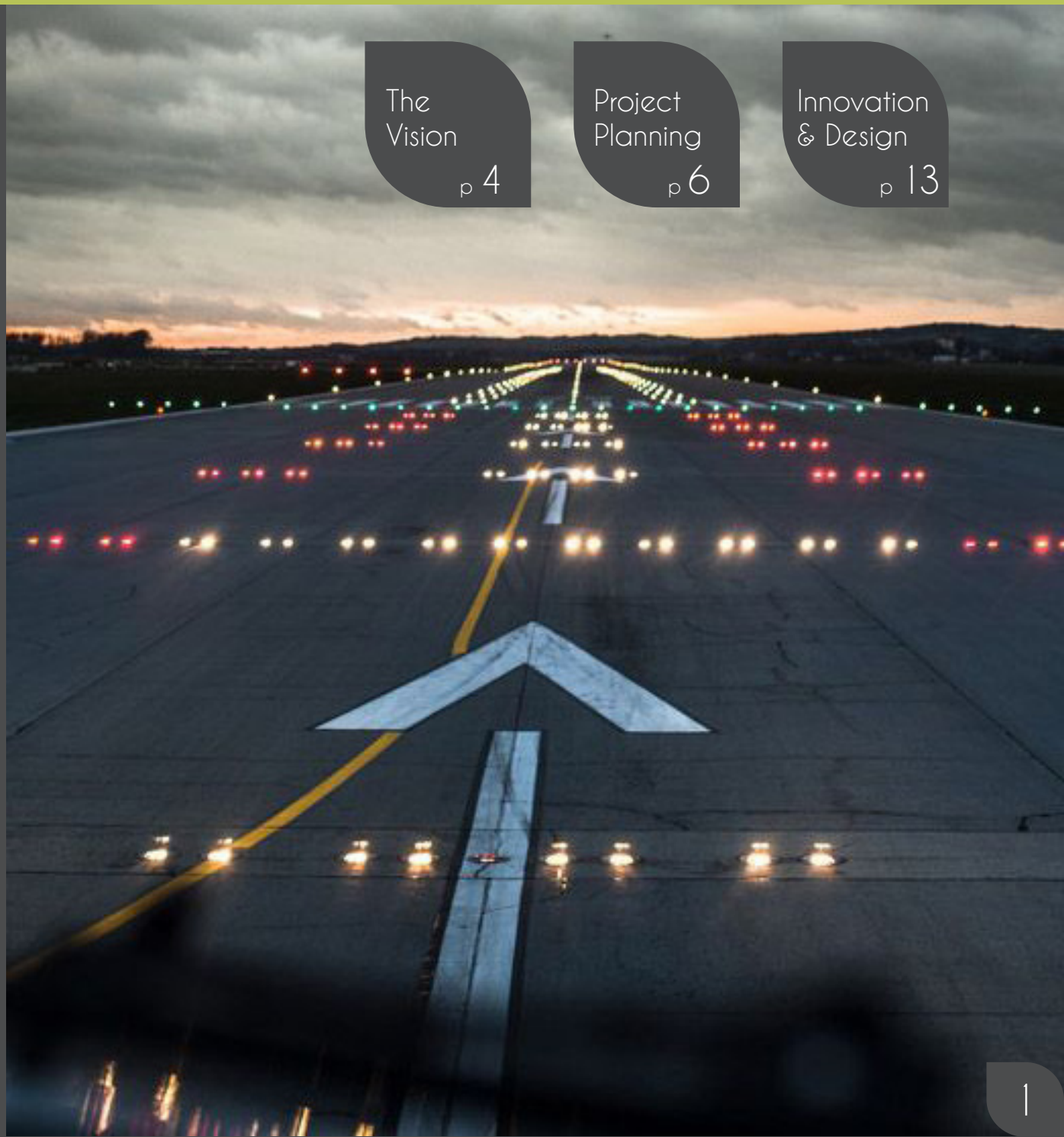
Western Sydney Airport

More than just an airport



A proposal by ICE Solutions for the Western Sydney Airport Alliance

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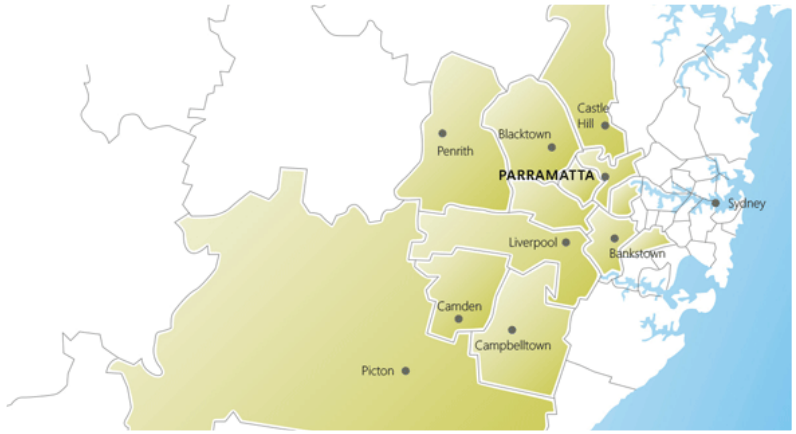


Executive Summary

ICE Solutions has been tasked with providing a strategy for the second Sydney airport at Badgerys Creek by the Western Sydney Airport Alliance covering three stages of construction to 2050, and encorporating solutions to the current and predicted future issues in the area. With housing and rezoning investment already underway in Western Sydney, population is growing beyond the current capacities of employment, community, and transport options and facilities. ICE Solutions' airport proposal encompasses a unique vision to provide the investment required in these areas that enhance both the local community while meeting the airport needs of the broader Sydney region; a sustainable, vibrant and highly integrated vision.

ICE Solutions

Innovation & Community & Environment

ICE Solutions is an established provider of construction projects, driven by industry professionals passionate about creating long term, innovative solutions to complex new and existing problems across Australia.

ICE Solutions' focus has always been on designing for the user through transparent and continual community engagement while offering the most current and cost effective technologies. It's through this combination of people and process that ICE Solutions is able to consistently provide ideas and develop projects with a positive impact for all stakeholders involved.

Past Projects

- North Pole Regional Airport Strategy
- Canberra Ports and Maritime Future Planning
- Penrith to Lithgow high speed rail feasibility study

Nando Nicotra

Specialist Consultant on Business Development

Karina Nilsson

Preliminary Cost Consultant

Annie Townley

Cost Consultant, B Com M Constr Mgt

Annie has experience in providing services in all aspects of pre and post contract construction for rail and road projects.

Her passion for projects which significantly improve access for all Australians comes through in transport design for ICE Solutions.

- Sydney road maintenance contract bid
- Richmond Road upgrade cost services

Bec Temperley

Civil Engineer, B Eng B SC

Rebecca is a civil and traffic design engineer with experience in both the public and private sector, through all project phases.

