SGS Economics & Planning

WESTERN SYDNEY GROWTH INFRASTRUCTURE COMPACT PROGRAM LAND USE SCENARIO FORECASTS

SUMMARY REPORT

MARCH 2020

Prepared for

Greater Sydney Commission

Independent insight.

SGS Economics and Planning Pty Ltd
ACN 007 437 729
www.sgsep.com.au
Offices in Canberra, Hobart, Melbourne, Sydney

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Project background

Travel Zone Projections (TZP) are geographically detailed land use projections of population and employment that are developed to support a coordinated and strategic view of Sydney for a wide range of planning and infrastructure purposes. The level of detail provided in the data is intended to support strategic models (i.e. STM) and provide flexibility in aggregation.

The latest version of TZP is the TZP16 v1.51 release. TZP16 v1.51 aligns with the latest 2016 Census, 2016 NSW Government Population projections and the strategic vision for the city under the 2014 Metropolitan Strategy 'A Plan for Growing Sydney'.

FIGURE 1 A METROPOLIS OF THREE CITIES

These plans have since evolved with the release in 2018 of the Greater Sydney Region Plan 'A Metropolis of Three Cities'. This evolution particularly impacts the land use function of the west, with the creation of the three cities concept. Since the release of this new plan work on infrastructure and housing provision in Sydney has accelerated with significant investment in infrastructure in the pipeline, particularly for the new Western Parkland City. This includes Western Sydney Airport and city shaping Metro Rail services.

As a result, there is a need for an updated land use scenario to better understand the needs and nuance of the metropolis and to guide coordinated strategic land use planning in the Western Parkland City in particular.

Changes since 2016 also include the development of the Western City Deal. The City Deal is an agreement between councils in Western Sydney and the NSW and Australian governments to deliver the Aerotropolis, related infrastructure and other initiatives in the established parts of Western Sydney.

To facilitate the orderly development of the Western Parkland City and as a City Deal commitment, the Greater Sydney Commission (GSC) is working to deliver a Growth Infrastructure Compact (GIC) to identify and cost the required infrastructure and services to support future growth, and determine the staging and sequencing of this future growth.

Project scope

The Western Sydney Planning Partnership (WSPP), Transport for NSW (TfNSW), Department of Infrastructure and Environment (DPIE) and the GSC have joined with the eight local councils covered by the City Deal and Blacktown Council, in a collaborative co-design process to develop a set of alternative land use scenarios for the Western Parkland City.

These alternative land use scenarios vary from the current official land use dataset TZP16 v1.51 and capture new data, information and policy direction since TZP16 v1.51 release.

Extending from this co-design process, further work directly with the GSC and with inputs from other concurrent land use planning processes, have led to the development of three land use scenarios for the GIC program:

- A Base Case (~Scenario 1) has been developed for appraisal purposes, which assumes committed infrastructure with no land use changes other than what is already approved and committed.
- GIC land use Option 1 (~Scenario 2) assumes the base case plus a focus on early and strong industry and jobs attraction in the Aerotropolis with more compact urban form and renewal.
- GIC land use Option 2 (~Scenario 3) has a different growth pattern for Western City where it assumes the base case plus sustained and strong industry and jobs attraction in Liverpool, Penrith and Campbelltown supported by gradual investment at the Aerotropolis with a more dispersed urban form in the greenfield areas.

For all scenarios, the 2056 total number of people and jobs remains as per TZP16v1.51 remains the same at the Sydney GMA level with 8.261 million people and 4.291 million jobs, acting as control totals for this project.

The core output of the project is a detailed land use dataset. This dataset includes travel zone level projections for all of Sydney for a range of dwelling, population and employment variables from 2016 to 2056. The dataset also includes a range of summary breakdowns to enables further integration and understanding of the data.

As such, this report should be read in conjunction with the dataset. This report provides a high-level overview of results, along with details of the approach, inputs and assumptions.

Project approach and key assumptions

SGS has developed these scenarios through extensive consultation starting in March 2019 and running through to November 2019. This co-design process was the primary input to the results and focused around five workshops where interim results were presented to a wide stakeholder group and iteratively refined through additional meetings, synthesis of data inputs, information and feedback to understand views on specific precincts and catalytic infrastructure projects in the Western City. This process is further detailed in the report.

The land use scenarios also drew on several overarching data inputs and headline assumptions summarised in the table below.

HIGH LEVEL DATA INPUTS AND ASSUMPTIONS

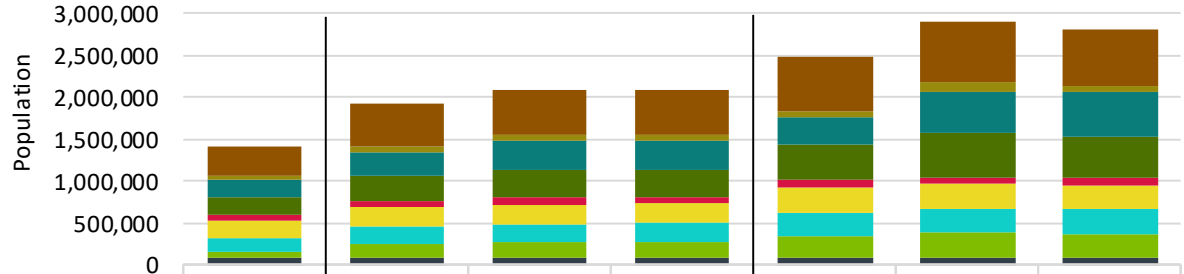
Input Area	Assumption
Planning Policy	Greater Sydney Region Plan, Western City District Plan
Transport	Future Transport 2056 infrastructure priorities and timing
Infrastructure Provision	As per GIC Macro Assumptions see Table 30
Future Growth	Greater Sydney growth for Population, Dwellings and Jobs to 2056 as per TZP16v1.51 District housing targets as per Greater Sydney Region Plan
Household Sizes	Initial distribution as per TZP16v1.51 with adjustments for new growth areas. Household size calculated as Estimated Resident Population (ERP) divided by Structural Private Dwellings (SPD)

Summary of land use scenario results

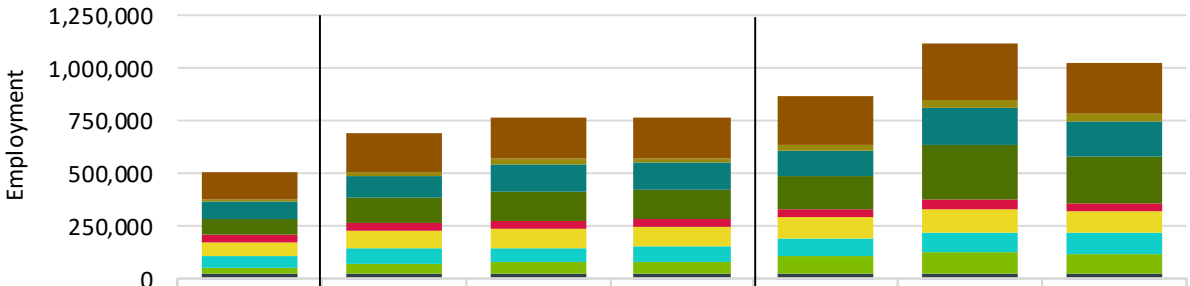
WSPP results overview

Under all scenarios we are likely to see significant growth in population and employment in the WSPP area. GIC Option 1 represents the highest overall growth for the region, particularly by 2056. The distribution of growth within the WSPP varies significantly between scenarios at a council and local precinct level based on assumed urban settlement patterns, planning, assets and infrastructure investment assumptions.

WSPP POPULATION AND EMPLOYMENT BY SCENARIO AND LGA



	2016	Base 2036	GIC Opt1 2036	GIC Opt2 2036	Base 2056	GIC Opt1 2056	GIC Opt2 2056
WSPP	1,407,713	1,936,593	2,091,939	2,091,938	2,483,882	2,900,058	2,824,565
Blacktown	350,795	529,299	549,998	533,963	641,576	726,610	678,960
Wollondilly	49,920	58,047	64,270	64,418	79,521	97,292	90,081
Penrith	201,046	283,245	343,288	356,893	318,465	497,145	533,505
Liverpool	211,504	296,958	338,294	335,600	435,535	534,043	489,464
Hawkesbury	67,039	74,506	74,114	73,906	88,473	86,369	83,524
Fairfield	206,399	239,441	233,852	233,449	307,146	303,930	291,471
Campbelltown	162,288	207,315	212,247	215,967	269,825	275,746	288,384
Camden	80,099	166,241	195,704	197,779	252,750	290,159	282,359
Blue Mountains	78,600	81,540	80,172	79,964	90,591	88,766	86,817



	2016	Base 2036	GIC Opt1 2036	GIC Opt2 2036	Base 2056	GIC Opt1 2056	GIC Opt2 2056
WSPP	507,849	695,340	768,772	767,139	867,013	1,113,616	1,027,796
Blacktown	127,244	186,482	198,862	192,937	231,743	266,387	243,146
Wollondilly	13,430	23,957	26,540	26,307	29,159	38,169	38,016
Penrith	80,812	103,696	127,475	124,283	117,027	176,810	167,288
Liverpool	80,694	116,868	142,761	139,682	155,954	258,624	217,185
Hawkesbury	28,838	34,452	34,661	34,864	40,058	43,083	39,270
Fairfield	69,318	85,930	89,574	90,432	100,061	110,804	106,770
Campbelltown	57,040	69,072	71,109	79,179	86,620	91,050	102,336
Camden	29,173	50,966	53,440	55,533	80,178	100,251	87,560
Blue Mountains	21,300	23,917	24,350	23,923	26,212	28,437	26,224

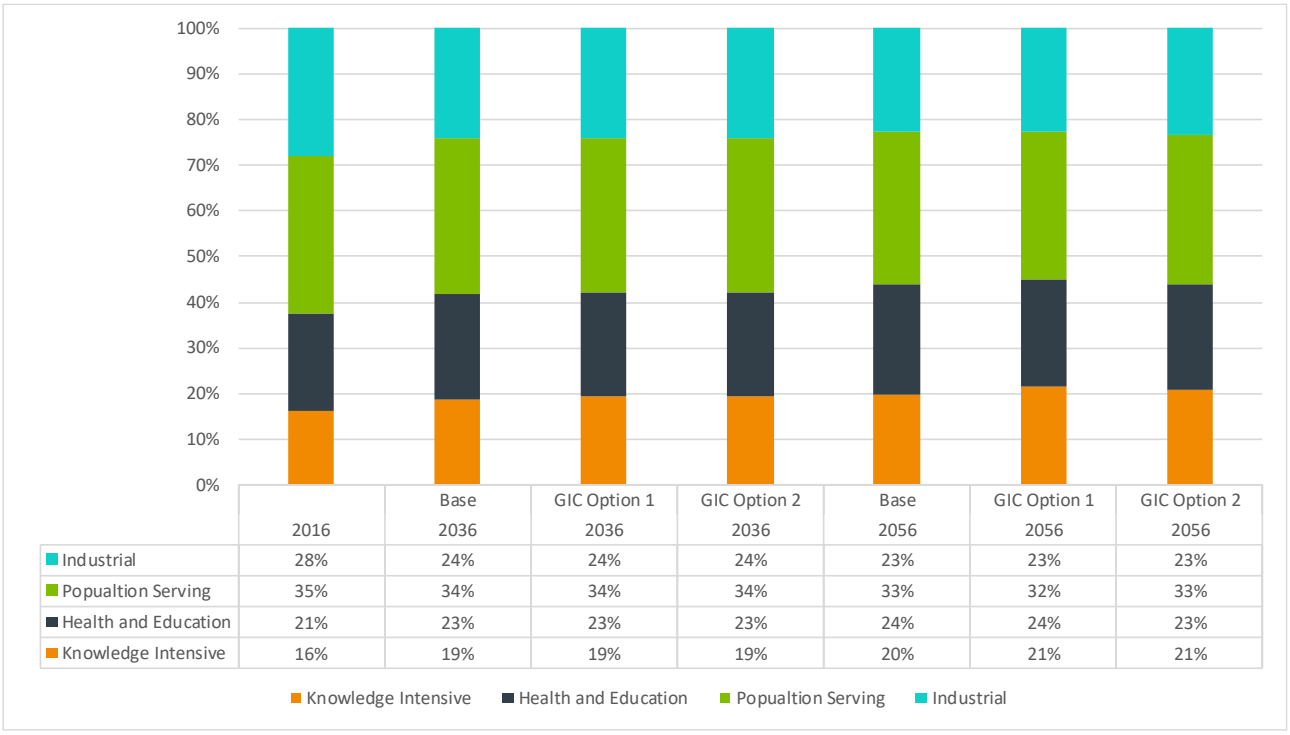
Source: SGS Economics and Planning

The employment forecasts for all scenarios were developed at a broad industry category level to reflect the scenario narratives related to the growth of the Western Parkland City.

This represented an increase in knowledge intensive jobs assumed for all scenarios of up to 5% by 2056 with a reciprocal reduction in industrial jobs. Population Serving jobs reduce slightly, while still growing overall to align with population growth and a higher proportion of health and education jobs.

These reflect the shift in the Western Parkland City from an industrial focused employment area with much of the working population travelling east to other parts of Sydney for other types of employment, with change towards a Western Parkland City serving more as an economic hub focussed around the Western Sydney Airport and Aerotropolis.

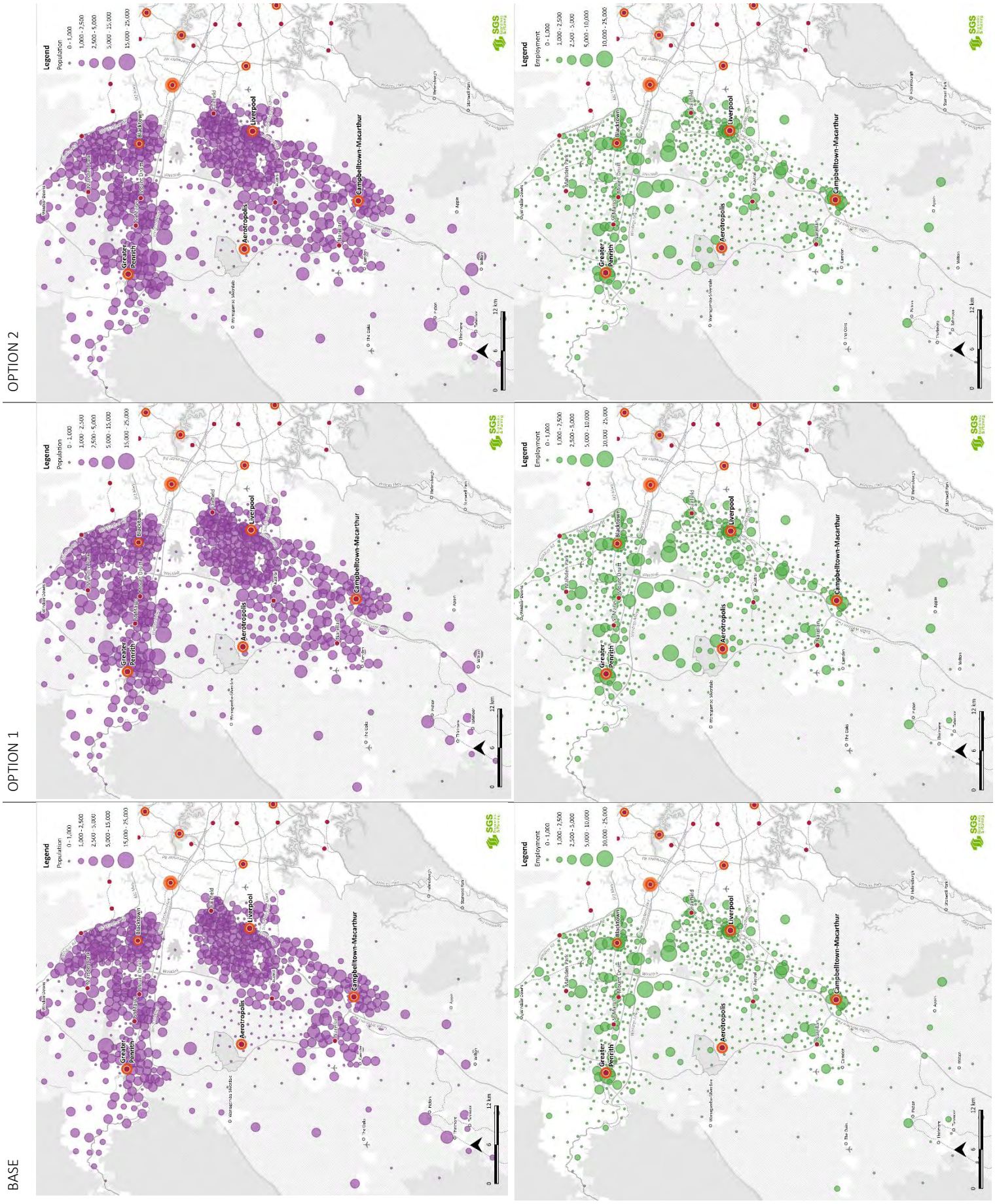
WSPP EMPLOYMENT BY INDUSTRY SUMMARY



	2016	Base 2036	GIC Option 1 2036	GIC Option 2 2036	Base 2056	GIC Option 1 2056	GIC Option 2 2056
Industrial	28%	24%	24%	24%	23%	23%	23%
Popualtion Serving	35%	34%	34%	34%	33%	32%	33%
Health and Education	21%	23%	23%	23%	24%	24%	23%
Knowledge Intensive	16%	19%	19%	19%	20%	21%	21%

Source: SGS Economics and Planning

WSPP 2036 Population (Purple) and Employment (Green) Distribution by scenario



Source: SGS Economics and Planning

Growth Infrastructure Compact #1 - Western Sydney Growth Area (Aerotropolis)

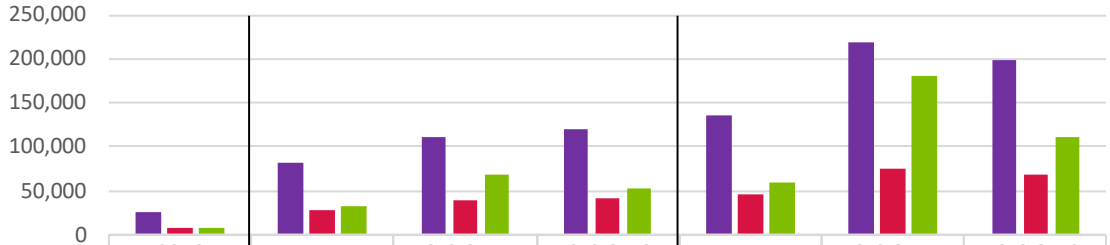
The following provides an overview of population, dwellings and employment projections for the GIC #1 study area under the three land use scenarios.

Growth in population, dwellings and jobs is higher under Option 1 with the development of the Western Sydney Aerotropolis as the key jobs hub for Western Sydney to 2056. Under Option 2 with a focus on existing centres and clusters in Western Sydney there is less growth in the GIC #1 area particularly for jobs with 68,000 less jobs in the area by 2056.

This jobs growth is driven by the development of the Aerotropolis Core supporting the functioning of the Western Sydney Airport as well as other key jobs precincts in the Northern Gateway. Population and dwelling growth are also stronger in Option 1 in Rossmore with its proximity to the Aerotropolis, compared with Option 2 where the existing centres and greenfield growth areas of Austral and Leppington North provide more population and dwelling growth.

Further summaries of the GIC #1 precincts are provided in the report and Appendix A.

GIC #1 (WESTERN SYDNEY AEROTROPOLIS) SCENARIO OVERVIEW



	2016	Base 2036	GIC Opt1 2036	GIC Opt2 2036	Base 2056	GIC Opt1 2056	GIC Opt2 2056
GIC 1 Population	25,292	81,394	111,266	120,957	136,229	218,653	199,360
GIC 1 Dwellings	8,337	27,632	38,360	41,128	46,030	73,993	67,353
GIC 1 Employment	8,014	31,928	68,742	53,505	59,005	179,908	111,246

Source: SGS Economics and Planning

GIC #1 PRECINCT POPULATION SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
North Luddenham	103	151	+48	948	+845	528	+425
Aerotropolis Core	1,278	2,088	+810	23,812	+22534	9,373	+8095
Agriculture and Agribusiness	1,722	1,904	+182	3,800	+2078	3,809	+2087
Northern Gateway	246	10,486	+10240	16,544	+16297	12,684	+12438
Badgerys Creek	200	16	-184	26	-174	26	-174
Rossmore	2,410	3,723	+1313	39,234	+36825	27,450	+25041
Mamre Road	211	217	+6	283	+72	272	+61
Kemps Creek	1,422	644	-777	648	-774	733	-689
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	53	4	-49	4	-49	5	-48
Austral	1,673	32,074	+30401	35,452	+33779	40,949	+39276
Leppington North	2,038	31,377	+29339	34,637	+32599	39,598	+37560
Edmondson Park	4,010	34,530	+30520	41,732	+37722	41,213	+37203
Glenfield	9,926	19,015	+9089	21,534	+11608	22,719	+12793
Total	**25,292**	**136,229**	**110,937**	**218,653**	**193,361**	**199,360**	**174,068**

GIC #1 PRECINCT DWELLING SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
North Luddenham	35	59	+24	432	+397	236	+201
Aerotropolis Core	373	679	+306	8,700	+8327	3,434	+3060
Agriculture and Agribusiness	607	683	+76	1,476	+869	1,467	+859
Northern Gateway	80	3,800	+3720	6,036	+5957	4,560	+4480
Badgerys Creek	72	4	-68	6	-67	6	-66
Rossmore	756	1,170	+413	12,334	+11578	8,629	+7873
Mamre Road	51	53	+2	71	+19	68	+17
Kemps Creek	451	190	-261	192	-259	219	-232
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	26	2	-23	2	-23	3	-23
Austral	628	10,940	+10313	12,086	+11459	14,001	+13374
Leppington North	744	11,475	+10731	12,667	+11923	14,486	+13743
Edmondson Park	1,211	10,472	+9261	12,595	+11384	12,507	+11296
Glenfield	3,302	6,503	+3200	7,395	+4093	7,738	+4436
Total	**8,337**	**46,030**	**37,693**	**73,993**	**65,656**	**67,353**	**59,016**

Source: SGS Economics and Planning

GIC #1 PRECINCT EMPLOYMENT SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
North Luddenham	73	451	+378	2,349	+2,276	812	+739
Aerotropolis Core	604	1,467	+862	49,928	+49,323	14,894	+14,289
Agriculture and Agribusiness	330	1,457	+1,127	13,844	+13,514	11,093	+10,763
Northern Gateway	221	7,619	+7,399	19,069	+18,848	7,620	+7,399
Badgerys Creek	154	434	+280	9,420	+9,265	3,206	+3,051
Rossmore	848	976	+128	3,360	+2,511	2,237	+1,389
Mamre Road	524	1,354	+829	13,416	+12,892	8,817	+8,292
Kemps Creek	845	1,807	+962	7,382	+6,537	4,438	+3,593
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	8	12,236	+12,228	20,043	+20,035	17,887	+17,879
Austral	425	7,276	+6,851	11,603	+11,178	10,142	+9,718
Leppington North	1,220	14,963	+13,743	18,413	+17,193	19,572	+18,352
Edmondson Park	373	5,100	+4,728	6,823	+6,451	5,882	+5,510
Glenfield	2,387	3,866	+1,478	4,258	+1,870	4,646	+2,259
Total	**8,014**	**59,005**	**50,991**	**179,908**	**171,894**	**111,246**	**103,232**

Source: SGS Economics and Planning

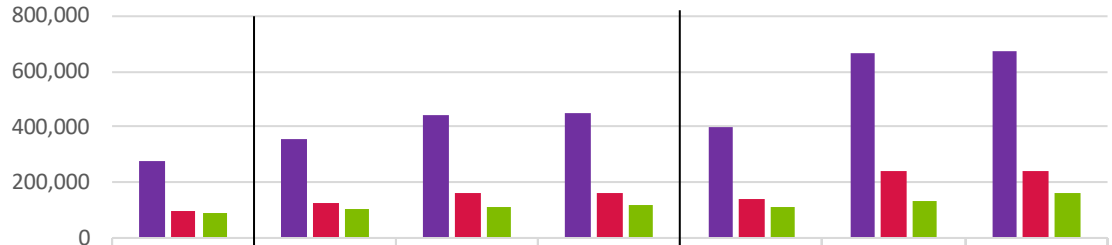
Growth Infrastructure Compact #2 - Greater Penrith to Eastern Creek (GPEC)

The following provides an overview of population, dwellings and employment projections for the GIC #2 study area under the three land use scenarios. It should be noted that projection data for the GIC #2 study area was not developed via the Co-design process and was developed through a separate process with these outputs then merged into the overall land use dataset.

The GIC #2 area benefits from the provision of Sydney Metro Greater West Stage 1 from St Marys connecting to the Western Sydney Aerotropolis, providing residents access to jobs around the GIC #1 area. GIC #2 experiences significantly more population and dwelling growth than GIC #1 without the strong jobs growth. Option 2 with the focus on existing centres, such as Penrith Centre provides higher population, dwelling and jobs growth than Option 1 to 2056. Growth across options is focused on areas expected to benefit from Sydney Metro Greater West Stage 1 metro stations such as Orchard Hills, St Marys and Kingswood/Werrington, as well as the development of Luxford.

Further summaries of the GIC #2 precincts are provided in the report and Appendix A.

GIC #2 (GREATER PENRITH AND EASTERN CREEK CORRIDOR) SCENARIO OVERVIEW



	2016	Base 2036	Option1 2036	Option2 2036	Base 2056	Option1 2056	Option2 2056
GIC 2 Population	273,648	359,146	445,421	445,860	397,065	668,919	675,146
GIC 2 Dwellings	95,634	126,540	162,238	162,673	139,516	240,862	243,269
GIC 2 Employment	86,054	100,317	110,695	120,457	109,454	135,476	160,665

Source: SGS Economics and Planning

GIC #2 PRECINCT POPULATION SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Mount Druitt Centre and Rooty Hill	39,161	63,734	+24573	102,126	+62965	81,513	+42352
Ropes Crossing	6,324	6,462	+138	6,462	+138	6,462	+138
Luxford	61,422	64,723	+3301	127,121	+65699	106,153	+44731
Australian Defence	123	1,969	+1847	2,008	+1886	2,807	+2684
Cranebrook and Werrington Downs	28,251	30,738	+2487	39,910	+11659	35,223	+6972
Jordan Springs	5,303	14,326	+9023	14,322	+9019	14,325	+9022
Kingswood and Werrington	19,306	40,722	+21416	60,372	+41067	74,126	+54820
Orchard Hills	4,536	17,693	+13158	99,053	+94517	139,080	+134544
Penrith Centre	9,338	17,881	+8544	28,944	+19606	34,104	+24767
Penrith Lakes	1,731	1,792	+61	1,804	+73	1,814	+83
Penrith West	3,655	6,218	+2563	6,372	+2717	6,544	+2889
South Penrith and Glenmore Park	38,868	49,815	+10947	60,375	+21507	66,298	+27430
St Clair	27,209	29,747	+2538	41,712	+14503	36,056	+8847
St Marys	28,423	51,245	+22821	78,338	+49915	70,642	+42219
Total	**273,648**	**397,065**	**123,417**	**668,919**	**395,271**	**675,146**	**401,498**

TABLE 1: GIC #2 PRECINCT DWELLING SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Mount Druitt Centre and Rooty Hill	12,175	19,758	+7583	32,900	+20725	26,201	+14026
Ropes Crossing	1,988	2,018	+30	2,144	+156	2,144	+156
Luxford	19,957	20,826	+869	42,811	+22854	35,571	+15614
Australian Defence	30	479	+449	505	+475	706	+676
Cranebrook and Werrington Downs	10,195	11,103	+908	14,644	+4449	12,922	+2727
Jordan Springs	1,862	5,030	+3168	5,429	+3567	5,430	+3568
Kingswood and Werrington	7,565	15,052	+7487	25,513	+17947	31,334	+23768
Orchard Hills	1,438	5,328	+3890	29,916	+28478	41,980	+40542
Penrith Centre	4,762	9,199	+4437	15,691	+10929	18,518	+13756
Penrith Lakes	622	644	+22	757	+136	761	+140
Penrith West	1,711	2,654	+943	2,734	+1022	2,794	+1083
South Penrith and Glenmore Park	13,413	17,176	+3763	21,608	+8195	23,807	+10394
St Clair	8,802	9,611	+810	13,600	+4798	11,760	+2958
St Marys	11,114	20,637	+9523	32,611	+21497	29,341	+18227
Total	**95,634**	**139,516**	**43,882**	**240,862**	**145,228**	**243,269**	**147,634**

Source: SGS Economics and Planning

GIC #2 PRECINCT EMPLOYMENT SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Mount Druitt Centre and Rooty Hill	17,592	22,026	+4434	26,740	+9148	29,140	+11548
Ropes Crossing	552	608	+56	695	+143	727	+175
Luxford	5,289	5,990	+701	10,404	+5115	10,619	+5330
Australian Defence	361	1,371	+1010	2,026	+1665	3,182	+2821
Cranebrook and Werrington Downs	2,417	2,700	+283	3,290	+873	3,448	+1031
Jordan Springs	621	1,096	+475	1,028	+407	1,331	+710
Kingswood and Werrington	9,506	14,921	+5415	17,293	+7787	21,046	+11539
Orchard Hills	1,290	1,458	+167	5,870	+4579	9,113	+7822
Penrith Centre	16,003	18,673	+2670	20,216	+4212	25,884	+9881
Penrith Lakes	318	387	+68	419	+101	386	+68
Penrith West	11,274	12,954	+1680	14,173	+2900	16,678	+5405
South Penrith and Glenmore Park	4,681	5,775	+1093	6,987	+2305	9,004	+4322
St Clair	2,975	3,340	+365	4,406	+1431	4,282	+1307
St Marys	13,173	18,155	+4982	21,928	+8756	25,825	+12653
Total	**86,054**	**109,454**	**23,400**	**135,476**	**49,422**	**160,665**	**74,611**

Source: SGS Economics and Planning

Age/Sex Profiles

Refinements of the population projections for all 3 scenarios were undertaken to develop age/sex profiles.

Profiles were developed for Male and Females according to the following age groups for each 5-year period between 2016 and 2056.

- 0-4 years
- 5-9 years
- 10-14 years
- 15-19 years
- 20-24 years
- 25-29 years
- 30-34 years
- 35-39 years
- 40-44 years
- 45-49 years
- 50-54 years
- 55-59 years
- 60-64 years
- 65-69 years
- 70-74 years
- 75-79 years
- 80-84 years
- 85-89 years
- 90-94 years
- 95-99 years
- 100 years and over

The age/sex profiles from TZP16 v1.51 were used as an initial basis for the GIC specific profiles. These were based on the 2016 NSW Government Population cohort projections.

When comparing GIC#1 and GIC#2 areas, GIC#1 has a higher proportion of adults 60+ years, and GIC#2 has a smaller decrease in working age adults than in GIC#1. Both areas have a strong representation of young children and young adults. This demonstrates the need for appropriate education and childcare facilities to be provided in the region. The significant older population also will require aged care and health services to support the older population.

Market Analysis

An analysis of the scenarios was undertaken to frame the scale of growth proposed in the GIC #1 area in a variety of ways to understand if it is realistic and achievable. This involved an assessment of historical and forecast population and employment to a selection of comparable locations (10-15) with commentary on how the GIC #1 area compares to these other locations in Sydney and Melbourne.

While the expected growth in the GIC #1 area is significant, it is lower than what has been experienced in comparable areas of Sydney such as the North West and South West Growth Areas, which both developed without a significant transport investment such as Sydney Metro Greater West and an economic driver such as the Western Sydney Airport.

Growth between 2036 and 2056 in the GIC #1 area is higher than any comparable location in Sydney or Melbourne. Given the amount of expected investment in the Western Parkland City, this level of growth seems reasonable. However, this will require the area to grow as fast as current historical greenfield areas, which have been growing faster than previously seen in Sydney, and for the Western Sydney Airport and Aerotropolis to experience CBD-like levels of employment growth.

The base case represents a significantly lower proportion of Option 1 growth as does Option 2 except for more population growth expected in GIC #1 in Option 2 up until 2036.

Option 2 growth is in line with the historical record setting growth currently seen in the North West and South West Growth Areas up until 2036, while it may be more reasonable in the long term towards 2056

1. INTRODUCTION

The core output of the project is a detailed land use dataset. This report should be read in conjunction with the dataset and provides a high-level overview of the results along with details of the approach, inputs and assumptions.

1.1 Background

Project context and need

Within TfNSW, Transport Performance and Analytics (TPA) produces Travel Zone Projections (TZP) for Greater Sydney (Sydney GMA) as an input into the Strategic Travel Model (STM). The projections are also used for a range of other strategic and policy work across government and the private sector. The level of detail provided in the data is intended to support strategic models (i.e. STM) and provide flexibility in aggregation.

The latest version (TZP16 v1.51) was released in June 2019 and developed by SGS Economics and Planning (SGS) in partnership with TPA. TZP16 v1.51 provides an interim update to the previous TZP16 projections by rebasing data and ratios to the 2016 ABS Census. However, it still aligns with the (2016 released) Department of Planning, Industry and Environment (DPIE) population projections and the strategic vision for the city under the 2014 Metropolitan Strategy 'A Plan for Growing Sydney'.

The next major TZP release is not due to be released until mid-2020 (TZP20). TZP20 will align with the recently released (December 2019) DPIE population projections.

However, plans have evolved since 2016 with the release in 2018 of the Greater Sydney Region Plan 'A Metropolis of Three Cities'. This evolution particularly impacts the land use function of the west, with the creation of the three cities concept. Since the release of this new plan work on infrastructure and housing provision in Sydney has accelerated with significant investment in infrastructure in the pipeline, particularly for the new Western Parkland City. This includes Western Sydney Airport and city shaping Metro Rail services.

As such, there is a need to develop an interim land use scenario that better reflects the three cities vision until TZP20 is released to support planning project priorities by WSPP, TfNSW and the GSC.

It should be noted the December 2019 DPIE population projections were not available during this project and as a result did not form an input into the project.

1.2 Project overview

Co-design land use scenario project

From this context in early 2019, a co-design process was developed to share and reconcile current information for the Western City and provide a common land use forecast basis for future work leveraging the existing TZP16 v1.51 dataset.

Ultimately the co-design project included direction from TfNSW, Western Sydney Planning Partnership (WSPP) and the Greater Sydney Commission (GSC) along with input from other State agencies and relevant councils directly. This process is described in Section 4.

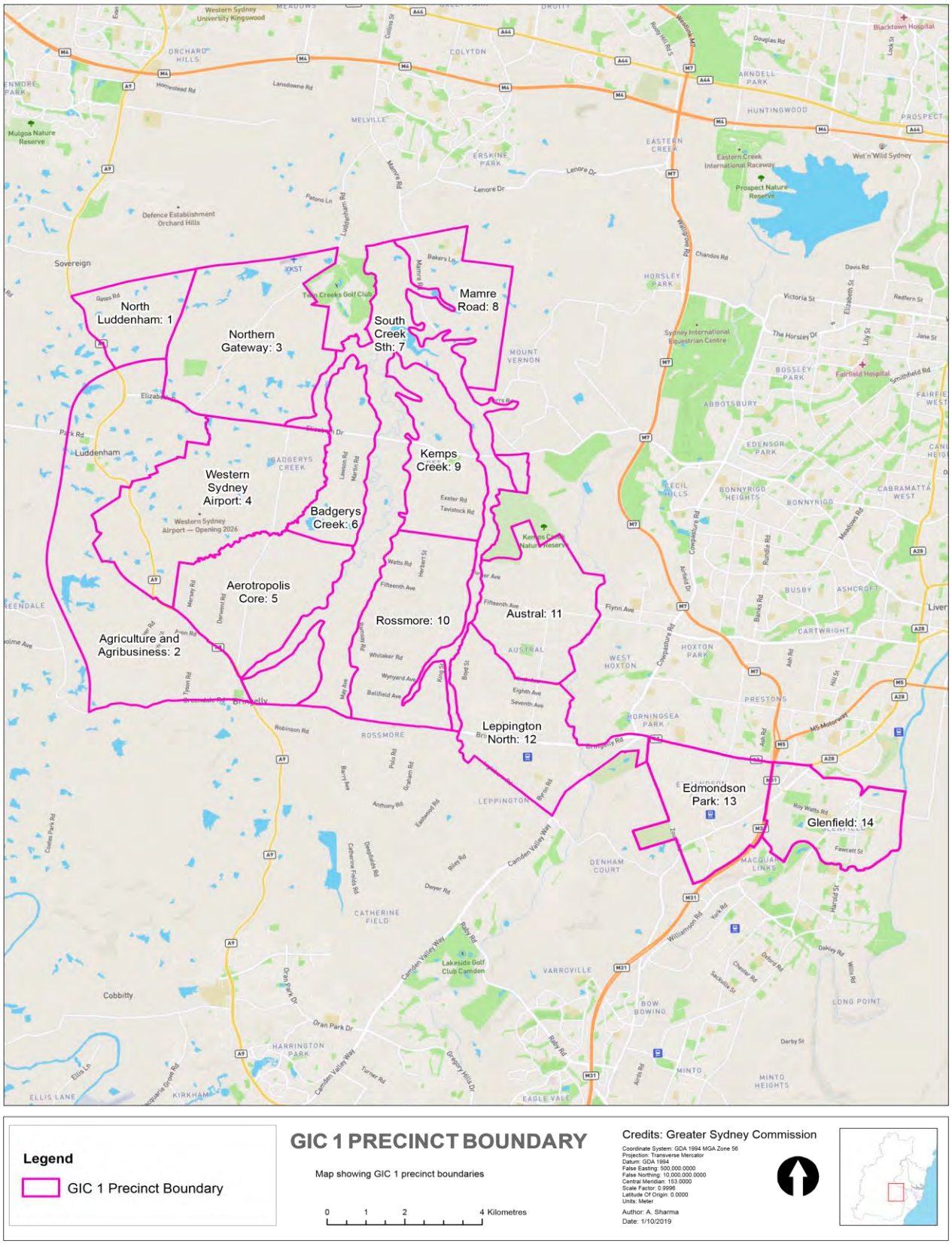
The Codesign project focused on developing one shared land use scenario consistent with the vision, latest data and thinking for the Western City.

GIC land use scenarios

Extending from this co-design process, further work for the GSC GIC program was undertaken to consider three land use scenarios for the Western City to support their work.

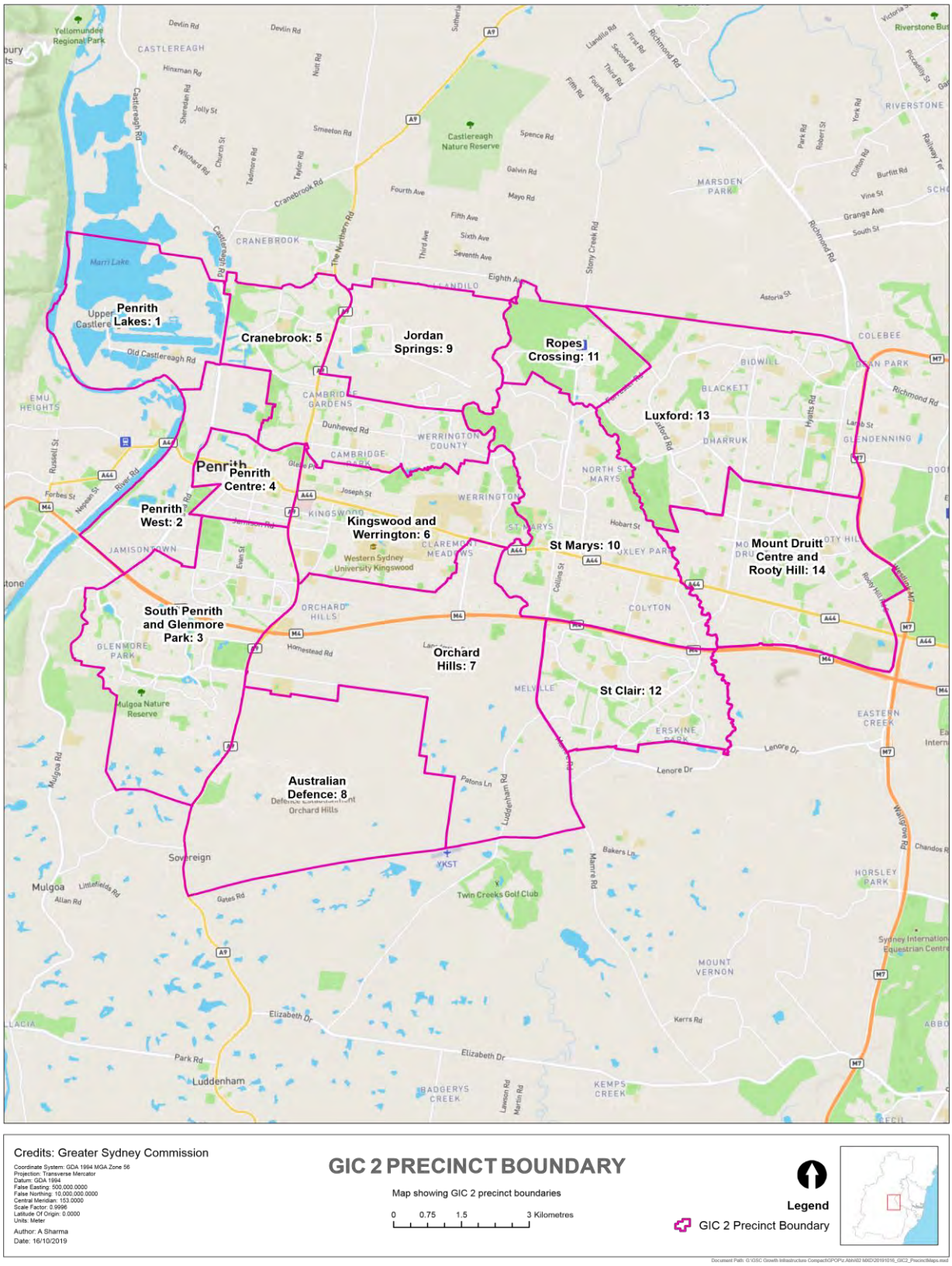
These were initially discussed with the broader co-design stakeholder group and considered the whole Western City region, with a later focus specifically on the GIC #1 Western Sydney Growth Area (Aerotropolis) and surrounding precincts and GIC #2 Greater Penrith to Eastern Creek (GPEC) corridor. Maps showing these two GIC areas and their precincts are shown below and discussed further in Section 4.3.

FIGURE 2 GIC #1 PRECINCTS



Source: Greater Sydney Commission, 2019

FIGURE 3 GIC #2 PRECINCTS



Source: Greater Sydney Commission, 2019

The three scenarios are (further discussed in Section 2):

- A **Base Case (~Scenario 1)** has been developed for appraisal purposes, which assumes committed infrastructure with no land use changes other than what is already approved and committed.
- **GIC land use Option 1 (~Scenario 2)** assumes the base case plus a focus on early and strong industry and jobs attraction in the Aerotropolis with more compact urban form and renewal.
- **GIC land use Option 2 (~Scenario 3)** has a different growth pattern for Western City where it assumes the base case plus sustained and strong industry and jobs attraction in Liverpool, Penrith and Campbelltown supported by gradual investment at the Aerotropolis with a more dispersed urban form in the greenfield areas.

Ultimately, the three GIC scenarios leveraged strategic land use insights from the co-design process for the Western City as whole, and additional limited bottom-up land use analysis and inputs from other concurrent land use planning processes for the GIC #1 and GIC #2 precincts.

The final three combination GIC scenarios is presented in this report along with details of the approach, assumptions and high-level market analysis for GIC #1.

Scenario development approach

SGS has developed these scenarios through extensive consultation starting in March 2019 and running through to November 2019. This co-design process was the primary input to the results and focused around five workshops where interim results were presented to a wide stakeholder group and iteratively refined through additional meetings, data inputs, information and feedback.

The land use scenarios focused on the years 2036 and 2056 and the 9 LGAs that make up the WSPP. GIC #1 and #2 areas were also a key focus for the scenarios.

The approach, data inputs and assumptions are further discussed in Section 4.

Modelling limitations

Comprehensive analysis of individual sites/precincts has not been completed as part of this process. The project has sought to draw on readily available, provided or easily digestible data. Additional research to fill gaps has not been completed. In addition, limitations with the base TZP16 v1.51 dataset should also be considered. These are documented in the TfNSW *2016 Travel Zone Projections (TZP2016 v1.51) for Population, Workforce & Employment in the Sydney Greater Metropolitan Area Technical Guide v1.51*.[1]

[1] https://www.transport.nsw.gov.au/system/files/media/documents/2019/TZP2016%20v1.51%20-%20Technical%20Guide%20Final_0.pdf

2. SCENARIO NARRATIVES

This section outlines the land use scenarios developed for the Growth Infrastructure Compact

2.1 Scenario overview

The scenarios developed for the GIC are predominantly based on the realisation of the Western Parkland City Vision and Future Transport 2056 as they relate to the Greater Sydney Region Plan. The scenarios developed are underpinned by the Macro Assumptions of catalytic infrastructure and services planned in the next 40 years for the Western Parkland City, shown in Section 4.4 and in Appendix B.

The three scenarios are:

- A **Base Case (~Scenario 1)** has been developed for appraisal purposes, which assumes committed infrastructure with no land use changes other than what is already approved and committed.
- **GIC land use Option 1 (~Scenario 2)** assumes the base case plus a focus on early and strong industry and jobs attraction in the Aerotropolis with more compact urban form and renewal.
- **GIC land use Option 2 (~Scenario 3)** has a different growth pattern for Western City where it assumes the base case plus sustained and strong industry and jobs attraction in Liverpool, Penrith and Campbelltown supported by gradual investment at the Aerotropolis with a more dispersed urban form in the greenfield areas.

An overview of each scenario is provided below.

