the construction of a Second Sydney Airport at Badgerys Creek or Holsworthy. The objective of the assessment was to analyse the regional economic impact of the development of an airport on employment creation and the local economic structure.

The main analysis was undertaken by Corporate Economics Australia using its Economic Regional Analysis Model to produce turnover, value added and employment forecasts for the two airport locations of Badgerys Creek and Holsworthy. There are unlikely to be differences in the impacts of the airport options at a specific site (that is, either Badgerys Creek or Holsworthy) except for construction costs. The model was therefore applied to a single option at each location.

The model did not include an assessment of general equilibrium effects or the effects that result from the potential diversion of scarce labour and capital from alternative investments or activities. It was not necessary to estimate these effects because the Environmental Impact Statement is a comparative

assessment of the options for a Second Sydney Airport rather than an assessment of whether a second airport is required in Sydney.

Nevertheless, the model was used to assess the impacts of not proceeding with the Second Sydney Airport by limiting passenger demand to the Sydney Airport capacity of 30 million passengers. These impacts were able to be estimated because the use of the model did not require specification of how the restriction on passenger numbers would be achieved or how the demand for airline travel in excess of 30 million passengers would be satisfied, both of which are necessary for a cost benefit analysis.

The Regional Assessment was largely restricted to the effects on the airport regions, that is areas surrounding Sydney Airport and the proposed Badgerys Creek or Holsworthy airports. The modelling process also produced economic impacts on Sydney as a whole. The State-wide and national economic impacts of a Second Sydney Airport were not included.

Additional information on the regional impacts of airports was drawn from other studies of Sydney Airport (Institute of Transport Studies, 1993 and 1996) and data sources on the economic value of airports.

Part B

Existing Environment

4

EXISTING ECONOMIC ENVIRONMENT**4.1 OVERVIEW**

The purpose of this chapter is to outline the current economic and social structure of the two regions which would be affected by the Second Sydney Airport. The role of Sydney Airport in the state and national context is reviewed. The level and composition of employment in the two regions are described as they would provide support to the airport in services and as a source of labour.

4.2 SYDNEY AIRPORT**4.2.1 INTERNATIONAL VISITORS**

Sydney Airport serves as a gateway through which over 45 percent of all international visitors to Australia entered and departed the country in 1995. The good air services in terms of frequency and range of destinations mean that Sydney is a popular arrival and departure point for visitors. Sydney is also a major financial and business centre and this explains why 60 percent of all arrivals by business passengers to Australia are through Sydney. The city may well be seen as a major reason for visiting the country even if it is as part of a tour which includes visits to a number of other states and territories. In 1995, 67 percent of all international visitors spent some time in Sydney as part of their stay (Bureau of Tourism Research, 1995). Only Queensland attracted a similar proportion of visitors (65 percent) but with a spread across a number of locations in the state, notably the Gold Coast and Great Barrier Reef (Bureau of Tourism Research, 1996).

Once in Australia visitors on average spend time in two States or Territories during their stay, with 68 percent travelling by aircraft within the country (Bureau of Tourism Research, 1996). Sydney Airport's significance continues after visitors arrive by facilitating movement around the country and spreading the economic benefits beyond New South Wales.

In terms of the amount of time visitors spend in Australia, a large proportion is spent in Sydney and New South Wales. Thirty percent of the total number of international visitor nights for Australia are spent in Sydney, whilst 39 percent are spent in New South Wales. By comparison, international visitors spend only 21 percent of total visitor nights in Queensland followed by 16 percent in Victoria (Bureau of Tourism Research, 1996). Total visitor expenditure in Australia in 1996 was \$7.0 billion (Bureau of Tourism Research, 1996), of which \$3.7 billion or 52 percent was spent in New South Wales and \$1.4 billion or 20 percent in Sydney (Tourism New South Wales, 1997). These statistics suggest that Sydney is more than a gateway, it is a major attraction in its own right to both tourist and business visitors.

Clearly Sydney and New South Wales are popular from a tourism and business perspective because these are the places favoured by most visitors. As a business centre a substantial amount of the country's economic and financial activity is conducted in Sydney. Whilst as a tourist centre Sydney and its surrounding region will continue to offer a great deal to the visitor, Sydney Airport has clearly played a key role in facilitating and enabling this growth. Any possible future constraints to the development of airport capacity in the Sydney basin will affect this role.

4.2.2 INTERNATIONAL TRADE

Sydney Airport plays a crucial role in Australia's international trade. The airport is a major provider of air freight services carrying 36 percent or \$5.8 billion of the country's air freighted exports and a considerable 60 percent or \$13.5 billion of imports. Whilst air freight through Sydney accounts for only 0.3 percent by weight of all of the nation's visible exports, it accounts for 8 percent by value (Australian Bureau of Statistics, 1997).

In terms of the value of visible imports 17 percent by value passes through Sydney Airport (Australian Bureau of Statistics, 1997). The high proportion of business passengers passing through Sydney Airport contributes to the level of invisible export earnings. Earnings from service related exports reached \$22 billion (*Australian Bureau of Statistics, 1996a*) much of which was enabled with business travel through Sydney Airport. Tourism export earnings for the nation in 1996 were \$16 billion representing 14 percent of the credits on the current account (Bureau of Tourism Research, 1997). Eight billion dollars is facilitated through Sydney Airport showing the importance of Sydney in this business. Any changes made at Sydney Airport could have impacts on the balance of trade. To this extent the development of Sydney Airport and airports within the Sydney basin could have consequences for the structure of the nation's trade balance.

Air freight is likely to grow in significance. Recent research has identified Australia as a major producer of high value added production known as Elaborately Transformed Manufactures (ETMs) (Victoria University of Technology, 1995). Examples of these products include electronics, pharmaceuticals and high quality processed foods. ETMs are forecast to experience rapid growth over the coming decade as markets in Asia expand. They rely heavily on air freight for transport as they are high value items.

4.2.3 PASSENGERS AND FREIGHT

The airport plays a major role in moving about a third of all domestic and international passengers in the country followed by Melbourne accounting for some 22 percent and Brisbane 7 percent (Bureau of Transport and Communications Economics, 1995b). In terms of total international passengers Sydney Airport accounts for around 46 percent.

Sydney Airport's importance is further strengthened when its role as a provider of air freight services is considered. A total of 45 percent of the country's air freight by tonnage is handled through Sydney Airport amounting to some 384,000 tonnes in 1996. Sydney handles a sizeable 53

percent by weight of Australia's international air cargo and 29 percent of domestic air cargo (Department of Transport and Regional Development, 1997).

4.2.4 EMPLOYMENT AT SYDNEY AIRPORT

Estimates of the number of people employed as a result of Sydney Airport activities vary considerably depending on the employment, activity and geographic definitions used. Employment may be defined to include only those directly employed in airport activities or to also include those employed indirectly (employment induced by production or consumption of the direct employment). A narrow activity definition only includes employment in firms which are classified as operating in the 'Air and Space Transport' industry, while a wider definition would include people working in other industries but producing goods or services for the airport, for example, catering, road transport and accommodation. Finally, those employed may be defined by reference to some geographical boundary, for example, on the airport site, or in the vicinity of the airport, or in Sydney.

The regional economic modelling of the effects of the Second Sydney Airport took a relatively narrow definition of the employment at Sydney Airport, in part, because of the use of Australian Bureau of Statistics input/output tables as the basis for the modelling. It estimated that there was direct employment of 17,370 at Sydney Airport, and a further 24,600 in indirect employment.

There have been two recent studies (Institute of Transport Studies 1993 and 1996) measuring the level of direct and indirect employment as a result of activity at Sydney Airport. The 1993 study concluded that the level of direct employment was 29,691 in 1992/93 whilst the 1996 study estimated the level of employment had risen to 33,509 in 1995 (see *Table 4.1*). Direct and indirect employment was estimated at about 66,000 people in 1995, or five percent of Sydney's total employment.

TABLE 4.1 EMPLOYMENT AT SYDNEY AIRPORT BY MAIN CATEGORY (1996)

Employment Category	Jobs
Major Airlines	21,769
General Aviation	832
Airport Government Services (Quarantine, Customs, Immigration)	1,760
Airline Support Services (Fuel, catering)	1,652
Airport Concessions and Duty Free	1,366
Transport and Taxis	1,383
Accommodation	752
Freight Forwarder and Customers Agent	3,992
Total	33,509

Source: Institute of Transport Studies 1996

The Institute of Transport Studies estimate was based on a survey of 500 businesses covering 97 percent of the categories of business activity. The survey covered a range of industries and, not surprisingly, resulted in an estimate of the level of direct employment in excess of that found for the 'Air and Space Transport' industry in the Australian Bureau of Statistics input/output tables. A further reason for the difference in employment estimates was the geographical definition of the Sydney Airport Region. The Institute of Transport Studies used 13 local government areas (Ashfield, Bankstown, Botany, Canterbury, Drummoyne, Hurstville, Kogarah, Leichhardt, Marrickville, Randwick, Rockdale, South Sydney and Sutherland), while Corporate Economics Australia used only three (Botany, South Sydney and Rockdale).

Employment as a result of activity at Sydney Airport could be regarded as more significant if the effect of tourism activity on employment is also considered. Tourism in New South Wales employs approximately 174,000 people and whilst it takes 177 domestic trips to create one tourism job only 18 international visitors (Tourism New South Wales, 1997) are needed to do the same. The airport enables much of this employment to occur with many of these jobs in non metropolitan and country areas of the state.

4.2.5 AIRPORT CONGESTION

Sydney Airport currently handles about 236,000 (1995/96) aircraft movements per year which is over 100,000 more than Australia's next busiest airport, Melbourne. Handling this level of traffic, it is not surprising that Sydney Airport experiences congestion. Congestion delays at Sydney Airport are a significant problem and are far greater than at any other airport in Australia.

Data recorded by Airservices Australia measures the difference between scheduled and actual arrival and departure times and hence any delay. The data does not identify the causes of delays which means that it is not possible to differentiate between delays caused by airport congestion and other causes. Congestion delays are themselves difficult to identify as one congestion delayed aircraft can result in further delays to its onward movements and impact on the arrival and departure times of other aircraft. Recent research concluded that the length of delays at certain times at Sydney Airport were double those occurring at other airports around the country (Bureau of Transport and Communications Economics, 1995b). Whilst average delays for Sydney Airport were within an acceptable industry standard, peak delays were particularly significant. Anecdotal evidence from Qantas and Ansett suggests that a significant proportion of the delays were caused by air traffic control, in effect congestion, as opposed to mechanical or weather problems.

Congestion is important because it imposes costs on air travellers and airline operators. Valuing these costs is problematic. The impact on air travellers is often measured using a standard value of time. Alternatively a higher value could be used because of the inconvenience to leisure travellers and disruption to working patterns for business travellers. In terms of airline costs little work has been undertaken on the marginal costs associated with airline operations and the incremental costs of keeping aeroplanes in the air for an

additional 30 minutes or so over the original scheduled time. The major costs will be fuel, crew costs, aircraft maintenance, reduced aircraft utilisation and a potential loss of customer goodwill owing to the perception that delays are caused by the carrier and not from congestion. External costs on social groups living near an airport may include additional noise and air pollution. Overall, the costs of congestion could be considerable imposing both resource costs on airlines and costs to individuals (through lost time and productivity) and external costs on airport neighbours.

4.3 AIRPORT REGIONS

As part of the regional economic modelling, Corporate Economics Australia defined three airport regions to examine employment and expenditure impacts of a Second Sydney Airport. As noted above, the Sydney Airport Region comprised the three local government areas of Botany, South Sydney and Rockdale.

The regions containing the proposed Second Sydney Airport options were as follows:

- Badgerys Creek: Penrith, Blacktown, Fairfield, Liverpool, Camden, Campbelltown and Wollondilly; and
- Holsworthy: Campbelltown, Camden, Liverpool, Bankstown, Sutherland and Wollondilly.

There is a significant overlap of the Badgerys Creek and Holsworthy regions which should be borne in mind when interpreting the regional employment and turnover data below.

Before the early 1970s the western Sydney region around Badgerys Creek and Holsworthy remained relatively undeveloped. Few people lived in the area and people travelled to employment centres outside of the region to work. As the region developed and population increased in the 1970s, it began to develop a greater level of regional self sufficiency in employment, although a large proportion of the workforce continued to travel outside the region for employment.

4.3.1 EMPLOYMENT BY INDUSTRY

The current industry and employment composition of the regions formed the basis of the regional economic modelling (see *Appendix A*). The ten most significant industries are listed in *Table 4.2* by region and for Australia as a whole. The Badgerys Creek and Holsworthy regions are similar to the country as a whole. The Sydney Airport region has more employment in its top ten industries and a very different industrial composition, reflecting existing airport activity.

TABLE 4.2 TOP TEN INDUSTRIES BY EMPLOYMENT BY REGION IN 1996 (PERCENT - SHARE OF TOTAL)

Industries	Holsworthy	Badgerys Creek	Sydney Airport	Australia
Retail Trade	13.6	13.5	5.8	11.1
Wholesale Trade	8.4	8.0	11.0	7.5
Other Construction	5.8	7.1	-	6.7
Education	5.6	6.6	4.9	6.4
Health Services	5.1	5.2	5.6	5.4
Road Transport	3.2	3.7	4.5	4.6
Accommodation, Cafes and Restaurants	3.1	3.0	4.0	4.0
Government Administration	3.0	2.7	2.9	2.8
Other Business Services	2.5	2.5	-	2.7
Other Electrical Equipment	2.4	2.3	-	2.2
Air and Space Transport	-	-	8.6	-
Defence	-	-	7.1	-
Services to Transport/Storage	-	-	3.6	-
Total Regional Employment	52.7	54.6	58.0	53.4
Total Regional Employment (Numbers)	214,439	241,012	188,689	7,193,424

Source: Corporate Economics Australia 1997 (Appendix A).

Note: '-' Indicates not in top ten.

A comparison between the industry types for the Holsworthy, Badgerys Creek and Sydney Airport regions emphasises the similarities and the differences between them. A number of employment categories remain consistent across the regions as well as being representative of Australia as a whole. These include 'Health Services', 'Accommodation, Cafes and Restaurants' and 'Government Administration'.

However, in a number of significant respects the Sydney Airport employment profile is different from Badgerys Creek and Holsworthy. There are three industries which together make up almost 20 percent of Sydney Airport employment ('Air and Space Transport', 'Defence' and 'Services to Transport/Storage') but which currently do not appear in the top ten industries of either of the other two regions. The selected site for the Second Sydney Airport will result in the industry and employment composition of that region moving towards that of the Sydney Airport region.

4.3.2 TURNOVER BY INDUSTRY

The Corporate Economics Australia model gives an estimate of the expenditure flows in the three regions concerned and the levels of total financial turnover. Turnover is the total amount of money that passes through a business including profit, wages, running costs and costs of buying goods and services to sell. Table 4.3 shows the top ten industries by turnover in the three regions and for Australia as a whole.

TABLE 4.3 TOP TEN INDUSTRIES BY TURNOVER BY REGION IN 1996 (PERCENT SHARE OF TOTAL)

Industries	Holsworthy	Badgerys Creek	Sydney Airport	Australia
Ownership of Dwellings	7.5	8.4	3.2	6.5
Wholesale Trade	5.9	5.7	7.2	5.5
Retail Trade	5.7	5.8	2.3	4.8
Residential Building	3.9	4.3	-	2.8
Other Construction	3.7	4.6	-	3.6
Petroleum and coal products	3.6	-	-	-
Coal, Oil and Gas	3.1	2.8	-	-
Other Electrical Equipment	2.9	-	-	-
Health Services	2.9	3.0	3.0	3.9
Road Transport	2.6	3.1	3.4	-
Education	-	3.0	-	2.9
Basic Non Ferrous Metals	-	2.7	-	-
Air and Space Transport	-	-	18.9	-
Defence	-	-	6.1	-
Service to Transport/Storage	-	-	4.1	-
Communication	-	-	3.0	2.7
Government Administration	-	-	2.2	3.8
Legal, Accounting, Marketing	-	-	-	2.9
Share of Total Turnover Percent	41.8	43.4	53.4	39.4

Source: Corporate Economics Australia 1997 (Appendix A).

Note: - indicates not in top ten.

The top ten account for around 40 percent of the total industry turnover in Badgerys Creek, Holsworthy and Australia; the profiles of industry turnover are also similar, although they are not as close as the employment profiles. The three industry categories 'Ownership of Dwellings', 'Wholesale Trade' and 'Retail Trade' are the top three industries and this reflects the residential

nature of these regions. The share of turnover for these industries in Badgerys Creek and Holsworthy is higher than for Australia as a whole.

Comparison between Badgerys Creek and Holsworthy indicates that eight of the top ten industries are the same. 'Petroleum and Coal Products' and 'Other Electrical Equipment' do not rank in Badgerys Creek, and are replaced by 'Education' and 'Basic Non Ferrous Metals'. Badgerys Creek also has a slightly higher concentration of turnover in its top ten industries than Holsworthy (43.4 percent compared to 41.8 percent). Both Badgerys Creek and Holsworthy have a higher concentration than Australia, but a significantly lower concentration than the Sydney Airport region.

For the Sydney Airport region the main industries by turnover are different from the other regions and the nation as a whole, again reflecting the different industry structure resulting from the airport's dominant role. The three main industries by turnover are 'Air and Space Transport', 'Wholesale Trade' and 'Defence'. Together, these three industries accounted for around 32 percent of the Sydney Airport region's industry turnover and 27 percent of its total employment. 'Air and Space Transport' is the largest industry by turnover at nearly three times the size of the next largest, 'Wholesale Trade'.

Part C

Assessment of Impacts

5

COSTING ANALYSIS**5.1 OVERVIEW OF DATA INPUTS**

The method relating to the estimation of resource impacts was outlined in *Chapter 3* and in this chapter the impacts are enumerated following assessments provided by the engineers and planners. Five airport options are considered. The main resource cost impacts both in terms of those specific to each option and those common to all options are detailed. For each option we assumed that the Second Sydney Airport was developed to the master plan capacity of 30 million passengers per annum. All cost estimates are in 1997 prices unless otherwise noted.

5.2 BADGERYS CREEK AIRPORT OPTIONS

The three options covered for Badgerys Creek are the original 1985 master plan proposal (Option A), the expansion of the original proposal (Option B), and the North/South alignment proposal (Option C). Each proposal has been separately costed and the benefits and costs relating to each option included. The options themselves are described in detail in *Technical Paper No.3*.

5.2.1 CAPITAL COSTS

A full listing of the capital costs can be found in the Summary Report: Second Sydney Airport (Second Sydney Airport Planners, 1997). The capital costs include on-site costs incurred during the construction period only. *Table 5.1* outlines the costs broken down by nine main cost categories. The ranges quoted here and elsewhere follow the assumed level of accuracy for the cost estimates of approximately minus 20 percent and plus 10 percent.

Badgerys Creek Options B and C have higher costs than Option A because they cover a larger area and include an additional runway. Options B and C include a 2,500 metre long cross wind runway and include a greater distance between the parallel runways for future building and facilities development, which increases the pavement area required and the land area needed for the airport. The additional runway also increases airfield lighting costs in both Options B and C.

TABLE 5.1 TOTAL AIRPORT CONSTRUCTION COST ESTIMATES - MASTER PLAN ON-SITE AIRPORT DEVELOPMENT - BADGERYS CREEK (\$'S MILLION)¹

Capital Cost Item	Option		
	A	B	C
<i>Airport Development²</i>			
Project Development	295	310	320
Site Preparation	55	55	55
Construction Facilities and Preliminaries	20	20	20
Site Development	520	685	595
Site Services	150	150	150
Aircraft Pavements	560	750	745
Airfield Lighting	45	60	60
Buildings, Structures, Road	1,660	1,600	1,595
Contingency	340	410	390
Total Airport Development³	2,915-4,010	3,230-4,445	3,145-4,325
Air Services Australia Facilities	40-55	40-55	40-55
Land Acquisition	0	205-280	190-265
UXO Clearance	0	0	0
Transmission Line Relocation	25	25	25
Total Airport Construction Costs	2,980-4,090	3,500-4,805	3,400-4,670

- Notes:
1. All costs rounded to nearest \$5 million.
 2. Airport development costs are for complete master plan development. It is likely, however, that the costs would be expended in stages. Costs do not include the cost of commercial/support facilities that would be developed by the airlines and other airport tenants.
 3. Source is Second Sydney Airport Planners, 1997. Range of costs due to assumed range of accuracy of approximately minus 20 percent and plus 10 percent.

