Western Distributor Business Case

Inputs for Business Case

PricewaterhouseCoopers

October 2015

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Independent insight.

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1   INTRODUCTION

1.1   Context

PwC has entered into an agreement with the State of Victoria through the Department of Treasury and Finance dated 1 September 2015 in relation to the provision of commercial and financial services pertaining to the Western Distributor project. The project is a market-led proposal submitted to the Victorian Government by Transurban.

PwC has engaged SGS Economics and Planning to provide land use related inputs to enable PwC to meet its obligations under the Agreement and the Subcontractor has agreed to supply those services to PwC on the terms and conditions of the same Agreement.

SGS Economics and Planning (SGS) is a leading Australian privately owned firm that specialises, among other things in, analysing and estimating wider economic impacts (including land use impacts) of transport infrastructure projects. We were one of the first private sector consultancy in Australia to derive a quantifiable measure of agglomeration economies.

1.2   Scope of SGS analysis

SGS's role on the engagement with PwC is two-fold, as follows:

1. Articulate the land use and accessibility-related problems associated with the proposal not proceeding, and

2. Estimating (were the proposal to proceed):

    i.   Changes in accessibility (measured using effective job density (EJD)) resulting from the Western Distributor proposal, and

    ii. Consequent effects on land use distributions (i.e. place of residence and work) due to changes in accessibility.

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2   LAND USE CONTEXT

2.1   Demographic and economic landscape

While the project is largely located in the inner west of Melbourne, it will significantly impact on the broader metropolitan landscape.

Figure 1 presents housing development over the past 100 years *(Grey shadings represent previous development, whilst the red shadings show the extent of new development since the time of the previous caption)*. This highlights how Melbourne has historically grown to the east. Continued expansion to the south-east is now limited and as such, future growth areas are largely focused to the north and west of central Melbourne. Due to structural economic change, consolidation around the central city has also increased significantly in recent years and is projected to continue into the future. A more thorough examination of Melbourne's historical development is provided in the appendices.

FIGURE 1   HISTORICAL GROWTH OF MELBOURNE, 1900-2010
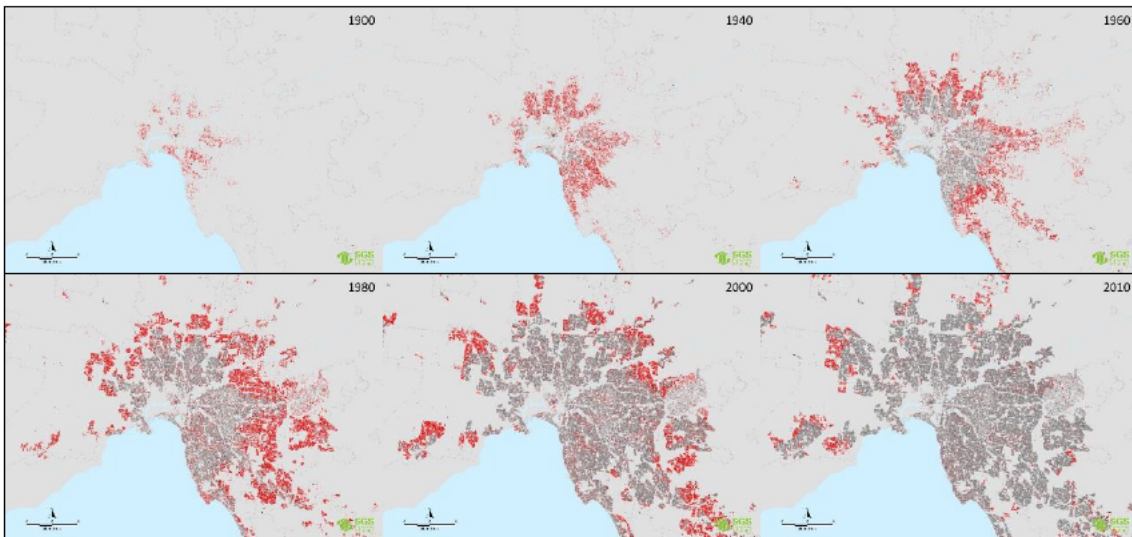
Source: SGS Economics and Planning drawing from council rates data and other datasets.

As Melbourne grows to be 5, 6, 7 million people, an integrated lattice of transport modes will be required: passenger trains to funnel people into major economic nodes (largely central Melbourne), as well as trams and buses to spread these nodes and provide easy short trips for people and businesses.

Notwithstanding the importance of public transport, roads will still be required to connect up suburban precincts and hook new emerging economic areas into the historically dispersed employment and labour force centres of the east and south east. Cross city freight routes will need to grow even faster than population as the economy shifts toward importation and specialisation, which will require increased distribution networks. Importantly, if Melbourne and Victoria are to retain their competitive advantage at exports, efficient access to its major ports (i.e. Port of Melbourne and Melbourne Airport) will need to be maintained, if not improved.

For the emerging west and north to develop as more than just dormant suburbs, they will increasingly need strong connections to Melbourne's historical south east economic corridor to leverage the long

heritage of economic growth and skilled workforce. Importantly, the significant anticipated increase in population growth in Melbourne's west will need to be serviced by manufacturing and logistics firms lying to the city's east.

2.2 Strategic significance of the M1 corridor

In this context, the role of the M1 corridor is vital. For the purposes of this report, the M1 corridor is defined as the regions of metropolitan Melbourne along the M1 road corridor, stretching from Geelong through to the Latrobe Valley. This corridor accommodates key economic assets, including: significant employment and education clusters; major and emerging freight terminals; arterial roads; and key public transport routes (refer Figure 2).

FIGURE 2 VICTORIA'S M1 CORRIDOR
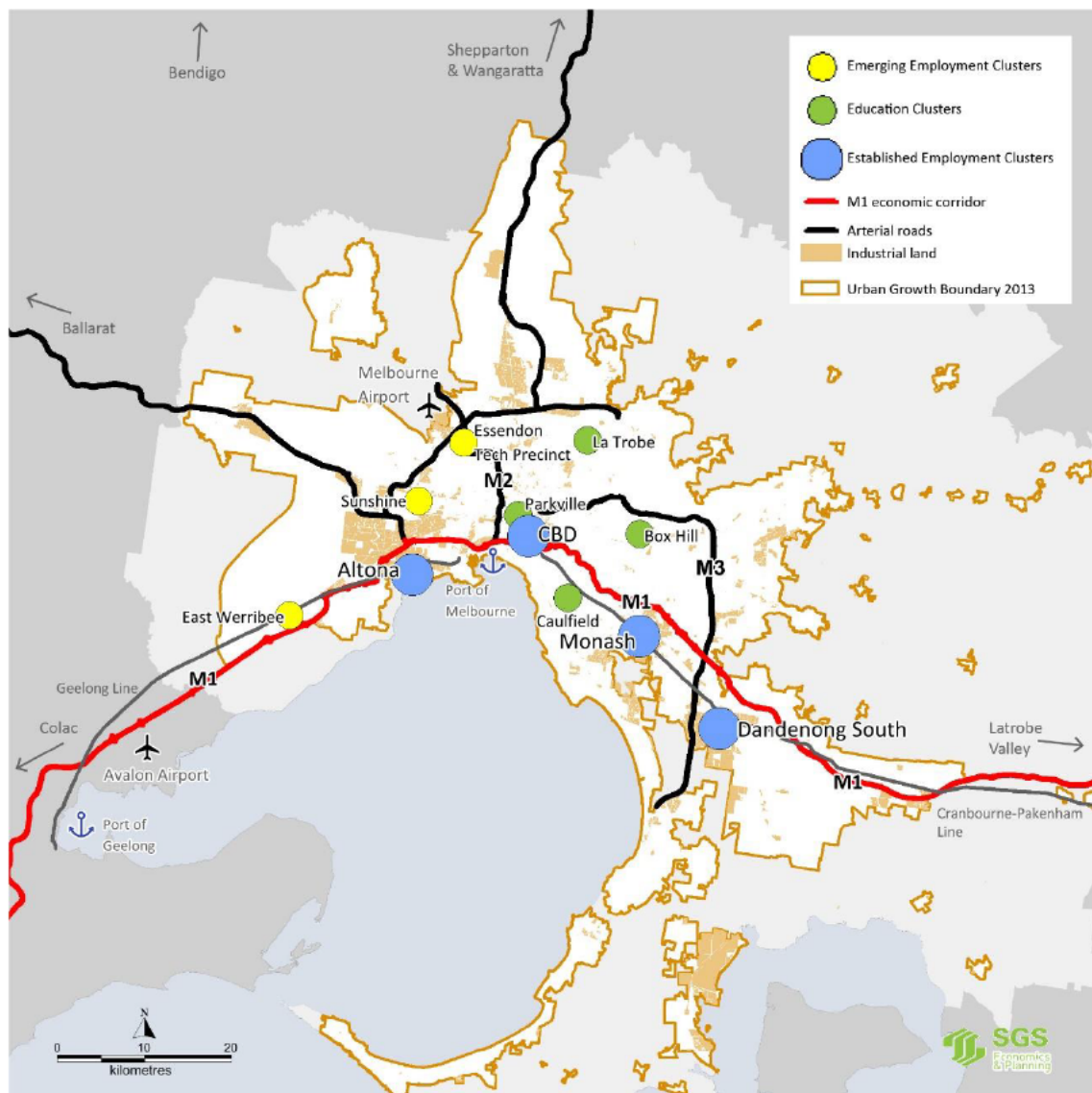
Source: SGS Economics and Planning

For analytical purposes, we selected a buffer for the M1 road corridor (defined as the Statistical Areas (SA2's)), which lies within 1 kilometre of the M1 road corridor encompassing the West Gate Freeway/ Princess Freeway and Monash Freeway. This corridor buffer can be disaggregated into the western, central and eastern parts, with the western and eastern parts comprising the SA2's that lie to the west and east of central Melbourne respectively, and with the City of Melbourne being the central region. Several Statistical Local Areas (SLAs) comprise this corridor buffer, which are listed in the appendices.

The M1 corridor will increasingly be the focus of Victoria's economic activity and will need investment to support its growing challenge as a rail, freight and road corridor.

The established employment clusters along the corridor employ more than 600,000 workers, i.e. nearly 28 percent of the metropolitan workforce (central Melbourne: 470,000; Monash: 58,500; Dandenong South: 55,000; and Altona: 20,000). There is no other single significant concentration of workers elsewhere in Melbourne that matches the scale of these established clusters. The Sunshine employment cluster supports some 14,000 workers, whereas Melbourne Airport supports nearly 15,000; the success of both rely significantly on the performance of, and access to, the M1 corridor.

A leading emerging employment cluster along this corridor (i.e. at East Werribee) is expected to support up to 70,000 – 80,000 of Victoria's workers.

Meanwhile, the Parkville, Monash (Clayton and Caulfield) and RMIT education clusters, all of which fall within the M1 corridor regions, comprise nearly three-fourths of the total student load at metropolitan Melbourne's world-leading universities[1].

Importantly, all of Victoria's major arterial freight network that connects Melbourne and the regional Victorian economy, either lies along or extends through to this corridor. The Port of Melbourne handles the bulk of Victoria's freight (excluding road), at 35 million tonnes per annum, with Melbourne Airport providing a further 350,000 tonnes per annum of air freight handling.

Importantly, Victoria's three major regional cities (Geelong, Ballarat and Bendigo) are all located to the west of central Melbourne. As these regional cities continue to grow, they require robust and reliable connections into Melbourne.

Mismatch between production and consumption nodes along the M1 corridor

Manufacturing activity was historically located in Melbourne's inner suburbs. Over time however, this activity has shifted to the outer metropolitan area, with the development of major manufacturing and logistics precincts in the west, north and south east. These areas contain a third of all manufacturing and transport-related firms in Melbourne. This shift has implications for the city's transport network.

In the past, much of the city's freight moved in and out of inner Melbourne. Currently, it needs to bypass inner Melbourne (while retaining access to the Port of Melbourne) in order to service the growing manufacturing and warehousing precincts in the outer metropolitan area.

Over the next three decades or so, i.e. out to 2046, Melbourne is expected to accommodate nearly 1.2 million additional people, with its employment base expecting to increase by approximately 960,000. However, the mismatch between manufacturing production and consumption centres will continue to be exacerbated.

Population growth in the western part of the M1 corridor buffer is expected to be significantly higher, at 1.8 percent per annum relative to 1.4 percent for the eastern part. By contrast, employment growth in the western part (1.4 percent) will be shy of that anticipated in the east (1.5 percent). Nearly 285,000

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[1] Nearly 200,000 split as follows: University of Melbourne – Parkville (~54,000); Monash – Clayton and Caulfield (~45,000); RMIT – City (~45,000); Deakin – Burwood (~26,000); and La Trobe – Bundoora (~26,000).

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additional people are expected to live in the western part of this corridor by 2046, while it is anticipated to accommodate only an additional 93,000 jobs by then.

Consequently, the self-sufficiency ratio (i.e. the ratio of employment to people) in the western part will fall in the west from 44 percent today to 39 percent by 2046. By contrast, it will rise in the eastern part of the corridor (refer Table 1). This will further exacerbate the self-containment of workers (or ability for resident workers to find jobs locally) in the region.

Employment outcomes in the western part are already compromised, with 18 percent of all resident workers travelling outside of the region for work, compared with 7 percent for the eastern part. Access to jobs for residents of the western part of the corridor are also severely compromised compared with those in the east (refer Figure 3).

As a result, significant travel flows will be required in both directions; skilled workers in the west will need to access jobs and services in the east, while production companies will need to access households and warehouses in the west for distribution.

## TABLE 1 ANTICIPATED POPULATION AND EMPLOYMENT GROWTH IN THE CORRIDOR

	West	East	Centre
Change in Population 2011-46	283,000	649,000	267,000
Change in Employment 2011-46	93,000	391,000	480,000
Self-sufficiency ratio at 2011*	44%	53%	448%
Self-sufficiency ratio at 2046*	39%	56%	258%
Self-containment**	82%	93%	-

Source: SGS Economics and Planning
Notes: *defined as the ratio of employment to population. **defined as the ratio of employment to resident workers of the region.

This anticipated growth is expected to put further pressure on the existing public transport network. Usage of public transport by workers travelling to the western part is marginal (at 5 percent of total trips), whereas it is higher at 10 percent for those workers travelling to the eastern part
It is vitally important that efficient transport connections are provided for east-west linkages between Melbourne, such as those along the M1 corridor, to ensure that the divide between Melbourne's production and consumption centres is not exacerbated.

FIGURE 3 EFFECTIVE JOB DENSITY*
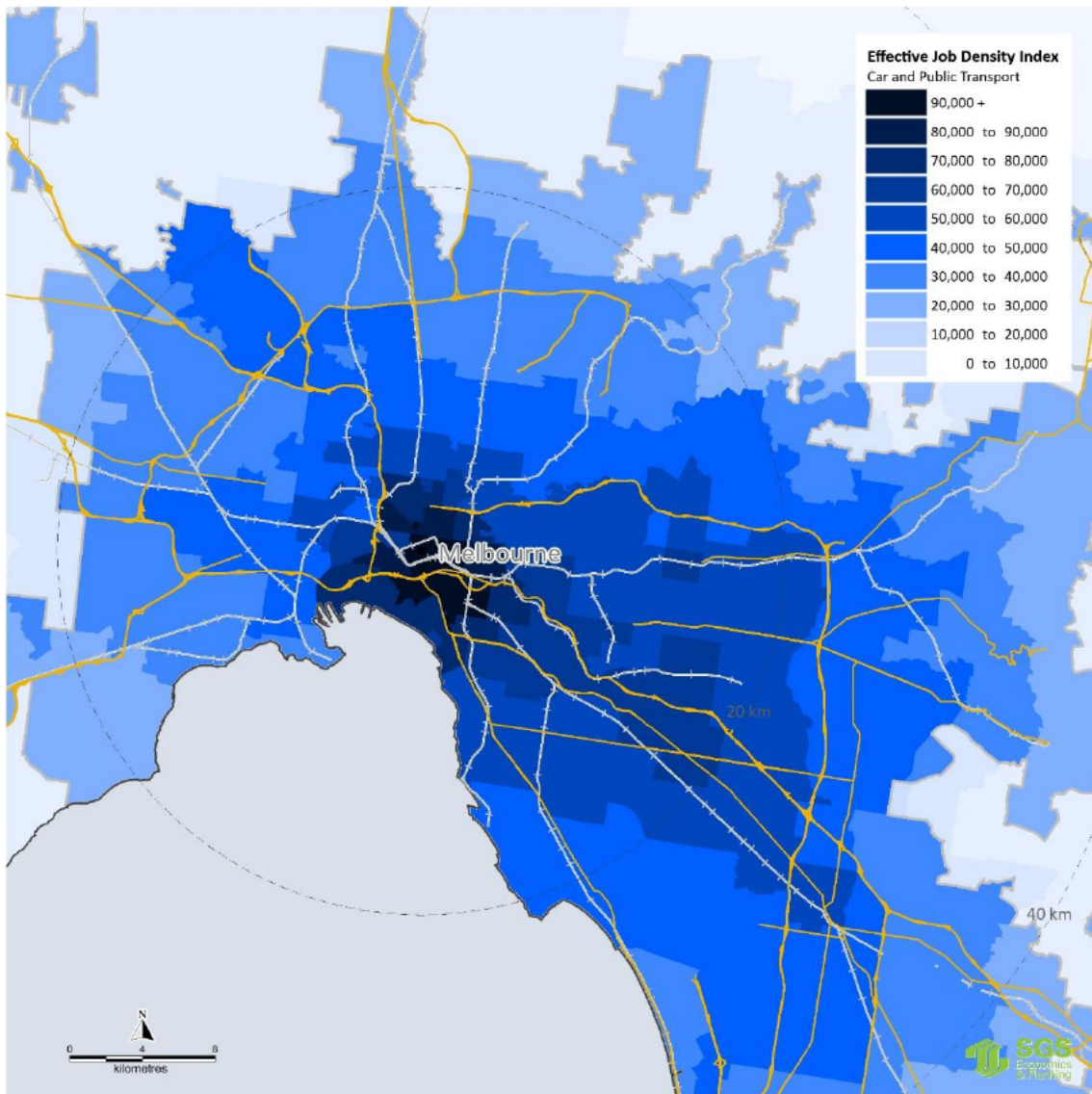
Source: SGS Economics and Planning
Notes:*a measure of number of jobs accessible from a given location, which is dependent on the scale of economic activity and transport connections available in that region.

