

Deloitte Access Economics

# The benefits of mixed use in the Southern Industrial Area

Goodman

9 March 2015

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# Glossary

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ABS	Australian Bureau Of Statistics
BITRE	Bureau of Infrastructure, Transport And Regional Economics
BTS	Bureau of Transport
CBD	Central Business District
DAE	Deloitte Access Economics
DP&I	Department of Planning And Infrastructure
ICT	Information and Communications Technology
IT	Information Technology
LGA	Local Government Area
SIA	Southern Industrial Area
TEU	Twenty Foot Equivalent
URA	Urban Redevelopment Authority
VKT	Vehicle Kilometres Travelled
VOC	Vehicle Operating Cost

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# Executive Summary

Decisions are currently being made for the future development of the Southern Industrial Area (SIA) in Sydney. The area is close to Sydney CBD, Port Botany and the airport and forms part of the NSW Government's Global Economic Corridor. This makes the area unique in its strategic potential. Rezoning and future development in this region therefore has significant economic and social implications for the economy of the Sydney Local Government Area (LGA) and Metro Sydney.

For example, the redevelopment of the Southern Industrial Area in a genuinely mixed use way will help support goals and planning principles set out in the NSW Government's Plan for Growing Sydney. In particular, redevelopment will support the overall goal of providing a mix of housing options close to work and improving the amenity and transport options of areas in which people live. The redevelopment particularly supports two planning principles that underlie the Plan for Growing Sydney:

- Principle 1: Increasing housing choice around all centres through urban renewal in established areas.
- Principle 2: Stronger Economic Development in Strategic Centres and Transport Gateways.

Given the strategic importance of the SIA in the Sydney economy, there has been detailed consideration to redevelopment options. SGS Economics and Planning produced a report for the City of Sydney in 2013 that recommended mixed use redevelopment including residential development. This was supported by a report by Hill PDA in 2014 that also recommended mixed use development including residential development. This approach to redevelopment reflects a mix of the land uses that are in demand in the area as well as recognising the strategic importance of maintaining some industrial activity in the area.

The City of Sydney subsequently adopted the Employment Lands Strategy 2014-2019 in June 2014. The strategy remains somewhat consistent with the SGS and Hill PDA reports but departs by excluding market based residential development from the area entirely and, in essence, replacing the residential areas identified by SGS and Hill PDA with a business park. This is a significant departure from apparent market demands in the area and means that redevelopment of the SIA would create a business focussed precinct rather than a genuine mixed use precinct.

Goodman, a significant landholder in the area, estimates that a genuine mixed use development could deliver around 200Ha of both residential and business floorspace which equates to creating 30,000 new residences and 50,000 new jobs in the SIA. To put this development into perspective, Barangaroo South is expected to deliver around 28 Ha of commercial space and less than 1000 residential apartments. With this redevelopment plan in mind, Goodman has commissioned Deloitte Access Economics to analyse the economic outcomes that it could create.

The current alignment of jobs, skills and home locations in the area is an important backdrop to the analysis of benefits from redeveloping the SIA in a genuine mixed use way. We have found that:

- The most common place of work for those living near the SIA is the Sydney CBD with the most common industries of work for these people being professional and finance related.
- The most common industries of employment in the SIA are transport, manufacturing and wholesale. Workers in these industries frequently commute from locations like Mascot and Bexley as well as Western Sydney (Blacktown and Penrith).

In this report we have quantitatively analysed the major economic consequences that could arise from redeveloping the SIA into a genuine mixed use area: commuting time savings, freight efficiencies and payments to Governments as a result of redevelopment. While there are other economic effects that would be created through redevelopment (such as improved amenity for residents or more use of active transport) we consider that the three effects discussed below are likely to account for the majority of economic effects.

- The economic benefits of reduced travel times, cost and distance;
  - Commuter related savings of an estimated \$122 million per year could be expected from redeveloping the SIA into a genuine mixed use area.
  - There are three sources of these benefits: new residents in the area will save time on their commute (as they are likely to work in the CBD or within the precinct itself); current industrial workers in the area are spending longer than average getting to work and so relocation to jobs closer to home will reduce their travel time; and new jobs in the SIA will allow people living near the SIA to work close to home.
  - These benefits consist of the value of time saved by commuters and the value of avoided costs such as emissions, road wear and similar.
- Improving the efficiency of freight;
  - Relocation of some industrial activity in the SIA could create freight efficiencies worth around \$6.5m a year to NSW.
  - This benefit comes from using more productive vehicles and bringing supply chains close together.
  - These benefits could increase in the future as infrastructure such as WestConnex, Moorebank Intermodal Terminal and Enfield Intermodal terminal begin operation.
  - The SIA's proximity to the port appears not to be critical for logistics businesses with the major destinations for imports in Sydney all being west of Parramatta.
- Stamp duty, rates and other payments to governments.
  - These payments are not direct economic benefits as they are transfers from one party to another. Further, if development in the SIA did not take place then it is likely that offsetting development and payments would have to take place elsewhere in Sydney
  - Initial developer contributions of around \$790m could be payable to City of Sydney with annual payment to governments of around \$118.0 million a year.
  - The present value of all payments to Governments from the redevelopment of the SIA into a genuine mixed use area could amount to around \$2.5 billion.

## Deloitte Access Economics



Putting 30,000 residential properties and 50,000 jobs in the SIA would save:

**\$100 million**  
worth of commuter time

**28 million**  
vehicle kilometres

**\$22 million**  
of other transport costs  
every year

Reducing industrial activity in the SIA would save:

**\$6.5 million**  
of freight costs every year



Redeveloping the SIA could generate

**\$690 million**  
of developer contributions



**\$100 million**  
affordable housing scheme contributions



**\$53 million**  
of stamp duty every year



**\$39 million**  
of rates from the SIA every year

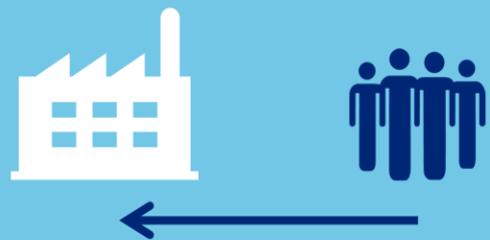


**\$26 million**  
of land taxes every year



**2,522**

residents near the SIA commute to the CBD for work in professional and financial industries every day



**9,238**

workers commute into the SIA for work in manufacturing, transport and wholesaling industries every day

# 1 Introduction

## 1.1 Focus and scope of this report

Decisions are currently being made for the future development of the Southern Industrial Area (SIA) in Sydney. The area is close to Sydney CBD, Port Botany and the airport and forms part of the NSW Government's Global Economic Corridor. Rezoning and future development in this region therefore has significant economic and social implications for the economy of the Sydney Local Government Area (LGA) and Metro Sydney.

At present, Sydney City Council has proposed to rezone the land to allow for a mix of industrial and commercial uses including a business park but will exclude any market driven residential development. This proposal follows, although it is a departure from, a number of planning documents that analysed various options for redevelopment. These include a report by SGS to the City of Sydney (2013) and the Employment Lands Analysis and Opportunities Study (2014) prepared by Hill PDA.

This report has been commissioned by Goodman Australia (Goodman). Goodman manages a portfolio of 206 industrial and business properties across Australia and is a landowner in the SIA. Goodman has commissioned Deloitte Access Economics to analyse the economic outcomes that could result from proposed redevelopment opportunities in SIA. The report will focus on the economic impacts of rezoning the SIA into a genuinely mixed use area. The report will consider the economic consequences of genuine mixed use on:

- the alignment of jobs, skills and home locations in the area
- freight efficiency; and
- The stamp duty and rates payable to the NSW government.

## 1.2 Layout of this report

The report is structured as follows:

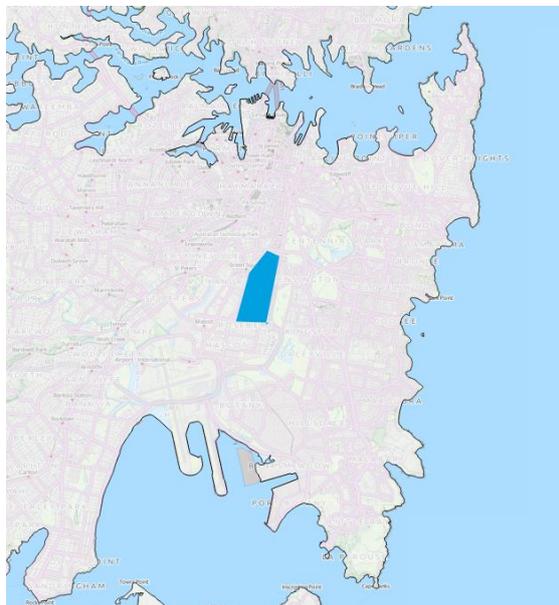
- Section 2 provides a brief background to some of the major issues in the SIA and current plans for redevelopment.
- Section 3 provides quantitative analysis of the economic consequences of redeveloping the SIA.
  - Section 3.1 covers the alignment of jobs, skills and home locations
  - Section 3.2 covers the economic benefits associated with home and job location
  - Section 3.3 covers the efficiency of freight; and
  - Section 3.4 covers stamp duty and rates payable.

## 2 Background

### 2.1 The Southern Industrial Area

The SIA, also known as the southern Sydney employment lands is approximately 265 hectares of land in the Erskineville – Alexandria region of Sydney. It is recognised as one of the most strategically important employment lands within Sydney’s metropolitan area as it is located just 3 kilometres south of the Sydney Central Business District (CBD), two kilometres north of the Airport and 3 kilometres northwest of Port Botany (SGS 2013).

**Figure 2.1: Regional location of the SIA**



**Figure 2.2: Looking north over the SIA**



Source: City of Sydney (June 2014)

### Defining the SIA for economic analysis

The SIA is smaller than many areas used for statistical analysis. As a result, this report uses a number of different regions to analyse economic activity in the SIA. The primary region is the Erskineville – Alexandria SA2 as defined by the ABS. This region encompasses the SIA as well as some residential parts of Erskineville. Current residents of this area are assumed to be a good representation of the mix of residents likely to settle in the redeveloped SIA.

Other sections of this report use data based on postcodes where the 2015 postcode is the closest comparator for the SIA. Again the 2015 postcode encompasses the SIA as well as some residential areas just outside the SIA.

ABS Census data (2011) shows the total population of the SA2 to be 9,600 residents with only a small amount of residential dwellings within the SIA proper (estimated to total of 345).

At present the SIA is largely zoned and used for commercial, light industrial and bulky goods purposes. The main strength of the SIA, its location within the Global Economic Corridor and proximity to the CBD, Airport and Port Botany is not currently being fully exploited. One of the major issues holding back the SIA is accessibility. For freight, there is very limited access for high productivity vehicles with use restricted to Botany Road and O’Riordan Street while access to the airport and port is hampered by poor road connections and congestion in the area. For workers, the nearest train station to the centre of the SIA is approximately 2 kilometres away. Parking is also a major constraint due to limits on availability.