Bec has a passion for sustaiability and environmental integration through smart design.

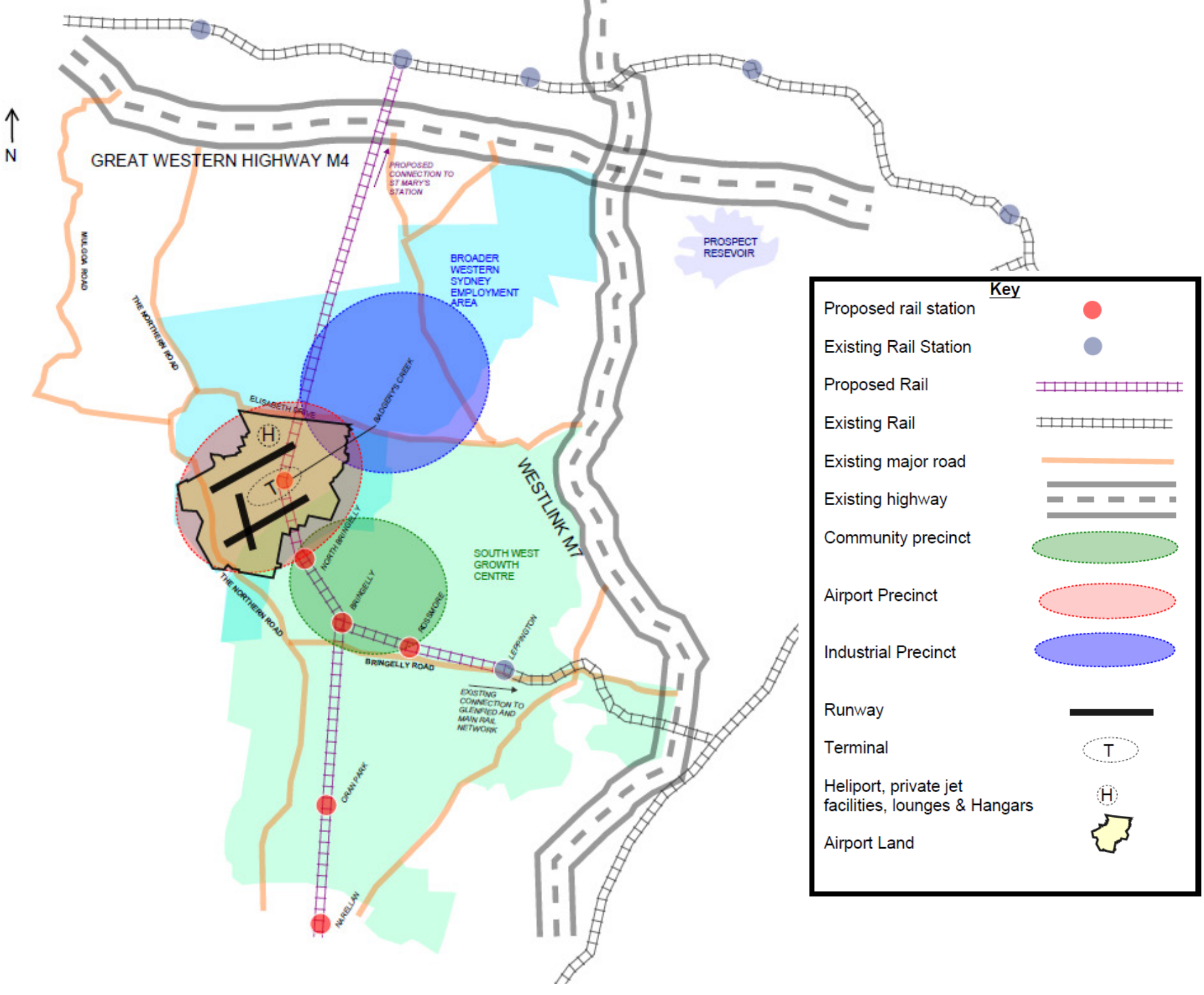
- Kurrambee Special Needs School Werrington
- Nepean Hospital Carpark, WSUD

Andrew Worboys

Project Manager, B Eng M Eng Sc

Andrew is a Project Manager involved in projects from feasibility through to construction. Andrew brings a proven history of delivering successful project outcomes for clients through his experience in significant infrastructure projects.

- Inland Rail between Brisbane and Melbourne
- Maldon to Dombarton rail link


N
GREAT WESTERN HIGHWAY M4
PROPOSED CONNECTION TO ST MARY'S STATION
PROSPECT RESEVOIR
BROADER WESTERN SYDNEY EMPLOYMENT AREA
MULGOA ROAD
THE NORTHERN ROAD
ELISABETH DRIVE
BADGERY'S CREEK
WESTLINK M7
SOUTH WEST GROWTH CENTRE
NORTH BRINGELLY
BRINGELLY
ROSSMORE
LEPPINGTON
BRINGELLY ROAD
EXISTING CONNECTION TO GLENFIELD AND MAIN RAIL NETWORK
GRAHAM PARK
NARELLAN
Key
Proposed rail station
Existing Rail Station
Proposed Rail
Existing Rail
Existing major road
Existing highway
Community precinct
Airport Precinct
Industrial Precinct
Runway
Terminal
T
Heliport, private jet facilities, lounges & Hangars
H
Airport Land

The ICE Solutions Vision

"More than just an airport"

ICE Solutions has developed an innovative solution to the Western Sydney's transport, employment and community needs through its new airport at Badgerys Creek. Our vision encompasses an innovative terminal with joint focus on passenger comfort and enjoyment, and a sustainable environment. The terminal will make use of a dual fuel shuttle bus with transport links to the major Western Sydney hubs, to be expanded as the airport grows into multiple rail links across the region. Our vision also focuses on benefits for the Western Sydney community such as job creation, training opportunities, and a multipurpose community hub. Revenue will be raised through diverse income streams including industrial freight and tourism.