FIGURE 4 ACCESSIBILITY OF JOBS USING PUBLIC TRANSPORT
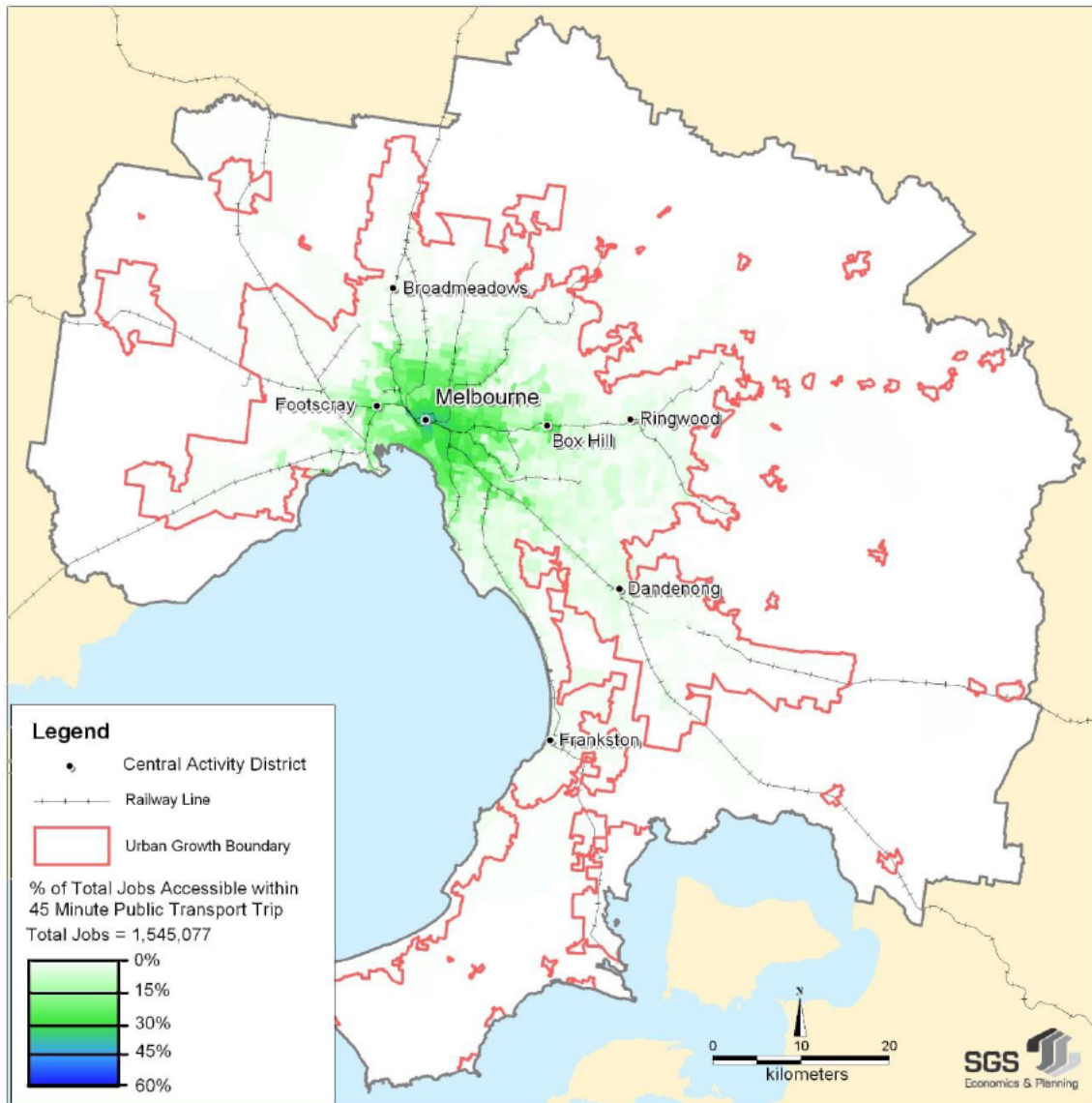
Source: SGS Economics and Planning

The western region

The 'western region' for the purpose of this business case has been defined and based on the Western Sub-Region in Plan Melbourne. It consists of the Local Government Areas of Maribyrnong, Moonee Valley, Hobsons Bay, Brimbank, Wyndham and Melton.

FIGURE 6 WESTERN REGION

Source: SGS Economics and Planning

Recent employment and population trends

Over the last few decades, we have seen a shift in the spatial distribution of population and employment patterns, which have placed increasing pressure on transport infrastructure.

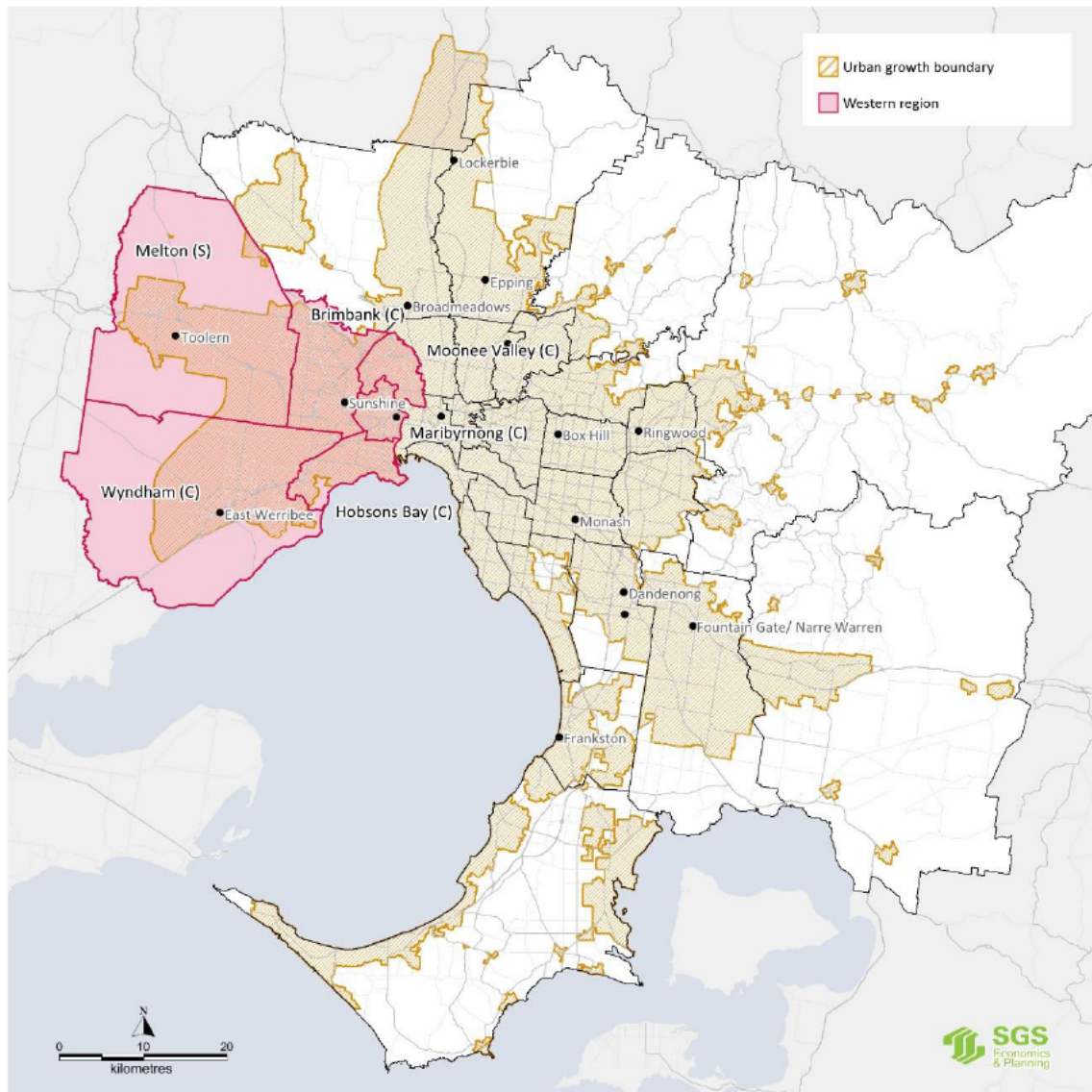Figure 7 presents population and employment by the distance (in kilometres) from central Melbourne from 1981 to 2011. From this figure, the spatial separation occurring can be observed. The majority of new employment has occurred within five kilometres of central Melbourne, which is due to a shift in the structure of the economy toward knowledge intensive services. While there has been growth in population within this five kilometre ring, a significant proportion of growth has also occurred at Melbourne's fringe, over 20 kilometres from central Melbourne.

FIGURE 7 MELBOURNE POPULATION AND EMPLOYMENT GROWTH, 1981-2011
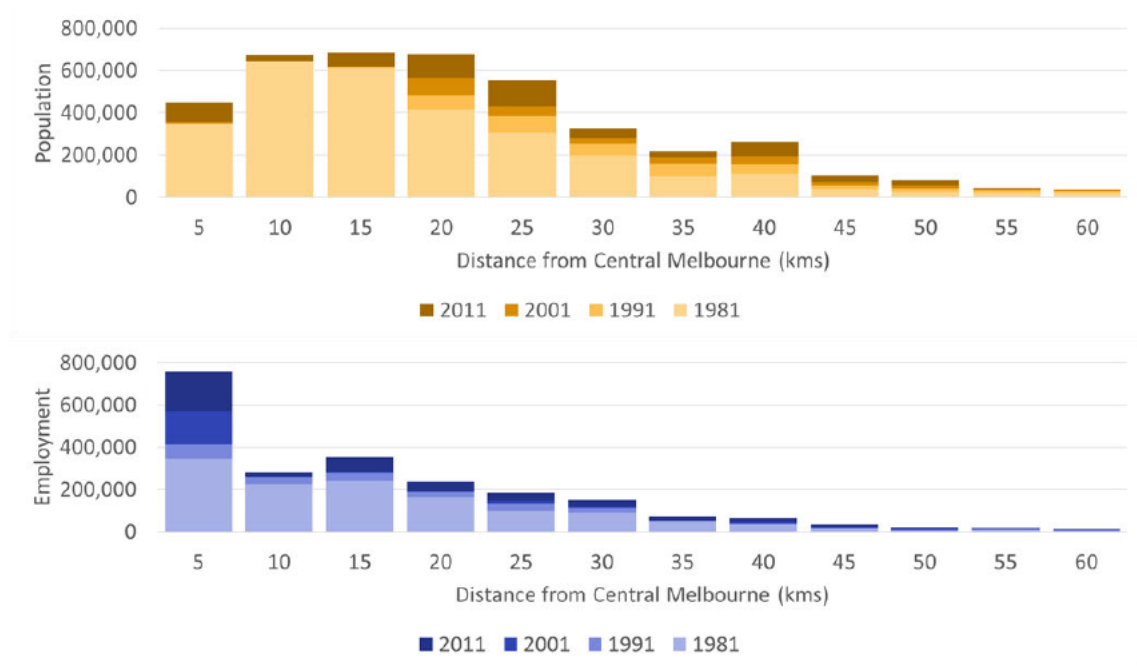
Source: SGS based on ABS datasets

Figure 8 isolates these developments for just the western region. A similar pattern is presented with much of the population growth being focused on the fridge. In addition, there is a significant misalignment between population and employment within the region. In 2011, there were 2 jobs for every 10 people in the west; by comparison, there were 7 jobs for every 10 people across Melbourne as a whole.

FIGURE 8 WESTERN POPULATION AND EMPLOYMENT GROWTH, 1981-2011
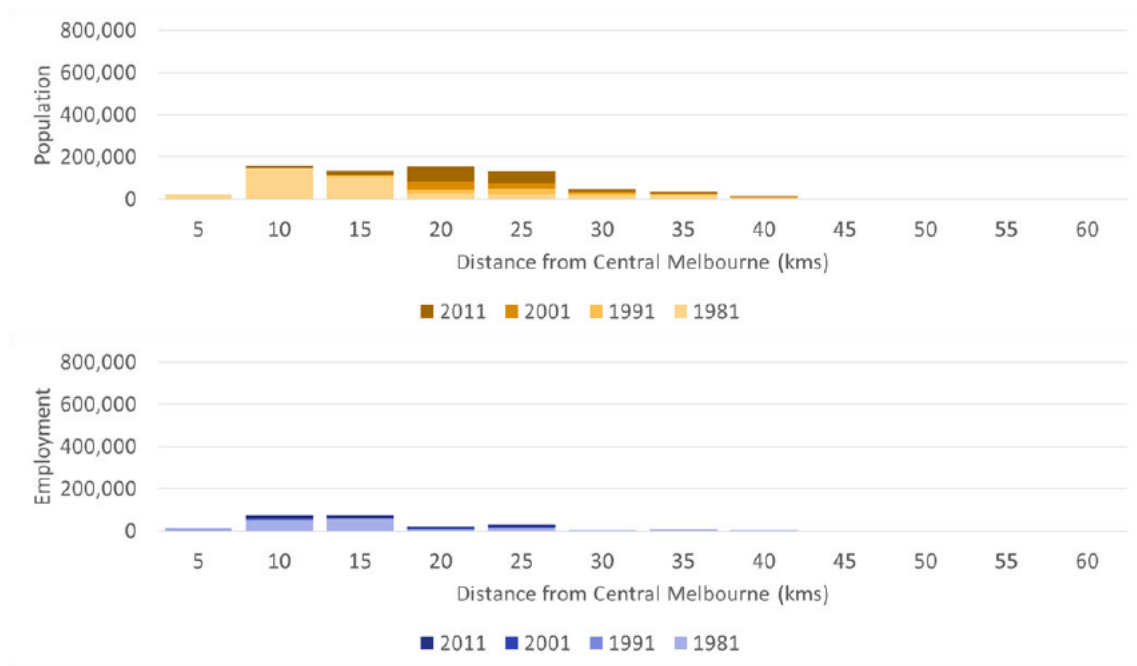
Source: SGS based on ABS datasets

Socio-economic status

The western region of Melbourne is currently more disadvantaged relative to Melbourne's east and south. Part of this disadvantage can be attributed to transport accessibility issues and weak transport connections to key employment clusters around Melbourne.

FIGURE 9 SEIFA DISADVANTAGE SCORE, 2011
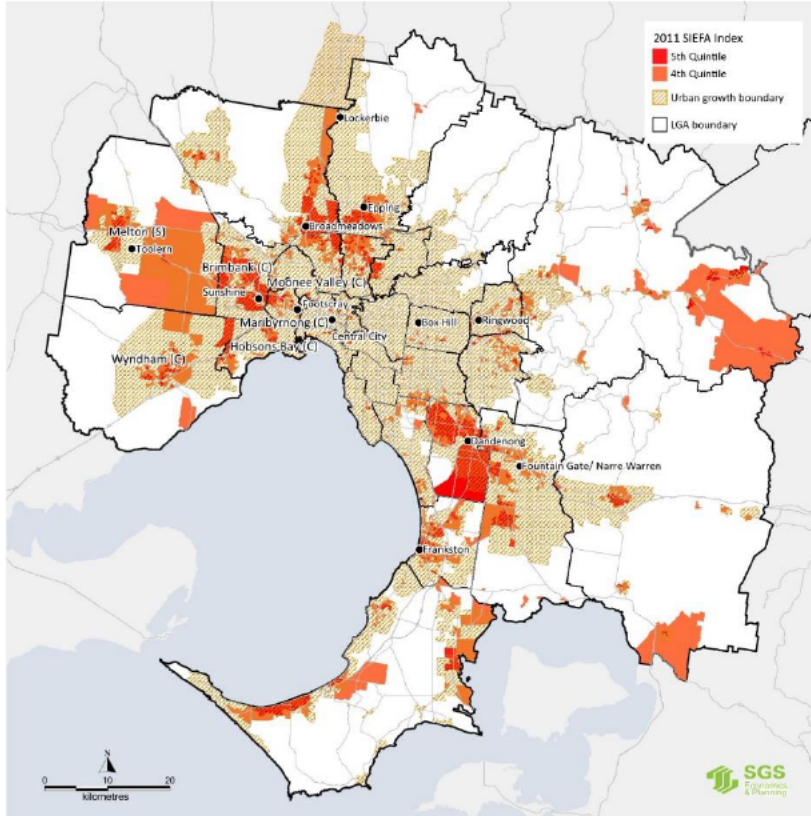
Source: SGS Economics and Planning

Existing travel behaviours

Nearly 70,000 journey-to-work trips originate from the western region that are destined for the City of Melbourne per working day.[2] This represents some 22 percent of total work-related trips undertaken by western region residents.

Significantly, a lower proportion of total work-related trips destined for the central city originate from Wyndham and Melton, partly reflecting the severe congestion that residents from these municipalities face when accessing work-related opportunities, which reflects in the severely compromised access to jobs highlighted above in .

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[2] Note, this data has been accessed from the ABS Census. This data significantly undercounts employment for a number of reasons, including misreporting, incorrectly labelling place of work, incomplete census forms and the like.

FIGURE 10   WORK-RELATED TRAVEL FROM THE WESTERN REGION TO CENTRAL MELBOURNE
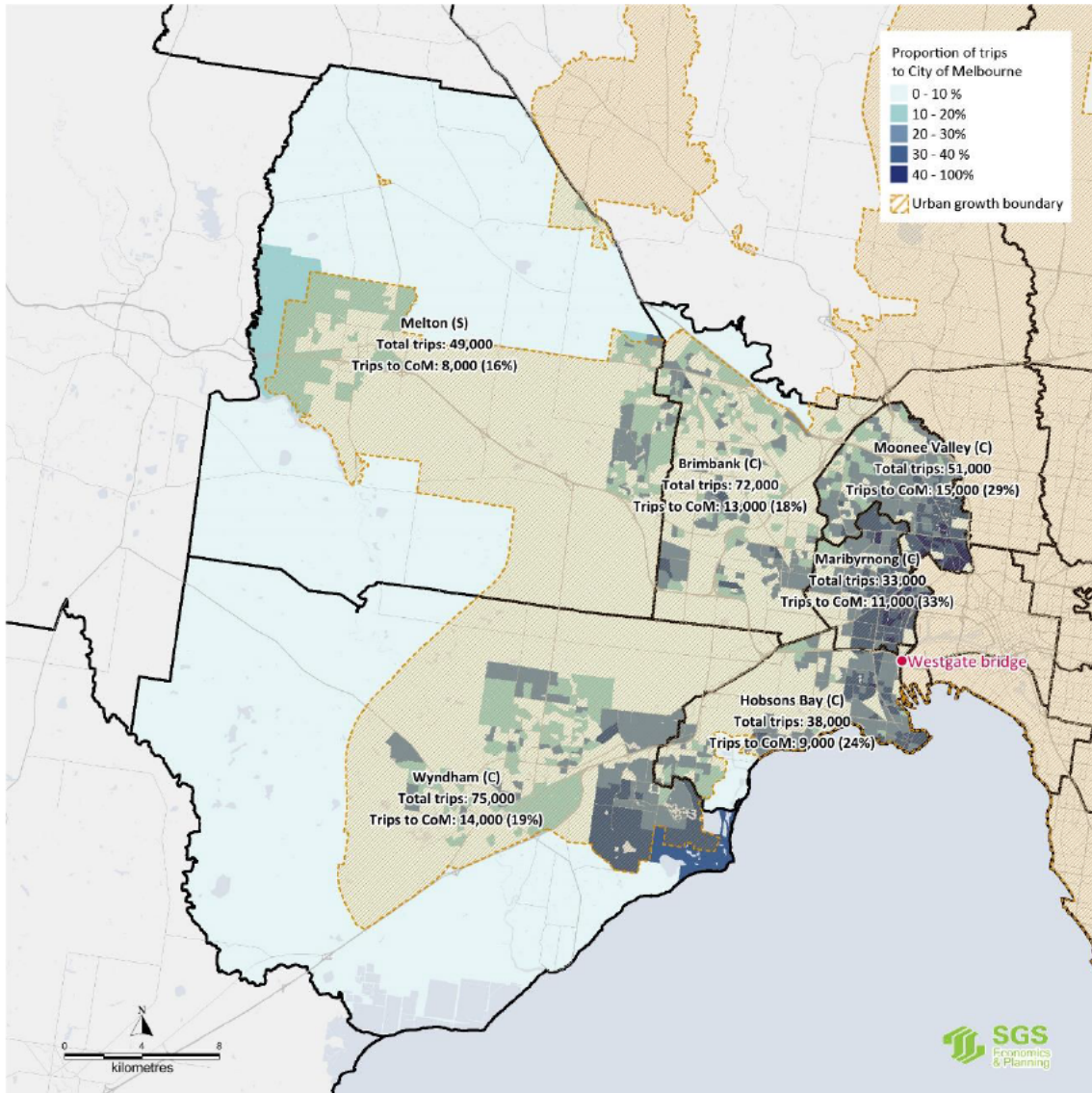
Source: SGS Economics and Planning

2.3   Current policy and planning

Plan Melbourne

Plan Melbourne is Melbourne's metropolitan current (although it is currently under review) planning strategy. Plan Melbourne outlines a range of challenges that have the potential to undermine "[the] city's liveability and competitiveness over the coming decades":
– Congestion of both road and public transport infrastructure;
– Affordability of housing for low and middle income households;
– Diversity of housing to cater for the changing needs of the population; and
– Accessibility, specifically for the growth fronts at Melbourne's suburban fringe.