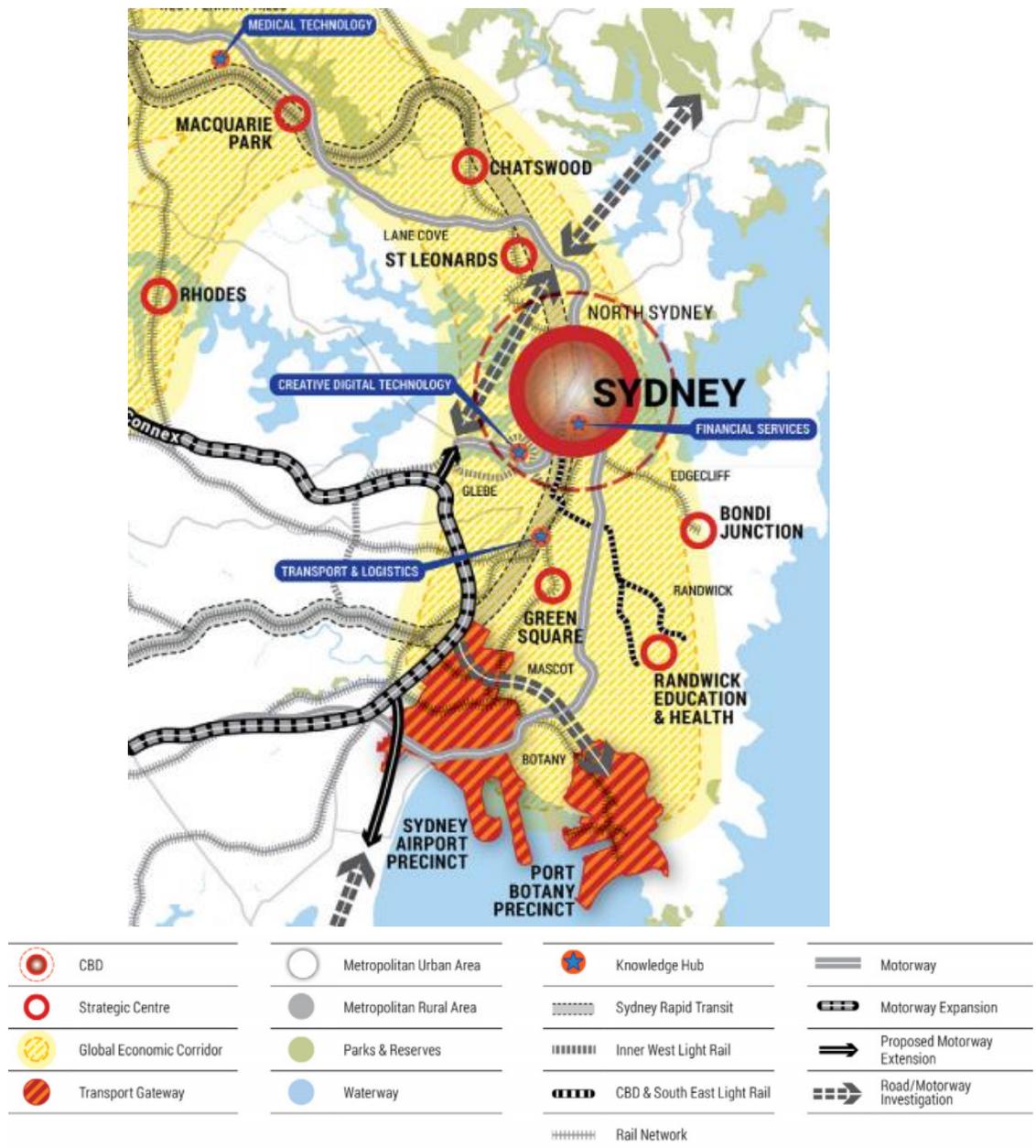
While the area remains a useful inner city location for light industrial uses, it is not vital with 20 percent of property currently vacant. There is also a growing transition of businesses and employment to sectors such as retail, food, professional services and information and communications technology (ICT). They are expanding at a faster pace than the traditional industries in the area such as transport, wholesale trade and manufacturing (Hill PDA 2014). Accompanying this industrial transition is a demographic transition, the area is becoming increasingly populated by young professionals between the ages of 20 and 44. These residents tend to be well-educated and work in service industries – primarily in and around the CBD.

The combination of its strategic location in the Global Economic Corridor, its current underutilisation and its current natural transition into different uses makes the SIA prime for redevelopment. Redevelopment would aim to strengthen Sydney’s global competitiveness and productivity as set out in the metropolitan planning strategy, *A plan for growing Sydney* released by the NSW Government (2014). This will be explored in greater detail in Section 2.2.

## 2.2 Metropolitan strategy in Sydney

The NSW Government has recently released a broader metropolitan planning strategy, “A plan for growing Sydney” to guide land use decisions over the next 2 decades. This plan outlines the Government’s vision to strengthen Sydney as a global city, as well as setting out the goals and principles necessary to achieve this vision. One of the key themes throughout the planning strategy is strengthening the Global Economic Corridor, which extends from Macquarie Park, through Sydney’s CBD and into the Sydney Airport and Port Botany Precinct. The SIA is located within Sydney’s economic corridor and thereby plays a significant role in achieving the goals set out by NSW Government.

Figure 2.3: Sydney’s Global Economic Corridor



Source: NSW Government – Planning & Environment (2014)

The *Plan for Growing Sydney* includes increased housing that is located within a close distance to employment, community facilities and public transport. This includes choices in style and pricing to offer choice and better suit the lifestyle of Sydneysiders. A part of the framework includes strengthening the competitiveness of Sydney through increased investment and growth in employment in the global economic corridor (NSW Government – Planning & Environment, 2014).

In particular, the redevelopment of the SIA in a genuinely mixed use way will help support this framework via achieving the following goals and principles set out in the strategy:

- *Goal 1: A competitive economy with world-class services and transport*, which aims to ensure that Sydney will continue to compete in the global economy by becoming more internationally competitive. This includes identifying redevelopment opportunities to grow high skilled jobs in the global economic corridor, allowing the expansion of employment opportunities and mixed-use activities
- *Goal 2: A city of housing choice with homes that meet our needs and lifestyles*, which aims to meet the changing needs and lifestyle choices of households. Furthermore, accelerating the housing supply and local housing choices within the economic corridor will meet increased demand resulting from greater employment within high skilled industries and the changing dynamic of household lifestyles.

The redevelopment of the SIA into mixed use also aligns closely with the planning principles set out in the strategy that will guide the methods to future growth in Sydney, in particular:

- ***Principle 1: Increasing housing choice around all centres through urban renewal in established areas.*** This will increase the ease of travelling to work via various methods; reducing traffic congestion and increased social benefits of establishing better linked communities.
- ***Principle 2: Stronger Economic Development in Strategic Centres and Transport Gateways.*** Improving the transport gateways and removing poor road connections will reduce traffic congestion and benefit the city's overall productivity and global competitiveness.

Redevelopment of the SIA in a genuinely mixed use way will provide an opportunity for the City of Sydney to meet the housing and employment targets that will be developed in the coming months. This will be achieved through increased density of employment in the SIA and by increasing the availability of housing in the area.

## 2.3 Current Redevelopment Plans

Given the strategic importance of the SIA in the Sydney economy, there has been detailed consideration to redevelopment options. Several reports investigating land use policies for the SIA have been released over the past few years. Many of these publications have been prepared to inform the City of Sydney’s Draft Employment Land Study (2014). A summary of the relevant reports and suggested strategies are summarised in this section:

- **SGS Economics & Planning**

Released an Employment land study to the City of Sydney in March 2013. SGS identified possible future land uses for the study area and the advantages and disadvantages associated with each strategy. The possible scenarios considered are summarised in the table below. Each of three options was separately considered and weighted against a base case representative of the current status of the SIA.

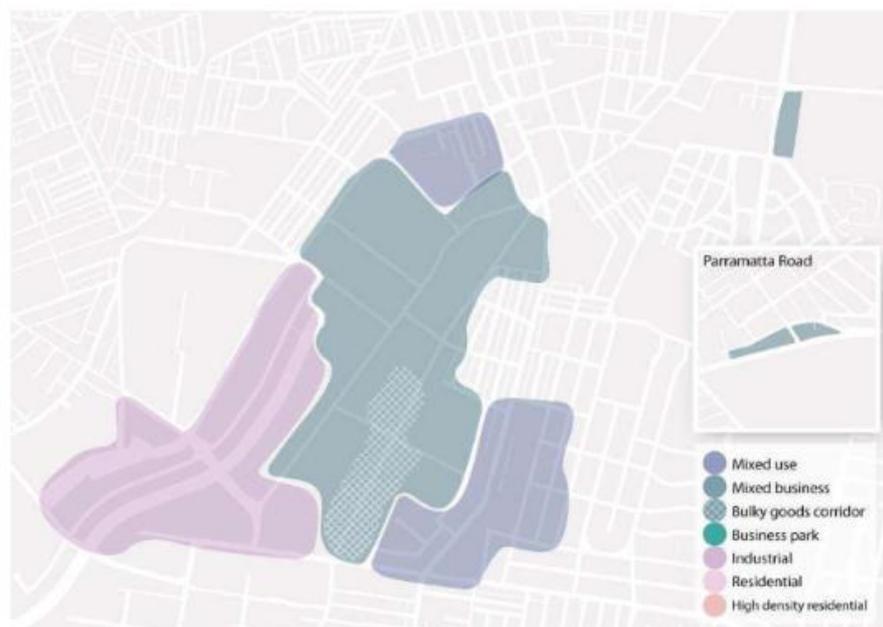
**Table 2.1: Development scenarios considered by SGS**

Scenario	Change in jobs	Change in residences
Residential	-2,987	+6,259
Commercial	+19,396	-104
Mixed economy	+10,255	+468

Source: SGS (2013)

The SGS report highlights many advantages of the mixed economy strategy including ensuring the study area supports its position within the Global Economic Corridor; its flexibility to cater for growth in tertiary-based and creative industries; and the ability to improve local amenity. Figure 2.4 provides a summary of the possible land use zoning under this scenario.

**Figure 2.4: SGS’ Mixed Economy Scenario**



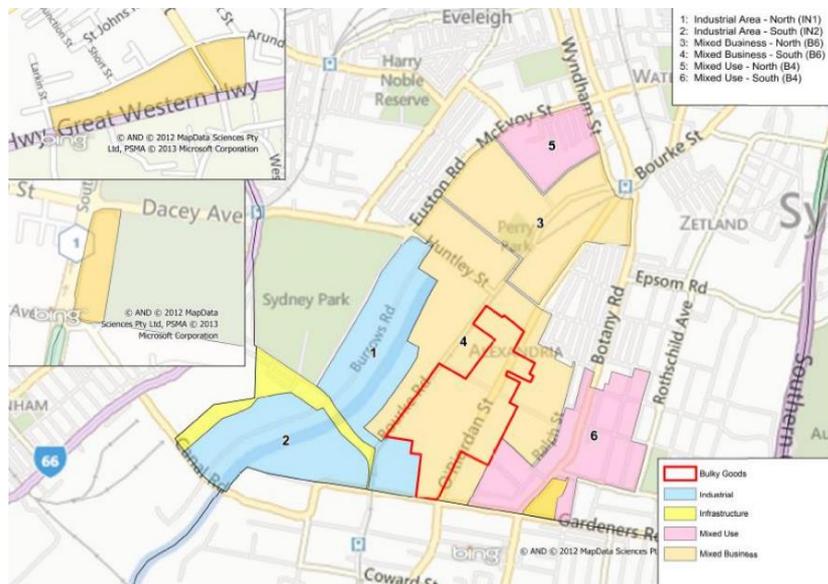
Source: SGS Economics and Planning (2013)

- **Hill PDA**

Prepared an *Employment Lands Analysis and Opportunities Study* for the City of Sydney based on a *Draft Strategy (2014)* released by the City of Sydney in February 2014. This strategy was similar to SGS’s recommended scenario, with the SIA zoned for predominately mixed business use, with smaller industrial and mixed use areas. The layout analysed by Hill PDA is shown in Figure 2.5.