5.2.2 REGIONAL INFRASTRUCTURE COSTS

Regional infrastructure includes road and rail links plus water and other communications connections between airport site options and the main trunk infrastructure. Because the Badgerys Creek sites are all relatively close together, for planning purposes separate estimates of the level of regional infrastructure needed were not necessary and assumed to be the same for each of the three site options.

Road upgrades to the airport site include Elizabeth Drive, Bringelly Road and The Northern Road. Whilst the exact level of road capacity needed has been specified during the transport modelling task (*Technical Paper No. 13*), these are the main roads requiring improvement in order to provide sufficient highway capacity and access to each of the three options. Rail access is provided to each of the three options by way of a rail line heading west from around Glenfield on the main southern line as far Bringelly before heading north to Badgerys Creek and any of the three airport options. A range of costs for a dual track rail line are included common to all three options depending on the route selected (see *Table 5.2*).

TABLE 5.2 REGIONAL INFRASTRUCTURE COSTS (ROAD AND RAIL) - BADGERYS CREEK (\$'S MILLION)¹

Infrastructure Item	Options A, B, C
<i>Roads</i>	
Elizabeth Drive	110
Bringelly Road	110
The Northern Road	120
Road Upgrading ²	130
Road Total	470
<i>Rail</i>	
Dual Track Railway Line ³	345-400
Total Access Costs	815-870

- Notes:
1. Source is Second Sydney Airport Planners, 1997.
 2. Related road improvements provided by DTRD.
 3. Costs of rail line to Badgerys Creek airport options vary depending on the route selected. Rail costs do not include any network improvements or rolling stock that may be required.

Other regional infrastructure required is associated with water, wastewater, electricity, aviation fuel, natural gas and telecommunications. The costing includes the provision of services to Badgerys Creek as identified by the utility authorities as the most efficient access routes to the airport options (see *Table 5.3*). The costings are based on minimising the cost of construction whilst providing sufficient capacity for the forecast airport demand.

TABLE 5.3 REGIONAL INFRASTRUCTURE COSTS (SERVICES) - BADGERYS CREEK (\$'S MILLION)¹

Infrastructure Item	Options A, B and C
Water	40
Wastewater (on-site treatment) ²	30
Electricity	30
Telecommunications	15
Aviation Fuel Pipeline	25
Natural Gas Pipeline	6
Total Services Costs	146

- Notes:
1. Source is Second Sydney Airport Planners 1997.
 2. An additional \$45m was estimated for wastewater treatment off-site, which is not included here.

The total regional infrastructure costs for each of the three Badgerys Creek options ranges from \$961 to \$1,016 million. These figures are additional to the estimates for the on-site construction and related work in *Table 5.1* above.

5.2.3 AGRICULTURAL IMPACT

All three Badgerys Creek site options are currently used for agricultural production. The types of farming activities taking place include the intensive grazing of beef cattle and agisted horses, the semi intensive grazing of dairy cattle, the training and spelling of trotting horses, and intensive poultry production, vegetable cropping and fruit production. This agricultural activity would be lost from any of the sites if selected whilst also impacting on other land zoned for airport related development. Following the 1985 EIS, land has been purchased by the Commonwealth Government but then leased back to agricultural producers, suggesting that any disruption to farmers has already been factored into expectations. *Table 5.4* below details the proportion of agricultural land in each Badgerys Creek airport option.

TABLE 5.4 AGRICULTURAL AREA COVERED BY THE BADGERYS CREEK AIRPORT OPTIONS (HECTARES)¹

	A	B	C
Total Land Area ²	1,706	2,902	2,838
Agricultural Area	1,526	2,444	2,222
Percentage Agriculture	89%	84%	78%

Notes: 1. Source is *Technical Paper No. 8*.
2. Agricultural area includes rural small holdings.

The financial value of the agricultural production for each of the sites was estimated with the assistance of a specially conducted survey. The results are outlined in *Table 5.5*.

TABLE 5.5 ANNUAL VALUE OF AGRICULTURAL PRODUCTION (\$000'S)¹

	A	B	C
Annual production value	615	2,303	1,656

Notes: 1. Source is *Technical Paper No. 8*.

Despite the size of the potential economic loss attributable to each of the three sites the likely impact is that the agricultural enterprises currently operating in these areas would either disappear or be relocated over the period of construction. *Table 5.6* details the estimated value of annual agricultural production directly affected (that is, within the runway boundaries) for each Badgerys Creek option. Option A covers the smallest agricultural land area and so has the least impact on agricultural production.

TABLE 5.6 ANNUAL VALUE OF AGRICULTURAL PRODUCTION AFFECTED (\$000'S) - BADGERYS CREEK¹

	A	B	C
Annual Production Value		1,900	1,100

Notes: 1. Source is *Technical Paper No. 8*.

The lost agricultural production in Badgerys Creek would result in other farm producers increasing their production to meet any shortfall in supply. To this extent there is likely to be no net economic loss in agricultural production from the selection of any of the Badgerys Creek sites as it would be re-distributed amongst existing producers. The economic cost which would be incurred is the transitional cost associated with moving farms and the associated compensation to on going businesses. Costs associated with land purchase are included elsewhere, but no estimates of compensation over and above this are included in the Costing Analysis.

5.2.4 STERILISATION OF MINERAL RESOURCES

The coal reserves identified at the Badgerys Creek site are of a relatively poor quality. Added to this the deposit is too deep and the seams are of a thickness which make it unlikely that it is economic to mine within the next twenty years. Because of this the sterilisation of all or part of this mineral deposit of medium ash thermal coking coal would not have a significant impact. *Table 5.7* outlines the estimated deposits at each of the three sites.

TABLE 5.7 POTENTIAL BADGERYS CREEK COAL DEPOSITS (MILLION TONNES)

	A	B	C
Sterilisation of mineral resources	57-63	64-84	63-84

5.2.5 NOISE IMPACT COSTS - BADGERYS CREEK

Three costings were available in terms of quantifying the possible impacts from noise caused by the proposed airport options. *Table 5.8* below covers the cost items. The first was voluntary acquisition of residential properties affected by more than 35 ANEC. Because the sales would be voluntary a cost range is included to cover varying take up rates. The second was acoustical treatment of properties which fall within the 25 to 35 ANEC contour with treatment following the Australian Standard 2021 and the 30 to 35 ANEC cost separately identified. As some interpretation of this standard would be required to fully identify the cost implications, a cost range is included for acoustical treatment. Finally an estimate has been made of the likely loss in property value caused by the impact of airport noise on properties within the 20 ANEC contour. The calculation is more fully detailed in *Technical Paper No. 3* and is based on previous studies of airport noise impacts on property values. The number of current and future residential and commercial properties were estimated for areas around the airport options and then valued with and without the impact of noise. The values are in 1996 price levels.

TABLE 5.8 NOISE IMPACT AND MANAGEMENT COSTS - BADGERYS CREEK¹ (\$'S MILLION)

	Option		
	A	B	C
Residential Property Acquisition ²	6-11	0	12-27
Acoustical Treatment 25 to 35 ANEC ⁵	12-19	7-9	6-12
Acoustical Treatment 30 to 35 ANEC ⁵	3	1-3	2-5
Direct Property Devaluation ³	49-67	52-60	25-31
Total Available Noise Impact and Management Costs⁴	67-97	59-69	43-70

- Notes:
1. Source is *Technical Paper No.3*.
 2. Calculated on acquisition of residential properties affected by more than 35 ANEC.
 3. Property prices calculated by examining average sale prices and adding a 20 percent contingency. Actual costs may vary significantly due to large variation in the value of properties that occur around the airport sites. Net total property devaluation by 2016 in 1996 prices using 1996 property values.
 4. Range of costs due to the range of noise impacts created by the different assumptions about how the airport may operate.
 5. Acoustical insulation assumed for all residential properties within ANEC contour. Average cost of insulation assumed to be \$50,000 per dwelling. Range of costs due to the range of noise impacts created by different assumptions about how the airport may operate. Acoustical treatment 30-35 ANEC included as part of 25-35 ANEC.

5.2.6 RELOCATION OF DEFENCE

There is some uncertainty about whether the Defence facilities at Orchard Hills could co-exist with an airport at Badgerys Creek. The most likely outcome at this stage is that they could remain if Options A or B proceeded but not if Option C does. No estimate of the cost of relocating the Defence facilities at Orchard Hills is currently available.

5.3 HOLSWORTHY AIRPORT OPTIONS

The Holsworthy site was considered in the 1985 EIS although in this assessment two new options have been developed. Option A is the Holsworthy northern option covering 4,200 hectares whilst Option B is the southern option covering 2,500 hectares.

5.3.1 CAPITAL COSTS

Similar cost breakdowns are shown in *Table 5.9* below for Holsworthy Options A and B as for Badgerys Creek. Of particular note are the large Site Development costs to clear land at both Options A and B which largely explain the cost differences between the Holsworthy and Badgerys Creek sites. Construction cost estimates include all costs incurred during the construction period; they vary between options and also between sites. The

ranges quoted here and elsewhere follow the assumed level of accuracy for the cost estimates of approximately minus 20 percent and plus 10 percent (Second Sydney Airport Planners, 1997).

TABLE 5.9 TOTAL AIRPORT CONSTRUCTION COST ESTIMATES - MASTERPLAN ON-SITE AIRPORT DEVELOPMENT - HOLSWORTHY (\$'S MILLION) ¹

Capital Cost Item	Option A	Option B
Airport Development²		
Project Development	390	415
Site Preparation	55	75
Construction Facilities and Preliminaries	30	30
Site Development	1,840	1,585
Site Services	155	160
Aircraft Pavements	710	715
Airfield Lighting	60	60
Buildings, Structures, Road	1,655	1,730
Contingency	630	610
Total Airport Development³	4,420-6,080	4,305-5,920
Air Services Australia Facilities	40-55	40-55
Land Acquisition	0	0
UXO Clearance	31-42	33-39
Transmission Line Relocation	0	0
Total Airport Construction Costs³	4,491-6,177	4,378-6,014

- Notes:
1. All costs rounded in nearest \$5 million.
 2. Airport development costs are for complete master plan development. It is likely, however, that the costs would be expended in stages. Costs do not include the cost of commercial/support facilities that would be developed by the airlines and other airport tenants.
 3. Source is Second Sydney Airport Planners, 1997. Range of costs due to assumed range of accuracy of approximately minus 20 percent and approximately plus 10 percent.

5.3.2 REGIONAL INFRASTRUCTURE COSTS

Regional infrastructure for the Holsworthy sites is separately estimated for the north and south options. Furthermore there are a number of combinations of road links and rail alignments available to offer the maximum access opportunities.

Road access options to the Holsworthy north (Option A) site include access from the M5 Motorway to the north (via Moorebank Ave, Road Alternative 1), two possible links from the South Western Freeway (Road Alternatives 2 and 4) to the west and a link from Heathcote Road to the east (Road Alternative 3). All road costs for Holsworthy Options A and B are detailed in Table 5.10.

Rail access for the Option A site could be provided by a branch line from the East Hills line, from a junction between Holsworthy and Glenfield stations. The railway would follow a similar alignment to the northern road access.

Three possible road access links have been proposed for Option B. The road capacities and alignments were examined separately by a traffic study (*Technical Paper No. 13*). Costs for all road alternatives have been included producing a range of estimated costs of road access. Road Alternative 5 is the route to the M5 in the north following the same alignment as Option A, Road Alternative 1. The western access route (Road Alternative 6) would link with the South Western Freeway at Menangle Park. The access road linking with Heathcote Road (Road Alternative 7) follows the Old Illawarra Road along the Military Reserve boundary and intersects with Heathcote Road at Lucas Heights.

There are two options for rail access (Rail Alternatives 1 and 2) to Holsworthy south. Rail Alternative 1, which is included in Holsworthy Option B, would follow the road route for Holsworthy Option A turning off the East Hills Line south of Holsworthy station. The alternative option involves a spur line off the Main South line, south of Macarthur station, approaching the airport from the west. The costs for construction of the rail link are high because it will have to cross difficult terrain.

TABLE 5.10 REGIONAL INFRASTRUCTURE COSTS (ROAD AND RAIL) - HOLSWORTHY (\$'S MILLION)¹

Infrastructure Item	Option A	Option B
<i>Roads</i>		
Road Alternative 1	135	
Road Alternative 2	170	
Road Alternative 3	190	
Road Alternative 4	230	
Road Alternative 5		165
Road Alternative 6		350
Road Alternative 7		85
Road Upgrading ⁴	0-90	10-60
Road Total²	230-395	360-575
<i>Rail³</i>	140-260	180-430
Total Access Costs	370-655	540-1,005

- Notes:
1. Source is Second Sydney Airport Planners (1997).
 2. Costs of roads to Holsworthy airport options vary depending on the access alternative selected.
 3. Costs of rail line to Holsworthy airport options vary depending on the route selected and whether a single or dual track is constructed. Rail costs do not include any network improvements or rolling stock that may be required.
 4. Road related improvements provided by DTRD.

The regional services infrastructure required includes water, wastewater, electricity, aviation fuel, natural gas and telecommunications. The costing includes the provision of services to both Holsworthy options as identified by the utility authorities as the most efficient access routes and full detail is provided elsewhere (Second Sydney Airport Planners, 1997). The costings are based on minimising the cost of construction whilst service capacity meets forecast airport demand. Table 5.11 below details services costs.

TABLE 5.11 REGIONAL INFRASTRUCTURE COSTS (SERVICES) - HOLSWORTHY (\$'S MILLION)¹

Infrastructure Item	Option A	Option B
Water	35	20
Wastewater (on-site treatment) ²	30	45
Power	20	40
Telecommunications	15	15
Aviation	35	50
Natural Gas	15	10
Services Total	150	180

- Notes: 1. Source is Second Sydney Airport Planners, 1997.
2. An additional \$45m was estimated for wastewater treatment off-site, which is not included here.

The costs outlined in *Table 5.11* represent the direct connection costs to existing services, however, a facility as large as an airport will represent a considerable increase in demand on existing infrastructure capacity. Consequently upgrades of existing downstream infrastructure are likely to be needed and these costs which would be borne by the airport facility were not estimated and so are not included.

The range of total regional and service infrastructure costs for each of the two Holsworthy options is \$520-\$805 million for Option A and \$720-\$1,185 million for Option B. This figure is additional to the estimates for construction and related work in *Table 5.9* above.

5.3.3 AGRICULTURAL IMPACT

The Holsworthy option has no direct agricultural impact as there is no agricultural activity on the site.

5.3.4 NOISE IMPACT COSTS - HOLSWORTHY

Similar to Badgerys Creek, three costings were estimated for the Holsworthy options in terms of quantifying possible impacts from noise caused by the proposed airport. *Table 5.12* below shows the cost items. While there is very little property acquisition required, total noise impact and management costs for Holsworthy are significantly greater than Badgerys Creek. The majority of the cost arises from the expected decline in property values.

TABLE 5.12 NOISE IMPACT AND MANAGEMENT COSTS - HOLSWORTHY (\$'S MILLION) ¹

	Option A	Option B
Residential Property Acquisition ²	0	0-2
Acoustical Treatment 25 to 35 ANEC ⁶	7-12	26-91
Acoustical Treatment 30 to 35 ANEC ⁷	0	2-14
Direct Property Devaluation ^{3 and 5}	108-121	122-149
Total Available Noise Impact and Management Costs⁴	115-133	148-242

- Notes:
1. Source is *Technical Paper No.3*.
 2. Calculated on acquisition of residential properties affected by more than 35 ANEC.
 3. Property prices calculated by examining average sale prices and adding a 20 percent contingency. Actual costs may vary significantly due to large variation in the value of properties that occur around the airport sites. Net total property devaluation by 2016 in 1996 prices using 1996 property values.
 4. Range of costs due to the range of noise impacts created by the different assumptions about how the airport may operate.
 5. Acoustical insulation assumed for all residential properties within ANEC contour. Average cost of insulation assumed to be \$50,000 per dwelling. Range of costs due to the range of noise impacts created by different assumptions about how the airport may operate. Acoustical treatment 30-35 ANEC included as part of 25-35 ANEC.

5.3.5 STERILISATION OF MINERAL RESOURCES

Mineral reserves in the form of coal at Holsworthy are considerable. The reserves are high quality and have the potential to be sold on the domestic and export coking coal market (*Technical Paper No. 8*). There is also a small proportion of lower value reserves that could potentially be sold as export or domestic thermal coal.

Holsworthy Option B overlies approximately 30 percent of the existing West Cliff Colliery lease area. According to the Department of Mineral Resources, sterilisation of part of the resources within this existing lease could jeopardise the viability of this operation in the long term. Holsworthy Option A has a significant impact in terms of limiting the expansion of an existing mining operation. Both Holsworthy options involve sterilisation of significant amounts of high quality coal.

TABLE 5.13 POTENTIAL HOLSWORTHY COAL RESOURCES (MILLION TONNES) ¹

	Option A	Option B
Runway Boundaries	66	76
Total	110	96

- Notes: 1. Source is *Technical Paper No. 8*.

The coal deposits beneath the Holsworthy options are of strategic significance as hard coking coal for Port Kembla steelworks as well as blast furnace feedstock for other facilities. The Southern Coalfield which includes

the Holsworthy site supplies 80 percent of the nation's blast furnace feedstock.

The NSW Department of Mineral Resources in *1996 Coal Industry Profile*, estimates the export price of coal to be between \$40 and \$60 per tonne in 1994-95 depending on the destination country, quantity and quality of the coal. Assuming a rate of \$50 per tonne then the development of Holsworthy north (Option A) would result in the potential sterilisation of approximately \$5.5 billion dollars of coal resources if 110 million tonnes were made inaccessible. Within the airport boundaries, however, the value of sterilised minerals could be between \$3.3 and \$3.8 billion for Holsworthy Options A and B. These estimates are for guidance only but help to give an idea of the economic value. No attempt has been made to estimate the costs of extracting the coal.

There is considerable uncertainty over the price of coal in the future, the true extent of reserves and whether mining of the reserves would be environmentally permissible or commercially attractive. In any event, no coal would be likely to be mined for a further 20 years.

5.3.6 RELOCATION OF DEFENCE

Holsworthy Military Area is a defence training area with a large accommodation and storage facility to the north. The relocation of this facility would require a one-off cost of between \$150 to \$450 million, and increased operating costs of between \$3 to \$5 million per annum.

5.4 AIRPORT OPERATING COSTS

Airport operating costs have been estimated and are common for the Badgerys Creek and Holsworthy site options. Operating expenses for a Second Sydney Airport are based on airport operating costs for the Federal Airports Corporation group airports over the last three years. The costs do not include airline operating expenses at the airport. Operating costs include five components as shown in *Table 5.14*. The costs do not include depreciation or interest. In 2006 operating costs are estimated at \$19.1 million per annum and increase to \$79.1 million per annum in 2016.

TABLE 5.14 AIRPORT OPERATING COSTS (\$000'S) PER ANNUM¹

Cost Item	2006		2016	
Salaries, Wages and On-Costs	48%	9,100	44%	35,100
Cost of Sales	8%	1,600	9%	7,200
Property Maintenance	19%	3,700	20%	16,100
General Administration	16%	3,100	17%	13,600
Services and Utilities	8%	1,600	9%	7,100
Total Operating Costs for a Second Sydney Airport	100%	19,100	100%	79,100

Notes: 1. Source is Second Sydney Airport Planners, 1997, separate fax communication.

5.5 AIRLINE OPERATING COSTS

Airline operating costs related to flying time are unlikely to vary between each of the five airport options. Even if total airline operating costs are greater than those for Sydney Airport, which is unlikely, they will not vary significantly between Badgerys Creek and Holsworthy options. The variations in flight distance between any of the Second Airport options and Sydney Airport will be small for a domestic flight and insignificant on an international flight.

Two other aspects of airline operating costs may vary as a result of a Second Sydney Airport. Costs are likely to be higher for individual airlines if operations are split between two airports in Sydney rather than the present one, because of reduced opportunities for economies of scale. Passenger and freight operations are likely to be affected. Whether split operations occur depends on how the Second Sydney Airport develops. Chapter 7 of the Draft EIS contains a discussion of potential development scenarios. Secondly, taxiing costs for airlines represent a significant proportion of operating costs. These are likely to vary between the five options as some runway master plans involve greater average taxiing distances than others. In spite of these potential differences, the actual cost differences between the options have not been estimated as this would require a large amount of detailed operational modelling, which is beyond the scope of the EIS.