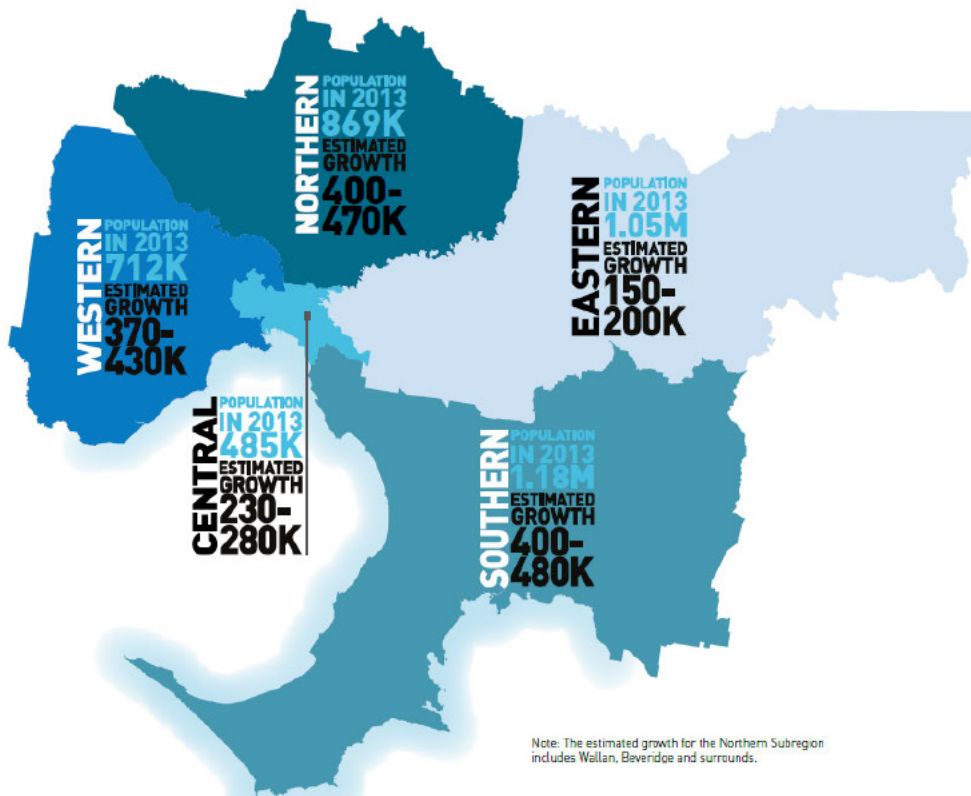*Plan Melbourne* plans for a 2031 future population of between 5.85 and 6.15 million people. This represents **an annual** growth rate of between 1.7 and 2.0 percent. Western Melbourne is projected to accommodate between 370,000 and 430,000 additional residents.

FIGURE 11   SUB-REGION POPULATION AND ESTIMATED GROWTH TO 2031

NORTHERN
POPULATION IN 2013
869K
ESTIMATED GROWTH
400-470K

WESTERN
POPULATION IN 2013
712K
ESTIMATED GROWTH
370-430K

EASTERN
POPULATION IN 2013
1.05M
ESTIMATED GROWTH
150-200K

CENTRAL
POPULATION IN 2013
485K
ESTIMATED GROWTH
230-280K

SOUTHERN
POPULATION IN 2013
1.18M
ESTIMATED GROWTH
400-480K

Note: The estimated growth for the Northern Subregion includes Wallan, Beveridge and surrounds.

Source: Plan Melbourne

The rate and pattern of population growth will place increasing pressure on Melbourne's already strained infrastructure and service systems, which may threaten the amenity of its suburbs. This is particularly evident in Melbourne's west, with its deficient infrastructure and rapid population growth. If transport congestion and uneven accessibility to employment, services and recreational opportunities persists, the city's liveability and competitiveness over the coming decades is likely to erode.

Population growth in the west, supported by improved connectivity and accessibility, will attract significant investment as businesses decide to relocate or expand into the western suburbs. However, the western region requires significant improvements in order to boost employment opportunities. The sub-regional targets for growth to 2031 detailed in Plan Melbourne anticipate little change in the ratio of employment to population.

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West Growth Corridor Plan

The West Growth Corridor Plan developed by the Metropolitan Planning Authority (MPA) summaries the current actions to address this poor transport connectivity for Melbourne's west:

- The **Regional Rail Link (RRL)** (complete) provides a new rail line from Sunshine to Werribee through the western growth areas of the city (new stations at Wyndham Vale and Tarneit, with opportunities for four more stations in the longer term). The RRL will also improve VLine services from Geelong and beyond, which will free up capacity on the congested Werribee line.
- The **Western Interstate Freight Terminal** is proposed at Truganina.
- The proposed **Outer Metropolitan Ring Road** will provide orbital connectivity between the Port of Melbourne and Melbourne Airport via the western and northern growth areas. It could provide both road and rail transport links for freight and people. Land has already been reserved for this corridor.
- The **Melton rail line corridor upgrade,** with new stations identified at Toolern and Paynes Road.
- Expansion of the **western industrial node** further westwards.
- Development of **six new higher-order town centres** through the western growth area.

Amy, can you find out where are these located?

Over and above the projects contained in the West Growth Corridor Plan, the Government is currently evaluating the merits of the Melbourne Metro rail project. The Melbourne Metro will deliver two nine-kilometre rail tunnels from South Kensington to South Yarra, running via Swanston Street in central Melbourne, linking the Sunbury and Cranbourne / Pakenham rail lines.

The project will:

- Increase the capacity, reliability and efficiency of Melbourne's busiest train lines in the north, west and south-east; and
- Significantly ease congestion in the busy City Loop to allow for more services on other rail lines and relieve crowding during peak periods.

However, even with the proposed network improvements, there is still heavy reliance on one major east-west road link (the M1 corridor) for cross-city travel and freight movement. This renders the city's economy highly vulnerable to incidents on this corridor. It also constrains development in the city's west and threatens Melbourne's aspirations for sustainable population and economic growth.

3 TRANSPORT AND LAND USE THEORY

3.1 Land use and transport accessibility theory

Well established economic theory indicates that over time, firms will tend to locate closer to areas that improve their land use efficiency. Locating in areas with superior accessibility reduces transaction costs through ease of contact with suppliers and customers. Crucially, this also increases access to a skilled labour force. The theoretical underpinnings of the relationship between land price and accessibility can be seen graphically in Figure 12.

FIGURE 12   DEMAND FOR DIFFERENT LAND USES AS A FUNCTION OF ACCESSIBILITY
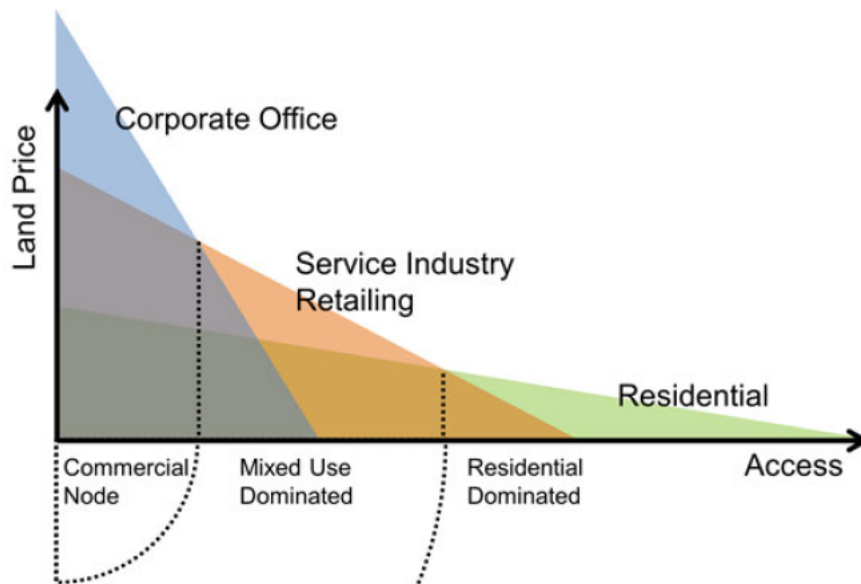
Source: SGS Economics and Planning

Whilst all firms prefer locations with high levels of accessibility, their ability to pay for locational advantages will differ, as do their aggregate land use demands. Land use demands between industries and the collar of the workers (blue and white) generally differ based on the functioning of their respective industries.

Land use demands by service industries are small relative to other industries such as manufacturing and wholesale trade. Those industries require large amounts of land, relative to service firms. Furthermore, land rents can be shared across multiple firms as office towers use the relatively cheaper option of expanding vertically, rather than having large parcels of land. This contributes to the ability of service firms to locate within the confines of a heavily dense area of employment and population such as in central Melbourne. On the other hand, manufacturing and wholesale trade tends to locate further away from highly dense areas given their larger land requirements.

Ways to improve the accessibility of firms differs across industries based on their respective customer and supplier bases. Generally, manufacturing requires quality road infrastructure. Consequently, they tend to locate closer to areas with adequate access to major road networks. Both their suppliers and customers also tend to have similar accessibility requirements. Therefore, efficiencies can be gained for those industries when they locate closer to points of road infrastructure. This is not necessarily the case for service industries.

Whilst all firms require timely access to their suppliers, employees and customers, their strategic ability to access those people differ based on the function of their business models.

Opportunities for access to employment apply in a similar way to households as they do for industries. People, over time, will adjust their residential location due to a wide range of factors, some of which include: access to employment, education, essential services and recreation. Literature indicates that these choices tend to be constrained due to factors such as family and historical ties to a region or corridor.

For these reasons many people and families may tend to locate 'within corridors', rather than moving 'across town'. However, when moves are made within this context, the relative accessibility of the two areas is a key consideration.

As the case studies below will demonstrate, traffic ramp-up associated with newly provided transport infrastructure in Australian cities (only considering meritorious projects) has been relatively fast-paced. On the other hand , the associated land use changes, and consequently, the wider economic benefits of the project, taking somewhat longer to be realised – up to eight years in some cases.

3.2 Case studies

These theoretical predications are illustrated by recent experience in Australian cities, particularly with respect to the Western Ring Road, CityLink, EastLink and Westlink (M7) in Sydney.

CityLink

Initial project drivers and anticipated impacts

As early as 1929, a proposal for a southern bypass to central Melbourne was put forward. However, it was during the transport planning of the 1950s and 60s when the concept of a southern and western city bypass (later to become CityLink) gained more traction. The 1969 Melbourne Transportation plan advocated for reservations and setting aside sinking funds for the new inner-city freeway system.

FIGURE 13   EARLY CITY RING ROAD AND CENTRAL MELBOURNE ACCESS ROUTES, 1954

Source: Melbourne Metropolitan Planning Scheme 1954: City Ring Road and central Melbourne access routes, p.198

With the completion of many of the planned freeways of the 1950s and 60s by the late 1980s, Melbourne was served by several freeways that terminated in its inner suburbs, generally five kilometres from the centre. Once traffic left these freeways, it was distributed onto local and arterial roads, resulting in gridlock and some roads of the city, notably King, Spencer and Swanston Streets performing major through road arterial roles.

Some residential and urban streets were handling volumes of up to 80 percent greater than their planned capacity (Russell, 2000). While a degree of this traffic was bound for central Melbourne, many of the trips were cross town, largely servicing the regions beyond the inner city, but forced through central Melbourne as there was no bypass available. During the 1980s, the Melbourne City Council advocated for a western bypass for the City, but in the 1990s, first under the Labor Government and then under the Liberal Kennett Government, the concept of a city bypass was taken further and the project was conceptualised as an east-west connector (Institute of Engineers Australia, 2002).

While the inner core of Melbourne is dependent on mass public transport, the next ring of the city and particularly the city's air and sea ports, rely on major road access. This interaction of the inner core with its surrounds allows for a high value services economy to be supported by the adjacent freight and logistics industry. However, prior to the development of CityLink, access and utilisation of the Port of Melbourne and between Melbourne's individual freeways was poor.

CityLink was built between 1996 and 2000, with stages opened throughout 1999 and 2000. The full link was operational from December 2000.

FIGURE 14   CITYLINK WESTERN AND SOUTHERN COMPONENTS


Source: Transurban

Originally proposed as a city bypass route, the final design included the Exhibition Street extension that provided central Melbourne access, via Batman Avenue to the Monash Freeway and CityLink. This link provided access over the rail yards east of Flinders Street station and allowed the Route 70 tram to be rerouted to dedicated tracks between the sporting precincts.

The City of Melbourne was a primary supporter of this extension, partly because it enabled traffic to enter and exit the city without the use of Swanston Street or local roads in Southbank. While land use changes as a result of this project were not immediately seen, it is highly likely that the project spurred on a greater density of development within its immediate vicinity.

Impacts to Employment and Housing

The impacts to employment and housing from CityLink have been estimated by SGS using an accessibility model. A map of the changes to EJD brought about by the CityLink project is presented in Figure 5. This illustrates substantial uplift in EJD in Statistical Local Areas along the CityLink corridor to the north and the south east of central Melbourne.

FIGURE 5 CITYLINK IMPACT TO EFFECTIVE JOB DENSITY, 2011
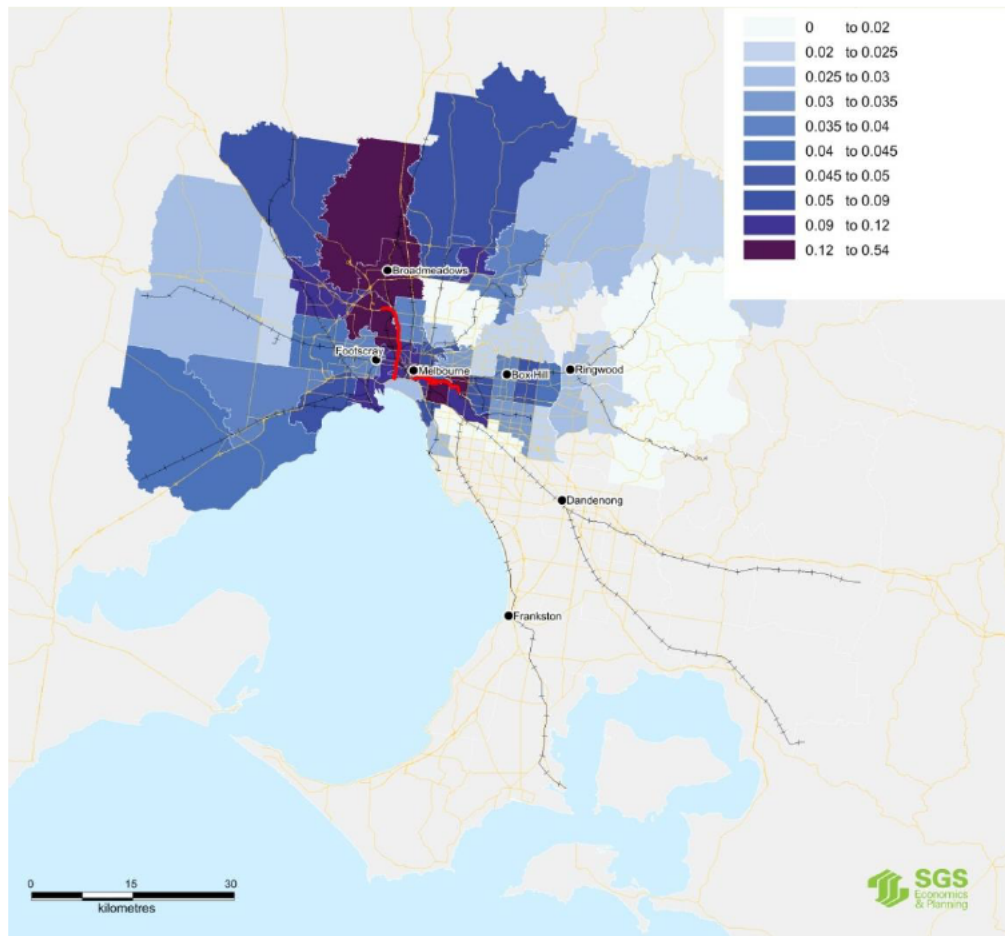
Source: SGS Economics & Planning

The impact of this project to the level of employment and households in 2006 and 2011 is presented in Table 1. It is estimated that this project enabled Melbourne to accommodate an additional 63,300 jobs in 2006. By 2011, the additional number of jobs increased to 70,300 (that is, an additional 7,000 jobs were added). There was a larger impact to households and population as a result of this project. It was estimated that approximately 58,200 new households were enabled in Melbourne as a result of CityLink.

TABLE 1 CITYLINK IMPACTS TO EMPLOYMENT AND HOUSEHOLDS

Year	Employment	Households
2006	63,300	52,800
% of total	3.3%	3.7%
2011	70,300	58,200
% of total	3.2%	3.7%

Source: SGS Economics & Planning

Figure 16 presents the changes to employment by industry resulting from this project for 2006 and 2011. The largest impacts were estimated to be in Professional, Scientific & Technical Services, Financial & Insurance Services and Health Care & Social Assistance.

FIGURE 16   EMPLOYMENT IMPACTS OF CITYLINK
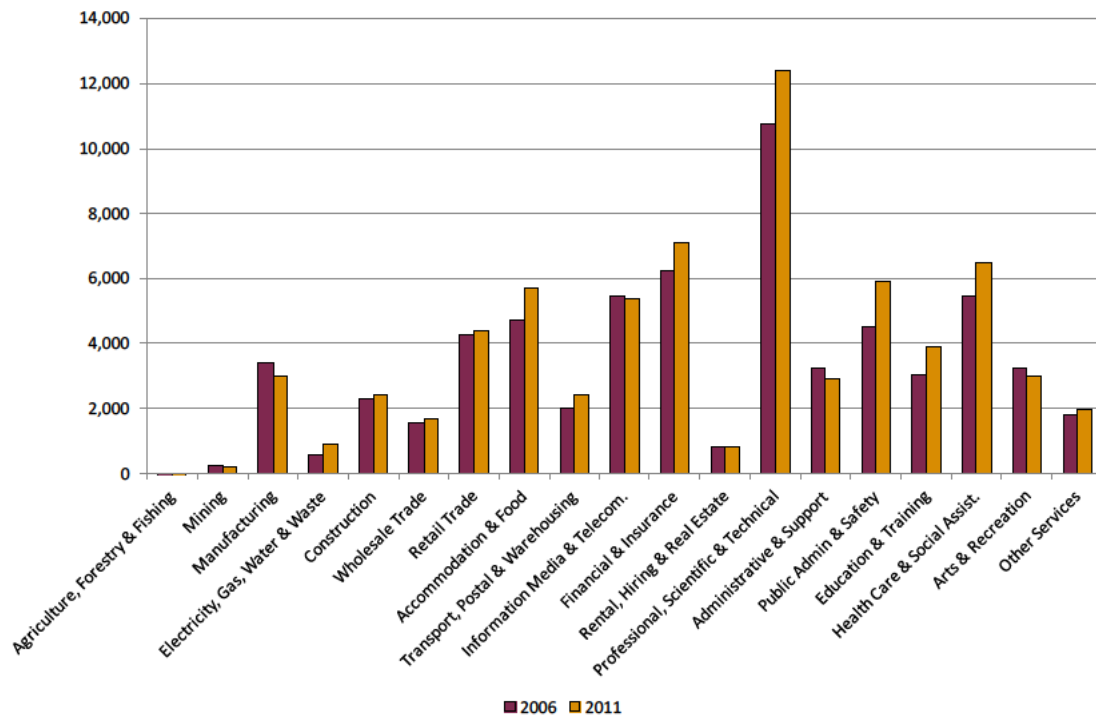
Source: SGS Economics & Planning

The largest increases in employment occurred in Stonnington, Prahran, Moreland North, Boroondara Hawthorn and Moonee Valley West. Most of the areas which contain the CityLink roads experienced a positive uplift to employment. This is due to their now increased accessibility to central Melbourne and many other locations compared to before the project was built.