2.2 Base Case Land Use (~Scenario 1)

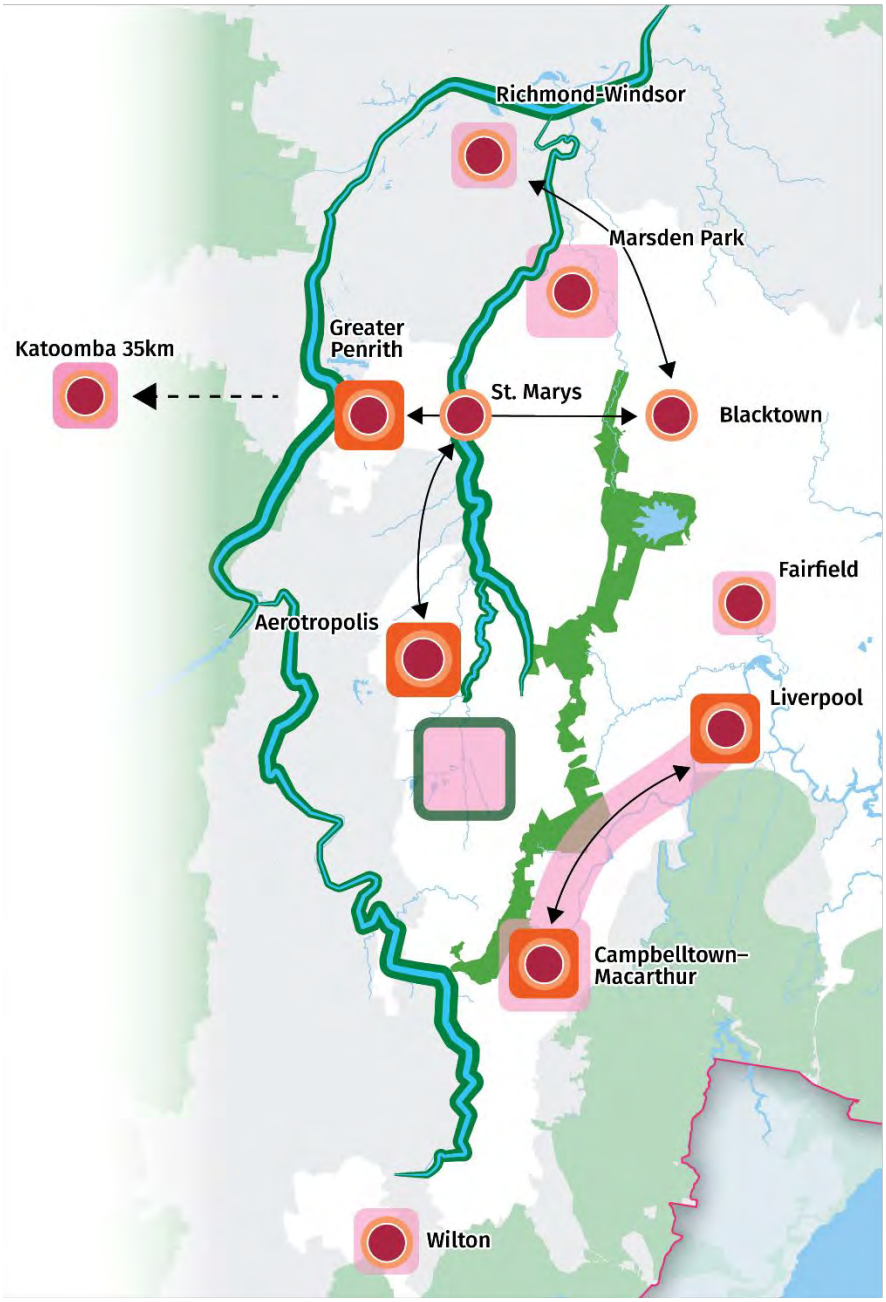
The base case represents a no land use policy change scenario with only committed infrastructure and committed or expected rezoning of land for housing growth included.

Under base case, the Western Sydney Airport is developed at Badgerys Creek, with Sydney Metro Greater West Stage 1 between St Marys and the Aerotropolis delivered.

New jobs growth is limited and focused on existing metropolitan clusters such as Penrith, Liverpool and Campbelltown-Macarthur. Housing, population and jobs growth occurs in Eastern and Central City instead of the Western City.

The conceptual pattern of development for the base case is shown schematically in Figure 4.

FIGURE 4 BASE CASE SCENARIO



Source: Greater Sydney Commission, 2019

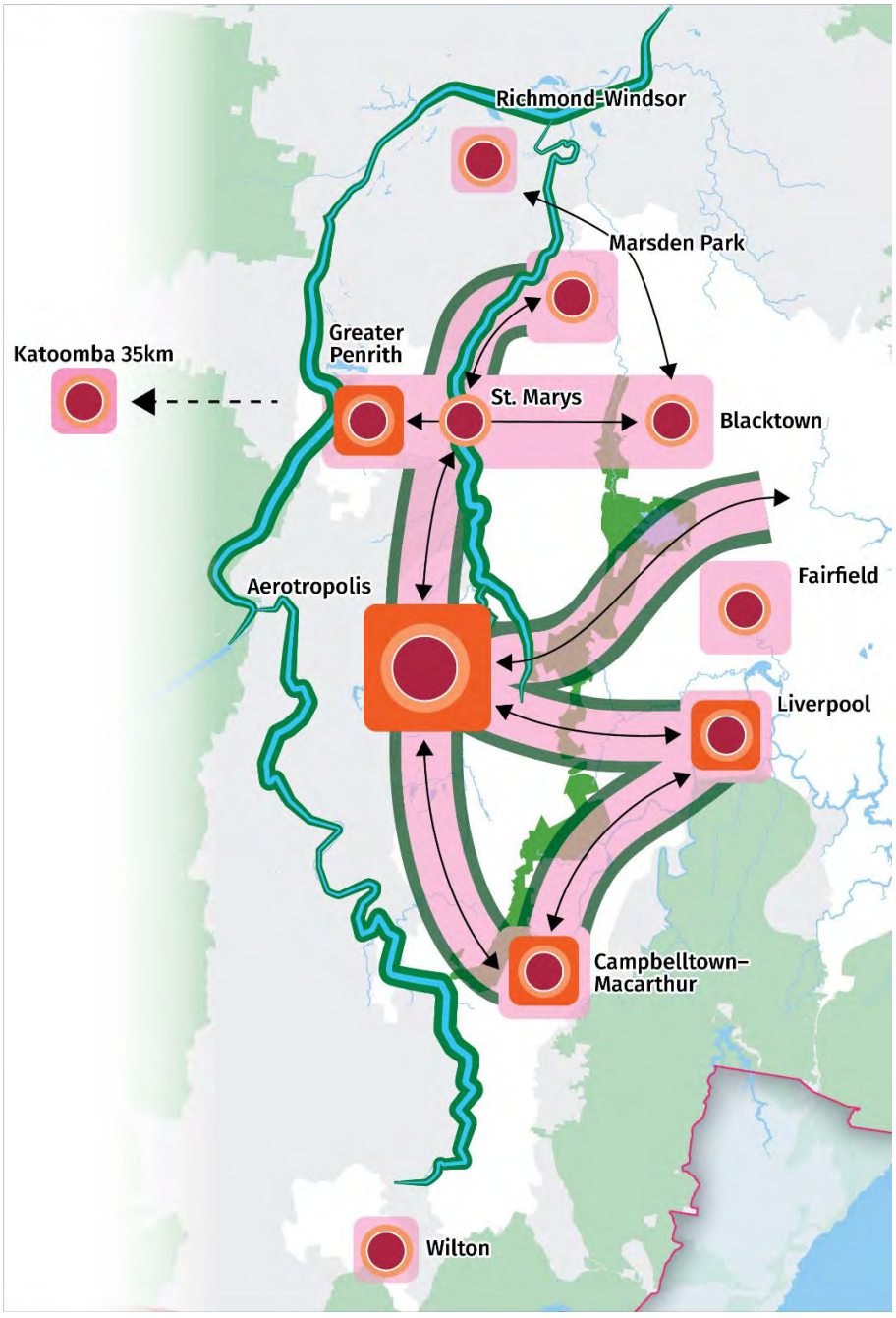
2.3 GIC Land Use Option 1 (~Scenario 2)

The GIC land use Option 1 assumes the base case with housing growth initially focused on renewal in existing communities with new infill opportunities provided by the initial precincts of the Aerotropolis with a more compact urban form developing around newly provided metro stations, between St Marys and the Aerotropolis with new transport links provided as per Future Transport 2056.

Jobs growth is focused with early and strong industry and jobs attraction in the Aerotropolis, supported by steady growth with existing metropolitan centres and employment areas.

The conceptual pattern of development for this scenario is shown schematically in Figure 5.

FIGURE 5 GIC OPTION 1



Source: Greater Sydney Commission, 2019

2.4 GIC Land Use Option 2 (~Scenario 3)

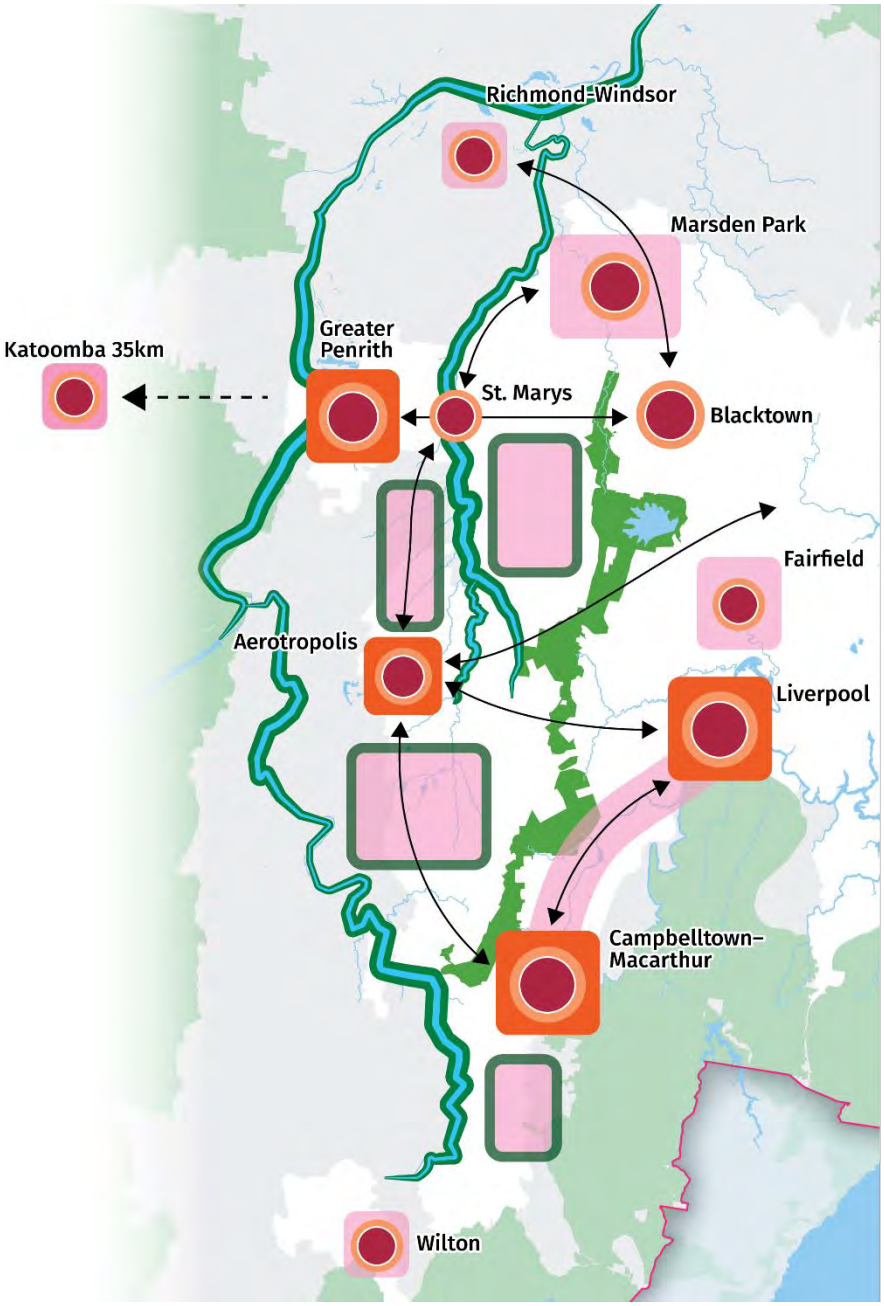
The GIC land use Option 2 assumes the base case with sustained and strong industry and jobs in the existing centres such as Liverpool, Penrith and Campbelltown-Macarthur, supported by gradual investment at the Aerotropolis.

New housing is more dispersed on the development of greenfield areas with new transport links provided as per Future Transport 2056.

Jobs growth in the Western City overall under this option is less compared to Option 1 as the impetus for a shift in jobs to the west is smaller with a less attractive Aerotropolis.

The conceptual pattern of development for this option is shown schematically in Figure 6.

FIGURE 6 GIC OPTION 2



Source: Greater Sydney Commission, 2019

3. SCENARIO RESULTS

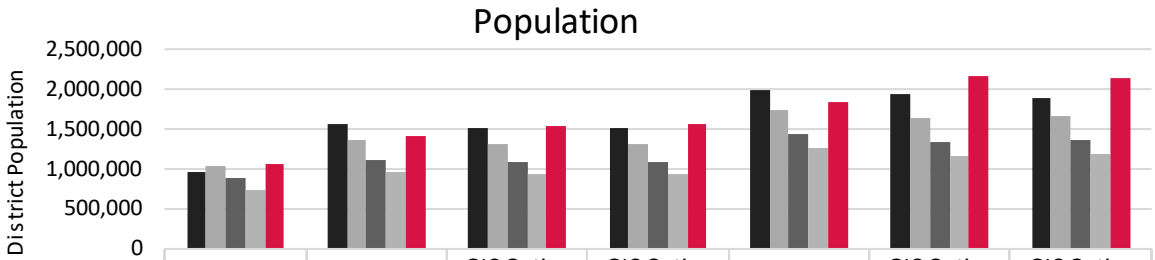
This section provides some high-level results for each scenario. The full dataset and additional summary outputs are available in accompanying spreadsheets.

3.1 Greater Sydney distribution

Population

Figure 7 shows a summary of the Greater Sydney population by District[2] for all 3 scenarios in 2016/2036 and 2056, shown as growth in Table 2. It shows how the proportion of population in the Western City district increased in the two GIC scenarios such that the population is higher in the west than in the Central City. Under the base case there is less of a shift to the west with more population remaining in the Eastern and Central City Districts.

FIGURE 7 GREATER SYDNEY POPULATION SUMMARY



	2016	Base 2036	GIC Option 1 2036	GIC Option 2 2036	Base 2056	GIC Option 1 2056	GIC Option 2 2056
Central City	972,892	1,559,501	1,524,102	1,508,066	1,983,870	1,949,409	1,903,555
Eastern City	1,030,284	1,364,647	1,323,736	1,323,736	1,752,539	1,635,123	1,659,573
North	887,017	1,116,643	1,090,551	1,090,551	1,429,241	1,339,413	1,363,863
South	741,201	973,760	941,515	941,515	1,253,055	1,163,617	1,188,414
Western City	1,056,918	1,407,293	1,541,940	1,557,976	1,842,307	2,173,449	2,145,605
Gr Sydney	4,688,312	6,421,844	6,421,844	6,421,844	8,261,011	8,261,011	8,261,011

Source: SGS Economics and Planning

TABLE 2: POPULATION GROWTH SUMMARY

	2016-2036 Base	2016-2036 GIC Option 1	2016-2036 GIC Option 2	2036-2056 Base	2036-2056 GIC Option 1	2036-2056 GIC Option 2
Central City District	586,609	551,209	535,174	424,369	425,308	395,489
Eastern City District	334,36 3	293,452	293,452	387,892	311,387	335,837
North District	229,626	203,534	203,534	312,598	248,862	273,312
South District	232,560	200,314	200,314	279,295	222,103	246,900
Western City District	350,375	485,023	501,058	435,014	631,508	587,630
Greater Sydney	**1,733,532**	**1,733,532**	**1,733,531**	**1,839,167**	**1,839,167**	**1,839,167**
Western City District %	20%	28%	29%	24%	34%	32%

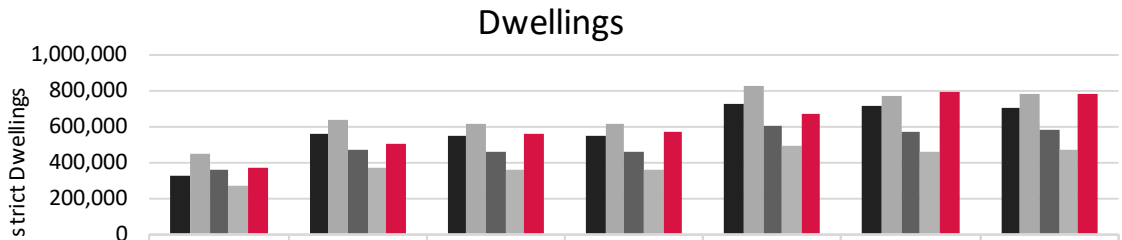
Source: SGS Economics and Planning

[2] Noting that this comparison is at a district level and the Western City District does not include Blacktown LGA.

Dwellings

Figure 8 shows a summary of the dwelling distribution by District for all 3 scenarios in 2016/2036 and 2056. It shows a similar pattern to the population figures with more dwellings in the Western City District in the 2 GIC scenarios compared to the base case.

FIGURE 8 GREATER SYDNEY DWELLING SUMMARY



	2016	Base 2036	GIC Option 1 2036	GIC Option 2 2036	Base 2056	GIC Option 1 2056	GIC Option 2 2056
Central City	329,127	559,358	549,012	543,611	722,435	714,599	698,793
Eastern City	443,376	636,129	616,708	616,805	823,927	774,519	785,548
North	355,157	470,888	460,417	460,256	604,912	572,175	582,518
South	269,632	375,927	364,410	364,410	488,044	457,929	467,700
Western City	366,444	507,169	558,925	565,285	671,084	791,181	780,473
Gr Sydney	1,763,736	2,549,471	2,549,471	2,550,367	3,310,402	3,310,402	3,315,032

Source: SGS Economics and Planning

A summary of the growth in dwellings is shown in Table 3.

TABLE 3: DWELLING GROWTH SUMMARY

	2016-2036 Base	**2016-2036** GIC Option 1	**2016-2036** GIC Option 2	**2036-2056** Base	**2036-2056** GIC Option 1	**2036-2056** GIC Option 2
Central City District	230,231	219,885	214,484	163,078	165,587	155,182
Eastern City District	192,753	173,331	173,429	187,798	157,812	168,742
North District	115,731	105,260	105,099	134,024	111,758	122,262
South District	106,295	94,778	94,778	112,117	93,519	103,290
Western City District	140,725	192,480	198,841	163,914	232,256	215,188
Greater Sydney	**785,735**	**785,735**	**786,631**	**760,931**	**760,931**	**764,664**
Western City District %	*18%*	*24%*	*25%*	*22%*	*31%*	*28%*

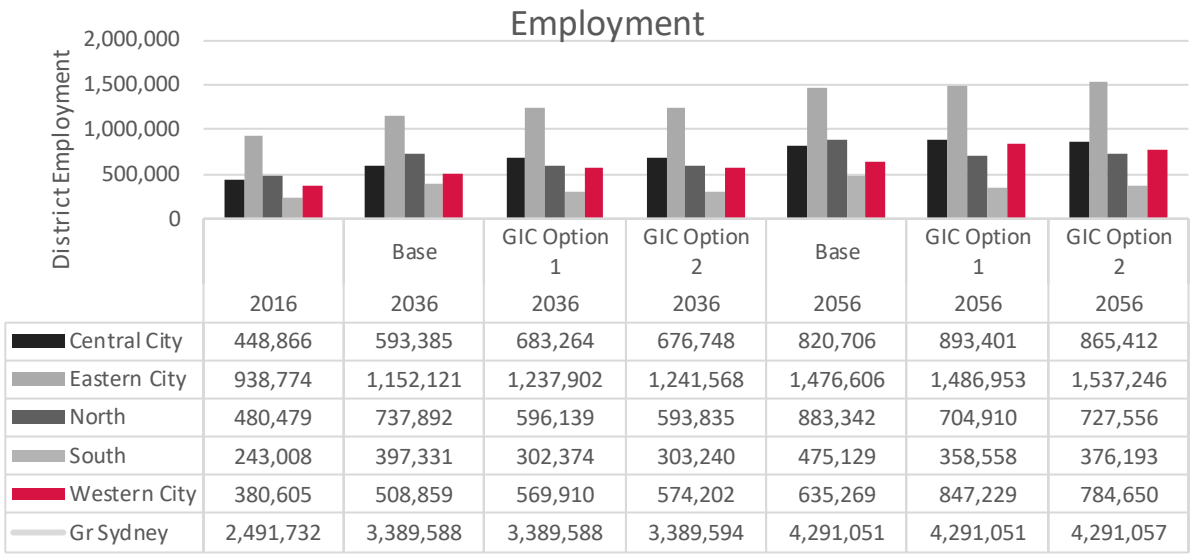
Source: SGS Economics and Planning

Employment

Figure 9 shows a summary of the Greater Sydney employment by District for all 3 scenarios which shows a shift towards employment in the Western City District, particularly between 2036 and 2056 but not to the same magnitude as the expected population shift. The additional employment in the Western City district is also approximately 60,000 higher in Option 1 compared to Option 2 due to the assumption of an Aerotropolis led development of the Western Parkland City attracting more high knowledge intensive jobs from the Eastern and Central City.

This attraction of highly value jobs provides an impetus for other industries to want to locate within proximity to the Aerotropolis to interact with the new knowledge based workers. This has an influence on the total number of jobs located in the Western City District in 2056 between Options 1 and 2, as the focus on existing metropolitan and strategic centres in Option 2 attracts less of these highly value jobs from other parts of Sydney.

FIGURE 9 GREATER SYDNEY EMPLOYMENT SUMMARY



	2016	Base 2036	GIC Option 1 2036	GIC Option 2 2036	Base 2056	GIC Option 1 2056	GIC Option 2 2056
Central City	448,866	593,385	683,264	676,748	820,706	893,401	865,412
Eastern City	938,774	1,152,121	1,237,902	1,241,568	1,476,606	1,486,953	1,537,246
North	480,479	737,892	596,139	593,835	883,342	704,910	727,556
South	243,008	397,331	302,374	303,240	475,129	358,558	376,193
Western City	380,605	508,859	569,910	574,202	635,269	847,229	784,650
Gr Sydney	2,491,732	3,389,588	3,389,588	3,389,594	4,291,051	4,291,051	4,291,057

Source: SGS Economics and Planning

TABLE 4: EMPLOYMENT GROWTH SUMMARY

	2016-2036 Base	**2016-2036** GIC Option 1	**2016-2036** GIC Option 2	**2036-2056** Base	**2036-2056** GIC Option 1	**2036-2056** GIC Option 2
Central City District	144,519	234,398	227,883	227,321	210,137	188,663
Eastern City District	213,346	299,128	302,794	324,485	249,051	295,678
North District	257,413	115,660	113,356	145,449	108,771	133,721
South District	154,323	59,366	60,232	77,797	56,184	72,953
Western City District	128,253	189,304	193,597	126,411	277,319	210,448
Greater Sydney	**897,855**	**897,855**	**897,861**	**901,463**	**901,463**	**901,464**
Western City District %	*14%*	*21%*	*22%*	*14%*	*31%*	*23%*

Source: SGS Economics and Planning

Western City District Growth Share Comparison

Under both GIC options the Western City District increases the share of growth significantly compared with the base case, notably in the post 2036 period, with over 30% of population, dwellings and employment growth under Option 1 occurring in the Western Sydney District as shown in Table 4.

The increased dwelling shares represent a shift towards smaller households and away from historical development trends in the west towards higher density living.

TABLE 5: WESTERN CITY DISTRICT GROWTH SHARE SUMMARY

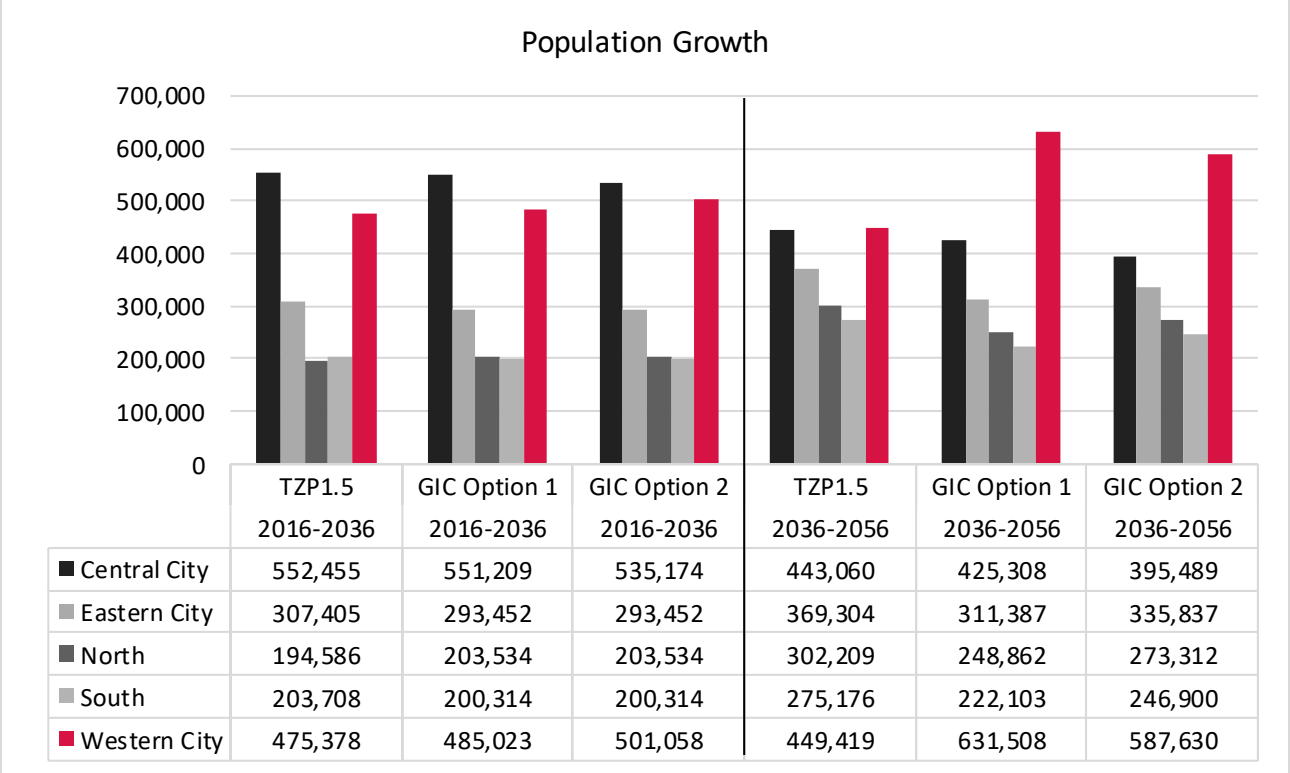
	2016-2036 Base	2016-2036 GIC Option 1	2016-2036 GIC Option 2	2036-2056 Base	2036-2056 GIC Option 1	2036-2056 GIC Option 2
Population	20%	28%	29%	24%	34%	32%
Dwellings	14%	21%	22%	14%	31%	23%
Employment	18%	24%	25%	22%	31%	28%

Source: SGS Economics and Planning

Comparison to TZP2016v.151

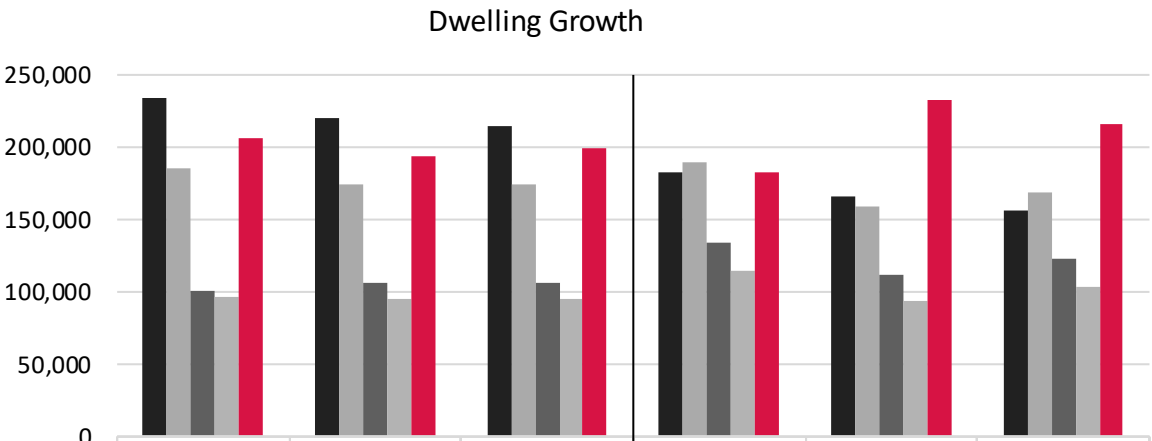
Comparing Option 1 and 2 to the reference dataset of TZP2016v1.51 this shows a significant shift in growth west under these scenarios with an additional 192,000 people, 37,000 dwellings and 85,000 jobs in the Western City District in Option 1 compared to TZP2016v.1.51 by 2056.

FIGURE 10 GREATER SYDNEY POPULATION COMPARISON TO TZP1.51



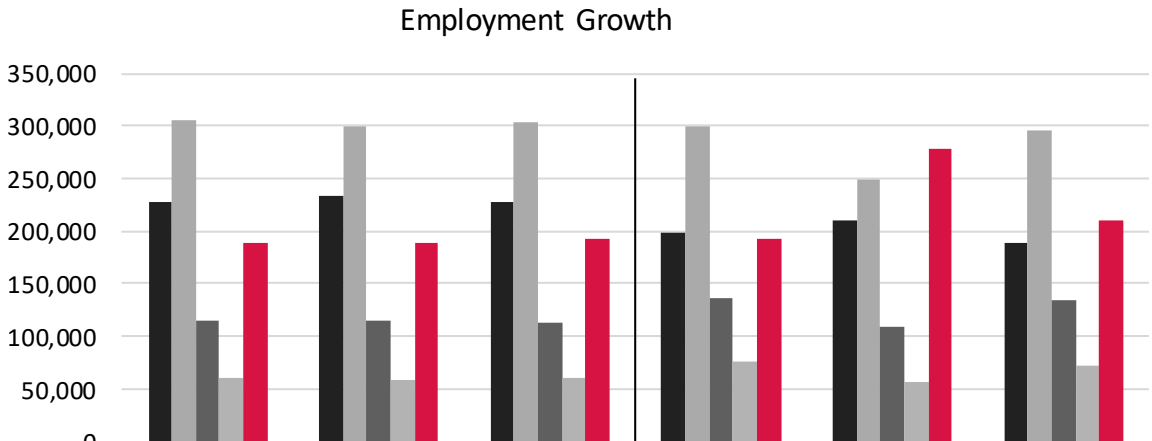
	TZP1.5 2016-2036	GIC Option 1 2016-2036	GIC Option 2 2016-2036	TZP1.5 2036-2056	GIC Option 1 2036-2056	GIC Option 2 2036-2056
Central City	552,455	551,209	535,174	443,060	425,308	395,489
Eastern City	307,405	293,452	293,452	369,304	311,387	335,837
North	194,586	203,534	203,534	302,209	248,862	273,312
South	203,708	200,314	200,314	275,176	222,103	246,900
Western City	475,378	485,023	501,058	449,419	631,508	587,630

FIGURE 11 GREATER SYDNEY DWELLING COMPARISON TO TZP1.51



	TZP1.5 2016-2036	GIC Option 1 2016-2036	GIC Option 2 2016-2036	TZP1.5 2036-2056	GIC Option 1 2036-2056	GIC Option 2 2036-2056
Central City	233,064	219,885	214,484	182,213	165,587	155,182
Eastern City	184,648	173,331	173,429	188,530	157,812	168,742
North	99,981	105,260	105,099	134,103	111,758	122,262
South	95,967	94,778	94,778	114,480	93,519	103,290
Western City	206,244	192,480	198,841	181,695	232,256	215,188

FIGURE 12 GREATER SYDNEY EMPLOYMENT COMPARISON TO TZP1.51



	TZP1.5 2016-2036	GIC Option 1 2016-2036	GIC Option 2 2016-2036	TZP1.5 2036-2056	GIC Option 1 2036-2056	GIC Option 2 2036-2056
Central City	226,856	234,398	227,883	198,490	210,137	188,663
Eastern City	306,000	299,128	302,794	298,706	249,051	295,678
North	114,672	115,660	113,356	136,444	108,771	133,721
South	60,929	59,366	60,232	75,637	56,184	72,953
Western City	189,404	189,304	193,597	192,186	277,319	210,448

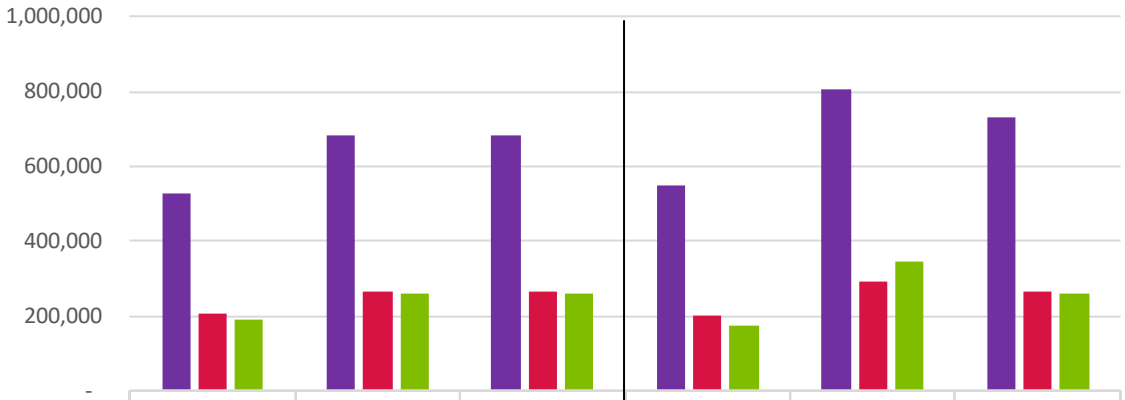
Source: SGS Economics and Planning

3.2 Western Sydney Planning Partnership LGAs

Adding Blacktown LGA forecasts to the Western City District allows a summary of the Western Sydney Planning Partnership area.

Figure 13 shows a growth summary of the population, dwelling and employment forecasts for the WSPP area in each scenario. Adding in Blacktown LGA to the Western City District results shows a similar pattern between scenarios with the differences increased due to an increased level of growth in the Blacktown LGA above what was assumed in TZP2016v1.51.

FIGURE 13 WSPP FORECAST GROWTH SUMMARY



	Base 2016-2036	GIC Option 1 2016-2036	GIC Option 2 2016-2036	Base 2036-2056	GIC Option 1 2036-2056	GIC Option 2 2036-2056
WSPP Population	528,880	684,226	684,225	547,290	808,120	732,627
WSPP Dwellings	204,810	263,861	264,821	201,753	293,019	264,854
WSPP Employment	187,491	260,923	259,290	171,672	344,844	260,657

Source: SGS Economics and Planning

Table 6 shows a summary of growth in the base case scenario as a proportion of growth in GIC Option 1, which is around 93% for population and dwellings in 2036 with employment lower at 86%. These proportions drop further out to 2056 with employment below 80%.

TABLE 6: BASE CASE PROPORTION OF OPTION 1

Base Proportion	Population	Dwellings	Employment
2036	93%	92%	86%
2056	86%	86%	78%

The ratios are similar for the base proportion of Option 2 as shown in Table 7.

TABLE 7: BASE CASE PROPORTION OF OPTION 2

Base Proportion	Population	Dwellings	Employment
2036	93%	92%	91%
2056	88%	88%	84%

This growth builds on the existing distribution of people, dwellings and jobs as shown in Table 8 with the more established LGA's of Campbelltown, Fairfield, Liverpool, Penrith and Blacktown with the higher proportion of people and jobs.

TABLE 8: WSPP LGA 2016 POPULATION, DWELLING AND EMPLOYMENT DISTRIBUTION

LGA	Population	Dwellings	Employment
Blue Mountains	78,622	34,733	21,300
Camden	80,099	27,028	29,173
Campbelltown	162,288	56,732	57,040
Fairfield	206,399	64,958	69,318
Hawkesbury	67,039	25,010	28,838
Liverpool	211,504	67,893	80,694
Penrith	201,046	72,741	80,812
Wollondilly	49,920	17,350	13,430
Blacktown	350,795	114,581	127,244
WSPP	**1,407,713**	**481,025**	**507,849**

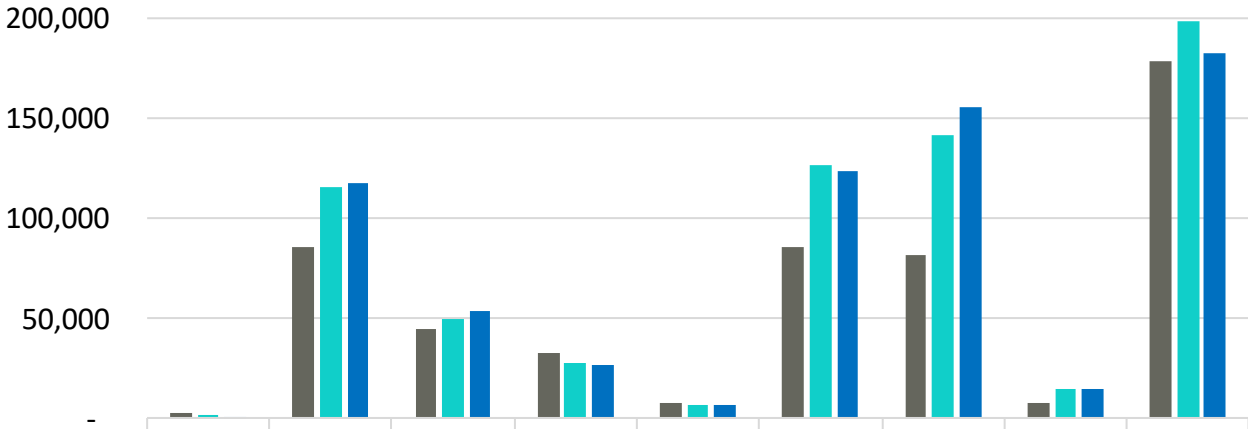
Source: SGS Economics and Planning

The following charts show the forecast growth under the different scenarios by LGA.

Population Growth

Figure 14 shows the population growth in the first 20 years between 2016 and 2036. This is focused on greenfield development in the South West and North West Growth Areas (Camden and Blacktown LGAs) with further development in Liverpool and Penrith growth areas associated with the Aerotropolis, Austral and Glenfield, and Stage 1 of the Sydney Metro Greater West, particularly around Orchard Hills. Differences between Option 1 and Option 2 are seen between Blacktown and Penrith LGAs with the shifting focus in the scenarios between different greenfield growth areas of the North West Growth Area in Option 1 and the Orchard Hills area in Option 2.

FIGURE 14 WSPP LGA 2016-2036 POPULATION GROWTH

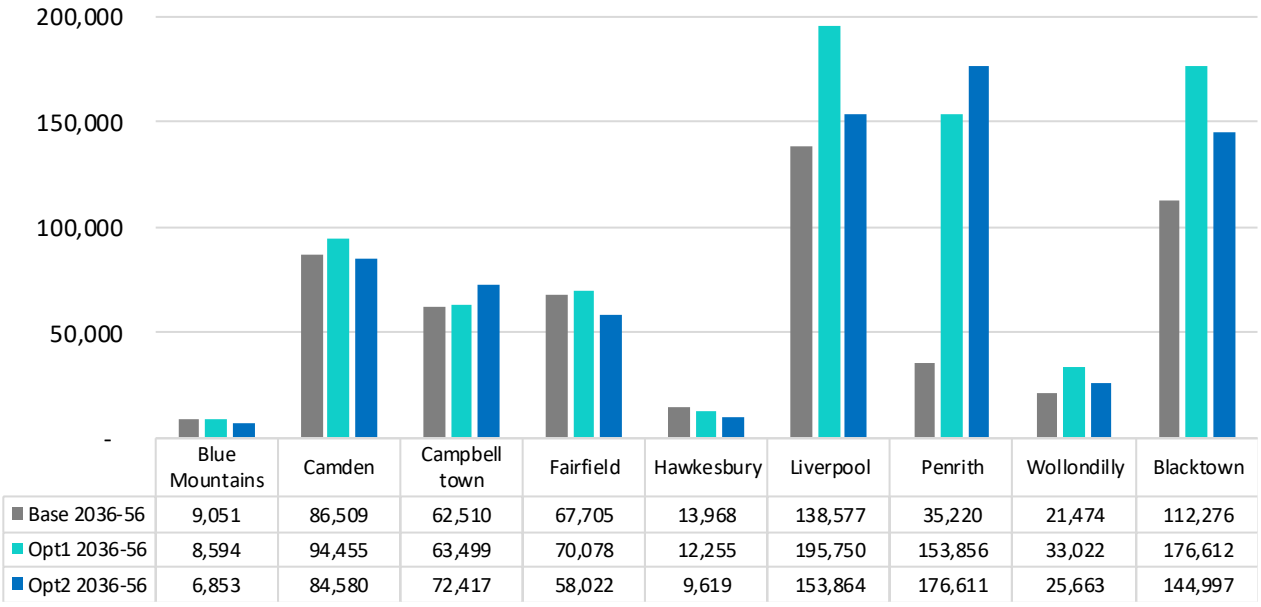


	Blue Mountains	Camden	Campbell town	Fairfield	Hawkesbury	Liverpool	Penrith	Wollondilly	Blacktown
Base 2016-36	2,918	86,142	45,027	33,042	7,467	85,454	82,199	8,127	178,504
Opt1 2016-36	1,550	115,605	49,959	27,453	7,075	126,789	142,242	14,350	199,203
Opt2 2016-36	1,342	117,680	53,679	27,050	6,867	124,095	155,847	14,498	183,168

Source: SGS Economics and Planning

As shown in Figure 15, growth continues around Liverpool and Penrith LGAs around the same areas of the Aerotropolis over the next 20 years, moving into Rossmore and the continued development of Orchard Hills in Penrith LGA towards 2056. Differences between the scenarios are due to the assumptions of growth related to the Aerotropolis in Option 1 (Liverpool LGA) and the Orchard Hills/Metro Corridor in Option 2 (Penrith LGA) with development in Option 2 focused on the Sydney Metro Greater West corridor and away from precincts in the Aerotropolis.

FIGURE 15 WSPP LGA 2036-2056 POPULATION GROWTH



	Blue Mountains	Camden	Campbell town	Fairfield	Hawkesbury	Liverpool	Penrith	Wollondilly	Blacktown
Base 2036-56	9,051	86,509	62,510	67,705	13,968	138,577	35,220	21,474	112,276
Opt1 2036-56	8,594	94,455	63,499	70,078	12,255	195,750	153,856	33,022	176,612
Opt2 2036-56	6,853	84,580	72,417	58,022	9,619	153,864	176,611	25,663	144,997

Source: SGS Economics and Planning

This total population growth to 2036 is summarised in Table 9.

TABLE 9: WSPP LGA POPULATION GROWTH SUMMARY TO 2036

LGA	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
Blue Mountains (C)	78,622	81,540	2,918	80,172	1,550	79,964	1,342
Camden (A)	80,099	166,241	86,142	195,704	115,605	197,779	117,680
Campbelltown (C) (NSW)	162,288	207,315	45,027	212,247	49,959	215,967	53,679
Fairfield (C)	206,399	239,441	33,042	233,852	27,453	233,449	27,050
Hawkesbury (C)	67,039	74,506	7,467	74,114	7,075	73,906	6,867
Liverpool (C)	211,504	296,958	85,454	338,294	126,789	335,600	124,095
Penrith (C)	201,046	283,245	82,199	343,288	142,242	356,893	155,847
Wollondilly (A)	49,920	58,047	8,127	64,270	14,350	64,418	14,498
Blacktown (C)	350,795	529,299	178,504	549,998	199,203	533,963	183,168
WSPP	**1,407,713**	**1,936,593**	**528,880**	**2,091,939**	**684,226**	**2,091,938**	**684,225**

Source: SGS Economics and Planning

And further to 2056 with an additional 20 years of growth in Table 10.

TABLE 10:WSPP LGA POPULATION GROWTH SUMMARY TO 2056

LGA	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Blue Mountains (C)	78,622	90,591	11,969	88,766	10,144	86,817	8,195
Camden (A)	80,099	252,750	172,651	290,159	210,060	282,359	202,260
Campbelltown (C) (NSW)	162,288	269,825	107,537	275,746	113,458	288,384	126,096
Fairfield (C)	206,399	307,146	100,748	303,930	97,531	291,471	85,072
Hawkesbury (C)	67,039	88,473	21,434	86,369	19,330	83,524	16,485
Liverpool (C)	211,504	435,535	224,031	534,043	322,539	489,464	277,959
Penrith (C)	201,046	318,465	117,419	497,145	296,098	533,505	332,458
Wollondilly (A)	49,920	79,521	29,601	97,292	47,372	90,081	40,161
Blacktown (C)	350,795	641,576	290,781	726,610	375,815	678,960	328,165
WSPP	**1,407,713**	**2,483,882**	**1,076,170**	**2,900,058**	**1,492,346**	**2,824,565**	**1,416,852**

Source: SGS Economics and Planning

The below figures show the population distribution across the WSPP for each scenario as well as the change between the base case and the GIC options 1 and 2.