5.6 LAND TRANSPORT ACCESS COSTS

The traffic modelling undertaken for the EIS did not produce estimates of the costs of road and rail services to access the airport options (*Technical Paper No. 13*). The modelling was aimed at estimating the minimum road infrastructure requirements required to maintain levels of service with the proposed airport options. It is the costs of these minimum levels of service which are included in the Cost Analysis (see *Tables 5.2 and 5.10*).

The traffic modelling did not evaluate the economic worth of specific road and rail options to service the proposed airport options. An evaluation would have required a completely different approach to the modelling than that which was undertaken; it would have been the costs of using and operating the system that were minimised rather than the costs (levels of service) being maintained at the same or similar levels. An evaluation would also have required the specification of a Base Case (ie no Second Sydney Airport) for road and rail infrastructure and demand in the forecast years; the development of such information would have required considerable resources and would not have been able to be used to much effect. As noted in *Section 3.2*, a Base Case could not be specified for the operation of Sydney Airport.

The traffic modelling produced estimates of travel times and distances for each of the airport options and road/rail alternatives in 2006 and 2016. Because the modelling was aimed at identifying infrastructure requirements which would maintain levels of service, the differences between travel distances and times for each of the options are small. Valuation and

inclusion in the Costing Analysis would not necessarily be a good representation of the comparative costs of using and operating the land transport services.

6

REGIONAL ASSESSMENT

6.1 OVERVIEW

The purpose of this chapter is to review the employment and other regional development impacts of an airport. The results of the Economic Regional Analysis Model are an important input (see *Appendix A*), but use is also made of other airport studies. Employment forecasts are presented for Sydney Airport and the Second Sydney Airport.

6.2 THE SOCIO-ECONOMIC IMPACT OF AIRPORTS

As the main tourism and business gateways into the destinations they serve, airports are significant generators of employment and economic activity.

In Australia, the Federal Airports Corporation has commissioned socio-economic impact studies for a number of its airports including Sydney, Brisbane, Perth, Adelaide and Townsville. These studies have generally found that airports have both significant direct and indirect employment effects. These employment effects are defined as any activity either on-airport or off-airport that is directly associated with the movement of passengers and cargo at an airport.

Similar studies have also been conducted of a number of airports overseas. In Europe the Airports Council International, the airport industry association, actually publishes guidelines for member airports on how to measure the socio-economic impacts of airports. The studies that have been conducted overseas, particularly at European airports including Manchester, London Heathrow and Vienna, have identified a similar relationship between traffic levels and both direct and indirect employment effects. Most studies of the socio-economic impacts of airports have found, not surprisingly, similar relationships between the level of traffic at an airport and employment effects. The range of employment effects identified in the Australian and overseas studies is between 500 and 800 passengers per job for direct employment and between 400 and 700 passengers per job for indirect employment (see *Table 6.1*).

A trend that emerges from these studies is that airports with high traffic levels tend to generate proportionally more employment than airports with low traffic levels, despite an intuitive expectation for employment levels to fall proportionately at higher traffic levels due to a degree of airport related employment being facility, rather than throughput, related.

TABLE 6.1 EMPLOYMENT IMPACTS OF AIRPORTS

Employment Effects	Lower Range of Estimates (Passenger per Job)	Higher Range of Estimates (Passenger per Job)
Direct	500	800
Indirect	400	700

The positive relationship between passenger numbers and size emerges because high traffic airports attract additional types of activities, for example, major airline maintenance facilities are more likely to be found at a large airport than a smaller one.

6.3 REGIONAL MODELLING

An Economic Regional Analysis Model was used to assess the impacts of a Second Sydney Airport on the Badgerys Creek and Holsworthy regions. The modelling is described in *Appendix A* and summarised below.

6.3.1 MODEL DESCRIPTION

The Economic Regional Analysis Model contains a database of employment, turnover and value added for the 113 industry sectors included in Australian Bureau Statistics input/output tables, and the inter-relationships between those industry sectors. The data on employment and turnover reported in *Tables 4.2* and *4.3* are basic inputs to the model. The model was used to analyse the impact of changes in industry structure as a result of the construction and operation of the Second Sydney Airport by reporting:

- the effect on related industries;
- the effect on employment; and
- the effect on total output.

The input/output industry sector covering airport operations is 'Air and Space Transport' and the industry sector covering the construction phase of the Second Sydney Airport is 'Other Construction'. As noted in *Section 4.2.4*, the 'Air and Space Transport' industry only covers firms classified as mainly operating in that industry sector and not all firms that provide goods and services to airport activities.

The Economic Regional Analysis Model made 'first round' changes to defined regional economies to reflect the proportional changes in selected industries consistent with passenger number forecasts and construction cost estimates. The model was then able to provide estimates of the flow-on effects of these first round impacts on other industries and employment in the selected regions and the Statistical Division of Sydney. As noted in *Section 3.4*, the general equilibrium affects of the investment on the Second Sydney Airport were not estimated in the model.

6.3.2 REGIONS

The regional economic effect of a Second Sydney Airport required the definition of regions likely to be affected. The regions were defined by aggregating local government areas in the vicinity of the two potential airport sites (see *Section 4.3*). Because Badgerys Creek and Holsworthy are relatively close together there was some overlap in the defined regions. The local government areas of Liverpool, Camden, Campbelltown and Wollondilly were included in both regions.

6.3.3 OPTIONS ANALYSED

The options analysed were defined in terms of passenger growth and airport site location. It was assumed that Sydney Airport would be restricted to 30 million passengers per annum.

As discussed in *Chapter 5* the costs of the airport options at Badgerys Creek and Holsworthy vary. As a result specific options were selected for use in the Economic Regional Analysis Model to assess construction effects. They were Option B at Badgerys Creek and Option A at Holsworthy.

6.3.4 LIMITATIONS OF REGIONAL MODELLING

As with any forecasting, there are underlying assumptions or limitations of the technique that should be borne in mind when interpreting the results. The major ones in the case of the Economic Regional Analysis Model are as follows:

- the impacts of the alternative airport options are assessed against a projected regional economy based on an assessment of the national growth potential of each of the 113 input/output industries as they currently occur in the regions. In other words, the potential growth of a region is affected by the composition of its industrial base and no account is taken of industries that may grow more or less than the national rate;
- the model does not provide an assessment of national economic benefits or costs, rather the distributional effects of the Second Sydney Airport are measured. One implication is that the shift of airport activity from Sydney Airport to the proposed sites may result in costs and duplication of investment that are not evident from the model analysis; and
- the model does not include any new industry developments (aside from the development at the Second Sydney Airport), or constraints on development for practical and political reasons because they are currently not known.

6.3.5 MODEL RESULTS

The results of the regional analysis are affected by the two underlying forecasts of:

- annual airline passenger demand increasing from 19.7 million in 1996 to 49 million by 2016¹; and
- an increase in labour productivity within the air transport industry and industries serving the industry of 1.5 percent per year. Productivity improvement will come through larger aircraft with larger average passenger numbers per movement and efficiency gains in all other airport operations. Growth in labour productivity of this magnitude over a 20 year period implies that about 30 percent less employment will be required for the same tasks performed now.

The model results are similar for Badgerys Creek and Holsworthy regions because they currently have a similar industrial structure which is due in part to the fact that the defined regions have some common local government areas. The similarity is reinforced as industry structure is only forecast to change in accordance with national trends and the development of the Second Sydney Airport.

Impact of No Second Sydney Airport

The Economic Regional Analysis Model was first used to examine the impacts of not having a Second Sydney Airport by constraining passengers to 30 million passengers per annum, the current capacity of Sydney Airport. The implicit assumption of this scenario was that any demand in excess of this capacity would not be satisfied. There would be an annual economic cost (that is, loss of value added) of \$606 million in 2006 which would increase to \$2.4 billion by 2016. The latter figure is equivalent to a loss in terms of employment of more than 17,000 full-time jobs in 2016.

The size of these losses in value added and employment for Sydney indicate the importance of an airport or airports that can handle the estimated growth in passenger demand.

Operational Phase

The modelling of the operational phase of the Second Sydney Airport assumed that of the 49 million airline passengers in 2016, 19.7 million would use Sydney Airport (the same as occurs now) and 29.3 million would use the Second Sydney Airport. Despite the constant passenger use of Sydney Airport, there would be an economic contraction in the Sydney Airport region because of the projected increase in labour productivity. In the Sydney Airport region, employment is estimated to fall by about 5,000 and value added by \$400 million. The airport would continue to make a significant contribution to its regional economy, with direct employment at about 11,500 and value added at \$1.9 billion in 2016.

1 The estimate of 1996 demand changed slightly during the course of the EIS, but not enough to affect the model results.

The Badgerys Creek or Holsworthy region would experience an increase in economic activity. Direct employment in the 'Air and Space Transport' industry is estimated to be some 6,000 by 2006 and more than 17,000 in 2016 in both regions. In addition, a further 9,000 jobs are forecast to be generated within the regions and a further 14,000 jobs elsewhere in Sydney as a result of the Second Sydney Airport in 2016. The direct value added by the Second Sydney Airport to the regions would be \$2.8 billion, and \$4.3 billion when multiplier effects are taken into account.

About 70 per cent of the increased economic activity in the Badgerys Creek or Holsworthy region would occur in the 'Air and Space Transport' industry, as one would expect. Other industries where the increase in economic activity would be of some significance are 'Accommodation, Cafes and Restaurants', 'Aircraft', 'Wholesale Trade', 'Services to Transport/Storage' and 'Petroleum and Coal Products'.

Construction Phase

The construction phase of the Second Sydney Airport is estimated to have a major impact on the Badgerys Creek or Holsworthy regional economies. The Badgerys Creek option at a cost of some \$4.4 billion, involves \$1.2 billion less expenditure than Holsworthy and, starting in 1998, requires a six year construction program rather than 10 years.

These expenditures would comprise a significant increase in the expenditure in the 'Other Construction' industry sector in the two regions. For example, the Badgerys Creek option requires an average expenditure of \$728 million per annum over the construction period while the current turnover in the 'Other Construction' industry sector is about \$1.7 billion per annum. The respective figures for the Holsworthy region are \$553 million and \$1.3 billion.

During the construction phase average annual on-site employment is estimated to be some 1,400 for Badgerys Creek and 1,050 for Holsworthy. The construction will be capital intensive compared to 'Other Construction' so that employment is only estimated to increase by about six percent in this industry sector in both regions as a result of the construction of the Second Sydney Airport. Nevertheless, the direct and indirect employment effects of construction are estimated to be significant. In the Badgerys Creek region, 8,500 person years of direct employment and 17,000 person years of indirect employment will be created. The respective figures for the Holsworthy region are 10,500 and 28,000.

The construction phase in Holsworthy would have more effect on regional economic activity than in Badgerys Creek because the 'Other Construction' sector is smaller, and the construction cost is larger and construction extends over a longer period of time. This is in contrast to the economic activity effects of the operational phase which are similar in the two regions.

6.4 FUTURE ECONOMIC AND SOCIAL CHARACTERISTICS WITH A SECOND SYDNEY AIRPORT

The development of a Second Sydney Airport is likely to trigger an increase in business opportunities in either the Badgerys Creek or Holsworthy region through new business start-ups and the re-location of firms. A new airport and the associated infrastructure and service needs will act as catalysts to economic development. The Regional Economic Analysis Model did not take these potential effects into account because that would have required precise forecasts of the industry activity that would be encouraged by the airport development. As noted in Section 6.3.4, one of the assumptions of the modelling was that existing industries in the Badgerys Creek and Holsworthy regions would grow at the same rate as in the national economy and no account was taken of changes in industrial composition, except as a result of the airport development.

One study has identified important industry benefits from a new airport (Western Sydney Economic Development Committee, 1992), including:

- greater value added manufacturing;
- greater value added horticultural produce;
- education services to overseas consumers;
- health service to overseas consumers;
- greater regional tourism; and
- improved freight capacity and regional access.

The opportunities for greater value added manufacturing included the access and spin-off benefits from a number of key industries such as aerospace, defence and electronics. Further sources of industry growth were estimated to come from information technology and telecommunications all of which are industry sectors experiencing growth which are expected to be further encouraged by proximity to an airport development.

Food and food processing are significant small industries in both regions in the south west of Sydney. The food processing sector is currently rapidly developing new export markets in Asia. Food and beverage exports were estimated to grow at eight percent per annum over the next decade; this growth is likely to be assisted by good access to air freight transport, which is able to ensure the higher value added goods are delivered in a timely manner.

Education and business services were identified as likely to benefit from airport access and proximity to related industry. Whilst the direct benefits of airport proximity to this service sector may not be great, the airport may act as a catalyst to the further development nationally and internationally by assisting access to new markets.

The medical, health and pharmaceutical industries were again identified as likely beneficiaries of airport proximity because they represent low volume, high value, low weight products and services which could gain access to major Asian markets. Pharmaceuticals have grown dramatically in recent years and some forecasts are projecting rapid export led growth in this sector of around 20 percent per annum. In addition to this the provision of private health care to patients from overseas has also been identified as a source of medically related export potential. Easy access to an airport will assist the development of this market.

Whilst greater regional access resulting from an airport will improve the prospects for local tourism the impact was estimated to be small.

6.5 EMPLOYMENT BASE

A large international airport will be closely linked into the fabric of the regional economy at a number of levels. Because the airport is a complex operating entity it has links into local and regional industry at the retail, services, engineering, freight and catering levels. Economic activities are considered to be airport related if the employment disappears once the airport disappears. Within the scope of this definition there are three sub-categories of economic involvement. These levels begin with Airport Bounded at the closest level followed by Airport Using and Airport Susceptible (following van den Berg et al, 1996, reported in Institute of Transport Studies, 1996). In Table 6.2 below the types of airport related activity and geographical region of influence are summarised.

TABLE 6.2 LEVELS OF AIRPORT RELATED ACTIVITY

Type of Activity	Functional Relationship	Region of Influence
Airport Bounded	Primary Airport Services	On the airport
	Secondary Airport Services	Immediate vicinity of the airport
Airport Using	Cargo	Within 10 kilometres
	Passengers	Within 50 kilometres
Airport Susceptible	Cargo	Within 100 kilometres
	Passengers	Within 100 kilometres
	Indirect User	Up to 5 kilometres

Source: Institute of Transport Studies, 1996

Primary airport services include direct operational activities such as air traffic control, aircraft maintenance and cleaning and customs. Secondary airport services include freight forwarders and retail activities such as duty free stores. Airport Using activities include tour operators and accommodation providers. The category of Airport Susceptible activities represents those which are not fully dependent on the airport but which are partially involved with it. This includes business people who need to make regular air trips and technology parks for which close proximity to an airport may assist in

the building of a strong image for the development. Directly attributing numbers of jobs created by Airport Susceptible activities is problematic, but there is little doubt that closeness to an airport is one of a number of prerequisites for such developments to occur.

Despite the clear link that exists between the airport and all of these related economic activities it has become common practice in Europe to limit the impact assessment to the Airport Bounded category. The reason for this has been that in Europe and North America, where a number of such studies have been conducted, services provided by an airport are not the only means of transport. Access may be possible through other airports or road or rail transport. The Institute of Transport Studies (1996) did not restrict its employment estimates for Sydney Airport to the Airport Bounded category as the distances to other major population centres are large and there is restricted competition with other airports and modes of transport. This approach was given some credence during the 1989 pilots strike when there was a dramatic reduction in the number of domestic air trips which was not matched by a similar increase in trips by other modes. As noted in *Section 4.2.4*, tourism employment was not included in the Institute of Transport Studies job numbers.

6.6 EMPLOYMENT FORECASTS

There were two main data sources used in the development of the employment forecasts: the work completed for the Federal Airports Corporation by the Institute of Transport Studies in 1993 and 1996 and the work undertaken specifically for this study by Corporate Economics Australia (see *Appendix A*).

In order to cover a range of possible outcomes, the results of both studies were used to produce a method which combined multipliers and base employment numbers from both studies to produce a range of forecasts. The mid-level employment forecasts were then used in the traffic model, land use planning work and other parts of the EIS.

6.6.1 THE APPROACH TO EMPLOYMENT FORECASTING

The task was to develop a set of employment projections for the Sydney Basin, separately for Sydney Airport and the Second Sydney Airport options, covering direct and indirect employment.

Direct employment is that created by the initial impact of the operating entity (Hooper 1995). This means current on-site and off-site employment resulting directly from the airport's activities. Indirect employment results from the consumption and production expenditure generated by the direct employment. It is the employment created by the purchase of inputs and outputs as part of the activities of those directly employed in the main airport operating entity.

As noted in Section 4.2.4, the Corporate Economics Australia study adopted a relatively narrow definition by use of the 'Air and Space Transport' industry sector and three local government areas in the vicinity of Sydney Airport. This is appropriate for assessing regional economic impacts, but not the total employment as a result of airport related activities. On the other hand, the Institute of Transport Studies assumed no productivity improvement when forecasting employment.

6.6.2 FINAL EMPLOYMENT FORECASTS

The forecasting method used to estimate the number of jobs associated with airport operations in Sydney was as follows:

- A 1996 figure of 34,000 jobs related to activities at Sydney Airport was used as the base employment number of forecasting purposes. This was based on the 1995 estimate of airport related employment in Institute of Transport Studies (1996).
- A gross employment multiplier of approximately 2 (taking into account both the Institute of Transport Studies and Corporate Economic Analysis work) was used to estimate indirect employment associated with the airport(s). This means that indirect employment is approximately equal to indirect employment.
- The split between Sydney Airport and the Second Sydney Airport in the two forecast years (2006 and 2016) was based on relative passenger numbers in Air Traffic Forecast 1 and Air Traffic Forecast 3.
- Both direct and indirect employment were adjusted over time to account for improved labour productivity. A productivity improvement 0.5 percent per annum was used in the high employment forecasts and 1.5 percent per annum in the low employment forecasts.

The resulting employment forecasts are shown in *Table 6.3*.

TABLE 6.3 FORECAST DIRECT AND INDIRECT EMPLOYMENT GENERATION OF SYDNEY'S MAJOR AIRPORTS

	1996	2006	2016
Direct Employment			
Sydney Airport	34,000	37,000-41,000	21,000-26,000
Second Sydney Airport	0	15,000-17,000	44,000-53,000
Sydney Total	34,000	52,000-58,000	65,000-79,000
Indirect Employment			
Sydney Airport	34,000	37,000-41,000	21,000-26,000
Second Sydney Airport	0	15,000-17,000	44,000-54,000
Sydney Total	34,000	52,000-58,000	65,000-80,000
Total Employment			
Sydney Airport	68,000	74,000-82,000	42,000-52,000
Second Sydney Airport	0	30,000-34,000	88,000-107,000
Sydney Total	68,000	104,000-116,000	130,000-159,000

The reason for the labour productivity improvement factor is that with the application of new technology to airports and the probable advent of larger aircraft, passenger demand and employment levels will not grow at the same rate. Past trends indicate that labour productivity improvement across all industries has been slightly in excess of 1.5 percent per annum and measures of productivity in some parts of the air industry have been higher and some lower than 1.5 percent (see *Appendix A* for a more detailed discussion of this issue).

The Sydney Basin airport related employment in 2006 is estimated to be at least 18,000 more jobs than the 1996 number of 34,000. The bulk of the employment growth will occur at the Second Sydney Airport, although Sydney Airport will continue to employ more than twice the number that the Second Sydney Airport does.

By 2016, the Second Sydney Airport will be a more important employment generator than Sydney Airport. Total employment estimates in that year suggest that there will be at least 62,000 more jobs than in 1996 and that the bulk of the employment growth will be associated with the Second Sydney Airport. In 2016, the Second Sydney Airport will be twice as important as Sydney Airport in generating employment, with between 88,000 and 107,000 jobs (direct and indirect).

7

COMPARATIVE ECONOMIC ASSESSMENT

7.1 OVERVIEW

The economic analysis has been used not to justify in an absolute sense the economic worth of the project but to compare some costs or quantifiable resource impacts of a series of project options. Because of the difficulty relating to undertaking either a cost-benefit analysis or a cost effectiveness analysis owing to a lack of significant items of data, a Costing Analysis and a Regional Assessment were undertaken.

The objective was to analyse the economic impact of the development of an airport, with the main focus of the analysis being at the regional level. The regions used were made up of local government areas as follows:

- Holsworthy region: Bankstown, Liverpool, Camden, Sutherland, Campbelltown and Wollondilly; and
- Badgerys Creek region: Penrith, Blacktown, Fairfield, Liverpool, Camden, Campbelltown and Wollondilly.