A similar pattern to the distribution of employment impacts can be seen in the distribution of population (and households). Stonnington, Prahran and Hawthorn are estimated to have received an additional 34,500 people in 2011 as a result of the CityLink project. The CityLink project also spurred population growth within the City of Melbourne, of approximately 15,700 people in 2011.

Transport and land use ramp up period

As shown below, the traffic ramp up for CityLink took roughly three years. After that period, growth was in line with population.

Unlike the traffic ramp-up, which was relatively fast-paced, land use change and consequently, the wider economic benefits of the project, took somewhat longer to be realised – up to eight years.

FIGURE 17   CITYLINK FORECAST VS ACTUAL*[3]
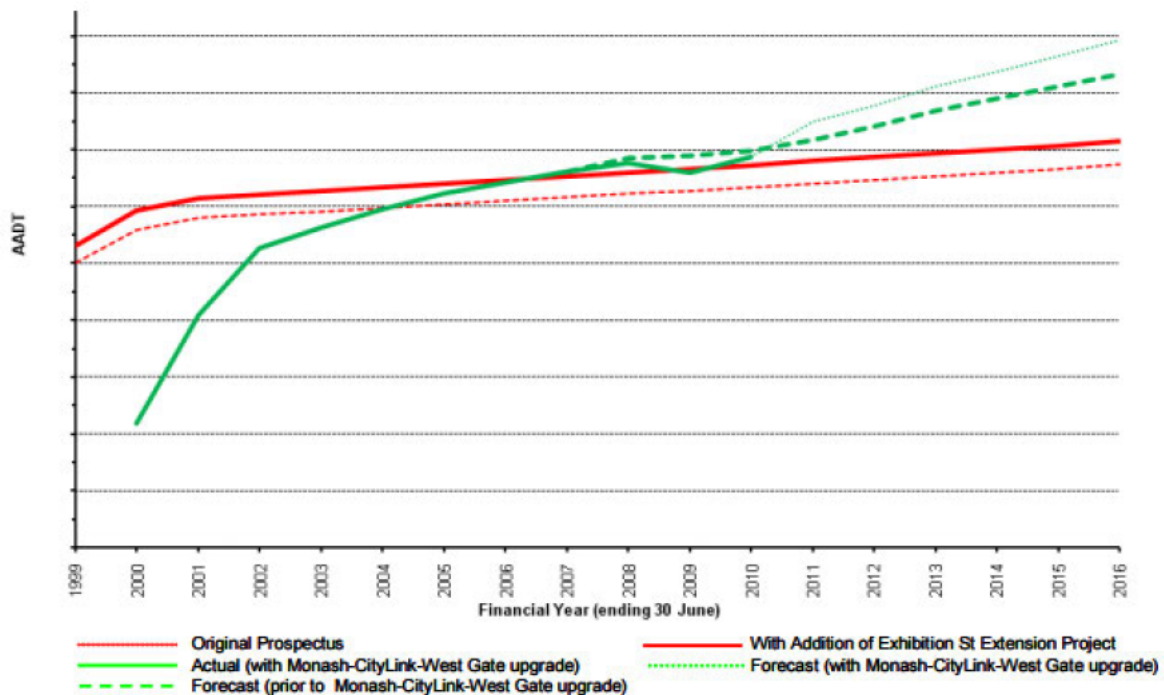
Source: Transurban
Notes:*AADT on the y-axis refers to Average Annual Daily Traffic.

Behavioural change is an inherently slow process. It takes time for people to realise the benefits they might enjoy by changing location. This holds true for both households and businesses.

On top of that, the development industry takes time to seek approvals, acquire sites and commence building. In sum, this process of realisation that new corridors have potential, including development lags, occurs during the 3- 4 years following the construction of a project.

Only when a sufficient scale of activity gathered pace in these initial 3 – 4 years, did other businesses and households start to realise the true potential of relocating to the CityLink corridor.

In this second phase, which also took up to 4 years, did more intensive activities start to take place in the corridor. That is, it was in the second half of the ramp up period that agglomeration benefits really geared up. Consequently, the estimated wider economic benefits have increased more rapidly since 2005.

In the case of CityLink, the ramp up period may have also been influenced by the staged opening of the Link, including the closure of the Burnley tunnel due to leaks. It was only in 2002 that the Link became fully operational.

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[3] Original can be located here https://infrastructure.gov.au/infrastructure/infrastructure_reforms/files/Attach_C-GHD_Report.pdf

Importantly, the magnitude of agglomeration impacts was quite high. The corridor's proximity to central Melbourne enabled a large pool of knowledge intensive businesses and workers (those associated with financial services and professional industries) to locate in the corridor, with intensification also seen in the central Melbourne corridor.

Western Ring Road

Initial project drivers and anticipated impacts

Planning for the Western Ring Road, as part of a much larger Outer Ring Road, dates back to the 1954 Melbourne Metropolitan Planning Scheme and 1969 Melbourne Transportation Plan. The scheme proposed a city ring road as well as a series of concentric ring roads at various distances from central Melbourne.

It remained in many transport planning documents for several decades, but re-emerged on the agenda in the 1980s, largely as an alternative to major freight traffic congestion on Pascoe Vale Road, between the Hume Highway and Tullamarine Freeway (Rumpf and Kiss, 1994).

FIGURE 18   PROPOSED ARTERIAL ROAD NETWORK, 1954
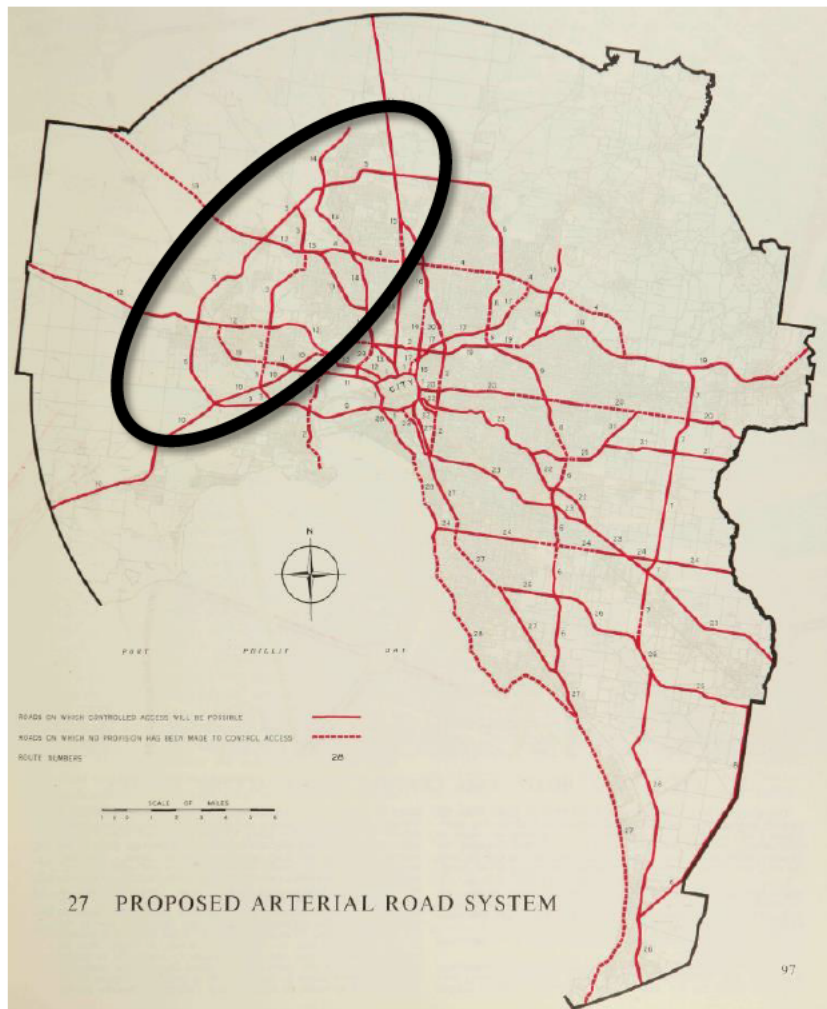
Source: Melbourne Metropolitan Planning Scheme 1954: Proposed Arterial Road Network, p.97

Construction of the Western Ring Road commenced in 1989, with initial works centred around Broadmeadows. Over the next decade, various sections of the route were completed and opened, with the entire route completed by 1999.

The Western Ring Road extends 28 kilometres from the junction of the Princes and West Gate Freeways in Laverton to Sydney Road/Hume Highway in Fawkner. Through this section the Ring Road connects to all of Melbourne's western and northern highways, namely: the West Gate, Princes, Western, Calder, Tullamarine and Hume freeways (See Figure 19).

FIGURE 19   WESTERN RING ROAD CONNECTIVITY

Source: SGS Economics & Planning

Eastwards of the Hume Highway, the Western Ring Road joins the much shorter Metropolitan Ring Road (10 kilometres). Together these form the national M80 highway, with the easterly section terminating at Greensborough. Initially, the Metropolitan Ring Road was intended to orbit the whole metropolitan area, cutting through Eltham, Templestowe and Warrandyte, and link up with the now constructed Eastern Ring Road ('Eastlink'). The 'missing link' through Eltham, Templestowe and Warrandyte has never been constructed, and at present there are no tabled plans to complete the link. Historically, there has been sustained community opposition to the construction of the 'missing link'.

Anecdotal impacts

The Western Ring Road connects the individual freeways that service Melbourne's sea and air ports, and as such, the movement of freight is a primary function of the road. The road relieves freight traffic from Sydney Road, Pascoe Vale Road and Geelong Road. The completion of the Ring Road was anticipated to deliver major economic benefits to Victoria by linking up the national freight corridors with the Port of Melbourne and Melbourne Airport (VicRoads, 1994a).

The heavy freight use of the connection has spurred industrial growth along the length of the route, resulting in a redistribution of Melbourne's industry. In the late 1980s, the suitability of the wharves (that now house the 'Docklands' development) for port functions were being investigated. The decision was made to not rebuild the wharves, and hence the slow birth of 'Docklands' began. The construction of the Western Ring Road in the 1990s allowed the existing industries of Docklands to relocate to cheaper industrial land with good access to the port. This relocation freed up the Docklands area for residential and commercial redevelopment. During this same period, retreating industries from the gentrifying areas of Southbank, Richmond and Collingwood could also relocate to new premises along the Western Ring Road.

Funding for the Western Ring Road was provided by both State and Federal Governments. In 1974, the Federal Government established a National Roads Program. Initially Federal funds were only provided for interstate Freeways. However, the program was progressively broadened to include Metropolitan roads of significance, largely to improve freight movements. The National Roads Program provided the bulk of the funds for the Western Ring Road, supplemented by State Government funding. Recently, there have been substantial improvements made to the road in the order of $2 billion, including: additional lanes, dedicated exits and traffic management systems.

Impacts to Employment and Housing

Figure 20 presents the estimated changes to EJD for the Western Ring Road project. This illustrates that the benefits of the project were concentrated in the north and west of Melbourne rather than the south eastern region. Importantly, the EJD impacts of this project were lower compared with that of the CityLink.

FIGURE 20   WESTERN RING ROAD IMPACTS TO EFFECTIVE JOB DENSITY, 2011
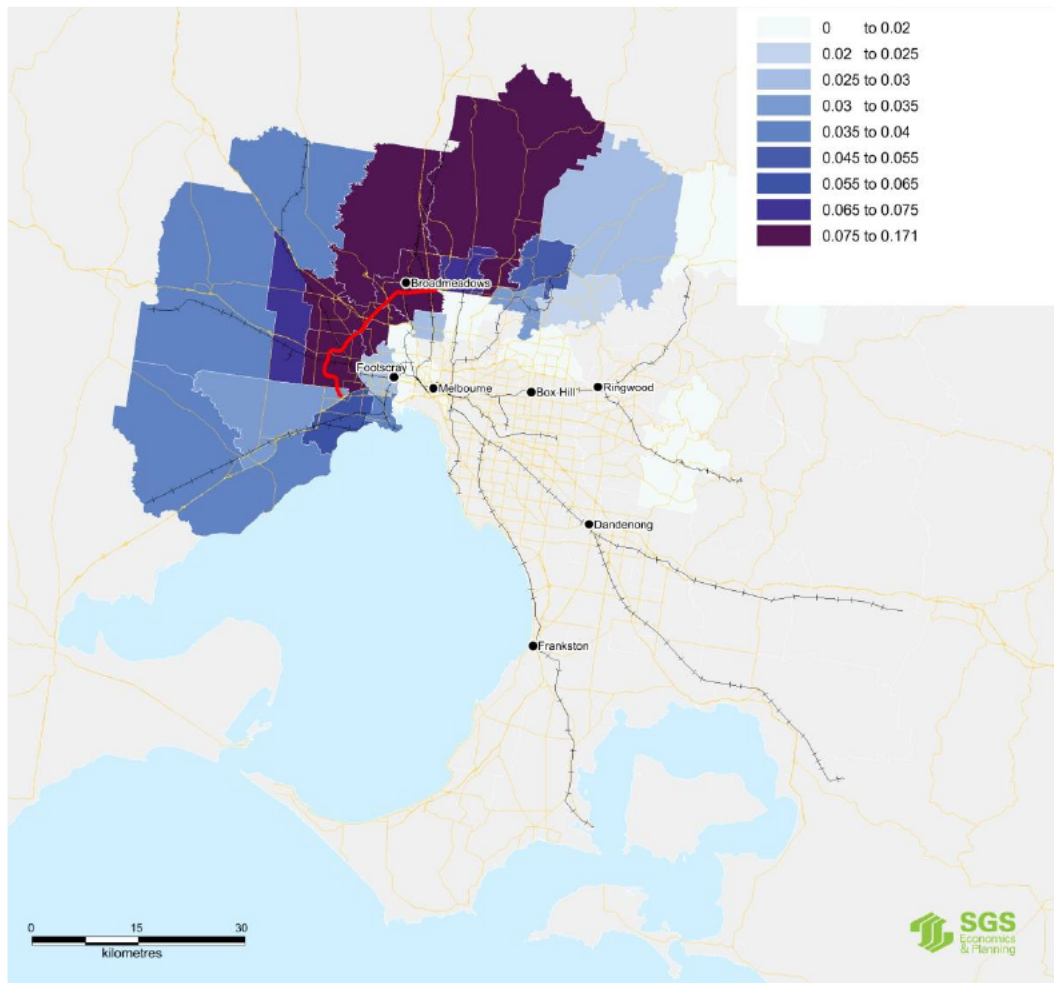
Source: SGS Economics & Planning

The impact of this project on the level of employment and households in 2006 and 2011 is presented in Table 2. It is estimated that this project enabled an additional 24,900 jobs to be accommodated within metropolitan Melbourne in 2006, and 27,300 jobs in Melbourne in 2011. This was equivalent to some 1.3 percent of the total employment base in each year.

There was a similar impact to population and households as a result of this project. It was estimated that approximately 19,300 additional households moved to Melbourne as a result of the Western Ring Road in 2011. That is, in comparison to the CityLink project, the land use impacts of the Western Ring Road were only modest.

## TABLE 2   WESTERN RING ROAD IMPACTS TO EMPLOYMENT AND HOUSEHOLDS

Year	Employment	Households
2006	24,900	17,500
% of total	1.3%	1.2%
2011	27,300	19,300
% of total	1.3%	1.2%

Source: SGS Economics & Planning

Figure 21 presents the changes to employment by industry resulting from this project for 2006 and 2011. The largest impacts were estimated to be in Professional, Scientific & Technical Services, Financial & Insurance Services and Health Care & Social Assistance.

FIGURE 21   EMPLOYMENT IMPACTS OF THE WESTERN RING ROAD
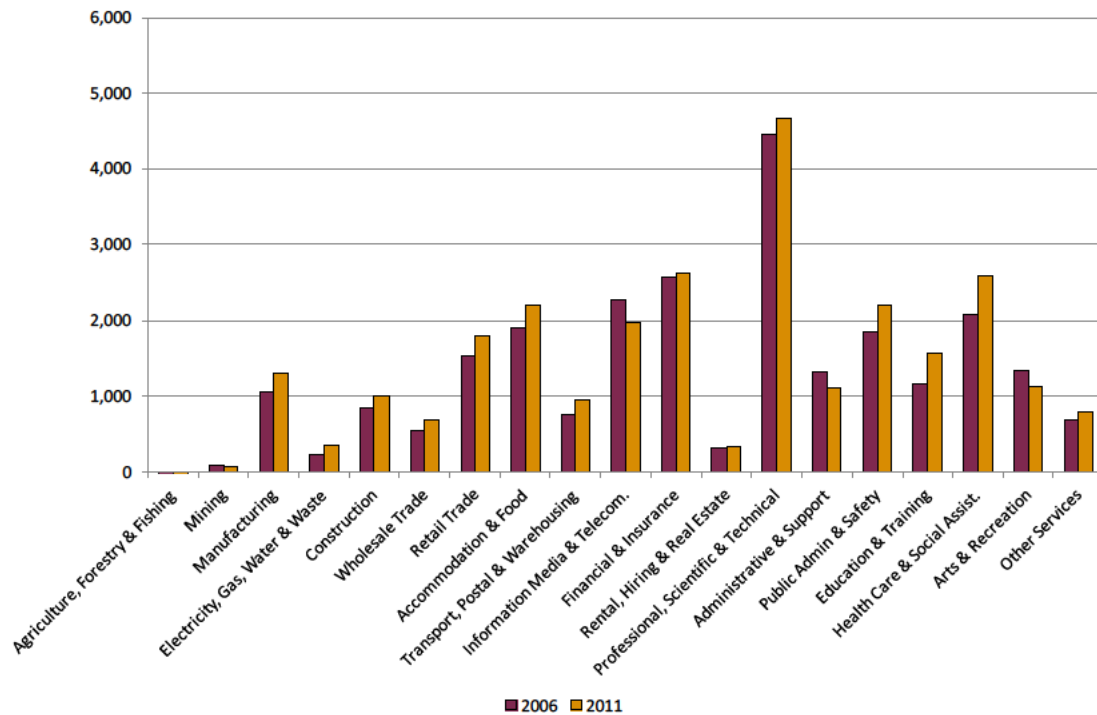
Source: SGS Economics & Planning

The largest increases in employment occurred in Craigieburn, Melbourne and Sunshine. Most of the areas which contain on and off ramps to the Western Ring Road experienced a positive uplift to employment. This is due to their now increased accessibility from central Melbourne to the western region compared to before the project was built.

The majority of the impact to population was also felt in the western suburbs, particularly: Craigieburn, Whittlesea, Sunshine and Mooney Valley West. These areas are estimated to have accommodated an additional 16,500 people (28 percent of the total impact) in 2006 as a result of the project.

Transport and land use ramp up periods

In the case of the Western Ring Road, land use change, and the resulting wider economic impacts, took between 4 and 6 years to "ramp up".