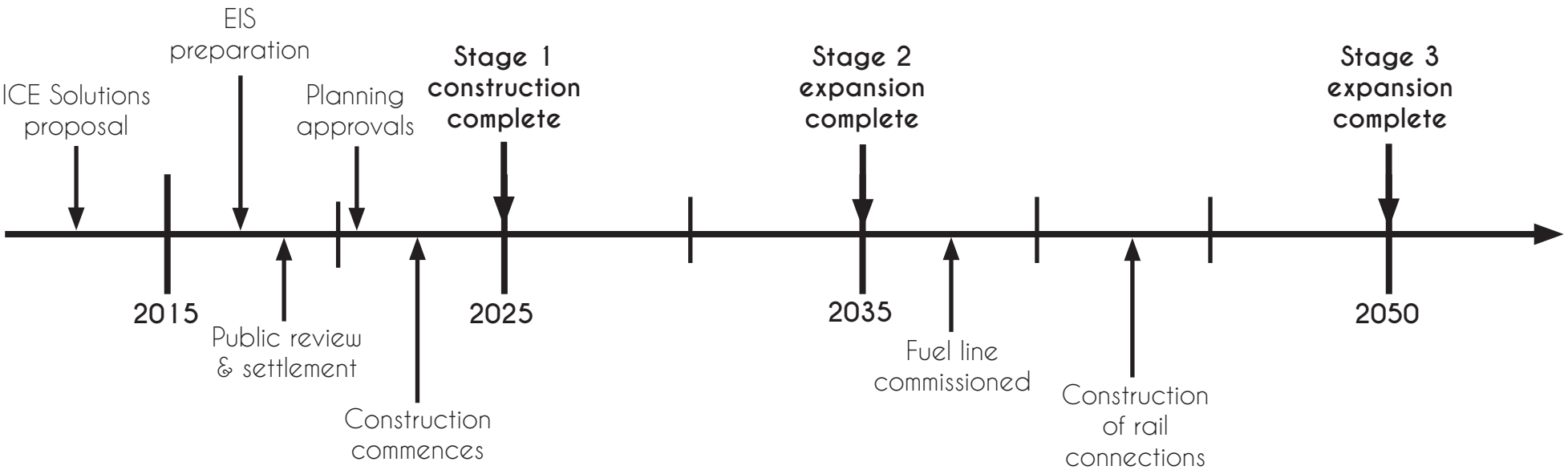
Air traffic forecasts have shown an immediate need for a second airport, with Badgerys Creek as the prefered site.

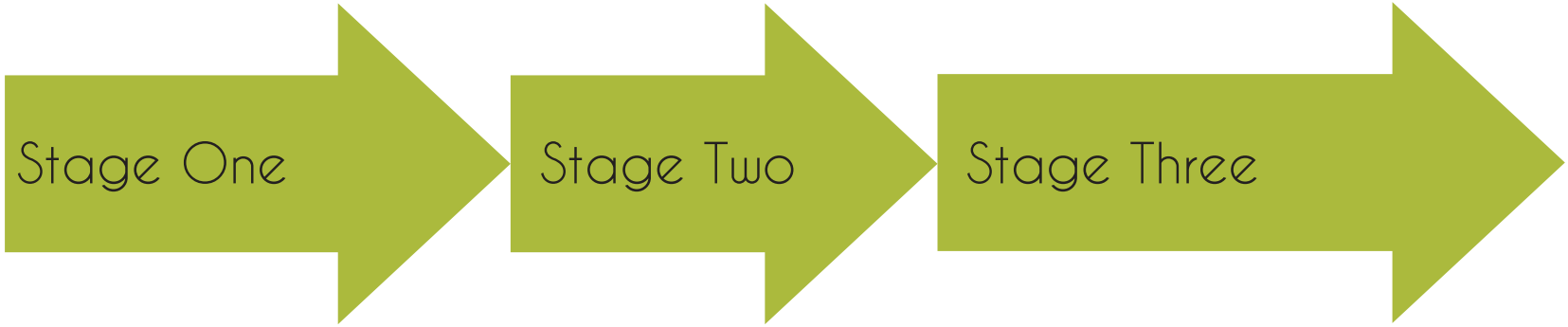
Early stage planning is already underway for the Western Sydney Airport at Badgerys Creek with many key stakeholders supporting the development. Crucially, both state and federal governments have commited financially and politically, which gives further certainty to this proposal.

Key Proposed Features:

- Community centre and associated shopping and entertainment precinct
- The creation of a not for profit organisation to assist with housing and employment
- Additional training facilities and training positions
- Additional freight facilities
- Helipad and private flight facilities and lounges
- Shuttle bus services
- Train links to major hubs, CBD and Kingsford Smith Airport
- Key stakeholder management through a proactive approach increasing private investment
- Maximising state investment through integrated planning

Project Timeline





Project Costing

	Stage One	Stage Two	Stage Three
Terminal construction including terminal building, runways and taxiways, car parks, hangars, and services	500	45	600
Sustainability and environmental initatives including water sensitive urban design, green roof and walls	100	8	120
Helipad including associated facilities and services	50	-	-
Commercial/offices buildings including car parks and services	150	-	180
Community initiatives including community hub, NFP housing and employment organisations	150	4	200
Public transport initiatives from shuttle buses to new train links and pre-terminal interchanges and stations	800	4	1,500
Design and engineering	350	12	520
Project management	300	11	480
Total costs (AUD millions)	**2,400**	**84**	**3,600**

Staged Investment

Investment

Stage One

- Helipad for business travel and tourism
- Terminal building including restaurants and shops
- Green roof and facade
- Freight handling facilities
- Shuttle buses

Stage Two

- Expansion of range of airline destinations
- Community hub
- Affordable housing
- Training centre expansion for TAFE and university
- Business Park

Stage Three

- Retail and Entertainment zone including Convention Centre
- Passenger rail new loop and stations
- Freight rail connection to Outer Sydney Orbital

Returns

- Airline revenue
- Income from terminal facilities
- Industrial estate revenue
- Renewable energy outputs from terminal design

- Business park revenue
- Revenue from increased tourism
- Increased freight revenue with additional runway

Benefits

- Increase in local jobs / reduced commute
- Better access to public transport network
- Sustainable facilities

- Multipurpose communal space
- Affordable housing to meet population growth
- Better access to education opportunities

- Integrated transport system with easier and quicker access between major town centres
- Decentralisation of Sydney with stronger Western Sydney hub

Stakeholder Map

Stakeholder Engagement

Group	Regulatory Authorities	Economic Entities	Community & Users
Concerns	• Spending on preliminary stages without guarantee of later stage funding available • Conflicting needs of authorities and how to align	• Pax below predictions leading to lower than expected initial revenue • Long term low growth where airport does not grow beyond Stage One • Lack of connections for freight operations	• Disruption during construction phase • Noise and air pollution • Increased traffic congestion • Crowded public transport
How	• Maintain a strong relationship with authorities • Lobbying government through professional organisations • Forward planning on requirements e.g. legal requirements, to keep to timelines • Secure required funding and ensure long term commitment to the aiport • Provide required facilities on airport grounds to enable authority presence	• Prepare media documentation showing potential revenue using predicted pax and population growth figures • Promote the airport through targeted investment campaigns such that the uptake of investment matches the growth of the airport itself through all stages • Ensure that the airport provides an environment in which commerical entities are able to thrive through a competitive market	• Actively engage with local organisations e.g. libraries, activity groups • Create a taskforce to investigate what facilities are required to enhance community value and plan accordingly, and record community questions and concerns • Local media campaigns to keep general public informed of progress • Forums with community leaders • Information at key locations such as shopping centres and transport hubs • Letter drop of key information
Ideal Outcomes	• An airport that is supported by the authorities • Provide a framework for straightforward regulation and law enforcement	• An airport that is commercially viable and provides a reasonable return to those who invest in it • Facilitates ongoing investment in the airport	• Community support for the development • A development that meets the needs of those who will be using it

Community Initiatives

It is critical to engage the local community and obtain their buy in to the construction and operation of the Western Sydney Airport. In addition to the concerns listed on page 4, there are concerns that while the population is predicted to grow, investment in the community will not grow at a comparable rate. ICE Solutions proposes a number of investments in the community to ensure vibrancy and high quality facilities that are accessible to all Western Sydney residents.