There is some overlap between the local government areas in each region so the airport development impacts are similar.

7.2 REGIONAL ECONOMIC CHARACTERISTICS

Table 7.1 below provides summary characteristics for the two airport regions in comparison with the Sydney region as a whole. The table shows a number of comparative economic indicators. The major differences and similarities are as follows:

- the participation rate (calculated as the employed and unemployed workforce as a proportion of the total workforce) is higher in both the Badgerys Creek and Holsworthy regions when compared to the whole of Sydney;
- unemployment is higher in the Badgerys Creek region than in either the Holsworthy region or the whole of Sydney;
- the levels of employment in the manufacturing and trade sectors for Badgerys Creek and Holsworthy regions are larger than for Sydney as a whole; and
- agriculture in Sydney and the regions is a relatively unimportant source of employment.

TABLE 7.1 ECONOMIC CHARACTERISTICS OF DEFINED ECONOMIC REGIONS¹ (PERCENT)

Indicator	Badgerys Creek Region	Holsworthy Region	Sydney Statistical Division
Participation rate	64	64	62
Unemployment rate	14	11	10
Employment in manufacturing (% of regional employment)	22	19	14
Employment in trade (% of regional employment)	18	18	13
Employment in agriculture (% of regional employment)	1	1	1
Labour force (Number)	385,000	300,000	1,743,000
Percentage of total Sydney workforce	22	17	n/a

Notes: 1. Source is CDATE91, Australian Bureau of Statistics.

7.3 ECONOMIC IMPACTS OF BADGERYS CREEK OPTIONS

The following are the expected economic impacts of an airport in the Badgerys Creek region:

- **Local Industry:** The proposed airport facility would be large and dominate the relatively economically undeveloped region. When fully operating, the airport is estimated to increase value added in the region by between \$2.8 and \$4.3 billion per annum. The complexity of the facility would require new service and ancillary industries providing for the airport's needs, few of which exist at present. The Badgerys Creek region has a manufacturing and trade industry base which may be able to adapt to the proposed airport's demands. In the longer term high technology industries would be expected to develop or relocate from Sydney Airport providing airport and airline operators with services and also generating other spin off products and services marketable both within Australia and overseas;
- **Employment creation:** It is estimated that within the Sydney basin, the airport's activity would generate between 88,000 and 107,000 jobs in terms of both direct and indirect employment by 2016;
- **Impact during construction:** During the six year construction period Badgerys Creek options are estimated to require on-site employment averaging around 1,400 jobs per year and to generate around 17,000 person years in off-site additional employment;
- **Agricultural Production:** Depending on which of the three proposed airport options proceeds, the value of affected agricultural production ranges from \$400,000 to \$1.9 million per annum. These amounts are relatively small and in any event are likely to be replaced by increases in agricultural activity elsewhere in the region or State;

- **Change in Property Values:** Airport related noise impacts on property values were calculated within the 20 ANEC contour. A net depreciation in the values of current and future housing stock was estimated at between \$25 million and \$67 million with a fully operating airport; and
- **Mineral Sterilisation:** Relatively poor quality coal is known to exist at some depth below the surface of the Badgerys Creek region in difficult to mine seams. The deposits affected range between 57 million tonnes and 84 million tonnes but it is unlikely that these resources would ever be economically mined.

7.4 ECONOMIC IMPACTS OF HOLSWORTHY OPTIONS

The following are the expected economic impacts of an airport in the Holsworthy region:

- **Local Industry:** The proposed airport facility would be large and dominate the relatively economically undeveloped region. When fully operating, the airport is estimated to increase value added in the region by between \$2.8 and \$4.3 billion per annum. The complexity of the facility would require new service and ancillary industries providing for the airport's needs, few of which exist at present. The Holsworthy region has a manufacturing and trade industry base in centres such as Campbelltown, Liverpool and Sutherland which may be able service the proposed airport's demands. In the long term high technology industries would be expected to develop providing airport and airline operators with services and also generate other spin off products and services marketable both within Australia and overseas;
- **Employment creation:** It is estimated that within the Sydney basin, the airport's activity would generate between 88,000 and 107,000 jobs in terms of both direct and indirect employment by 2016;
- **Impact during construction:** During the ten year construction period Holsworthy options are estimated to require on-site employment averaging around 1,050 jobs per year and to generate around 28,000 person years in off-site additional employment;
- **Agricultural Production:** There is no impact on agricultural production at either of the proposed Holsworthy sites;
- **Change in Property Values:** Airport related noise impacts on property values were calculated within the 20 ANEC contour. A net depreciation in the values of current and future housing stock was estimated at between \$108 million and \$149 million with a fully operating airport; and
- **Mineral Sterilisation:** Considerable high quality coal reserves are known to exist at a reasonable depth within the Holsworthy Military Reserve. In terms of that affected directly by the presence of the airport the volume are relatively small, however, it is unlikely mining of the remaining deposit would be permitted within the vicinity of airport operations resulting in the sterilisation of between 66 and 110 million tonnes of coal.

7.5 ECONOMIC AND FINANCIAL COSTS

The Second Sydney Airport proposal would have a range of potential costs. It is possible to enumerate a number of these costs as shown in *Table 7.2*. The approach adopted was to summarise the financial or economic costs by major cost category. The main cost categories which are excluded from *Table 7.2* are:

- relocation of defence activities and/or facilities from the Defence Establishment at Orchard Hills;
- effects on the operations of other airports in Sydney (Bankstown, Hoxton Park and Camden Airports);
- sterilisation of mineral resources;
- changes to transport user and operating costs to access the Second Sydney Airport;
- airport and airline operating costs; and
- environmental costs other than noise costs.

TABLE 7.2 AVAILABLE ESTIMATED PROPOSAL COSTS (\$'S MILLIONS)¹

	Badgerys Creek			Holsworthy	
	Option A	Option B	Option C	Option A	Option B
Land Acquisition	\$0	\$205-\$280m	\$190-\$265m	\$0	\$0
Airport Development ^{2 and 3}	\$2,915-\$4,010m	\$3,230-\$4,445m	\$3,145-\$4,325m	\$4,420-\$6,080m	\$4,305-\$5,920m
Airservices Australia Facilities	\$50m	\$50m	\$50m	\$50m	\$50m
UXO Clearance ²	\$0	\$0	\$0	\$31-\$42m	\$33-\$39m
Transmission Line Relocation ⁴	\$25m	\$25m	\$25m	\$0	\$0
Total Airport Construction Costs	\$2,980-\$4,090m	\$3,500-\$4,805m	\$3,400-\$4,670m	\$4,491-\$6,177m	\$4,378-\$6,014m
Roads ^{4 and 5}	\$470m	\$470m	\$470m	\$230-\$395m	\$360-\$575m
Rail Line ^{4 and 6}	\$345-\$400m	\$345-\$400m	\$345-\$400m	\$140-\$260m	\$180-\$430m
Total Access Costs	\$815-\$870m	\$815-\$870m	\$815-\$870m	\$370-\$655m	\$540-\$1,005m
Water ⁴	\$40m	\$40m	\$40m	\$35m	\$20m
Waste Water ⁴ (on-site treatment)	\$30m	\$30m	\$30m	\$30m	\$45m
Power ⁴	\$30m	\$30m	\$30m	\$20m	\$40m
Telecommunications ⁴	\$15m	\$15m	\$15m	\$15m	\$15m
Aviation Fuel Pipeline ⁴	\$25m	\$25m	\$25m	\$35m	\$50m
Natural Gas Pipeline ⁴	\$6m	\$6m	\$6m	\$15m	\$10m
Total Services Costs	\$146m	\$146m	\$146m	\$150m	\$180m
Defence Relocation Costs ⁷	\$0 ⁸	\$0 ⁸	Not available ⁸	\$150-\$450m	\$150-\$450m
Increased Defence Operating Costs per annum	\$0 ⁸	\$0 ⁸	Not available ⁸	\$3-\$5m	\$3-\$5m
Total Defence Costs	\$0	\$0	\$0	\$150-\$450m	\$150-\$450m

	Badgerys Creek			Holsworthy	
	Option A	Option B	Option C	Option A	Option B
Residential Property Acquisition ¹⁰	\$6-\$11m	\$0	\$12-\$27m	\$0	\$0-\$2m
Acoustical Treatment ¹¹ 25 to 35 ANEC	\$12-\$19m	\$7-\$9m	\$6-\$12m	\$7-\$12m	\$26-\$91m
Acoustical Treatment ¹¹ 30 to 35 ANEC	\$3m	\$1-\$3m	\$2-\$5m	\$0	\$2-\$14m
Direct Property Devaluation ⁹ and ¹²	\$49-\$67m	\$52-\$60m	\$25-\$31m	\$108-\$121m	\$122-\$149m
Total Available Noise Impact and Management Costs¹³	\$67-\$97m	\$59-\$69m	\$43-\$70m	\$115-\$133m	\$148-\$242m

- Notes:
1. All costs rounded to nearest \$million. Expressed as \$ 1997 except property devaluation at 1996.
 2. Range of costs due to assumed level of accuracy.
 3. Airport development costs are for complete master plan development. It is likely, however, that the costs would be expended in stages. Costs do not include the cost of commercial/support facilities that would be developed by the airlines and other airport tenants but do include costs of Airservices Australia facilities.
 4. Source is Second Sydney Airport Planners, 1997.
 5. Costs of roads to Holsworthy airport options vary depending on the access alternative selected.
 6. Costs of rail line to Badgerys Creek airport options vary depending on the route selected. Costs of rail line to Holsworthy airport options vary depending on the route selected and whether a single or dual track is constructed. Rail costs do not include any potential network improvements that may be required.
 7. Costs are indicative, based on preliminary analysis of the potential impact on Defence.
 8. It has been assumed that Badgerys Creek Options A and B could co-exist with Defence facilities at Orchard Hills. It is uncertain whether the Defence facilities at Orchard Hills have to be relocated.
 9. Net total property devaluation by 2016 in 1996 prices using 1996 property values.
 10. Source is Technical Paper No.3. Calculated on acquisition of residential properties affected by more than 35 ANEC. Range of costs due to the range of noise impacts created by the different assumptions about how the airport may operate. Property prices calculated by examining average sale prices and adding a 20 percent contingency. Actual costs may vary significantly due to large variation in the value of properties that occur around the airport sites.
 11. Source is Technical Paper No.3. Acoustical insulation assumed for all residential properties within 25 ANEC contour. Average cost of insulation assumed to be \$50,000 per dwelling. Range of costs due to the range of noise impacts created by the different assumptions about how the airport may operate.
 12. Source is Technical Paper No.4. Direct estimated residential property devaluation. Does not include indirect changes to property values such as changes to the future development potential of land. Range of costs due to the range of noise impacts created by the different assumptions about how the airport may operate.
 13. Acoustical treatment 30 to 35 ANEC included as part of 25 to 35 ANEC.

Keeping the cost exclusions in mind, what the Costing Analysis shows is that there is no single minimum cost airport option. In terms of:

- airport construction costs, the Badgerys Creek options are preferred to the Holsworthy options. Badgerys Creek Option A has the lowest construction costs;
- road and rail infrastructure costs, all Badgerys Creek options have the same costs, and Holsworthy Option A has the lowest costs;
- infrastructure costs for services, all Badgerys Creek options have the same costs which are marginally lower than Holsworthy Option A and considerably lower than Holsworthy Option B;
- Defence relocation costs, Badgerys Creek is preferred to Holsworthy. The costs that are available are of a preliminary nature, indicated by the

large range in the cost estimates for Holsworthy and the absence of any estimate for Badgerys Creek Option C; and

- noise impact costs, the Badgerys Creek options are clearly preferred to either of the Holsworthy options. The range in the cost estimates does not permit one of the Badgerys Creek options to be identified as preferable to the other two.

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Appendices

Appendix A

Regional Economic Analysis

Prepared by Corporate Economics
Australia Pty Ltd

CHAPTER 1: METHODOLOGY

1.1 Regional Economic Analysis

1.1.1 Overview and Scope

The objective was to provide a profile of employment and industry effects of alternative airport developments for regions associated with the proposed Second Sydney Airport sites at Badgerys Creek and Holsworthy using the Economic Regional Analysis Model. The analysis is based on a number of airport scenarios which have been specified in terms of numbers of passengers for the forecast years of 2006 and 2016. While air freight is an important component of the air transport task, passenger movements dominate. The analysis is based on the assumption that the relativity of passenger and freight air transport remains unchanged throughout the forecast period as the data sources used do not allow these aspects to be separated.

These objectives were pursued through the following tasks:

- developing base employment and industry data for the regional economies (defined in terms of statistical local areas) most directly affected by the two proposed sites;
- providing forward projections of employment and industry composition as a 'baseline' scenario for each region to the year 2016;
- assessing the regional impacts of the operational phase of the proposed Second Sydney Airport using the model; and
- assessing the regional impacts of the construction phase of the Second Sydney Airport using the model.

1.1.2 The Economic Regional Analysis Model and its application to the Second Sydney Airport

The model is a multi-purpose tool which was developed to provide a rigorous approach to regional strategic planning and analysis.

Aside from providing a detailed database for selected regions, the model is useful in analysing the impact of changes in industry competitiveness through for example, infrastructure investment or the development of an industry in a particular region. The model has the capacity to distribute the economic benefits to industry which would be a direct result of specific infrastructure investments. Alternatively, disinvestment or reduction in an industry can also be modelled and the impact on a region assessed.

Key Economic Regional Analysis Model outputs include:

- the effect on related industries;
- the effect on employment; and
- the effect on total output.

The model inputs and processes comprise:

- a basic industry structure extending across 113 input/output industries as defined by the Australian Bureau of Statistics;
- regional weights for each industry;
- growth forecasts for each of the 113 industries;
- an analysis facility allowing the user to specify regions, inputs, industries and year;
- an experiment facility enabling the modelling of different scenarios; and
- a comparison facility to allow differences between scenarios to be compared.

The model includes a base data set which provides a detailed picture of the characteristics of industries within regions and the pattern of their expenditures. This data can be manipulated for the purpose of analysing interrelationships between industries and regions as well as evaluating the effect of change in any one of a number of key variables such as employment and investment.

An overview of the conceptual framework of the model is illustrated in Figure 3.1. A brief outline of each component of its structure follows:

Industry Cost Structures

The industry cost structure tables provide the basic input/output relationships for each of the 113 industries defined by the Australian Bureau of Statistics (ABS) within the standard input/output tables (Australian Bureau of Statistics, 1996c).

From the same publication full-time equivalent employment data are also obtained. These data provide the basic cost structures for each industry and the relationship between industries, expressed in 1992-1993 Australian dollars. Data presented in this Appendix have been adjusted to 1996 values using the GDP implicit price deflator.

Regional Distribution of Industry and Employment Weight

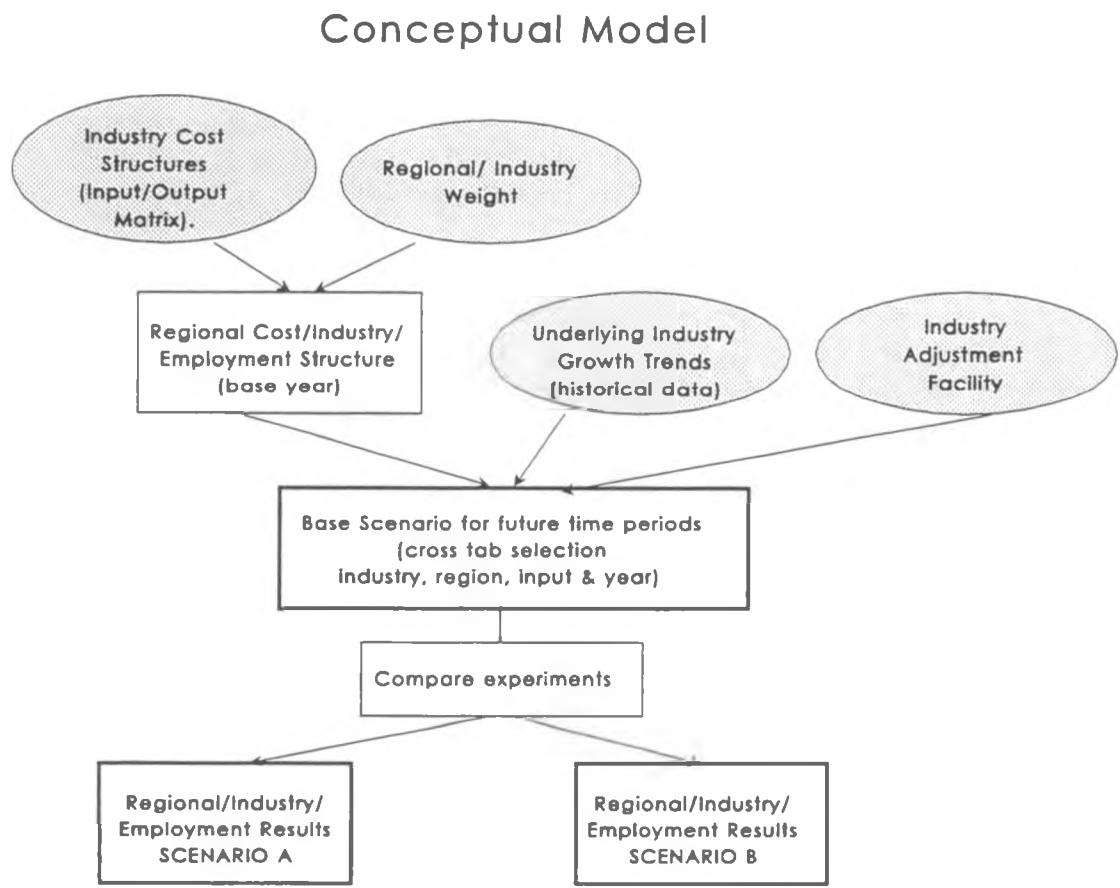
This data table consists of each region's share of employment for each industry. These data were obtained from the ABS register of businesses, current as at 30 June 1994. Using these shares the national input/output tables can be allocated to each region included in the model. The allocation of activity is strictly in proportion to each region's share of employment by industry. Regions are defined in terms of the Australian Standard Geographical Classification (Australian Bureau of Statistics, 1994b).

Base Year Industry and Cost Structures

From the two preceding tables a unique industry structure is derived for each region. Each region is characterised by an exclusive mix of industries, although the cost structures for each of the industries remain in proportion to the cost structures in the national input/output framework. Included in the

cost structures are estimates for employment, wages and profits. The model does not create an input/output table for each region.

Figure 3.1



Underlying Industry Growth Trends

The model includes estimates of underlying industry growth rates². These growth rates usually differ between industries, depending on the structure of their markets and the demand outlook for their products. These estimates can be used to generate a base-line projection as a reference point against which the particular impact of the infrastructure investment can be evaluated. Separate estimates of the growth of labour demand are also included in the model to allow for improved labour productivity. An average annual

²⁾ The assessment of the growth potential of each industry involved CEA undertaking an (unpublished) econometric analysis of available data for each industry where data were available from official sources especially ABS Cat No. 5206.0. The projections produced by the econometric analysis were then adjusted to take into account prospective changes in the pattern of world demand, changes in protection levels and likely shifts in the international distribution of production.

improvement of 1.5 percent in labour productivity is assumed. This compares with an average annual increase in Australian labour productivity of 1.8 percent for the 5 years ended June 1996 and 1.3 percent for the period 1978/1979 to 1995/1996 (based on Real Gross Domestic Product Per Hour Worked, *National Income and Expenditure*, Australian Bureau of Statistics Cat No. 5206.0).

Algebraic Structure of the Model

Each item of data produced by the Model is uniquely defined by the Industry (i), Input (j), Regional Weight (Rr) and time period growth multiple (Tt). The appropriate element from the input/output table, Aij, is multiplied by an Rr and Tt to produce a unique Aijrt.

Scenarios for Future Time Periods

The industry composition of each region in future time periods depends on the initial combination of industries and growth projections for those industries.

Experimental Scenarios

Users can vary the model's base data in a wide variety of ways to simulate economic and industry developments. In particular, the model allows for an industry sector to be expanded or contracted by a specified factor or the value of an input category to be increased or reduced by a specified factor. The model allows alternative scenarios to be compared and results to be tabulated. Where an industry is expanded, those industries supplying inputs to the initial industry are expanded sufficiently to supply additional requirements such that regional market shares are maintained.