This timeframe was somewhat shorter than that of the CityLink project. The development lag and behavioural changes on the part of businesses and households took roughly the same time as with the CityLink project (i.e. 3 – 4 years). However, there was not yet benefits to be realised for knowledge intensive businesses with respect to agglomeration. Importantly, the scale of resulting land use impacts from the Western Ring Road project were much more modest in magnitude compared with that of the CityLink.

In other words, the Western Ring Road did not provide the same magnitude of agglomeration effects that CityLink had. The more intensive activities did not occur and spur more changes to behaviour in terms of location.

4 LAND USE SCENARIOS AND CHALLENGES

This section identifies the land use and accessibility-related challenges facing Melbourne. Two scenarios are considered - the Reference Case and a Project Case - to understand the impact on land use from a major city shaping project such as the western distributor.

4.1 Defining land use scenarios

Reference Case (Base Case) Land Use Scenario

A 'Reference Case' scenario essentially represents a compromise between an aspirational scenario and a pure trend based scenario. It is often referred to as a 'policy evolution' scenario, as it largely relies on established trends while capturing to some degree the effect of policy shifts and planned land release/renewal sites/infrastructure projects. The full realisation of these shifts are not intended to be captured in this type of scenario.
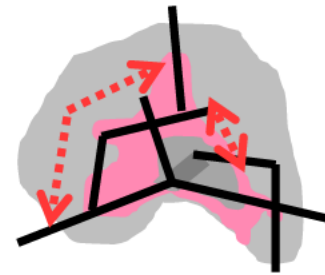
It assumes that the city <u>will</u> continue to grow in line with broader macro-economic trends and that appropriate investments (in transport and other social infrastructure) will be made in the future to ensure that the projected population and employment patterns can be realised.

In effect, this scenario assumes that:

— Total population and employment (structure) will grow in line with recent trends, based on information currently available.

— The distribution of growth will largely follow recent trends, along with known future development opportunities.

Where there is existing development occurring, these policy aspirations will be more fully realised (e.g. Footscray has recently experienced significant gentrification and employment growth and we would subsequently see its role with respect to Melbourne continuing to develop this way). Where this development is not yet evident (particularly for future urban areas), similar comparator centres are used to estimate a likely future growth pattern.

Separate project/policy specific scenarios should be developed if targeted analysis is required on a particular area/corridor/site.

Project Case Land Use Scenario

The 'Project Case' scenario represents the best estimate of the future land use distribution resulting from the project in question being fully realised.

Evidence points out that major investments in the past (in both roads and Public Transport) in the east of Melbourne have supported strong connections between key nodes and suburbs and into central Melbourne. This in turn has been a key enabler for the strong historical growth in both population and employment to the east and south. Similar major infrastructure investment is required for the west to support its forecast growth. Evidence of this phenomena can be found in the original East West Link Needs Assessment completed by Sir Rod Edington.
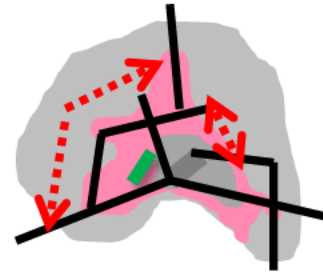
More recent major investments such as CityLink and the Western Ring Road have helped increase the relative accessibility of the west, which has helped shift Melbourne's growth pattern back toward the north and west. This has also been supported by significant land releases and other policy decisions.

Analysis of the impact on land use patterns resulting from these major infrastructure projects can provide insights into the likely impacts of this specific project. SGS will use a land use transport accessibility model to define land use changes resulting from the proposed investment (this is detailed in Section 5).

4.2   Problems with the Reference Case (Base Case)

The Reference Case (drawing from the Victoria In Future 2014 publication (VIF2014)) assumes considerable population growth in Melbourne, with a considerable proportion of this growth to be accommodated in the west. This implicitly implies that <u>significant</u> investment in the west <u>will</u> occur to support this growth and that of employment.

Without a project such as the Western Distributor (which includes the Monash Freeway M1 upgrade and the West Gate Freeway widening), there is greater uncertainty about whether the land use distribution (and possibly the quantum) outlined in VIF2014 and the associated employment are in fact likely outcomes.

Figure 22 presents the growth in resident workers and local jobs by Melbourne's regions under the Base Case. Figure 23 and

Figure 24 present the ratio of resident workers to local jobs, and the scale of 'mismatch' between the two.

From these figures, it can be seen that there is currently a significant mismatch between resident workers and local jobs in the western (and northern) regions, compared to the eastern and southern regions of Melbourne.

Importantly, this trend is projected to worsen under the Base Case, with a small reduction in the jobs/worker ratio for central Melbourne given very significant population growth projected for this region under VIF2014.

As a result, there is a continued increase in the total scale of the misalignment. In turn, this will result in a greater amount of cross city trips in aggregate.

FIGURE 22   REFERENCE CASE RESIDENT WORKER AND LOCAL JOBS
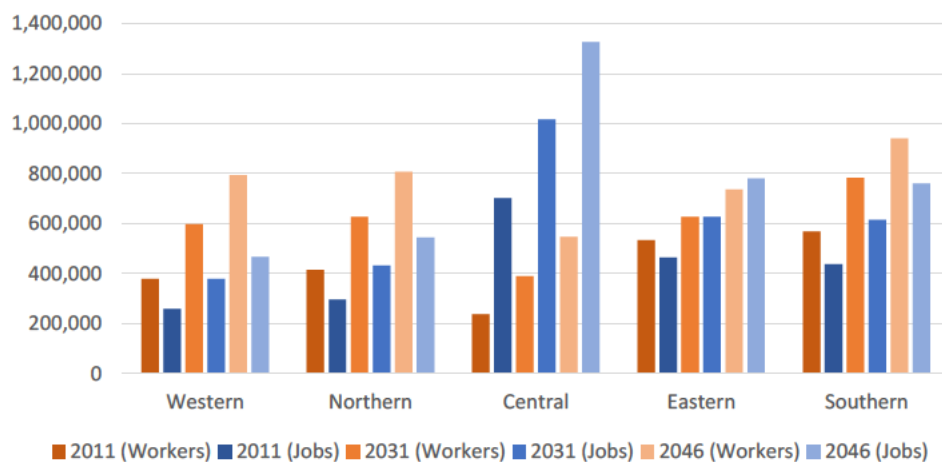
Source: VIF 2014 and SGS Economics and Planning

FIGURE 23   RATIO OF REFERENCE CASE RESIDENT WORKER TO LOCAL JOBS

Source: VIF 2014 and SGS Economics and Planning

FIGURE 24   REFERENCE CASE RESIDENT WORKER & LOCAL JOBS MISMATCH
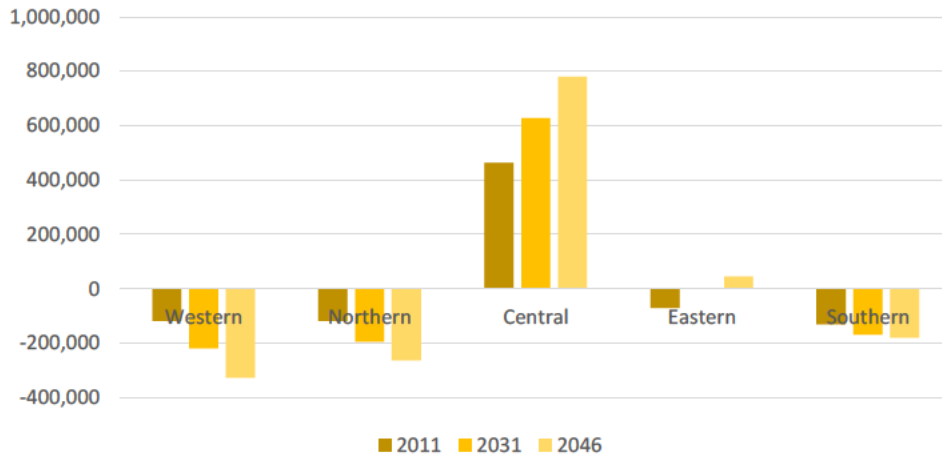
Source: VIF 2014 and SGS Economics and Planning

The following charts show net transport flows from each region at 2031 during the 2-hour morning peak. They show that by 2031, there are significant outflows from the western region along with the northern and southern regions.

FIGURE 25   NET CAR OUTFLOWS (AM PEAK), 2031
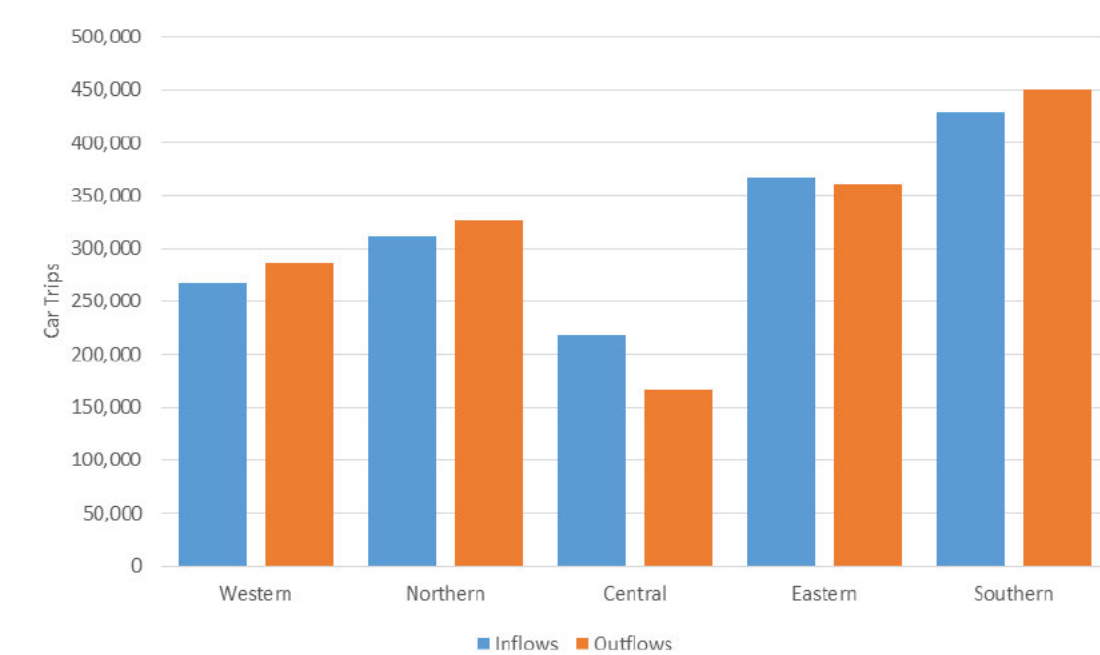
Source: VLC- Zenith transport model

FIGURE 26   CAR FLOWS AS OF 2031 (AM PEAK)
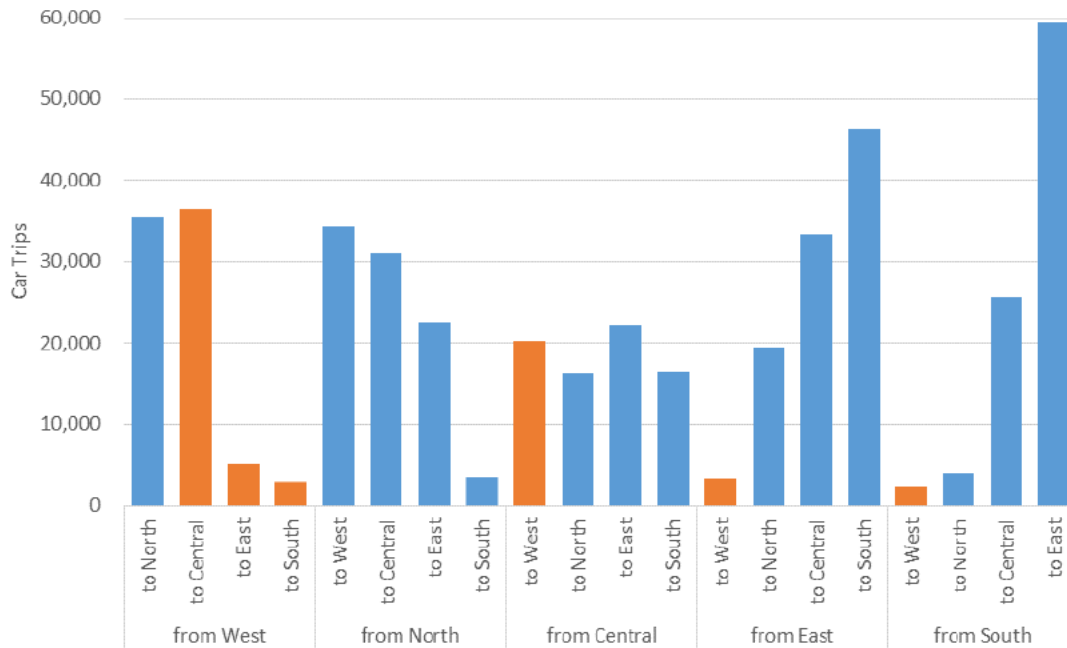
Source: VLC- Zenith transport model

This analysis, along with other outputs from the transport modelling, suggests that without the Western Distributor, (and potentially, the Melbourne Metro), the land use form specified in the Reference Case will result in significant (and potentially implausible) congestion in some areas relative to others.

Indeed, VicRoads data shows maximum weekday (during school term) traffic volumes to be around 220,000 in both directions along the cross of the city (i.e. east and west). There has been a lot of growth in demand on the West Gate Bridge since 2011, which is particularly notable in 2014 following the implementation of ramp metering on the freeway. Traffic volumes started at about 25,000 in 1978 when the Bridge first opened and grew rapidly by 2003 to reach nearly 140,000 after the opening of the CityLink.

In reality, this would likely be addressed through a range of behavioural changes. For example:

— People would adjust transport behaviour resulting in things such as 'peak spreading', where people travel to/from work across a longer period of time.

— People will also change their housing location, potentially living somewhere relatively more accessible to the city.

— People will adjust their employment decisions, which could result in a change to the mix of employment across the city. For example, if people can't access central areas, then those highly productive jobs will not grow as fast due to labour constraints.

5 LAND USE TRANSPORT ACCESSIBILITY RESULTS

The following section details the results of the land use transport accessibility modelling completed for the Western Distributor project. This represents the likely change in the spatial distribution of employment and housing across Melbourne that is likely to result from a major city shaping project such as this.

5.1 Approach

Model conceptual framework

To estimate the induced changes in households and employment from the proposed investment, detailed analysis of changes in accessibility was undertaken by SGS.

With the implementation of this project, two key components related to an area's access to jobs and services will be impacted and subsequently estimated. These are:
- Changes in travel times; and/or
- Changes in mode share uses (Public Transport versus Private Vehicles).

It should be noted that for this analysis, the change in the distribution of people and firms is purely based on the induced effects of improved accessibility. While not captured in this analysis, in addition to these impacts, there can often be one or more targeted intervention developments near key locations (i.e. tunnel portals or off ramps) that may further capitalise on the improved accessibility of the corridor.

This model quantifies the observed historical relationship (at 1996, 2001, 2006 and 2011) that population and employment (by industry group) levels have with the relative accessibility (weighted travel time) of each SLA across Western Melbourne and the wider metropolitan area. In short, the model predicts where population and employment will gravitate given augmented accessibility in the road network. This method is outlined in Figure 27 and in more detail below.

FIGURE 27   ACCESSIBILITY MODELLING APPROACH
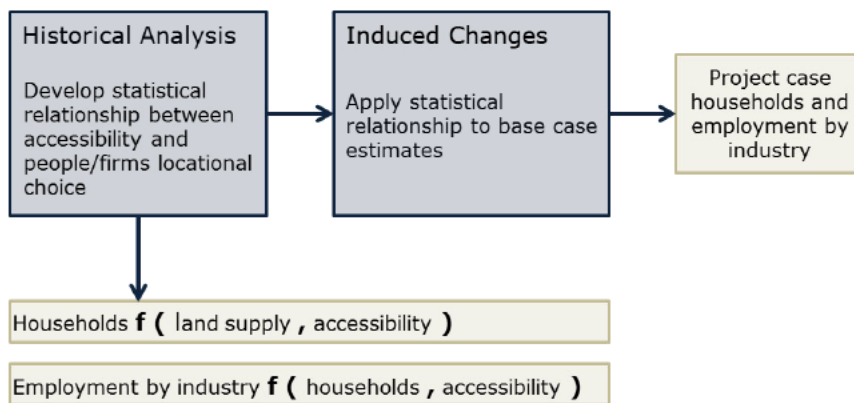
Source: SGS Economics & Planning

Over the past 15 years there have been several major road infrastructure projects that have had a significant impact on the accessibility of certain locations across metropolitan Melbourne, such as:

- 1996 to 2001 – Western Ring Road
- 2001 to 2006 – CityLink; and
- 2006 to 2011 – Eastlink and major improvements to the Monash Freeway and the West Gate Bridge.

Over this period, detailed information regarding the distribution and accessibility changes within Melbourne have been made available through the ABS Census and the Victorian Integrated Transport Model (VITM). For this analysis, the data has been aggregated to the Statistical Local Area (SLA) level for four time periods: 1996, 2001, 2006 and 2011.

While all these projects are road based initiatives, they help to provide an evidence base for understanding the degree to which firms and households change their locational preferences as a result of shifts in the metropolitan accessibility contours. A statistical regression analysis was undertaken using this historical data to test and quantify this conceptual theory, which is as follows:

> All else being equal, a SLAs share of metropolitan Melbourne's total employment by industry sector is based on two broad factors: Share of population/dwellings[4] and accessibility[5].

> In addition, if all else was equal, a SLAs share of metropolitan Melbourne's total housing stock is based on two key factors: the urban land supply[6] and Accessibility.

This concept suggests that the strong growth within a growth area is a result of increased land supply, while the recent strong growth within the inner city is a result of increased accessibility.

Furthermore, if a location's accessibility is improved it will increase the level of demand and in turn growth rate, similar to releasing land within a growth area. The strength of this relationship varies from industry to industry depending on its requirements and willingness/capacity to pay for more accessible locations.

For this analysis, these two factors have been identified as the key considerations in the distribution of households and employment. However, it is noted that in reality the exact spatial distribution of households and employment is far more complex, particularly at a local level. There are a wide range of other localised issues, historical factors and development trends that also determine the locational choices of firms and people.

It has been assumed that all these other factors related to localised issues are indeed inherent and therefore captured within the Base Case projections. Consequently, any changes observed under the Project Case scenario are over and above these other contextual issues.

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[4] The share of population/housing has been included to capture the distributional changes of underlying population serving employment.

[5] Where, accessibility is defined in its broadest sense. That is, a locations access to activity centres, skilled workers, employment opportunities, services, education, transport infrastructure, restaurants, etc.

[6] The amount of urban land has been included to capture the varying geographic sizes of SLAs. That is, if SLA X is 10 times larger than SLA Y, all else being equal, it should have 10 times the amount of dwellings.

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Data synthesis and alignment

In order to undertake this statistical analysis, three key data variables were synthesised by SGS for each SLA across metropolitan Melbourne from 1996 to 2011:
  – SLAs share of total employment by industry sector and households;
  – SLAs share of total urban land; and
  – SLAs relative accessibility.

Population and employment

Historical employment and housing data for 1996, 2001, 2006 and 2011 by SLA have been collated from a range of ABS data sets, including the past four Censuses (1996, 2001, 2006 and 2011), the ABS labour force survey data[7] and ABS estimated resident population figures[8].