As part of its findings, Hill PDA highlights that the mixed use development under consideration delivers benefits including significant job growth, alignment with a number of State Government objectives, increased housing supply and aligning residential dwellings with places of work.

**Figure 2.5: Proposed Land Use Zones**



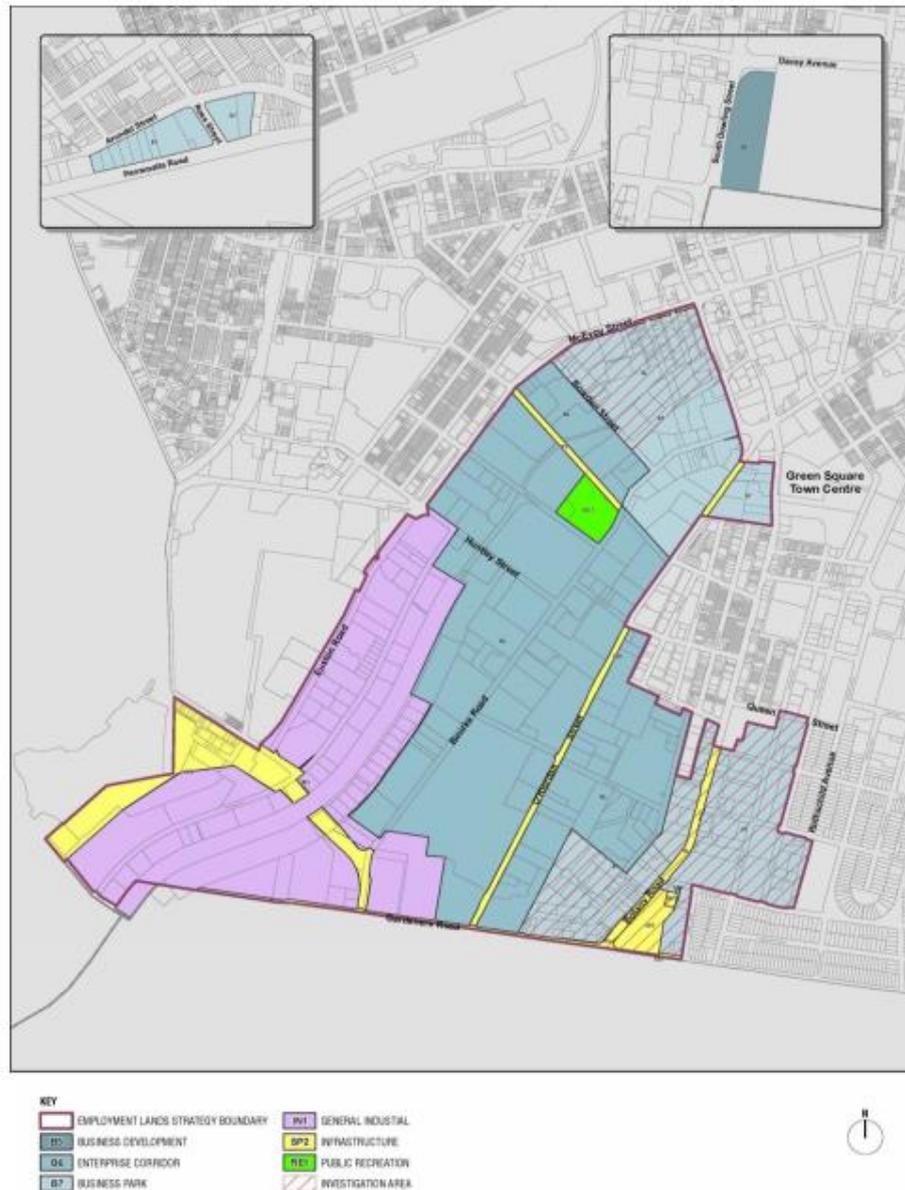
Source: Hill PDA (2013)

- **City of Sydney**

Adopted the *Employment Lands Strategy 2014-2019* in June 2014. The strategy remains somewhat consistent with the SGS and Hill PDA reports with a long term goal for a relatively higher density mixed business precinct to accommodate a variety of uses, including creative and knowledge based industries.

A critical exception to this consistency is that the areas dedicated to mixed use (and a portion of the mixed business areas) in these previous reports were converted to a Business Park. This means that any market based residential development would be excluded from the SIA. While the expected activity in the Business Park is not highly detailed, the zone has been established to encourage a mixture of economic activities as well as ‘other’ uses to support and attract higher value activities and improved amenities for the area. The housing component of the strategy involves the introduction of an affordable housing contribution to ensure the provision of some housing for low income workers in the area.

Figure 2.6: City of Sydney’s proposed zoning for SIA



Source: City of Sydney (2014)

When taken together, it is clear that there is a consensus that a mixed use redevelopment of the SIA would be beneficial for Sydney’s economy and would aid the NSW Government and the City of Sydney in meeting their strategic goals. The exclusion of residential development in the Employment Lands Strategy does seem to represent a departure from previous analysis and moves the redevelopment of the SIA away from a genuine mixed use area into a mixed business area.

The Employment Lands Strategy raises questions over whether the area is well suited to a business park, which is analysed below, as well as whether the departure from a genuine mixed use development will be a missed opportunity to generate economic benefits through aligning jobs, skills, home locations and supply chains – this is explored in Section 3.

### Successful Business Parks

In 2013 the NSW Department of Planning and Infrastructure (now Department of Planning and Environment (DP&E)) released an Economic Issues and Drivers Study focusing on the future development of the Broader Western Sydney Employment area. Section 8 applies a qualitative demand analysis of Business Park lands for the area by considering the key criteria for successful operation of a business park. This framework can be applied to the SIA:

- **Access to public transport – preferably rail:** Transport and access into the SIA is one of the most significant issues currently facing future development (SGS, 2013). The SIA lacks the appropriate transportation infrastructure to support the development of a Business Park. The majority of the study area is well outside the 800m walking parameter to the nearest train station; especially the south west land zoned for Business Park and central core of the SIA. Furthermore, current Airport rail lines are approaching seated capacity. Finally, parking is a major constraint due to limits on availability, reducing marketability and dampening the attractiveness of a business park in the area (Hill PDA, 2014).
- **Links to freight corridors and transport nodes:** proximity is a strength of the SIA, with the area being close to Port Botany, Sydney Airport and the CBD. However, with considerable movement of heavy vehicles through relatively poor quality roads, and limited connectivity to arterial roads, the benefits of proximity are hampered. There is also limited B-Double access with freight use restricted to Botany Road and O’Riordan Street, adding to traffic pressure. BIS Shrapnel (2014) also indicated that there has been little success of office park developments in areas surrounding airports.
- **Land area of 50-180 ha to allow for expansion:** The SIA is well above the threshold for expansion, totalling 265 hectares of land. Therefore the construction of a business park in this area could supply in excess of market demand for the area. The SGS report (2013) stated that the majority of increased value and market demand from redevelopment of the area would be concentrated in the mixed use zone which raises issues about how the supply created by the business park zoning will affect supply and demand in the mixed use zone.
- **Demand for critical mass of employees (concentrated in one location):** there are already numerous business parks across Sydney which currently meets demand for a critical mass of employees. These established business centres include Macquarie Park, Parramatta and Norwest. BIS Shrapnel’s report (2014) highlighted the fact that, unless established offices have reached their capacity, it will be very challenging to encourage market demand in newly establish business parks. Further, the proposed location is very close to the Sydney CBD, which delivers the highest level of critical mass for employers and workers in Australia.
- **Proximity to workforce – within 30 minute commute:** The SIA is relatively well placed in this regard, with surrounding suburbs containing a large pool of workers. However, as with freight, proximity advantages of the SIA are offset by poor public transport infrastructure, high levels of traffic congestion and limited parking in the area. The poor accessibility of the area means that most workers that are within 30 minutes commute of the area are also within 30 minutes commute of the CBD.

Assessing the SIA against the qualitative criteria developed by the NSW Government indicates potential shortfalls of the location with respect to proximity to public transport, the large land size, its proximity to established business districts and its accessibility for freight. This indicates that the area may not be well suited to development as a business park.

## 3 Economic benefits of mixed use redevelopment in the SIA

This section of the report analyses a number of benefits that could arise from redeveloping the SIA into a genuine mixed use area. While there are a broad number of economic effects that could be measured we have focussed on economic outcomes that would be influenced by including more residential in the mix of redeveloping the SIA. We believe that these effects are likely to account for the majority of economic effects of redevelopment in the area. We have assessed:

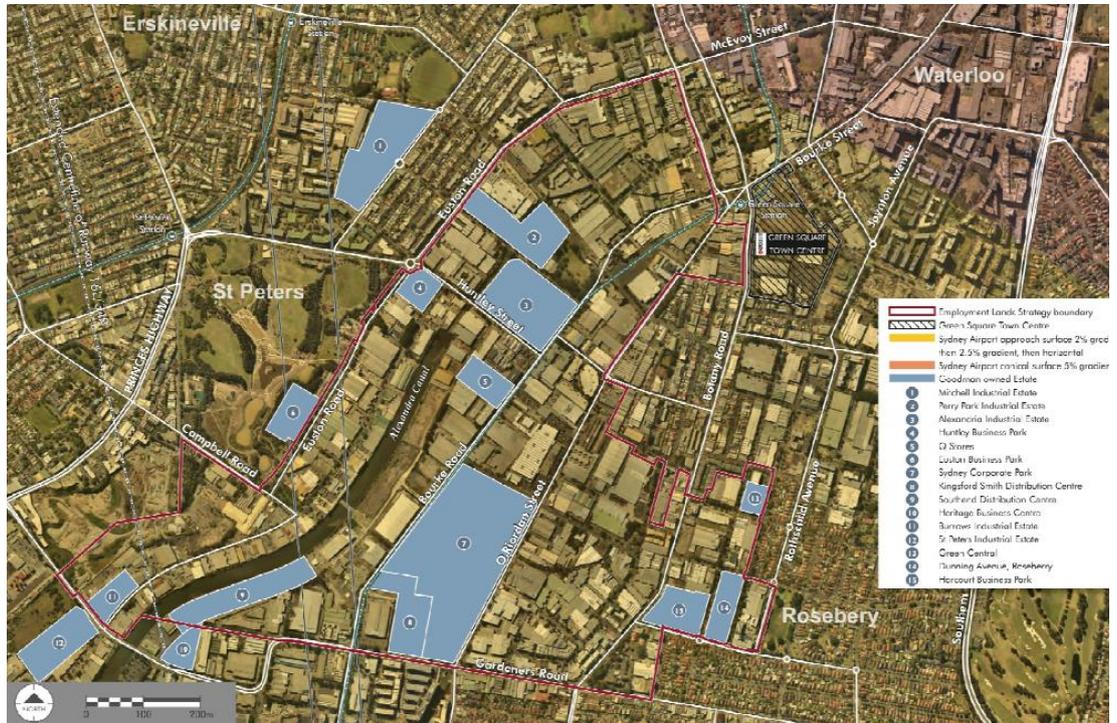
- The current alignment of jobs, skills and home locations in the area;
- The economic benefits of reduced travel times, cost and distance;
- Improving the efficiency of freight; and
- Stamp duty, rates and other payments to governments.