FIGURE 16 WSPP 2036 POPULATION DISTRIBUTION BY SCENARIO

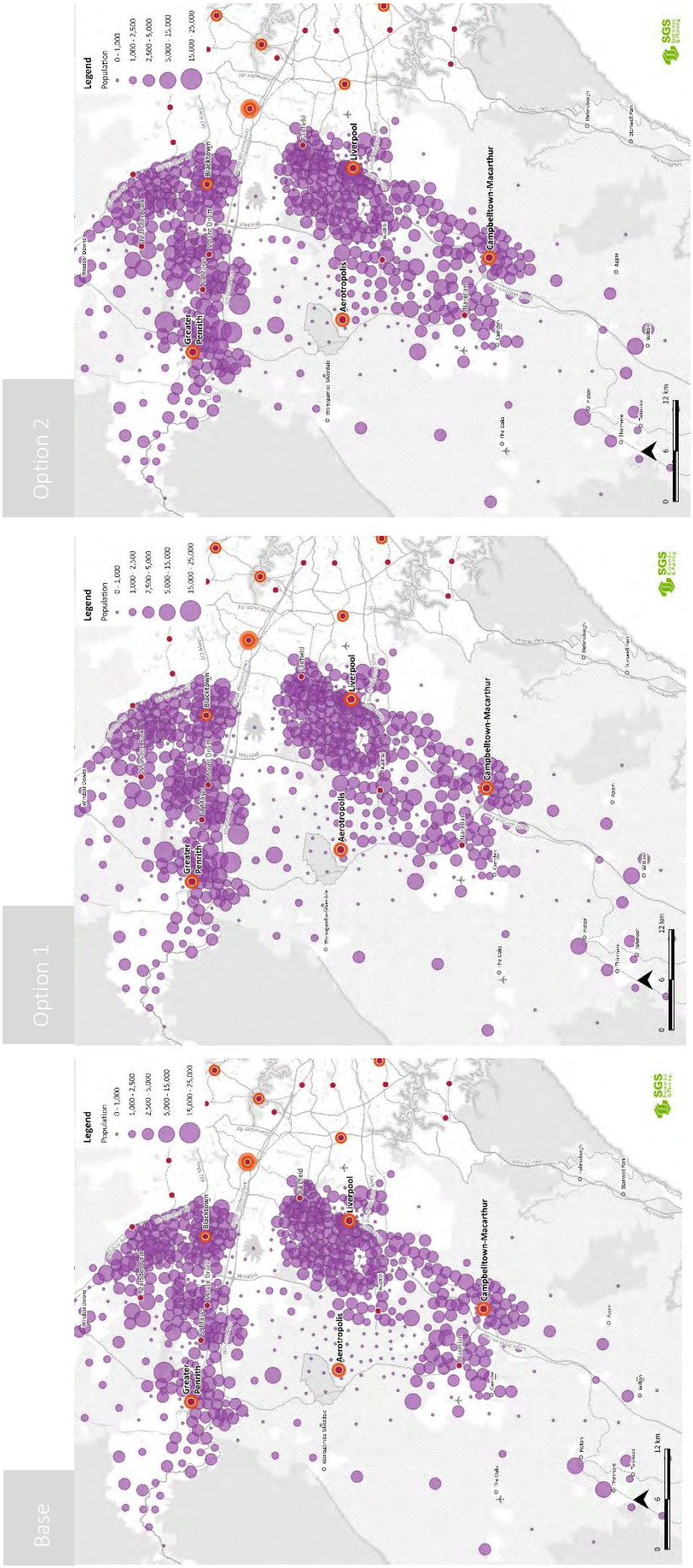
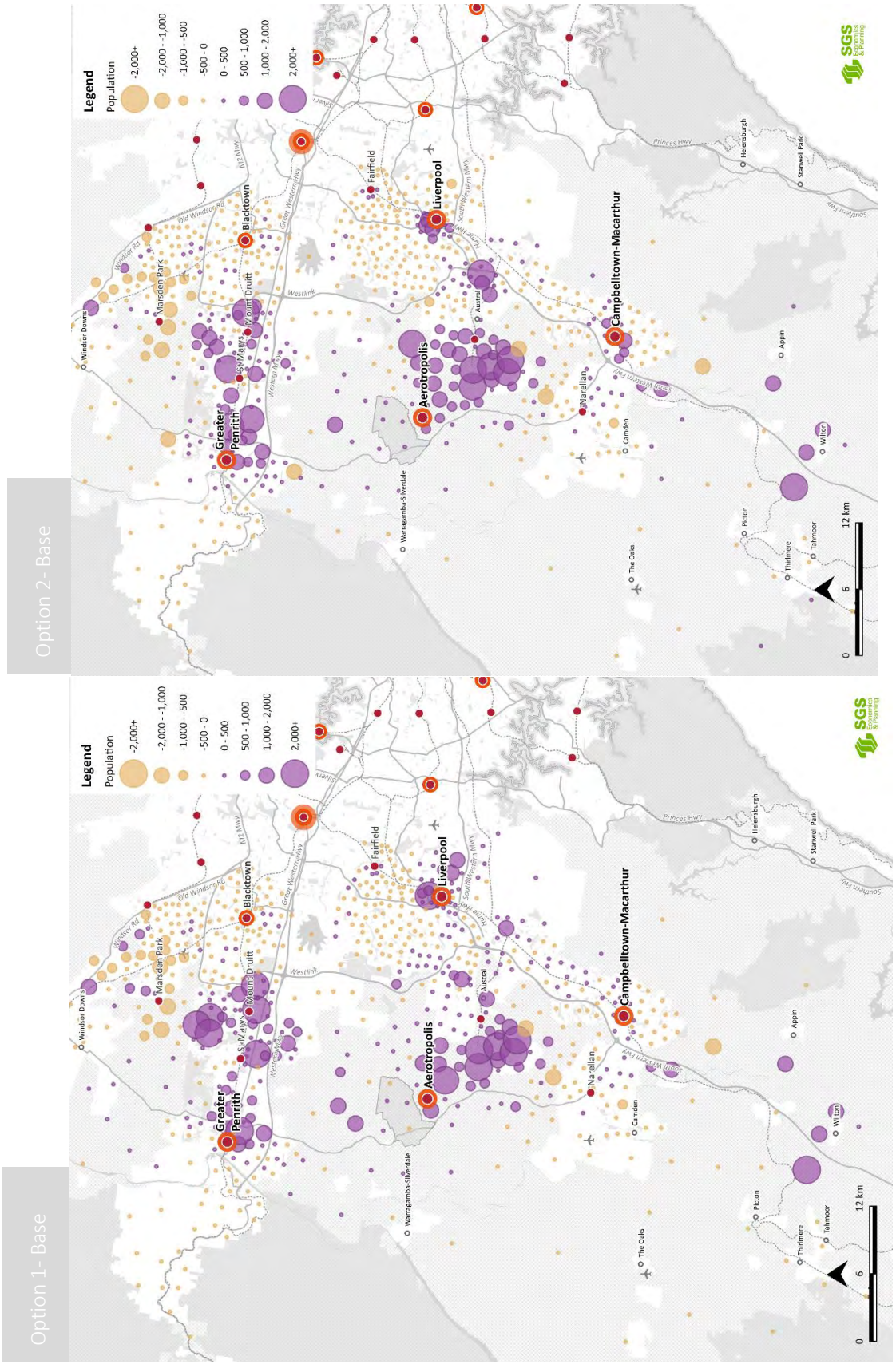
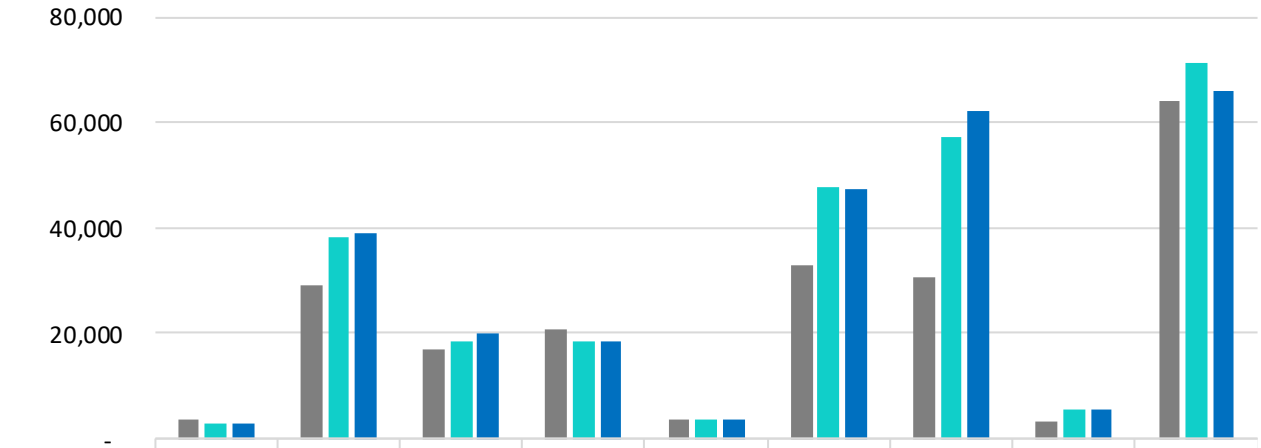


FIGURE 17 WSPP 2036 POPULATION DIFFERENCE TO BASE CASE



Dwelling changes across the LGAs align with the population growth with summary statistics shown below.

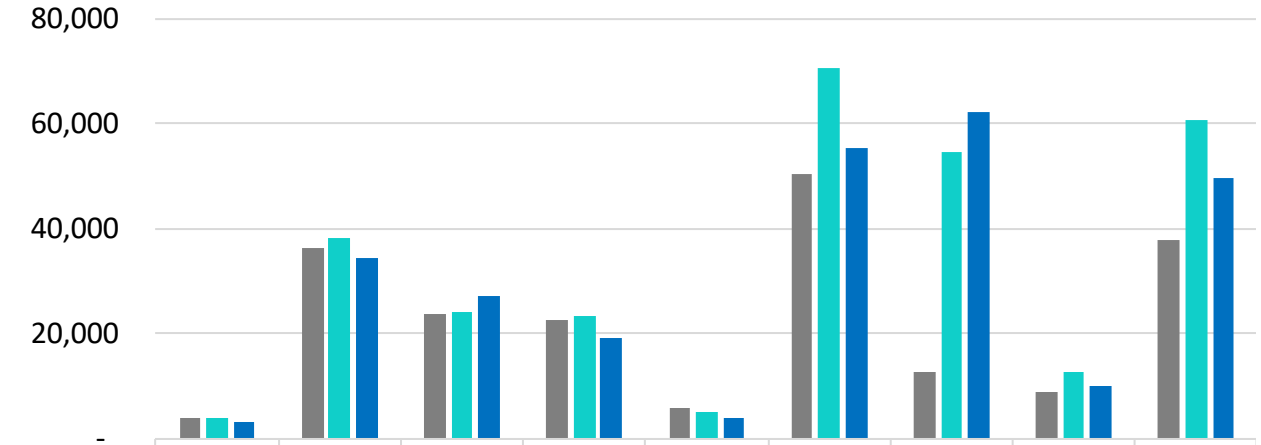
FIGURE 18 WSPP LGA 2016-2036 DWELLING GROWTH



	Blue Mountains	Camden	Campbell town	Fairfield	Hawkesbury	Liverpool	Penrith	Wollondilly	Blacktown
Base 2016-36	3,501	29,244	16,831	20,642	3,804	32,882	30,481	3,340	64,085
Opt1 2016-36	2,856	38,156	18,459	18,639	3,626	47,769	57,390	5,585	71,381
Opt2 2016-36	2,750	38,829	20,068	18,491	3,545	47,483	62,054	5,621	65,980

Source: SGS Economics and Planning

FIGURE 19 WSPP LGA 2036-2056 DWELLING GROWTH



	Blue Mountains	Camden	Campbell town	Fairfield	Hawkesbury	Liverpool	Penrith	Wollondilly	Blacktown
Base 2036-56	4,004	36,112	23,628	22,402	5,792	50,586	12,590	8,798	37,839
Opt1 2036-56	3,806	38,284	24,078	23,370	5,052	70,542	54,618	12,508	60,763
Opt2 2036-56	2,965	34,304	27,231	19,003	3,917	55,529	62,228	10,011	49,667

Source: SGS Economics and Planning

This total dwelling growth to 2036 is summarised in Table 9.

TABLE 11:WSPP LGA DWELLING GROWTH SUMMARY TO 2036

LGA	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
Blue Mountains (C)	34,733	38,234	3,501	37,589	2,856	37,483	2,750
Camden (A)	27,028	56,272	29,244	65,184	38,156	65,856	38,829
Campbelltown (C) (NSW)	56,732	73,563	16,831	75,191	18,459	76,801	20,068
Fairfield (C)	64,958	85,600	20,642	83,596	18,639	83,449	18,491
Hawkesbury (C)	25,010	28,814	3,804	28,636	3,626	28,555	3,545
Liverpool (C)	67,893	100,775	32,882	115,662	47,769	115,376	47,483
Penrith (C)	72,741	103,222	30,481	130,131	57,390	134,795	62,054
Wollondilly (A)	17,350	20,690	3,340	22,935	5,585	22,970	5,621
Blacktown (C)	114,581	178,666	64,085	185,962	71,381	180,561	65,980
WSPP	**481,025**	**685,835**	**204,810**	**744,887**	**263,861**	**745,846**	**264,821**

Source: SGS Economics and Planning

And further to 2056 with an additional 20 years of growth in Table 10.

TABLE 12:WSPP LGA DWELLING GROWTH SUMMARY TO 2056

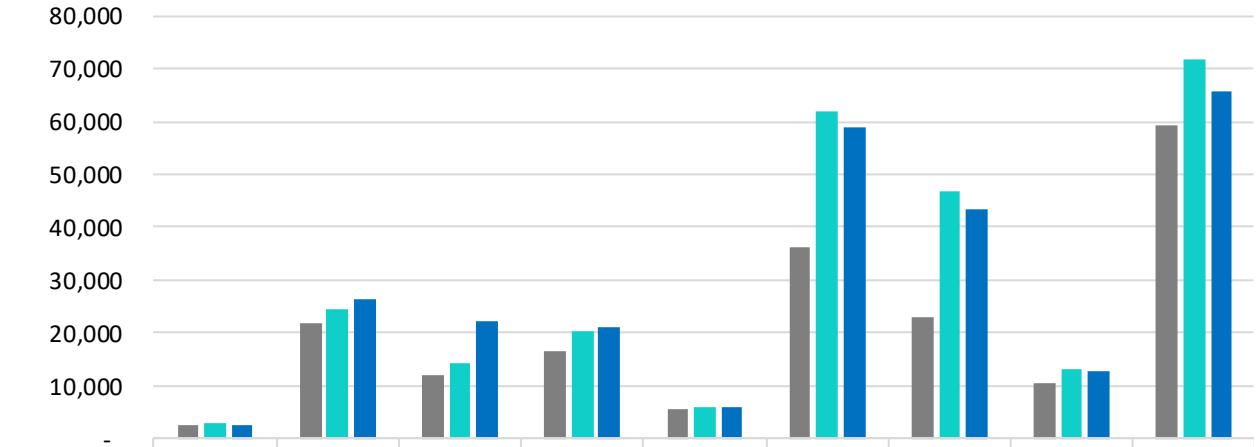
LGA	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Blue Mountains (C)	34,733	42,238	7,505	41,395	6,662	40,449	5,716
Camden (A)	27,028	92,384	65,356	103,468	76,440	100,160	73,132
Campbelltown (C) (NSW)	56,732	97,192	40,459	99,269	42,537	104,031	47,299
Fairfield (C)	64,958	108,002	43,045	106,966	42,008	102,451	37,494
Hawkesbury (C)	25,010	34,606	9,596	33,688	8,678	32,472	7,462
Liverpool (C)	67,893	151,361	83,468	186,204	118,311	170,904	103,012
Penrith (C)	72,741	115,812	43,071	184,748	112,008	197,023	124,282
Wollondilly (A)	17,350	29,488	12,138	35,443	18,093	32,982	15,632
Blacktown (C)	114,581	216,505	101,924	246,725	132,144	230,228	115,647
WSPP	**481,025**	**887,588**	**406,563**	**1,037,905**	**556,880**	**1,010,700**	**529,675**

Source: SGS Economics and Planning

Employment Growth

Employment shows the focus on the Aerotropolis with growth in Liverpool and Penrith LGAs to 2036 across both Option 1 and Option 2, with Liverpool LGA adding approximately 60,000 jobs in this period in both Option 1 and Option 2 compared to approximately 35,000 in the base case. In this period both the GIC options show strong jobs growth throughout the WSPP area.

FIGURE 20 WSPP LGA 2016-2036 EMPLOYMENT GROWTH

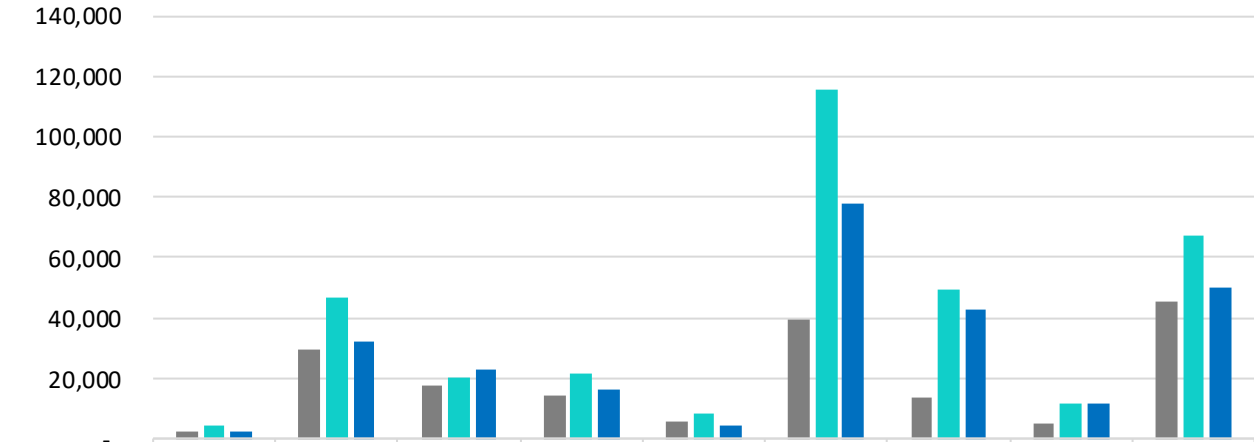


	Blue Mountains	Camden	Campbell town	Fairfield	Hawkesbury	Liverpool	Penrith	Wollondilly	Blacktown
Base 2016-36	2,616	21,793	12,032	16,612	5,614	36,174	22,884	10,527	59,238
Opt1 2016-36	3,049	24,267	14,069	20,256	5,823	62,067	46,663	13,110	71,619
Opt2 2016-36	2,623	26,360	22,139	21,114	6,026	58,988	43,471	12,877	65,693

Source: SGS Economics and Planning

The focus of employment growth post 2036 is even more focused in Liverpool, with the Aerotropolis becoming the key economic hub for the Western Parkland City. Jobs growth in Penrith LGA is less in this period as growth in Camden LGA increases to account for the further population growth in the entire south west region around the Aerotropolis and the South West Growth Area.

FIGURE 21 WSPP LGA 2036-2056 EMPLOYMENT GROWTH



	Blue Mountains	Camden	Campbell town	Fairfield	Hawkesbury	Liverpool	Penrith	Wollondilly	Blacktown
Base 2036-56	2,295	29,211	17,548	14,131	5,605	39,086	13,331	5,203	45,261
Opt1 2036-56	4,088	46,811	19,941	21,230	8,422	115,863	49,335	11,629	67,524
Opt2 2036-56	2,300	32,027	23,158	16,338	4,406	77,503	43,006	11,709	50,209

Source: SGS Economics and Planning

This total employment growth to 2036 is summarised in Table 9.

TABLE 13:WSPP LGA EMPLOYMENT GROWTH SUMMARY TO 2036

LGA	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
Blue Mountains (C)	21,300	23,917	2,616	24,350	3,049	23,923	2,623
Camden (A)	29,173	50,966	21,793	53,440	24,267	55,533	26,360
Campbelltown (C) (NSW)	57,040	69,072	12,032	71,109	14,069	79,179	22,139
Fairfield (C)	69,318	85,930	16,612	89,574	20,256	90,432	21,114
Hawkesbury (C)	28,838	34,452	5,614	34,661	5,823	34,864	6,026
Liverpool (C)	80,694	116,868	36,174	142,761	62,067	139,682	58,988
Penrith (C)	80,812	103,696	22,884	127,475	46,663	124,283	43,471
Wollondilly (A)	13,430	23,957	10,527	26,540	13,110	26,307	12,877
Blacktown (C)	127,244	186,482	59,238	198,862	71,619	192,937	65,693
WSPP	**507,849**	**695,340**	**187,491**	**768,772**	**260,923**	**745,846**	**237,997**

Source: SGS Economics and Planning

And further to 2056 with an additional 20 years of growth in Table 10.

TABLE 14:WSPP LGA EMPLOYMENT GROWTH SUMMARY TO 2056

LGA	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Blue Mountains (C)	21,300	26,212	4,912	28,437	7,137	26,224	4,923
Camden (A)	29,173	80,178	51,005	100,251	71,078	87,560	58,386
Campbelltown (C) (NSW)	57,040	86,620	29,580	91,050	34,010	102,336	45,296
Fairfield (C)	69,318	100,061	30,743	110,804	41,486	106,770	37,453
Hawkesbury (C)	28,838	40,058	11,219	43,083	14,245	39,270	10,432
Liverpool (C)	80,694	155,954	75,260	258,624	177,930	217,185	136,491
Penrith (C)	80,812	117,027	36,215	176,810	95,998	167,288	86,477
Wollondilly (A)	13,430	29,159	15,730	38,169	24,739	38,016	24,586
Blacktown (C)	127,244	231,743	104,499	266,387	139,143	243,146	115,902
WSPP	**507,849**	**867,013**	**359,163**	**1,113,616**	**605,766**	**1,027,796**	**519,947**

Source: SGS Economics and Planning

The below figures show the employment distribution across the WSPP for each scenario as well as the change between the base case and the GIC options 1 and 2.

FIGURE 22 WSPP 2036 EMPLOYMENT DISTRIBUTION BY SCENARIO

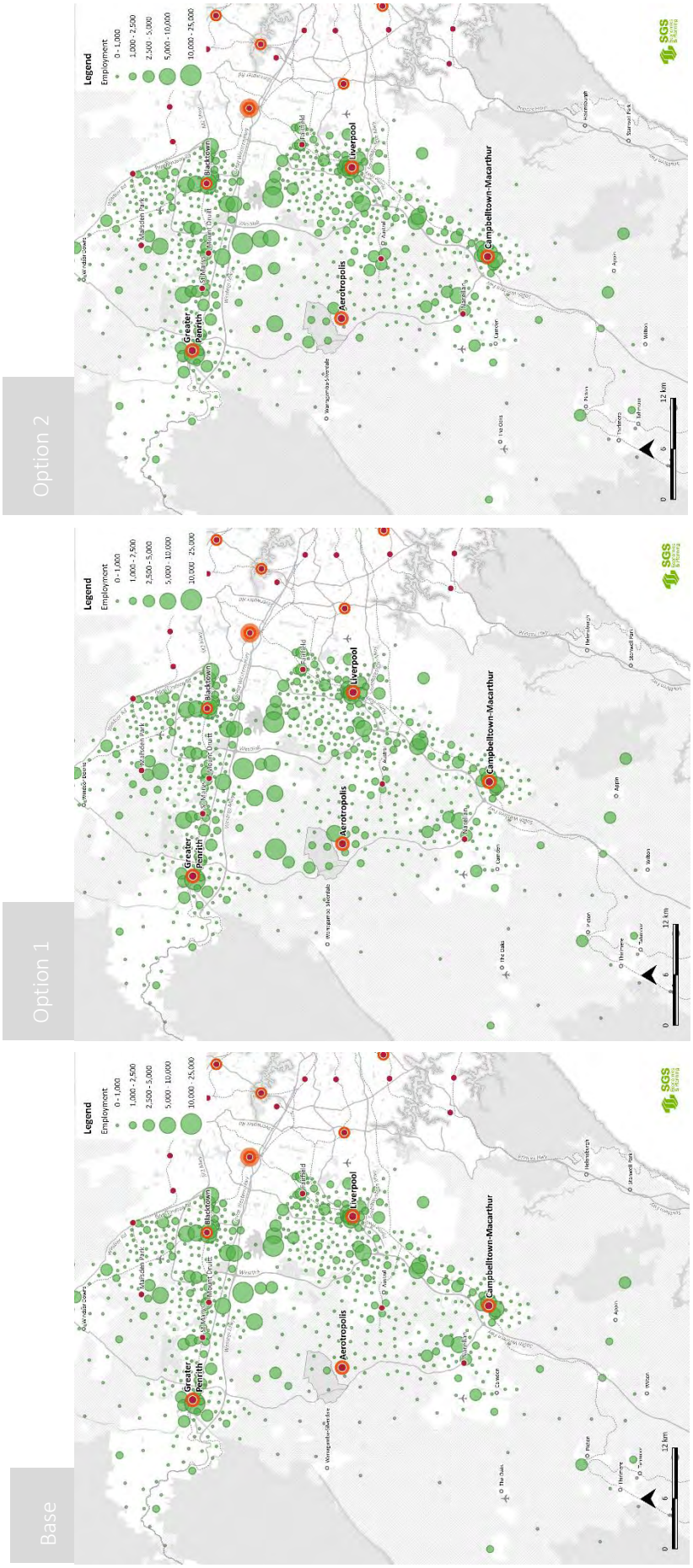
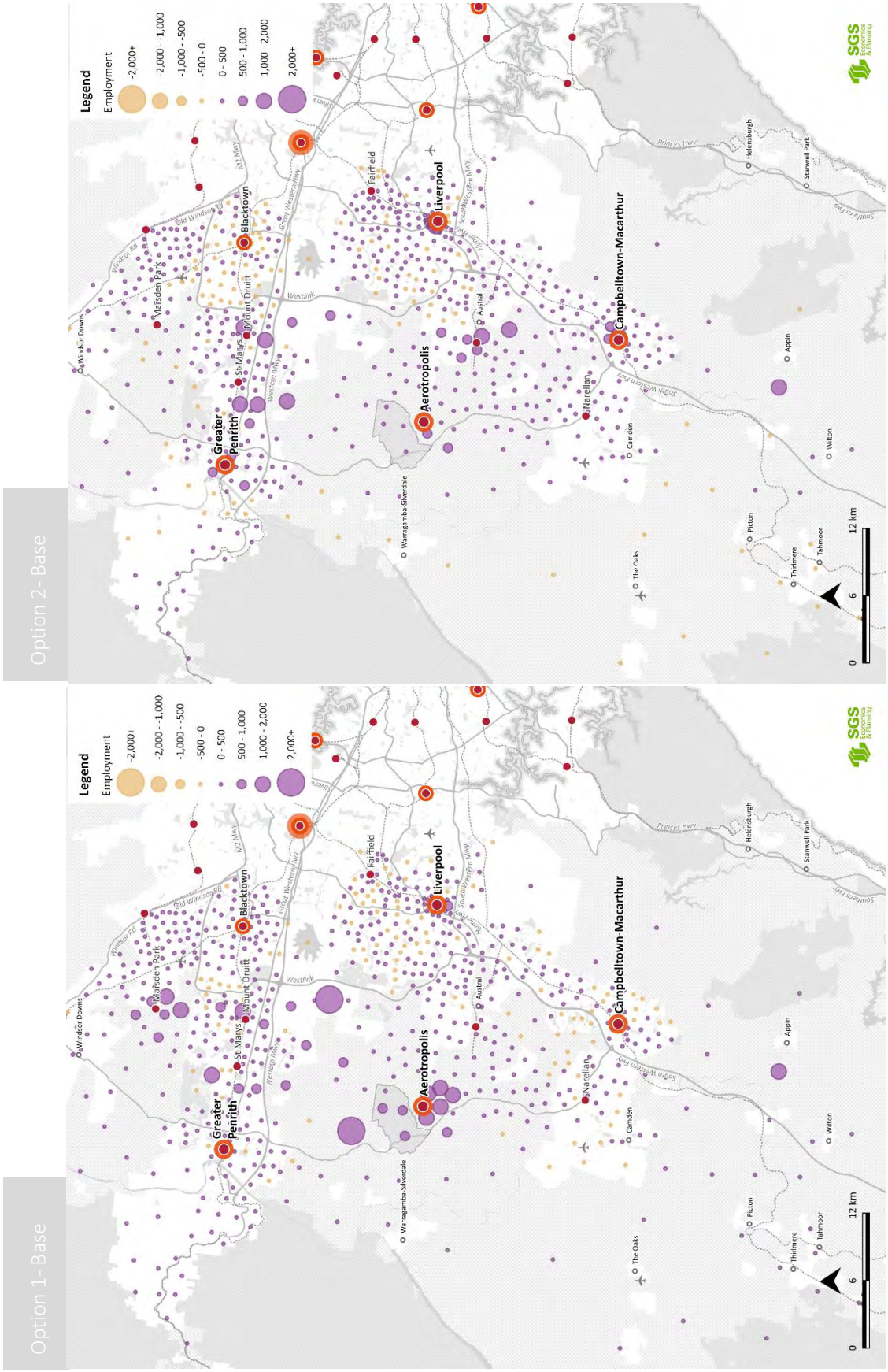


FIGURE 23 WSPP 2036 EMPLOYMENT DIFFERENCE TO BASE CASE

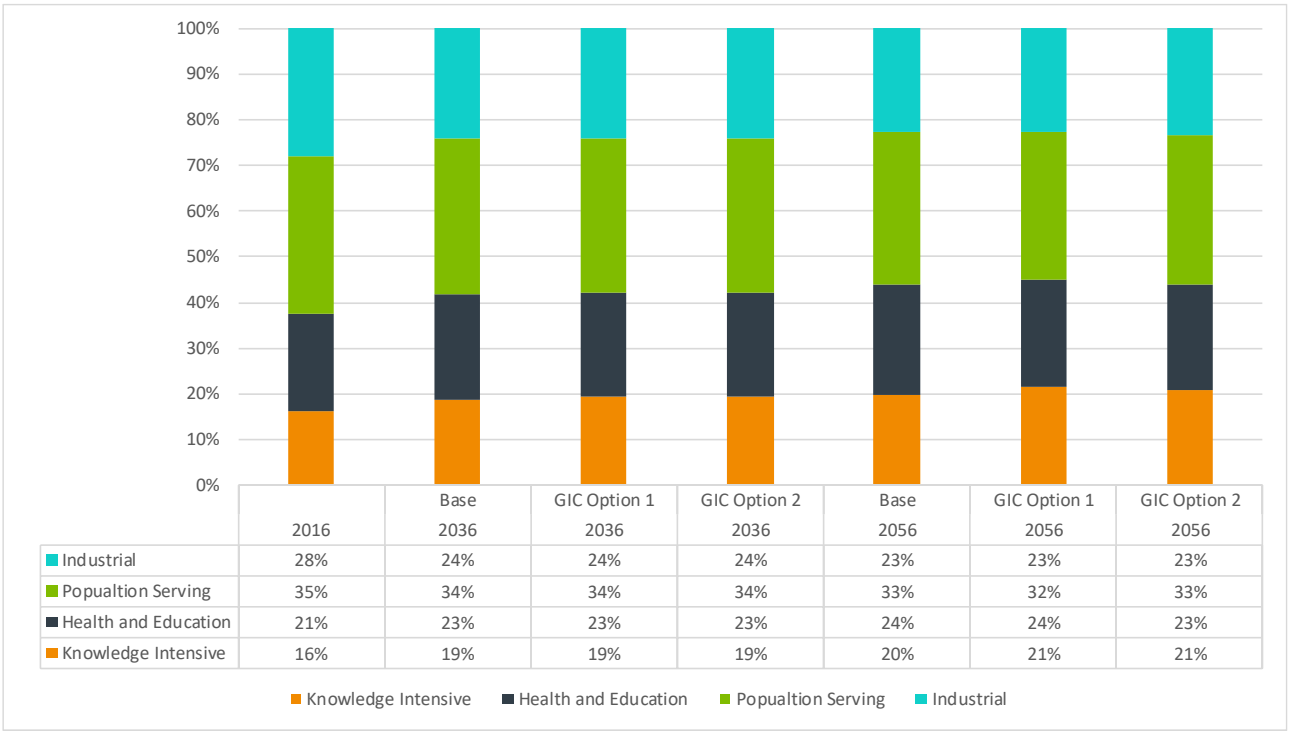


Employment by Industry

The employment forecasts for all scenarios were developed at a broad industry category level to reflect the scenario narratives related to the growth of the Western Parkland City.

Figure 24 shows a summary of the employment composition for the WSPP in 2016/2036/2056 for each scenario. It shows an increase in knowledge intensive jobs assumed for all scenarios of up to 5% by 2056 with a reciprocal reduction in industrial jobs. Population Serving jobs reduce slightly, while still growing overall to align with population growth and a higher proportion of health and education jobs. These reflect the shift in the Western Parkland City from an industrial focused employment area with much of the working population travelling east to other parts of Sydney for other types of employment, with change towards a Western Parkland City serving more as an economic hub focussed around the Western Sydney Airport and Aerotropolis.

FIGURE 24 WSPP EMPLOYMENT BY INDUSTRY SUMMARY



	2016	Base 2036	GIC Option 1 2036	GIC Option 2 2036	Base 2056	GIC Option 1 2056	GIC Option 2 2056
Industrial	28%	24%	24%	24%	23%	23%	23%
Popualtion Serving	35%	34%	34%	34%	33%	32%	33%
Health and Education	21%	23%	23%	23%	24%	24%	23%
Knowledge Intensive	16%	19%	19%	19%	20%	21%	21%

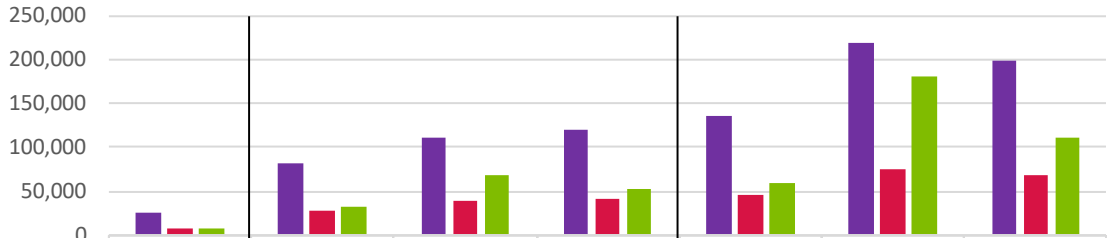
Source: SGS Economics and Planning

3.3 GIC #1 Overview

The 20 year and 40-year growth totals for the GIC #1 precincts is shown Figure 25, which highlight significant jobs growth under Option 1 post 2036. By 2056 there are an additional 68,000 jobs in the GIC#1 precincts in Option 1 compared with Option 2.

Population growth is higher in the first 20 years in Option 2 compared with Option 1 to 2036, reflective of growth in existing greenfield areas such as Austral, Leppington North, Edmondson Park and Glenfield. Post 2036, the growth in areas such as Rossmore and the Aerotropolis Core experience higher growth in this time in Option 1 compared with Option 2, such that by 2056 there are approximately 20,000 additional people in the GIC#1 area.

FIGURE 25 GIC #1 FORECAST SUMMARY



	2016	Base 2036	GIC Opt1 2036	GIC Opt2 2036	Base 2056	GIC Opt1 2056	GIC Opt2 2056
GIC 1 Population	25,292	81,394	111,266	120,957	136,229	218,653	199,360
GIC 1 Dwellings	8,337	27,632	38,360	41,128	46,030	73,993	67,353
GIC 1 Employment	8,014	31,928	68,742	53,505	59,005	179,908	111,246

Source: SGS Economics and Planning

Table 15 shows the proportions of Option 1 for the base case and Option 2 at 2036 and 2056. It shows that the base case compared with Option 1 has less than half of jobs in 2036 and a third of jobs by 2056.

Option 2 jobs are approximately 80% of Option 1 at 2036 with a 9% higher population, this jobs to 9% lower by 2056 with jobs reducing to 62%.

TABLE 15: GIC #1 SCENARIO PROPORTIONS SUMMARY

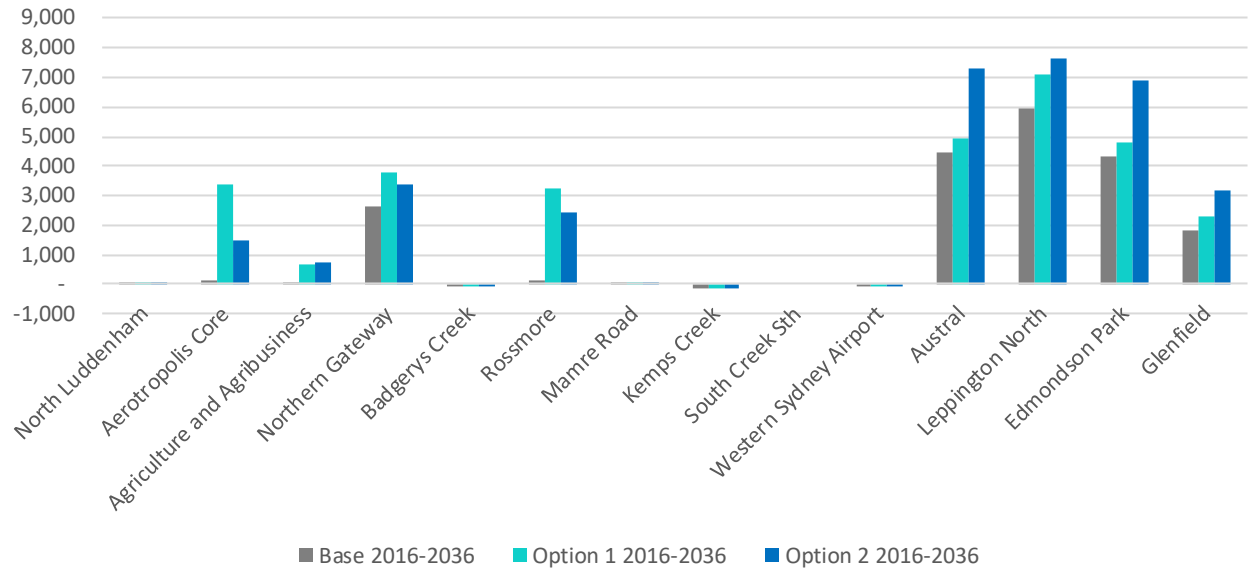
Proportion of Option 1	**Population**	**Employment**
Base 2036	73%	46%
Base 2056	62%	33%
Option 2 2036	109%	78%
Option 2 2056	91%	62%

The following section provides a precinct level breakdown of the forecasts.

GIC #1 Precinct Comparison - Population

Comparing the first 20 years of population growth, Option 1 is focused on the Aerotropolis core whereas Option 2 is focused on existing centres and developing greenfield areas such as Austral, Leppington North, Edmondson Park and Glenfield. Note the negative population growth shown in Figures 24 and 25, and Tables 16 and 17 reflect the transition of rural residential to employment lands.

FIGURE 26 GIC #1 PRECINCT 2016-2036 POPULATION GROWTH

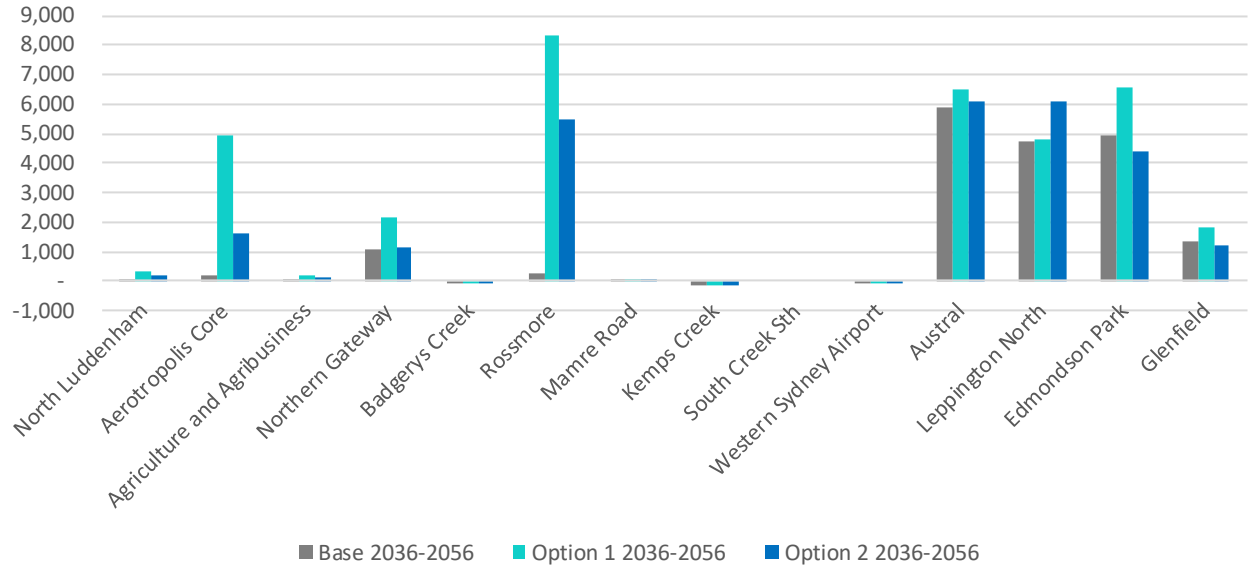


Source: SGS Economics and Planning

In the second 20 years of the forecast, growth drops in these more established areas in Option 2 compared to Option 1, with people wanting to live close to the developing Aerotropolis Core and surrounding employment precincts.

The development of Rossmore occurs during this time, with approximately 25,000 additional people added to the precinct in Option 1 between 2036 and 2056, and the Aerotropolis Core adding approximately 15,000 people.

FIGURE 27 GIC #1 PRECINCT 2036-2056 POPULATION GROWTH



Source: SGS Economics and Planning

Table 16 shows population growth by precinct to 2036. This highlights growth being focused initially in Austral, Leppington North, Edmondson Park, Glenfield and the Northern Gateway. Growth in the Aerotropolis Core and the Northern Gateway is higher in Option 1.

TABLE 16: GIC #1 PRECINCT POPULATION SUMMARY TO 2036

Precinct	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
North Luddenham	103	135	+31	198	+94	143	+39
Aerotropolis Core	1,278	1,593	+315	10,130	+8852	4,885	+3607
Agriculture and Agribusiness	1,722	1,869	+147	3,319	+1597	3,436	+1713
Northern Gateway	246	7,414	+7167	10,263	+10017	9,482	+9236
Badgerys Creek	200	47	-153	53	-147	48	-152
Rossmore	2,410	2,836	+426	12,555	+10146	10,029	+7620
Mamre Road	211	214	+2	235	+24	234	+22
Kemps Creek	1,422	1,058	-364	1,088	-333	1,066	-356
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	53	5	-48	5	-48	6	-47
Austral	1,673	14,333	+12660	15,739	+14066	22,389	+20716
Leppington North	2,038	18,362	+16324	21,127	+19089	23,166	+21128
Edmondson Park	4,010	18,325	+14316	20,029	+16019	26,877	+22867
Glenfield	9,926	15,205	+5279	16,524	+6598	19,195	+9269
Total	**25,292**	**81,394**	**56,102**	**111,266**	**85,975**	**120,957**	**95,665**

Source: SGS Economics and Planning

Table 17 highlights the higher growth in Option 2 in Austral, Leppington North, Edmondson Park and Glenfield, with 126,000 additional people compared with 115,000 in Option 1. Also shows the higher growth in Option 1 at the Aerotropolis Core and Rossmore with 60,000 additional people compared with 33,000 in Option 2. There are some precincts with a reduction in population due to the conversion of rural residential land to employment uses.