Total employment by industry sector and households for each SLA was converted to a share of overall metropolitan Melbourne levels. The share of metropolitan Melbourne was used as it is assumed that there are a wide range of other external factors such as international and interstate migration and economic trends that influence the total amount of population and employment in a city as a whole. Furthermore, it was assumed that a project such as this will only have an influence in the reorganisation (or locational decisions) of people/firms within Melbourne and will not be able to influence a person from Sydney, for example. In other words, it was assumed that a project of this scale is unlikely to affect the overall employment outcomes for the Metropolitan Statistical Division (MSD) with only reorganisation of employment within the metropolitan economy envisaged.

Urban land

There were a range of data sources that could be utilised (such as the Victorian Planning Provisions) to calculate the amount of total urban land that an SLA has as a proportion of metropolitan Melbourne. However, many of these datasets are difficult to source consistently across a 15 year historical time period (1996-2011). Therefore, a geographic unit referred to as Urban Centre Locality (UCL) was used as a broad estimate of the amount of urban land. A UCL measures the broad extent of urbanisation for a city/town and is published by the ABS for the 1996, 2001 and 2006 Censuses. An estimate of the Melbourne UCL for 2011 was made by adding in all future 2010 Urban Development Program (UDP) broad hectare sites to the 2006 UCL. This provided a consistent measure across all time periods.

As the UCL grows for an area (i.e. due to green-field land being released) the proportion of total Melbourne UCL for other established locations was found to decrease. This statistic isolates dwelling growth related to changes in accessibility from growth related to increased development opportunities.

Accessibility

SGS has developed a measure of accessibility within a specified geographical region and the ability to access overall economic activity across the wider MSD, known as EJD.

Quantifying changes to relative accessibility was performed through translating the absolute EJD's across the four years of analysis into a 0 to 1 index, i.e. a relative EJD index. The index was created using the SLA with the highest EJD. This was consistently found to be Melbourne (C) – Inner across all years of analysis, which provided a ceiling for the index (a score of 1). To provide a floor to the index, the converse was performed. Consistently, Mornington Peninsula (S) – South was found to have the lowest EJD and was thus given a score of 0.

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The equation used to calculate the relative EJD ranking is as follows:

$$Relative\ EJD_i = \frac{EJD_i - Min\ EJD}{Max\ EJD - Min\ EJD}$$

Where:

EJD_i = Effective Job Density for SLA i

$Min\ EJD_{SLA}$ = the SLA found to have the lowest EJD amongst all MSD SLAs

$Max\ EJD_{SLA}$ = the SLA found to have the highest EJD amongst all MSD SLAs

The following table provides a summary of the relative EJD scores for a selection of SLAs across Melbourne.

TABLE 3   RELATIVE EJD INDEX, SELECTED SLAS, 1996-2011

SLA	1996	2001	2006	2011	1996-2011
Melbourne (C) - Inner	1.00	1.00	1.00	1.00	0.000
Port Phillip (C) - West	0.63	0.66	0.67	0.62	-0.013
Monash (C) - South-West	0.44	0.44	0.45	0.42	-0.024
Maribyrnong (C)	0.43	0.43	0.44	0.41	-0.019
Moonee Valley (C) - Essendon	0.43	0.46	0.47	0.40	-0.021
Hobsons Bay (C) - Williamstown	0.37	0.38	0.39	0.36	-0.012
Gr. Dandenong (C) - Dandenong	0.33	0.33	0.35	0.32	-0.011
Hobsons Bay (C) - Altona	0.29	0.30	0.31	0.28	-0.006
Brimbank (C) - Sunshine	0.27	0.31	0.33	0.26	-0.003
Wyndham (C) - North	0.19	0.20	0.21	0.19	0.001
Frankston (C) - West	0.14	0.14	0.15	0.14	0.003
Melton (S) Bal	0.11	0.12	0.13	0.11	0.001
Mornington P'sula (S) - South	0.00	0.00	0.00	0.00	0.000

Source: SGS Economics and Planning

Regression analysis

The regression equation used to estimate the relationship between industry movements, accessibility and households is shown below.

$$Industry\ Share_i = \beta_1 Relative\ EJD_i + \beta_2 HH\ Share_i + \beta_0 + \varepsilon$$

Where:

$Relative\ EJD_i$ = Relative Effective Job Density for SLA i

$Industry\ Share_i$ = The share of an industry's metropolitan employment within SLA i

$HH\ Share_i$ = The share of metropolitan Households within SLA i

β_0 = Constant term

ε = Error term

Accessibility also induces locational change for households, given that they can access a greater amount of services and employment opportunities. The regression equation that estimates accessibility induced household changes is shown below.

$$HHshare_i = \beta_1 Relative\ EJD_{j,SLA} + \beta_2 Share\ of\ MSD\ UCL_i + \beta_0 + \varepsilon$$

Where:

$Relative\ EJD_i$ = Relative Effective Job Density for SLA i

$HH\ Share_i$ = The share of Households within SLA i

$\textit{Share of MSD UCL}_i$ = The share of overall urbanised areas within SLA i
β_0 = Constant term
ε = Error term

When applying this statistical relationship to the project, the key coefficient relates to Relative EJD. This coefficient represents the increase in a location's share of metropolitan Melbourne's total households or employment if a location was to shift from being the least accessible location to being the most accessible location.

Figure 28 presents the relative EJD coefficient for each employment industry sector and households.

This can be interpreted as follows:

> *If the accessibility of a location increased from 0 to 1, it would increase its share of metropolitan Melbourne's total housing stock by 0.02 (or 2%), for example.*

FIGURE 28   RELATIVE EJD REGRESSION COEFFICIENTS
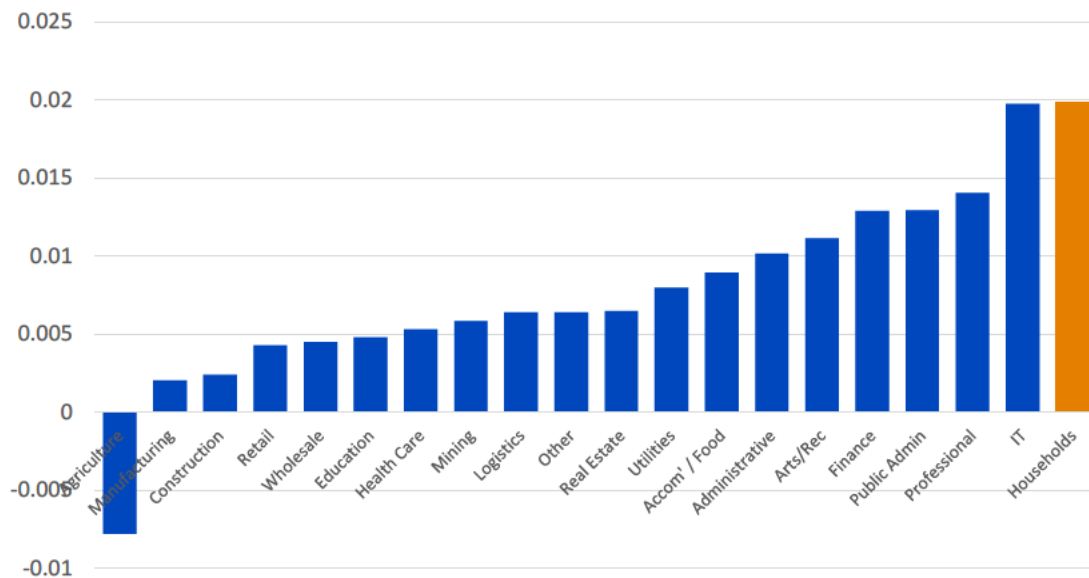
Source: SGS Economics and Planning

Given that much of the total housing and employment stock is already established, we see that the coefficient is relatively small (i.e. 2%). However, as a share of growth within a defined period of time, this could potentially represent a substantial proportion of total growth.

Over the past 15 years, much of Melbourne's housing growth has been focused on two broad regions: fringe growth areas (about half of total growth) or inner city Melbourne (about one fifth of total growth). Greenfield growth is predominately a result of large amounts of land supply resulting from significant areas of land being rezoned as urban residential. Strong growth within the inner city can be predominately attributed to a preference to be close to jobs, services and central Melbourne (i.e. accessibility). As a result, it is estimated that households have a strong propensity to relocate due to changes in accessibility.

In relation to a firm's locational preferences, it can be seen that as previously suggested, the service sector and higher value added industries exhibit a higher preference for more accessible locations.

Information media & telecommunications, Professional, scientific & technical services and Finance & insurance are some of the most susceptible industries to changes in accessibility.

Agriculture experiences the only negative coefficient with relative EJD. Agriculture land uses typically require large and relatively cheap land parcels that are situated away from major centres. Furthermore, particularly within the urban fringe growth areas, farm land within the MSD has been rezoned in order to accommodate for housing or other employment land uses.

Regarding employment, there is a secondary effect resulting from the estimated shifts in households. That is, many industries depend on a local population as either customers or skilled workers. Therefore, an increase in population in an area often results in a further increase in population servicing employment. Figure 29 displays the coefficients related to a change in household share for each of the employment industry sectors.

As expected, industries that thrive on proximity to population, such as Retail trade, Health care, Education & training and Accommodation & Food Services all have a strong positive relationship with an induced change in households.

FIGURE 29   HOUSEHOLD SHARE REGRESSION COEFFICIENTS
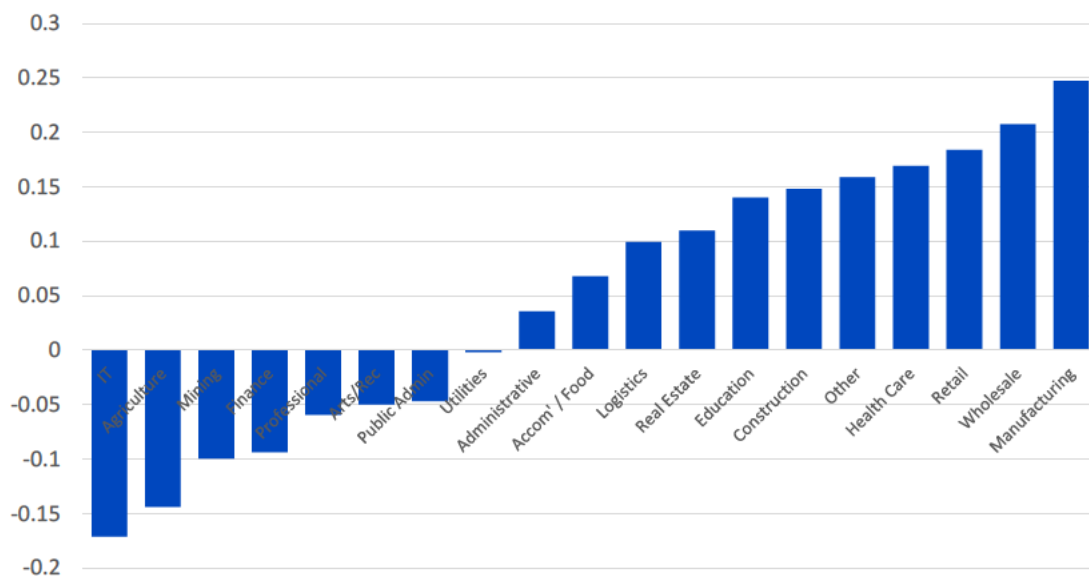
Source: SGS Economics and Planning

Application of Land Use Transport Accessibility Model

The statistical relationships derived from the historical analysis have been applied to estimated changes in accessibility resulting from the Western Distributor project at 2031.

Forecasting land use scenarios due to proposed infrastructure projects depends largely on the accessibility changes that the proposed project will deliver. VLC have provided projected trip and travel time estimates by mode (car and public transport) for the Reference Case (No Western Distributor) and the Project Case (with Western Distributor, as well as Monash Freeway capacity improvements and widening of the West Gate Freeway) at 2031.

The difference in the relative EJD index for each SLA between the Project and Base Cases was applied to the results from the regression analysis to estimate the induced changes to the spatial distribution of

households and employment by industry. Constraints were applied to ensure that the total employment and population level of metropolitan Melbourne was unchanged, and that no single location saw an unrealistic reduction in employment or households relative to current levels and Base Case trends. That is, outliers were removed from the analysis. Population estimates were developed based on average household size estimates from the Base Case projections.

5.2   Impact to effective job density

SGS estimated the EJD at 2031 for both the Base and Project cases. This measure was created using travel time and trip matrices data for 2031 provided by VLC, along with reference case land use projections created by SGS. The EJD captures both shifts in travel time and mode share resulting from the project. Figure 30 presents the change in EJD resulting from the project.

This highlights that the western region gains a significant increase in accessibility as a result of the project, particularly inner western locations adjacent to the project. There is a small negative impact to central Melbourne and also to the middle south east as a result of increased congestion. The outer south east also receives a relatively modest increase in accessibility due to improved connections across Melbourne.

FIGURE 30   CHANGE IN RELATIVE EJD
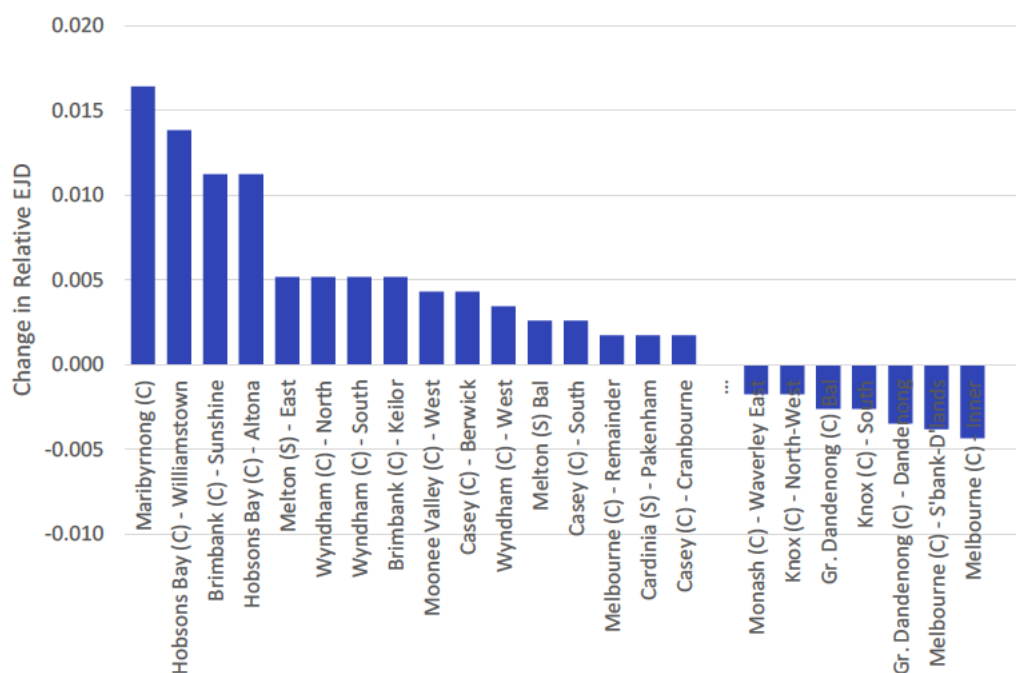
Source: SGS Economics and Planning

5.3   Induced land use changes

Households

The greatest beneficiary of the project is expected to be the western region of Melbourne with an anticipated increase of 3,600 and 4,600 households respectively in 2031 and 2046, which is over and above Base Case projections. The inner western SLAs of Maribyrong (C), Hobsons Bay (C) – Altona, Hobsons Bay (C) – Williamstown, Brimbank (C) – Sunshine and Moonee Valley (C) – West will experience the most significant uplift.

TABLE 4 INDUCED HOUSEHOLD CHANGES FOR SELECTED SLAS

SLA	2031				2046			
	Base	Project	Change (no.)	Change (%)	Base	Project	Change (no.)	Change (%)
Maribyrnong (C)	49,200	49,900	700	1.4%	58,500	59,500	900	1.5%
Brimbank (C) - Keilor	33,500	33,700	200	0.6%	34,900	35,200	300	0.9%
Brimbank (C) - Sunshine	43,800	44,300	500	1.1%	53,000	53,600	600	1.1%
Hobsons Bay (C) - Altona	27,000	27,500	500	1.9%	33,400	34,000	600	1.8%
Hobsons Bay (C) - Williamstown	16,600	17,300	600	3.6%	19,800	20,600	800	4.0%
Melton (S) - East	29,000	29,200	200	0.7%	33,500	33,800	300	0.9%
Melton (S) Bal	59,400	59,600	100	0.2%	99,300	99,400	100	0.1%
Moonee Valley (C) - Essendon	38,700	38,700	0	0.0%	44,100	44,200	0	0.0%
Moonee Valley (C) - West	20,600	20,800	200	1.0%	28,500	28,700	200	0.7%
Wyndham (C) - North	68,400	68,600	200	0.3%	103,200	103,500	300	0.3%
Wyndham (C) - South	25,200	25,400	200	0.8%	28,900	29,200	300	1.0%
Wyndham (C) - West	35,300	35,400	200	0.6%	52,600	52,800	200	0.4%
Western Region	446,700	450,400	3,600	0.8%	589,700	594,500	4,600	0.8%
Melbourne (C) - Inner	25,300	24,700	-600	-2.4%	45,200	44,400	-700	-1.5%
Melbourne (C) - Remainder	58,400	58,500	100	0.2%	89,000	89,100	100	0.1%
Melbourne (C) - S'bank-D'lands	27,200	26,700	-500	-1.8%	44,400	43,700	-600	-1.4%

Source: SGS Economics and Planning

Overall, growth in the number of metropolitan households between 2011 and 2031 is shown in Figure 31. The project is not expected to alter the overall number of households within greater Melbourne. Therefore any induced land use changes in one location is exactly offset by decreases in another. As a result, locations that are not directly affected by the project may see a change as they become relatively less attractive compared to other locations in Melbourne that are not better connected.

The land use changes induced by the project in 2031 is shown in

Figure 32. Broadly, we see a shift in household growth towards the western region. This is particularly focused around the inner and middle parts of the west. This increase in housing will be offset by a very small reduction in the central Melbourne and Southbank apartment market (equivalent to one less apartment project in each location). There will also be a reduction in the outer eastern and southern suburbs as the western suburban market becomes relatively more connected to the broader Melbourne economy. There will also be a slight increase in housing developments in the south eastern growth corridor.