Each of these items is considered in detail below.

Goodman has built on the development strategy outlined by SGS and Hill PDA to provided us with a predicted increase in residential and commercial opportunities that they believe could be achieved under an alternative development approach. The advice provided to us indicates that an extra 4 million square meters of floorspace could be developed split roughly evenly between residential and commercial uses. Goodman has advised that this equates to around 30,000 new residential apartments and 50,000 new jobs in the SIA through a mixed use development. The additional jobs are expected to be mainly in the service sector and to focus on industries such as professional services, finance, media and IT.

This development strategy represents a bolder vision for the area which maximises employment yield as well as providing for a mixed-use, live-work-play environment. The strategy seeks to align public interest, current industry distribution trends, and established State objectives for housing and jobs distribution. The development strategy also takes into account significant planned and current infrastructure projects under consideration that may impact the SIA, such as WestConnex and the second Sydney Airport. In particular, Goodman's proposal involves taking land currently proposed to be zoned as B7 – Business Park and rezoning it to B4 – Mixed Use zoning (as recommended in the SGS Employment Lands Study).

Figure 3.1: Goodman estates in the SIA



Source: Goodman

## 3.1 Aligning jobs, skills and home locations

The alignment of the location of home and work for Sydneysiders is an important part of the NSW Government's "A Plan for Growing Sydney" (December 2014). Outlined in *Goal 2: A city of housing choice, with homes that meet our needs and lifestyles*; the Plan's focus is to improve the availability and mix of dwelling types to ensure that people have access to more affordable housing closer to place of work. The alignment of housing and employment locations will ensure greater ease of travel and reduced congestion on Sydney's roads – making life better for residents.

The redevelopment of the SIA into a genuine mixed use area will allow for growth in high skilled jobs located close to housing that will attract high skill workers. This will provide both time and cost savings via a reduced number of journeys and traffic congestion. Furthermore, the redevelopment will result in the relocation of some industrial and commercial activity to other industrial areas in Sydney which could, potentially, bring work closer to home and reduce travel times for those workers as well.

### International experience

Sydney is not the only major city attempting to more closely align work and home. The Hong Kong Planning Department (Working Paper 15, 2002) explored current examples of mixed use development in the U.S. and Singapore. The paper illustrates factors favouring mixed use strategies in growing an economy; with increased flexibility of land uses to compliment and allow for greater integration across elements. Examples of commercial precincts allowing for residential housing include Oakland in California, Special Long Island City Mixed Use District in New York, and Quebec in Canada. The Urban Redevelopment Authority (URA) in Singapore has also encouraged greater injection of mixed use development across major city locations, with a dedication of growth in housing development over the next 15 years (Master Plan, 2014).

The Canadian Centre of Science and Education (2013) also considered the German experience, determining that employment suburbanisation had a significant impact on commuting patterns, travel times and distances. Over the observed period of 1987-2007, they concluded that polycentric metropolitan regions allowed for greater travel efficiency in comparison to monocentric regions.

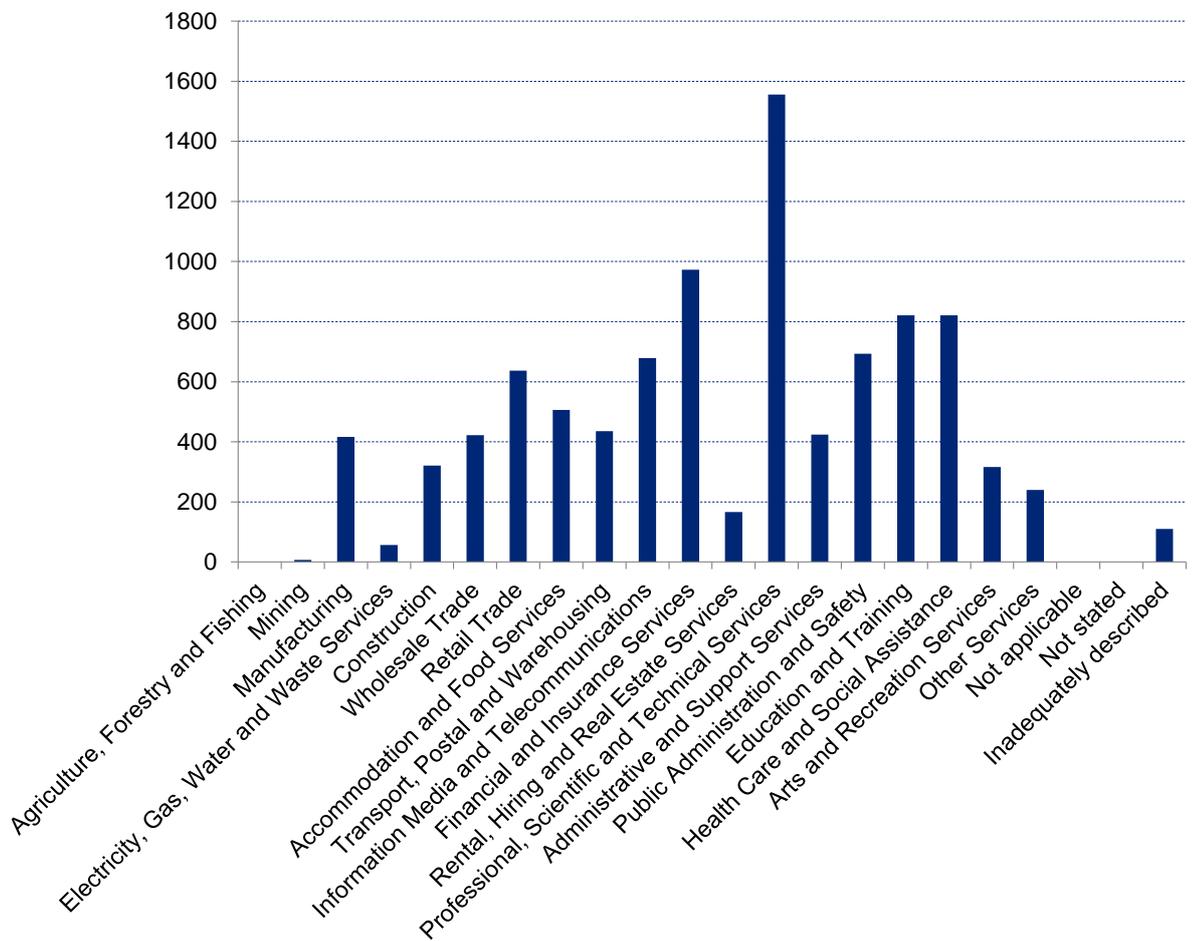
Before estimating the effects of redevelopment on travel times a detailed analysis of the current mix of jobs, skills and homes in the area is necessary. To investigate the current alignment of jobs, skills and home locations we have considered Australian Bureau Statistics' Census Data (Place of Work, 2011). This allowed us to consider both the labour exports; the current skills and place of employment for the residents of the SIA and the labour imports; the place of residence of those currently employed in the area.

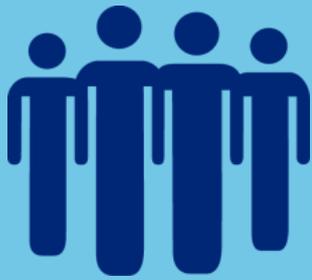
This historical data analysis underlies the assessment of the economic impact of proposed redevelopment in Section 3.2.

### 3.1.1 Labour exports

The SIA has been identified as part of the Erskineville - Alexandria Statistical Area 2 (SA2). According to Census 2011 data, there were 9,600 residences living in Erskineville - Alexandria. Residents are mostly employed in highly skilled jobs particularly in the ‘professional, scientific and technical services’ industry. The second most common industry of employment is the ‘financial and insurance services’ industry. The breakdown of the skill set of those living within this area are summarised in Chart 3.1 below.