TABLE 17: GIC #1 PRECINCT POPULATION SUMMARY TO 2056

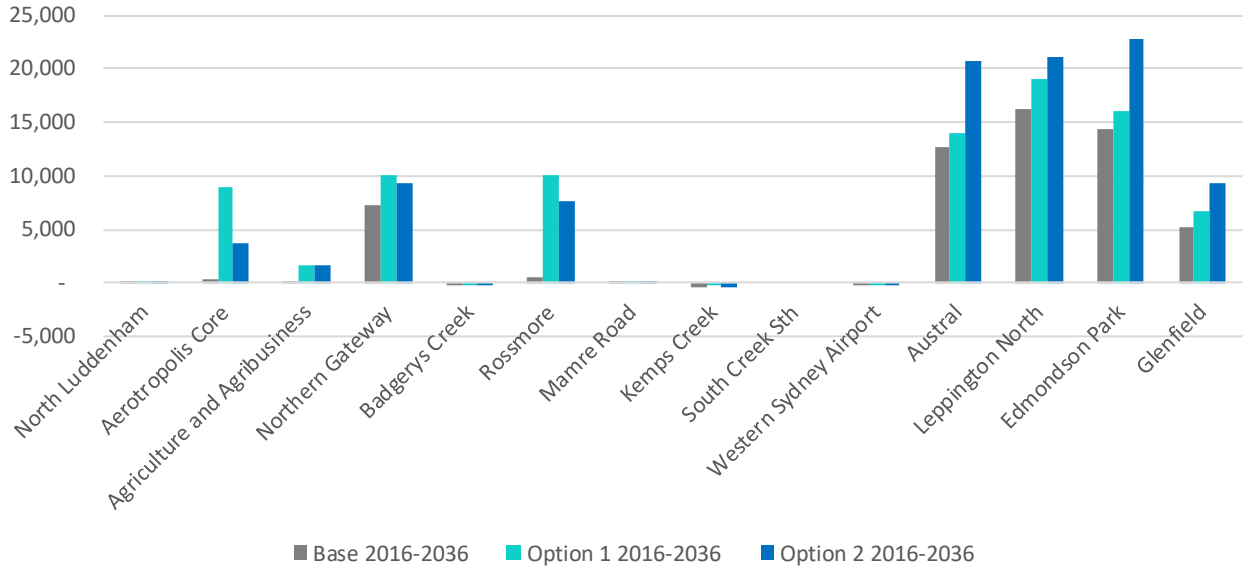
Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
North Luddenham	103	151	+48	948	+845	528	+425
Aerotropolis Core	1,278	2,088	+810	23,812	+22534	9,373	+8095
Agriculture and Agribusiness	1,722	1,904	+182	3,800	+2078	3,809	+2087
Northern Gateway	246	10,486	+10240	16,544	+16297	12,684	+12438
Badgerys Creek	200	16	-184	26	-174	26	-174
Rossmore	2,410	3,723	+1313	39,234	+36825	27,450	+25041
Mamre Road	211	217	+6	283	+72	272	+61
Kemps Creek	1,422	644	-777	648	-774	733	-689
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	53	4	-49	4	-49	5	-48
Austral	1,673	32,074	+30401	35,452	+33779	40,949	+39276
Leppington North	2,038	31,377	+29339	34,637	+32599	39,598	+37560
Edmondson Park	4,010	34,530	+30520	41,732	+37722	41,213	+37203
Glenfield	9,926	19,015	+9089	21,534	+11608	22,719	+12793
Total	**25,292**	**136,229**	**110,937**	**218,653**	**193,361**	**199,360**	**174,068**

Source: SGS Economics and Planning

GIC #1 Precinct Comparison - Dwellings

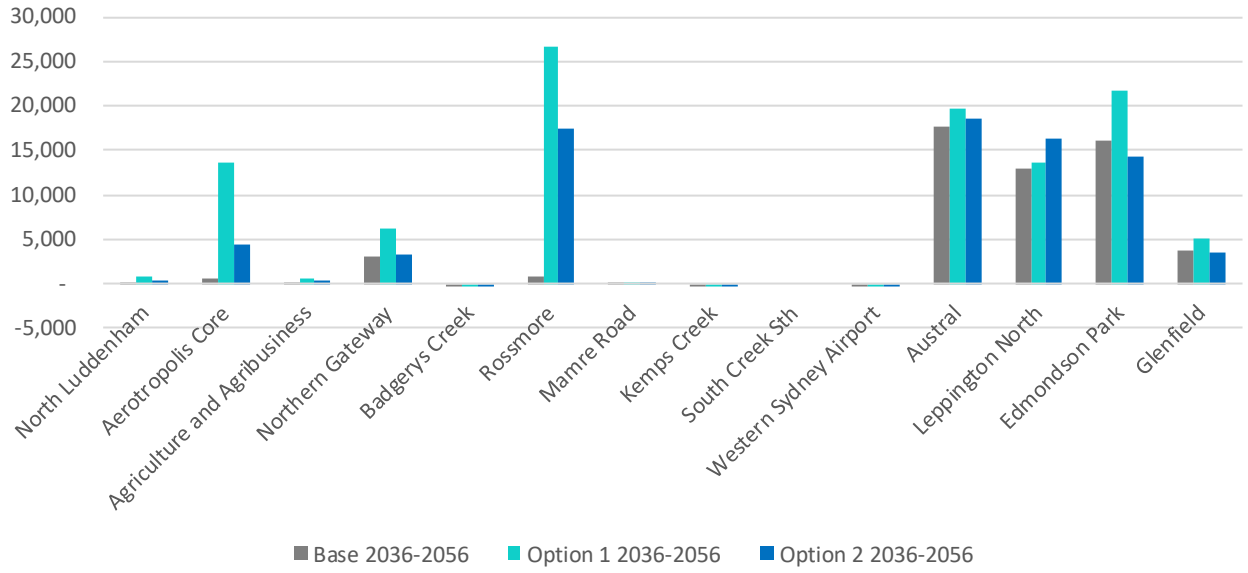
Summary statistics of dwelling changes across the GIC #1 precincts aligned to the population changes are shown below.

FIGURE 28 GIC #1 PRECINCT 2016-2036 DWELLING GROWTH



Source: SGS Economics and Planning

FIGURE 29 GIC #1 PRECINCT 2036-2056 DWELLING GROWTH



Source: SGS Economics and Planning

TABLE 18: GIC #1 PRECINCT DWELLING SUMMARY TO 2036

Precinct	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
North Luddenham	35	51	+16	81	+46	56	+20
Aerotropolis Core	373	499	+126	3,747	+3374	1,823	+1450
Agriculture and Agribusiness	607	670	+63	1,288	+681	1,327	+720
Northern Gateway	80	2,692	+2612	3,840	+3760	3,441	+3362
Badgerys Creek	72	16	-56	18	-54	16	-57
Rossmore	756	890	+134	3,974	+3217	3,150	+2394
Mamre Road	51	53	+1	63	+12	63	+11
Kemps Creek	451	323	-128	333	-118	326	-125
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	26	3	-23	3	-23	3	-22
Austral	628	5,064	+4436	5,557	+4929	7,912	+7284
Leppington North	744	6,722	+5978	7,838	+7094	8,366	+7623
Edmondson Park	1,211	5,507	+4296	6,017	+4806	8,140	+6929
Glenfield	3,302	5,141	+1838	5,600	+2298	6,505	+3203
Total	**8,337**	**27,632**	**19,295**	**38,360**	**30,024**	**41,128**	**32,792**

Source: SGS Economics and Planning

TABLE 19: GIC #1 PRECINCT DWELLING SUMMARY TO 2056

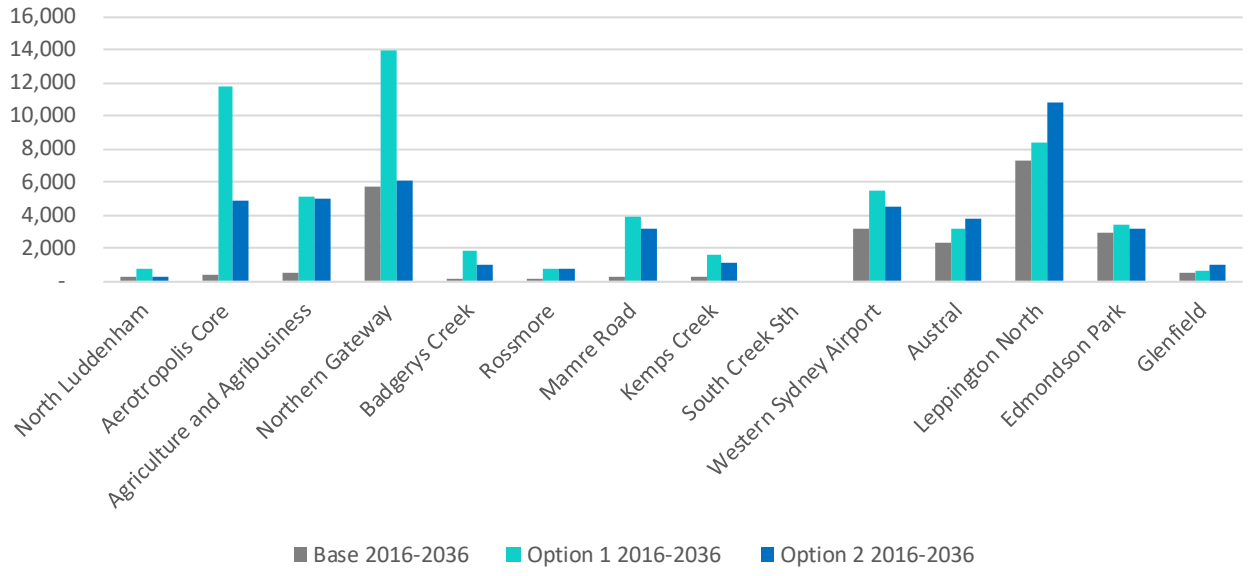
Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
North Luddenham	35	59	+24	432	+397	236	+201
Aerotropolis Core	373	679	+306	8,700	+8327	3,434	+3060
Agriculture and Agribusiness	607	683	+76	1,476	+869	1,467	+859
Northern Gateway	80	3,800	+3720	6,036	+5957	4,560	+4480
Badgerys Creek	72	4	-68	6	-67	6	-66
Rossmore	756	1,170	+413	12,334	+11578	8,629	+7873
Mamre Road	51	53	+2	71	+19	68	+17
Kemps Creek	451	190	-261	192	-259	219	-232
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	26	2	-23	2	-23	3	-23
Austral	628	10,940	+10313	12,086	+11459	14,001	+13374
Leppington North	744	11,475	+10731	12,667	+11923	14,486	+13743
Edmondson Park	1,211	10,472	+9261	12,595	+11384	12,507	+11296
Glenfield	3,302	6,503	+3200	7,395	+4093	7,738	+4436
Total	**8,337**	**46,030**	**37,693**	**73,993**	**65,656**	**67,353**	**59,016**

Source: SGS Economics and Planning

GIC #1 Precinct Comparison - Employment

The employment breakdown by precinct shows the significant growth in Option 1 at the Aerotropolis Core and Northern Gateway initially, as well as at Western Sydney Airport itself. Under Option 2, with less focus on the Aerotropolis, Leppington North picks up additional jobs with a focus on that being a key employment centre.

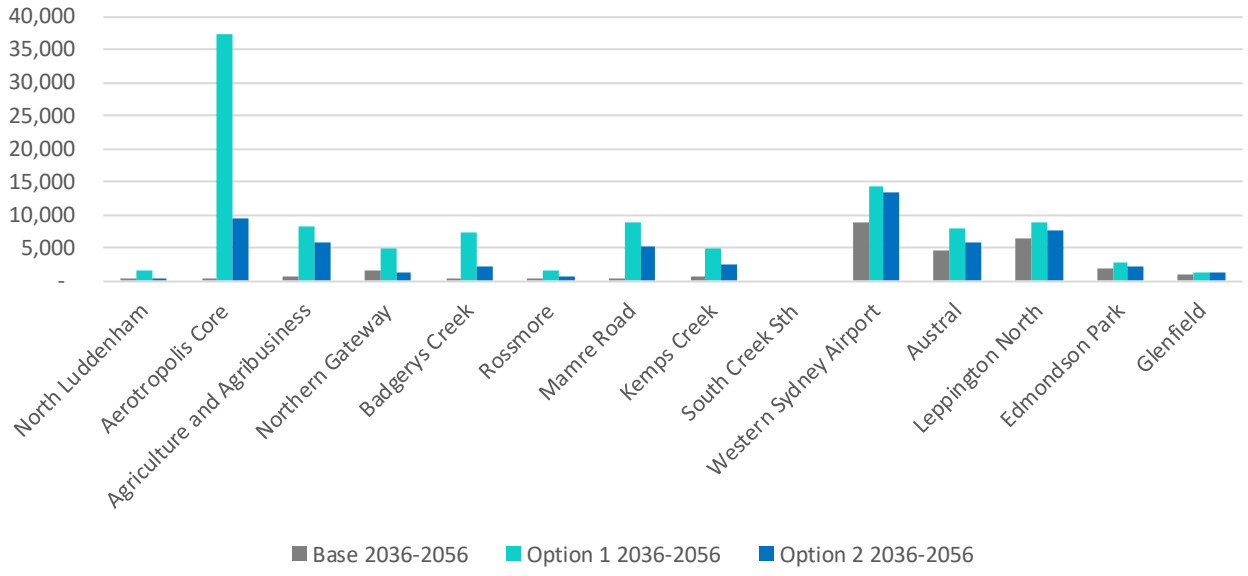
FIGURE 30 GIC #1 PRECINCT 2016-2036 EMPLOYMENT GROWTH



Source: SGS Economics and Planning

Between 2036 and 2056, jobs growth in Option 1 is dominated by the Aerotropolis Core with further development around other Aerotropolis precincts, with minimal change in established centres with additional job growth drawn from outside the Western City District.

FIGURE 31 GIC #1 PRECINCT 2036-2056 EMPLOYMENT GROWTH



Source: SGS Economics and Planning

Table 19 shows a summary of population growth by precinct to 2036 showing the strong growth in the Aerotropolis Core and the Northern Gateway during this time with Option 1 jobs growth more than double that of Option 2. Higher jobs growth is seen in Option 2 at Austral, Leppington North and Glenfield.

TABLE 20: GIC #1 PRECINCT EMPLOYMENT SUMMARY TO 2036

Precinct	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
North Luddenham	73	365	+292	798	+724	391	+318
Aerotropolis Core	604	998	+394	12,431	+11827	5,530	+4926
Agriculture and Agribusiness	330	849	+519	5,405	+5075	5,314	+4984
Northern Gateway	221	5,989	+5768	14,129	+13908	6,328	+6107
Badgerys Creek	154	249	+94	1,998	+1844	1,089	+935
Rossmore	848	920	+71	1,648	+800	1,574	+725
Mamre Road	524	816	+291	4,479	+3954	3,653	+3129
Kemps Creek	845	1,161	+316	2,391	+1546	1,913	+1068
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	8	3,210	+3202	5,540	+5532	4,526	+4518
Austral	425	2,715	+2290	3,542	+3117	4,171	+3746
Leppington North	1,220	8,505	+7285	9,593	+8373	12,023	+10802
Edmondson Park	373	3,242	+2870	3,820	+3448	3,591	+3219
Glenfield	2,387	2,910	+522	2,968	+581	3,402	+1014
Total	**8,014**	**31,928**	**23,914**	**68,742**	**60,729**	**53,505**	**45,492**

Source: SGS Economics and Planning

Table 21 highlight the higher growth in Aerotropolis Core in Option 1 with almost 50,000 jobs compared to approximately 14,000 in Option 2. Other precincts such as the Northern Gateway, Badgerys Creek and Mamre Road have higher job totals in Option 1 as well.

TABLE 21: GIC #1 PRECINCT EMPLOYMENT SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
North Luddenham	73	451	+378	2,349	+2276	812	+739
Aerotropolis Core	604	1,467	+862	49,928	+49323	14,894	+14289
Agriculture and Agribusiness	330	1,457	+1127	13,844	+13514	11,093	+10763
Northern Gateway	221	7,619	+7399	19,069	+18848	7,620	+7399
Badgerys Creek	154	434	+280	9,420	+9265	3,206	+3051
Rossmore	848	976	+128	3,360	+2511	2,237	+1389
Mamre Road	524	1,354	+829	13,416	+12892	8,817	+8292
Kemps Creek	845	1,807	+962	7,382	+6537	4,438	+3593
South Creek Sth	0	0	0	0	0	0	0
Western Sydney Airport	8	12,236	+12228	20,043	+20035	17,887	+17879
Austral	425	7,276	+6851	11,603	+11178	10,142	+9718
Leppington North	1,220	14,963	+13743	18,413	+17193	19,572	+18352
Edmondson Park	373	5,100	+4728	6,823	+6451	5,882	+5510
Glenfield	2,387	3,866	+1478	4,258	+1870	4,646	+2259
Total	**8,014**	**59,005**	**50,991**	**179,908**	**171,894**	**111,246**	**103,232**

Source: SGS Economics and Planning

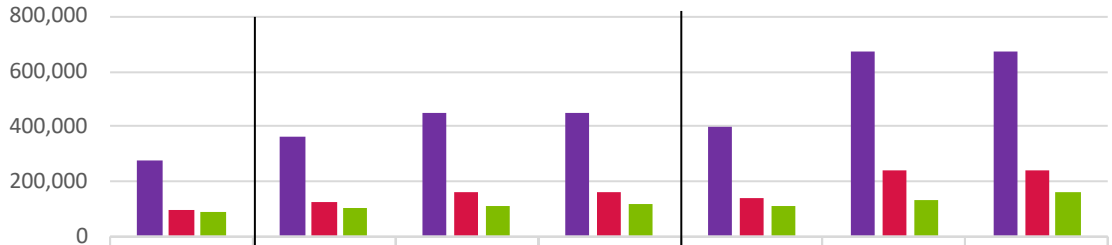
3.4 GIC #2 Overview

Forecasts for the GIC #2 precincts are based directly on inputs provided by the GSC, this is discussed further in Section 4.2. Precinct and Travel Zone growth figures from the inputs provided were applied to 2016 base year numbers from the co-design process, with other areas within the Western City District (other than the GIC#1 area) adjusted to accommodate the GIC #2 precinct growth forecasts to ensure Western City District totals for population and jobs from the co-design process remain the same.

Growth in the GIC #2 area in this dataset is significant with growth assumed due to the provision of Sydney Metro Greater West (both Stage 1 and its northern extension) and assumptions around future land releases of greenfield areas and urban renewal areas such as the Luxford precinct.

Figure 32 shows a comparison of the scenario forecasts with significant population growth and minimal associated jobs growth, especially post 2036. The assumption here is that this population will have employment opportunities in the Aerotropolis growth area or other existing metropolitan and strategic centres. In the GIC #2 precincts, Option 2 has a higher population, dwelling and jobs total by 2056 reflective of less growth at the Aerotropolis, highlighted by an additional 25,000 jobs compared to Option 1.

FIGURE 32 GIC #2 FORECAST SUMMARY



	2016	Base 2036	Option1 2036	Option2 2036	Base 2056	Option1 2056	Option2 2056
GIC 2 Population	273,648	359,146	445,421	445,860	397,065	668,919	675,146
GIC 2 Dwellings	95,634	126,540	162,238	162,673	139,516	240,862	243,269
GIC 2 Employment	86,054	100,317	110,695	120,457	109,454	135,476	160,665

Source: SGS Economics and Planning

Table 22 shows the proportions of Option 1 for the base case and Option 2 at 2036 and 2056. It shows that jobs across the scenarios are relatively similar with 19% less jobs in the base case by 2056. Population shows a more pronounced difference with 41% less people in the base case compared to Option 1 by 2056.

As mentioned, Option 2 population and jobs are higher than Option 1 for both 2036 and 2056.

TABLE 22: GIC #2 SCENARIO PROPORTIONS SUMMARY

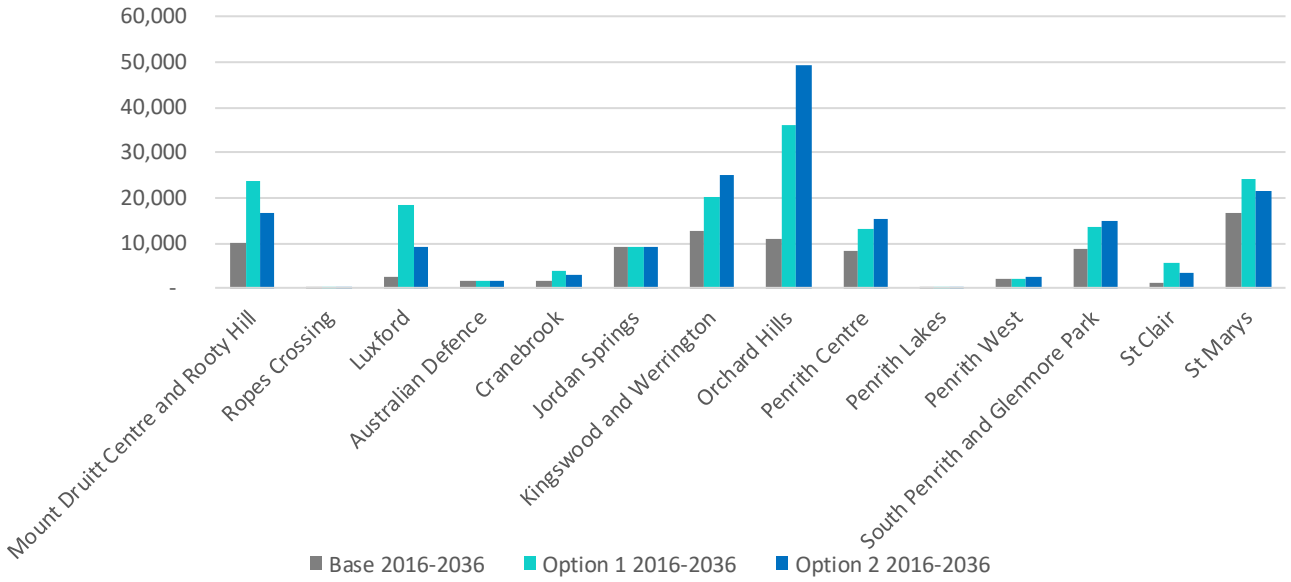
Proportion of Option 1	Population	Employment
Base 2036	81%	91%
Base 2056	59%	81%
Option 2 2036	100%	109%
Option 2 2056	101%	119%

The following section provides a precinct level breakdown of the forecasts.

GIC #2 Precinct Comparison - Population

Comparing the population growth by precinct in Figure 33 shows the expected growth led by the Orchard Hills precinct, particularly in Option 2. Further growth is seen in Luxford precinct, most notably in Option 1, as well as at Mount Druitt Centre and Kingswood/Werrington in the first 20 years as well as St Marys with the connection to Sydney Metro Greater West Stage 1.

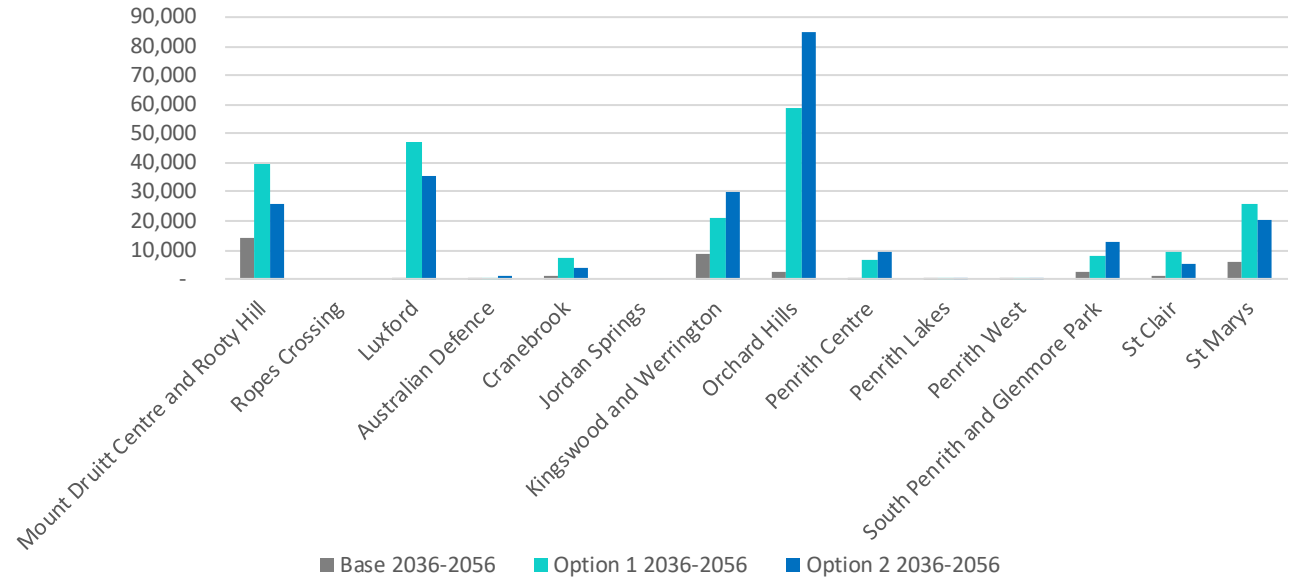
FIGURE 33 GIC #2 PRECINCT 2016-2036 POPULATION GROWTH



Source: SGS Economics and Planning

In the next 20 years as shown in Figure 34, the same precincts (Luxford Mount Druitt Centre Kingswood/Werrington, St Marys) continue to grow strongly with 85,000 additional people in Orchard Hills in Option 2 compared with 58,000 in Option 1, and only 2,300 in the base case.

FIGURE 34 GIC #2 PRECINCT 2036-2056 POPULATION GROWTH



Source: SGS Economics and Planning

Table 23 shows a summary of the population growth to 2036 in tabular format which shows the same trends as mentioned regarding Figure 33.

TABLE 23: GIC #2 PRECINCT POPULATION SUMMARY TO 2036

Precinct	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
Mount Druitt Centre and Rooty Hill	39,161	49,445	+10284	62,839	+23678	55,924	+16763
Ropes Crossing	6,324	6,462	+138	6,462	+138	6,462	+138
Luxford	61,422	63,991	+2569	79,678	+18256	70,740	+9318
Australian Defence	123	1,641	+1518	1,641	+1518	1,641	+1518
Cranebrook and Werrington Downs	28,251	29,903	+1652	32,322	+4071	31,276	+3024
Jordan Springs	5,303	14,326	+9023	14,322	+9019	14,326	+9023
Kingswood and Werrington	19,306	31,858	+12552	39,494	+20188	44,518	+25212
Orchard Hills	4,536	15,342	+10806	40,540	+36004	54,083	+49547
Penrith Centre	9,338	17,431	+8093	22,579	+13242	24,789	+15451
Penrith Lakes	1,731	1,771	+41	1,771	+41	1,785	+54
Penrith West	3,655	5,948	+2293	5,980	+2325	6,022	+2367
South Penrith and Glenmore Park	38,868	47,498	+8630	52,284	+13416	53,625	+14757
St Clair	27,209	28,313	+1104	32,682	+5473	30,619	+3410
St Marys	28,423	45,217	+16794	52,826	+24403	50,051	+21628
Total	**273,648**	**359,146**	**85,498**	**445,421**	**171,773**	**445,860**	**172,211**

Source: SGS Economics and Planning

Table 24 shows a summary of the population growth to 2056 in tabular format.

TABLE 24: GIC #2 PRECINCT POPULATION SUMMARY TO 2056

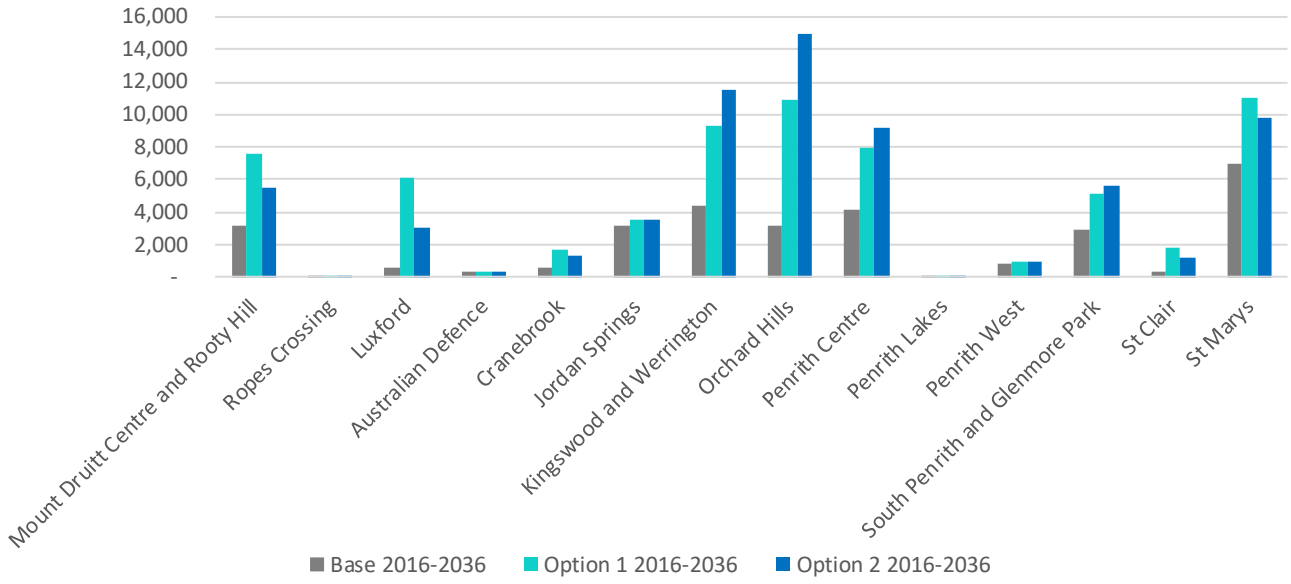
Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Mount Druitt Centre and Rooty Hill	39,161	63,734	+24573	102,126	+62965	81,513	+42352
Ropes Crossing	6,324	6,462	+138	6,462	+138	6,462	+138
Luxford	61,422	64,723	+3301	127,121	+65699	106,153	+44731
Australian Defence	123	1,969	+1847	2,008	+1886	2,807	+2684
Cranebrook and Werrington Downs	28,251	30,738	+2487	39,910	+11659	35,223	+6972
Jordan Springs	5,303	14,326	+9023	14,322	+9019	14,325	+9022
Kingswood and Werrington	19,306	40,722	+21416	60,372	+41067	74,126	+54820
Orchard Hills	4,536	17,693	+13158	99,053	+94517	139,080	+134544
Penrith Centre	9,338	17,881	+8544	28,944	+19606	34,104	+24767
Penrith Lakes	1,731	1,792	+61	1,804	+73	1,814	+83
Penrith West	3,655	6,218	+2563	6,372	+2717	6,544	+2889
South Penrith and Glenmore Park	38,868	49,815	+10947	60,375	+21507	66,298	+27430
St Clair	27,209	29,747	+2538	41,712	+14503	36,056	+8847
St Marys	28,423	51,245	+22821	78,338	+49915	70,642	+42219
Total	**273,648**	**397,065**	**123,417**	**668,919**	**395,271**	**675,146**	**401,498**

Source: SGS Economics and Planning

GIC #2 Precinct Comparison - Dwellings

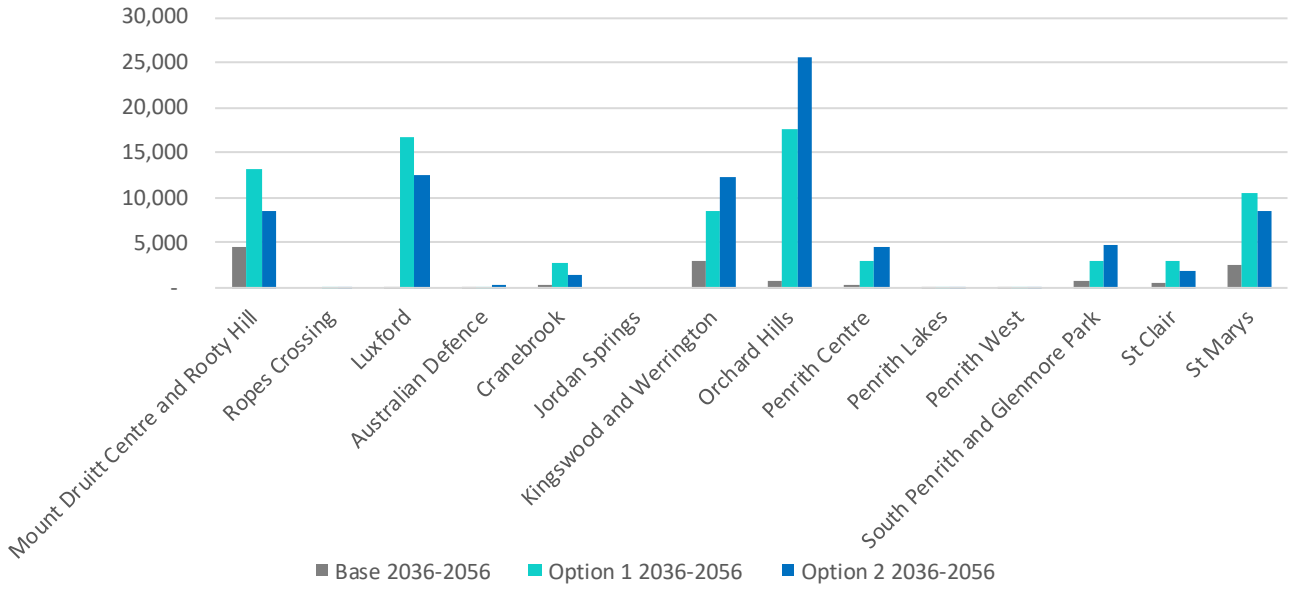
Summary statistics of dwelling changes across the GIC #2 precincts to support the population growth and reflect land use changes under each scenario are shown below.

FIGURE 35 GIC #2 PRECINCT 2016-2036 DWELLING GROWTH



Source: SGS Economics and Planning

FIGURE 36 GIC #2 PRECINCT 2036-2056 DWELLING GROWTH



Source: SGS Economics and Planning

TABLE 25: GIC #2 PRECINCT DWELLING SUMMARY TO 2036

Precinct	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
Mount Druitt Centre and Rooty Hill	12,175	15,311	+3136	19,821	+7646	17,623	+5448
Ropes Crossing	1,988	2,018	+30	2,039	+52	2,039	+52
Luxford	19,957	20,601	+643	26,024	+6067	22,973	+3016
Australian Defence	30	399	+369	430	+399	430	+399
Cranebrook and Werrington Downs	10,195	10,797	+602	11,857	+1662	11,476	+1281
Jordan Springs	1,862	5,030	+3168	5,433	+3571	5,435	+3572
Kingswood and Werrington	7,565	11,952	+4387	16,927	+9362	19,086	+11521
Orchard Hills	1,438	4,636	+3198	12,315	+10877	16,399	+14961
Penrith Centre	4,762	8,965	+4203	12,711	+7949	13,906	+9144
Penrith Lakes	622	636	+15	744	+122	750	+128
Penrith West	1,711	2,554	+843	2,662	+951	2,677	+966
South Penrith and Glenmore Park	13,413	16,373	+2960	18,565	+5152	19,023	+5610
St Clair	8,802	9,148	+347	10,631	+1829	9,961	+1159
St Marys	11,114	18,120	+7006	22,079	+10965	20,895	+9781
Total	**95,634**	**126,540**	**30,906**	**162,238**	**66,604**	**162,673**	**67,039**

Source: SGS Economics and Planning

TABLE 26: GIC #2 PRECINCT DWELLING SUMMARY TO 2056

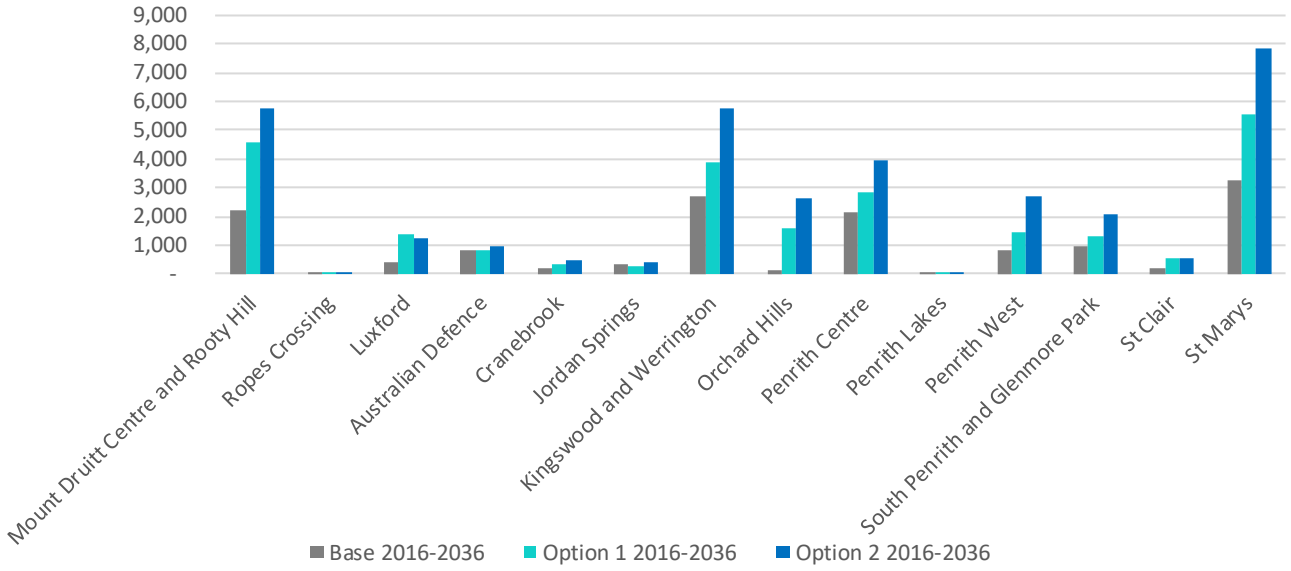
Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Mount Druitt Centre and Rooty Hill	12,175	19,758	+7583	32,900	+20725	26,201	+14026
Ropes Crossing	1,988	2,018	+30	2,144	+156	2,144	+156
Luxford	19,957	20,826	+869	42,811	+22854	35,571	+15614
Australian Defence	30	479	+449	505	+475	706	+676
Cranebrook and Werrington Downs	10,195	11,103	+908	14,644	+4449	12,922	+2727
Jordan Springs	1,862	5,030	+3168	5,429	+3567	5,430	+3568
Kingswood and Werrington	7,565	15,052	+7487	25,513	+17947	31,334	+23768
Orchard Hills	1,438	5,328	+3890	29,916	+28478	41,980	+40542
Penrith Centre	4,762	9,199	+4437	15,691	+10929	18,518	+13756
Penrith Lakes	622	644	+22	757	+136	761	+140
Penrith West	1,711	2,654	+943	2,734	+1022	2,794	+1083
South Penrith and Glenmore Park	13,413	17,176	+3763	21,608	+8195	23,807	+10394
St Clair	8,802	9,611	+810	13,600	+4798	11,760	+2958
St Marys	11,114	20,637	+9523	32,611	+21497	29,341	+18227
Total	**95,634**	**139,516**	**43,882**	**240,862**	**145,228**	**243,269**	**147,634**

Source: SGS Economics and Planning

GIC #2 Precinct Comparison - Employment

Jobs growth is concentrated around the established centre of St Marys as well as Mount Druitt Centre and Kingswood/Werrington with continued growth in Penrith Centre between 2016-2036 in both Option 1 and Option 2. There are an additional 10,000 jobs across the GIC#2 area in Option 2 compared with Option 1 by 2036 which results in the higher job totals across many precincts.

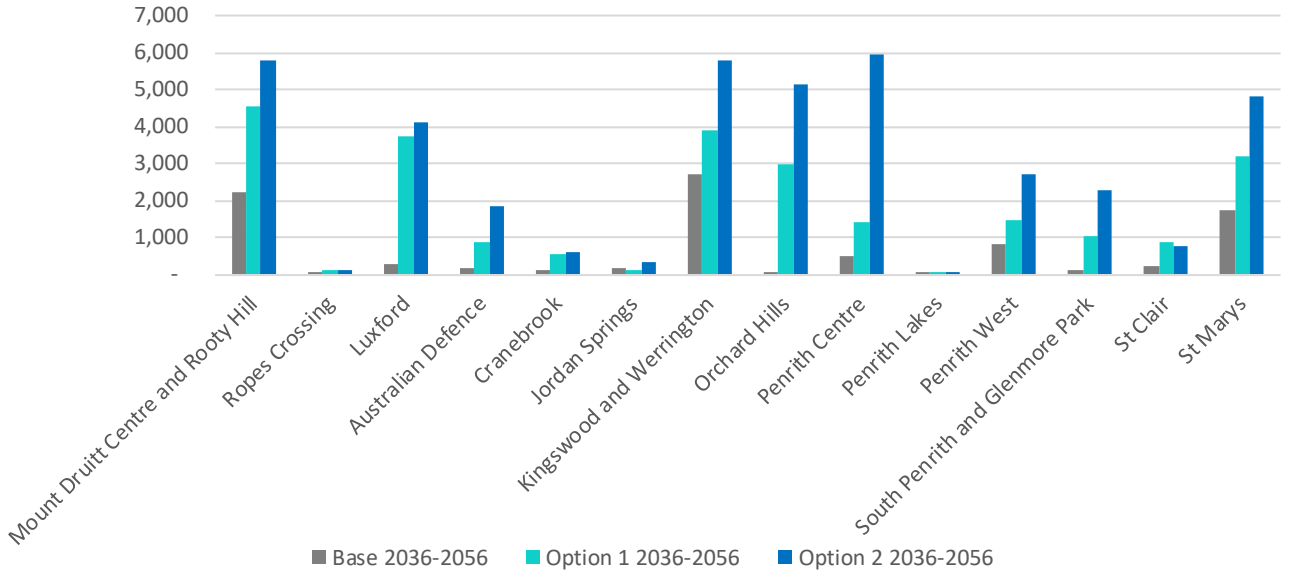
FIGURE 37 GIC #2 PRECINCT 2016-2036 EMPLOYMENT GROWTH



Source: SGS Economics and Planning

Jobs growth is more widespread between 2036 and 2056, with Luxford and Orchard Hills beginning to see jobs growth to support the resident populations. All precincts experience higher growth in Option 2 with the additional 15,000 jobs in this period compared to jobs growth in Option 1.

FIGURE 38 GIC #2 PRECINCT 2036-2056 EMPLOYMENT GROWTH



Source: SGS Economics and Planning

Table 27 shows a summary of the employment growth to 2036 for the GIC#2 precincts in tabular format with jobs growth focused on St Marys, Mount Druitt Centre, Kingswood/Werrington and Penrith Centre.

TABLE 27: GIC #2 PRECINCT EMPLOYMENT SUMMARY TO 2036

Precinct	2016	2036 Base	2016-2036 Base	2036 GIC Option 1	2016-2036 GIC Option 1	2036 GIC Option 2	2016-2036 GIC Option 2
Mount Druitt Centre and Rooty Hill	17,592	19,804	+2211	22,166	+4574	23,355	+5763
Ropes Crossing	552	583	+31	602	+50	609	+57
Luxford	5,289	5,707	+417	6,649	+1360	6,528	+1238
Australian Defence	361	1,194	+834	1,180	+819	1,327	+966
Cranebrook and Werrington Downs	2,417	2,586	+169	2,728	+311	2,869	+452
Jordan Springs	621	946	+325	907	+286	1,006	+385
Kingswood and Werrington	9,506	12,214	+2707	13,416	+3910	15,267	+5761
Orchard Hills	1,290	1,434	+143	2,893	+1602	3,954	+2664
Penrith Centre	16,003	18,156	+2153	18,824	+2821	19,954	+3950
Penrith Lakes	318	366	+47	377	+58	364	+45
Penrith West	11,274	12,114	+840	12,721	+1447	13,994	+2720
South Penrith and Glenmore Park	4,681	5,648	+967	5,981	+1299	6,739	+2057
St Clair	2,975	3,138	+163	3,533	+558	3,498	+523
St Marys	13,173	16,428	+3255	18,718	+5545	20,995	+7822
Total	**86,054**	**100,317**	**14,263**	**110,695**	**24,641**	**120,457**	**34,403**

Source: SGS Economics and Planning

Table 28 shows a summary of the job totals by precinct the GIC#2 area by 2056, with the additional jobs in Option 2 spread across the precincts, particularly in Penrith Centre with double the amount of Option 1 jobs.

TABLE 28: GIC #2 PRECINCT EMPLOYMENT SUMMARY TO 2056

Precinct	2016	2056 Base	2016-2056 Base	2056 GIC Option 1	2016-2056 GIC Option 1	2056 GIC Option 2	2016-2056 GIC Option 2
Mount Druitt Centre and Rooty Hill	17,592	22,026	+4434	26,740	+9148	29,140	+11548
Ropes Crossing	552	608	+56	695	+143	727	+175
Luxford	5,289	5,990	+701	10,404	+5115	10,619	+5330
Australian Defence	361	1,371	+1010	2,026	+1665	3,182	+2821
Cranebrook and Werrington Downs	2,417	2,700	+283	3,290	+873	3,448	+1031
Jordan Springs	621	1,096	+475	1,028	+407	1,331	+710
Kingswood and Werrington	9,506	14,921	+5415	17,293	+7787	21,046	+11539
Orchard Hills	1,290	1,458	+167	5,870	+4579	9,113	+7822
Penrith Centre	16,003	18,673	+2670	20,216	+4212	25,884	+9881
Penrith Lakes	318	387	+68	419	+101	386	+68
Penrith West	11,274	12,954	+1680	14,173	+2900	16,678	+5405
South Penrith and Glenmore Park	4,681	5,775	+1093	6,987	+2305	9,004	+4322
St Clair	2,975	3,340	+365	4,406	+1431	4,282	+1307
St Marys	13,173	18,155	+4982	21,928	+8756	25,825	+12653
Total	**86,054**	**109,454**	**23,400**	**135,476**	**49,422**	**160,665**	**74,611**

Source: SGS Economics and Planning

3.5 Age/Sex Profile

The age/sex profiles developed based on the population projections show variations in the age distribution between the GIC #1 and GIC #2 precincts. The GIC#1 area has a large number of young children and adults up to 24 years of age, with a large older adult population 50+ and a lower proportion of adults between 30 to 50 years of age.