Community Hub

Alongside the airport it is proposed to build a community centre to promote the airport as a hub not only for travellers, but also as a facility providing a service to the people of Western Sydney to enhance the region.

The community centre will incorporate retail opportunities as well as art galleries, community spaces, a library, cinemas, and training facilities.

The people of Western Sydney will be involved in an extensive community consultation process as part of the development of the community centre. During community consultation, the focus will be to listen and engage with the people of Western Sydney to ascertain their true needs.

Local Partnerships

Partnerships with local training facilities will allow the airport to provide the people of Western Sydney with opportunities to develop their skills and improve employment prospects. It will be critical to engage local training organisations including local TAFE (Western Sydney institute), private training centres, and of course the University of Western Sydney (UWS).

In particular, UWS has grown significantly in recent years. As a younger university it will be ideal for further expansion facilitated through partnership with the airport.

Terminal Art

To assist in engaging the local community it is proposed to host an art competition. Local schools will be contacted for their students to produce an artwork. The theme of the artwork will be "The identity of Western Sydney; What does it mean to you?". The artworks will then be displayed within the terminal in a mosaic style alluding to the the mosaic that is the identity of Western Sydney. The artwork will be a way to engage the people of Western Sydney and leave a legacy of what the community means to those who live in it.

The competition will further link the terminal to the community centre where gallery spaces will be provided for further art exhibitions. This paves the way to support the arts and have the airport intertwined as the identity of the Western Sydney region develops.

Why another EIS?

A draft Environmental Impact Statement (EIS) for the site was undertaken in 1996/7. We anticipate that much of the EIS is outdated, and we propose a gap analysis be undertaken to assess the extent of revision required. A gap analysis will identify areas requiring update and minimise unnecessary rework.

We predict the following areas will require significant revision:

- Forecasts of aviation movements
- Environmental baseline collection including flora & fauna and environmental contaminants
- Noise impacts
- Community concerns
- Transport integration

Ice Solutions proposes the revised EIS be undertaken by a range of experts in the relevant fields. The expert team will report back to the EIS coordinator in great detail who will then communicate and publicise the results. The EIS Coordinator will be engaged by the government with experts appointed on an as needs basis according to required information and community concerns.

It is important that the EIS coordination body does not have an interest in the construction or operation of the new airport as this would evoke a conflict of interest.

Community Engagement - A Key Component

A key stakeholder in the project is the community. Environmental Impact Statements do not just encompass the physical environment but include economic and social environments in which the development sits. As such it is integral to include the community and to properly assess how this development will affect them. ICE Solutions proposes an all out consultation campaign. *One that is not limited to the EIS period but is ongoing.* The campaign will be honest with the community and treat them as an informed and valuable part of the process.

LESSONS LEARNT COAL SEAM GAS:

Much of the failure of CSG in Western Sydney is attributed to poor community consultation. An uniformed community created a backlash and halted many developments. Whilst environmental concerns are justified, the poor consultation exaggerated concerns far more than in other parts of Australia and the world.

Fuel Line

The new airport will require fuel to be provided at a rate of 90 litres / pax / day in order to sustain operations. In moving fuel from access points to the airport, a number of factors have been assessed to determine the best method.

	Cost Effectiveness	Environmental Sustainability	Local Community
Stage One: Trucking (20 trucks / day)	Low cost initial phase which allows for greater investment in other areas of airport construction.	Increased air pollution from truck movements. Low noise pollution.	Minimal disruption on major roads as low number of trucks / day.
Stage Two: Trucking (60 trucks / day)	Low cost increase of movements, but with potential for need for higher road maintenance costs.	Increased air pollution from truck movements, much greater than in Stage One. Higher noise pollution.	In combination with higher pax, increase in congestion on major local arterial roads.
Stage Three: Pipeline (28km from Plumpton)	High cost for initial construction but providing greater returns and reliability to airport and airlines.	Operation of pipeline has minimal environmental impact, however construction must be focused around maintaining local wildlife and landscape.	High disruption during construction with potential for push back against any necessary land acquisitions. However, long term the pipeline is more favourable as there will be no day to day disruption.

Maintaining a strong and consistent supply of fuel to the airport is vital for its economic growth. ICE Solutions' fuel support proposal will ensure consistent and cost effective supply without sacrficing the needs of the local community and the environment.

Without confidence in Western Sydney Airport to provide fuel, airlines will not commit to basing their operations in the new airport as the risk of delayed or cancelled flights is too high. An inconsistent supply will also affect the airport's ability to raise capital through freight operations as it will affect freight turn around times.

The initial trucking phase will work with the new road upgrade package to ensure the fastest routes and least disruption to the local community.

Runway Layout and the N word

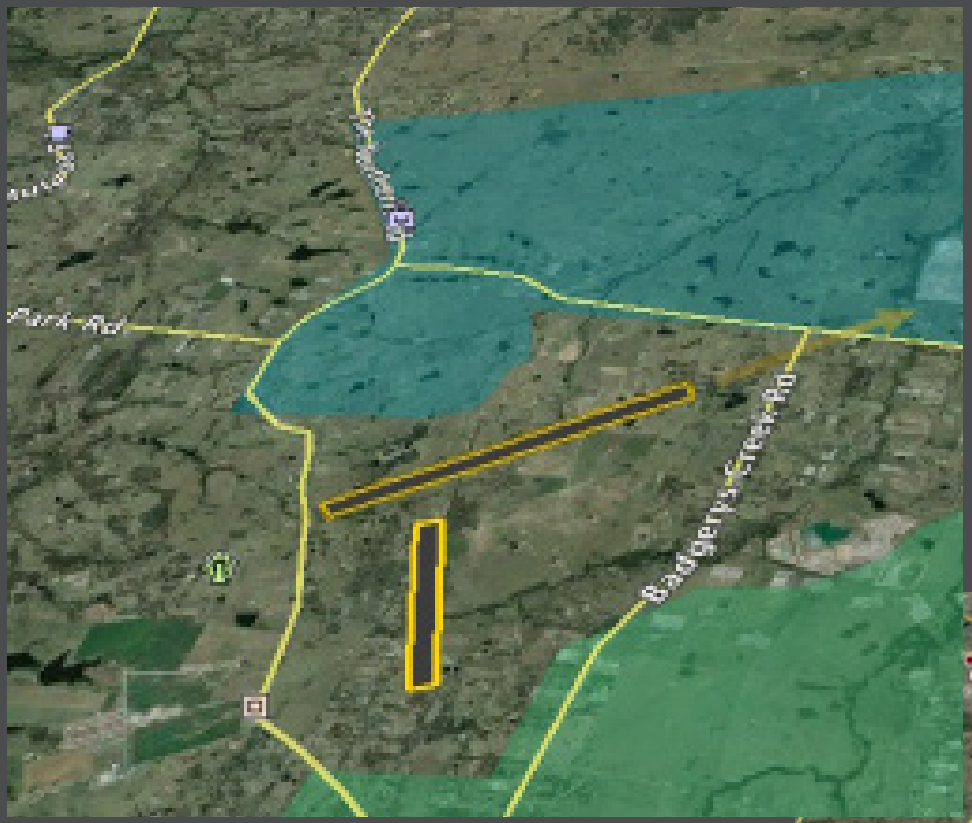
The runway location has been selected in conjunction with the previous EIS and current proposed land use in the region. The proposed runway layout minimises noise over residential areas. The layout directs low flying aircraft over commercial and industrial areas, greatly reducing noise (defined as an unwanted sound) to nearby areas. The proposed orientation also allows for smooth operation in conjunction with the existing Kingsford Smith airport. This arrangement gives a flexibility of flight paths and ease of aircraft management.