**Chart 3.1: People living in SIA**





**2,522**

**residents near the SIA commute to the CBD for work in professional and financial industries every day**

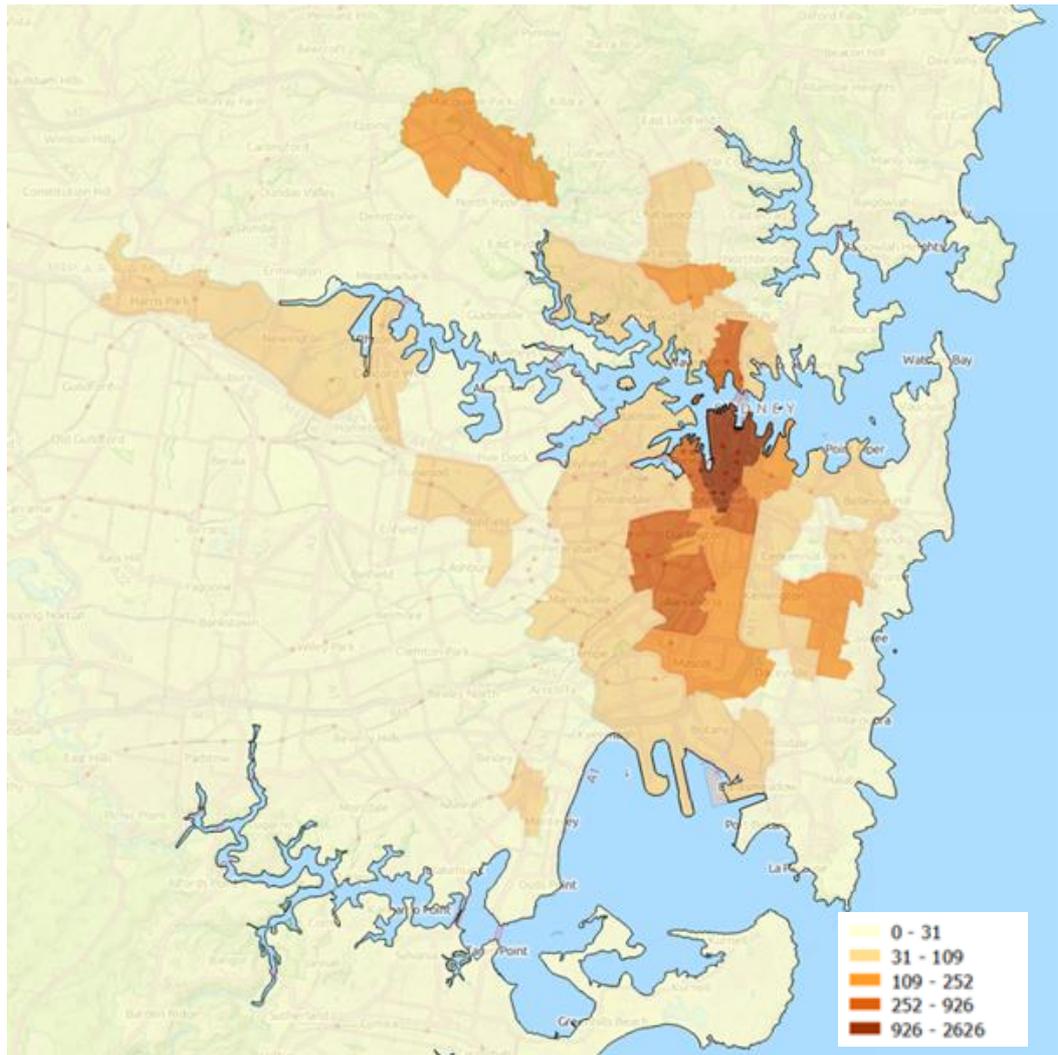


**9,238**

**workers commute into the SIA for work in manufacturing, transport and wholesaling industries every day**

The most common location of place of employment is central Sydney, or more specifically the ‘Sydney- Haymarket – The Rocks’ area. This area is the destination for more than half of those working in the ‘professional, scientific and technical services’ industry and the ‘financial and insurance services’ industry. The dominance of the city and surrounds as a destination for those living near the SIA can be seen in the figure below.

**Figure 3.2: Residents of SIA: Place of Work (All industries)**



Source: Deloitte Access Economics, ABS (Census 2011)

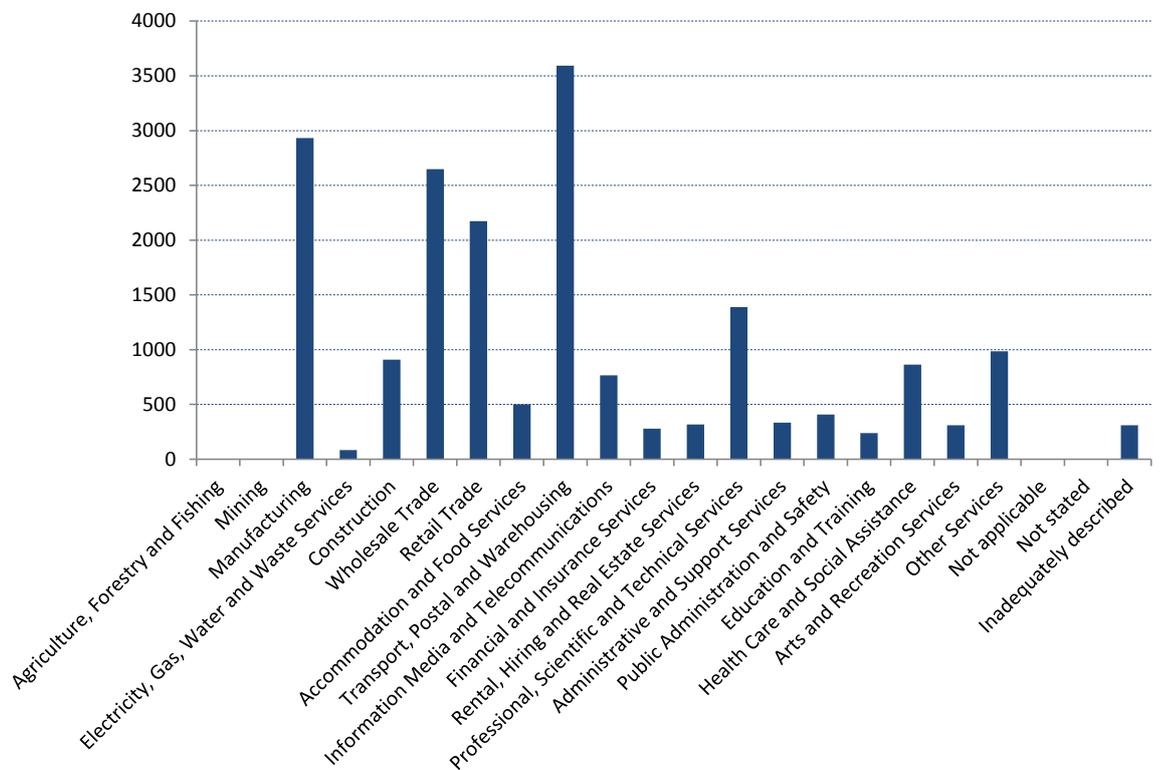
### 3.1.2 Labour imports

Rezoning the SIA for mixed use purposes will also provide opportunity to accommodate increases in demand for labour in high skilled industries within Sydney’s Economic Corridor. Mixed use land zone will allow for integrated business, office and retail developments to maximise growth potential of highly skilled and creative industries as well as achieving efficient use of land within the Erskineville - Alexandria area. According to the *Employment Lands Analysis and Opportunities Study (2014)*, there has been a shift towards tertiary and creative industries, with a 19% decrease if SIA floor space dedicated to transport, logistics and manufacturing uses since 2007.

At the time of 2011 Census data there were 19,032 people working in the SA2 of Erskineville – Alexandria. Investigation of place of residence of labour employed in the region is useful in considering the likely impact of the relocation of these jobs to other Sydney industrial areas that are in closer vicinity to the relevant workers.

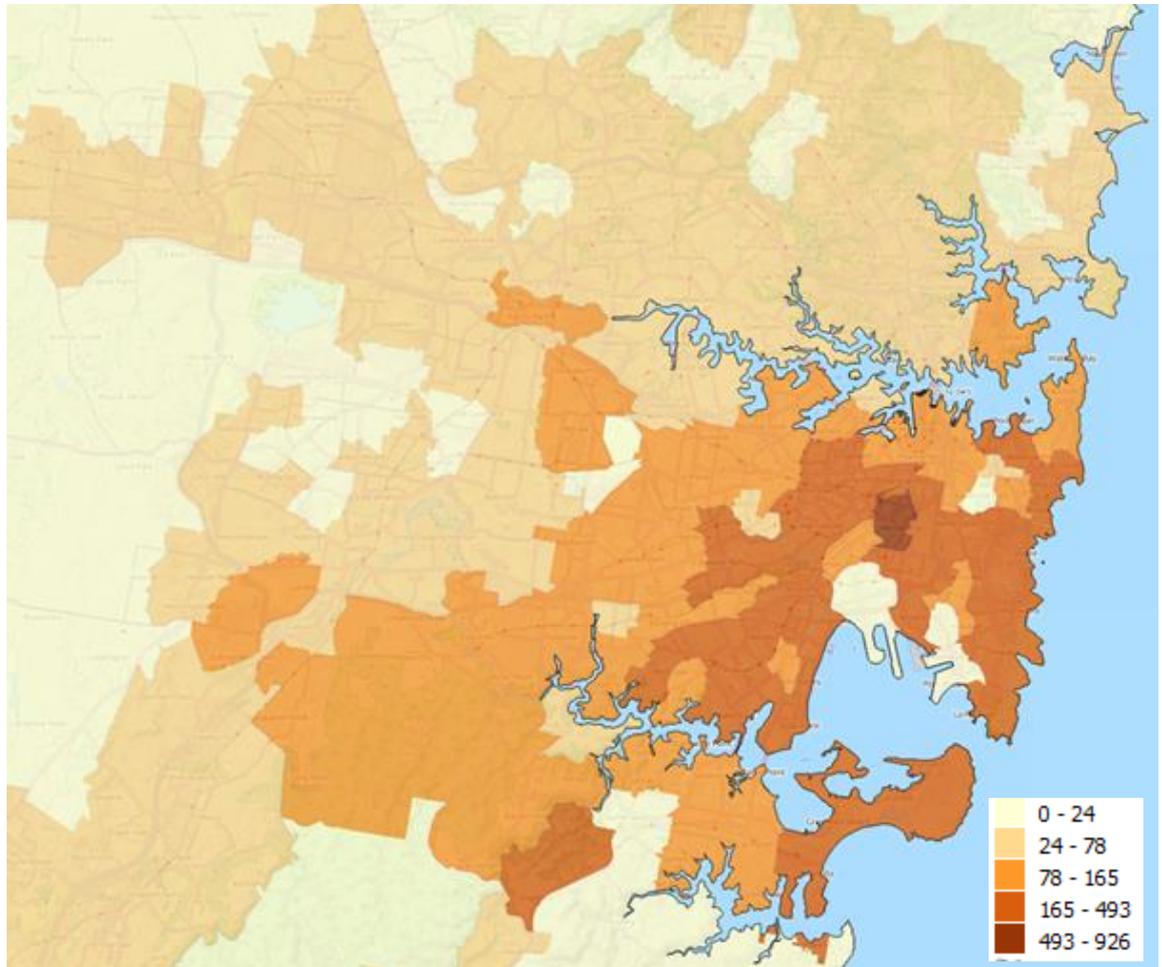
Despite a decline in recent years, the main industry of work in the area is ‘transport, postal and warehousing’, ‘Manufacturing’ and ‘Wholesale trade’ are second and third most popular industry group respectively. The three sectors accumulate to almost half (48%) of the entire workforce in the area. The type of worker employed in the area is in stark contrast to the type of worker living in the area, described above.

**Chart 3.2: People working in SIA**



Given the mix of industries in the SIA, it is likely that many of the workers currently employed in the SIA are travelling from areas that are a relatively far way. Figure 3.3 provides a summary of the place of residence for labour imports into SIA across all industries. The map demonstrates that the workers being drawn into the SIA come from a number of locations including south-western and western Sydney.