FIGURE 31   GROWTH IN METROPOLITAN HOUSEHOLDS, 2011-2031 BASE CASE
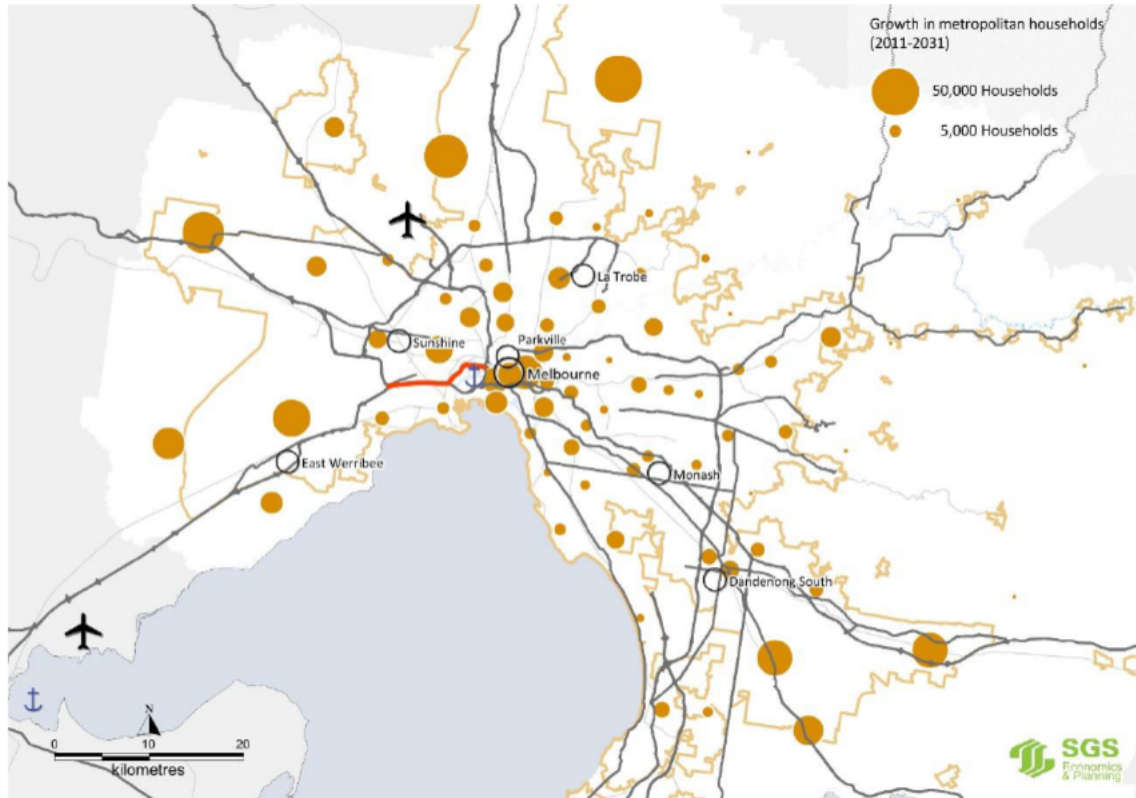
Source: SGS Economics and Planning

FIGURE 32   HOUSEHOLD INDUCED CHANGES, 2031
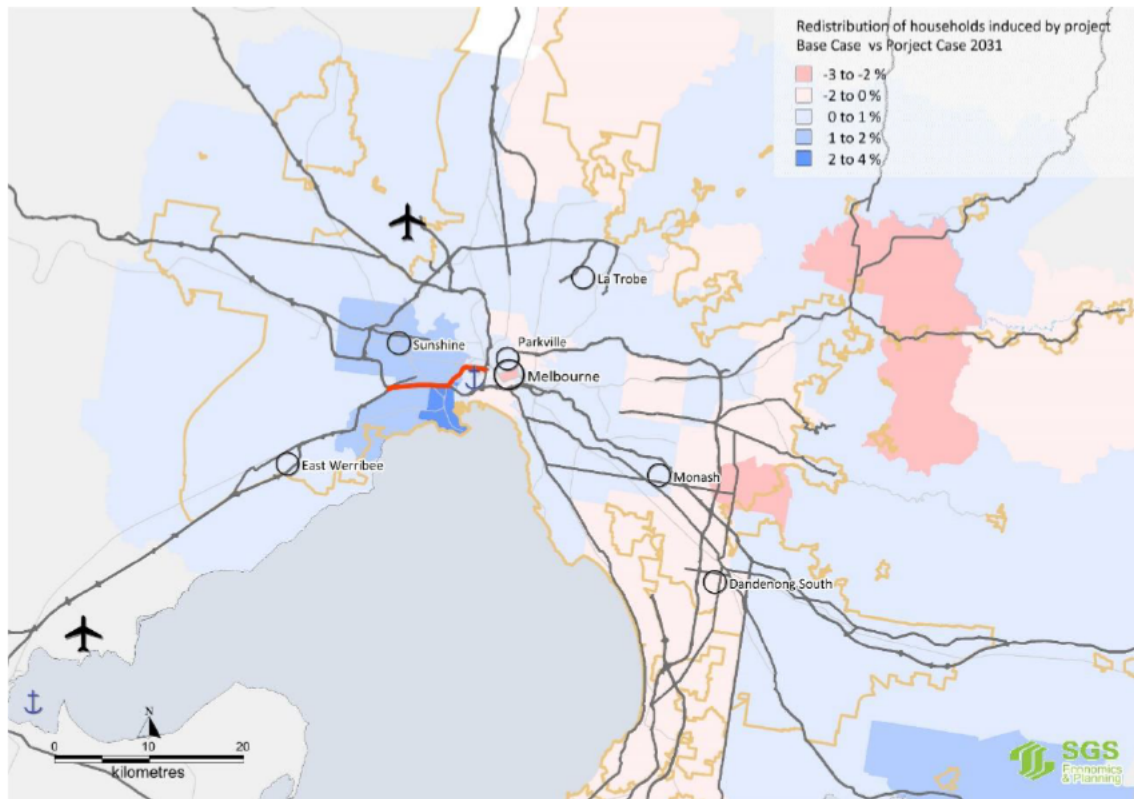
Source: SGS Economics and Planning

Employment

Changes in employment are similar to the estimated induced changes in households. That is, the project results in a re-distribution of the future land use profile that is somewhat more in favour for the western region. Overall, the employment impact to the western region raises employment levels by 2,200 in 2031 and by 3,100 in 2046. This represents quite a modest impact, and is at the expense of employment growth in the south-east.

Overall, the inner western SLAs of Hobsons Bay (C) – Altona, Hobsons Bay (C) – Williamstown and Maribyrong (C) will experience the most significant uplift in total employment. However, the composition of employment will vary.

TABLE 5   INDUCED EMPLOYMENT CHANGES, 2031 AND 2046

| SLA	2031				2046			
	Base	Project	Change (no.)	Change (%)	Base	Project	Change (no.)	Change (%)
Maribyrnong (C)	56,700	57,200	500	0.9%	68,600	69,200	600	0.9%
Brimbank (C) - Keilor	46,000	46,100	100	0.2%	56,400	56,500	200	0.4%
Brimbank (C) - Sunshine	57,100	57,500	300	0.5%	70,400	70,800	400	0.6%
Hobsons Bay (C) - Altona	26,400	26,800	300	1.1%	31,500	31,900	400	1.3%
Hobsons Bay (C) - Williamstown	17,400	17,800	400	2.3%	21,200	21,700	500	2.4%
Melton (S) - East	11,900	12,000	100	0.8%	14,800	15,000	200	1.4%
Melton (S) Bal	28,900	29,000	100	0.3%	35,900	36,000	100	0.3%
Moonee Valley (C) - Essendon	38,100	38,100	0	0.0%	48,200	48,300	0	0.0%
Moonee Valley (C) - West	11,300	11,400	100	0.9%	13,900	14,100	200	1.4%
Wyndham (C) - North	58,300	58,500	100	0.2%	71,500	71,700	200	0.3%
Wyndham (C) - South	13,100	13,200	100	0.8%	15,500	15,600	200	1.3%
Wyndham (C) - West	19,500	19,500	100	0.5%	23,500	23,700	100	0.4%
Western Region	384,700	387,100	2,200	0.6%	471,400	474,500	3,100	0.7%
Melbourne (C) - Inner	348,700	348,300	-400	-0.1%	507,300	506,900	-500	-0.1%
Melbourne (C) - Remainder	231,300	231,300	0	0.0%	293,900	294,000	100	0.0%
Melbourne (C) - S'bank-D'lands	122,600	122,300	-300	-0.2%	145,400	144,900	-400	-0.3%

Source: SGS Economics and Planning

Figure 33 presents the change in total employment between 2011 and 2031 at the metropolitan scale, and Figure 34 shows the land use changes induced by the project in 2031. Similar to housing we see that the western region gains a significant increase in employment growth, which is offset by a slight reduction in the expected employment growth rates for Melbourne's central and south eastern employment clusters.

Collectively, the land use change results point out that significant household growth is anticipated around Melbourne's fringes – in the west, north and east. However, employment growth will be concentrated primarily in the city centre and Melbourne's south-east, with some growth also expected in the city's north-west.

This will consolidate central Melbourne and the south-east regions as an employment destination. However, this will exacerbate already constrained journey-to-work patterns from the city's west.

The Western Distributor project will help redistribute this growth somewhat. Some of the growth destined for the city's centre and south-east will be redirected towards the west and north of the city, though this redistribution will be marginal. The magnitude of redistribution in favour of the west will be up to 3 percent in some areas, which is somewhat significant for those areas given the low scale of employment that would occur in the absence of the project.

FIGURE 33   GROWTH IN METROPOLITAN EMPLOYMENT, 2011-31 BASE CASE
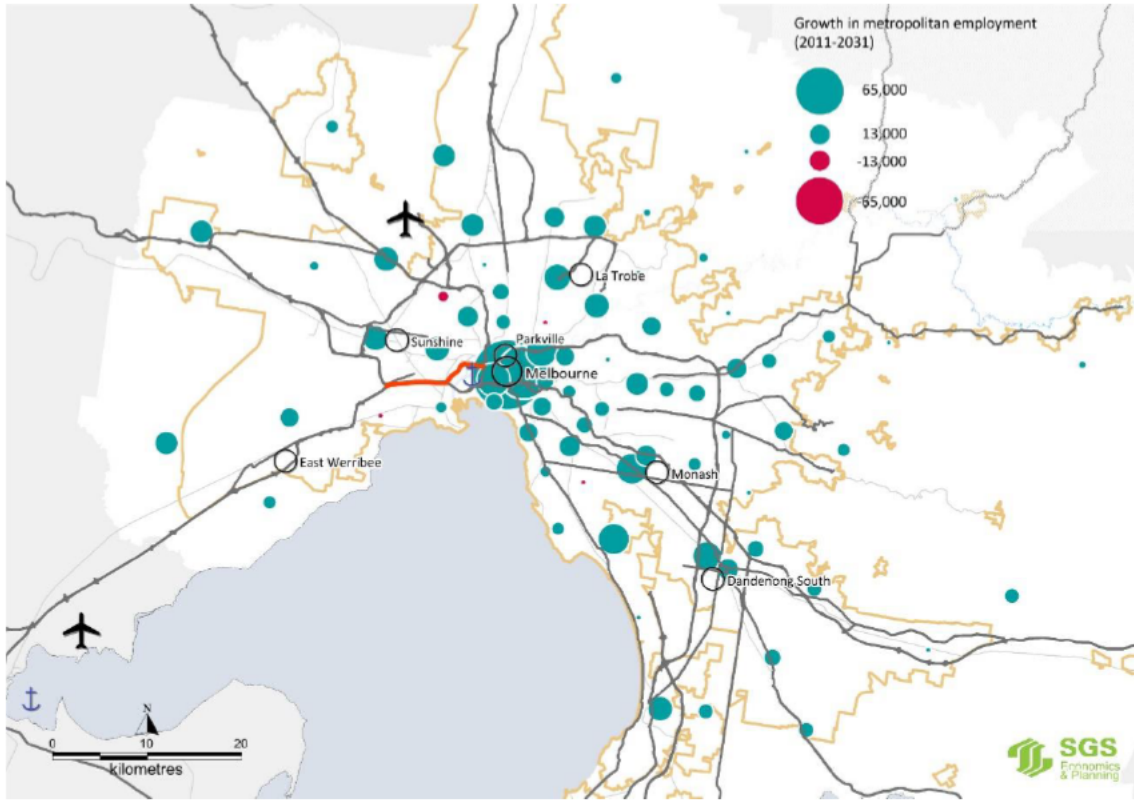
Source: SGS Economics and Planning

FIGURE 34   INDUCED EMPLOYMENT CHANGE, 2031
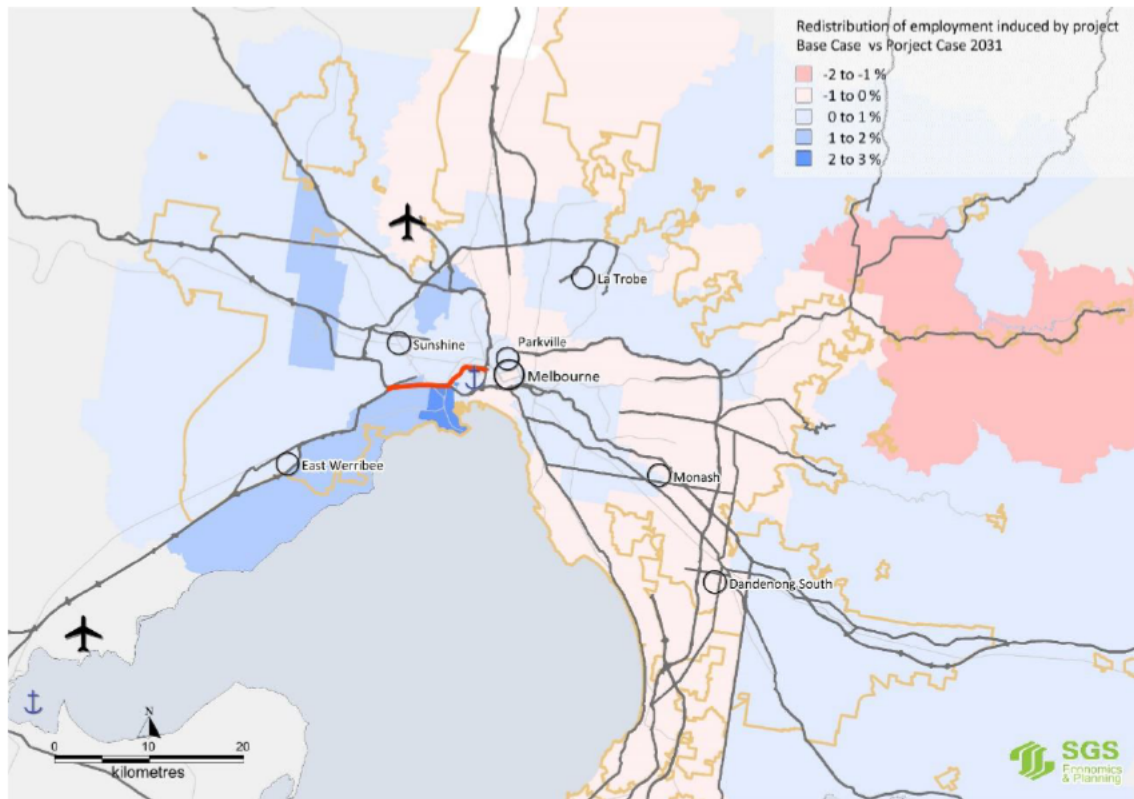
Source: SGS Economics and Planning

Whilst employment change in the region resulting from the project is not trajectory shifting, it is important to take note of the changes across broad industrial categories. At 2031, the western region is estimated to have an additional 2,200 jobs over and above the Base Case. Of these jobs, 50 percent are high value knowledge intensive jobs (i.e. Professional and Scientific Services, Education, Financial and Insurance Services and Health care). Growth of industry based jobs, (i.e. Manufacturing, Construction, Wholesale Trade, etc.) represent the remaining 19 percent of new growth.

Table 6 displays the projected changes to the broad industry categories at 2021 and their respective contributions to overall growth.

TABLE 6   INDUCED BROAD INDUSTRY GROUP CHANGES, 2021

SLA	2031				2046			
	Base	Project	Change (no.)	Change (%)	Base	Project	Change (no.)	Change (%)
Agriculture, Foresty and Fishing	1,100	1,100	-10	-0.9%	1,100	1,100	-10	-0.9%
Mining	300	300	0	0.0%	300	300	0	0.0%
Manufacturing	34,900	35,000	120	0.3%	33,900	34,000	120	0.4%
Electricity, Gas, Water and Waste Services	3,900	4,000	20	0.5%	4,800	4,800	20	0.4%
Construction	39,200	39,300	110	0.3%	47,600	47,800	140	0.3%
Wholesale Trade	25,800	25,900	130	0.5%	32,100	32,300	160	0.5%
Retail Trade	51,900	52,100	210	0.4%	66,700	67,000	280	0.4%
Accommodation and Food Services	23,300	23,500	160	0.7%	28,400	28,600	190	0.7%
Transport Postal and Warehousing	31,000	31,100	90	0.3%	34,900	35,000	100	0.3%
Information Media and Telecommunications	3,000	3,000	80	2.7%	2,900	3,000	80	2.8%
Financial and Insurance Services	7,100	7,200	140	2.0%	8,900	9,100	180	2.0%
Rental, Hiring and Real Estate Services	5,200	5,200	30	0.6%	5,600	5,600	40	0.7%
Professional, Scientific and Technical Services	21,900	22,300	420	1.9%	30,400	31,000	610	2.0%
Administrative and Support Services	6,900	6,900	60	0.9%	7,000	7,100	70	1.0%
Public Administration and Safety	12,600	12,700	100	0.8%	12,500	12,600	110	0.9%
Education and Training	36,100	36,300	180	0.5%	48,400	48,600	240	0.5%
Health Care and Social Assistance	61,500	61,900	370	0.6%	84,300	84,800	500	0.6%
Arts and Recreation Services	6,400	6,400	60	0.9%	7,900	8,000	70	0.9%
Other Services	12,600	12,700	90	0.7%	13,800	13,900	110	0.8%
Total Western Region	**384,700**	**387,100**	**2,200**	**0.6%**	**471,400**	**474,500**	**3,100**	**0.7%**

Source: SGS Economics and Planning

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APPENDIX A: MELBOURNE'S HISTORICAL DEVELOPMENT

In order to understand the future infrastructure challenges for Melbourne, it is important to understand its current development landscape and how this has evolved.

Melbourne today is a function of its natural environment and settlement patterns from the last hundred years. Transport infrastructure, both public and private, has played a pivotal role in this process by connecting people to jobs and services and unlocking new development potential, both in Greenfield and established areas.

European settlement of Melbourne commenced in the early 1830s. Melbourne's location at the foot hills of the Dandenong Ranges where the Yarra River meets Port Phillip Bay provided the ideal location. That is, development in Melbourne began in the east. Flat, fertile land supported farming and later enabled suburban expansion.

FIGURE 35   MELBOURNE IN THE 1800S

Source: Metropolitan Melbourne Board of Works (1971, pp.18-19)

The Victorian gold rush of the 1850s saw Melbourne grow considerably in wealth and population. This growth was facilitated by a number of railways within Melbourne and between regional cities that lay to its west.

Melbourne's tram network was also largely developed prior to 1900 as horse and then cable trams. Melbourne's early urban population grew rapidly along this extensive tram and train network.

Due to the great depression and two world wars, there was little change in Melbourne's transport network over the next few decades (1900 to 40s). For the most part, the car had not yet been taken up by the masses either. Melbourne's urban growth over this period largely continued to extend along the existing train and tram network. This created distinct development corridors to the east, south-east, and north. The west developed, but largely for industrial purposes.

The post-World War 2 period (1950-60s) saw a boom in population as servicemen and women returned home. The urban footprint of Melbourne continued to expand along the existing train and tram network. As the car became more common for Melbournians however, the city's planners began to plan for a greatly expanded city, with the east and south-east being the preferred growth corridors.

The south-east corridor in particular had strong connections beyond to the booming Latrobe Valley and Gippsland region. This expansion was also enabled by the industrial boom which saw strong growth in manufacturing and employment leaving the central city in favour of new suburban industrial estates to the west and north.