Operational restrictions will be considered on an ongoing basis. It is important that the noise management of the airport is not set and forgotten after the establishment. A state of the art management analysis system and real time monitoring will determine if levels are acceptable when compared to global standards including health and annoyance criteria. This will include the development of noise contours to compare the predicted to the measured actual scenarios. Operational management will then be considered ensuring that both the community and those with an economic interest in the airport are engaged in the discussion and a decision is based on scientific analysis.

Runway layout by Stage

Stage One

ICE solutions notes the runway layout in conjunction with land use planning as the most innovative noise management strategy. We also note that in recent years the noise output of even the largest aircraft has fallen dramatically compared to previous years. Current aircraft are 20-30 dB quieter than first generation Jet Aircraft. Advances in engine technology has meant quieter engines and subsequently less noise to those living near airports.



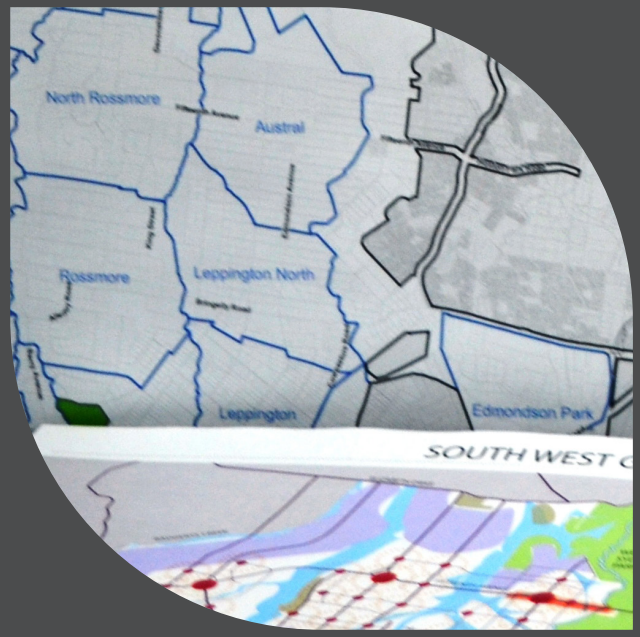
Stage Two

The international civil aviation organisation notes there is a four fold approach to managing aircraft noise.
These are:

- Reduction at the source (quieter aircraft)
- Land use planning and management
- Noise abatement operational procedures
- Operating restrictions

Stage Three

Integration with State Planning



Planning for the South West growth centre has been underway since 2003, with continual land release in a number of precincts. A predicted 300,000 new residents will move into the area with need for employment, transport, education and recreation. It is vital to meet these needs while also maintaining affordable housing and an affordable lifestyle away from the Sydney CBD.

Growth Regions

Local Employment

There is currently potential capacity for 22,120 new jobs in the new precints, however this number will need to increase to 50,000 to allow for local residents to gain local employment. Currently in the South West region 75 - 86% of workers drive to work, with 0 - 3% walking or cycling. Increasing local employment through jobs either at the airport or indirectly through new retail and commerical zones as described in our proposal will help reduce vehicles on the road at peak times, while also encouraging healthy transport alternatives such as cycling and walking.

Sydney also currently has the longest average commuting time of all Australian cities of 4 hours and 43 minutes a week. Local employment will reduce commuting time where employees will arrive at their place of work quicker, and leave them with more time to spend with family and friends.

Local Education

ICE Solutions proposed extensions of the University of Western Sydney and Western Sydney Institute (TAFE) will cater for residents moving into the region. As with local employment, it will reduce congestion on roads where students can study locally, and industry links with airport and surrounding employment will retain talent in the region and allow for courses to be specialised in the unique needs of Western Sydney.

Local Recreation

The airport precinct proposal includes a number of recreational facilities that will be easily accessible to new residents of this growth region. Shopping malls, cinemas and theatres will all increase the appeal of living in the growing suburbs, encouraging a lively community.

Passenger Rail Expansion

The new South West Rail Link between Glenfield and Leppington is due for completion in 2015. The proposed airport rail link will be completed in Stage Three, and will extend from Leppington Station, utilising the protected transport corridor north to St Marys and south to Narellan.

With only 7 - 18% of local residents commuting by rail, ICE Solutions' Western Sydney Airport transport strategy aims to increase this number with better rail services; more links between the different rail lines for those travelling along the ring of the network, and increased regularity of bus services to new growth centres and the local rail station.

Road Upgrades

The bus and private car strategies for the airport will make use of the $3 billion plus road package for Western Sydney over the next ten years. In particular, the new east-west motorway to the airport will allow for easy airport access for employees and passengers.

In tandem with the public transport strategies, road upgrades are necessary to account for increased population, and new industry traffic to the Western Sydney zone. Our proposed increased regularity of bus services to encourage a cheaper and more sustainable mode of transport requires dedicated bus lanes and priority interchanges which will be available under the new funding. ital

Planned freight services will also benefit from the road upgrades until the completion of the dedicated freight rail links in Stage Three.

Data used from 2006 Census from
Camden, Campbelltown and Liverpool

Economic Growth: Stage One

Stage Overview

The ICE Solutions concept is built around a core of sustainable economic growth for the airport facility and the surrounding Broader Western Sydney Employment Area.

Initially the airport facility will focus on servicing regional, domestic and short haul international travel, targetting low cost airlines. Passengers will largely be from local residential areas and existing Western Sydney business hubs such as Parramatta and Blacktown who currently have to undertake significant travel to the existing airport.