**Figure 3.3: Employed in SIA: Place of Residence (All industries)**



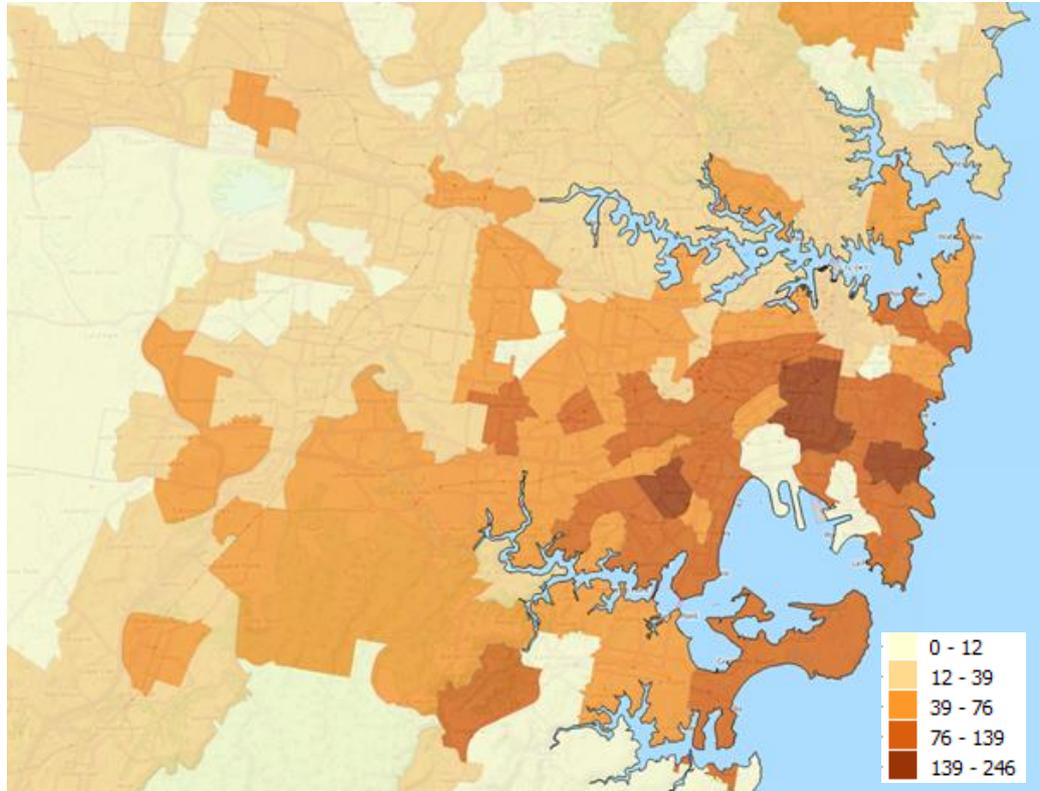
Source: Deloitte Access Economics, ABS (Census 2011)

However, this pattern of labour imports also includes those working in professional and service industries in the SIA. This group is likely to remain in the area following redevelopment. The group of workers most likely to be affected by redevelopment of the SIA are those working in ‘Transport, postal and warehousing’, ‘Manufacturing’ and ‘Wholesale trade’. These workers, therefore, bear particular scrutiny.

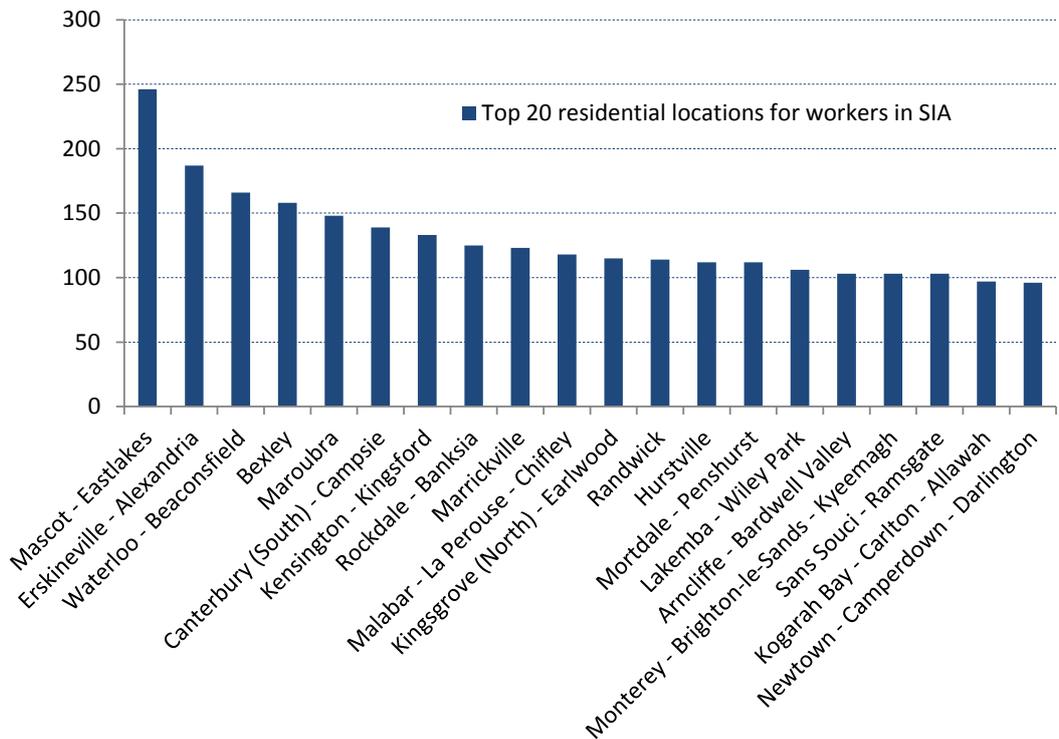
Figure 3.4 provides a visual summary of the place of residence for workers in the transport, manufacturing and wholesale industries. The map reveals that these workers are travelling from areas further out than the average worker in the SIA. These workers account for a large portion of the workers coming to the SIA from the south-west and west of Sydney. The breakdown of the top 20 residential locations account for 28% of total workers within the three industry groups and are summarised in Chart 3.3.

This evidence suggests that the relocation of industrial jobs to areas with lower industrial land rental rates may also improve journey to work times and create benefits for those in the transport, manufacturing and wholesale. This effect is explored and quantified in section 3.2.

**Figure 3.4: Employed in SIA: Place of Residence (SIA based industries)**



**Chart 3.3: Residential location for top three industries of workers in SIA**



Source: Deloitte Access Economics, ABS (Census 2011)

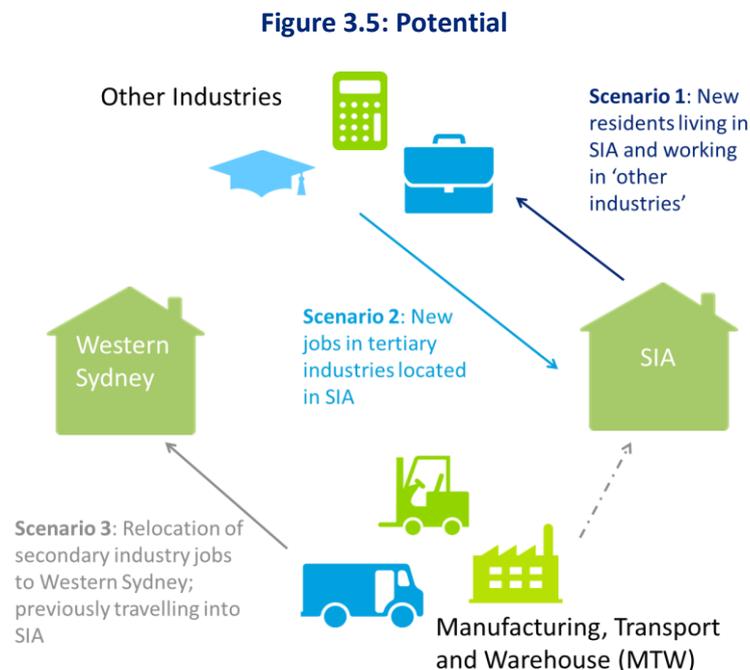
## 3.2 Economic benefits of reduced travel time, cost and distance

Redevelopment of the SIA with a greater mixed use focus will allow for an increased number of new residents, greater number of jobs in growing tertiary industries and a relocation of employment within secondary industries to other industrial areas in Sydney. This has the potential to align place of work with home locations, generating economic benefits by reducing commute times and congestion. Other associated benefits include a reduction in negative externalities such as air and noise pollution.

More specifically, the additional 30,000 new residential dwellings in the area are estimated to result in an additional 33,058 workers. This is based on an average number of people per residence in Erskineville – Alexandria of 1.79 and an average participation rate in the area of 62%.

### 3.2.1 Modelling Approach

There are three separate consequences resulting from the proposed mixed use redevelopment that potentially result in economic benefits and reduced externalities. First, new residents in the SIA working in tertiary sectors may save time in their commute, second, new jobs in the tertiary sector in the SIA may reduce travel times for individuals coming into the area to work and third relocation of secondary industries out of the SIA may save travel time for workers in those industries. These relationships are depicted in Figure 3.5





Putting 30,000 residential properties and 50,000 jobs in the SIA would save:

**\$100 million**

worth of commuter time

**28 million**

vehicle kilometres

**\$22 million**

of other transport costs

every year

For each of the three scenarios, the impact of aligning home and work locations is dependent on current travel time and the cost of commuting. For some commuters, travel times could be reduced due to redevelopment. To investigate the current journey to work we have used data from the ABS Census (2011). Travel time was estimated based on the distance between locations and an average travel speed of 37.3 km/h (BTS 2015). Estimated travel times were then compared to travel times shown on Google maps to ensure that this estimation approach was robust. Travel time was converted in monetary value at a rate of \$13.76 per hour which is consistent with Transport for NSW (2013).

- **New residents in SIA**

The increased availability of residential use land allows for an additional 33,058 commuters to travel to work from the SIA. Considering workers in ‘other’ industries, benefits are generated through reduced travel from the SIA in comparison to average travel time across greater Sydney in the same industries.

- **New jobs in SIA**

With the inclusion of greater employment opportunities in ‘other’ industries, 50,000 new commuters will be commuting to the SIA. The comparison of the average workers’ commuter travel time across greater Sydney and in similar industries allows for potential travel time and cost savings.

- **Manufacturing, wholesale and transport jobs out of the SIA**

The average travel time for workers commuting into the SIA who work in the manufacturing, wholesale and transport industries was compared against other workers across greater Sydney in the same industries. On average those employed in the SIA spend more time getting to work, suggesting potential time and costs savings per commuter trip. At present an estimated 9,238 people working in the SIA are employed within these industries. The increased relocation of manufacturing, wholesale and transport jobs allows for potential commuter savings.

### 3.2.2 Total Benefits of redeveloping in SIA

Total potential benefits for commuters in terms of travel time and distance is summarised in Table 3.2. The total travel cost savings is estimated at \$100.2 million a year and the total travel distance saved is estimated at 28 million vehicle kilometres per year.

Based on this reduction in travel, further benefits can be estimated based on values in Transport for NSW (2013). The assumptions used in this report are summarised in Appendix B. Additional benefits arise from a set of avoided costs and externalities, including:

- Urban vehicle operating cost (VOC)
- Congestion Cost
- Air pollution
- Greenhouse gas
- Noise pollution
- Water Pollution
- Nature and landscape
- Urban separation
- Upstream and downstream costs

- Road damage cost
- Accident cost

The value of reduction in total distance travelled by relevant workers on avoided costs and negative externalities is summarised in the table below:

**Table 3.1: Impact of reduced vkm on avoided costs and negative externalities**

Cost component	Impact of reduced vkm (\$/commute period)	Impact of reduced vkm (\$m/year)
<b>Vehicle Operating Cost (VOC)</b>	18,806	9.0
<b>Congestion Cost</b>	17,823	8.6
<b>Environmental impact</b>		
Air pollution	1,782	0.9
Greenhouse Gas Emission	1,407	0.7
Noise	584	0.3
Water Pollution	270	0.1
Nature and Landscape	31	0.0
Urban Separation	412	0.2
Upstream and Downstream Costs	2,403	1.2
<b>Road Damage</b>	2,323	1.1
<b>Accident cost</b>	31	0.0
<b>Total</b>	45,873	22.0

The total benefit associated with redevelopment of the SIA to a true mixed-use precinct is therefore estimated at \$122 million per year, this is summarised in the table below. These benefits consist of the value of time saved by commuters and the value of avoided costs such as emissions, road wear and similar. We have applied a conservative approach in the travel savings calculations, considering the average across all commuters in the Sydney Region. The application of a more optimistic approach focusing on commuters with longer travel times as the most likely to relocate suggests total benefits up to around \$244 million per year.