The expansion plans for Melbourne began to take shape in the 1970s and 80s. Many of the city's major roads were constructed, including the Tullamarine, Hume, Western, Princess, Westgate, Hoddle, Eastern and Monash freeways/highways. This established a significant east-west economic corridor for Victoria stretching from the Latrobe Valley in the east through Melbourne and to Geelong, Ballarat and Bendigo in the west.
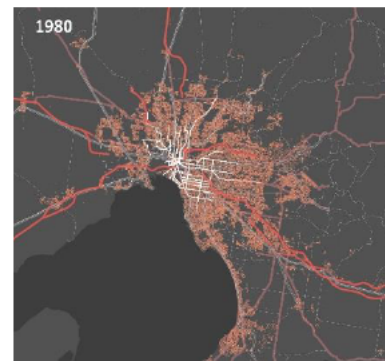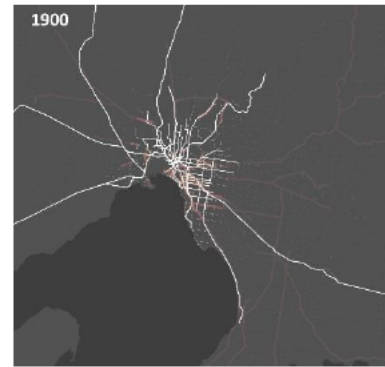
The corridor consisted of passenger and freight rail services and the M1 road corridor. This extensive road network also provided easy access across Melbourne, which helped 'fill in' vacant land parcels that sat between the original radial rail networks. There was also continued expansion in the east (starting with Dandenong) and south-eastern suburbs, with transport accessibility no longer dictated by fixed lines and routes. Jobs increasingly located across Melbourne rather than concentrating in traditional urban centres or central Melbourne.

During the 1980s and 90s, Melbourne continued to develop as a car city, with new growth suburbs opening up in all directions at the city's urban fringes. Growth to the west and north helped to rebalance the city. However, these largely operated as separate settlement corridors with little migration of people or economic activity between corridors.

The Western Ring Road and CityLink were also completed, which connected up many freeways and provide a 'missing link' in the east-west M1 corridor. This facilitated better cross city travel and improved access to the ports (air and sea).

The 1980s also saw its first major extension of the rail network with the City Loop being built. This opened up the northern portions of central Melbourne to more intense commercial development, which was rapidly capitalised on as Melbourne's economy shifted again towards more knowledge based services and increasingly focused around the central city.

From the early 2000s, Melbourne has seen the development of the Regional Rail Link, due to open in 2015 that will further support development in the west. The development of the EastLink and Peninsula Link have also provided greater access to firms and households travelling across Melbourne's outer east and south-east corridors.

Melbourne has undergone record population growth in the last decade, growing both in Greenfield areas and through urban densification, particularly around central Melbourne, rail and tram network. The south-east growth corridor has begun to reach development capacity and growth continues to shift to Melbourne's north, west and central core. Surrounding regional cities such as Geelong, Ballarat and Bendigo have also experienced unprecedented growth, leveraging off Melbourne as a national and global Gateway.
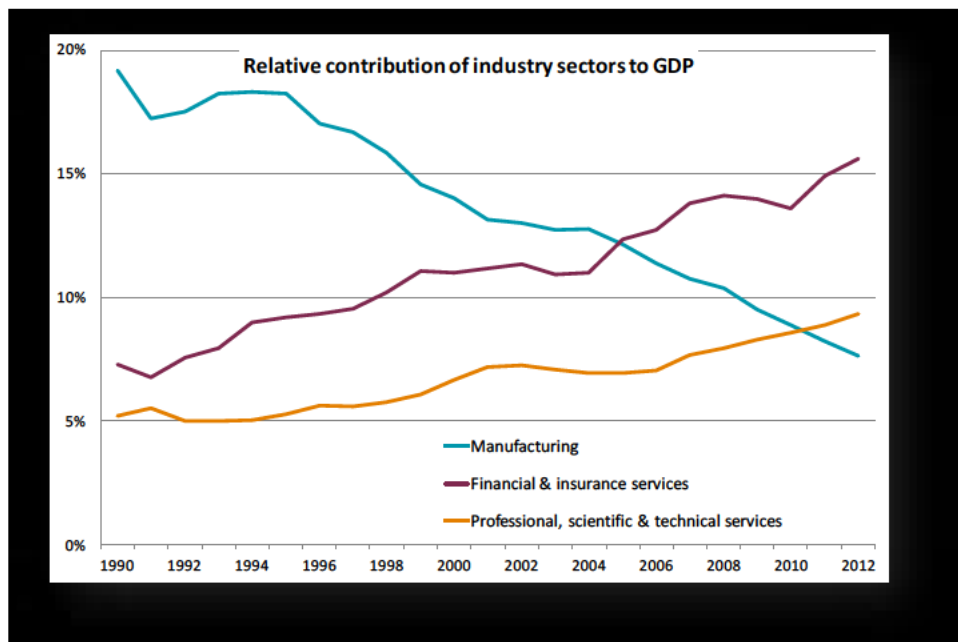
While Victoria's population has grown, the structure of the state economy has undergone significant change – from a more broad-based manufacturing and agricultural economy to a more diverse and specialised knowledge-intensive economy. This represents a broad transition from 'making things', to commerce associated with design, brokerage and finance, as well as household related services.

This includes the growth of industries such as the financial and insurance services, professional, scientific and technical sectors, particularly in the centre of Melbourne. Knowledge industries comprise nearly 20 percent of the economy and are transforming international perceptions of Melbourne as a fully competitive business services city, with significant potential to grow.

Strong population growth has also underpinned expansion of the healthcare, housing construction, education and retail sectors, particularly in the middle and outer areas of Melbourne (refer Figure 36).

FIGURE 36   MELBOURNE'S CHANGING ECONOMY

Relative contribution of industry sectors to GDP

Legend:
- Manufacturing
- Financial & insurance services
- Professional, scientific & technical services

Source: Australian System of National Accounts (cat no. 5204) and SGS Economics & Planning

The impact of globalised value chains has resulted in structural adjustment and the contraction of the manufacturing sector, including transition in the automotive industry to more automated and specialised high-value manufacturing.

That said, it is important not to overstate this shift. The manufacturing value chain has 'unbundled' under globalisation, so that some activities which were once carried out in the factory have now been spun out to specialist offices. This is particularly the case for functions such as accounting, training and marketing. Thus, the demise of manufacturing may be exaggerated in the statistics. All policymakers would do well to support creative and competitive manufacturing firms that have adapted successfully to the new global trading environment.

High growth in professional services employment has cemented central Melbourne as the economic engine of Melbourne and Victoria. Investments such as the City Loop, have enabled a significant rise in rail patronage. Importantly, further planned investments, such as the Melbourne Metro, will be required to keep up with this demand. Sydney by comparison has not seen the same level of patronage growth as its system largely reached capacity in the 1950s (see Figure 37).

In regional Victoria, there has been strong growth in agricultural exports driven by rising demand in the Asian region. While the more advanced nature of agricultural production is less labour intensive, output has grown and opportunities for value adding in food processing has increased.

Tourism and major events continue to be strong contributors to the Victorian economy, contributing nearly $20 billion to the state economy each year and employing just over 200,000 people. Between 2010 and 2014, international overnight visitors to Victoria increased by 7.7 percent per annum, well above the national average of 4.3 percent per annum. This trend is forecast to continue with passenger numbers through Melbourne Airport expected to more than double to 64 million per annum by 2033.

FIGURE 37   RAIL PASSENGER JOURNEYS, SYDNEY AND MELBOURNE (MILLIONS)
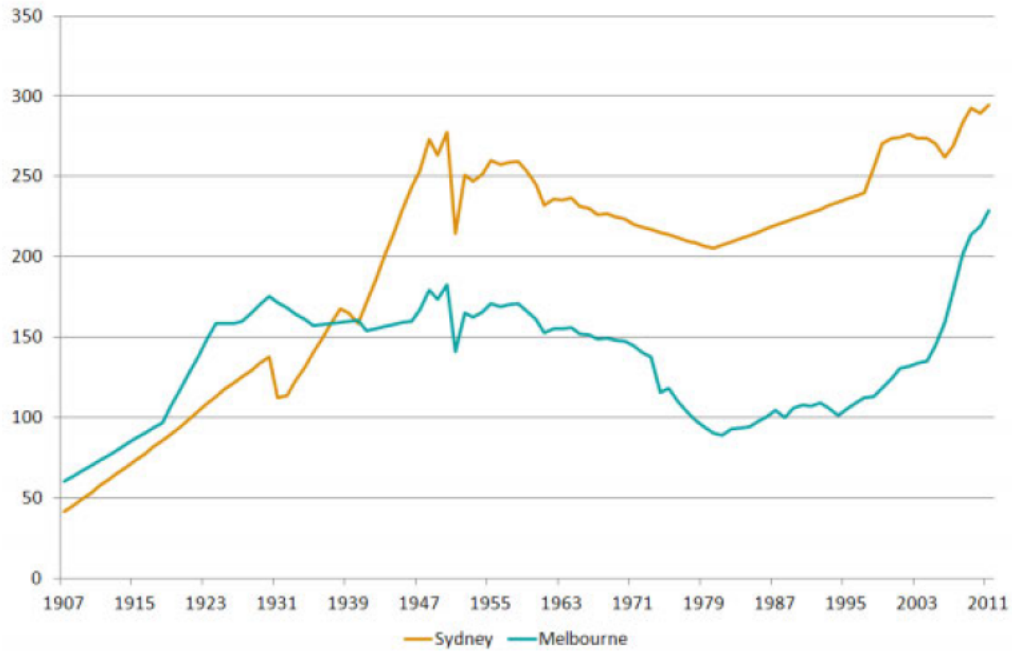
Source: Historical ABS Year Books and Grattan Institute 2012 'Can we afford to get our cities back on the rails. The time series is not complete so data has been interpolated and estimated in certain periods.

APPENDIX B: ECONOMIC SIGNIFICANCE OF THE M1 CORRIDOR

The M1 corridor buffer (as defined above in section 2.2) is shown graphically in Figure 38, and comprises several SLAs as listed in Table 8.

FIGURE 38 M1 CORRIDOR BUFFER DEFINED
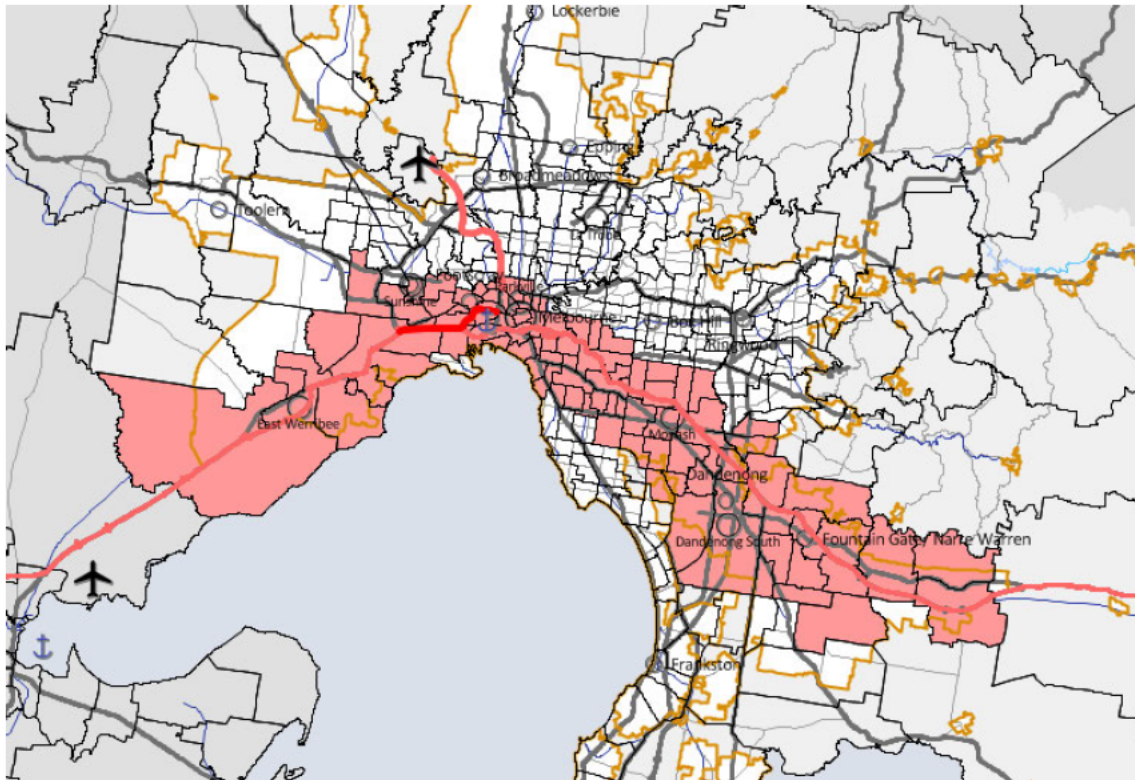
Source: SGS Economics and Planning

TABLE 8   M1 CORRIDOR - SLAS[9]

SLA
Boroondara (C) - Camberwell S.
Boroondara (C) - Hawthorn
Brimbank (C) - Sunshine
Cardinia (S) - Pakenham
Casey (C) - Berwick
Casey (C) - Cranbourne
Casey (C) - Hallam
Casey (C) - South
Glen Eira (C) - Caulfield
Glen Eira (C) - South
Gr. Dandenong (C) - Dandenong
Gr. Dandenong (C) Bal
Hobsons Bay (C) - Altona
Hobsons Bay (C) - Williamstown
Kingston (C) - North
Knox (C) - South
Maribyrnong (C)
Melbourne (C) - Inner
Melbourne (C) - Remainder
Melbourne (C) - S'bank-D'lands
Monash (C) - South-West
Monash (C) - Waverley East
Monash (C) - Waverley West
Moonee Valley (C) - Essendon
Port Phillip (C) - St Kilda
Port Phillip (C) - West
Stonnington (C) - Malvern
Stonnington (C) - Prahran
Wyndham (C) - North
Wyndham (C) - South
Wyndham (C) - West
Yarra (C) - North
Yarra (C) - Richmond

Source: SGS Economics & Planning

It is a key production and consumption corridor. For analytical purposes, the M1 corridor buffer can be disaggregated into the western, central and eastern parts, with the western and eastern parts comprising the SA2s that lie to the west and east of central Melbourne respectively, and the City of Melbourne being the central region.

[9] Only includes SLAs within Melbourne SD that fall within the defined geographical region of the M1 Corridor.

It accommodates 37 percent of the total metropolitan population and 44 percent of the total skilled workforce. More than half the metropolitan workforce (56 percent) is employed within this buffer.

Importantly, the M1 corridor buffer is anticipated to remain a highly desirable place to live and work by 2046 (with share of the corridor buffer in total metropolitan population and employment maintained, if not improved) (refer Table 9). Indeed, growth in population and employment within the buffer is expected to outpace that of the rest of the metropolitan economy.

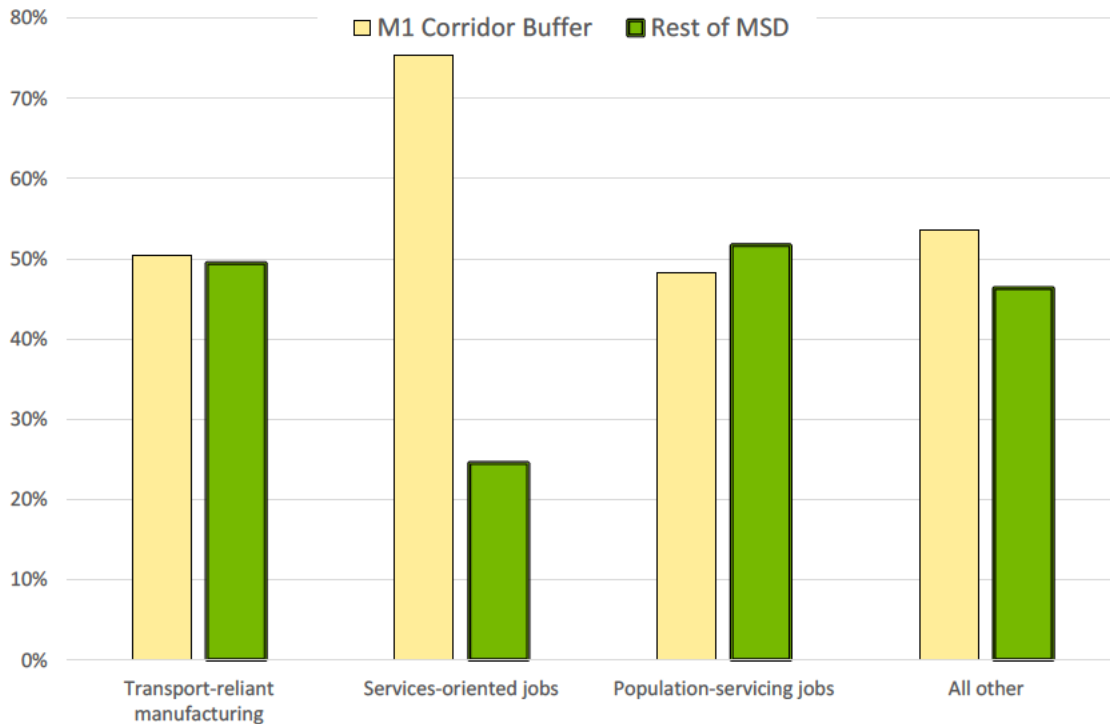TABLE 9   KEY DEMOGRAPHIC AND ECONOMIC YARDSTICKS

	M1 Corridor Buffer	Rest of MSD	M1's share in MSD
Population			
2011	1,515,300	2,593,000	37%
2046	2,713,300	4,499,000	38%
2011-46 Growth %	2.3%	2.1%	-
Employment			
2011	1,202,100	959,400	56%
2046	2,164,200	1,716,900	56%
2011-46 Growth %	2.3%	2.3%	-

Source: SGS Economics and Planning

The buffer's economic significance is further underscored by the share of metropolitan transport-reliant manufacturing and services-oriented jobs hosted by it. Relative to the rest of the metropolitan economy, the M1 corridor buffer hosts nearly three-times the number of service-oriented jobs and slightly higher transport-reliant manufacturing workers (refer Figure 39).

Importantly, the relative significance of the corridor in its ability to host such jobs is anticipated to remain steady to 2046. The total number of jobs growth in this corridor buffer is expected to outpace that of the rest of the metropolitan economy in all sector, except for population servicing industries.

Source: SGS Economics and Planning
Notes: Transport-reliant manufacturing includes the 1 digit ANZSIC industries of Manufacturing; Wholesale Trade; and Transport, Postal and Warehousing. Services-oriented industries include Telecommunications; finance; Professional Services; and Rental and Hiring industries. Population-servicing industries include Retail; Accommodation and Food; Education; and Health Care. Other remaining industries include Agriculture; Mining; Utilities; Construction; Administration; and the Creative sector.

TABLE 10   ANTICIPATED JOBS GROWTH, 2014-46

	M1 Corridor Buffer	Rest of MSD
Transport-reliant manufacturing	82,000	59,000
Services-oriented jobs	318,200	110,000
Population-servicing jobs	396,700	439,900
All other	118,800	96,800
Total	915,700	705,700

Source: SGS Economics and Planning
Notes: Transport-reliant manufacturing includes the 1 digit ANZSIC industries of Manufacturing; Wholesale Trade; and Transport, Postal and Warehousing. Services-oriented industries include Telecommunications; finance; Professional Services; and Rental and Hiring industries. Population-servicing industries include Retail; Accommodation and Food; Education; and Health Care. Other remaining industries include Agriculture; Mining; Utilities; Construction; Administration; and the Creative sector.

The M1 corridor buffer contributes nearly two-thirds of the metropolitan economy's total value-added (i.e. nearly $135 billion in Gross Value-Added or 63.8 percent of total). This exceeds its share in total metropolitan employment (56 percent), indicating that the output produced by each worker in this

corridor is higher than their counterparts in the rest of the regions. Indeed, the productivity of employed workers in this region is some 40 percent higher than workers employed elsewhere (refer Table 11).

TABLE 11 GROSS VALUE ADDED – M1 ECONOMIC CORRIDOR, 2011

Region	GVA ($ million)	GVA per worker ($)
M1 Corridor buffer	$134,900	$112,200
Rest of MSD	$76,500	$79,700
MSD Total	**$211,400**	**$97,800**

Source: SGS Economics & Planning

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