Job Growth

Stage One job growth will be generated through construction activities, initial airport operations and through the freight, providing opportunities for the existing community.

Freight

The initial operations of the airport will incorporate a large percentage of commercial freight movements and take advantage of the available space around the airport to develop freight handling facilities. The economic benefits generated through freight operations will help fund expansions to the airport facilities and precinct.

The development of the industrial area will see the expansion of freight handling facilities and the development of a new intermodal terminal at the Badgerys Creek Airport site capable of handling approximately 200,000 TEUs per annum. The freight handling facilities will be supported by the predicted increase in air freight demand of 3.8% per annum. The location of the airport will allow for longer operating hours and hence make it more appealing to freight specific planes. Air freight requires a significant amount of land infrastructure to support it. The ICE Solutions proposal includes a large industrial area that will be the location of the freight support infrastructure and will, in Stage Three, connect to the future Outer Sydney Orbital as part of the NSW Freight and Ports Strategy. This industrial area will be developed in the Stage One with freight initially being transported via road until rail links are operational.

Airlines

The current demand on the existing Kingsford Smith Airport (KSA) is increasing, and demand will outway capacity in the medium term future. The timing of the development of the Western Sydney Airport will allow for operations to commence before the KSA capacity is reached. As the airport increases its operations it will be able to expand to meet the ongoing capacity requirements of Sydney. Also, the development of the second airport will generate more competition between airlines with an increase in flight numbers, which in itself will increase airport capacity demand. This means that the second airport will generate its own capacity and reduce the direct competition with the existing KSA. The initial focus will be targeting low cost airlines which will attract people looking for cheaper air travel. A large percentage of the initial travel will be for holidaying and other non-business related travel.

Chart 2.4: Travellers to/from Western Sydney and Rest of Sydney – by purpose

Source: National/International Visitor Survey Data Q1 2013.

Currently Western Sydney is underrepresented in the top 5 industries that require business travel however a large percentage of people living in Western Sydney commute to work in these areas. Hence the initial stage will also target business travel from those living in the west.

Economic Growth: Stage 2 & 3

Stage Overview

As the Western Sydney populations grow, ICE Solutions' proposed economic focus shifts into more frequent and longer distance passenger services, with additional runways added to accommodate the larger planes required for long haul travel.

While the freight facilities around the airport will continue to grow, there will be a focus on developing commercial office buildings around the airport. This will help drive a shift of professional industries into the region as they look to capitalise on the airport and an increase in clients located around the new growth centres. The shift of professional industries will also be supported by the development of tertiary education centres in the later stages of the proposal.

Long term ICE Solutions will provide a new airport city which provides the opportunity for people to live, study and work within minutes of access to international travel facilities.

Job Growth

The expansion of the airport will provide additional jobs in the airport facility itself. As the passenger numbers and flights increase the freight movements will increase proportionately as a large percentage of the freight will be moved in the bellyholds of the passenger aircrafts. Stage 2 and 3 of the ICE Solutions proposal also sees the development and expansion of the white collar industries in the business park. The development of the business park will create additional jobs for the growth centres and also relocate current professional workers from the CBD reducing commuter travel. This will result in the Airport City where people will live, work and travel all within close vicinity of the airport.

The job growth in the is estimated to be 57,000 in the next 30 years and will continue to grow to an estimated 200,000 jobs as the Broader Western Sydney Employment Area continues to grow around the new airport economy.

Gross Regional Product Contribution
$8.7 bil in Western Sydney
$15.2 bil in entire Sydney region

Business

The development of the business park will offer lower cost options for companies currently based in other CBD areas. The location will be ideal for companies servicing the South Western growth areas. The opportunity for businesses to service national and international clients easily by situated close to the new airport will also help drive development of the business park. Head offices for the airlines and industries servicing the airport will be able to shift from the constrained area around KSA and into the new business park. The business park development will also recruit professionals that are graduating through the nearby tertiary education campuses which will begin development in Stage Two.

Convention Centre

The development of a new convention centre will attract international conventions to the area. The availability of the convention centre will complete the ability of the airport area to operate independently to other areas of Sydney, offering all elements of service to the business community. The close proximity to the Blue Mountains and easy access to the Hunter Region will offer conference attendees tourist attractions rivalling the existing entertainment centre in the centre of Sydney.

Affordable Housing

Western Sydney is effectively facing a housing crisis. With rents increasing dramatically and extensive waiting lists for government housing many people find themselves couch surfing and calling in favours, with eventually nowhere to go.

ICE Solutions proposes a stock of housing be provided alongside the airport and community centre as part of the overall development.

The proposed housing stock will provide a range of dwelling sizes with a focus on a design that supports community and communal spaces whilst providing accessibility. Part of the development will be rented out as standard private rentals at market rates. Subsidised housing will be offered to employees on low income wages who express a need (for example, single parent families or those with specific health needs). The provision of affordable childcare will be integrated within the housing precinct.

The remaining housing stock will be managed by a not for profit organisation set up by the airport. The organisation will identify individuals across Western Sydney who are unable to escape a cycle of homelessness. Through the airports connections with the University of Western Sydney and TAFE, the housing position will be supplemented by training courses to develop employable skills. Skills training will be channelled so that foreseen vacancies at the airport site can be filled by those in the housing program. The program will provide a full a cycle approach and offer a chance for those in need to enter the workforce.

This kind of program has proven successful in Victoria in the public tenant employment program which helps those in government housing gain skills to enter the workforce. A similar program for youth is also run by Hume Housing in Western Sydney.

Transport Strategy

Convenient transport links between the new airport, Western Sydney, and wider Sydney communities will enable the airport to attract passengers as an airport of choice.

Convenience relies upon minimal travel times, including the time taken to walk or drive to a public transport station or stop, regular services to minimise wait times, and the most efficient route. The transport strategy must also be flexible to grow proportionately with the expected passenger movements of the airport, which will allow the transport systems to be cost effective.

ICE Solutions transport strategy encompasses a number of new and innovative solutions, as well as expansions upon existing services to better meet the growing needs of the region. ICE Solutions has focused on a flow of movement between transport modes for convenience and accessibility for all passengers and, specifically, clarity for tourists and visitors to the region.

While the solutions must be necessary and cost effective, ICE Solutions also recommends an asethetic approach which allows for new transport links to be fully integrated into the current and expanding situation with minimal construction and operational disruption to the community.

Helipad

There is a lack of capacity for private air travel in Western Sydney currently, and an economic need to tap into the executive and tourism markets.

The construction of a helipad zone will allow for alternative transport for executives heading to the Parramatta and Sydney business districts, and for tourists wishing to access the Blue Mountains.

The helipad and adjacent hangars and lounges will be situated at the Northern end of the airport precinct just off Elizabeth Drive for easy and fast access to both the terminal and the broader Western Sydney employment area.