In the present study, the model is used to quantify the regional impacts of the proposed Second Sydney Airport on employment and industry. It quantifies these elements against a 'no second airport' or base case scenario for regions adjacent to Sydney Airport and the Badgerys Creek and Holsworthy alternatives. Further, the model provides a detailed picture of the existing and likely shape of industries within the relevant regions, and what goods and services air transport in particular, will purchase and from whom, for the forecast years, 2006 and 2016. Also provided is a composite picture of the potential impact on employment, industry and output from the proposed Second Sydney Airport at either of the proposed sites for the same periods.

1.1.3 Definition of Regions Used to Assess Regional Impacts

The local government areas (which are equivalent to Statistical Local Areas for the regions under study) used in assessing the regional impacts of the alternate Second Sydney Airport sites were:

- Penrith, Blacktown, Fairfield, Liverpool, Camden, Campbelltown and Wollondilly for Badgerys Creek; and
- Campbelltown, Camden, Liverpool, Bankstown, Sutherland and Wollondilly for Holsworthy.

Data were also produced for Sydney Airport and its surrounding region to provide a picture of a region in which a major airport currently exists and to illustrate the shift in regional economic activity throughout the greater Sydney region likely to result from the development of the Second Sydney Airport. The Sydney Airport region was defined by the local government areas of:

- Botany, South Sydney and Rockdale

These local government areas were chosen because of their proximity to the alternative sites, developed transport links with the respective surrounding regions and other key transport nodes, and existing regional industrial and service bases. Because of the relatively close distance between the alternative sites, the Badgerys Creek and Holsworthy regions overlap.

1.1.4 Description and Assessment of Second Sydney Airport Scenarios

Only two passenger forecast scenarios for each of the two Second Sydney Airport options were assessed for their regional economic impacts:

- Air Traffic Forecast 2 where the Second Sydney Airport would be developed to cater for 10 million passengers per annum by 2006, with all further growth after this time being directed to the Second Sydney Airport rather than Sydney Airport; and
- Air Traffic Forecast 3 which would be similar to Air Traffic Forecast 2, but with more international flights being directed to the Second Sydney Airport.

For the purposes of the regional economic analysis, Air Traffic Forecast 2 is only addressed in relation to the year 2006 and Air Traffic Forecast 3 only in relation to the year 2016. This represents the maximum throughput at the Second Sydney Airport for both the forecast years.

The impact of the construction phase of the Second Sydney Airport is explored in *Chapter 4*. Two construction cost profiles are explored: Option B for Badgerys Creek and Option A for Holsworthy. In each case construction is assumed to be initiated in 1998 and completed in 6 years for Badgerys Creek and 10 years for Holsworthy.

Comparative Assessment

Assessment of the impact of the two scenarios studied is achieved by comparing the impact of the Second Sydney Airport on each of the two alternative sites. As two development scenarios are assessed for each site, a total of four sets of results are presented for the operational phase of the Second Sydney Airport. The base case against which each of these results can be compared is a scenario in which Sydney Airport is constrained to a maximum of 30 million passengers and there is no Second Sydney Airport. Results are also presented for the Sydney Airport region to make clear the nature of the base case against which the second airport options are being presented.

The purpose of comparing the results to an arbitrary Base Case at Sydney Airport of 30 million passengers is to demonstrate the economic costs in

employment and expenditure terms of this capacity cap. Whether this capacity limit would eventuate is an operational issue as well as being a political issue. Passenger demand might be suppressed in terms of denying people the opportunity to travel or it might be simply diverted to the other capital cities; this latter possibility is more likely with international passengers than domestic passengers.

The economic measures used to make these comparisons were employment, turnover and value added (value added is a measure of the net value of output and is calculated by subtracting the value of intermediate goods used by an industry from its turnover). Each of these measures is derived from the model using a common experimental specification.

TABLE A1-1 PASSENGER NUMBERS BY AIR TRAFFIC FORECAST (MILLION)

	Air Traffic Forecast 2	Air Traffic Forecast 3	Base Case
	2006	2016	2006/2016
Second Sydney Airport	10.0	29.3	-
Sydney Airport	24.8	19.7	30.0
Total passengers	34.8	49.0	30.0

The comparative assessment of the construction phase of the Second Sydney Airport is made against the level of construction activity estimated to be otherwise achieved within the regions specified for each of the proposed Second Sydney Airport options.

1.1.5 Application of the Economic Regional Analysis Model: Overview and Scope

The Economic Regional Analysis Model is applied to this study by making 'first round' changes to defined regional economies to reflect the proportional changes in selected industries consistent with passenger number forecasts and construction cost estimates. The model is then able to provide estimates of the flow-on effects of these first round impacts on other industries and employment in the selected regions and the Statistical Division of Sydney.

The regions identified as being proximate to the alternative airport sites are defined in *Section 1.1.3*.

The Input/Output industry which provides air transport services is termed *Air and space transport* by the Australian Bureau of Statistics and the corresponding industry undertaking the construction phase is termed *Other construction*.

An important feature of the model is that the impacts of the alternative airports are assessed against a projected regional economy for each region taking into account the potential for each of the regions to expand to the specified forecast years of 2006 and 2016. This underlying growth to future time periods is based on an assessment of the growth potential of each of the

113 Input/Output industries. Therefore, the potential growth of a region is also affected by the composition of its industrial base.

The scope of the analysis is limited to the regional impact of the proposed development of a Second Sydney Airport and the model is not intended to provide an assessment of national economic benefits or costs. From a national perspective it is likely that the investment of a major sum in developing a Second Sydney Airport would result in less investment elsewhere (than would otherwise have occurred) and thereby, for example, provide offsetting employment losses. Also, the shift of airport activity from Sydney Airport to the proposed sites may result in costs and duplication of investment that are not evident from the model analysis.

The economic assessment of major investment projects should generally include an assessment of what economists term "general equilibrium effects". These general equilibrium effects result from the potential diversion of scarce capital and labour from alternative investments to the investment being studied, in this case the Second Sydney Airport. That is, the gross economic benefits of a project will generally be overstated unless account is taken of what other investments may be foregone if a particular project proceeds. For example, unless a project yields a rate of return on the capital employed above the return available from alternative investments, it is likely to reduce the rate of growth of national income even if its rate of return may be greater than zero.

However, the EIS is largely a comparative assessment of the two alternative sites for the Second Sydney Airport (and the options at each). A decision has been taken that Sydney is to have a second airport. In this context, the general equilibrium impacts of the construction and operation of a Second Sydney Airport would only be important if the construction and operating costs differed substantially or if the alternatives provided a substantially different level of output.

Estimates of the costs of construction are of a similar magnitude (and involve similar timeframes for the construction phase) for each of the options and therefore the additional effort of estimating general equilibrium impacts would not improve the information base upon which a decision about which airport site should be chosen. To the relatively minor extent to which the construction costs are different, it can be readily assumed that the general equilibrium effects would be proportional to the direct costs.

Similarly, the projected throughputs of each of the alternative Second Sydney Airport sites are based on the same traffic projections and assumptions about the capacity of the existing Sydney International Airport. Also, both sites are of similar distance from the centroid of Sydney's geographical demand for air travel.

Given the nature of the study there is no need, therefore, to explicitly estimate the general equilibrium impacts of each of the alternative investments. It would be a different matter if the EIS was focused on whether a second airport should be constructed or not.

1.1.6 Limitations of Regional Analysis

Aside from matters addressed in the preceding section there are further limitations which should be borne in mind in relation to this particular regional analysis. These include:

- the regions chosen as being associated with each of the proposed Second Sydney Airport options and Sydney Airport can only be defined in relation to statistical units for which data are available. Practically, this means that regions need to be defined in terms of statistical local areas. This may lead to a lack of precision in defining Badgerys Creek and Holsworthy regions;
- the model builds on the existing structure of industry within the defined Badgerys Creek and Holsworthy regions and, aside from the specified Second Sydney Airport scenarios, necessarily contains no information about industry developments which are currently not known;
- there are likely to be practical and political constraints to regional economic developments that are not incorporated in the model which will affect the future composition of industry and regional growth; and
- the regional analysis will exclude the impact of industries likely to grow relatively strongly or poorly at a regional level (that is industries not identified as high or low growth industries nationally).

CHAPTER 2: EXISTING ENVIRONMENT AND GROWTH PROSPECTS

2.1 Existing Environment

2.1.1 Employment in Air Transport and Related Industries

The starting point for an assessment of the employment and other economic impacts of the proposed Second Sydney Airport is an understanding of the level of employment currently involved in providing and supporting air transport at Sydney Airport. Also important is the level and composition of employment in the particular regions being studied as the proposed Second Sydney Airport alternatives.

Several recent studies have attempted to measure the level of employment in the air transport and related industries for Sydney and in association with Sydney Airport. Prime among these studies were those undertaken by the Institute of Transport Studies based at the University of Sydney. Its 1993 report *The Economic Significance of Sydney Airport* indicated total employment of 29,691 in airport related industry in 1992/93. A subsequent report by the same organisation *Report on the Economic Significance of Sydney International Airport* put the total employment in airport related industry at 33,509 in 1995. This employment is located within a defined airport 'sub-region' (comprising the local government areas of Ashfield, Bankstown, Botany, Canterbury, Drummoyne, Hurstville, Kogarah, Leichhardt, Marrickville Randwick, Rockdale, South Sydney and Sutherland). In both of these studies additional employment generated indirectly from airport related economic activity was estimated.

It should be stressed that the total employment numbers estimated by the Institute of Transport Studies are not estimates of the employment on the site of Sydney Airport or even in the immediate region. The geographic dimension of its airport region is much broader than that defined for this study where a key objective is the assessment of comparative impacts of airports within Sydney. This study looks to identify employment impacts within relatively tight regions defined in terms of a small number of local government areas.

Also, this study uses industry definitions in accord with the Australian Bureau of Statistics 1992/93 Input/Output tables (ABS Australian National Accounts Cat. No. 5209.0). In particular, all economic modelling of air transport and airport impacts is based on the *Air and space transport* industry category. Based on this industry definition, data obtained from the 1995 Australian Bureau of Statistics Business Register, has employment of 13,537 in *Air and space transport* in Botany (where Sydney Airport is located). The modelled estimate of employment for 1996 for the local government areas of South Sydney and Rockdale is 16,335 and 17,370 for the Statistical Subdivision of Sydney.

Our estimates of employment in air transport have been derived in a different way and for different purposes. However, a reconciliation of the two estimates is important for an understanding of the employment associated with air transport within Sydney (see *Table A2-1*).

TABLE A2-1 RECONCILIATION OF AIR TRANSPORT EMPLOYMENT FOR SYDNEY AIRPORT REGION 1995

Employment Category	Employment by Region	Employment by Industry
Institute of Transport Studies		
Airport-related employment	33,509	33,509
less		
employment outside immediate region	-11,016	-3,147 ¹
employment in related industries	-3,309 ¹	-10,908
adjustment to full-time equivalent	-1,814	-1,814
Sydney		
Air and space transport	17,370	17,370
less		
Air and space transport - other Sydney	-1,035	-1,035
Sydney Airport Region		
Air and space transport (full-time equiv.)	16,335	16,335
plus		
adjustment to "employment" basis	884	884
Sydney Airport Region		
Air and space transport (employment basis)	17,219	17,219
plus		
related employment (from I/O table)	1,194	1,194
Sydney Airport Region		
Airport-related employment	18,335	18,335

Notes: 1. Interaction of regional and related industry effects, estimated as a residual.

From these data it can be deduced that there are currently some 18,000 persons directly employed at Sydney Airport in the air and space industry category. In full-time equivalent employment (based on data from the Economic Regional Analysis Model) the level would be slightly lower at around 17,000. This magnitude of employment, which is geographically and industrially associated with Sydney Airport would be likely to be proportionally associated with the Second Sydney Airport given current technology.

In Section 3.3.2 the impact of technological developments and higher labour productivity on employment demand is discussed. With continued improvements in efficiency the demand for labour by an airport per passenger or tonne of freight will steadily decline thereby reducing the employment generated by any given level of air transport demand.

In interpreting the results of the model presented here the way in which employment is defined should be kept in mind. That is, defined to be strictly within the regions and industries as described using official ABS definitions from the Australian Standard Geographical Classification (Version 2.4) and the 1992/93 Input/Output Tables.

The result of the modelling is to identify the flow-on impact of changes in employment in *Air and space transport*, as defined by the Australian Bureau of Statistics, on other industries in the Holsworthy and Badgerys Creek regions. Two qualifications need to be made when comparing the estimates presented here with those recently published by the Institute of Transport Studies.

First, the model is designed only to capture those flow-on effects which derive from the purchases of goods or services from other industries by the industry subject to change. No effect is generated from the expenditures of wages or profits resulting from an increase in an industry's level of activity. Outside of the model a number of calculations are presented using additional information which indicates the magnitude of these additional impacts.

Second, the model takes specific account of the regional composition of industry and limits flow-on effects to industries which are currently located in the region under study and these industries are assumed to maintain their national market shares. Thus, flow-on effects for small regions with a limited range of industries will be lower, and arguably more realistic, than if national input/output multipliers are used at the regional level.

2.1.2 Overview of Existing Regional Environment - 1996

To put the regions most influenced by the proposed Sydney Second Airport into perspective, the relative size and industrial composition of each are described below. To provide a basis for comparison, details are also provided for the Sydney Airport Region, as well as for the balance of the Statistical Division of Sydney. Each of the three “airport” regions are characterised by significant and diverse industrial and economic activity. These three regions combined, accounted for around 38 percent of Sydney's total workforce of 1.7m and 40 percent of its annual turnover (see Table A2-2).

TABLE A2-2: SUMMARY CHARACTERISTICS: SYDNEY REGIONS 1996

	Sydney Airport Region	Second Sydney Airport Region		Other Sydney	Sydney Statistical Division ¹
		Badgerys Creek ¹	Holsworthy ¹		
Employment	188,690	241,012	214,439	1,023,147	1,667,288
Turnover (\$bn 1996 prices)	23.6	27.5	25.0	113.0	189.1
Value added (\$bn 1996 prices)	12.4	14.6	13.0	63.3	103.3

Notes: 1. These numbers are indicative only, since some local government areas appear in both Second Sydney Airport Regions.

In terms of employment, turnover and value-added, Badgerys Creek is estimated to be the largest of the three regions. However, this is due to the way in which Badgerys Creek has been defined relative to Holsworthy. The close geographical proximity of Badgerys Creek and Holsworthy led to some inevitable sharing of local government areas between the two regions.

All three regions were characterised by a broad spectrum of manufacturing and service industries.

Compared to the Badgerys Creek and Holsworthy regions, the Sydney Airport region features a greater proportion of declining industries such as textiles and clothing.

2.2 Current Employment, Turnover and Value Added

2.2.1 Current Employment: Sydney Airport, Badgerys Creek, Holsworthy Regions

Data from the Economic Regional Analysis Model indicate that employment within the Badgerys Creek region was 28 percent higher than within the Sydney Airport region and 13 percent higher than within the Holsworthy region.

It also showed that the largest employing industries in the Badgerys Creek and Holsworthy regions were engaged in *Wholesale trade*, *Retail trade* and *Other construction*. By contrast, *Air and Space Transport* and related industries were among the biggest employers at Sydney Airport (see Table A2-3).

Data presented in Table A2-3 indicate that ten industries accounted for over one-half of employment in each of these three regions. As would be expected, some of the largest employing industries such as *Wholesale trade* and *Retail trade* were generally included among the top ten industries by turnover.

In terms of employment (Table A2-3), *Retail trade*, *Wholesale trade* and *Other construction* accounted for around one-third of regional employment within both the Badgerys Creek and Holsworthy regions. These industries accounted for a relatively greater proportion of industry employment within the Sydney Airport region and for Australia generally.

Airport related industries such as *Air and space transport*, *Defence* and *Road transport* accounted for 20 percent of Sydney Airport's regional employment level in 1996. This compared with the Australian average of four percent. The three largest industries in terms of employment in the Sydney Airport Region were: *Wholesale trade*, *air and space transport* and *Defence*. These industry categories accounted for nearly 27 percent of the region's employment. For each of the regions, employment in *Accommodation*, *cafes and restaurants* ranked either seventh or eighth position on the industry employment ladder. This was approximately in line with the national ranking for this industry.

TABLE A2-3: TOP TEN INDUSTRIES BY EMPLOYMENT BY REGION IN 1996

Rank	Sydney Airport	%	Holsworthy	%	Badgerys Creek	%	Australia	%
1	Wholesale trade	11.0	Retail trade	13.6	Retail trade	13.5	Retail trade	11.1
2	Air and space transport	8.6	Wholesale trade	8.4	Wholesale trade	8.0	Wholesale trade	7.5
3	Defence ³	7.1	Other construction	5.8	Other construction	7.1	Health services	6.7
4	Retail trade	5.8	Education	5.6	Education	6.6	Education	6.4
5	Health services	5.6	Health services	5.1	Health services	5.2	Other construction	5.4
6	Education	4.9	Road transport	3.2	Road transport	3.7	Government administration	4.6
7	Road transport	4.5	Accommodation, cafes and restaurants	3.1	Accommodation, cafes and restaurants	3.0	Accommodation, cafes and restaurants	4.0
8	Accommodation, cafes and restaurants	4.0	Government administration	3.0	Other business services	2.7	Legal, accounting etc services	2.8
9	Services to transport, storage	3.6	Other business services	2.5	Government administration	2.5	Road transport	2.7
10	Government administration	2.9	Other electrical equipment	2.4	Residential building construction	2.3	Communication services	2.2
Total regional employment (percent)		58.0		52.7		54.6		53.4
Total regional employment		188,689		214,439		241,012		7,193,494

These data indicate that the remainder of economic activity in Sydney Airport included a strong representation of warehousing, and food and drink manufacturing and business services. A significant proportion of these industries provide goods and services to the *Air and space transport* industries and vice versa (see *Section 2.3*).

2.2.3 Turnover: Sydney Airport, Badgerys Creek, Holsworthy and Other Sydney

Data from the model indicate that the Badgerys Creek region was larger than either Sydney Airport or Holsworthy regions in terms of industry turnover in 1996 (see *Table A2-4*).

Notably, industry turnover at Badgerys Creek was concentrated in the Local Government Areas of Blacktown, Fairfield and Penrith. For Holsworthy, most industry activity was located in Bankstown, Sutherland Shire and Liverpool. By contrast, South Sydney and Botany were the main centres for industry activity in the Sydney Airport Region.

3 At first glance the 3rd ranking position of Defence as an employer in the Sydney Airport region appears surprising (especially as Defence does not rank in the Top 10 employers within the Holsworthy region). The Sydney Airport region includes an RAAF contract liaison office at Mascot, but most of the regional Defence employment is in South Sydney SLA and includes facilities at the Victoria Barracks, the Sydney University Regiment and the Naval Supply Centre at Zetland.

TABLE A2-4: TOP TEN INDUSTRIES BY TURNOVER 1996

Rank	Kingsford Smith	%	Holsworthy	%	Badgerys Creek	%	Australia	%
1	Air and space transport	18.9	Ownership of dwellings	7.5	Ownership of dwellings	8.4	Ownership of dwellings	6.5
2	Wholesale trade	7.2	Wholesale trade	5.9	Retail trade	5.8	Wholesale trade	5.5
3	Defence	6.1	Retail trade	5.7	Wholesale trade	5.7	Retail trade	4.8
4	Services to transport; storage	4.1	Residential building construction	3.9	Other construction	4.6	Health services	3.9
5	Road transport	3.4	Other construction	3.7	Residential building construction	4.3	Government administration	3.8
6	Ownership of dwellings	3.2	Petroleum and coal products	3.6	Road transport	3.1	Other construction	3.6
7	Communication services	3.0	Coal, oil and gas	3.1	Health services	3.0	Education	2.9
8	Health services	3.0	Other electrical equipment	2.9	Education	3.0	Legal, accounting and marketing	2.9
9	Retail trade	2.3	Health services	2.9	Coal, oil and gas	2.8	Residential building construction	2.8
10	Government administration	2.2	Road transport	2.6	Basic non-ferrous metal	2.7	Communication services	2.7
Share of turnover (percent)		53.4		41.8		43.4		39.4
Total 1996 turnover (\$bn)		23.57		25.02		27.55		808.1

Data presented in *Table A2-4* indicate that out of the 113 input/output industries, ten industries accounted for over 40 percent industry turnover within the Badgerys Creek, Holsworthy and Sydney Airport regions in 1996.