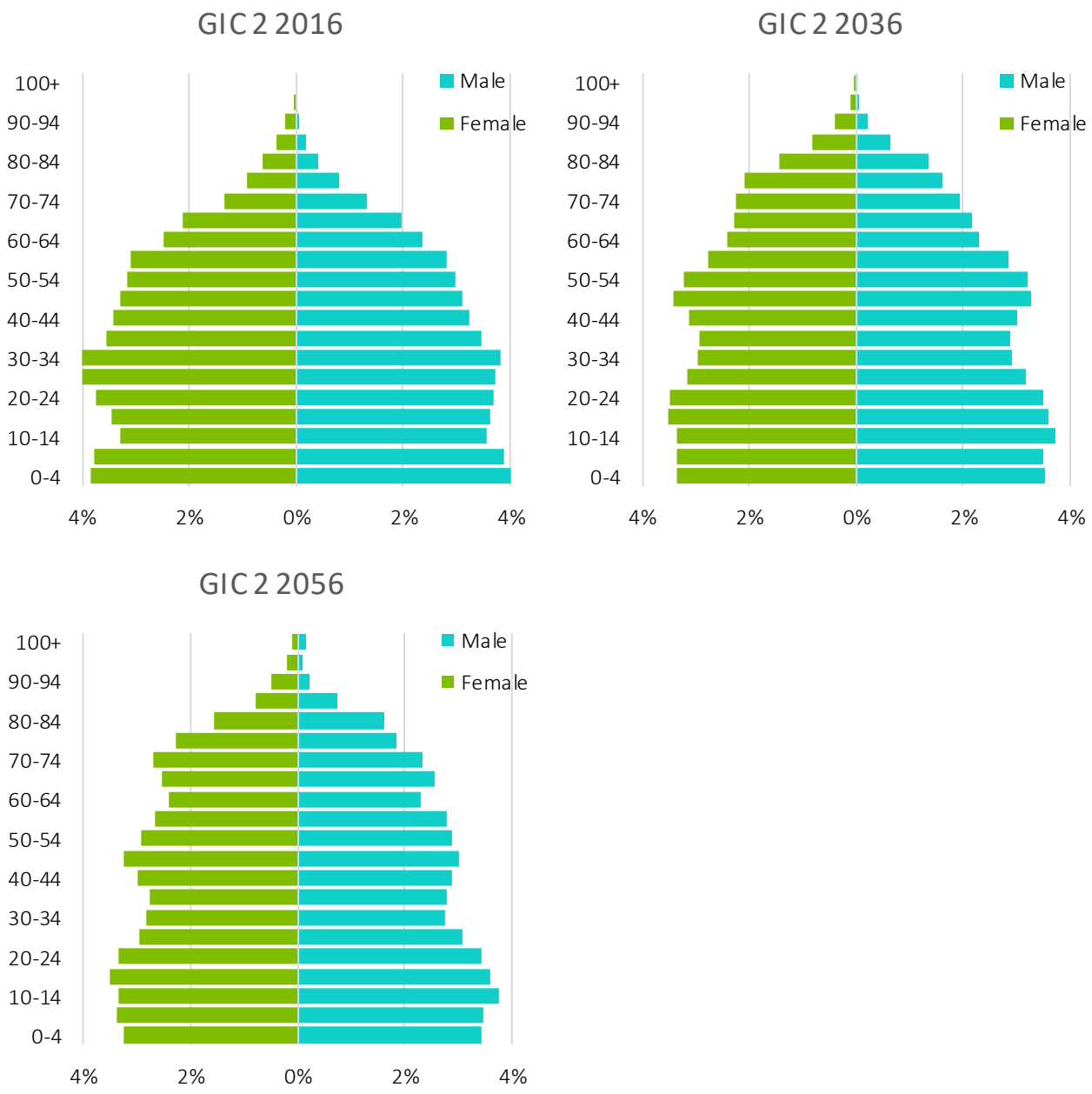
Figure 37 shows the proportions of the GIC#1 area for 2036 and 2056, these proportions are consistent between the different land use options and are then applied to the total population numbers in each scenario to provide the quantum of people by age/sex. This process is discussed further in 4.2.

FIGURE 39 GIC #1 2016, 2036 AND 2056 AGE/SEX PROFILE

Source: SGS Economics and Planning

The GIC #2 area in Figure 38 show a more “bottom heavy” pyramid with large numbers of young children and young adults.

FIGURE 40 GIC #2 2016, 2036 AND 2056 AGE/SEX PROFILE



Source: SGS Economics and Planning

When comparing GIC#1 and GIC#2 areas, GIC#1 has a higher proportion of adults 60+ years, and GIC#2 has a smaller decrease in working age adults than in GIC#1. Both areas have a strong representation of young children and young adults. This demonstrates the need for appropriate education and childcare facilities to be provided in the region. The significant older population also will require aged care and health services to support the older population.

Further analysis of the age/sex profiles for different geographies, including on a precinct by precinct basis can be accessed via the dataset provided as part of the land use scenarios, file name: *190104 GIC Scenario AgeSex 20191113 TC.xlsb*

Profiles for the LGAs of Penrith, Blacktown, Liverpool, Camden and Campbelltown in 2036 are available for reference in Appendix C.

4. DEVELOPMENT METHOD

This section details the projection methodology for each scenario.

4.1 TZP modelling approach and concepts

The methodology employed for TZP is intended to be an operational, policy-analysis focussed model, which forms a middle-ground between spatial interaction models, which are suited to analysing broad policy scenarios under a theoretical framework, and supply driven models, which are utilised for precinct specific analysis. As such, the forecasts produced most accurately reflect a 'reference case' (or most likely future) and can be used within either a static transport model or LUTI[1] model. Policies, at either a metropolitan or precinct scale, can also be analysed by varying assumptions and data inputs at the appropriate scale.

TZP reconciles 'top-down' and 'bottom-up' modelling components, capturing the benefits of each. In simplified terms, this is achieved via the following process:

- Forecast state-wide aggregates of population and employment
- Employ predictive models, which consider factors such as population migration and accessibility, to forecast the distribution at a regional geographic level
- Incorporate supply-side data to drive the small area distribution of population and employment, while validating or refining regional trends and expectations.

FIGURE 4 TOP DOWN AND BOTTOM UP APPROACH CONCEPT

This dual approach address many of the issues of a purely 'top-down' or 'bottom-up' approach:

- Purely top down approaches, such as a population cohort or CGE model, can be highly robust at a national/state scale. However, they miss (or overly simplify) supply-side and local policy factors such as new growth locations, capacity constrained areas or the role of spatial drivers.
- Conversely, purely bottom up approaches, which heavily rely on supply inputs, can be overly conservative or aspirational and not consider broader economic constraints/drivers. They are often skewed by localised agendas and don't provide a coherent city-wide narrative.

The adjustments made to TZP to develop the GIC land use scenarios have focussed on the distribution of top down regional adjustments at District/LGA and precinct levels, with travel zone based forecasts largely a result of disaggregating the high level adjustments based on the prior distribution from the Travel Zone Projections.

Further supply side analysis of development capacity could assist in the fine grain distribution of future forecasts as part of more bottom up analysis of new areas forecast to grow.

[1] In the case of a LUTI model, it would represent the starting distribution prior to policy impact analysis

4.2 Scenario development method

Scenario development approach overview

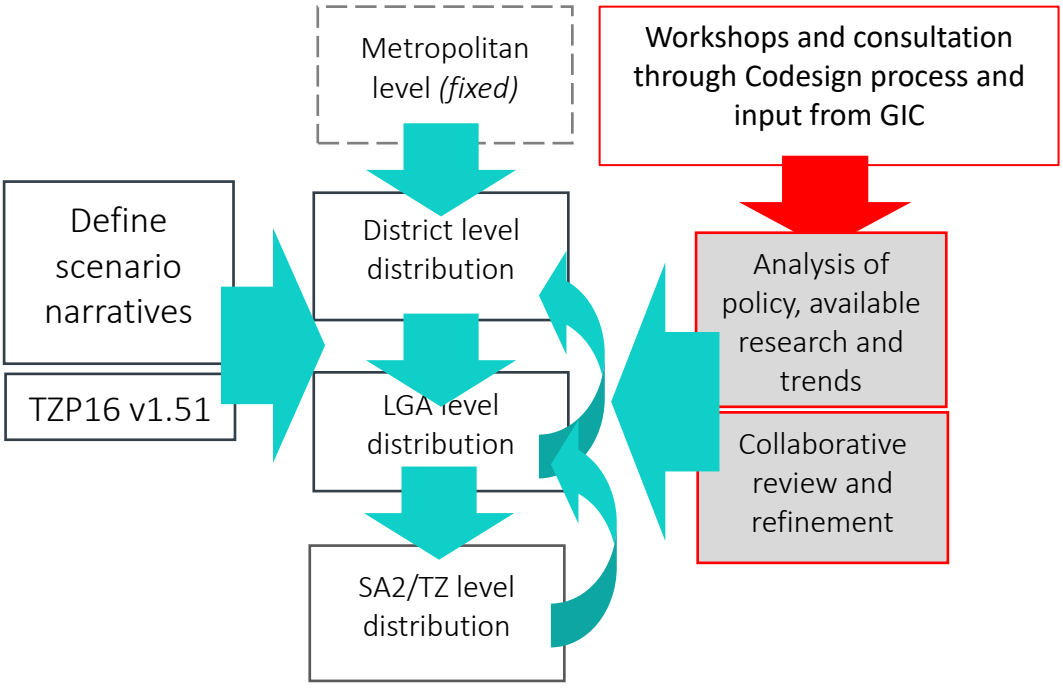
Land use scenarios have been developed using an iterative refinement and review approach, rather than a rigid econometric land use model. This approach was taken, given the extensive (while fragmented) information already available across the stakeholder groups and given the region is seeing significant targeted policy and investment to shift the outcomes from existing land use trends. As such, the method adopted included a rapid redistribution model with co-design stakeholder workshops, extensive review and feedback rounds to iterate toward a robust and collective land use forecast scenario.

Land use forecasts have been based off the TZP16 v1.51 dataset. Redistribution of this original dataset has been completed at three spatial frames (District, LGA and SA2/TZ) in parallel to consider top down and bottom up factors.

This methodology was an iterative approach considering a number of different data sources directly or via consultation, with multiple data rounds produced, reviewed, refined and agreed upon.

TZ refinements have only been completed by exception for strategic/new growth locations, in particular, the WSPP area and the GIC #1 and #2 precincts. This has been informed by the scenario narratives and infrastructure macro assumptions provided by the GSC GIC program, data, research and feedback from the project stakeholders and in the codesign workshops (see Figure 41).

FIGURE 41 SCENARIO REDISTRIBUTION PROCESS



Conceptually, the redistribution model works as a share shift model for forecasted people, housing and jobs at various levels of geography as outlined above. This resulted in Travel Zone level forecasts for the whole of Greater Sydney.

The final Travel Zone data was also recut to align with the GIC #1 precinct boundaries for use in the GIC program. This included a travel zone to precinct concordance for population and jobs based on a review of the intended land uses for most precincts in the GIC #1 area as shown in DPIE's Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan (LUIIP) Stage 1.

Employment

This approach allowed assumptions about the structural composition of employment to be considered in the analysis. Generally, shifts in health and education and population serving jobs were associated with shifts in population, with knowledge intensive jobs moving to areas identified as key employment areas and industrial jobs focused on existing and proposed industrial employment lands.

Key employment areas considered were the Aerotropolis, Western Sydney Employment Area, existing centres such as Penrith, Liverpool and Campbelltown.

Dwellings

The only variable that was forecasted differently was structural private dwellings. Initial household sizes (approximated by the ratio of Estimated residential population per structural private dwellings) were calculated based on TZP 2016v1.51. Then the new values for ERP were divided by this household size to calculate dwellings.

Further adjustment in household sizes were made for certain travel zones based on the expected change in policy for certain areas in changing the land uses from either employment land or rural living to a different urban typology (i.e. detached vs attached/apartments).

This approach meant there was no 'locking' to control totals for dwellings in Greater Sydney as, fluctuations in the distribution of people, and the differences in household sizes in certain areas changes the overall numbers of dwellings. These changes were minor in nature and the general alignment in district housing targets was maintained as much as possible.

Base Case (~Scenario 1)

The Base Case is a 'do minimum' future scenario with respect to the GIC project scenarios. It represents a no policy change future with no additional rezoning or investment beyond what is already committed for delivery or approved for the purposes of quantifying the incremental change of the other two scenarios.

To develop the scenario the following process was used:

- Current zoning and land release status for precincts within the WSPP study area was reviewed based on information provided by DPIE. The location and status of major infrastructure was also reviewed. Each precinct was then classified as: limit growth, slower growth or unchanged with respect to their outcome in the project scenario.
- Areas defined a 'limit growth' referred to precincts which had not yet been rezoned, such as Kemps Creek or Vineyard Stage 2. Growth in these areas was limited to 5% of current level to allow for a small degree of background/rural growth over the forecast period.
- Areas defined as 'slow growth' includes precincts that were only partly rezoned and/or were influenced by infrastructure/investment included in the GIC project scenarios. These areas had growth slowed to align with approved dwelling release information only or to reflect reduced growth rates consistent with other comparator areas.
- Areas defined as 'Unchanged' referred to precincts which were already zoned and/or established areas. This included areas such as Marsden Park, Penrith and Picton. There were unchanged from the minimum of the two GIC Scenarios.

Growth limited within the WSPP was redistribute on a pro-rata basis to areas outside the WSPP to maintain the Greater Sydney control total.

GIC Project Option 1 (~Scenario 2) and GIC Project Option 2 (~Scenario 3)

For the non-base case scenarios, an initial district level distribution was established, which was then reflected at the LGA level. Further refinements were then undertaken at a SA2 and TZ level to reflect aspirations and intentions aligned to the GIC scenario narratives for precincts in the Aerotropolis and other GIC #1 area precincts, North West Growth Area, South West Growth Area and areas along Sydney Metro Greater West Stage 1. This also feedback to LGA and District level assumptions.

The redistributions drew on a wide range of inputs and feedback as documented in Section 4.4.

This approach means top-down city-wide trends are considered and reconciled with bottom up information from Councils and other stakeholder groups through a six-month consultation (including stakeholder workshops and one on one meetings) and data review process which included four detailed review cycles.

GIC #2 PRECINCT ADJUSTMENT

Following the initial scenario development for the entire WSPP study area SGS received revised bottom-up data for each scenario for the GIC #2 precincts by travel zone. This was based on separate analysis of land capacity and the potential for growth within the GIC #2 precincts and was notably higher than initial scenario forecasts.

Each scenario was then recalibrated to align to the new GIC#2 precinct growth estimates by travel zone for population, dwellings and employment by broad industry. The dataset SGS was provided with included different assumptions for the base year 2016 distribution of people and jobs and therefore there are minor differences in the GIC#2 future year numbers when compared to the alternative dataset.

This required a further redistribution of people and jobs within the WSPP area to reflect the GIC #2 dataset was provided. No changes were made to the GIC #1 area forecasts and the redistribution occurred with movements between the South West Growth Area, North West Growth Area and other established precincts. Growth adjustments in the South West and North West Growth Areas were minimised as much as possible with further adjustments made to established areas.

This resulted in approximately 90,000 people being redistributed into the GIC #2 area between 2016 and 2036 in both Option 1 and Option 2 with approximately 25,000 from the North West Growth Area, 10,000 from the South West Growth Area (excluding GIC #1 precincts) and 15,000 from Wilton, with the remainder proportionally from other areas in the WSPP.

Jobs redistribution was minimal with less jobs forecast in the GIC #2 specific dataset.

For the Base Case, adjustments were made to the non-WSPP redistribution calculation i.e. outside Western City.

Age/Sex Profiles

Further refinements of the population projections for all 3 scenarios were undertaken to develop age/sex profiles.

This was done at the following geographic levels:

- Travel Zones within GIC #1 and #2
- Precincts in GIC #1 and #2
- SA2 areas with overlaps GIC #1 & #2
- LGA's that overlap GIC #1 and #2, being Penrith, Blacktown, Liverpool, Camden and Campbelltown

Profiles were developed for Male and Females according to the following age groups for each 5-year period between 2016 and 2056.

- 0-4 years
- 5-9 years
- 10-14 years
- 15-19 years
- 20-24 years
- 25-29 years
- 30-34 years
- 35-39 years
- 40-44 years
- 45-49 years
- 50-54 years
- 55-59 years
- 60-64 years
- 65-69 years
- 70-74 years
- 75-79 years
- 80-84 years
- 85-89 years
- 90-94 years
- 95-99 years
- 100 years and over

The age/sex profiles from TZP16 v1.51 were used as an initial basis for the GIC specific profiles. These were based on the 2016 NSW Government Population cohort projections.

This captures spatial variations in the age profile and the changing age profiles largely at an LGA level from the existing DPIE forecasts. New growth area locations, that existed in TZP15v1.51 dataset, would also have had the regional growth area age profile applied to them which would be carried through.

However, it does not capture shift in age profile for newly defined growth areas (i.e. Wilton) or TZ variation in age profile between scenarios or more recent data which may suggest an alternative profile to existing DPIE LGA forecasts

To account for this, seed profiles of typical growth area locations were applied to new growth areas and adjustments made at travel zone level with a review of new growth precincts. Seed profiles were based on new growth areas from TZP16v1.51 to keep consistency with the NSW government cohort projections. A consistent set of proportions was applied to all three scenarios.

4.3 Dataset scope and variables

At a high level, the data covers three dimensions with over 2 million data points.

Time periods

The dataset includes 5 yearly projections from 2016 to 2056.

Scenarios have been developed with assumptions focussed on 2036 and 2056 time periods.

Minor adjustments have been made at intervening 5-year intervals, with trends largely derived from the base TZP16 v1.51 dataset.

Forecast variables

Scenario development focused on changes to total population and employment by four broad industry categories. From this, dwellings and population by age and sex was estimated drawing on TZP16 v1.51 ratios.

The following variables were forecast for each scenario

- Estimated Resident Population (ERP)
- Estimated Resident Population by 5-year age and sex (for selected geographies only)
- Structural Private Dwellings
- Employment by Broad Industry Category:
    - Knowledge Intensive
    - Health and Education
    - Population Serving
    - Industrial

Spatial Scope

The dataset covers 3,758 travel zones consistent with the TPA 2016 travel zones:

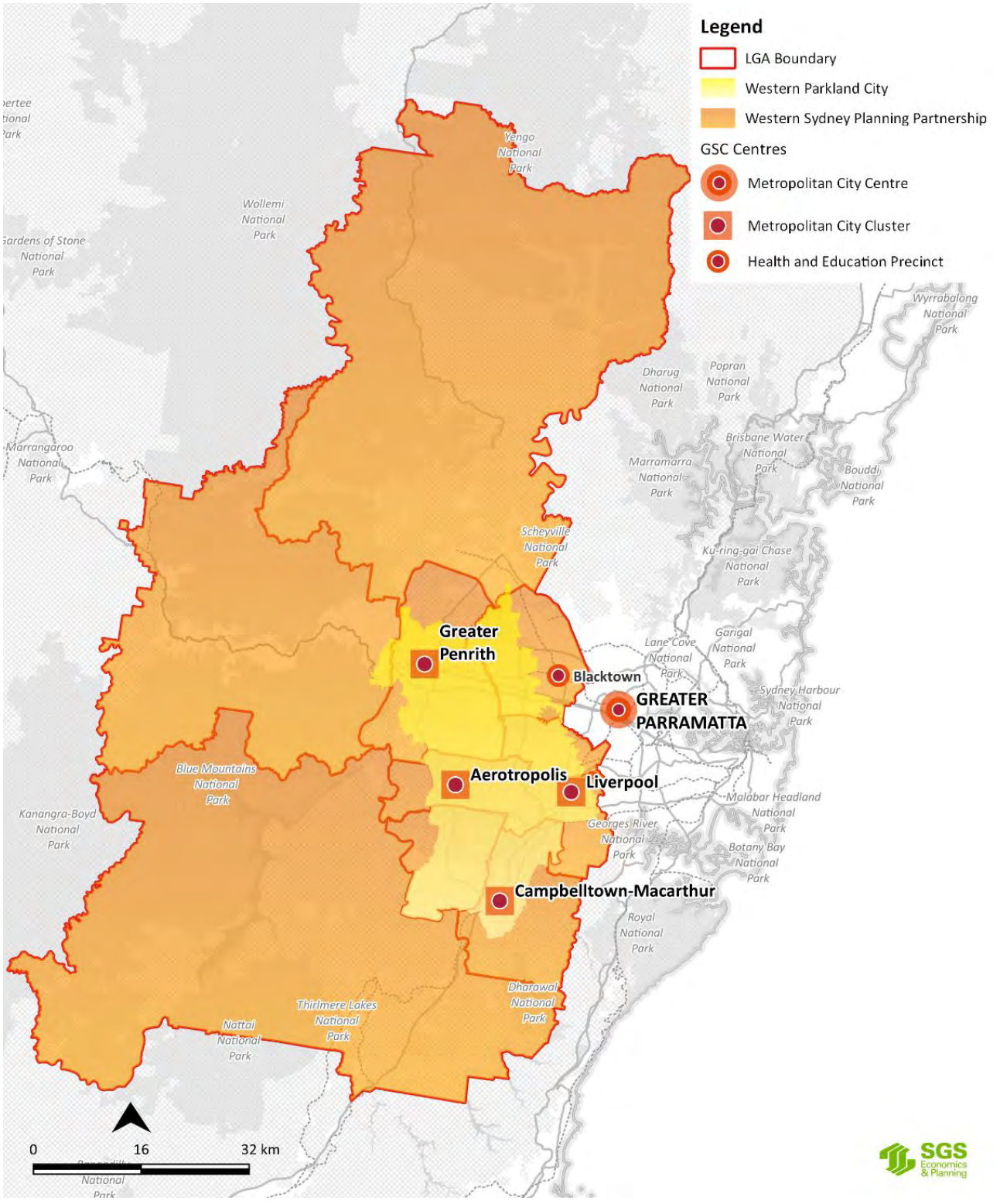
https://data.nsw.gov.au/data/dataset/travel-zone-spatial-data/resource/74f720d2-398b-4b10-8121-26b5ff9421a6?inner_span=True

However, scenarios were considered with a focus on the Western Parkland City and the 8 Local Government Areas that are part of the Western Sydney Planning Partnership (WSPP) established under the City Deal namely: Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith; and Wollondilly, as well as Blacktown council.

For the purposes of the study, the WSPP area includes Blacktown LGA (see Figure 42).

Adjustments outside this area were completed to maintain Greater Sydney totals (noted in Table 1) and based on TZP16 v1.51 dataset.

FIGURE 42 WESTERN SYDNEY PLANNING PARTNERSHIP AREA



To assist in the development of the forecasts, the boundary definitions of growth areas and precincts within these growth areas in the Western City were based on information from the GSC, DPIE and other stakeholders.

These precincts were developed as collections of travel zones with some work undertaken for the GIC #1 precincts to concord the data to match the actual defined precinct boundaries.

Key growth areas of interest were:

- Western Sydney Aerotropolis LUIIP area
- GIC #1 Western Sydney Growth Area (Aerotropolis)
- North West Growth Area
- South West Growth Area
- GIC #2 Greater Penrith to Eastern Creek (GPEC)

GIC #1 - Western Sydney Growth Area (Aerotropolis)

The Aerotropolis precincts were initially defined in the Western Sydney Aerotropolis Land Use Infrastructure and Implementation Plan (LUIIP) Stage 1.

The Aerotropolis LUIIP Stage 1 precincts are:

- Aerotropolis Core
- Agriculture and Agribusiness
- Badgerys Creek
- Kemps Creek
- Mamre Road
- North Luddenham
- Northern Gateway
- Rossmore
- South Creek Sth
- Western Sydney Airport

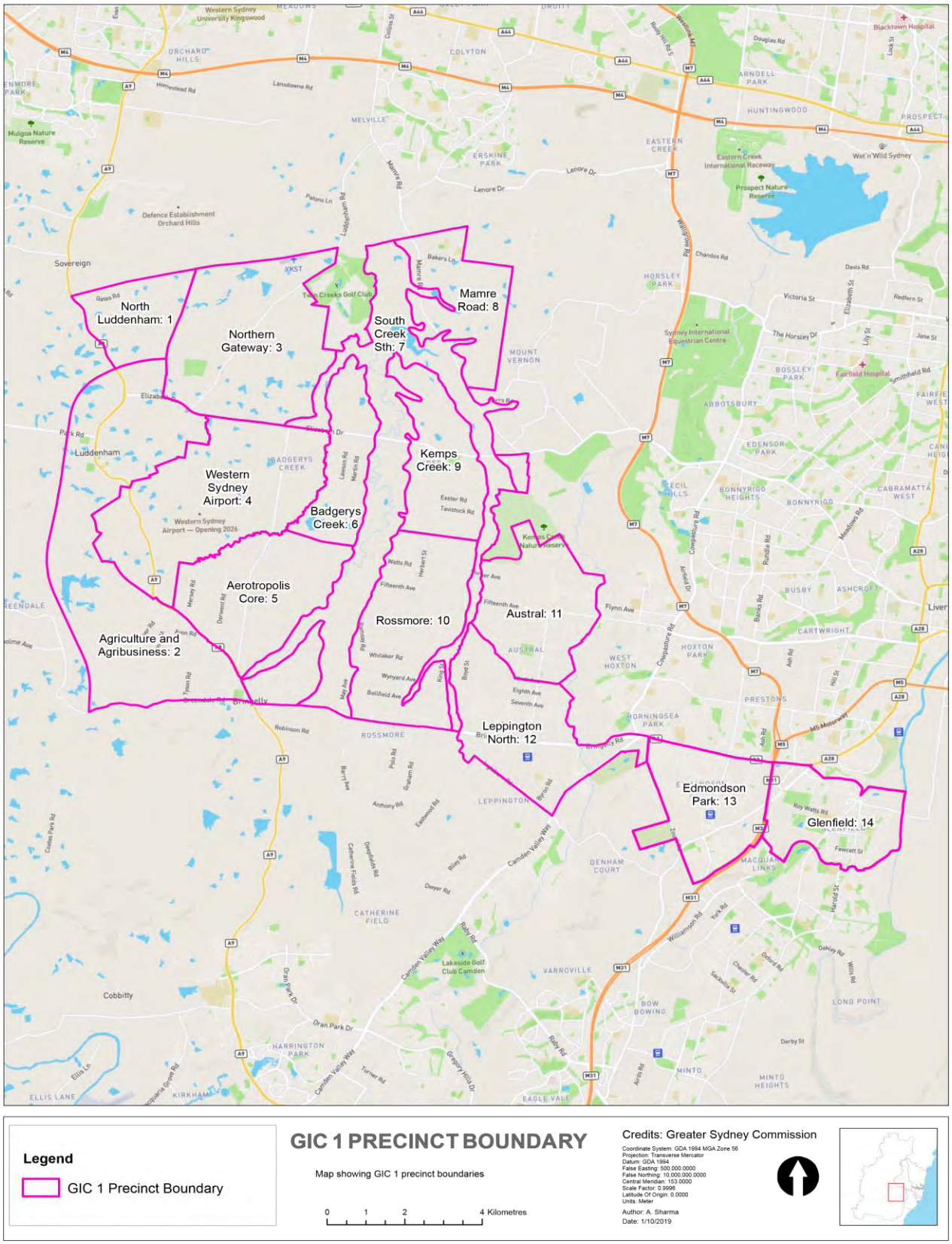
In addition to the above, the GIC #1 area also includes the following precincts:

- Austral
- Leppington North
- Edmondson Park
- Glenfield

Due to the geography of travel zones, there was not an exact alignment between the precinct boundaries and the travel zones. Therefore, a concordance was applied to travel zone data to reflect precinct boundaries in the scenario precinct level datasets.

Figure 7 shows the GIC #1 precincts.

FIGURE 43 GIC #1 PRECINCTS



Source: Greater Sydney Commission, 2019

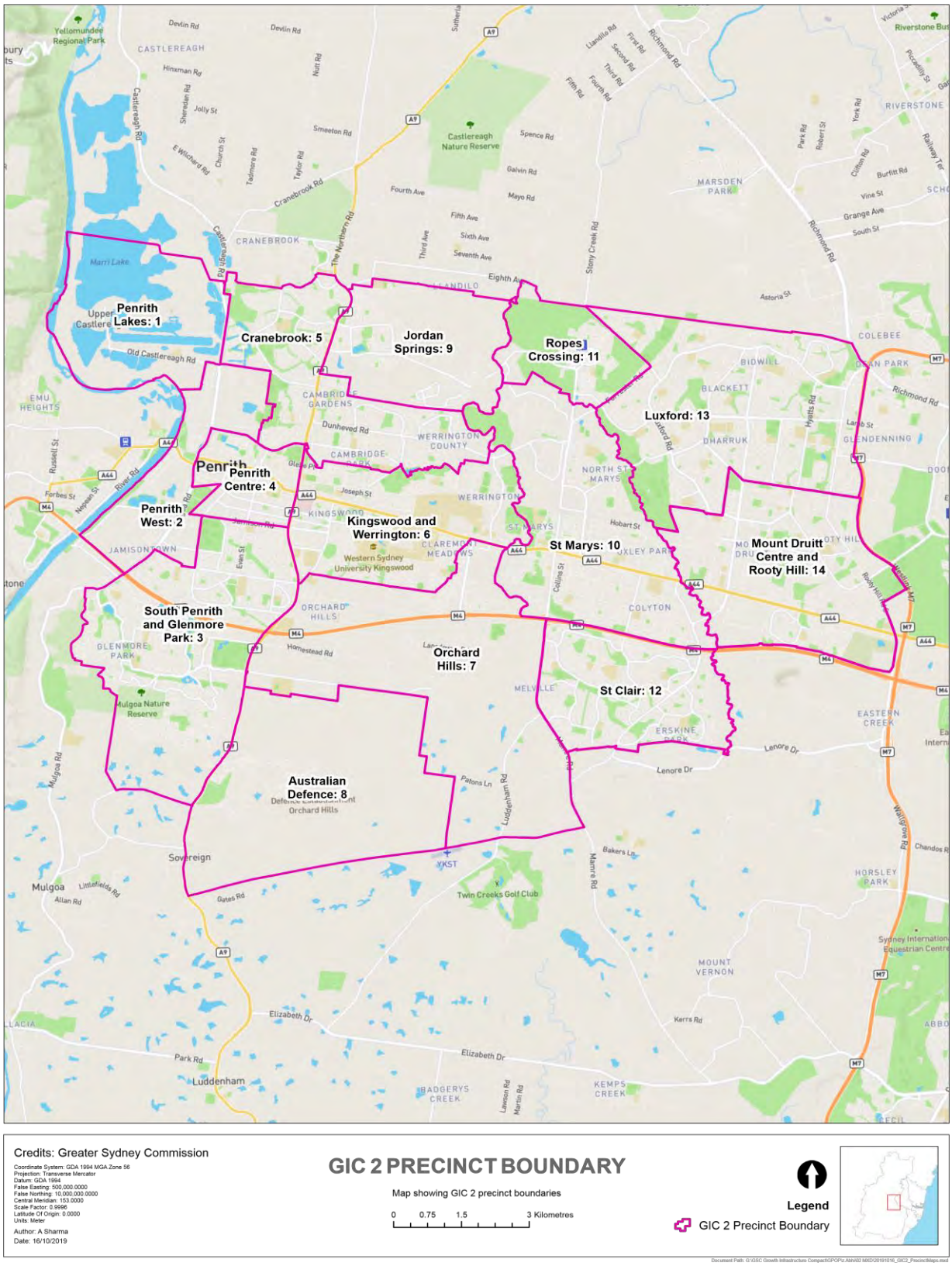
GIC #2 - Greater Penrith to Eastern Creek (GPEC)

Precincts in the GIC #2 area include the following:

- Luxford
- Mount Druitt Centre and Rooty Hill
- Ropes Crossing
- Australian Defence
- Cranebrook
- Jordan Springs
- Kingswood and Werrington
- Orchard Hills
- Penrith Centre
- Penrith Lakes
- Penrith West
- South Penrith and Glenmore Park
- St Clair
- St Marys

Figure 44 shows the GIC #2 precincts as defined travel zones. Precinct boundaries were agreed by DPIE, GSC, Penrith and Blacktown councils.

FIGURE 44 GIC #2 PRECINCTS



Source: Greater Sydney Commission, 2019

4.4 Key assumptions and inputs

Approach and input assumptions overview

The land use scenarios also drew on a numbers of overarching data inputs and assumptions summarised in the table below.

HIGH LEVEL DATA INPUTS AND ASSUMPTIONS

Input Area	Assumption
Planning Policy	Greater Sydney Region Plan, Western City District Plan
Transport	Future Transport 2056 infrastructure priorities and timing
Infrastructure Provision	As per GIC Macro Assumptions see Table 30
Future Growth	Greater Sydney growth for Population, Dwellings and Jobs to 2056 as per TZP16v1.51 District housing targets as per Greater Sydney Region Plan
Household Sizes	Initial distribution as per TZP16v1.51 with adjustments for new growth areas. Household size calculated as Estimated Resident Population (ERP) divided by Structural Private Dwellings (SPD)

The ultimate vision and the extent of population and employment growth for Greater Sydney and the Western Parkland City is the same in all scenarios to reflect the Greater Sydney Region Plan as well as the Western City District Plan.

Land use forecast scenarios developed for this project leveraged the TZP16 v1.51 datasets as its basis. The overall quantum of Sydney's population, dwellings and jobs growth are fixed between the scenarios as per TZP16 v1.51 (see Table 1). This assumes Sydney will have a population of 8.2 million people and 4.3 million jobs by 2056.

TABLE 29:GREATER SYDNEY DEMOGRAPHIC FORECAST AS PER TZP16V1.51

	2016	2036	2056
Population	4,688,312	6,421,844	8,261,011
Jobs	2,491,732	3,389,594	4,291,057
Knowledge Intensive	815,012	1,175,857	1,516,587
Health and Education	476,336	687,023	922,297
Population Serving	739,421	991,156	1,227,538
Industrial	460,963	535,558	624,635

Source: Transport for NSW, 2019

From this TZP16 v1.51 basis, spatial redistributions have been made to reflect new data, research, feedback, strategic direction and scenario descriptions (as outlined in Section 4). These shifts have been completed at a strategic level for key dimensions of the full datasets as discussed under Forecast Variables below.

Existing Travel Zone Projections

The major input for the development of the land use scenarios was the existing Travel Zone Projections dataset (TZP16 v1.51). They were developed to support a strategic view of Sydney and is calibrated with a city-wide view in mind. Therefore, these projections seek to represent the most *likely* urban future based on current data, trends and an understanding of policy/structural changes. As mentioned previously, this version of the Travel Zone Projections is not reflective of the Greater Sydney Region Plan and the 3 cities vision.

The TZP model includes 1.7m datapoints across 60+ variables, 9 periods (to 2056) and over 3,000 zones. It contains no 'unallocated' categories, i.e. every person/job needs to go somewhere

Travel Zone Projections are strategic city-wide dataset and caution should be exercised when considering results at detailed breakdowns at the travel zone level.

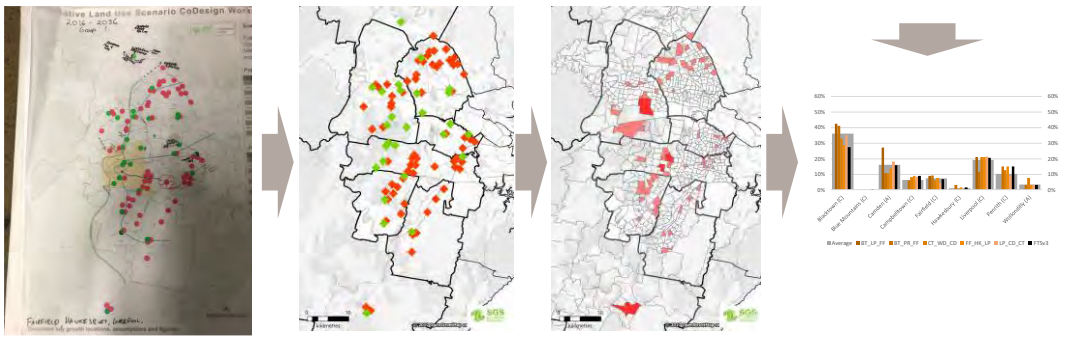
Consultation

A series of workshops and one on one meetings took place as part of the development of the scenarios. A total of 5 workshops were conducted with state government agencies, councils and other stakeholders to source a range of datasets and viewpoints on the future growth potential of the Western Parkland City.

Two detailed working group sessions were held with WSPP councils to understand local perspectives on growth in each LGA. The output of these sessions was a series of maps with growth locations identified from different groupings of Councils indicating where future population and jobs would locate. As per the methodology for the project to allocate a fixed number of people and jobs in Greater Sydney, an initial total population and jobs for the WSPP area was used for the Council working sessions to distribute.

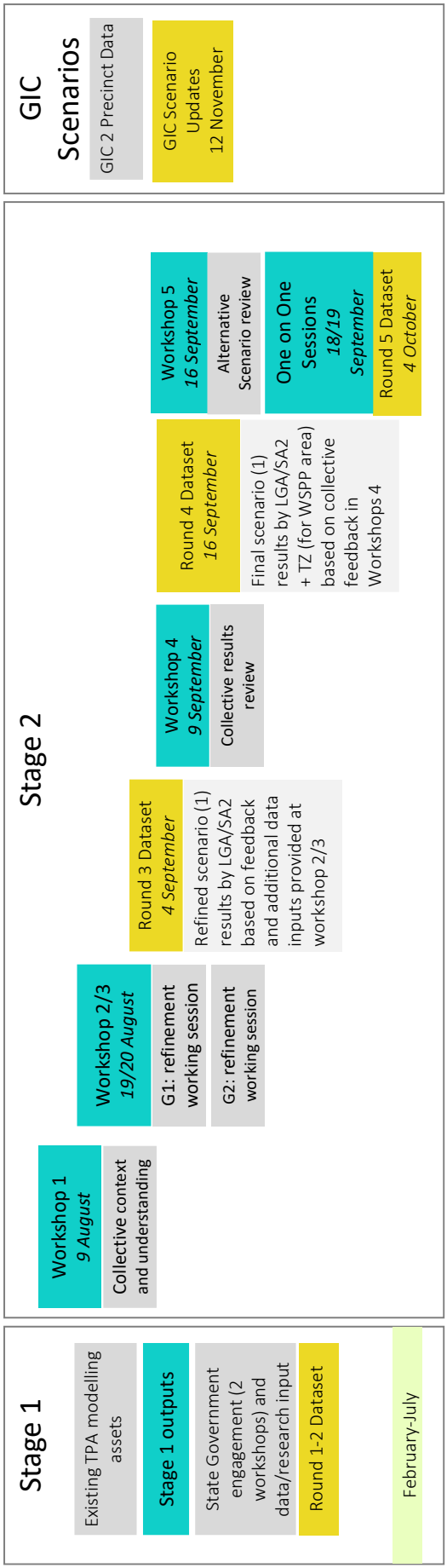
These maps were used to inform the distribution of future growth and digitised and quantified as part of the redistribution process. This process is shown in Figure 45.

FIGURE 45 LOCAL COUNCIL INPUTS



The process involved an iterative development of the scenarios as per the diagram below

FIGURE 46 CONSULTATION PROCESS



Western Sydney GIC Program Macro Assumptions

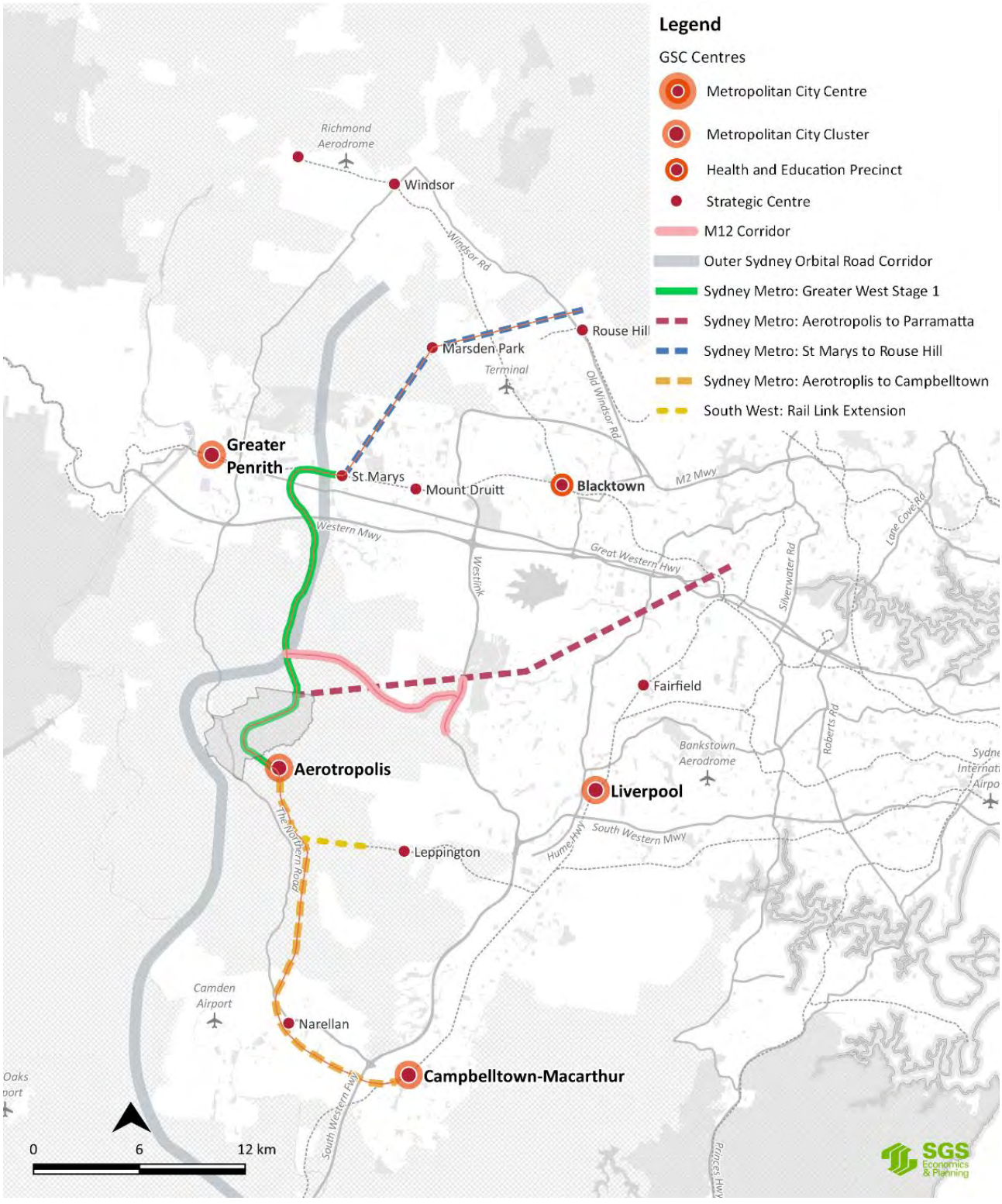
The GIC program has a list of macro assumptions, provided in Appendix B, for catalytic infrastructure and services in the Western City over the next forty years to underpin the development of the land use scenarios. These are aligned with transport network assumptions as outlined in *Future Transport 2056* and other known major projects. Major infrastructure project assumptions are listed below in Table 30 with the location of major transport projects shown in Figure 47.

TABLE 30: GIC INFRASTRUCTURE ASSUMPTIONS

Project	Timeframe	Base Case	Option 1/2
Western Sydney Airport	2026	✓	✓
Sydney Metro Greater West Stage 1 (0- 10 years)	0-10 years	✓	✓
M12 Motorway	0-10 years	✓	✓
Liverpool Health and Academic Precinct	0-10 years	✓	✓
Western Sydney Centre of Innovation in Plant Sciences at Mount Annan	0-10 years	✓	✓
Phase 1 Western Sydney Education Super Precinct	0-10 years		✓
Rapid Bus Services: Aerotropolis to Penrith, Liverpool, Campbelltown/Macarthur, Blacktown	0-10 years		✓
Sydney Metro Greater West Remainder: Tallawong to St Marys, Aerotropolis to Macarthur, Aerotropolis to Parramatta	10-20 years		✓
Outer Sydney Orbital Stage 1	10-20 years		✓
South West Rail Link Extension	10-20 years		✓
Phase 2 Western Sydney Education Super Precinct	10-20 years		✓
Western Sydney Freight Line	10-20 years		✓
New Western Sydney Education Super precinct (multiversity) in Aerotropolis (Phase 2)	10-20 years		✓
Outer Sydney Orbital Stages 2/3	20 years +		✓
Castlereagh Motorway	20 years +		✓
Sydney Metro Southwest extension to Liverpool	20 years +		✓
M5 Motorway Extension to Outer Sydney Orbital	20 years +		✓
City Serving Transit Corridors: Blacktown to Prairiewood, Bonnyrigg and Mt Druitt to Aerotropolis, Liverpool- North Austral- Leppington- Narellan- Campbelltown/Macarthur	20 years +		✓
New Western Sydney Education Super precinct (multiversity) in Aerotropolis (Phase 3)	20 years +		✓

Source: Greater Sydney Commission, 2019

FIGURE 47 MAJOR TRANSPORT PROJECTS



Household Sizes

The redistribution process for the GIC Land Use scenarios was initially based on population and employment by industry. Dwelling numbers were then estimated by applying household sizes by travel zone to the population figures.

For the purposes of the scenario household size was determined as the ratio between Estimated Resident Population (ERP) and Structural Private Dwellings (SPD). As ERP includes People in Occupied Private Dwellings such as regular households and People in Non-Private Dwellings i.e. hospitals, care facilities, student housing, prisons etc. this is not a true representation of the average size of a household.

Initial household sizes present in TZP2016v1.51 were used for the scenarios, which was based off DPIE modelling and also captures localised variations from the 2016 census. Where new growth areas were identified, sizes were adjusted or held constant in specific travel zones to accurately represent the type of dwellings and households that would be present.

Household size assumptions were consistent across all three scenarios. Table 31 shows the average household sizes by the LGA's in the WSPP in five-year increments from 2016 to 2056. It shows a general decrease in household sizes over time for all LGAs. This represents an average across all urban typologies in each LGA.

TABLE 31:LGA HOUSEHOLD SIZE ASSUMPTIONS

LGA	2016	2021	2026	2031	2036	2041	2046	2051	2056
Blue Mountains (C)	2.26	2.23	2.20	2.16	2.13	2.13	2.14	2.14	2.14
Camden (A)	2.96	2.97	2.97	2.98	3.00	2.98	2.94	2.88	2.83
Campbelltown (C) (NSW)	2.86	2.83	2.82	2.81	2.79	2.79	2.78	2.77	2.76
Fairfield (C)	3.18	3.08	2.99	2.89	2.79	2.81	2.82	2.83	2.84
Hawkesbury (C)	2.68	2.64	2.62	2.60	2.58	2.57	2.57	2.56	2.55
Liverpool (C)	3.12	3.05	3.00	2.95	2.92	2.90	2.88	2.86	2.87
Penrith (C)	2.76	2.71	2.68	2.65	2.62	2.63	2.63	2.64	2.64
Wollondilly (A)	2.88	2.84	2.84	2.85	2.86	2.86	2.84	2.81	2.79
Blacktown (C)	3.06	3.02	2.99	2.97	2.94	2.94	2.94	2.94	2.94

Greenfield household sizes are larger representing lower density development with bigger households. This includes areas in the GIC #1 and GIC #2 areas with household sizes at or above 3 persons per dwelling.

Other data and information inputs

Many other regional and localised datasets and strategic documents relating to the development of Western Sydney were also provided and reconciled as part of the development of the land use scenarios. This included data on expected uplift from the proposed Sydney Metro rail lines, land releases and expected jobs growth at the Aerotropolis.