**Table 3.2: Benefits of rezoning on travel time**

Benefit component	Quantity	Value (\$m)
Time (millions of hours)	6.8	100.2
Distance saved (millions of kilometres)	27.6	22.0
<b>Total Benefit</b>		122.2

## 3.3 Improving efficiency of freight

Redeveloping the SIA into a genuine mixed use area will mean that some of the current light industrial and commercial business in the area will relocate to other areas within Sydney. This will mean that current freight activity in the area will shift to other locations within Sydney.

It is likely that much of light industrial activity currently taking place in the SIA would relocate to south-western or western Sydney. There are both costs and benefits to this relocation. On the cost side, some freight may have to travel further. On the benefits side, supply chains could potentially be brought closer together and more efficient freight vehicles could be used.

The effect of redeveloping the SIA will be different for domestic freight (freight moving between businesses in Sydney) and port freight (imports and exports moving to or from the port). Each of these types of freight will be analysed in detail below.

### 3.3.1 Domestic Freight

The movement of goods through the domestic supply chain generates significant traffic for roads in Sydney. For example, a component of a motor may be brought from the SIA to a mechanic located in Windsor or a load of goods may be brought from a distribution centre to the Bunnings located in the SIA. However, there is currently no thorough information available on the number or nature of these freight movements. As a result, the analysis in this section is based on a basic freight model that we have constructed and which is explained in the box below.

As a starting point, our model was used to estimate the amount of domestic freight transported in Sydney each year and the origins and destinations of this freight. This modelling was undertaken using current employment and production locations to represent current business conditions.

A policy case was then developed based on relocating some production activity out of the SIA and to other locations within Sydney. More precisely, we modelled a case where all current employees in the SIA employed in the Manufacturing, Transport and Warehousing industries relocated to other areas in Sydney. The relocation was based on current employment patterns. For example, the 32 workers employed in bread manufacturing in the SIA were relocated mostly to Bankstown, Ryde and Liverpool as these three areas currently account for around 52% of employment in this industry in Sydney. Looking across all relocated workers, the main destinations where they were allocated in the model were Botany Bay, Blacktown, Bankstown, Auburn and Parramatta. This produced a set of policy case tonnes by origin and destination LGA, as well as tonne-kilometres by origin and destination LGA.

Having a freight pattern for Sydney under a base case and a policy case allows for a comparison of the change in net-tonne kilometres for each origin destination pair in Sydney. That is, the difference between the policy and base cases were used to create a matrix of values representing the change in tonne-kilometres of freight for each LGA pair in Sydney.

### Modelling freight in Sydney

Given the lack of data available on freight movements by origin and destination, we have developed a basic model to estimate how freight is likely to be moving within Sydney. This model starts with data from the ABS (2011) on employment and industry production and uses an economic structure to generate freight movements that match the overall data that is available on freight in Australia.

More specifically, the model starts with employment data from the latest census for each local government area in Australia. This employment data is at a very detailed level. For example, the data indicates that the “Motor Vehicle Dismantling and Used Parts Wholesaling” industry in Maribyrnong employs eight people.

This employment data is used to disaggregate production data from another data source from the ABS (2013a): the input-output table. The input-output table shows how different industries in Australia are connected to each other. For example, it shows that the domestic textile manufacturing industry supplied \$4 million of inputs into the Footwear manufacturing industry in 2009-10. The input-output table is consistent with the national accounts and so aligns with common measures produced by the ABS such as GDP and employment.

An economic gravity model is then used to estimate how the production occurring in each LGA is used as inputs into production occurring in other LGAs. A gravity model assumes that trade is more likely to occur the closer two trading partners are and the larger each trading partner is. For example, producers in Sydney are more likely purchase goods from Wollongong than Canberra despite their similar size as Wollongong is closer. Similarly, producers in Sydney are more likely to purchase goods from Melbourne than Brisbane despite their similar distance from Sydney as Melbourne is economically larger.

At this stage, trade between locations is measured in dollars. This is converted to tonnes based on UN Comtrade (2015). The data from UN Comtrade records average value per tonne for all varieties of goods moving through Australia’s ports. For example, the data indicates that, on average, output from beer manufacturing is worth around \$550 per tonne while output from Veterinary Pharmaceuticals is worth in excess of \$100,000 a tonne.

The gravity model is calibrated using numerical optimisation techniques (Nelder and Mead 1965) to ensure that the total volume of freight occurring within the model matches the total volume of freight occurring within Australia as reported by the ABS (2013b).

That is, the freight movement model brings together data from the ABS on employment, linkages between industries and total freight volumes into a coherent economic framework which allows the origin and destination of freight to be modelled. The model can provide outputs measures in dollars, tonnes and tonne-kilometres.

Reducing industrial activity in the SIA would save:

**\$6.5 million**

of freight costs every year



In turning this tonne-kilometres result into an estimate for vehicle journeys, an additional assumption was made on the type of vehicles used to transport freight in the SIA and in western Sydney. We assumed that freight currently going to or from the SIA is transported in a six-axle semitrailer. This reflects the fact that most businesses in the SIA are located on streets that only allow general access vehicles. Six-axle semitrailers represent the largest available, commonly-used General Access Vehicle. On the other hand, once freight was relocated we assumed that it would be transported in B-Doubles.<sup>1</sup>

Using the average loadings for these vehicles, an estimate of the change in vehicle kilometres travelled (VKT) was made for each LGA pair based on the tonne-kilometre output from the model. The reduction in VKT is then turned into economic benefits based on the values specified in Transport for NSW (2013). The specific assumptions used in this report are reported in Appendix A. The categories of avoided costs are as discussed in section 2.

**Table 3.3: Impact of change in freight**

<b>Cost Component</b>	<b>Net Impact (\$m)</b>
<b>Vehicle Operating Cost (VOC)</b>	<b>4.81</b>
<b>Congestion Cost</b>	<b>2.37</b>
<b>Environmental impact</b>	<b>-1.03</b>
Air pollution	-0.40
Greenhouse Gas Emission	-0.09
Noise	-0.07
Water Pollution	-0.06
Nature and Landscape	-0.01
Urban Separation	-0.04
Upstream and Downstream Costs	-0.36
<b>Road Damage</b>	<b>0.38</b>
<b>Total</b>	<b>6.53</b>

As can be seen from Table 3.3, there are \$6.53m of economic benefits generated each year from more efficient freight movements as a result of redeveloping the SIA into a mixed use area. These benefits are driven primarily by a reduction in vehicle operating costs and reduced congestion costs.

<sup>1</sup> Further information on vehicle classification can be found at National Heavy Vehicle Regulator (2014)

### 3.3.2 Imports and Exports

The SIA is located close to Port Botany and so is a common location for freight movements to and from the port. A potential effect that would offset the benefits estimated above for domestic freight is that, following redevelopment, port freight would have to travel further.

There is almost no publicly available information on import and export freight and locations from which it terminates and originates in Sydney. As a result a detailed analysis of port freight movement is not feasible. The best alternative is an analysis of imports using an experimental ABS data series from 2009-10. This data set is based on information on International Shipping Container Movements from 2009-10 and can be used to estimate the imports to the study region (ABS 2011). This data set records the volume of imports measured in twenty foot equivalent units (TEUs) by postcode.

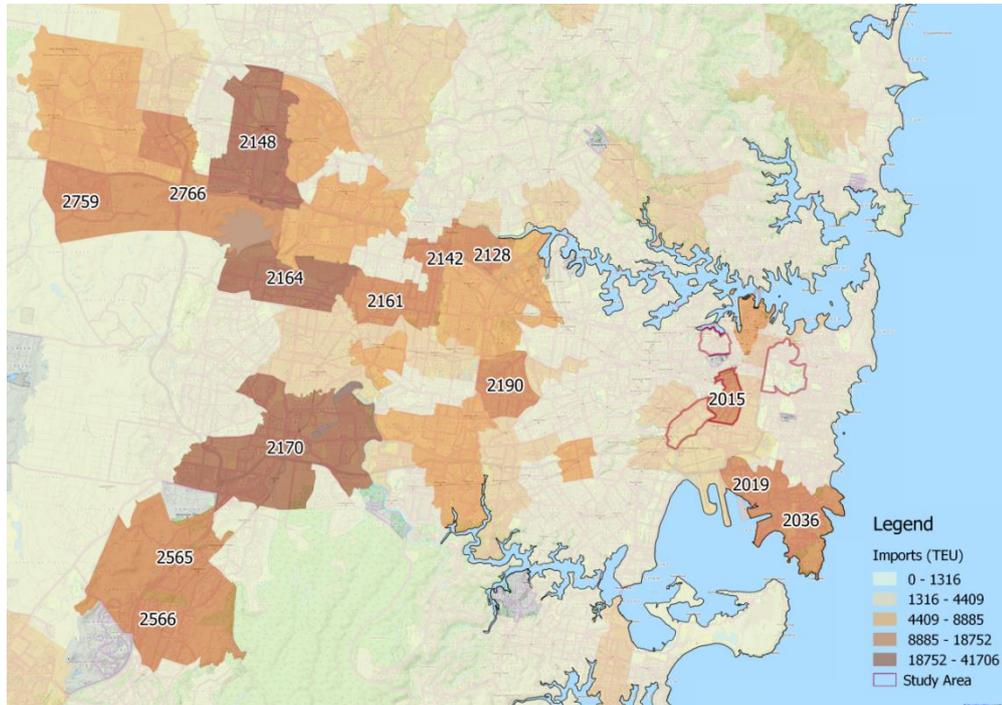
The study region falls roughly within the 2015 postcodes which, according to the ABS, accounted for 2.27% of all imports in 2009-10. The data shows the region as receiving 12,650 TEU from a total of 557,352 TEU imported into Sydney. While this is a significant number of TEUs, it is significantly less than many of the major destinations located in Western Sydney. Volumes in the study area can be compared to the postcodes with the greatest volume of imports from Port Botany which are represented in Table 3.4.

**Table 3.4: International Shipping Container Movements 2009-10 (Total)**

Rank	Post code	Area	Imports (TEU)	Share of total Port Botany imports (%)
1	2164	Smithfield	41,706	7%
2	2148	Blacktown	30,189	5%
3	2170	Liverpool	27,849	5%
4	2036	Malabar	18,752	3%
5	2565	Ingleburn	16,811	3%
6	2019	Botany	16,750	3%
7	2142	Auburn	14,090	3%
8	2566	Minto	13,316	2%
<b>9</b>	<b>2015</b>	<b>SIA</b>	<b>12,650</b>	<b>2%</b>
10	2161	Guildford	12,433	2%

The top three destinations for imports are all west of Parramatta. This pattern becomes clear in Figure 3.6. As can be seen from Figure 3.6, the vast majority of imports from Port Botany already go to Western Sydney.