The data indicate that in 1996 the Badgerys Creek and Holsworthy regions shared a similar industry profile to the national average (see *Table A2-4*). *Ownership of dwellings*, *Wholesale trade* and *Retail trade* were among the top three industries by turnover in 1996, mirroring the rapidly growing residential nature of these regions. Indeed, turnover for *Residential building construction* and *Ownership of dwellings* accounted for around 13 percent and 12 percent of turnover for the Badgerys Creek and Holsworthy regions respectively. *Table A2-4* reveals that this was some 3 to 4 percentage points higher than for Australia and well above the level recorded for the Sydney Airport region.

Also, a number of industries such as *Wholesale trade* are equally prominent in both the Badgerys Creek and Holsworthy regions. However, there were some differences in the relative size of industries between the regions which include the two proposed sites (especially in respect of *Air and space transport* and *Petroleum and coal products*).

As expected, the Sydney Airport region's three largest industries by turnover were: *Air and space transport*, *Wholesale trade* and *Defence*. Together, these three industries accounted for around 32 percent of the Sydney Airport region's industry turnover and 27 percent of its total employment. *Air and space transport* was by far the Sydney Airport region's most predominant industry in terms of turnover. This reflected largely Sydney Airport's current position as Sydney's major gateway for domestic and international air transportation. It was more than twice as large as its nearest rival, *Wholesale trade*. It was also double the size of *Ownership of dwellings*. *Ownership of dwellings* ranked as Badgerys Creek and Holsworthy regions' number one industry. *Health services* was also among the top 10 largest industries reflecting its relatively high national significance.

2.2.4 Value-Added: Sydney Airport, Badgerys Creek, Holsworthy Regions

As would be expected, Badgerys Creek was the largest of the three regions in terms of value-added (i.e. total industry turnover minus use of intermediate goods). The data indicate that the level of value added within the Badgerys Creek region was 12 percent and 17 percent higher than in the Holsworthy and Sydney Airport regions respectively.

2.3 Growth Prospects

2.3.1 Industry Growth Potential - Air and Space Transport

The number of passenger movements through the Sydney basin is forecast to increase to 49 million by 2016 (an increase of nearly 150 percent from its current level of around 20 million or an annual average growth rate of more than 4 percent per year). This projected growth of passengers using air transport is consistent with industry growth estimated for *Air and space transport* embodied in the model if due allowance is made for likely falls in the real price of air travel and improvements in labour productivity as discussed below. Implicitly, the model projects that this expansion will occur at Sydney Airport. To develop the base case for the analysis presented in the following chapter it was decided to constrain the model such that passenger numbers were limited to 30 million for Sydney Airport for the purpose of this study.

A view has been taken that the practical limit to the capacity of Sydney Airport is 30 million passengers. This practical limit is based on increasing community concerns about noise and pollution that might result from further expansion of Sydney Airport. This represents a shortfall in airport capacity of 58.5 percent relative to the projected level of demand in 2016 as determined by the Air Traffic Forecasts.

There are a number of important economic implications of the air traffic forecasts which need to be seen alongside the model output. The comments below are provided in review of the projections used.

A key assumption supporting the plausibility of the potential growth of air transport is that persistent improvements to airline productivity worldwide (e.g. increased aircraft size) will contribute to a further fall in the real price of

travel (that is, after adjusting for the effect of changes in the consumer price index). This positive outlook for air transport is predicated, in part, on world oil prices remaining relatively constant over the period under review.

The expectation that the consumption of air transport services will grow by more than four percent per annum also needs to be put into perspective relative to the expected growth of population in the Sydney basin over the same 20 year period. Population growth forecasts suggest likely growth for the Sydney basin at 0.7 percent per annum over the period. To reconcile these differing growth rates it is implicit that the coming 20 years will be characterised by continued growth in real incomes, falls in the real price of air travel and increases in labour productivity within the air transport industry. These three trends are important for projections of future levels of employment and the impact of the Second Sydney Airport options on their regional economies. In particular, the projected growth in demand for air transport is only logically possible if there is a corresponding increase in labour productivity in the industries directly and indirectly associated with air transport.

A key assumption of the regional employment projections is that labour productivity will increase at around 1.5 percent per annum over the period 1996 to 2016. This is slightly lower than the rate of labour productivity improvement achieved by the market sector of the Australian economy over the period 1978 to 1996 (using data derived from Australian Bureau of Statistics *Australian National Accounts* Cat. No. 5206.0). Further evidence of improvements in productivity within the air transport industry was provided in the 1996 *Annual Report* of the Federal Airports Corporation where it was reported that in 1995/96 passengers moving through Sydney airport increased by 13.1 percent over the previous year, passengers per flight increased by 1.3 percent and passengers per Federal Airports Corporation employee increased by 7.7 percent.

Air and space transport in the Statistical Division of Sydney is projected to double turnover and add nearly 80 percent to its current employment level by the year 2016 (see Table A2-5). To put these increases into perspective the projected growth of passenger numbers over the same period is nearly 150 percent, with the difference in the three growth rates being explained by falls in the real price of air transport and improvements in labour productivity.

TABLE A2-5 SYDNEY: AIR AND SPACE TRANSPORT (49 MILLION PASSENGERS BY 2016)

Year	Turnover \$billion (1996 prices)	% change	Employment numbers	% change
1996	4.7		17,370	
2006	6.7	42.3	23,610	35.9
2016	9.4	100.8	31,032	78.7

In the absence of a Second Sydney Airport, the data from the model indicate that Badgerys Creek and Holsworthy would continue to remain mainly subject to broader macro-economic factors. This would largely hold true, irrespective of whether there were further developments at Sydney Airport.

Industry Prospects - Other Industries

Industry prospects are based on an evaluation of general economic conditions along with an assessment of specific industry risks and opportunities. Implicit in these forecasts is average real growth of 3.4 percent a year for turnover and 1.9 percent for employment as an average across all industries in the Australian economy. As noted above average growth in labour productivity is assumed to be 1.5 percent per annum.

Data from the model showed that ten industries out of 113 analysed were expected to grow by at least 4 percent a year over the forecast period (see Table A2-6).

TABLE A2-6 TOP 10 INDUSTRIES BY GROWTH IN TURNOVER

Rank	Industries	Expected Growth Total Percentage Growth 1996 to 2016	Percentage Annual Growth
1	Communication services	155.9	4.8
2	Services to mining	146.8	4.8
3	Accommodation, cafes and restaurants	140.0	4.5
4	Non-ferrous metal ores	133.0	4.3
5	Sheet metal products	125.3	4.2
6	Structural metal products	125.3	4.2
7	Medicinal and pharmaceutical	123.3	4.1
8	Basic non-ferrous metal and pr	121.2	4.0
9	Services to finance, investment	119.1	4.0
10	Insurance	119.1	4.0
Average of top 10		131.9	4.3

High growth performers include *Communication services*, *Services to mining* and *Accommodation, cafes and restaurants*. Throughout the Australian economy these 10 industries currently account for around 10 percent of regional turnover. Within the three regions, they also account for around 10 percent of respective employment levels. This is expected to edge one percentage point higher over the next decade. Total real growth among these top ten is expected to average around 53 percent over the course of the next ten years.

Air and space transport, failed to rank in Table A2-6 despite its relatively positive growth outlook.

2.3.2 Growth Prospects for Regions to 2006 and 2016: No Limit to Sydney Airport Expansion

Employment

Employment for the Sydney Statistical Division is forecast to grow by 22.5 percent in the 10 years to 2006 and by 47 percent over 20 years. Similar employment growth is expected for the Badgerys Creek, Holsworthy and

Sydney Airport regions. Compared to the other sites, Badgerys Creek is forecast to maintain its dominant share of total employment at 14 percent for the period under review.

TABLE A2-7 TOTAL EMPLOYMENT BY REGION: NO LIMIT ON AIR TRANSPORT GROWTH

Scenarios	Sydney Airport	Badgerys Creek	Holsworthy	Sydney Statistical Division
1996	188,690	241,012	214,439	1,667,288
2006	229,668	293,233	261,173	2,041,689
2016	274,756	350,307	312,004	2,456,257

Turnover

Turnover for the three regions is forecast to grow by 37 percent to 2006 and by 90 percent in 2016, in line with Sydney as a whole. Of these, the Badgerys Creek region is forecast to remain the largest of these three regions.

TABLE A2-8 TOTAL TURNOVER BY REGION: NO LIMIT ON AIR TRANSPORT GROWTH (\$ MILLION IN 1996 PRICES)

Scenarios	Sydney Airport	Badgerys Creek	Holsworthy	Sydney Statistical Division
1996	23,573	27,546	25,025	189,047
2006	32,258	37,880	34,432	261,076
2016	44,406	52,157	47,477	362,274

Value added

Value added in the Sydney Statistical Division is forecast to grow by 39 percent in 10 years to 2006 and to nearly double in size by the year 2016. In terms of value added, the Sydney Airport, Badgerys Creek and Holsworthy regions are forecast to grow in tandem with the Sydney Statistical area over the next two decades (see Table A2-9). Consistent with these projections, the Badgerys Creek, Holsworthy and Sydney Airport regions are expected to maintain their respective share of total value added. Badgerys Creek will remain dominant with its share of total value added maintained at 14 percent of the Sydney Statistical Division total.

TABLE A2-9 VALUE ADDED BY REGION: NO LIMIT ON AIR TRANSPORT GROWTH (\$ MILLION IN 1996 PRICES)

Scenarios	Sydney Airport	Badgerys Creek	Holsworthy	Sydney Statistical Division
1996	12,352	14,558	13,015	103,282
2006	17,025	20,092	17,969	143,362
2016	23,590	27,761	24,855	199,877

2.3.3 Growth prospects for regions to 2006 and 2016: Sydney Airport limited to 30 million passengers

Employment

Capping passenger numbers at Sydney Airport to a level of 30 million passengers would result in a potential foregoing of 17,097 jobs for the Sydney Statistical Division in 2016 (see *Table 2.10*). The Sydney Airport region would bear the brunt of the constraint. Employment at Sydney Airport would be expected to be around four percent lower after 20 years than would otherwise be expected if passenger numbers were able to climb to 49 million a year. In interpreting this impact it is important to bear in mind the smaller number of persons required per passenger movement (more than 30 percent less) in 2016 as a result of projected improvements in labour productivity.

TABLE A2-10 TOTAL EMPLOYMENT: SYDNEY AIRPORT AT 30 MILLION PASSENGERS AND NO SECOND AIRPORT

	Sydney Airport	Badgerys Creek	Holsworthy	Sydney Statistical Division
Level 2006	226,358	293,050	261,010	2,036,925
Percentage change from 1996	20.0	21.6	21.7	22.2
Impact of constraint	-3,310	-183	-163	-4,764
Percentage impact	-1.4	-0.1	-0.1	-0.2
Level 2016	262,689	349,679	311,445	2,439,160
Impact of constraint	-12,067	-628	-559	-17,097
Percentage impact	-4.4	-0.2	-0.2	-0.7

Turnover

Turnover for the Sydney Statistical Division is forecast to grow by 37.5 percent in the 10 years to 2006 and by 89 percent in the 20 years to 2016 (see *Table A2-11*). However, a lack of airport capacity which limits passenger numbers to 30 million per year is estimated to reduce Sydney's industry turnover by 1.3 percent or \$4.6 billion by 2016.

TABLE A2-11 TURNOVER: SYDNEY AIRPORT AT 30 MILLION PASSENGERS AND NO SECOND AIRPORT (\$MILLION 1996 PRICES)

	Sydney Airport	Badgerys Creek	Holsworthy	Sydney Statistical Division
Level 2006	31,344	37,846	34,401	259,891
Percentage change from 1996	33.0	37.4	37.5	37
Impact of constraint	-914	-34	-31	-1,184
Percentage impact	-2.8	-0.1	-0.1	-0.05
Level 2016	40,815	52,024	47,355	357,623
Impact of constraint	-3,591	-133	-121	-4,650
Percentage impact	-8.1	-0.3	-0.3	-1.3

Value added

Value added is forecast to grow by 38 percent in the decade to 2006 and by 91 percent over 20 years to 2016 for the Sydney region (see *Table A2-12*). Data from the Economic Regional Analysis Model suggest that value added in Sydney would be some 1.2 percent lower than what would otherwise be expected in 2016. The economy of Sydney would thereby lose \$2.4 billion of annual economic output as a result of a lack of airport capacity in 2016. All regions of Sydney including the Holsworthy and Badgerys Creek regions would be expected to experience economic loss as a result of limited airport capacity.

TABLE A2-12 VALUE ADDED: SYDNEY AIRPORT AT 30 MILLION PASSENGERS AND NO SECOND AIRPORT (\$ MILLION 1996 PRICES)

	Sydney Airport	Badgerys Creek	Holsworthy	Sydney Statistical Division
Level 2006	16,546	20,076	17,956	142,756
Percentage change from 1996	33.9	37.9	38.0	38.2
Impact of constraint	-480	-15	-14	-606
Percentage impact	-2.8	-0.1	-0.1	-0.4
Level 2016	21,706	27,701	24,801	197,499
Impact of constraint	-1,884	-60	-54	-2,378
Percentage impact	-8.0	-0.2	-0.2	-1.2

CHAPTER 3: OPERATIONAL PHASE: ECONOMIC AND REGIONAL ECONOMIC IMPACTS

3.1 Scenarios evaluated

This chapter analyses the impact of the two second airport scenarios on employment, turnover and value added of *Air and space transport* using the model. Sydney Airport, Badgerys Creek and Holsworthy regions are each examined in turn.

Two air traffic forecasts are used, reflecting the highest level of activity at the second airport among the Air Traffic Forecasts at 2006 and 2016. These forecasts were chosen as maximum impact scenarios within the overall EIS process. There are no direct links between the two forecasts, which are as follows:

- **Air Traffic Forecast 2**

Where the Second Sydney Airport would be developed to cater for 10 million passengers per annum by 2006, with all further growth after this time being directed to the Second Sydney Airport rather than Sydney Airport.

- **Air Traffic Forecast 3**

Which is similar to Air Traffic Forecast 2, but with more international flights being directed to the Second Sydney Airport. This would also result in the larger and relatively more noisy aircraft being directed to the Second Sydney Airport.

Each of the Air Traffic Forecasts is examined relative to Sydney Airport with an assumed maximum capacity of 30 million passengers and with no second airport (the implications of which are set out in *Chapter 2*). The key time frames used to illustrate these scenarios and their accompanying impacts are 2006 and 2016.

3.2 Regional Impacts of Air Traffic Forecast 2 and 3

3.2.1 Employment: Air and Space Transport

When passenger numbers at Sydney Airport reach 24.8 million passengers in 2006 consistent with Air Traffic Forecast 2 the result is a foregoing of potential employment of 3,331 jobs relative to Sydney Airport handling 30 million passengers and without a second airport. However, the increase in employment within the *Air and space transport* industry category resulting from the Second Sydney Airport sites is estimated to be 6,183 and 5,872 for Badgerys Creek and Holsworthy respectively in 2006.

Under Air Traffic Forecast 3 passenger numbers at Sydney Airport are forecast to be 19.7 million passengers in 2016. This is estimated to result in a foregoing of 6,129 potential jobs in *Air and space transport* at Sydney Airport, relative to Sydney Airport handling 30 million passengers. Under

this scenario employment in *Air and space transport* would increase by 17,190 and 16,779 to 17,349 and 17,189 respectively for Badgerys Creek and Holsworthy by 2016.

TABLE A3-1 EMPLOYMENT: AIR AND SPACE TRANSPORT

	Sydney Airport	Second Sydney Airport		Other Sydney		Sydney Statistical Division
		Badgerys Creek	Holsworthy	Badgerys Creek	Holsworthy	
Sydney Airport at 30 million passengers and no second airport						
Level 2006	19,095	171	440	1,040	771	20,305
Level 2016	17,802	159	410	969	719	18,930
Air Traffic Forecast 2						
Level 2006	15,764	6,354	6,312	1,492	1,534	23,610
Impact	-3,331	6,183	5,872	453	764	3,305
Air Traffic Forecast 3						
Level 2016	11,673	17,349	17,189	2,010	2,170	31,032
Impact	-6,129	17,190	16,779	1,041	1,452	12,102

3.2.2 Turnover: Air and Space Transport

Turnover for *Air and space transport* at Sydney Airport is reduced by 17 percent under Air Traffic Forecast 2, to \$4.5 billion (1996 prices) in 2006 relative to a situation where Sydney Airport handles 30 million passengers. The joint impact of increasing total passenger numbers by 3.4 million per year and shifting activity to the Second Sydney Airport would see the turnover of *Air and space transport* increasing from negligible levels to \$1.8 billion in each of Badgerys Creek and Holsworthy regions.

Under Air Traffic Forecast 3 the level of turnover increases even further to about \$5.3 billion in each of the Second Sydney Airport alternatives.

TABLE A3-2 TURNOVER: AIR AND SPACE TRANSPORT (\$ MILLION 1996 PRICES)

	Sydney Airport	Second Sydney Airport		Other Sydney		Sydney Statistical Division
		Badgerys Creek	Holsworthy	Badgerys Creek	Holsworthy	
Sydney Airport at 30 million passengers and no second airport						
Level 2006	5,411	125	48	218	294	5,754
Level 2016	5,414	125	48	218	295	5,757
Air Traffic Forecast 2						
Level 2006	4,467	1,809	1,808	414	415	6,690
Impact	-944	1,684	1,760	197	121	937
Air Traffic Forecast 3						
Level 2016	3,550	5,307	5,307	580	580	9,437
Impact	-1,864	5,182	5,259	362	286	3,681

3.2.3 Value Added: Air and Space Transport

Value added for *Air and space transport* at Sydney Airport is reduced by 17 percent under Air Traffic Forecast 2, to \$2.4 billion (1996 prices) in 2006 relative to a situation where Sydney Airport handles 30 million passengers. The joint impact of increasing total passenger numbers by 3.4 million per year and shifting activity to the Second Sydney Airport would see the turnover of *Air and space transport* increasing from negligible levels to \$950 million in each of Badgerys Creek and Holsworthy regions.

Under Air traffic Forecast 3 the level of value added increases even further to about \$2.8 billion in each of the Second Sydney Airport alternatives.

TABLE A3-3 VALUE ADDED: AIR AND SPACE TRANSPORT (\$ MILLION 1996 PRICES)

	Sydney Airport	Second Sydney Airport		Other Sydney		Sydney Statistical Division
		Badgerys Creek	Holsworthy	Badgerys Creek	Holsworthy	
Sydney Airport at 30 million passengers and no second airport						
Level 2006	2,849	66	25	115	155	3,029
Level 2016	2,850	66	25	115	155	3,031
Air Traffic Forecast 2						
Level 2006	2,352	952	952	218	218	3,523
Impact	-497	887	927	103	63	493
Air Traffic Forecast 3						
Level 2016	1,869	2,794	2,794	306	305	4,969
Impact	-981	2,729	2,769	191	150	1,938

3.3 Flow-on (Multiplier) Effects of the Second Sydney Airport

3.3.1 Use of Multipliers in Regional Analysis

At a more general level, great care should be taken in relying on input/output multipliers. In reality all industries are inter-related and it is dangerous to assume that one particular industry causes activity to be generated in other industries. Total multipliers for all industries in the Australian economy vary between 1.7 and 3.2. (Australian Bureau of Statistics, 1996d). Therefore, it is possible to undertake separate studies of the importance of each to the Australian economy and then add the results. In terms of employment it might be concluded, for example, that collectively these industries had generated between 1.7 and 3.2 times the total employment of the whole economy. Clearly, this would be a nonsensical answer. The results of studies using input/output multipliers are most likely to be useful for small changes in economic activity in economies which are less than fully utilising their labour, capital and other resources.

3.3.2 Multiplier Effects by Regions and Scenario

As set out in the previous section, the establishment of a Second Sydney Airport under Air Traffic Forecasts 2 and 3 would be expected to result in a substantial increase in employment in *Air and space transport* in either the Badgerys Creek or Holsworthy regions and fewer employed in the same industry within the Sydney Airport Region. Changes in employment in *Air and space transport* would also be expected to be accompanied by impacts on the employment of other industries within these regions. These employment effects are summarised in Table A3-4. For Sydney as a whole and the three regions, five categories of employment are provided:

- Initial: representing estimated employment in *Air and space transport* within each of the defined regions;
- Flow-on, Production induced within region: representing the impact of the expansion of *Air and space transport* on other industries which supply inputs to *Air and space transport* as estimated by the Economic Regional Analysis Model;
- Flow-on, Production induced outside region: representing the impact of the expansion of the *Air and space transport* on other industries which supply inputs but are located in other regions of Sydney;
- Flow-on, Consumption induced overall: representing the effects of expenditures from wages and profits generated by the industry expansion as estimated from multipliers published by the Australian Bureau of Statistics for the Transport and Storage sector;
- Flow-on, Consumption induced pro rata to regions: representing the effects of expenditures from wages and profits generated by the industry expansion allocated to regions in proportion to employment numbers; and
- Totals: representing the estimated regional and Sydney employment impacts.