SGS also undertook a review of publicly available documentation related to Council's Local Strategic Planning Statements as well as other supporting material for the LSPS's that were provided by the respective councils.

A full list of the datasets provided and considered are included in Appendix D.

GIC #2 precinct projections were provided as discussed in Section 4.2.

4.5 Limitation of data and approach

The land use data has also been developed from a strategic perspective for the purposes of strategic transport and infrastructure planning. Data should be used and interpreted from this perspective and detailed breakdowns for individual zones should be used with caution.

Comprehensive analysis of individual sites/precincts has not been completed as part of this process. The project has sought to draw on readily available, provided or easily digestible data. Additional research to fill gaps has not been completed.

In addition, limitations with the base TZP dataset should also be considered. This is further discussed in the TfNSW *2016 Travel Zone Projections (TZP2016 v1.51) for Population, Workforce & Employment in the Sydney Greater Metropolitan Area Technical Guide v1.51*.

5. MARKET ANALYSIS

An analysis of the scenarios was undertaken to frame the scale of growth proposed in the GIC #1 area in a variety of ways to understand if it is realistic and achievable. This involved an assessment of historical and forecast population and employment to a selection of comparable locations (10-15) with commentary on how the GIC #1 area compares to these other locations.

The following sections detail a comparison of the GIC Option 1 growth compared to other sites. Further details are provided in Appendix E.

5.1 Sydney Comparison Sites

SA2s were selected within Greater Sydney to provide a comparison of historical growth versus growth expected in the GIC #1 Area. These sites are indicated in Table 32.

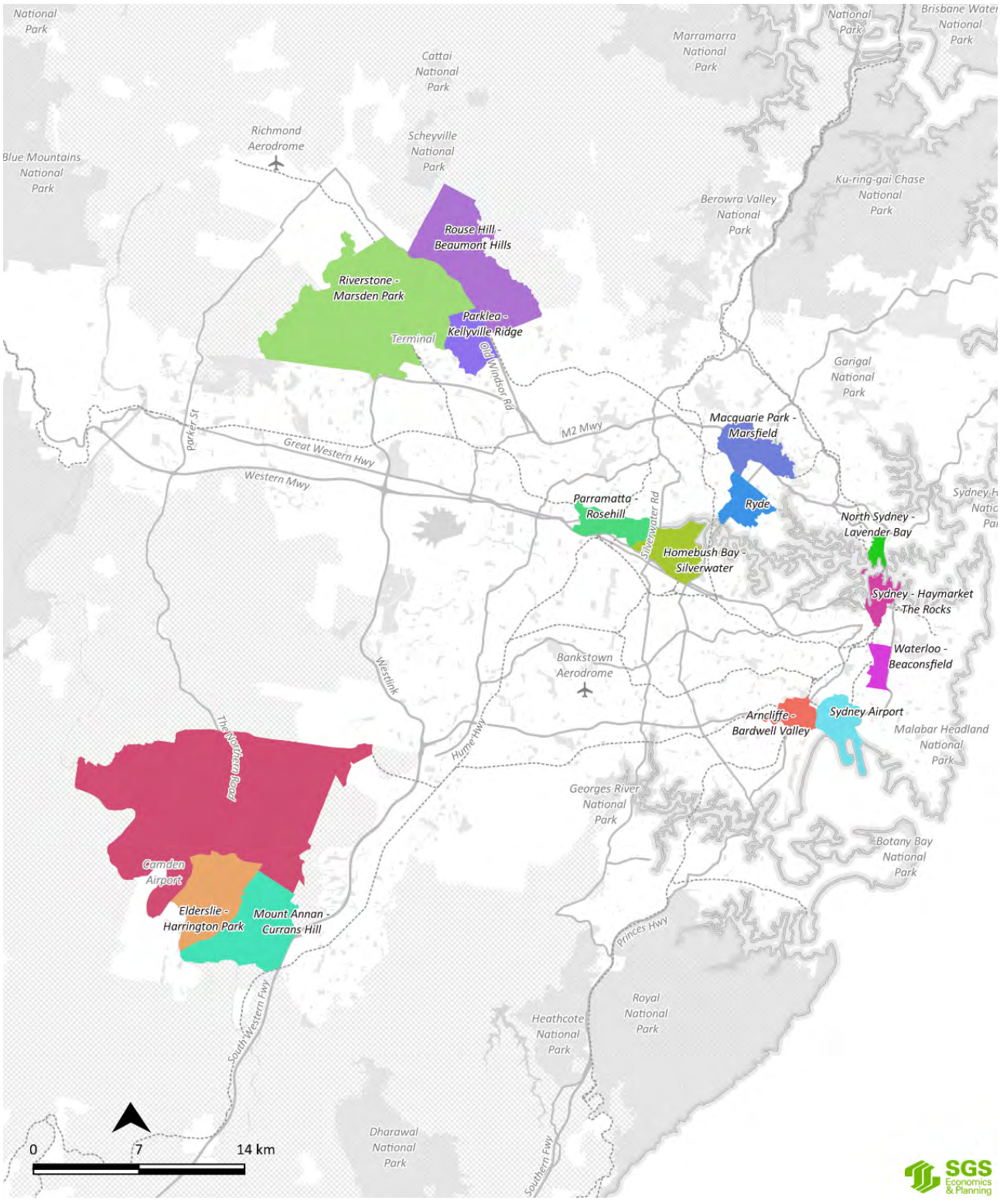
TABLE 32:SYDNEY COMPARISON SITES

Location (SA2)	Attributes
Arncliffe- Bardwell Valley	Suburbs around Sydney Airport
Castlereagh - Cranebrook	Penrith Growth Area
Cobbitty - Leppington	South West Growth Area
Elderslie - Harrington Park	Greenfield growth area
Homebush Bay - Silverwater	Sydney Olympic Park
Macquarie Park - Marsfield	Established industrial and residential area with University
Mount Annan - Currans Hill	Greenfield growth area
North Sydney - Lavender Bay	Key employment hub on Global Economic Corridor connected to Sydney CBD and Sydney Airport
Parklea - Kellyville Ridge	Established residential area in North West
Parramatta - Rosehill	Growing central city CBD
Riverstone - Marsden Park	North West Growth Area
Rouse Hill - Beaumont Hills	Growth Area with new rail provision
Ryde	Established suburb on the fringe of rail access
Sydney - Haymarket - The Rocks	Sydney CBD- largest concentration of employment in Sydney
Sydney Airport	Contains Sydney Kingsford Smith Airport
Waterloo - Beaconsfield	Key urban renewal precincts

These sites include several key sites within Greater Sydney including the centres of Sydney CBD, Parramatta, Macquarie Park as well as some key growth areas.

These sites are showing spatially in Figure 48.

FIGURE 48 SYDNEY SA2 COMPARISON SITES

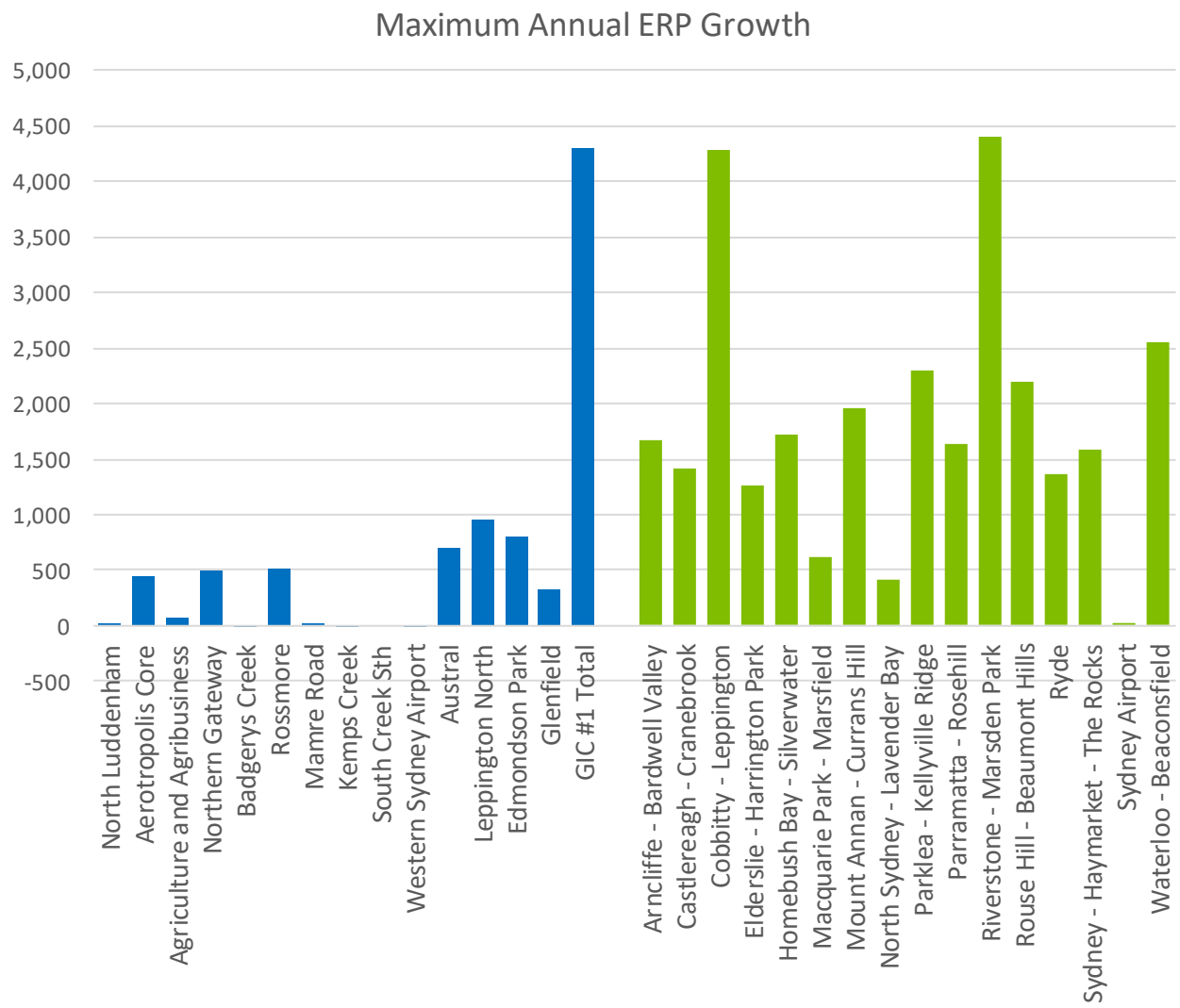


Population Comparison

A comparison of the maximum annual growth forecast for the GIC #1 precincts to 2036 compared with the maximum annual growth rate at the above locations for the past 22 years (1996-2018) is shown below. It shows that annual growth in the GIC precincts is comparable with historical growth in the comparison sites. Growth in the whole GIC area is in line with that occurring in Cobbitty-Leppington, which is part of the South West Growth Area and Riverstone-Marsden Park which encompasses the North West Growth Area.

Sub-precinct growth is comparable to Elderslie-Harrington Park in Camden and Ryde and is below inner city area such as Sydney, Waterloo and North Sydney.

FIGURE 49 MAXIMUM POPULATION GROWTH COMPARISON (SYDNEY)

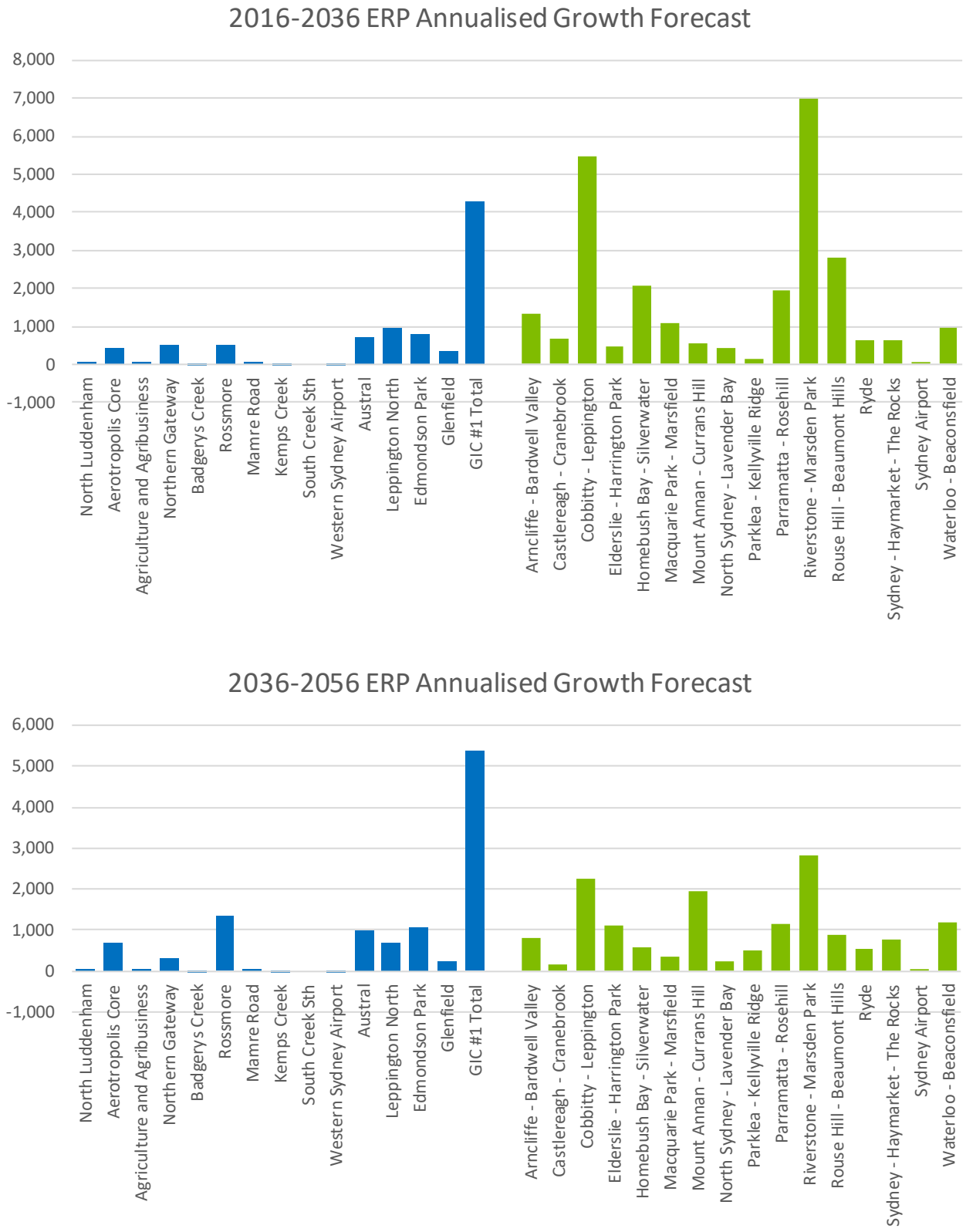


Maximum Growth for the GIC#1 area is based on the maximum annual growth forecast between 2016 and 2036

Source: SGS Economics and Planning, 2019

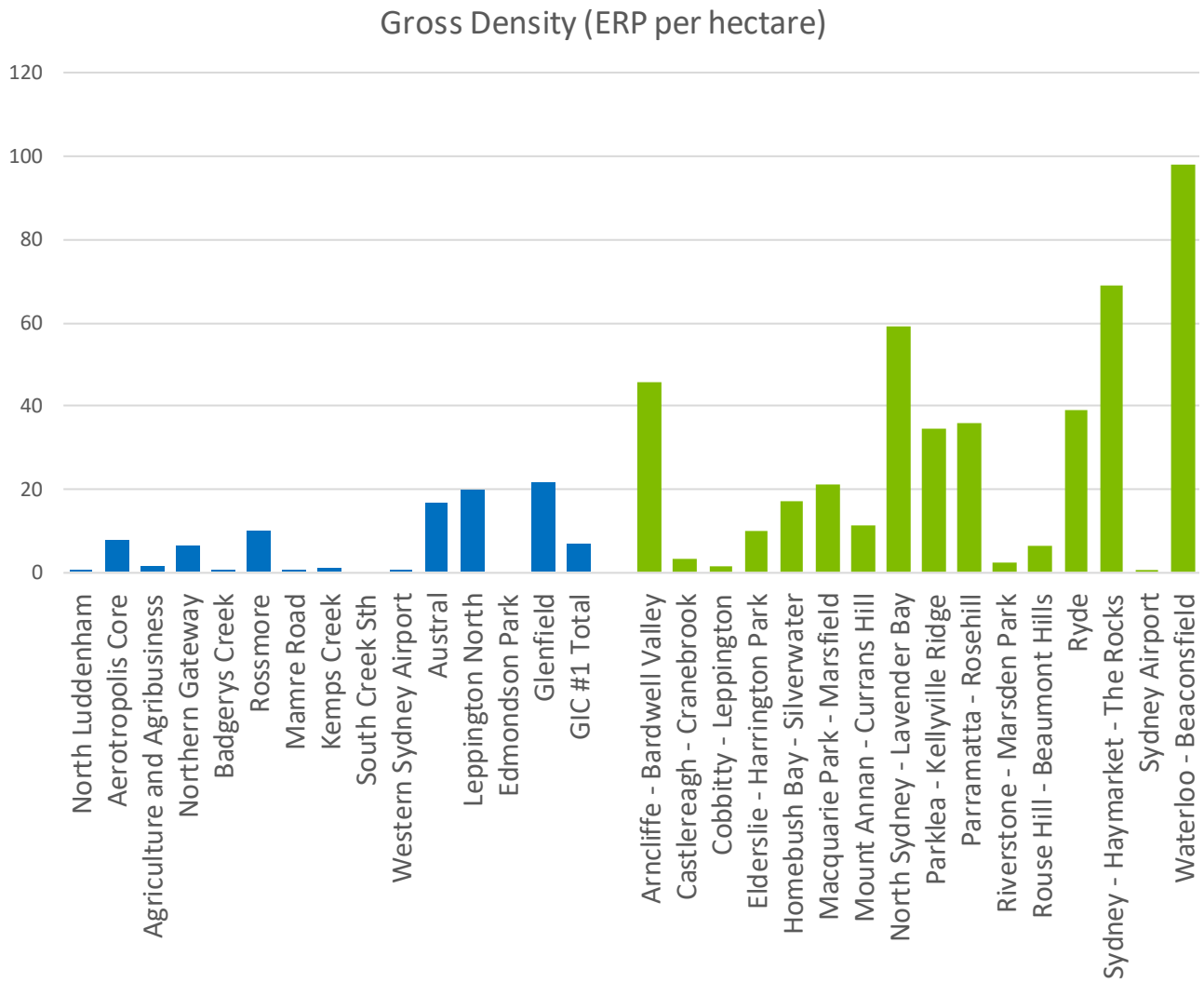
The forecast growth for the above locations in Sydney shows that higher growth is still expected in Cobbity-Leppington and Riverstone-Marsden Park than the GIC#1 area to 2036. Post 2036, annual growth in the GIC#1 area is higher than any other comparable location

FIGURE 50 FORECAST ANNUAL POPULATION GROWTH (SYDNEY)



While the quantum of growth appears reasonable, this can be skewed by the relative size of the comparison areas. A comparison of density (persons per hectare) shows that the density in the GIC area by 2036 is comparable to existing density (2016) in the comparison sites.

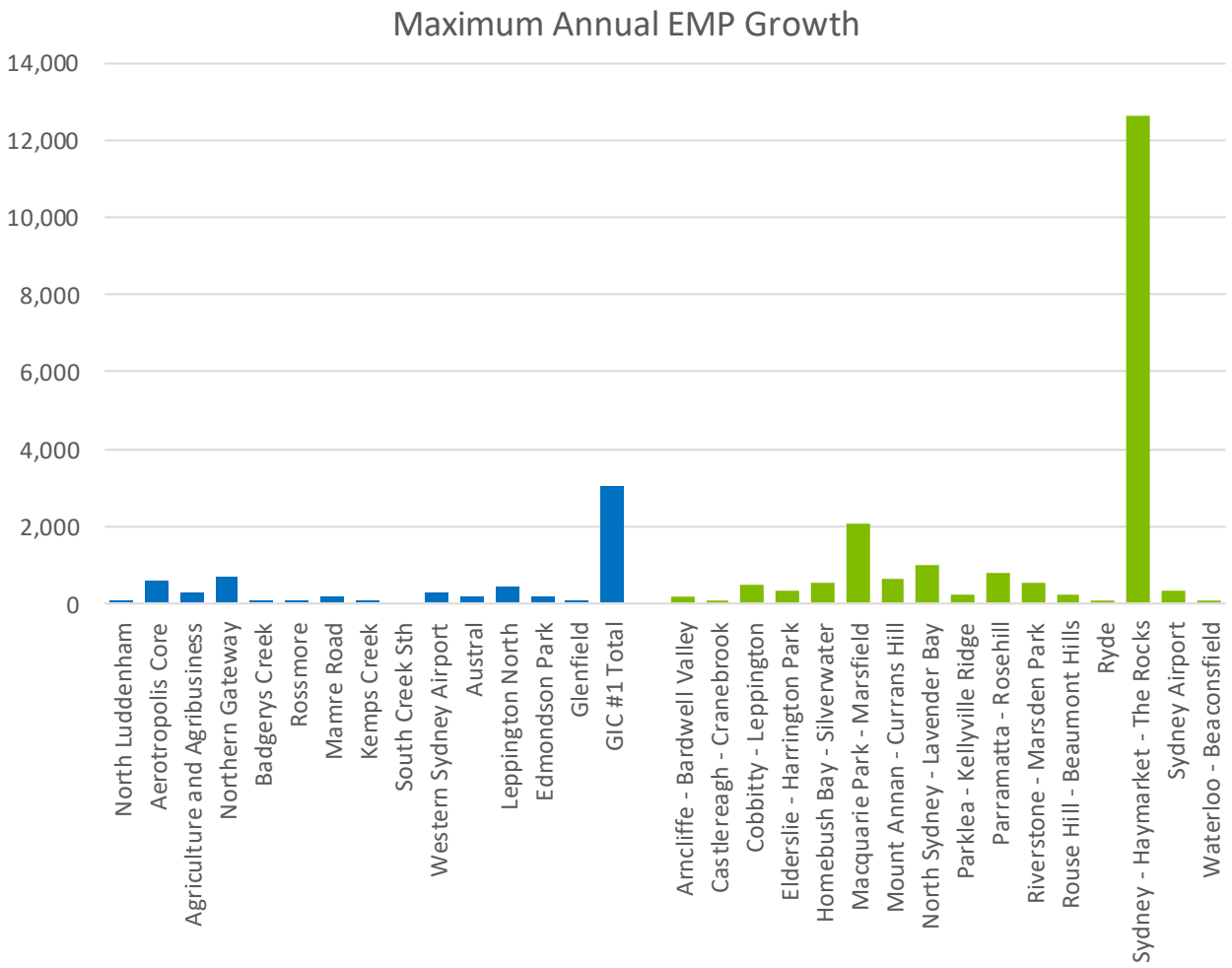
FIGURE 51 POPULATION DENSITY COMPARISON (SYDNEY)



Employment Comparison

The same comparison was undertaken for annual jobs growth to 2036. This shows that the jobs growth expected in the GIC area is significant compared to historical employment growth (2011-2016) in other areas and would approximately equal one third that maximum growth seen in SA2 which contains the Sydney CBD in the past five years and more than double that of North Sydney and Parramatta and approximately 33% higher than Macquarie Park.

FIGURE 52 MAXIMUM EMPLOYMENT GROWTH COMPARISON (SYDNEY)



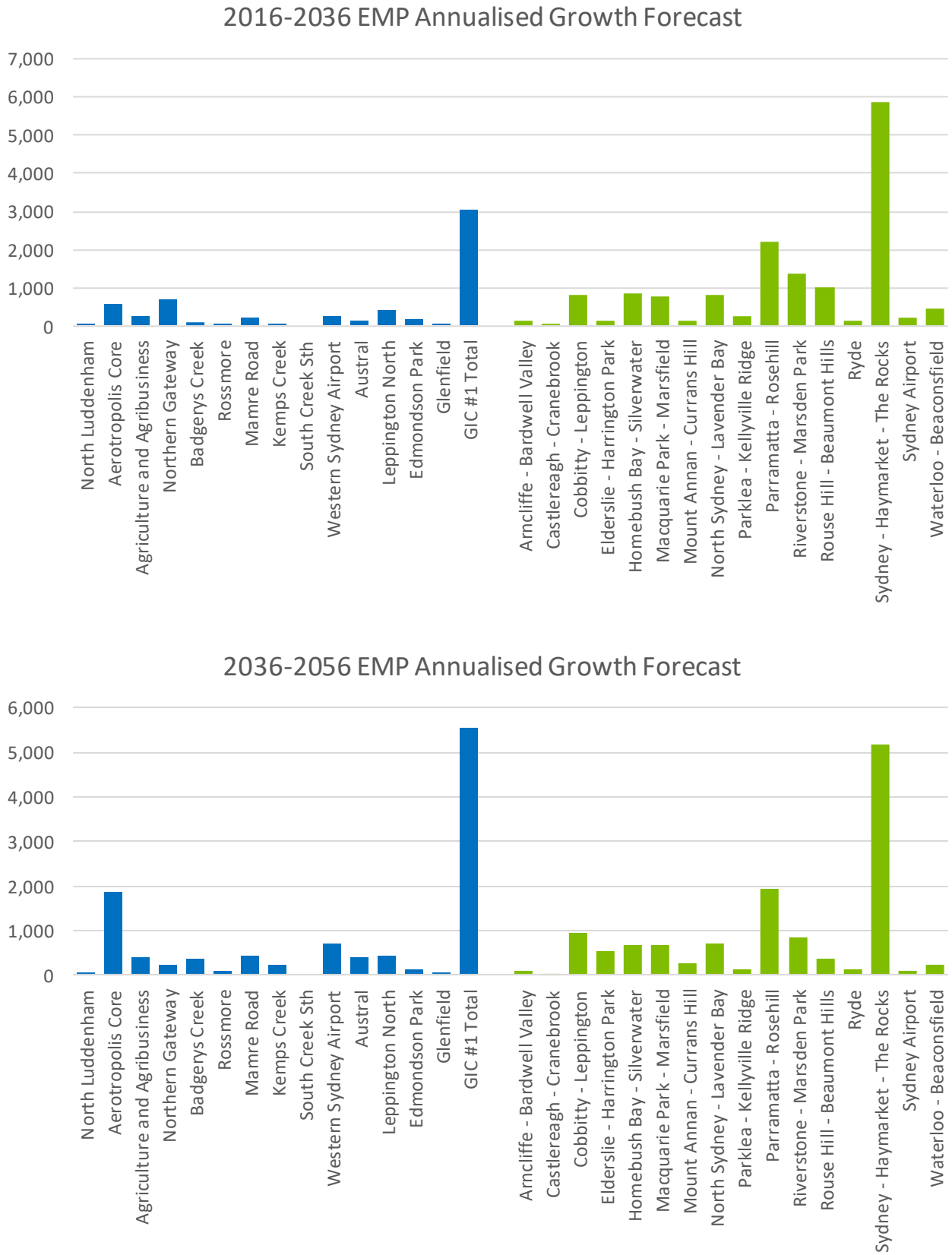
Maximum Growth the GIC and GIC precincts is based on the maximum annual growth forecast between 2016 and 2036

Source: SGS Economics and Planning, 2019

This analysis compares the growth to 2036, with the majority of the growth in jobs, particularly in the Aerotropolis Core to occur in the period between 2036 and 2056 representing a maturing area around Western Sydney Airport. The expected future growth in Sydney CBD is expected to be around 5,800 jobs per year between 2016 and 2036 and 5,181 between 2036 and 2056 which is comparable to the expected growth in the Aerotropolis Core at this time.

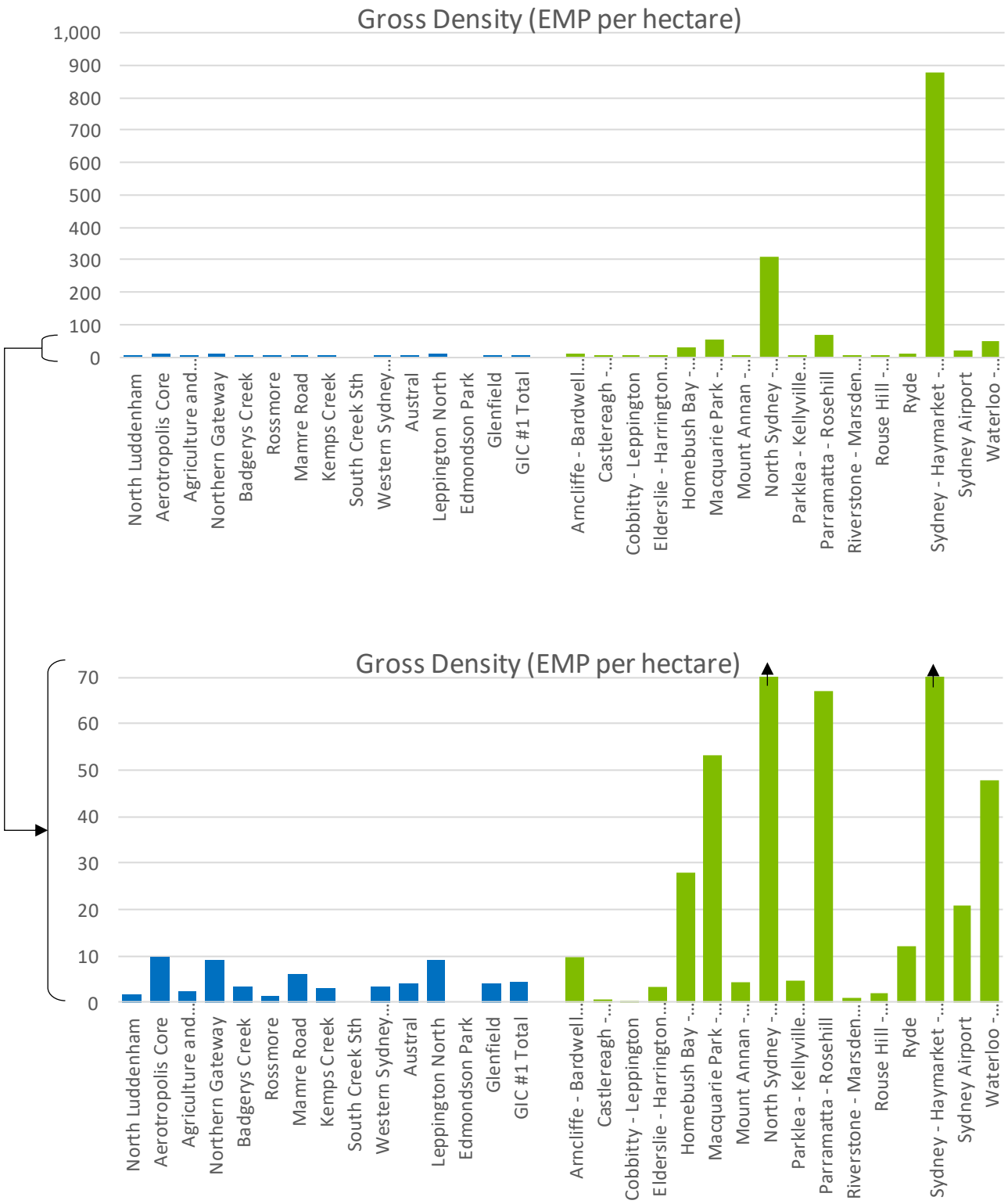
The forecast employment growth for the above locations in Sydney shows that growth in the GIC#1 area is about half that expected in the Sydney-Haymarket-The Rocks SA2 to 2036 before growing more strongly post 2036, with the Aerotropolis Core growing the same as Parramatta.

FIGURE 53 FORECAST ANNUAL EMPLOYMENT GROWTH (SYDNEY)



The job density (jobs per hectare) expected in the GIC area by 2036 is minimal compared to existing (2016) Sydney CBD and Parramatta.

FIGURE 54 EMPLOYMENT DENSITY COMPARISON (SYDNEY)



Source: SGS Economics and Planning, 2019

5.2 Melbourne Comparison Sites

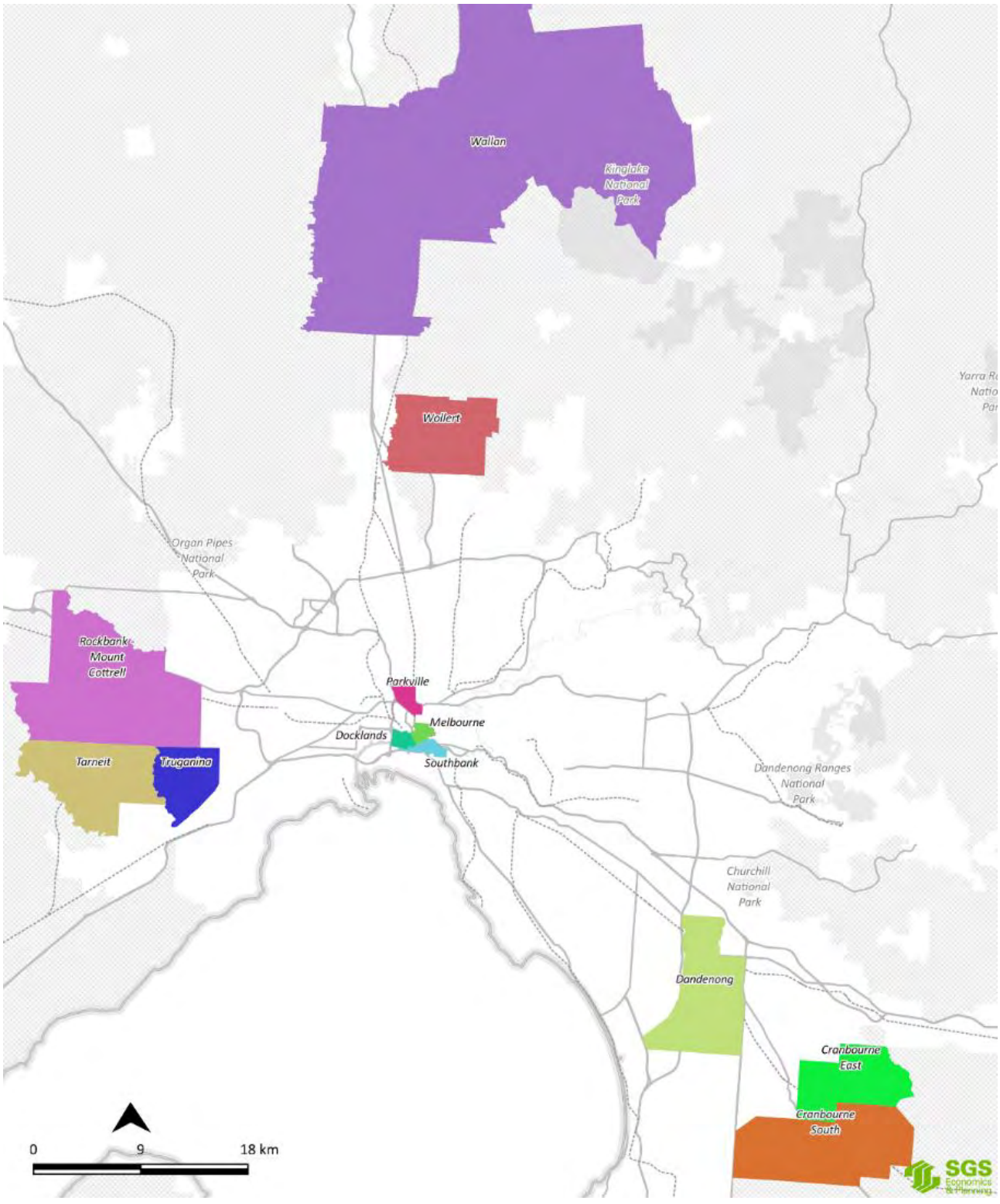
A broader analysis was undertaken with SA2s selected within Greater Melbourne. These sites are shown in Table 33.

TABLE 33:MELBOURNE COMPARISON SITES

Location (SA2)	Attributes
Cranbourne East	Greenfield growth area in south east of Melbourne
Cranbourne South	Greenfield growth area in south east of Melbourne
Dandenong	Growth area with significant job provision in Melbourne's south east, connectivity to rail lines and motorway access
Docklands	Inner city Melbourne housing and jobs centre
Melbourne	Melbourne CBD
Parkville	Inner Melbourne suburb
Rockbank - Mount Cottrell	Western Melbourne growth area
Southbank	Inner Melbourne suburb
Tarneit	Western Melbourne growth area
Truganina	Western Melbourne growth area
Wallan	Growth area north of Melbourne
Wollert	Growth area north of Melbourne

These sites include several key sites and growth areas within Greater Melbourne

FIGURE 55 MELBOURNE SA2 COMPARISON SITES

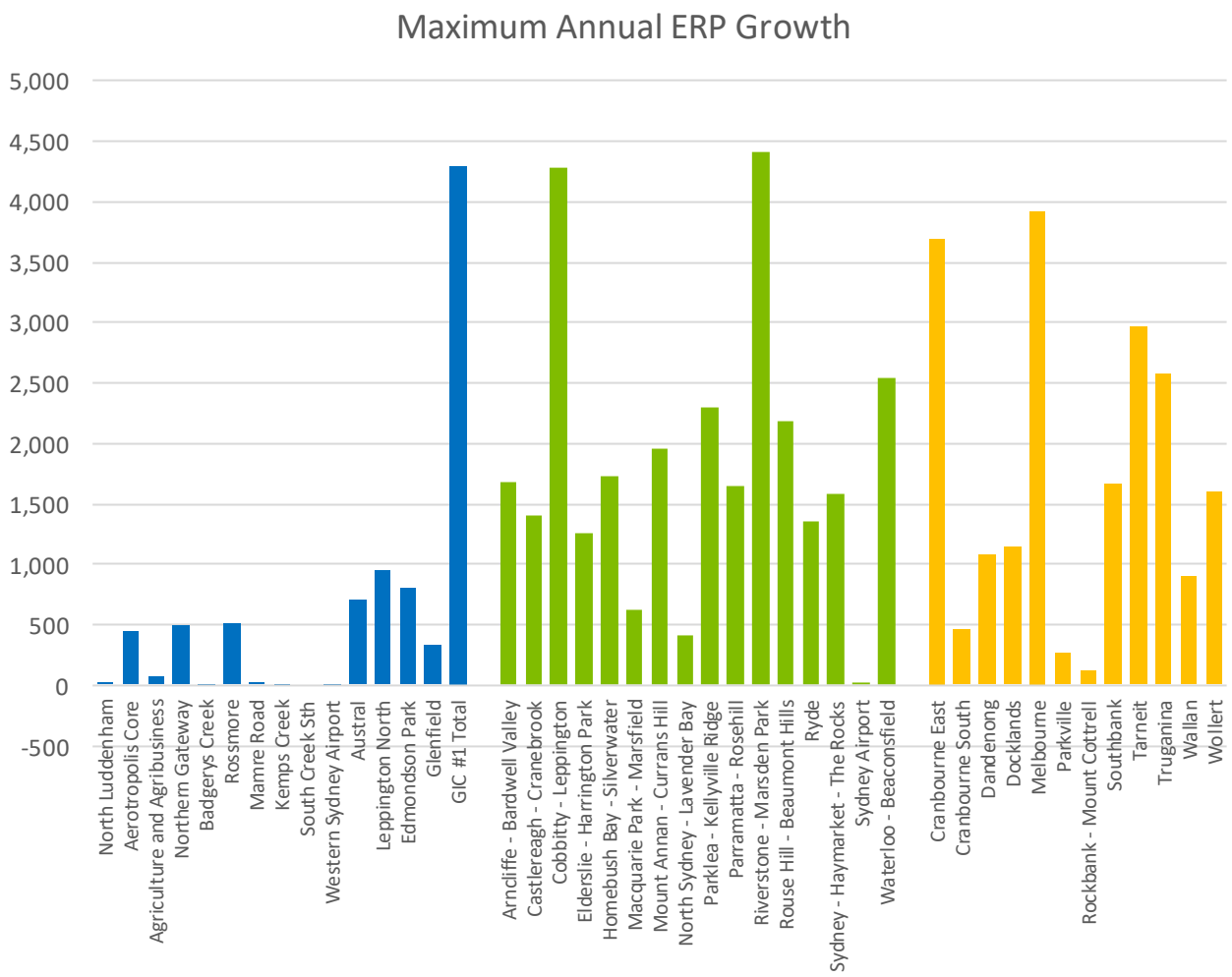


Source: SGS Economics and Planning, 2019

Population Comparison

Comparing the growth in the GIC #1 area to 2036 with the additional Melbourne sites showing that the maximum annual population growth in the GIC #1 area is higher than any of the Melbourne precincts for the past 22 years (1996-2018). This seems reasonable given that Melbourne's growth has multiple fronts to the west and south east specifically, and there is a real focus of growth in Western Sydney, as seen by the growth in the South West and North West Growth area.

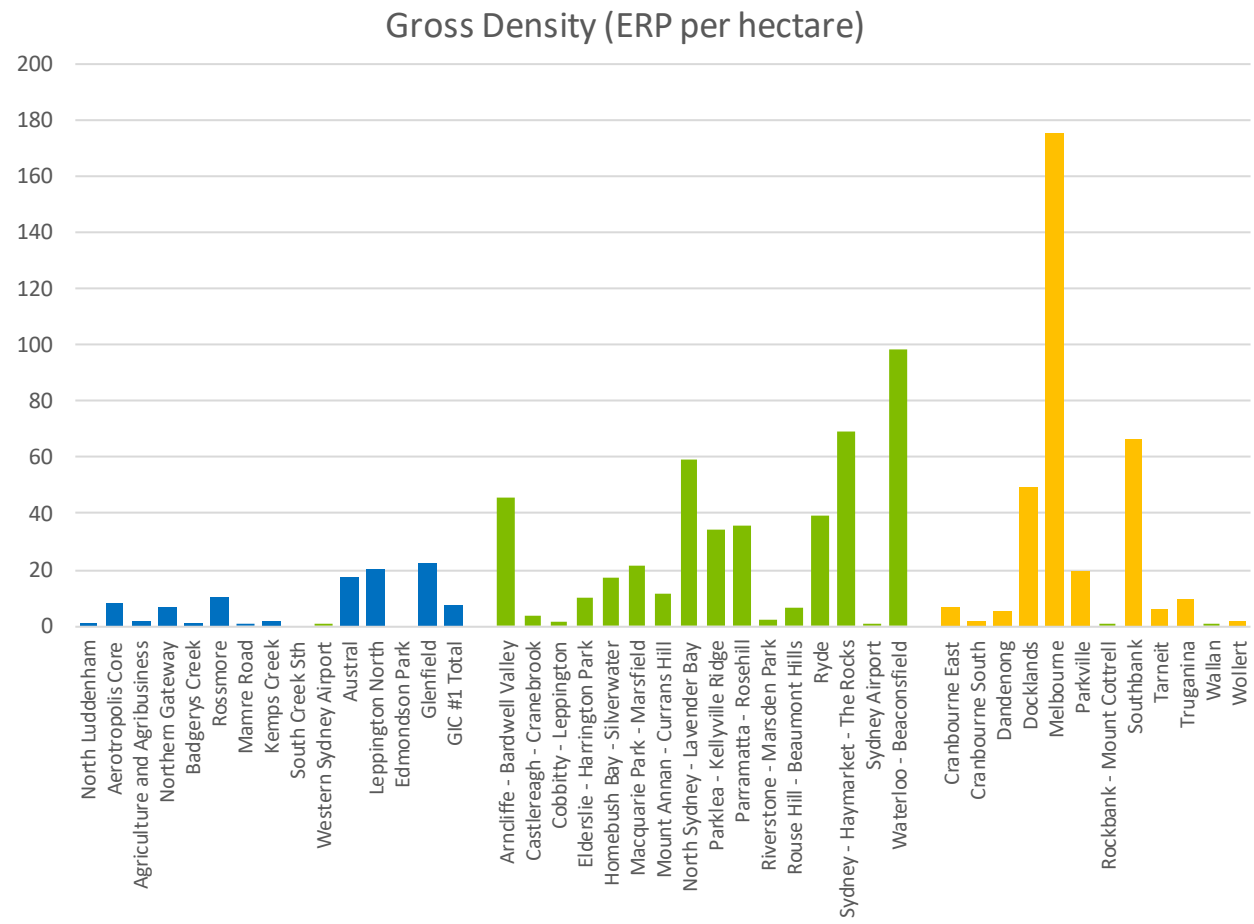
FIGURE 56 MAXIMUM POPULATION GROWTH COMPARISON (SYDNEY AND MELBOURNE)



Source: SGS Economics and Planning, 2019

Assessing the population density of the GIC #1 area compared to the Melbourne comparison sites shows that the expected density is higher than the majority of the greenfield development sites in Melbourne, but still comparable to Sydney.