Small shuttle buses from the main airport terminal and business parks will run in line with helipad use.

Community Transport

The proposal includes a number of community transport initatives designed around the expected population and employment growth to the region as a result of the airport construction and operation. These initatives aim to encourage sustainable transport for the local community, including for airport employees, passengers, local businesses, and students. They are low cost and will be implemented throughout all three stages, growing in size as the local population and passenger numbers grow so that the construction costs are sustainable.

As well as direct new transport links with the airport, ICE Solutions proposes further indirect links to service the local communities of the North West and South West growth regions to increase the appeal of living and working around the new airport. Fast commutes and easy access to services through increased regularity of local buses and accessible bus stops such as the one pictured left will help grow the employment base for both the airport and its planned associated facilities.

Encouraging Sustainability

One of the key themes of this proposal is sustainability, both environmentally and economically. Sustainability in transport will assist in improving the air quality at a time when car use is continuing to increase, and will keep living in Western Sydney affordable for its residents.

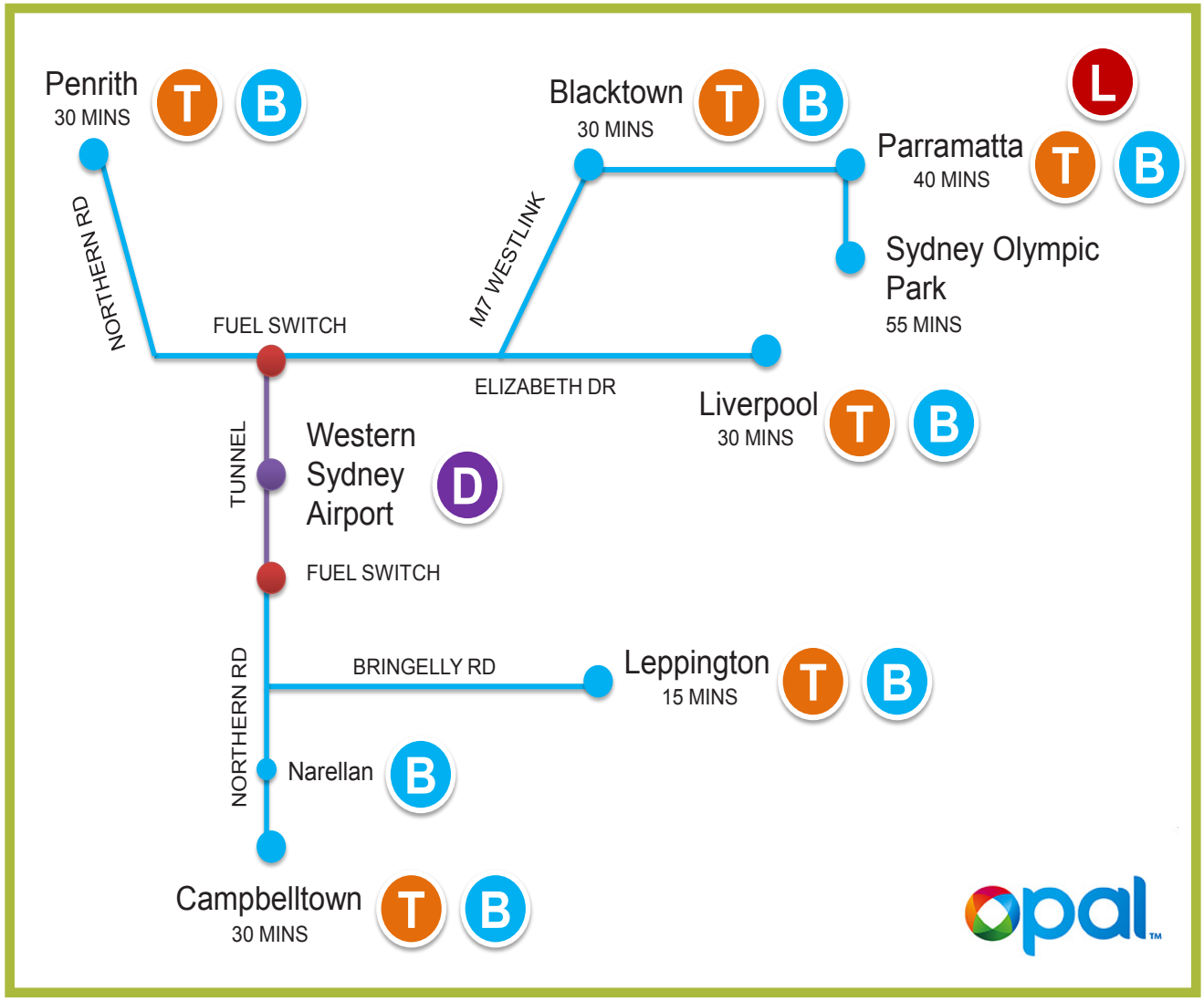
Key sustainability initiatives in transport include cycle parking at the terminal and surrounding businesses that will link with a new proposed cycle network stretching between Penrith, to Parramatta, and Campbelltown. Construction of safe, well lit cycle paths will encourage a healthy and cheap alternative to driving or even buses and trains offered for airport employees and short term visitors. Information on the cycle path routes will be displayed clearly on all cycle parking bays, with the routes also posted online and available from local community centres and libraries.

Car pooling initiatives will minimise congestion into the airport and reduce emissions. Car pooling of airport employees will be encouraged through an organised scheme with priority parking and rebates for participants.

Electric car charging facilities will be based both in the long and short term car parks, with the number of charging points growing as the airport pax increases. While electrical car ownership is still low in Australia, planning for the potential increase in this cheaper and more sustainable option will ensure Western Sydney Airport does not fall behind in innovative transport solutions.

Transport: Stage One

Dual Fuel Shuttle Buses



Dual fuel electrified buses run on both electricity from overhead wires similar to light rail, and on natural gas when on non-connected roads.

The Stage One strategy includes for the construction of a cut and cover tunnel below the airport precinct through which the electrified buses will run. Once the buses surface and meet the roads as listed in the diagram opposite, they will switch to natural gas and drive along surface roads to their destinations.

Upgrades to the shuttle bus routes including dedicated lanes and priority at interchanges will be funded under the Federal Government dedicated roads package for the region. These upgrades will ensure fast transit times.

The buses will run every 5-20 minutes to the various destinations shown from the underground airport station during the airport's hours of operation, and will cater for both airline passengers and airport employees.

Opal enabled buses with no airport station surcharge will keep transit costs to a minimum for all passengers to encourage the use of public transport options over private cars to reduce road traffic in the area and pollution.

Shuttle Conversion from Stage One to Stage Three

The tunnel running across the airport precinct will be constructed during Stage One, and represents a cost saving to the Stage Three construction costs when the tunnel is converted for heavy rail. To allow continuous operation of the shuttle buses, the rail lines will be constructed in a staged programme from the existing stations towards the tunnel entrances.