TABLE A3-4 EMPLOYMENT: INITIAL AND FLOW-ON IMPACTS

	Passenger Numbers (million)	Initial Air and Space Transport	Flow-on- effects Production Induced Within Region	Production Induced Outside Region	Consump- tion Induced Overall	Consumption Induced - Prorata to Region	Totals Regional	Overall
<i>Sydney Statistical Division</i>								
1996	19.7	17,370	10,474		14,122			41,966
2006	34.8	23,610	14,237		19,195			57,042
2016	49	31,032	18,712		25,229			74,973
<i>Badgerys Creek Region</i>								
1996	0	146	64	24	119	17	227	346
2006	10	6,354	2,802	1,029	5,166	742	9,898	15,064
2016	29.3	17,349	7,165	3,296	14,105	2,012	26,526	40,630
<i>Holsworthy Region</i>								
1996	0	376	165	61	306	39	581	886
2006	10	6,312	2,784	1,023	5,132	656	9,752	14,884
2016	29.3	17,189	7,099	3,266	13,975	1,775	26,063	40,038
<i>Sydney Airport Region</i>								
1996	19.7	16,335	7,187	2,646	13,280	1,503	25,025	38,306
2006	24.8	15,764	6,952	2,554	12,816	1,442	24,158	36,974
2016	19.7	11,673	4,821	2,218	9,490	1,062	17,556	27,046

The overall multipliers vary slightly between regions and years but are typically around 2.4. That is, for every person employed there are a further 1.4 persons employed in related industries. As noted earlier, care should be taken in interpreting these results as representing a causal link between airport employment and employment elsewhere. A better interpretation is that the broader measure of employment illustrates the quantum of employment that is directly or indirectly influenced by air transport in the corresponding regions. However, there will be other industries also influencing the future of these direct and indirect areas of employment other than air transport.

These results indicate a smaller number of persons employed directly and indirectly than those provided in the Institute of Transport Studies (1996). The main reason for this is that this study started with the defined industry category, *Air and space transport*, and then applied estimates of employment linkages. In contrast, the Institute of Transport Studies used a combination of industries to represent an airport.

For 1996, estimates presented in Table 3-4 indicate that direct employment in Sydney as a result of *Air and space transport* was 17,370, which with flow-on effects, increases to 41,966. In contrast the Institute of Transport Studies identifies direct employment in 'airport-related' activities of 33,509 for 1995, with flow-on effects increasing this to 66,590. As discussed earlier, there are significant methodological differences between the studies. Note also that for the Economic Regional Analysis Model results, the 1996 year referred to in this report is the financial year ended 30 June 1996 and therefore there is an overlap between the 1995 data from the Institute of Transport Studies and data generated for this report.

For the regional results, differences are smaller. The Sydney Airport region as defined in this report is much narrower than that defined by the Institute of Transport Studies see *Section 2.1.1*). The differences in total employment generated for the airport region are 38,306 and 44,380 respectively for this and the earlier study in the base year.

Results for 2006 and 2016 require further clarification because of the assumed impact of improved labour productivity. The Economic Regional Analysis Model includes as an assumption improvements in labour productivity of around 1.5 percent per year. Hence, an airport will require around one-third less labour to handle the same number of passengers in 2016 compared with 1996. For example, under Air Traffic Forecast 3 Sydney Airport is assumed to be handling the same number of passengers in 2016 as it did in 1996, although direct employment in *Air and space transport* is assumed to decline from 17,370 to 11,673.

The flow-on effects in relation to turnover and value added are similar to those for employment and are set out in *Tables A3-5* and *A3-6*. The estimated turnover of *Air and space transport* and related industries for 1995/96 is somewhat higher than that identified by the Institute of Transport Studies for 1995 and there is insufficient information available from the earlier study to explain the differences.

TABLE A3-5 TURNOVER: INITIAL AND FLOW-ON IMPACTS (\$ MILLION 1996 PRICES)

	Passenger Numbers (million)	Initial Air and Space Transport	Flow-on- effects Production Induced Within Region	Production Induced Outside Region	Consump- tion Induced Overall	Consumption Induced - Prorata to Region	Totals Regional	Overall
<i>Sydney Statistical Division</i>								
1996	19.7	4,738	2,857		3,852			11,447
2006	34.8	6,690	4,034		5,439			16,163
2016	49	9,437	5,691		7,672			22,800
<i>Badgerys Creek Region</i>								
1996	0	40	18	6	33	5	62	95
2006	10	1,808	797	293	1,470	211	2,816	4,286
2016	29.3	5,307	2,192	1,003	4,315	615	8,114	12,429
<i>Holsworthy Region</i>								
1996	0	103	45	17	84	11	159	243
2006	10	1,809	798	293	1,471	188	2,795	4,266
2016	29.3	5,307	2,192	1,008	4,315	548	8,047	12,361
<i>Sydney Airport Region</i>								
1996	19.7	4,445	1,956	720	3,614	409	6,810	10,424
2006	24.8	4,467	1,970	724	3,632	409	6,845	10,477
2016	19.7	3,550	1,466	675	2,886	323	5,339	8,225

TABLE A3-6 VALUE ADDED: INITIAL AND FLOW-ON IMPACTS (\$ MILLION 1996 PRICES)

	Passenger Numbers (million)	Initial Air and Space Transport	Flow-on- effects Production Induced Within Region	Production Induced Outside Region	Consump- tion Induced Overall	Consumption Induced - Prorata to Region	Totals Regional	Overall
<i>Sydney Statistical Division</i>								
1996	19.7	2,495	1,504		2,028			6,028
2006	34.8	3,522	2,124		2,863			8,509
2016	49	4,969	2,996		4,040			12,005
<i>Badgerys Creek Region</i>								
1996	0	21	9	3	17	2	33	50
2006	10	952	420	154	774	111	1,483	2,257
2016	29.3	2,794	1,154	531	2,272	324	4,272	6,543
<i>Holsworthy Region</i>								
1996	0	54	24	9	44	6	83	127
2006	10	952	420	154	774	99	1,471	2,245
2016	29.3	2,794	1,154	531	2,272	289	4,236	6,508
<i>Sydney Airport Region</i>								
1996	19.7	2,346	1,032	380	1,907	216	3,594	5,501
2006	24.8	2,352	1,037	381	1,912	215	3,604	5,517
2016	19.7	1,869	772	355	1,519	170	2,811	4,330

3.4 Air Traffic Forecast 2: Industry Impacts by Region

3.4.1 Employment

More than 9,000 additional full-time jobs are forecast to be created by the Sydney Second Airport at either Badgerys Creek or Holsworthy under Air Traffic Forecast 2 (see Table A3-7). The main industry to benefit is: *Air and space transport* with about 70 percent of the increase in employment. All other industries benefit by eight percent or less, with the main ones being: *Accommodation, cafes and restaurants, Aircraft, Services to transport and storage and Wholesale trade*.

TABLE A3-7 DIRECT AND FLOW-ON EMPLOYMENT: AIR TRAFFIC FORECAST 2: INDUSTRIES BY ORDER OF IMPACT ON EMPLOYMENT 2006

Badgerys Creek Region			Holsworthy Region		
Rank	Industry	Employment	Rank	Industry	Employment
1	Air and space transport	6,354	1	Air and space transport	6,312
2	Accommodation, cafes and restaurants	527	2	Aircraft	732
3	Wholesale trade	419	3	Services to transport; storage	466
4	Services to transport; storage	347	4	Accommodation, cafes and restaurants	343
5	Plastic products	288	5	Wholesale trade	274
6	Aircraft	228	6	Plastic products	223
7	Legal, accounting, marketing	196	7	Legal, accounting, marketing	134
8	Road transport	146	8	Petroleum and coal products	131
9	Other business services	103	9	Road transport	80
10	Communication services	100	10	Communication services	73
Total of top 10 industries		8,708	Total top 10		8,767
Percent of top ten		100	Percent of top ten		100
Percent of regional impact		95	Percent of regional impact		96
Total impact		9,156	Total impact		9,096

3.4.2 Turnover

Additional turnover of \$2.6 billion is estimated to be generated by Air traffic Forecast 2 within either the Badgerys Creek or Holsworthy regions in 2006. The main industry forecast to benefit is *Air and space transport*, with smaller increases to *Aircraft*, *Petroleum and coal products* and *Services to transport and storage*.

TABLE A3-8 DIRECT AND FLOW-ON TURNOVER: AIR TRAFFIC FORECAST 2: INDUSTRIES BY ORDER OF IMPACT ON TURNOVER 2006 (\$ MILLION 1996 PRICES)

Badgerys Creek Region			Holsworthy Region		
Rank	Industry	Turnover	Rank	Industry	Turnover
1	Air and space transport	1,808	1	Air and space transport	1,809
2	Aircraft	199	2	Aircraft	308
3	Petroleum and coal products	114	3	Petroleum and coal products	232
4	Services to transport; storage	101	4	Services to transport; storage	78
5	Plastic products	87	5	Plastic products	44
6	Accommodation, cafes and restaurants	65	6	Wholesale trade	27
7	Wholesale trade	54	7	Accommodation, cafes and restaurants	25
8	Legal, accounting, marketing	46	8	Legal, accounting, marketing	19
9	Road transport	26	9	Communication services	11
10	Communication services	20	10	Paperboard containers; paper bags	11
Top 10 industries		2,520	Total top 10		2,565
Percent of top 10		100	Percent of total top 10		100
Percent of regional impact		97	Percent of regional impact		98
Total impact		2,605	Total impact		2,607

3.4.3 Value Added

Additional value added of \$1.4 billion is estimated to be generated by Air Traffic Forecast 2 within either the Badgerys Creek or Holsworthy regions in 2006. The main industries forecast to benefit are the same as those for turnover, namely: *Air and space transport*, *Aircraft*, *Petroleum and coal products* and *Services to transport and storage*.

TABLE A3-9 DIRECT AND FLOW-ON VALUE ADDED: AIR TRAFFIC FORECAST 2: INDUSTRIES BY ORDER OF IMPACT ON VALUE ADDED 2006 (\$ MILLION 1996 PRICES)

Badgerys Creek Region			Holsworthy Region		
Rank	Industry	Value added	Rank	Industry	Value added
1	Air and space transport	952	1	Air and space transport	952
2	Aircraft	105	2	Aircraft	162
3	Petroleum and coal products	60	3	Petroleum and coal products	122
4	Services to transport; storage	53	4	Services to transport; storage	41
5	Plastic products	46	5	Plastic products	23
6	Accommodation, cafes and restaurants	34	6	Wholesale trade	14
7	Wholesale trade	29	7	Accommodation, cafes and restaurants	13
8	Legal, accounting, marketing	24	8	Legal, accounting, marketing	10
9	Road transport	13	9	Communication services	6
10	Communication services	10	10	Paperboard containers; paper bags	6
Top 10 industries		1,327	Total top 10		1,350
Percent of top 10		100	Percent of total top 10		100
Percent of regional impact		97	Percent of regional impact		98
Total impact		1,372	Total impact		1,372

3.5 Air Traffic Forecast 3: Regional and Industry Impacts

3.3.1 Employment

About 24,000 additional full-time jobs are forecast to be created by the Sydney Second Airport at either Badgerys Creek or Holsworthy under Air Traffic Forecast 3 (see Table A3-10). The main industries to benefit are: *Air and space transport, Accommodation, cafes and restaurants, Aircraft, Services to transport and storage and Wholesale trade.*

TABLE A3-10 DIRECT AND FLOW-ON EMPLOYMENT: AIR TRAFFIC FORECAST 3: INDUSTRIES BY ORDER OF IMPACT ON EMPLOYMENT 2016

Badgerys Creek Region			Holsworthy Region		
Rank	Industry	Employment	Rank	Industry	Employment
1	Air and space transport	17,349	1	Air and space transport	17,189
2	Accommodation, cafes and restaurants	1,600	2	Aircraft	1,505
3	Wholesale trade	1,034	3	Services to transport; storage	1,051
4	Services to transport; storage	853	4	Accommodation, cafes and restaurants	955
5	Plastic products	629	5	Wholesale trade	622
6	Aircraft	511	6	Plastic products	447
7	Legal, accounting, marketing	504	7	Legal, accounting, marketing	318
8	Road transport	350	8	Petroleum and coal products	301
9	Communication services	310	9	Communication services	208
10	Other business services	266	10	Road transport	176
Total top 10		23,407	Total top 10		22,770
Percent of top 10		100	Percent of top 10		100
Percent of regional impact		95	Percent of regional impact		97
Total impact		24,514	Total impact		23,524

3.5.2 Turnover

Additional turnover of \$7.5 billion is estimated to be generated by Air traffic Forecast 3 within either the Badgerys Creek or Holsworthy regions in 2016. The main industries forecast to benefit are *Air and space transport*, *Aircraft*, *Petroleum and coal products* and *Services to transport and storage*.

TABLE A3-11 DIRECT AND FLOW-ON TURNOVER: AIR TRAFFIC FORECAST 3: INDUSTRIES BY ORDER OF IMPACT ON TURNOVER 2016 (\$ MILLION 1996 PRICES)

Badgerys Creek Region			Holsworthy Region		
Rank	Industry	Turnover	Rank	Industry	Turnover
1	Air and space transport	5,307	1	Air and space transport	5,307
2	Aircraft	549	2	Aircraft	852
3	Petroleum and coal products	316	3	Petroleum and coal products	641
4	Services to transport; storage	266	4	Services to transport; storage	206
5	Plastic products	228	5	Plastic products	117
6	Accommodation, cafes and restaurants	199	6	Accommodation, cafes and restaurants	76
7	Wholesale trade	143	7	Wholesale trade	70
8	Legal, accounting, marketing	133	8	Legal, accounting, marketing	56
9	Road transport	67	9	Communication services	35
10	Communication services	62	10	Paperboard containers; paper bags	30
Total top 10		7,272	Total top 10		7,388
Percent of top 10		100	Percent of top 10		100
Percent of total impact		97	Percent of total impact		99
Total impact		7,499	Total impact		7,499

3.5.3 Value added

Additional value added of nearly \$4 billion is estimated to be generated by Air Traffic Forecast 3 within either the Badgerys Creek or Holsworthy regions in 2016. The main industries forecast to benefit are similar to those for turnover, namely: *Air and space transport, Aircraft, Petroleum and coal products, Services to transport and storage, and Wholesale trade.*

TABLE A3-12 DIRECT AND FLOW-ON VALUE ADDED: AIR TRAFFIC FORECAST 3: INDUSTRIES BY ORDER OF IMPACT ON VALUE ADDED 2016 (\$ MILLION 1996 PRICES)

Badgerys Creek Region			Holsworthy Region		
Rank	Industry	Value added	Rank	Industry	Value added
1	Air and space transport	2,794	1	Air and space transport	2,794
2	Aircraft	207	2	Aircraft	508
3	Services to transport; storage	164	3	Services to transport; storage	168
4	Wholesale trade	138	4	Petroleum and coal products	105
5	Accommodation, cafes and restaurants	112	5	Wholesale trade	69
6	Plastic products	105	6	Plastic products	62
7	Legal, accounting, marketing	88	7	Accommodation, cafes and restaurants	56
8	Petroleum and coal products	66	8	Legal, accounting, marketing	46
9	Communication services	64	9	Communication services	36
10	Road transport	55	10	Road transport	23
Total top 10		3,793	Total top 10		3,866
Percent of top 10		100	Percent of top 10		100
Percent of total impact		96	Percent of total impact		98
Total impact		3,948	Total impact		3,948

3.6 Industry Interactions

3.6.1 Industry Interactions

This section highlights regional and industry interactions with *Air and space transport*. It shows that these relationships are neither confined to one region nor one industry. Sections 3.6.2 and 3.6.3 show that *Air and space transport* is a significant purchaser of goods and services from a broad cross section of industries. Also, the industry itself is shown as a significant purchaser of *Air and space transport* industry services. Data from the model suggest that this symbiotic relationship is not confined to one region or industry. Therefore, any benefit arising from a Second Sydney Airport would be expected to be shared, to some extent, with other regions of Sydney.

3.6.2 Expenditure on Air Transport by Regions

Table A3-13 ranks industry expenditure by Statistical Subdivision within Sydney. Out of 14 subdivisions in 1996, Inner Sydney was the number one source for industry expenditure on air transport services. Lower North Sydney ranked number two (which was less than half the expenditure incurred by Inner Sydney), followed by Central Western Sydney. These three subdivisions accounted for over one-half of expenditure on *Air and space transport* in the Sydney catchment area. They are likely to account for the greatest concentration of potential users of airline services. These rankings are expected to persist over the next two decades.

Over the period from 1996 to 2016, Inner Western Sydney (96.7 percent) is projected to exhibit the strongest increase in industry expenditure on air transport services, closely followed by Lower Northern Sydney (94.5 percent) and Hornsby-Ku-ring-gai (90.5 percent). Weakest expenditure growth will be experienced by the subdivisions of Fairfield-Liverpool (81.8 percent), Outer Western Sydney (83.2 percent) and St George-Sutherland (84.0 percent). Overall, expenditure for the 14 subdivisions on air transport services by industry is forecast to nearly double in 20 years.

TABLE A3.13 EXPENDITURE BY INDUSTRY ON AIR TRANSPORT BY STATISTICAL SUBDIVISION (\$ MILLION 1996 PRICES)

Rank	Industry	1996		2006		2016		Total Percentage Increase		
		\$	%	\$	%	\$	%	1996 to 2006	2006 to 2016	1996 to 2016
1	Inner Sydney	388	34.0	524	33.7	716	33.5	35.0	36.7	84.5
2	Lower Northern Sydney	152	13.3	211	13.6	296	13.9	38.8	40.2	94.5
3	Central Western Sydney	112	9.8	152	9.8	208	9.7	35.6	37.1	85.9
4	Canterbury-Bankstown	66	5.7	89	5.7	122	5.7	36.0	37.2	86.5
5	St. George-Sutherland	64	5.6	86	5.5	117	5.5	34.9	36.4	84.0
6	Blacktown-Baulkham Hills	55	4.8	75	4.9	104	4.9	36.7	37.8	88.4
7	Inner Western Sydney	46	4.0	64	4.1	90	4.2	39.7	40.8	96.7
8	Fairfield-Liverpool	49	4.3	66	4.2	89	4.2	34.4	35.3	81.8
9	Manly-Warringah	44	3.8	60	3.8	82	3.9	36.6	37.7	88.1
10	Eastern Suburbs	36	3.2	50	3.2	69	3.2	37.1	38.5	89.8

Rank	Industry	1996		2006		2016		Total Percentage Increase		
		\$	%	\$	%	\$	%	1996 to 2006	2006 to 2016	1996 to 2016
11	Gosford-Wyong	36	3.1	49	3.1	67	3.1	36.2	37.4	87.1
12	Outer Western Sydney	36	3.1	48	3.1	66	3.1	34.7	36.1	83.2
13	Hornsby-Ku-ring-gai	34	3.0	46	3.0	64	3.0	37.4	38.7	90.5
14	Outer South Western Sydney	25	2.2	34	2.2	46	2.2	36.1	36.7	86.0
Total		1,142	100.0	1,553	100.0	2,137	100.0	36.1	37.6	87.2

3.6.3 Expenditure by air transport on industry

Data extracted from the model show that *Air and space transport* in the Sydney Airport region is a significant purchaser of inputs from a broad range of industries (see Table A3-14). Ten industries account for 90 percent of expenditure by *Air and space transport*. Three of these industries accounted for 60 percent of airline related expenditure, namely *Petroleum and coal products*, *Services to transport and storage* and *Aircraft*. Expenditure is forecast to remain relatively constant over the forecast time frames.