**Figure 3.6: Container Import Destinations (TEU in 2009-10)**



The postcodes outside of Western Sydney that currently receive a significant portion of freight are 2036 (which covers Port Botany itself), 2019 (which covers Botany) and 2015 (which includes the study area). Thus, other than geographic locations that include Port Botany itself, 2015 remains as the only postcode outside of Western Sydney to receive a significant quantity of imports.

This analysis suggests that proximity to the port is not a major constraint in choosing location for port users. It also indicates that proximity to the port is not a major strength for the SIA as, despite its proximity, it ranks behind many areas in Western Sydney as port freight destinations.

Given the lack of information on export freight and the type of transportation used to move freight to and from Port Botany, this report does not quantify the economic impact associated with relocating port traffic. Qualitatively, we would expect that entities currently located in the SIA and receiving freight from Port Botany would likely relocate to Western Sydney over time regardless of the specifics of redevelopment in the SIA. This follows the longer term trend of moving industrial activity further West in Sydney.

However, given the relatively modest quantities of port freight when compared to total freight, it is not expected that port freight relocations will substantially alter the traffic on Sydney's roads.

### 3.4 Stamp duty, rates and other payments

The redevelopment of the SIA into a genuine mixed use area will generate significant revenues for both local and state government. Development itself will create revenue for governments through Section 94 and affordable housing scheme developer contributions while ongoing revenue will be generated from land taxes, council rates and stamp duty.

An important consideration is that the payments calculated in this section are not net economic benefits to the economy of NSW. Instead, they are transfers of money from individuals and businesses to Governments. This transfer does not, in itself, create any economic benefits. This is in contrast to previous sections where a freight efficiency improvement or a reduction in commuting time generates direct economic benefits. Payments to government only generate benefits when Governments spend this money on services that are valued by the community. This analysis below focusses on the payments that are expected to be made to Governments without considering the ultimate benefits that these payments could generate through the provision of services.

Considering each of the payments in further detail:

- **Section 94 developer contributions:** are a one off contribution payable to the local government and are based on the size, number and occupancy of residences as well as the number of workers. The most recent information for the southern precinct of the City of Sydney indicates that a one bedroom residence has a contribution rate of around \$15,000 while a two bedroom residence has a contribution rate of \$20,000. The contribution rate per worker is set at around \$2,300 (City of Sydney 2014b).
- **Land taxes:** are an annual contribution payable to the state government and are based on the unimproved value of land. Land taxes are not payable for primary residences. For properties over \$432,000 in value, land tax is levied at 1.6% with an increase to 2% for value above \$2.6 million.
- **Council rates:** are an annual contribution payable to the local government and are based on the unimproved value of land. For residential properties there are fixed costs averaging around \$400 a year and a variable cost based on 0.16% of the property's value. For businesses in the SIA, the rate is 0.71%.
- **Stamp duty:** is a tax payable to the state government on transfer of a property and is levied on the market value of the property. While there is an increasing scale of rates, most properties are levied at a marginal rate of around 4.5-5.5% of their value which results in an average rate of around 3.6% for residential development in the SIA and around 5.9% for businesses in the SIA.
- **Developer contributions towards affordable housing scheme:** is a one off contribution payable to City of Sydney towards an affordable housing scheme. It is payable in respect of any land developed for residential land uses within the SIA. The relevant land area would be approximately 2 million m<sup>2</sup>. Increasing the current obligation to \$50 per square metre would increase the available funds for affordable housing.

The factors affecting the level of these payments are therefore: the area of residential and business properties, the number of residences and workers, the unimproved value of land for residential and business properties in the area, the market value of land for residential

and business properties in the area; and the expected number of property sales each year. Considering each of these factors in more detail:

- **Area of residential and business properties**

Information provided by Goodman indicated that around 200Ha each of residential and business property would likely result from the redevelopment.

- **The number of residences, business properties and workers**

Information from Goodman indicated that there would be a total of 30,000 residences and 50,000 new workers in the redeveloped SIA.

The development would consist of apartments rather than standalone properties. Considering the split between two bedroom and one bedroom apartments, the Section 94 contributions assume 1.3 people per one bedroom apartment and 1.9 people per two bedroom apartment. Data from the census indicates that each residence in the area has 1.8 occupants. Together this suggests that around 18% of apartments in the area are one bedroom apartments with the remainder being two bedroom or more (ABS 2011). Making a distinction between two bedroom or more apartments is not required for calculating payments under Section 94 as these are levied at the same rate by the City of Sydney.

The number of business properties was estimated at 382 based on an average land size of 5,233m<sup>2</sup> seen in sales of commercial, industrial and vacant properties in the SIA over the period from 2001-2013.

- **The unimproved value of land**

The NSW Valuer General makes some representative data available publicly. In particular, for a representative residence in Erskineville, valuations have held steady at \$4062 per m<sup>2</sup> since 2011 (Valuer General n.d.). For non-residential land, the best comparator that is publicly available is for a representative small industrial property in Marrickville where valuation has held steady at \$819 per m<sup>2</sup> since 2012 (Valuer General n.d.).

- **The market value of land for residential and business properties in the area**

We gathered a database of property sales in the area over the period from 2001 to 2013. This data indicates that in the period since 2010, an average unit in the area has sold for around \$527,476. For commercial, industrial and land an average from 2001 to 2013 was taken as prices tend to vary significantly. This indicated that, for an average sized business property in the area would be valued at around \$4.3 million.

- **The expected number of property sales each year**

Previous modelling of Government revenue in NSW has indicated that residential properties turnover at a rate of around 8.8% a year while non-residential properties turnover at a rate of around 1.8% a year.

With this supporting data we are able to estimate the payments that would flow to local and state governments following redevelopment of the SIA into a genuine mixed use area. The analysis indicates that initial developer contributions of around \$690m (Section 94) and around \$100m (affordable housing scheme) could be payable to the City of Sydney. In addition, annual payments of around \$38.8m (rates) could be made to the City of Sydney as well as \$79.2m (land taxes and stamp duty) to the NSW Government. This gives an ongoing annual payment to governments of around \$118.0 million a year. These calculations are summarised in the table below.

Redeveloping the SIA could generate

**\$690 million**  
of developer contributions



**\$100 million**  
affordable housing scheme  
contributions



**\$53 million**  
of stamp duty every year



**\$39 million**  
of rates from the SIA every year



**\$26 million**  
of land taxes every year



**Table 3.5: Estimated Government Revenue Generated within SIA**

	<b>Residential</b>	<b>Business</b>	<b>Total</b>
<b>Underlying factors</b>			
Number of properties	30,000	382	30,382
m <sup>2</sup>	2,000,000	2,000,000	4,000,000
Market value per property	527,476	5,276,443	
Unimproved value per property	270,833	4,287,615	
<b>Rates</b>			
Rates payable per property	907	30,352	
Total rates (\$m/year)	27.2	11.6	38.8
<b>Land taxes</b>			
taxable properties	14,521	382	
taxable value per property	270,833	4,287,615	
taxes payable per property	0	68,376	
Total tax (\$m/year)	0	26.1	26.1
<b>Stamp duty</b>			
Annual expected dutiable properties	2,647	7	
Dutiable value per property	527,476	5,276,443	
Total duty (\$m/year)	50.9	2.2	53.0
<b>Section 94</b>			
Number of 1 bedroom apartment	5,462		
Number of 2 bedroom apartment	24,538		
Number of workers		50,000	
Total payable (\$m)	573.3	116.2	689.6
<b>Affordable housing scheme</b>			
Total payable (\$m)	100.0		100.0

Taking the value of this annual payment as a perpetuity using a discount rate of 7% and adding the initial developer contributions indicates that the present value of all payments to Governments from the redevelopment of the SIA could amount to around \$2.5 billion.

An additional economic effect associated with redevelopment of the SIA is the investment in new capital in Western Sydney. The anticipated shift in manufacturing, wholesale and transport jobs from the SIA to less costly locations in Western Sydney represents a significant transfer of almost 10,000 jobs. This relocation will be associated with investment in new facilities in Western Sydney. Goodman has advised that this reinvestment would result in expenditure of around \$1.5 billion in western Sydney. This provides opportunities for the Western Sydney Economy and Government for new industrial development and new employment in the area.

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## Appendix A

The differences in impact of a 6-axle semitrailer and a B-Double are captured in the table below:

**Table A.1: Differences in impact**

<b>Assumption</b>	<b>6-axle semitrailer</b>	<b>B-Double</b>	<b>Source</b>
<b>Average loading (tonnes/ vehicle)</b>	<b>16.50</b>	<b>24.00</b>	BITRE (2011)
<b>Vehicle Operating Cost (VOC) (c/km)</b>	<b>200.03</b>	<b>234.88</b>	Transport for NSW (2013)
<b>Congestion Cost (c/vkt)</b>	<b>155</b>	<b>248</b>	Transport for NSW (2013)
<b>Environmental impact (c/vkt)</b>			
Air pollution	25.83	25.83	Transport for NSW (2013)
Greenhouse Gas Emission	5.75	5.75	Transport for NSW (2013)
Noise	4.30	4.30	Transport for NSW (2013)
Water Pollution	3.87	3.87	Transport for NSW (2013)
Nature and Landscape	0.43	0.43	Transport for NSW (2013)
Urban Separation	2.87	2.87	Transport for NSW (2013)
Upstream and Downstream Costs	23.00	23.00	Transport for NSW (2013)
<b>Road Damage (c/vkt)</b>	<b>17.77</b>	<b>23.20</b>	Transport for NSW (2013)

These values were derived from Transport for NSW (2013). Values were adjusted for inflation using the Consumer Price Index (RBA series: GCPIAG).

## Appendix B

The avoided costs and externalities for urban vehicles are summarised in the table below:

**Table B.1: Cost components for avoided costs and negative externalities**

<b>Assumption</b>	<b>Passenger vehicles (c/vkt)</b>	<b>Source</b>
<b>Vehicle Operating Cost (VOC) (c/km)</b>	<b>30.6</b>	Transport for NSW (2013)
<b>Congestion Cost (c/vkt)</b>	<b>29</b>	Transport for NSW (2013)
<b>Environmental impact (c/vkt)</b>		
Air pollution	2.9	Transport for NSW (2013)
Greenhouse Gas Emission	2.29	Transport for NSW (2013)
Noise	0.95	Transport for NSW (2013)
Water Pollution	0.44	Transport for NSW (2013)
Nature and Landscape	0.05	Transport for NSW (2013)
Urban Separation	0.67	Transport for NSW (2013)
Upstream and Downstream Costs	3.91	Transport for NSW (2013)
<b>Road Damage (c/vkt)</b>	<b>3.78</b>	Transport for NSW (2013)
<b>Accident costs</b>	<b>0.05</b>	Transport for NSW (2013)
<b>Total avoided costs</b>	<b>74.64</b>	

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