The final conversion from duel fuel bus to rail will be split into two further stages for minimal disruption to services. The Northern line will be built first while the Southern bus link continues to run, then once complete and operational, the Southern line will be built.

Due to the increase in passenger numbers from Stage One to Stage Three, the underground station will also be upgraded with wider platforms and larger facilities for the comfort of passengers.

The Silver Line (pictured above) is the dual-mode bus system in Boston, MA. The Silver Line transports passengers from the city lines using its electric mode before switching to diesel when diverting to the airport.

Pre-Terminal Interchanges

New interchanges will be constructed during Stage One at the shuttle dual fuel bus stops for seamless transition between the new line and existing bus, train and light rail infrastructure.

The interchanges will include free standing check in terminals (such as those pictured) for checking in, assigning seats and printing boarding passes. This will save passengers time at the airport, leading to a quicker arrival procedure, as well as reducing queues at the airport for check in facilities. Qantas, Virgin Australia and Jetstar currently operate free standing terminals for their airlines, and will be able to use the same technology for the new interchanges.

In Stage Three, pre-terminal facilities will be constructed at all major rail stations for the benefit for increased passenger numbers and accessibility by rail. Passengers will also be able to check in for flights from Western Sydney Airport in the Kingsford Smith Domestic and International Terminal rail stations for connecting flights before they board their connecting train.


Richmond
Berowra
Hornsby
Epping
Schofields
Carlingford
Olympic Park
Emu Plains
Central
Bondi Junction
Clyde
Lidcombe
Liverpool
Campbelltown
Macarthur
Cronulla
Waterfall
NORTH
T1 North Shore, Northern & Western Line
T2 Airport, Inner West & South Line
T3 Bankstown Line
T4 Eastern Suburbs & Illawarra Line
T5 Cumberland Line
T6 Carlingford Line
T7 Olympic Park Line
Stop
Interchange
Interchange
End of line
Stage Three
New Line

Transport: Stage Three

Train Links

In Stage Three, the airport will be integrated into the Sydney Rail Network through a new line between St Marys and Leppington stations. The aim for the new train lines is to open up the Western Sydney region with the loop servicing the new airport, Liverpool, Parramatta, and Blacktown, a new link south to new stops including at Narellan on to Campbelltown, and a direct link to Sydney CBD and the Kingsford Smith Airports.

A number of new stations will built on the new section of rail to service the Western and South West growth areas.

T1 Line

The rail line will run from Western Sydney Airport to St Marys, where the train will continue on the T1 line towards Central, Epping, Hornsby and Berowra opening up the airport to Northern Sydney residents.

Passengers can change at St Marys for services to Penrith and the Blue Mountains, increasing access for tourists to this popular destination.

T2 Line

There will be an express T2 service from the Western Sydney Airport running through the new South West link direct to the Domestic and International airport stops and the CBD.

Convenient and fast links with the existing airport will allow passengers more choice when booking flights and organising transfers.

The proposed new integrated train lines will provide easy access to the different major hubs outside of Sydney CBD without the current requirement to change train lines. This will encourage a decentralisation of employment as the hubs will be equally as accessible, leading to decreased road congestion and shorter commutes.

T3 Line

The rail line will link with Leppington Station on the new South West rail link, then head north at Glenfield to join the Bankstown line at Liverpool, retaining the link to this major hub.

ICE Solutions has proposed a direct link with the T3 line to provide access beyond the current state planning guidelines to enable passengers to reach employment and recreational areas on the Bankstown line quickly and easily.

T5 Line

The expansion of the T5 line to link from Campbelltown through Narellan then north to the airport station will service the growing population in this growth precint who currently do not have convenient access to a rail line.

Sustainable Urban Design

A Water Sensitive Airport

Water sensitive urban design is a key component of development in Western Sydney. Local councils in the regions impart strict requirements on new developments to ensure the pristine environment is protected. The devices serve to protect the water quality of the area and to prevent an increased incidence of flooding downstream.

To prevent the increased incidence of downstream flooding the development will include on site detention basins. As the construction of impervious buildings and runoff will increase the volume and flow rate of stormwater leaving the site when compared to the pre development scenario. To compensate for this the detention basins will hold back the flow of water through a controlled outlet such that the rate of water leaving the site is equal to or less than the pre development scenario.

Water quality devices will also be installed to eliminate litter, other gross pollutants/suspended solids, oils and excessive nutrients from stormwater. A mix of devices with a preference for at source treatment are proposed. Devices to be utilised in the strategy include swales, bioretention ponds, gross pollutant traps, buffer strips and rainwater re use. In addition to pollutants treatment/nutrient removal a dedicated oil catchment unit will be installed to ensure any aero fuel spills are fully contained on site preventing contamination of the stormwater system.

Stormwater treatment will be master planned during Stage One with stormwater treatment devices planned in advance. As the stages progress the treatment system will be installed to be sufficient for the current stage of development.

Protecting Downstream

Water quality devices will protect the integrity of downstream waterways. Onsite detention will prevent an increased incidence of flooding on receiving waterways due to the development.

Terminal Vision Sustainable & Enhanced Customer Experience

Design

Big transparent spaces inside the terminal, with glazing and skylights to allow natural light to enter the building.

Internal gardens, incorporating green walls to avoid creating cold, sterile spaces. Inclusion of a green roof to aid in thermal regulation. The terminal will also incoperate biophilic design features.

Renewable energy sources such as PV panels and co-generation will be incorporated seamlessly into the design, and used to minimise carbon footprint and energy costs. Smart controls will optimise energy consumption and communicate useage data to facilities management. We propse accreditation through NABERS.

The design will incorporate free passenger entertainment options such as a cinema , playground, and wildlife park with native animals as part of our tourism scheme.

Celebrating Culture

Catering for multicultural customers by providing prayer / meditation rooms and ensuring that diverse and all-inclusive food options are provided for. The culture of Western Sydney is diverse and should be celebrated through the terminal.

Relax Unwind

Serene, quiet lounge areas for customers to rest and unwind away from family-friendly areas that provide safe areas for children to play. Providing amenities and shower rooms in a stylish space. Airside hotel will allow for relaxation without security or immigration hassles.

CASE STUDIES

Singapore Changi: Singapore Changi won world's best airport in 2014 largely due to its innovative design and use of technology to improve the user experience.

Dubai: Dubai airport accounts for 19% of total employment in Dubai. Its importance in the economic prosperity of the region runs in parallel with our vision for Western Sydney Airport.

Denver: Denver airport in an insipration for integration within the natural environment. The sails roof integrates majestically with the surrounding Rockies. A inspriation for Western Sydney and the Blue Mountains using the green roof.

Western Sydney Airport

More than just an airport

ICE Solutions
www.icesolutions.com.au