TABLE A3-14 EXPENDITURE BY AIR AND SPACE TRANSPORT BY TOP TEN RECIPIENT INDUSTRIES: SYDNEY AIRPORT (\$ MILLION 1996 PRICES)

Rank	Industry	1996	2006	2016	Percentage of Expenditure
1	Petroleum and coal products	486	687	969	23.1
2	Services to transport; storage	407	575	812	19.3
3	Aircraft	376	310	749	17.8
4	Accommodation, cafes and restaurants	149	210	296	7.0
5	Legal, accounting, marketing	147	207	292	6.9
6	Wholesale trade	115	162	229	5.4
7	Plastic products	72	101	143	3.4
8	Communication services	53	75	106	2.5
9	Scientific research, technical	44	61	87	2.1
10	Road transport	39	55	77	1.8
Total		1,887	2,665	3,759	89.4

3.6.4 Expenditure by industry on air transport

For the Sydney basin, ten industries accounted for around 64 percent of the expenditure on *Air and space transport* in 1996 (see Table A3-15). Three industries, namely *Wholesale trade*, *Communication services* and *Government administration* accounted for 37 percent of total expenditure by Sydney based industries on airline services. The Government sector's importance as a client of airline services is forecast to fall substantially over the next 20 years.

Communications services is forecast to more than double its expenditure on air transport services by the year 2016. Earlier, *Communication services* was identified as one of the top ten growth industries in terms of turnover and employment (see Table 2.6). Nevertheless, *Wholesale trade* is expected to remain the largest user of airline services over the forecast period.

Among the other prominent users of air transport services are: Retail trade, Banking, Services to transport and storage, Legal, accounting, marketing and Scientific research, technical.

In terms of total real growth, *Accommodation, cafes and restaurants*, *Services to mining* and *Non ferrous metal ores* failed to rank in the top 10 list but are forecast to increase their expenditure substantially over the forecast period.

TABLE A3-15 EXPENDITURE BY INDUSTRY ON AIR TRANSPORT BY TOP TEN INDUSTRIES (\$ MILLION 1996 PRICES)

Rank	Industry	1996		2006		2016		Total Percentage Increase		
		\$	%	\$	%	\$	%	1996 to 2006	2006 to 2016	1996 to 2016
1	Wholesale trade	175	15.3	235	15.1	316	14.8	34.4	34.4	80.6
2	Communication services	108	9.5	173	11.2	277	13.0	60.1	59.8	155.9
3	Government administration	138	12.1	158	10.1	182	8.6	14.3	16.1	32.7
4	Retail trade	59	5.2	78	5.0	103	4.8	31.8	31.8	73.7
5	Banking	65	5.7	80	5.2	100	4.7	24.1	24.3	54.2
6	Services to transport; storage	54	4.7	72	4.7	97	4.6	34.4	4.4	80.6
7	Legal, accounting, marketing	43	3.8	63	4.1	94	4.4	47.2	48.0	117.8
8	Scientific research, technical	31	2.7	45	2.9	67	3.1	47.2	48.0	117.8
9	Other property services	33	2.9	46	3.0	65	3.1	41.4	41.6	100.3
10	Air and space transport	30	2.6	42	2.7	59	2.8	41.2	41.1	99.2
Total of top ten		735	64.5	993	64.0	1,361	63.9	-	-	-

CHAPTER 4: CONSTRUCTION PHASE: ECONOMIC AND REGIONAL IMPACTS

4.1 Construction Task

The Second Sydney Airport represents a very large project by Australian standards, but is well within the capacity of industry. The Input-Output industry within which this activity falls is termed *Other construction*. In this chapter the economic activity associated with the construction of the Second Sydney Airport is related to both this industry and the regions in which the airports would be constructed.

Two of the construction options are explored in this chapter. These are Option B for Badgerys Creek and Option A for Holsworthy. The choice of these two options does not represent any prejudgment of Government decisions and they should be regarded as being examples which are representative of the options available at each of the two sites. They were selected on the basis that each of the construction/site options involve similar expenditures and time frames. Badgerys Creek and Holsworthy differ largely because of the longer and more expensive construction program required for the Holsworthy options.

A single estimate of construction costs was used for each option. In practice a range of estimates has been prepared, reflecting some uncertainty in the cost estimates which can be expected to be refined over time.

4.1.1 Expenditure

Option B at Badgerys Creek involves construction expenditures of \$4.4 billion over a six year period from 1998. In contrast Option A for Holsworthy requires construction expenditure of \$5.5 billion over 10 years. The time profiles of these expenditures are set out in *Table A4-1*.

TABLE A4-1 AIRPORT CONSTRUCTION EXPENDITURE RELATIVE TO PROJECTED TURNOVER FOR OTHER CONSTRUCTION BY REGION AND YEAR (\$ MILLION)

	Badgerys Creek			Holsworthy		
	Other Construction	Project Expenditure Option B	Percent of Industry	Other Construction	Project Expenditure Option A	Percent of Industry
1998	1,393	366	26.3	934	110	11.8
1999	1,452	282	19.4	1,001	394	39.3
2000	1,511	783	51.8	1,068	414	38.8
2001	1,570	1,131	72.1	1,135	397	35.0
2002	1,629	1,160	71.2	1,202	342	28.4
2003	1,687	644	38.2	1,269	614	48.4
2004	1,746	3	0.1	1,336	975	73.0
2005	1,805	-	-	1,403	1,158	82.6
2006	1,864	-	-	1,469	952	64.8
2007	1,923	-	-	1,536	178	11.6
Total		4,368			5,534	
Average	1,687	728	43.1	1,269	553	43.6

It is notable that the level of planned expenditure for each of the options exceeds \$1.1 billion in at least one year for both options. In both cases the activity level of *Other construction* will need to almost double within the regions in which the alternative sites are situated. Over the entire construction program, there would be an average annual expansion of regional commercial construction activity of some 43 percent.

4.1.2 Employment

Direct employment in *Other construction* within the regions will also be significantly boosted by the construction phase, but by much less than the increase in turnover. This is because of the highly capital intensive nature of the airport construction, despite average employment levels on site of 1,400 at the proposed Badgerys Creek site and 1,050 at the proposed Holsworthy site. There would also be substantial employment generated off-site as identified in Table A4-2.

TABLE A4-2 EMPLOYMENT IN OTHER CONSTRUCTION BY REGION RELATIVE TO PROJECT DEMANDS

	Badgerys Creek			Holsworthy		
	Other Construction	Project Expenditure Option B	Percent of Industry	Other Construction	Project Expenditure Option A	Percent of Industry
1998	18,575	704	3.8	13,315	210	1.6
1999	19,586	543	2.8	14,085	748	5.3
2000	20,598	1,506	7.3	14,856	787	5.3
2001	21,610	2,178	10.1	15,627	755	4.8
2002	22,622	2,232	9.9	16,398	649	4.0
2003	23,634	1,240	5.2	17,169	1,166	6.8
2004	24,645	-	-	17,939	1,853	10.3
2005	25,657	-	-	18,710	2,200	11.8
2006	26,669	-	-	19,481	1,802	9.3
2007	27,681	-	-	20,252	338	1.7
Total						
Average	23,634	1,401	5.9	17,169	1,052	6.1

4.2 Regional economic linkages

The key industries linked to *Other construction* are identified in Table A4-3, together with their turnover share of the respective regional economies. Both regions offer a differing but strong range of industries important for construction activity.

TABLE A4-3 KEY CONSTRUCTION INDUSTRY LINKAGES BY REGION

Industry	Share of Regional Economy (%)	
	Badgerys Creek	Holsworthy
Other construction	5.3	4.1
Other electrical equipment	1.6	3.8
Electronic equipment	1.5	0.5
Structural metal products	1.4	1.6
Other property services	1.9	1.6
Plaster and other concrete products	0.8	0.2
Concrete slurry	0.3	0.4
Fabricated metal products	1.2	2.0
Wholesale trade	5.6	3.8
Road transport	3.0	1.8
Other machinery and equipment	0.7	1.3
Petroleum and coal products	1.1	6.6

4.3 Economic and Regional Impacts

4.3.1 Employment

The direct and flow-on employment effects of the construction phase within the specified regions are set out in *Table A4-4*. As noted above the construction of the Second Sydney Airport is highly capital intensive given the large scale of the enterprise and the large earthmoving (especially for Holsworthy) and pavement construction tasks involved. The flow-on effects of the project have been estimated using industry expenditures and turnover linkages to identify the additional employment likely to be generated by the construction phase. Some 8,400 person years of on-site labour is projected for Badgerys Creek and 10,500 for the Holsworthy option. These are estimated to generate employment over the course of construction of some 17,000 and 28,000 person years respectively within their respective regional economies.

Note that the on-site labour intensity of the project varies from year to year with the changing nature of the construction phases.

TABLE A4-4 EMPLOYMENT: EFFECTS OF CONSTRUCTION PHASE BY REGION AND YEAR (ADDITIONAL EMPLOYMENT BASED ON CONSTRUCTION EXPENDITURES)

	Badgerys Creek Region Option B			Holsworthy Region Option A		
	Direct Employment	Additional Employment	Ratio	Direct Employment	Additional Employment	Ratio
1998	704	1,452		210	556	
1999	543	1,119		748	1,983	
2000	1,506	3,106		787	2,087	
2001	2,178	4,490		755	2,001	
2002	2,232	4,603		649	1,722	
2003	1,240	2,556		1,166	3,091	
2004				1,853	4,913	
2005				2,200	5,834	
2006				1,809	4,796	
2007				338	897	
Total person years	8,406	17,332		10,515	27,879	
Average Ratio			2.0			2.7

4.3.2 Turnover

The turnover generated by *Other construction* for the construction phase of the Sydney Second Airport is assumed to be equal to the estimated project expenditures. For the options studied, this is equivalent to \$4.4 billion for Badgerys Creek and \$5.5 billion for Holsworthy. The additional turnover generated within the specified regions by the construction phase of the

alternative Second Sydney Airport sites is estimated to be \$2.6 billion and \$4.0 billion respectively or 59 percent of initial expenditures for the Badgerys Creek site and 72 percent for the Holsworthy site. This disparity in the degree of additional turnover created is explained by the differing mix of support industries located in each region. There would also be further economic activity generated outside the regions by the construction phase, but this is not estimated.

TABLE A4-5 TURNOVER: EFFECTS OF CONSTRUCTION PHASE BY REGION AND YEAR (\$ MILLION 1996 PRICES) (ADDITIONAL TURNOVER BASED ON CONSTRUCTION EXPENDITURES)

	Badgerys Creek Region Option B			Holsworthy Region Option A		
	Direct Turnover	Additional Turnover	Ratio	Direct Turnover	Additional Turnover	Ratio
1998	366	215		110	79	
1999	282	166		394	283	
2000	783	460		414	298	
2001	1,131	665		397	286	
2002	1,160	682		342	246	
2003	644	379		614	441	
2004	3	2		975	702	
2005				1,158	833	
2006				952	685	
2007				178	128	
2008				2	3	
Total	4,368	2,568	0.59	5,534	3,982	0.72

4.3.3 Value added

The regional value added generated by *Other construction* for the construction phase of the Sydney Second Airport is estimated to be \$2.4 billion for Badgerys Creek and \$3.0 billion for Holsworthy. The additional value added generated within the specified regions by the construction phase of the alternative Second Sydney Airport sites is estimated to be \$1.1 billion and \$1.6 billion respectively or 45 percent of initial value added for the Badgerys Creek site and 55 percent for the Holsworthy site. As with turnover, this disparity in the degree of additional value added created is explained by the differing mix of support industries located in each region. There would also be further economic activity generated outside the regions by the construction phase, but this is not estimated.

TABLE A4-6 VALUE ADDED: EFFECTS OF CONSTRUCTION PHASE BY REGION AND YEAR (\$ MILLION 1996 PRICES) (ADDITIONAL VALUE ADDED BASED ON CONSTRUCTION EXPENDITURES)

	Badgerys Creek Region Option B			Holsworthy Region Option A		
	Direct Expenditure	Additional Expenditure	Ratio	Direct Expenditure	Additional Expenditure	Ratio
1998	198	89		60	33	
1999	152	69		212	117	
2000	423	191		224	123	
2001	611	276		214	118	
2002	626	283		184	101	
2003	348	157		331	182	
2004				526	289	
2005				625	343	
2006				514	282	
2007				96	53	
2008				2	1	
Total	2,357	1,065	0.45	2,987	1,639	0.55

CHAPTER 5: CONCLUSIONS

5.1 Key Implications for Regional Economies

5.1.1 Adjustment Pressures Facing Air Transport

The demand for air transport is forecast to expand strongly over the next 20 years. Demand forecasts prepared for this study by the Department of Transport and Regional Development have passenger numbers from the Sydney Basin increasing from 19.7 million per year in 1996 to 34.8 in 2006 and 49 million in 2016. This represents an average annual growth rate of nearly six percent per year to the year 2006 and 3.5 percent per year to 2016. The achievement of growth rates of these magnitudes will inevitably require continued falls in the real price of air transport and improvements in labour productivity within the air transport industry.

Improvements in labour productivity within the air transport industry and industries serving the industry of around 1.5 percent per year would be consistent with the likely increases in passenger numbers forecast for the coming two decades. Productivity improvement will come through larger aircraft with larger average passenger numbers per movement and efficiency gains in all other facets of airport operations.

Growth in labour productivity of this magnitude over a 20 year period has important implications for the demand for labour by the industry. More than 30 percent less employment will be required for the same tasks performed now.

5.1.2 Economic Cost of Not Having a Second Airport

From the perspective of Sydney, the lack of a Second Sydney Airport would be likely to seriously impinge on economic activity from the year 2004. This is when the demand for air transport is projected to first exceed the assumed maximum capacity of Sydney Airport. By 2006 the reduction in economic activity from not being able to serve more than 30 million air passengers is estimated to be \$606 million per year increasing to \$2,378 million by 2016. This equates to a potential loss of more than 17,000 full-time jobs in 2016.

5.1.3 Regional Economic Benefits - Operational Phase

The economic impact of a second Sydney airport on the regional economies adjacent to the Badgerys Creek and Holsworthy sites would be similar once an airport was operational. Employment in *Air and space transport* within the regions is estimated to be some 6,000 by 2006 and more than 17,000 in 2016. In addition, a further 9,000 jobs are forecast to be generated within the regions and a further 14,000 jobs elsewhere in Sydney as a result of the Second Sydney Airport in 2016.

5.1.4 Regional Impact - Construction Phase

The construction phase of the Second Sydney Airport would also have a major impact on the regional economies. The Badgerys Creek option at a

cost of some \$4.4 billion involves \$1.2 billion less expenditure than Holsworthy and, starting in 1998, requires a six year construction program rather than 10 years. Over the construction phase average employment in each construction year on the two alternative sites is estimated to be some 1,400 for Badgerys Creek and 1,100 for Holsworthy.

It is notable that the construction phase is likely to be relatively capital intensive compared to the corresponding industry *Other construction* as defined by the Australian Bureau of Statistics. Using turnover as the link to related industries, it is estimated that an additional 17,000 person years of employment would be created in the Badgerys Creek region and 28,000 person years of employment would be created in the Holsworthy region as a result of the construction phase. These employment levels represent average (gross) multipliers of 3 and 3.7 respectively.

5.2 Indicative Benefit to Cost Ratios for the Second Sydney Airport Alternatives

In the following section the key conclusions in relation to the economic cost to Sydney of insufficient air transport capacity are put against the cost of construction at the alternative Sydney Second Airport sites. While a full benefit cost analysis is beyond the scope of this study, the comparison allows a preliminary (and highly qualified) judgement to be made about the net worth of the investment. In particular, there are many factors not included in the benefit cost analysis, including the absence of any consideration of environmental factors, a full summary of costs and the definition of a credible Base Case. Further, the comparison sheds no light on whether there may be other more efficient ways of achieving the same objectives.

The impact of insufficient airport capacity on the economic potential of Sydney is large. While the purpose of this analysis is not to fully assess the economic justification for the Second Sydney Airport, the level of value added (a measure of net economic production) potentially lost at \$606 million per year in 2006 increasing to \$2,378 million per year in 2016 represents a very large potential loss to the Sydney region. This cost can be compared to the cost of construction of the alternative Second Sydney Airport sites.

5.2.1 Assumptions

For the purposes of this indicative analysis the following assumptions are made:

- Sydney airport has a maximum capacity of 30 million passengers per year;
- the Second Sydney Airport has a maximum capacity of 30 million passengers per year;
- it is possible to fully utilise the full capacity of both airports thereby providing Sydney with a maximum capacity of 60 million passengers per year;

- the economic costs of limiting air passenger numbers in Sydney to 30 million are those identified in *Table A2-12* which include only the value added thereby foregone by the *Air and space transport* industry and those industries related to that industry through production linkages (note that data in *Table A3-3* only include value added from the *Air transport and space industry*);
- construction costs in terms of level and distribution through time are as set out in *Table A4-1*;
- costs and benefits of the Sydney Second Airport are allocated through time based on projected passenger numbers;
- the Second Sydney Airport is utilised as required from the year following completion of construction;
- all dollar values are expressed in 1996 prices and discounted to 1997 at a real discount rate of 6 percent per year over the period up to and including 2025; and
- the costs of additional road, rail and services infrastructure are included for the Second Sydney Airport.

The results of calculations based on these assumptions are set out in *Table A5-1*.

5.2.2 Conclusions

Overall, the estimated ratio in present value terms of benefits to costs, based on the assumptions set out above is 3.6:1 for Badgerys Creek and 3.0:1 for Holsworthy. The disparity between the ratios is largely the result of higher construction costs and a later start date for Holsworthy relative to Badgerys Creek. The internal rates of return (IRR) on the two alternatives are similar at 16.2 percent for Badgerys Creek and 15.3 percent for the Holsworthy option. Benefit cost ratios and internal rates of return of these magnitudes suggest that the investment in the Sydney Second Airport is economically viable, although, of course this analysis is subject to a number of qualifications, not the least of which is the possibility that input/output models are aggregate measures of welfare benefit in which it is not possible to determine which individual benefits and costs have been included and excluded.

The comparison of benefits and costs in *Table 5.1* provides a partial indication of the economic viability of each of the alternative sites. Despite a range of important economic factors not being taken into account, the estimated internal rates of return of 15 to 16 percent are comfortably greater than the cost of funds of Government. It could therefore be concluded that the investment of funds in a Second Sydney Airport is likely to be reasonable compared to many other investments. However, there may be other ways of meeting the additional demand for air travel which would yield a higher rate of return from a smaller investment.

The projected internal rates of return are similar for the two alternatives when major infrastructure costs and value added benefits are considered. It is

likely that other factors will provide the basis on which one alternative might be preferred to another.

TABLE A5-1 INDICATIVE COSTS¹ VS BENEFITS SYDNEY SECOND AIRPORT (\$ MILLION 1996 PRICES)

Year	Actual Values				Discounted Values (at 6% per year)			
	Badgerys Creek		Holsworthy		Badgerys Creek		Holsworthy	
	Benefits	Costs	Benefits	Costs	Benefits	Costs	Benefits	Costs
1998	-	366	-	110	-	345	-	104
1999	-	349	-	394	-	310	-	351
2000	-	889	-	469	-	746	-	394
2001	-	1,237	-	452	-	980	-	358
2002	-	1,266	-	397	-	946	-	297
2003	-	821	-	697	-	579	-	491
2004	133	75	-	1,058	89	50	-	704
2005	363	72	-	1,241	228	45	-	779
2006	606	-	-	1,090	359	-	-	645
2007	752	-	-	375	420	-	-	210
2008	909	-	909	59	479	-	479	31
2009	1,072	-	1,072	59	533	-	533	29
2010	1,240	-	1,240	-	581	-	581	-
2011	1,414	-	1,414	-	625	-	625	-
2012	1,593	-	1,593	-	665	-	665	-
2013	1,780	-	1,780	-	701	-	701	-
2014	1,972	-	1,972	-	732	-	732	-
2015	2,172	-	2,172	-	761	-	761	-
2016	2,378	-	2,378	-	786	-	786	-
2017	2,591	-	2,591	-	808	-	808	-
2018	2,812	-	2,812	-	827	-	827	-
2019	3,041	-	3,041	-	844	-	844	-
2020	3,278	-	3,278	-	858	-	858	-
2021	3,522	-	3,522	-	870	-	870	-
2022	3,755	-	3,755	-	875	-	875	-
2023	3,755	-	3,755	-	825	-	825	-
2024	3,755	-	3,755	-	779	-	799	-
2025	3,755	-	3,755	-	735	-	735	-
Total	46,648	5,074	44,793	6,402	14,379	4,001	13,283	4,392
Ratio IRR					16.2%		15.3%	

Notes: 1. This stream of costs does not include all final costs estimated in the Draft EIS.