FIGURE 57 POPULATION DENSITY COMPARISON (SYDNEY AND MELBOURNE)

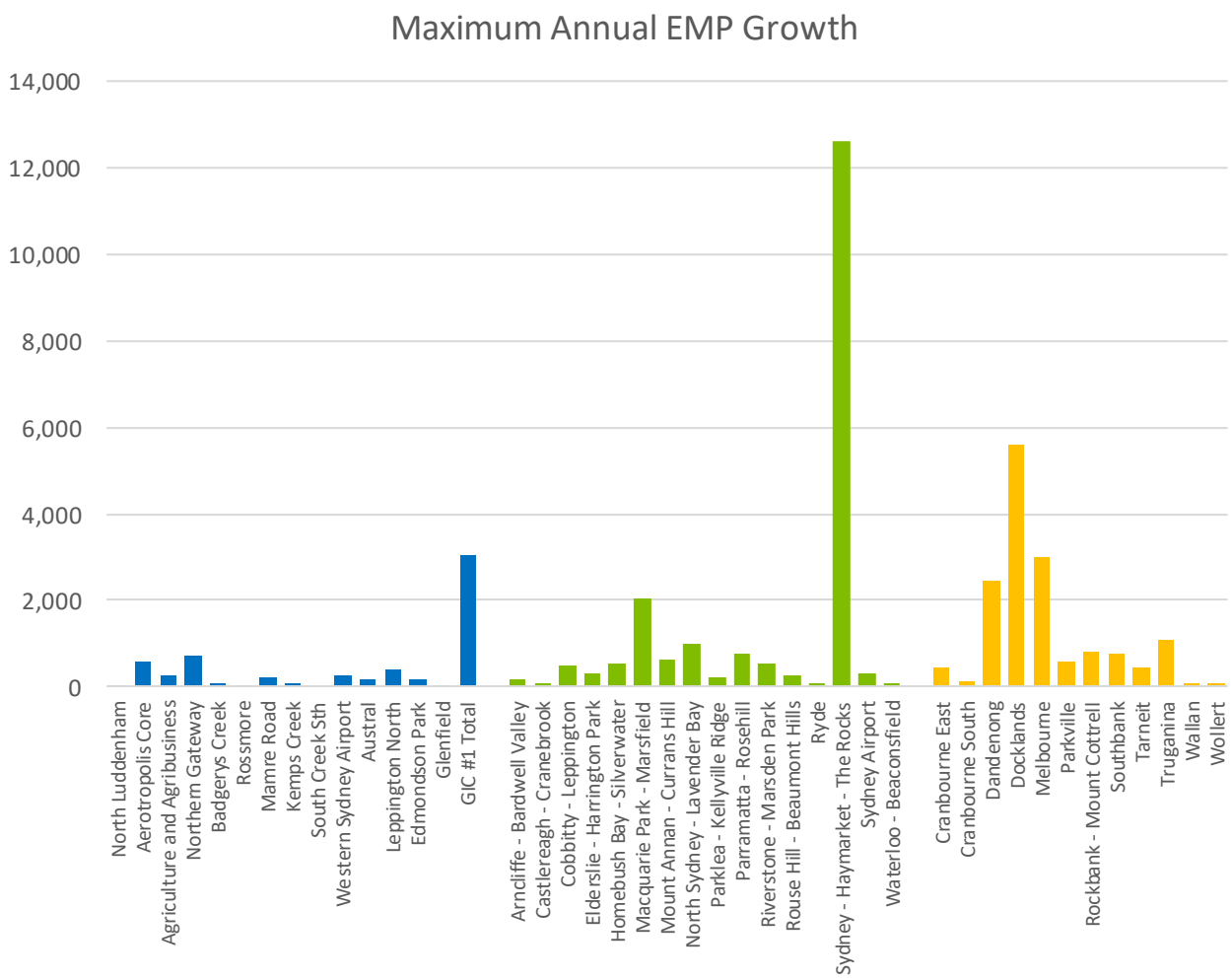


Source: SGS Economics and Planning, 2019

Employment Comparison

A comparison for employment growth shows the maximum annual growth in the GIC #1 area as compared to what has been seen in Docklands and Melbourne (2011-2016)., which function as the centre for employment in Melbourne, including the Melbourne CBD with growth comparable to Melbourne CBD but less than Docklands.

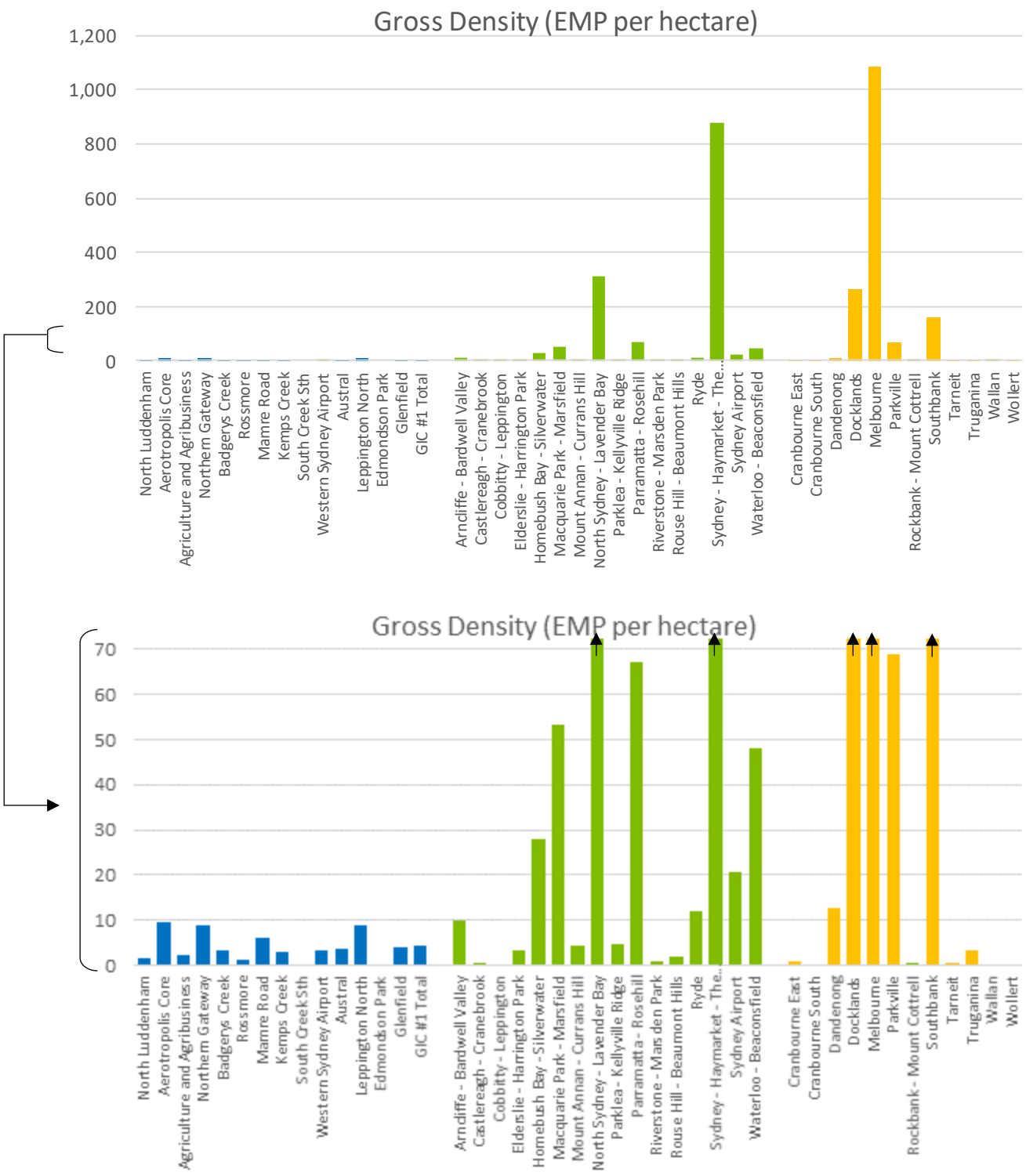
FIGURE 58 MAXIMUM EMPLOYMENT GROWTH COMPARISON (SYDNEY AND MELBOURNE)



Source: SGS Economics and Planning, 2019

The density and intensification in employment is still significantly less than other sites in Melbourne.

FIGURE 59 EMPLOYMENT DENSITY COMPARISON (SYDNEY AND MELBOURNE)



Source: SGS Economics and Planning, 2019

5.3 Summary of Market Analysis

While the expected growth in the GIC #1 area is significant, it is lower than what has been experienced in comparable areas of Sydney such as the North West and South West Growth Areas, which both developed without a significant transport investment such as Sydney Metro Greater West and an economic driver such as the Western Sydney Airport.

Growth between 2036 and 2056 in the GIC #1 area is higher than any comparable location in Sydney or Melbourne. Given the amount of expected investment in the Western Parkland City, this level of growth seems reasonable. However, this will require the area to grow as fast as current historical greenfield areas, which have been growing faster than previously seen in Sydney, and for the Western Sydney Airport and Aerotropolis to experience CBD-like levels of employment growth.

No assessment was made on the viability of growth in the GIC #2 precincts as this data was a direct input into the land use forecasts.

The above assessment has been based on the comparing Option 1 to historical and forecast growth at comparison sites. The base case represents a significantly lower proportion of Option 1 growth as does Option 2 as shown in Table 34, except for more population growth expected in GIC #1 in Option 2 up until 2036.

TABLE 34:BASE CASE AND OPTION 2 PROPORTION OF OPTION 1

Proportion of Option 1	Population	Employment
Base 2036	73%	46%
Base 2056	62%	33%
Option 2 2036	109%	78%
Option 2 2056	91%	62%

Therefore, Option 2 growth is also in line with the historical record setting growth currently seen in the North West and South West Growth Areas up until 2036, while it may be more reasonable in the long term towards 2056.

6. PROJECT SUMMARY

A new vision for the west

The focus on creating job opportunities in the Western Parkland City with the Western Sydney Airport and associated infrastructure is vital to the continued growth and prosperity of Greater Sydney and NSW. The development of the second airport, provision of public transport infrastructure upon opening and the land use opportunities along the corridor allow for appropriate and considered development for the people of Western Sydney.

The implementation of this vision is something that has not been attempted to date in Sydney or Australia, and the current datasets underpinning the planning of the region do not reflect the significant shifts that are being aimed for.

A collaborative co-design process

The development of these two alternative land use options is the result of wide-ranging consultation with stakeholders, analysis and reconciliation of a multitude of datasets and visions all created for different purposes to create a common set of forecasts under each scenario. These land use forecasts are to be used by partner agencies for the GIC program to ensure that the appropriate infrastructure required are identified and planned to support the future growth and success of the Western Parkland City.

Two possible land use futures for the west

Over 2 million people will live in the Western City District by 2056, which is approximately double the existing population in 2016. The places these people will live in by 2056 will result in a significantly different development pattern. They will be supported by approximately 800,000 jobs in the district, more than double current local job opportunities.

The scenarios developed for the GIC program represents two possible futures:

- Option 1: an early and strong Aerotropolis supported by Sydney Metro Greater West Stage 1 services to link people to jobs and opportunities particularly to 2036, or
- Option 2: a future with sustained and strong development of existing centres such as Liverpool, Penrith and Campbelltown, but with growth across all areas by 2056

Option 1, which focusses on the role of the Aerotropolis, has an additional 62,500 jobs in the Western City District by 2056. This is compared to Option 2, which focusses on the Aerotropolis supporting existing centres such as Penrith, Liverpool and Campbelltown.

Both options provide a similar level of population growth, with an additional 28,000 people in the district by 2056 in Option 1 associated with the additional number and the type of jobs in the scenario. Both scenarios represent a shift in the types of jobs being provided in the west, with a shift away from traditional industrial-based employment towards knowledge based employment supported by health and education and population serving jobs.

Option 1 and Option 2 have a similar quantum of people and jobs by 2036 with the differences between the options occurring post 2036, representing the development of the Aerotropolis as a driving force for the growth of Sydney occurring after 2036.

Both of these futures will result in significant changes for the west and the datasets developed provide for that range such that both can be appropriately planned for.

GIC #1 – Western Sydney Growth Area (Aerotropolis)

The GIC#1 area which includes Western Sydney Airport and the Aerotropolis will support significant jobs growth based around the development of the Airport in Option 1, with almost 180,000 jobs by 2056 compared with 111,000 jobs in Option 2. Approximately 218,000 people with make their home in the GIC#1 area by 2056 with the new housing development provided compared to approximately 200,000 people in Option 2

GIC #2 – Greater Penrith to Eastern Creek

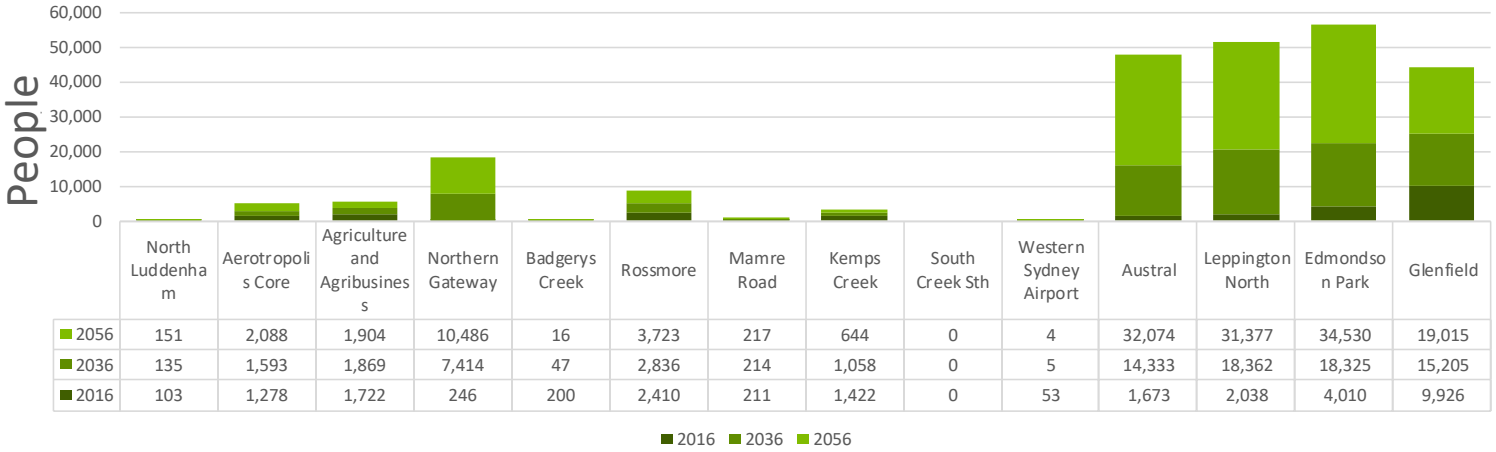
The GIC#2 area to the North, encompassing the new growth area of Orchard Hills and the existing centres of Penrith and St Marys, has strong growth in both scenarios. This growth is centred on the transit-oriented development along the Sydney Metro Greater West corridor, with approximately 400,000 additional people by 2056. Jobs growth is less than in the GIC#1 area without the anchor of the Aerotropolis.

APPENDIX A – GIC AREA PROFILES

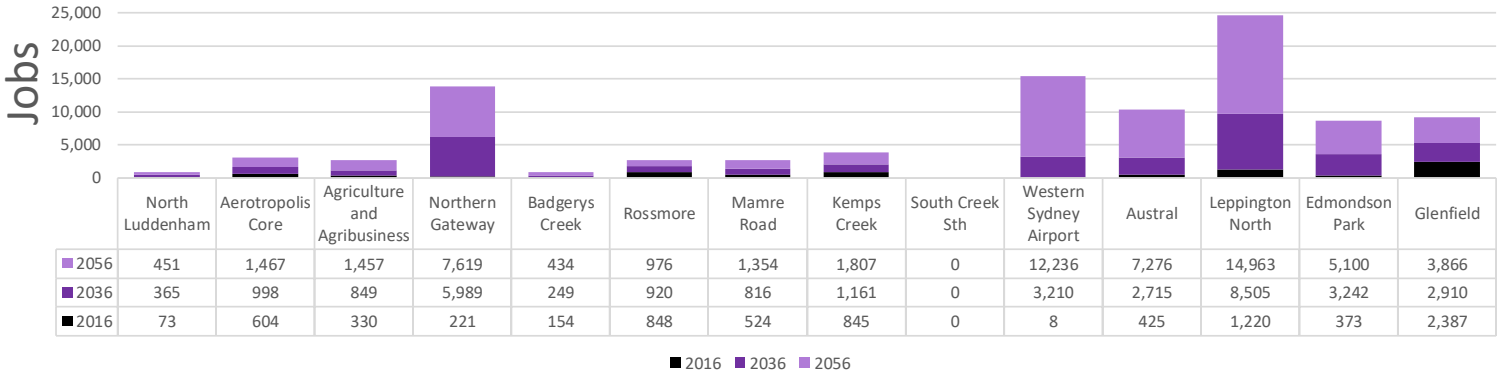
GIC #1 Area - Base Case

GIC #1	2016	2036	2056
pop	25,292	81,394	136,229
jobs	8,014	31,928	59,005
dwellings	8,337	27,632	46,030

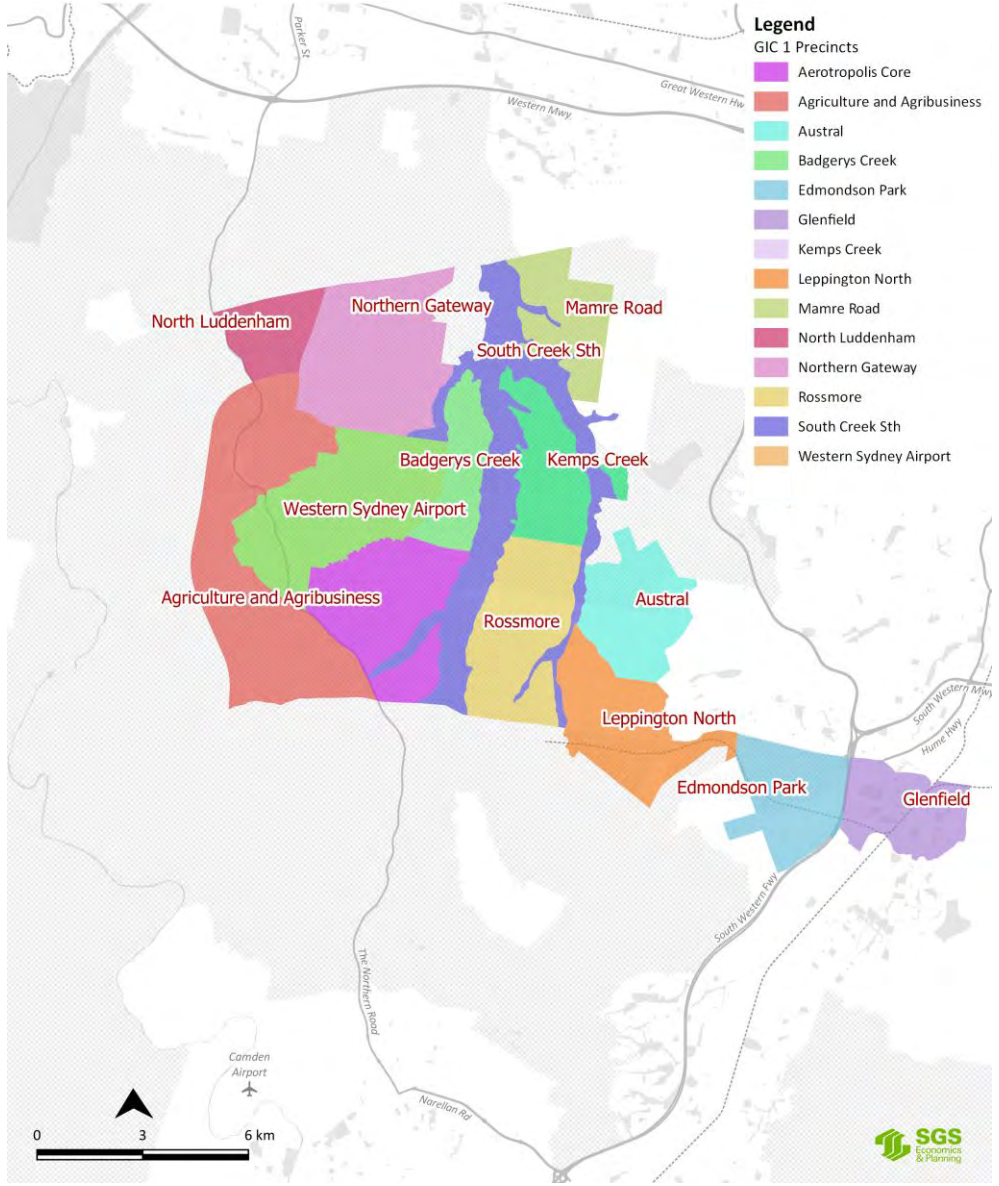
Job mix at 2036



	North Luddenham	Aerotropolis Core	Agriculture and Agribusiness	Northern Gateway	Badgerys Creek	Rossmore	Mamre Road	Kemps Creek	South Creek Sth	Western Sydney Airport	Austral	Leppington North	Edmondson Park	Glenfield
2056	151	2,088	1,904	10,486	16	3,723	217	644	0	4	32,074	31,377	34,530	19,015
2036	135	1,593	1,869	7,414	47	2,836	214	1,058	0	5	14,333	18,362	18,325	15,205
2016	103	1,278	1,722	246	200	2,410	211	1,422	0	53	1,673	2,038	4,010	9,926



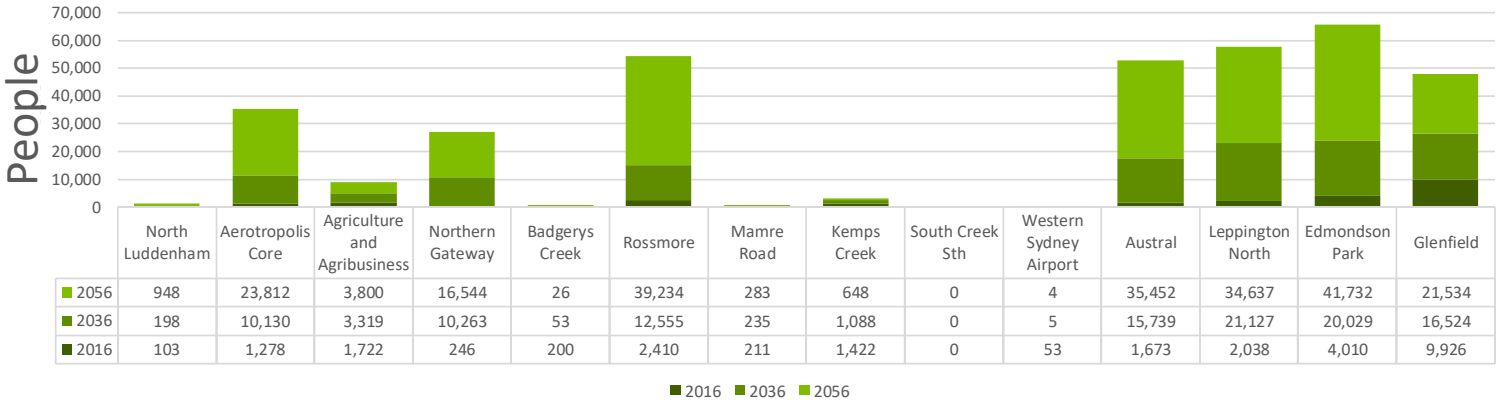
	North Luddenham	Aerotropolis Core	Agriculture and Agribusiness	Northern Gateway	Badgerys Creek	Rossmore	Mamre Road	Kemps Creek	South Creek Sth	Western Sydney Airport	Austral	Leppington North	Edmondson Park	Glenfield
2056	451	1,467	1,457	7,619	434	976	1,354	1,807	0	12,236	7,276	14,963	5,100	3,866
2036	365	998	849	5,989	249	920	816	1,161	0	3,210	2,715	8,505	3,242	2,910
2016	73	604	330	221	154	848	524	845	0	8	425	1,220	373	2,387



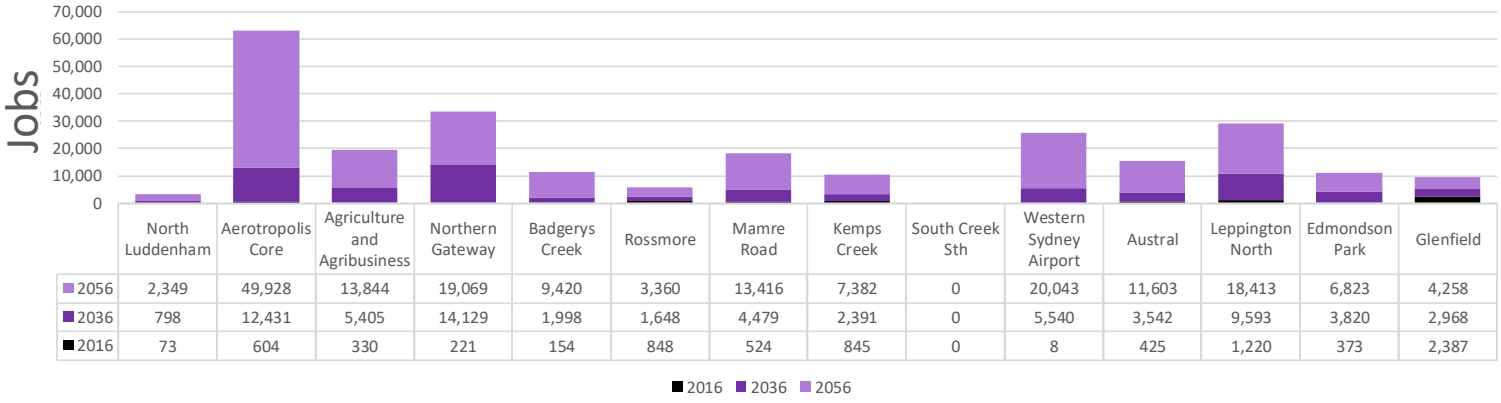
GIC #1 Area - Option 1

GIC #1	2016	2036	2056
pop	25,292	111,266	218,653
jobs	8,014	68,742	179,908
dwellings	8,337	38,360	73,993

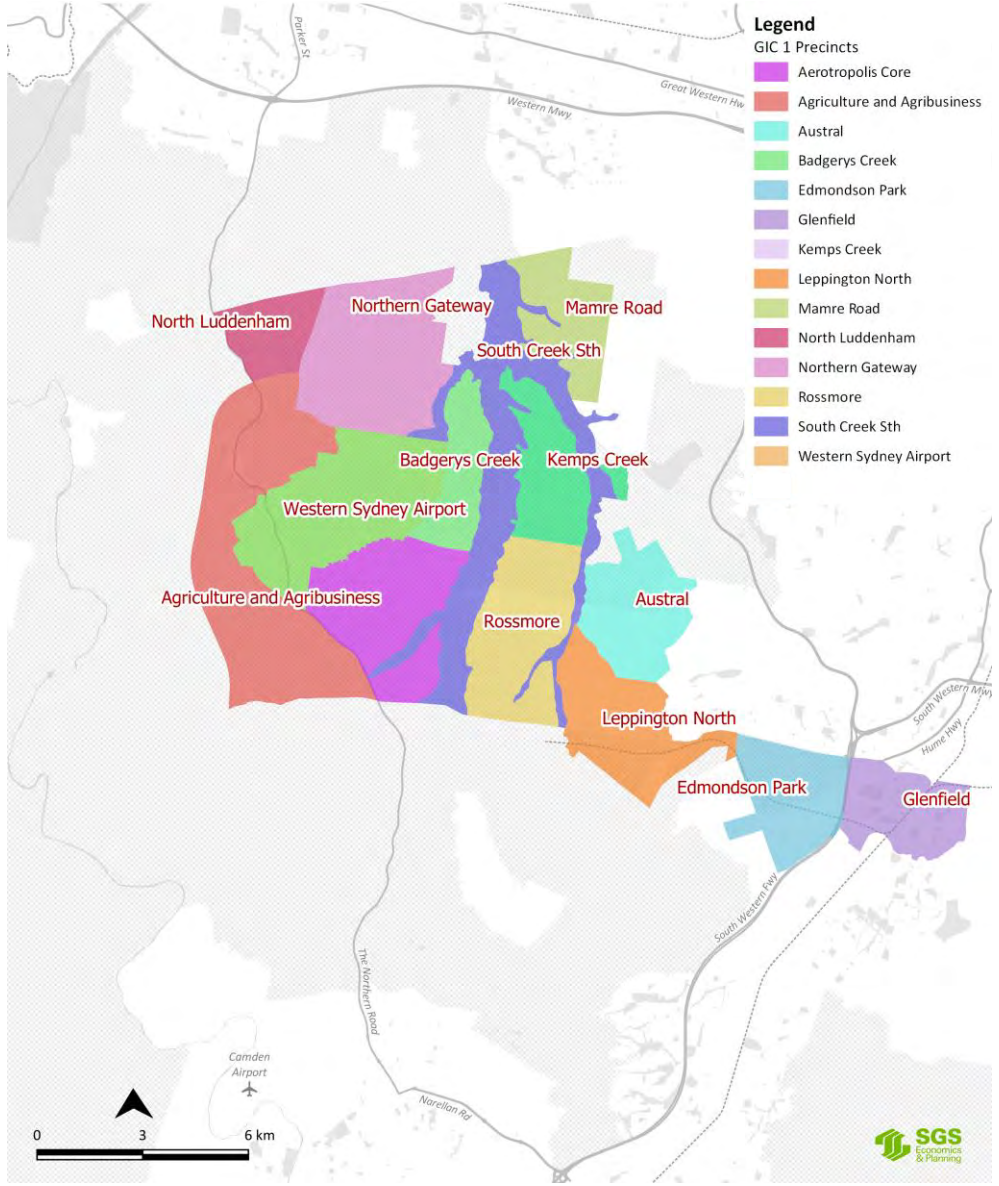
Job mix at 2036



	North Luddenham	Aerotropolis Core	Agriculture and Agribusiness	Northern Gateway	Badgerys Creek	Rossmore	Mamre Road	Kemps Creek	South Creek Sth	Western Sydney Airport	Austral	Leppington North	Edmondson Park	Glenfield
2056	948	23,812	3,800	16,544	26	39,234	283	648	0	4	35,452	34,637	41,732	21,534
2036	198	10,130	3,319	10,263	53	12,555	235	1,088	0	5	15,739	21,127	20,029	16,524
2016	103	1,278	1,722	246	200	2,410	211	1,422	0	53	1,673	2,038	4,010	9,926



	North Luddenham	Aerotropolis Core	Agriculture and Agribusiness	Northern Gateway	Badgerys Creek	Rossmore	Mamre Road	Kemps Creek	South Creek Sth	Western Sydney Airport	Austral	Leppington North	Edmondson Park	Glenfield
2056	2,349	49,928	13,844	19,069	9,420	3,360	13,416	7,382	0	20,043	11,603	18,413	6,823	4,258
2036	798	12,431	5,405	14,129	1,998	1,648	4,479	2,391	0	5,540	3,542	9,593	3,820	2,968
2016	73	604	330	221	154	848	524	845	0	8	425	1,220	373	2,387



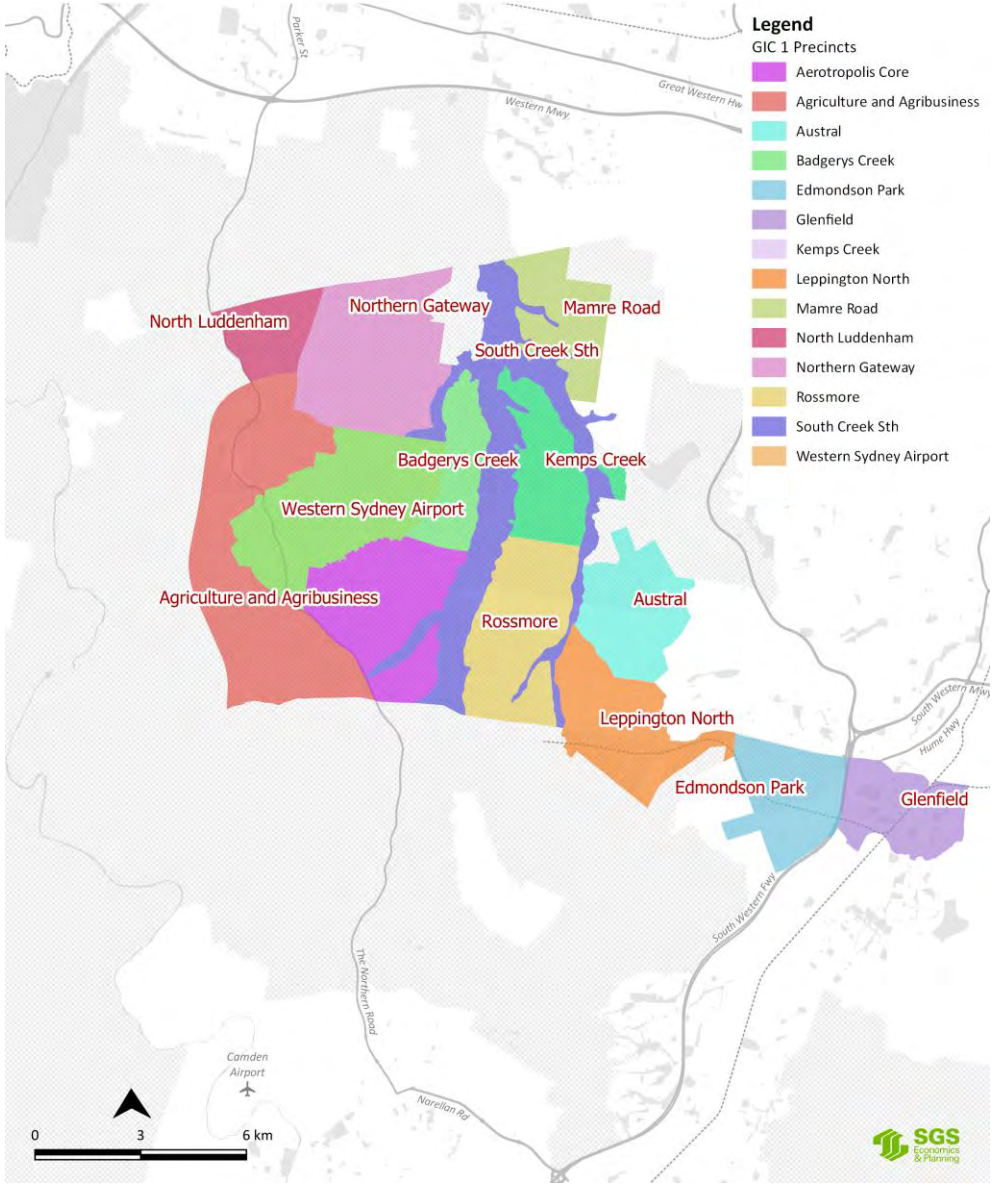
GIC #1 Area - Option 2

GIC #1	2016	2036	2056
pop	25,292	120,957	199,360
jobs	8,014	53,505	111,246
dwellings	8,337	41,128	67,353

Job mix at 2036

	North Luddenham	Aerotropolis Core	Agriculture and Agribusiness	Northern Gateway	Badgerys Creek	Rossmore	Mamre Road	Kemps Creek	South Creek Sth	Western Sydney Airport	Austral	Leppington North	Edmondson Park	Glenfield
2056	528	9,373	3,809	12,684	26	27,450	272	733	0	5	40,949	39,598	41,213	22,719
2036	143	4,885	3,436	9,482	48	10,029	234	1,066	0	6	22,389	23,166	26,877	19,195
2016	103	1,278	1,722	246	200	2,410	211	1,422	0	53	1,673	2,038	4,010	9,926

	North Luddenham	Aerotropolis Core	Agriculture and Agribusiness	Northern Gateway	Badgerys Creek	Rossmore	Mamre Road	Kemps Creek	South Creek Sth	Western Sydney Airport	Austral	Leppington North	Edmondson Park	Glenfield
2056	812	14,894	11,093	7,620	3,206	2,237	8,817	4,438	0	17,887	10,142	19,572	5,882	4,646
2036	391	5,530	5,314	6,328	1,089	1,574	3,653	1,913	0	4,526	4,171	12,023	3,591	3,402
2016	73	604	330	221	154	848	524	845	0	8	425	1,220	373	2,387

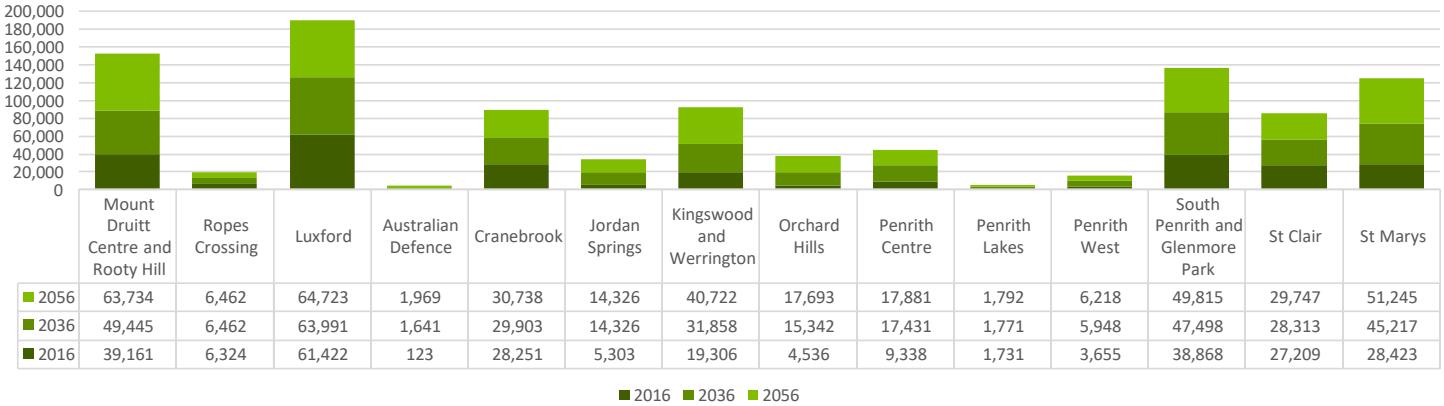


GIC #2 Area – Base Case

GIC #2	2016	2036	2056
pop	273,648	359,146	397,065
jobs	86,054	100,317	109,454
dwellings	95,634	126,540	139,516

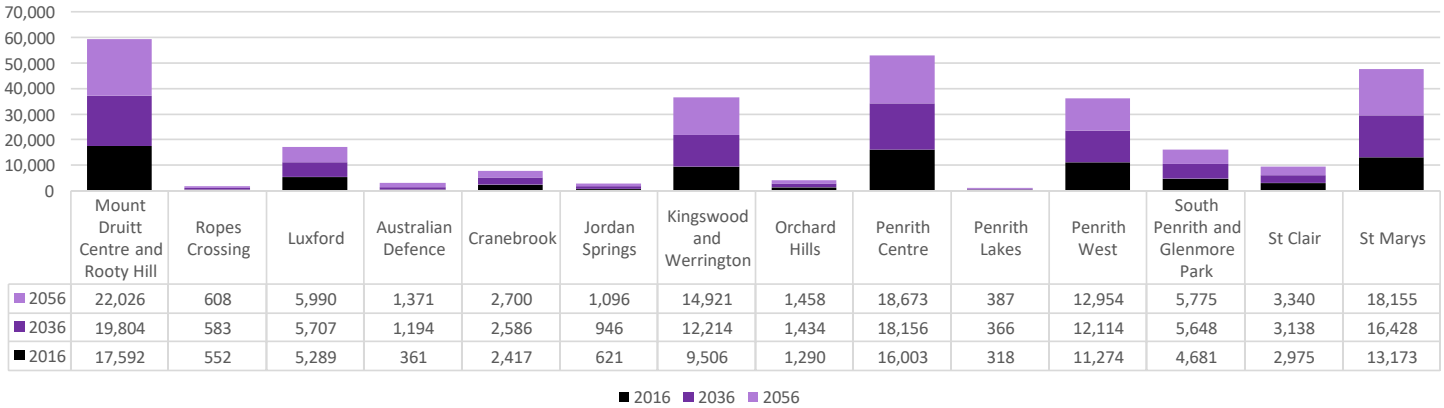
Job mix at 2036

People

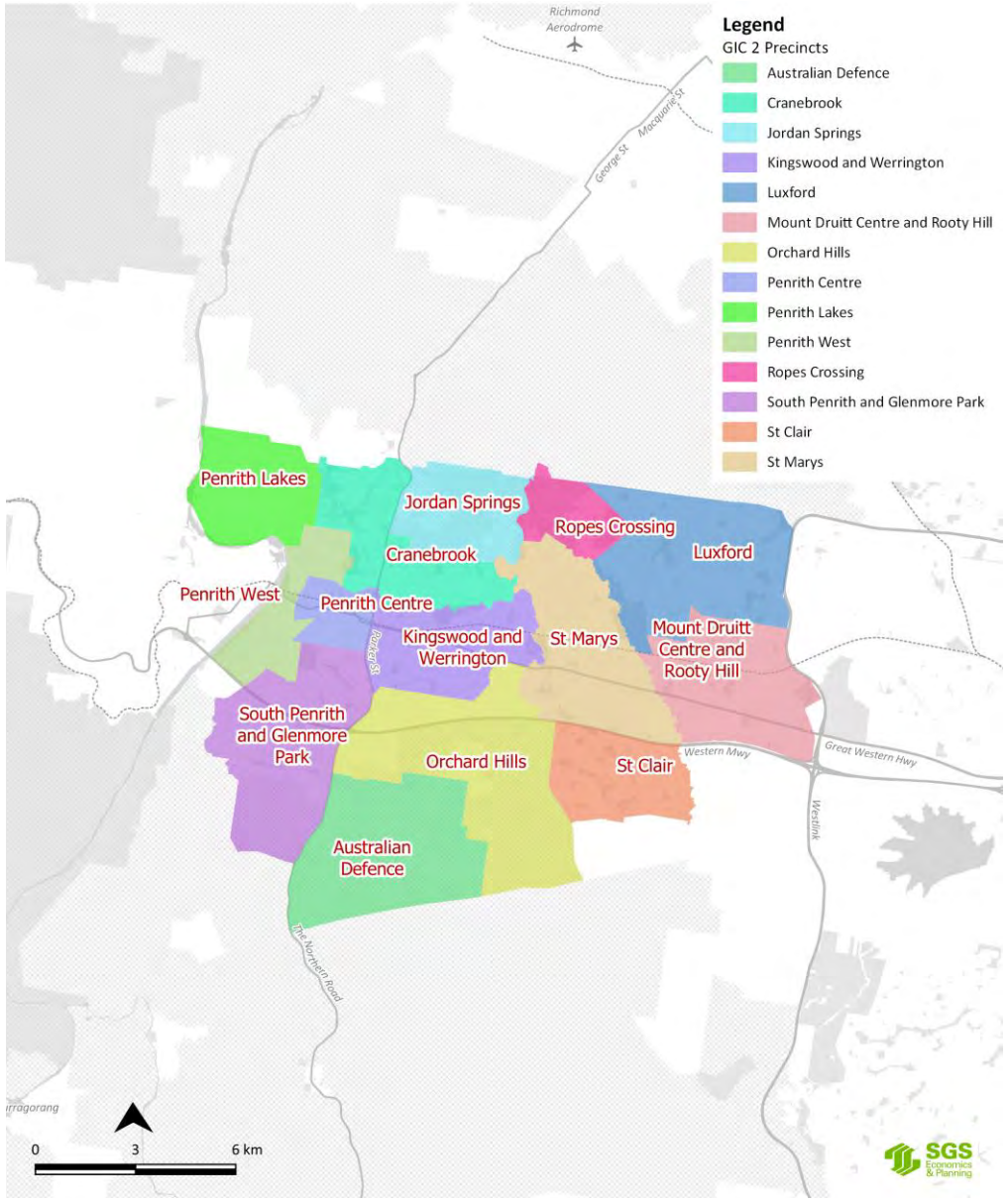


	Mount Druitt Centre and Rooty Hill	Ropes Crossing	Luxford	Australian Defence	Cranebrook	Jordan Springs	Kingswood and Werrington	Orchard Hills	Penrith Centre	Penrith Lakes	Penrith West	South Penrith and Glenmore Park	St Clair	St Marys
2056	63,734	6,462	64,723	1,969	30,738	14,326	40,722	17,693	17,881	1,792	6,218	49,815	29,747	51,245
2036	49,445	6,462	63,991	1,641	29,903	14,326	31,858	15,342	17,431	1,771	5,948	47,498	28,313	45,217
2016	39,161	6,324	61,422	123	28,251	5,303	19,306	4,536	9,338	1,731	3,655	38,868	27,209	28,423

Jobs



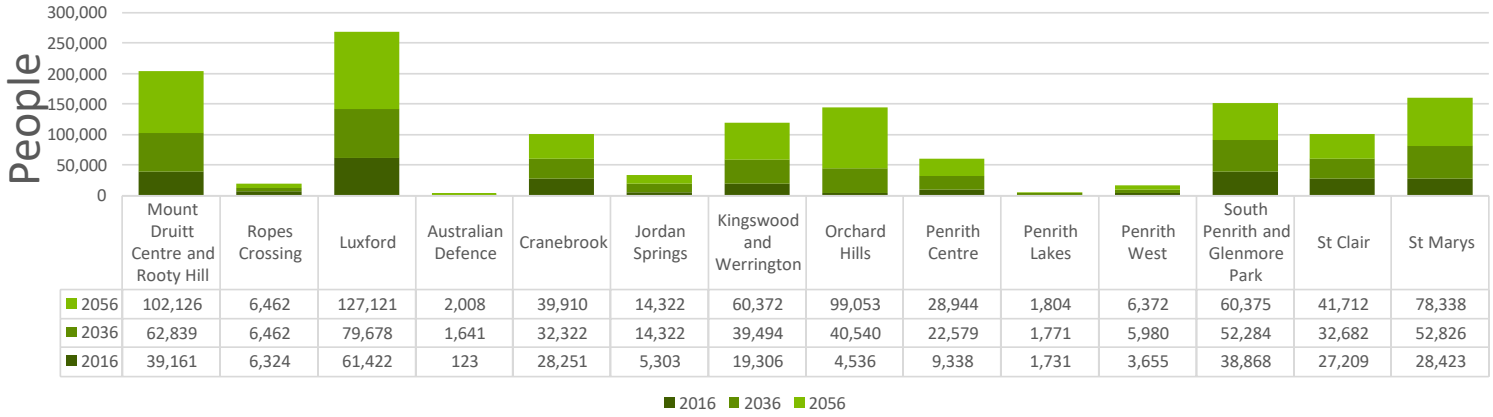
	Mount Druitt Centre and Rooty Hill	Ropes Crossing	Luxford	Australian Defence	Cranebrook	Jordan Springs	Kingswood and Werrington	Orchard Hills	Penrith Centre	Penrith Lakes	Penrith West	South Penrith and Glenmore Park	St Clair	St Marys
2056	22,026	608	5,990	1,371	2,700	1,096	14,921	1,458	18,673	387	12,954	5,775	3,340	18,155
2036	19,804	583	5,707	1,194	2,586	946	12,214	1,434	18,156	366	12,114	5,648	3,138	16,428
2016	17,592	552	5,289	361	2,417	621	9,506	1,290	16,003	318	11,274	4,681	2,975	13,173



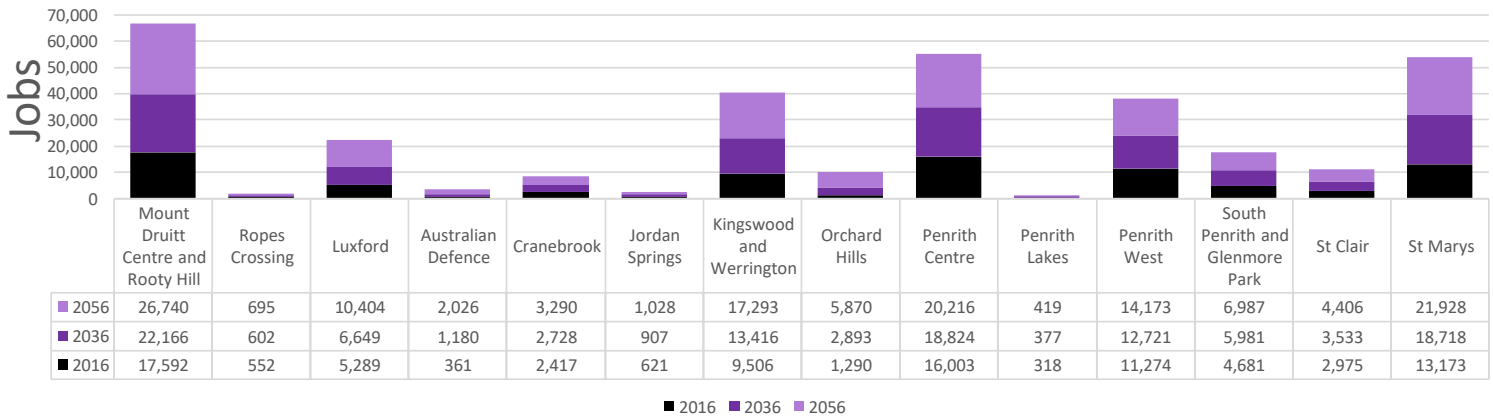
GIC #2 Area - Option 1

GIC #2	2016	2036	2056
pop	273,648	445,421	668,919
jobs	86,054	110,695	135,476
dwellings	95,634	162,238	240,862

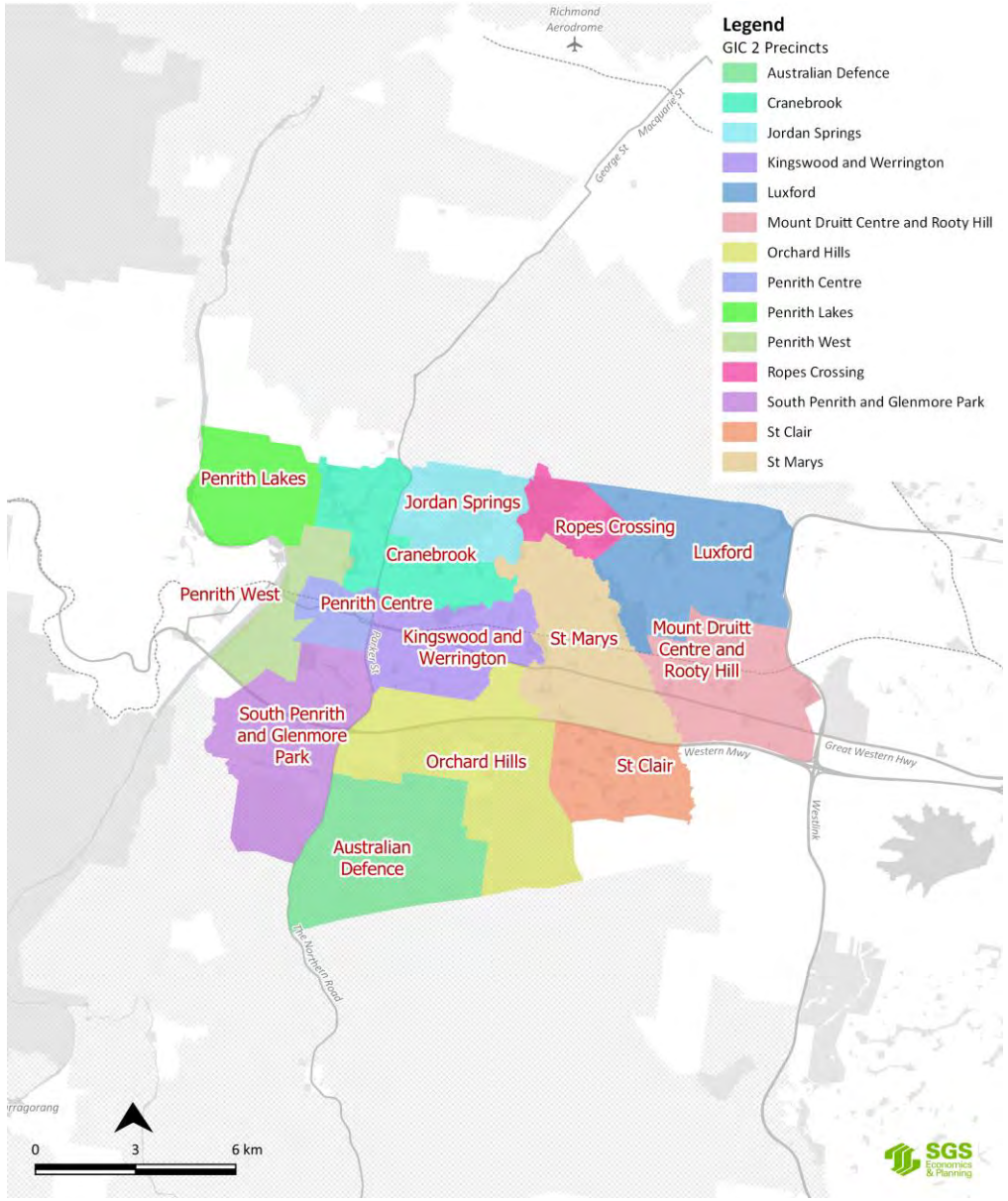
Job mix at 2036



	Mount Druitt Centre and Rooty Hill	Ropes Crossing	Luxford	Australian Defence	Cranebrook	Jordan Springs	Kingswood and Werrington	Orchard Hills	Penrith Centre	Penrith Lakes	Penrith West	South Penrith and Glenmore Park	St Clair	St Marys
2056	102,126	6,462	127,121	2,008	39,910	14,322	60,372	99,053	28,944	1,804	6,372	60,375	41,712	78,338
2036	62,839	6,462	79,678	1,641	32,322	14,322	39,494	40,540	22,579	1,771	5,980	52,284	32,682	52,826
2016	39,161	6,324	61,422	123	28,251	5,303	19,306	4,536	9,338	1,731	3,655	38,868	27,209	28,423



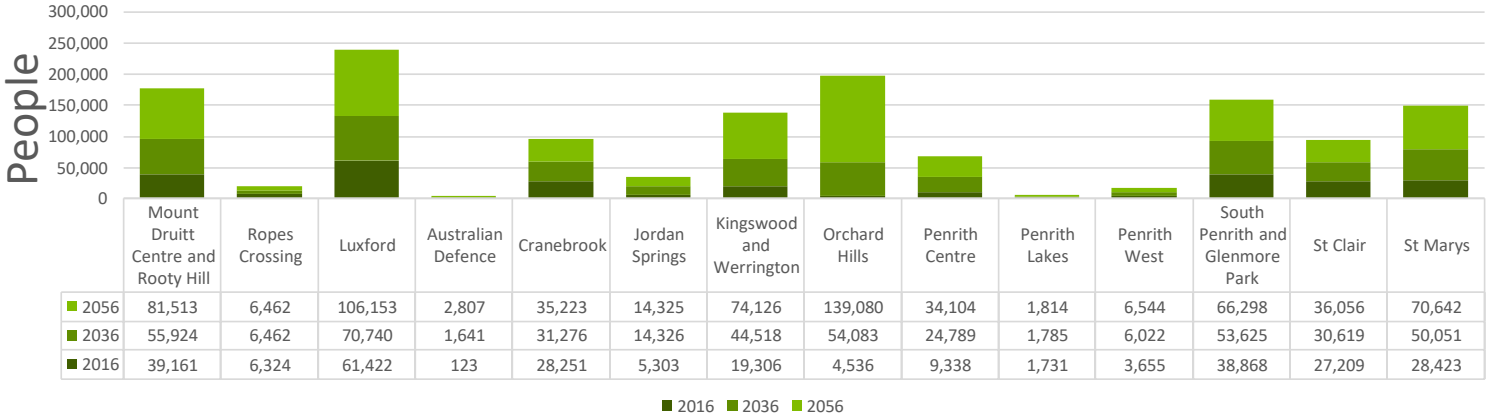
	Mount Druitt Centre and Rooty Hill	Ropes Crossing	Luxford	Australian Defence	Cranebrook	Jordan Springs	Kingswood and Werrington	Orchard Hills	Penrith Centre	Penrith Lakes	Penrith West	South Penrith and Glenmore Park	St Clair	St Marys
2056	26,740	695	10,404	2,026	3,290	1,028	17,293	5,870	20,216	419	14,173	6,987	4,406	21,928
2036	22,166	602	6,649	1,180	2,728	907	13,416	2,893	18,824	377	12,721	5,981	3,533	18,718
2016	17,592	552	5,289	361	2,417	621	9,506	1,290	16,003	318	11,274	4,681	2,975	13,173



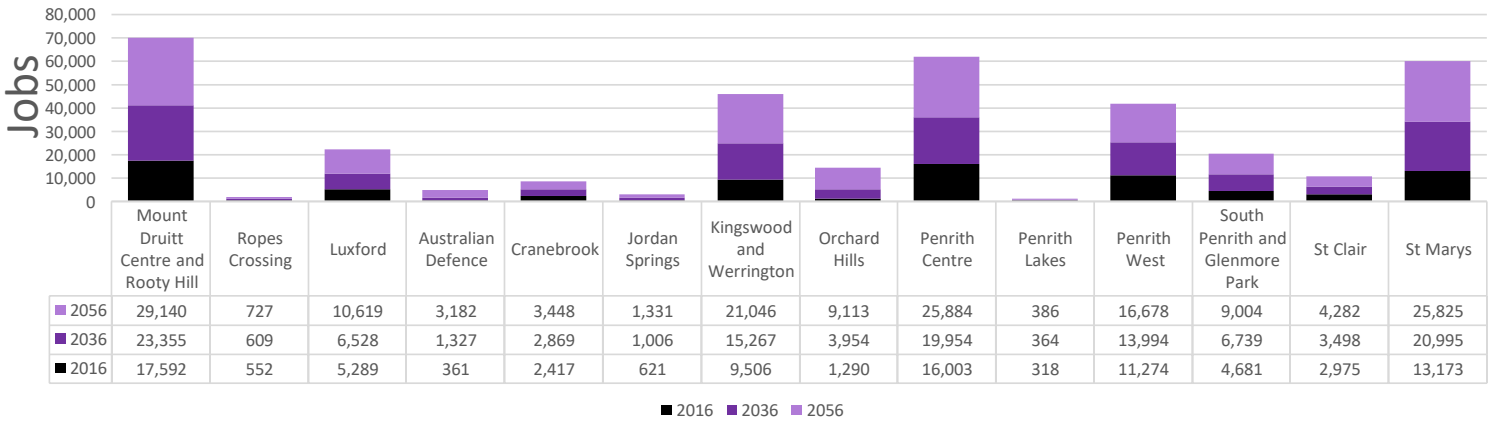
GIC #2 Area - Option 2

GIC #2	2016	2036	2056
pop	273,648	445,860	675,146
jobs	86,054	120,457	160,665
dwellings	95,634	162,673	243,269

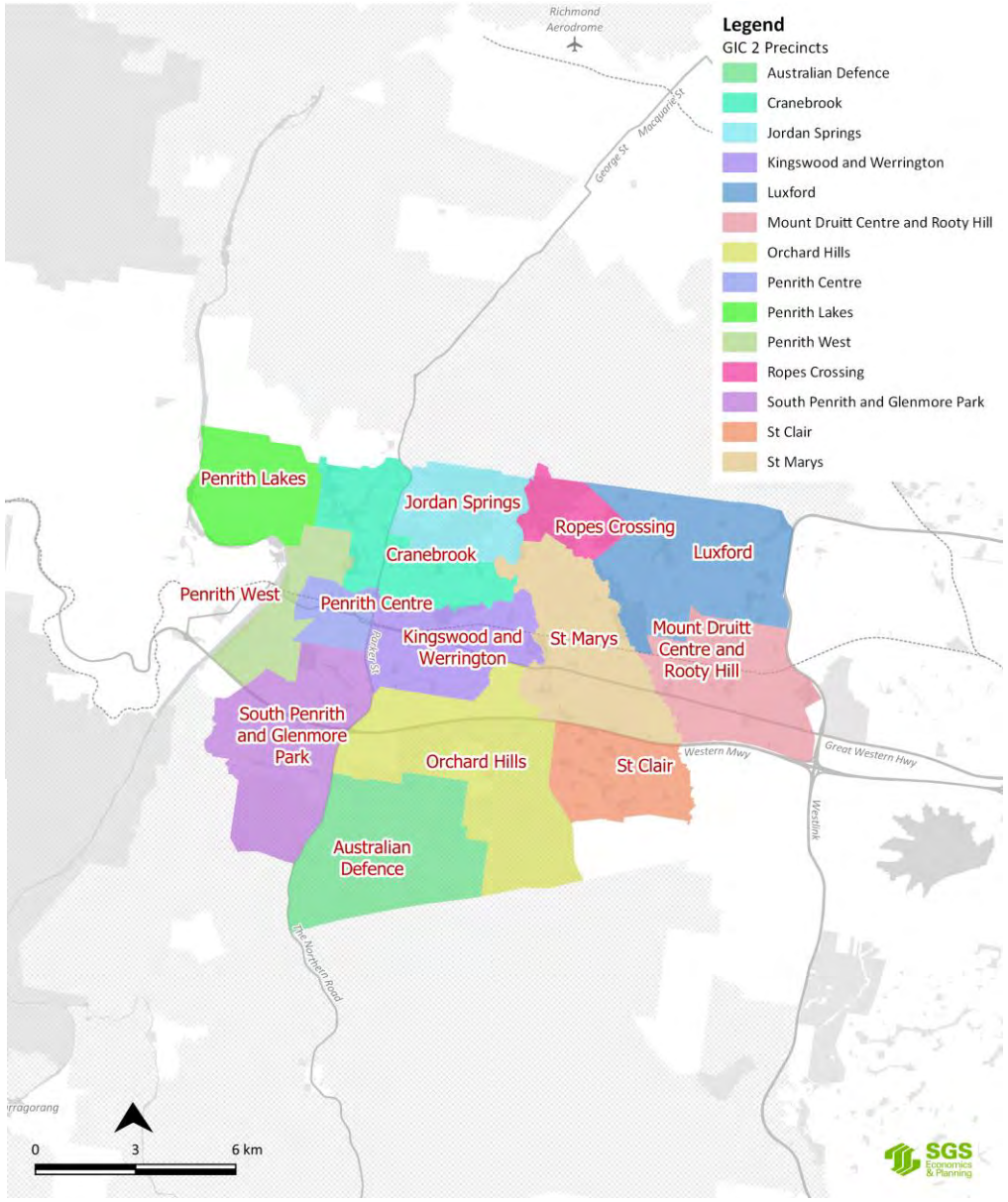
Job mix at 2036



	Mount Druitt Centre and Rooty Hill	Ropes Crossing	Luxford	Australian Defence	Cranebrook	Jordan Springs	Kingswood and Werrington	Orchard Hills	Penrith Centre	Penrith Lakes	Penrith West	South Penrith and Glenmore Park	St Clair	St Marys
2056	81,513	6,462	106,153	2,807	35,223	14,325	74,126	139,080	34,104	1,814	6,544	66,298	36,056	70,642
2036	55,924	6,462	70,740	1,641	31,276	14,326	44,518	54,083	24,789	1,785	6,022	53,625	30,619	50,051
2016	39,161	6,324	61,422	123	28,251	5,303	19,306	4,536	9,338	1,731	3,655	38,868	27,209	28,423



	Mount Druitt Centre and Rooty Hill	Ropes Crossing	Luxford	Australian Defence	Cranebrook	Jordan Springs	Kingswood and Werrington	Orchard Hills	Penrith Centre	Penrith Lakes	Penrith West	South Penrith and Glenmore Park	St Clair	St Marys
2056	29,140	727	10,619	3,182	3,448	1,331	21,046	9,113	25,884	386	16,678	9,004	4,282	25,825
2036	23,355	609	6,528	1,327	2,869	1,006	15,267	3,954	19,954	364	13,994	6,739	3,498	20,995
2016	17,592	552	5,289	361	2,417	621	9,506	1,290	16,003	318	11,274	4,681	2,975	13,173



APPENDIX B – GIC SCENARIO LENS MACRO ASSUMPTIONS

'Scenario Lens' Macro Assumptions – 0-10, 10-20 and 20-40 years

Draft Base Case, Scenarios and Macro Assumptions

BASE CASE – 'NO POLICY CHANGE'

Macro Assumptions

Infrastructure context	0-10 years	10-20 years	20-40 years
Networks and systems	• Western Sydney Airport • Sydney Metro Greater West Stage 1 – St Marys to Western Sydney Airport/ Aerotropolis (partially funded by the Commonwealth Government, subject to Final Business Case) • Western Sydney Roads: – The Northern Road upgrade – Bringelly Road upgrade • Moorebank Intermodal Terminal • M4 Smart Motorway - Mays Hill to Lapstone • M12 Motorway (partially funded by the Commonwealth Government, subject to Final Business Case) • BAU – water, wastewater, stormwater, electricity, gas and waste		
People and places	• Liverpool Health and Academic Precinct • Western Sydney Centre of Innovation in Plant Sciences at Mount Annan		

SCENARIO LENS 1 – 'PRODUCTIVITY'

Macro Assumptions

Infrastructure context	0-10 years	10-20 years	20-40 years
Networks and systems	As for the Base Case, plus: • Rapid bus services: - Penrith to WSA - Liverpool to WSA - Campbelltown to WSA - Blacktown to WSA	As Base Case, plus: • Sydney Metro Greater West extensions – St Mary's to Tallawong – Aerotropolis to Campbelltown/Macarthur • East-West Rail - Parramatta to WSA/Aerotropolis • South West Rail Link Extension • Western Sydney Freight Line • Maldon to Dombarton Rail • Outer Sydney Orbital – Stage 1 Richmond Rd to Hume Mwy	As Base Case, plus: • City-serving Transit Corridor: – Blacktown to Prairiewood – Bonnyrigg to WSA/Aerotropolis – Mt Druitt to WSA/Aerotropolis – Liverpool – North Austral – Leppington – Narellan – Campbelltown/Macarthur • Castlereagh Motorway • Sydney Metro Southwest extension to Liverpool • Outer Sydney Orbital: – Stage 2 Hume Mwy to the Illawarra – Stage 3 Richmond Rd to Central Coast • M5 Extension – Liverpool to Outer Sydney Orbital
People and places	• New Western Sydney Education Super precinct (multiversity) in Aerotropolis (Phase 1) • TAFE NSW Western Sydney Construction Hub (subject to final business case) • Permanent VET facility in Aerotropolis (focusing on construction, aviation and aeronautical-related engineering)	• New Western Sydney Education Super precinct (multiversity) in Aerotropolis (Phase 2)	• New Western Sydney Education Super precinct (multiversity) in Aerotropolis (Phase 3)

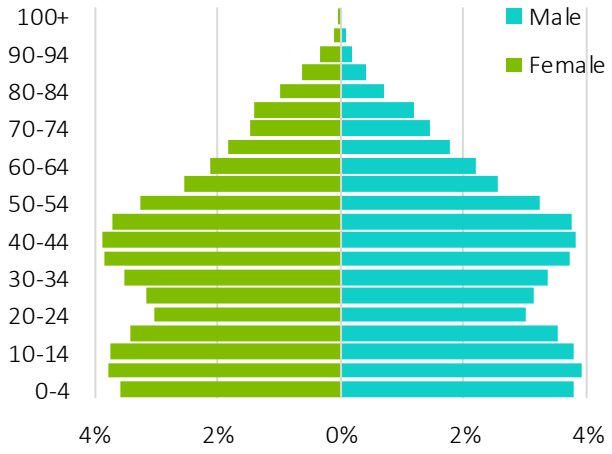
SCENARIO LENS 2 – 'LIVEABILITY AND SUSTAINABILITY'

Macro Assumptions

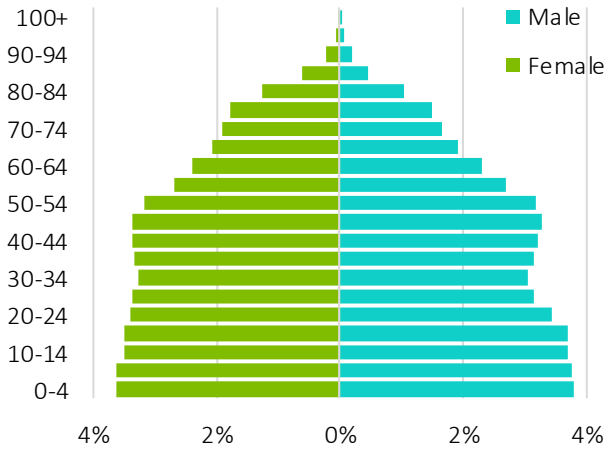
Infrastructure context	0-10 years	10-20 years	20-40 years
Networks and systems	• New Integrated water cycle management in South Creek catchment for Aerotropolis and major land release areas adopting the Parkland City urban typologies (per South Creek Sector Review) • South Creek Corridor spine in Aerotropolis and major new release areas for parks, walking and cycling trails, community facilities, ecological services, including nutrient capture, urban cooling and local habitat (per District Plan)	• Mainstream integrated water cycle management for South Creek catchment, including new release areas and urban renewal areas utilising Parkland City urban typologies • South Creek Corridor spine in Aerotropolis and major new release areas for parks, walking and cycling trails, community facilities, ecological services, including nutrient capture, urban cooling and local habitat (per District Plan) • Enhanced resource recovery and energy generation (for an integrated resource recovery facility(s))	• Integrated water cycle management for the wider Western Parkland City • South Creek Corridor spine in Aerotropolis and major new release areas for parks, walking and cycling trails, community facilities, ecological services, including nutrient capture, urban cooling and local habitat (per District Plan) • Resource recovery and energy generation
People and places	• A high quality of urban design with amenity and services, and cultural facilities as places urbanised, renewed and revitalised • Redevelopment of old public housing estates in the Penrith, Blacktown, Fairfield, Liverpool and Campbelltown LGAs linked to catalytic infrastructure to ensure more diverse, mixed-tenure (social, affordable, private) vibrant and safer communities	• As for 0-10 plus: • Provision of new social and affordable housing	• As for 10-20 years

APPENDIX C – AGE-SEX PROFILES

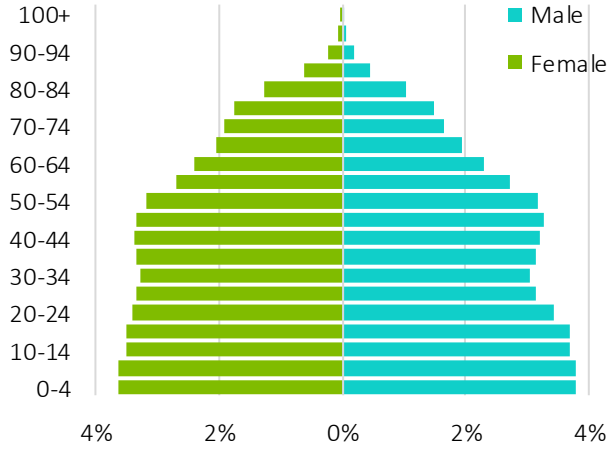
Camden 2036



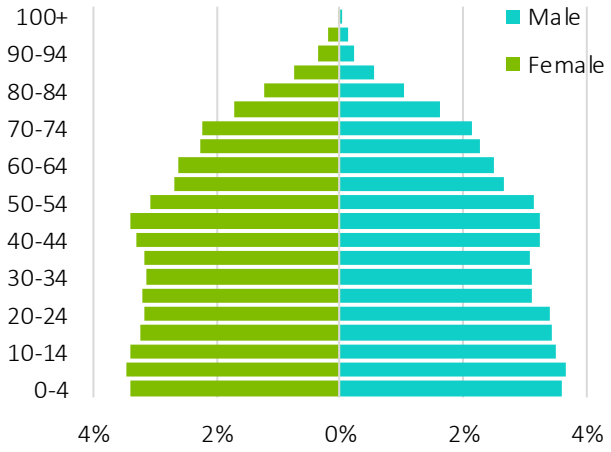
Campbelltown 2036



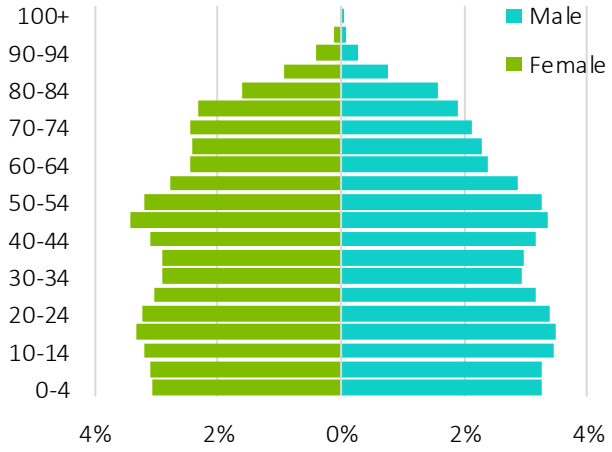
Liverpool 2036



Penrith 2036



Blacktown 2036



APPENDIX D – DATA INPUTS

Travel Zone Datasets

File Name	Description	Source	Type	Sub Type	Geography	Timeframe	Received
20181023 DPE NW SW TZP2016 POP Scenario 2	Growth Area Forecasts	Transport for NSW	Population	POPD	TZ11	2011-2056	June 2019
20181023 DPE NW SW Employment - Scenario 2 and 3	Growth Area Forecasts	Transport for NSW	Employment	BIC	TZ11	2011-2056	June 2019
DPE NW SW Scenario 2 Redistribution from Nov 2018	Growth Area Forecasts	Transport for NSW	Population & Employment	Total POP and EMP	TZ11	2026 & 2036	June 2019
GPEC - Projections	Growth Area Forecasts	DPIE	Population	NA	Custom	NA	June 2019
GPOP Scenario 3 Population and Employment	Growth Area Forecasts	Greater Sydney Commission	Population & Employment	SGS Industry and BIC	TZ11	2016-2061	June 2019
LUIIP Employment and Dwellings	Growth Area Forecasts	DPIE	Employment & Dwellings	Total Employment & Total Dwellings	Precincts	2021-2056	June 2019
Metro West NW CBD SW Population and Employment 2026 2036	Metro Projects	Transport for NSW	Population & Employment	BIC	TZ11	2026 & 2036	June 2019
Redistribution outputs OSO2	Road Projects	Transport for NSW	Population & Employment	Total POP and EMP	TZ11	2036 & 2056	June 2019
Metro Remainder Stages Intervention Data - Redistribution by TPA 18 June 19	Metro Projects	Transport for NSW	Population & Employment	POPD and Total Employment	TZ16	2026,2036 &2056	July 2019
Final WPC TYPOLOGY METRICS_030718	South Creek Development	Transport for NSW	Population & Employment		TZ11	2056	July 2019
South East Sydney Transport Strategy GSC Scenario	Metro Projects	Transport for NSW	Population & Employment	Total POP and EMP	TZ11	2031 & 2041	August 2019
METRO East West Manual Redistribution Pop and Emp	Metro Projects	Transport for NSW	Population & Employment	POPD and Total Employment	TZ16	2026,2036 &2056	July 2019
160232-TPA LU16v1.3	Travel Zone Projections	Transport for NSW	Population & Employment	POPD & BIC	TZ11	2011-2056	October 2017
TZP2016v1.51	Travel Zone Projections	Transport for NSW	Population, Dwellings and Employment	POPD, SPD and BIC Employment	TZ16	2011-2056	March 2019

Council Information

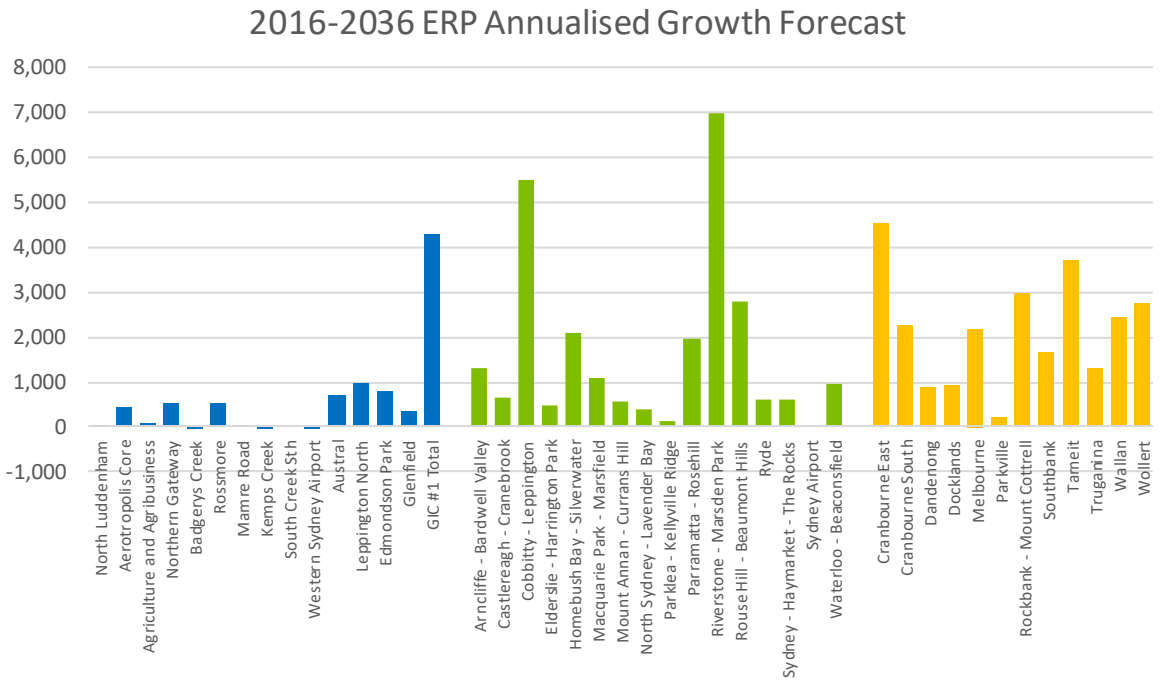
Council	Description	Date Received
Penrith	Housing Demand and Capacity from Draft Local Housing Strategy and Economic Corridor Mapping	22nd August 2019
Blacktown	Marsden Park and North West Growth Area council analysis	21st August, 20 September 2019
Fairfield	Population and Dwelling Analysis	23rd August, 20th September 2019
Liverpool	Commentary on provided data	11th September 2019
Hawkesbury	Rural Land Strategy, Employment Lands Analysis, Local Housing Strategy	13th September 2019
Wollondilly	AEC population projections, Wollondilly and Wilton Housing Market Analysis	23rd August 2019
Blue Mountains	Population, Housing Demand and capacity data	23rd August 2019

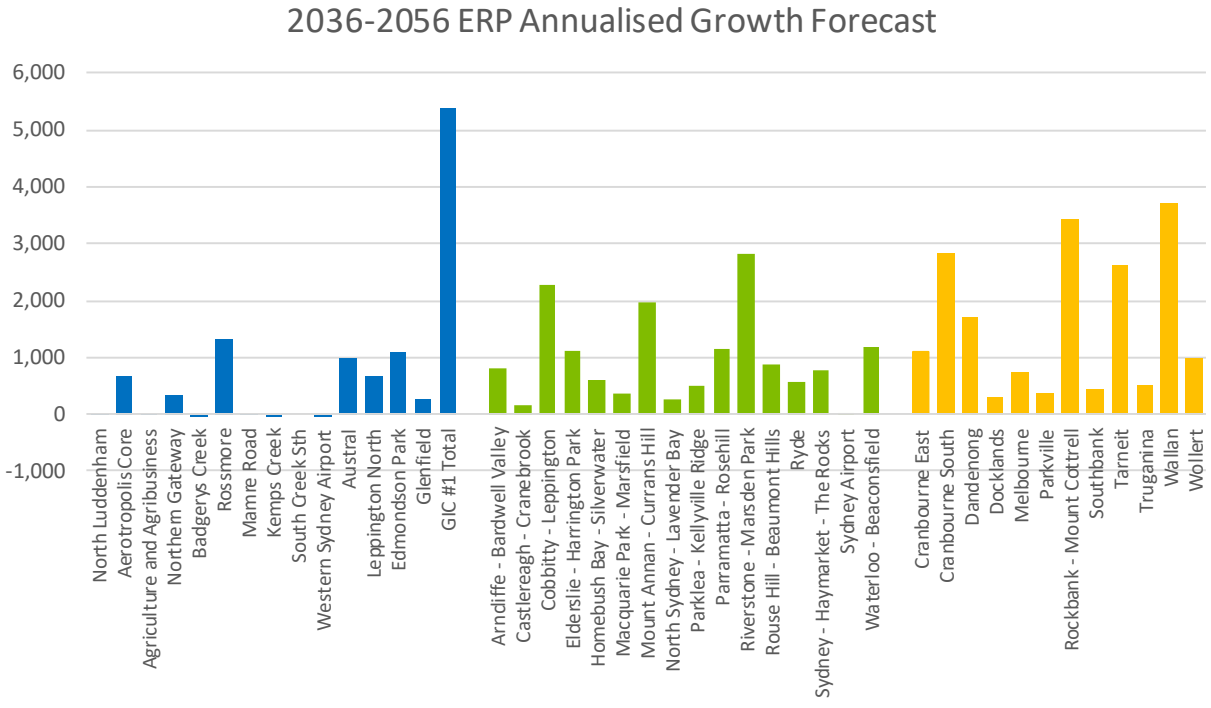
Other

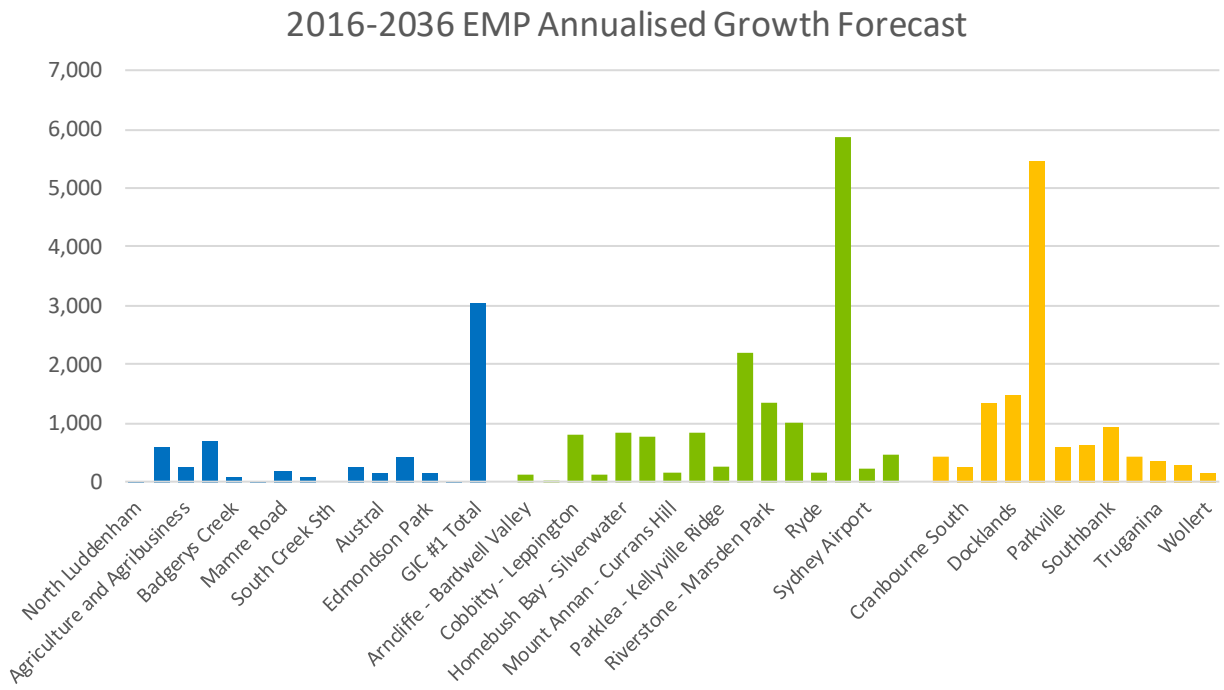
Source	Description	Date Received
DPIE	UFM dwelling potential forecast	29th August 2019
DPIE	Western City Housing Supply forecast	29th August 2019
Sydney Metro	Sydney Metro Forecast Data Updates	23rd September 2109

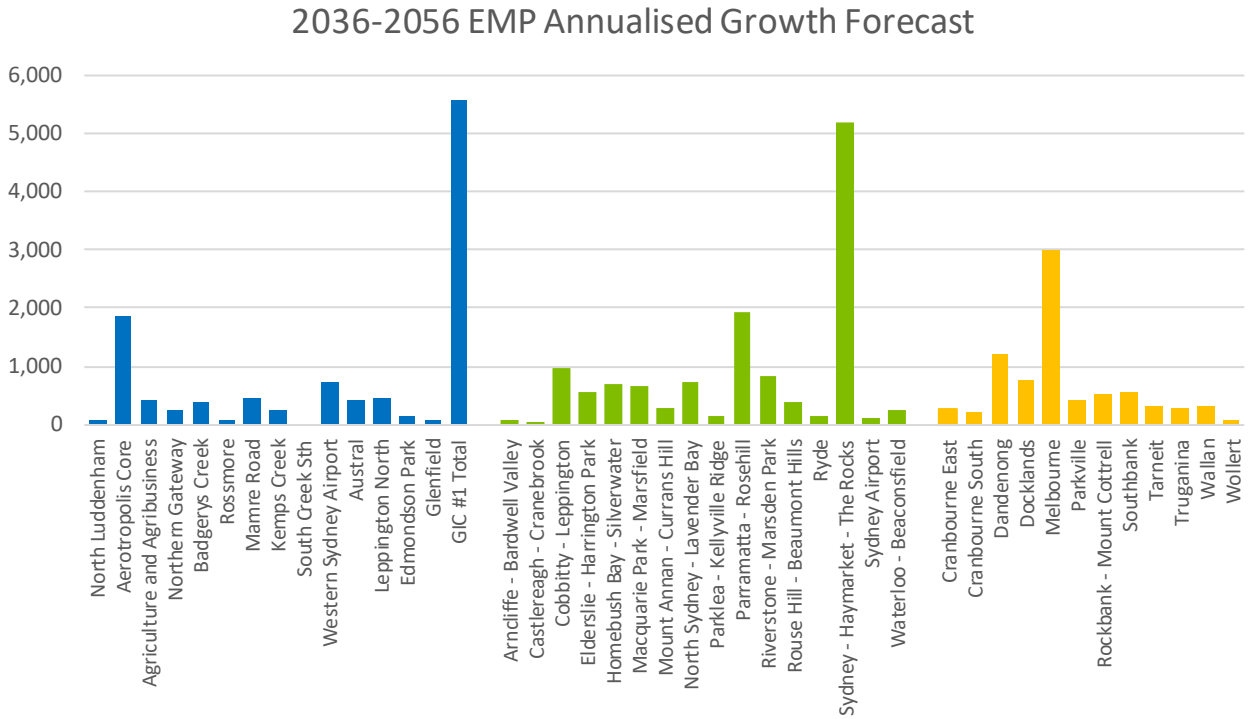
APPENDIX E – ADDITIONAL MARKET ANALYSIS RESULTS

Market Analysis Time Period Analysis- Sydney and Melbourne






2016-2036 EMP Annualised Growth Forecast
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
North Luddenham
Agriculture and Agribusiness
Badgerys Creek
Mamre Road
South Creek Sth
Austral
Edmondson Park
GIC #1 Total
Arndcliffe - Bardwell Valley
Cobbitty - Leppington
Homebush Bay - Silverwater
Mount Annan - Currans Hill
Parklea - Kellyville Ridge
Riverstone - Marsden Park
Ryde
Sydney Airport
Cranbourne South
Docklands
Parkville
Southbank
Truganina
Wollert


2036-2056 EMP Annualised Growth Forecast
6,000
5,000
4,000
3,000
2,000
1,000
0
North Luddenham
Aerotropolis Core
Agriculture and Agribusiness
Northern Gateway
Badgerys Creek
Rossmore
Mamre Road
Kemps Creek
South Creek Sth
Western Sydney Airport
Austral
Leppington North
Edmondson Park
Glenfield
GIC #1 Total
Arndcliffe - Bardwell Valley
Castlereagh - Cranebrook
Cobbitty - Leppington
Elderslie - Harrington Park
Homebush Bay - Silverwater
Macquarie Park - Marsfield
Mount Annan - Currans Hill
North Sydney - Lavender Bay
Parklea - Kellyville Ridge
Parramatta - Rosehill
Riverstone - Marsden Park
Rouse Hill - Beaumont Hills
Ryde
Sydney - Haymarket - The Rocks
Sydney Airport
Waterloo - Beaconsfield
Cranbourne East
Cranbourne South
Dandenong
Docklands
Melbourne
Parkville
Rockbank - Mount Cottrell
Southbank
Tarneit
Truganina
Wallan
Wollert

SGS Economics & Planning

Contact us

CANBERRA
Level 2, 28-36 Ainslie Place
Canberra ACT 2601
+61 2 6257 4525
sgsact@sgsep.com.au

HOBART
PO Box 123
Franklin TAS 7113
+61 421 372 940
sgstas@sgsep.com.au

MELBOURNE
Level 14, 222 Exhibition St
Melbourne VIC 3000
+61 3 8616 0331
sgsvic@sgsep.com.au

SYDNEY
209/50 Holt St
Surry Hills NSW 2010
+61 2 8307 0121
sgsnsw@sgsep.com.au

SGS Economics & Planning

WESTERN SYDNEY GROWTH INFRASTRUCTURE COMPACT PROGRAM LAND USE SCENARIO FORECASTS

SUPPLEMENTARY REPORT: CONSTRAINED BASE CASE

MAY 2020

Prepared for

Greater Sydney Commission

Independent insight.

This document has been prepared for the purpose of providing information that will be included in the Western Sydney GIC Program Recommendations which is to be submitted to NSW Cabinet for its consideration.

SGS Economics and Planning Pty Ltd
ACN 007 437 729
www.sgsep.com.au
Offices in Canberra, Hobart, Melbourne, Sydney

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

The Greater Sydney Commission (GSC), Western Sydney Planning Partnership (WSPP), Transport for NSW (TfNSW), and the Department of Infrastructure and Environment (DPIE) have joined with the eight local councils covered by the City Deal and Blacktown Council, in a collaborative co-design process to develop a set of alternative land use scenarios for the Western Parkland City.

The travel zone level forecast in population, dwellings and jobs in these alternative land use scenarios vary from the current official land use dataset TZP16 v1.51 and capture new data, information and policy direction since TZP16 v1.51 release.

Extending from this co-design process, further work directly with the GSC and with inputs from other concurrent land use planning processes, have led to the development of three land use scenarios for the Western Sydney GIC program:

- A **Base Case (~Scenario 1)** has been developed for appraisal purposes, which assumes committed infrastructure with no land use changes other than what is already approved and committed.
- **GIC land use Option 1 (~Scenario 2)** assumes the base case plus a focus on early and strong industry and jobs attraction in the Aerotropolis with more compact urban form and renewal.
- **GIC land use Option 2 (~Scenario 3)** has a different growth pattern for Western City where it assumes the base case plus sustained and strong industry and jobs attraction in Liverpool, Penrith and Campbelltown supported by gradual investment at the Aerotropolis with a more dispersed urban form in the greenfield areas.

For all scenarios, the 2056 total number of people and jobs remains as per TZP16v1.51 remains the same at the Sydney GMA level with 8.261 million people and 4.291 million jobs, acting as control totals for this project.

1.2 Constrained Base Case

Subsequent to the completion of developing forecasts for the above set of alternative scenarios, further analysis by CIE for the GSC was undertaken to assess the impact of uncommitted infrastructure identified by State agencies and utility providers which was included in their infrastructure response to the base case (~Scenario 1) land use assumptions.

The CIE capacity analysis and the project need to exclude uncommitted infrastructure for economic evaluation purposes necessitated an adjustment to the Base Case to constrain growth to levels that could be accommodated by committed infrastructure.

This supplementary report outlines the methodology, inputs and results of creating a constrained base case scenario with growth constrained in the GIC precincts and redistributed outside of the Western Sydney Planning Partnership area to the rest of Greater Sydney.

This report should be read in conjunction with the *Western Sydney Growth Infrastructure Compact Program Land Use Scenarios Summary R*eport dated March 2020.

For the purposes of this report, references to "**Base Case**" are to Base Case (~Scenario 1) originally developed for the GIC program. References to "**Constrained Base Case**" are to the updated base case using the capacity analysis from CIE.

2. RESULTS

2.1 GIC #1 Area

Table 1 shows a summary of the 2056 constrained base case forecast for the GIC #1 precincts which shows a forecast population of almost 40,000 people and 38,000 jobs.

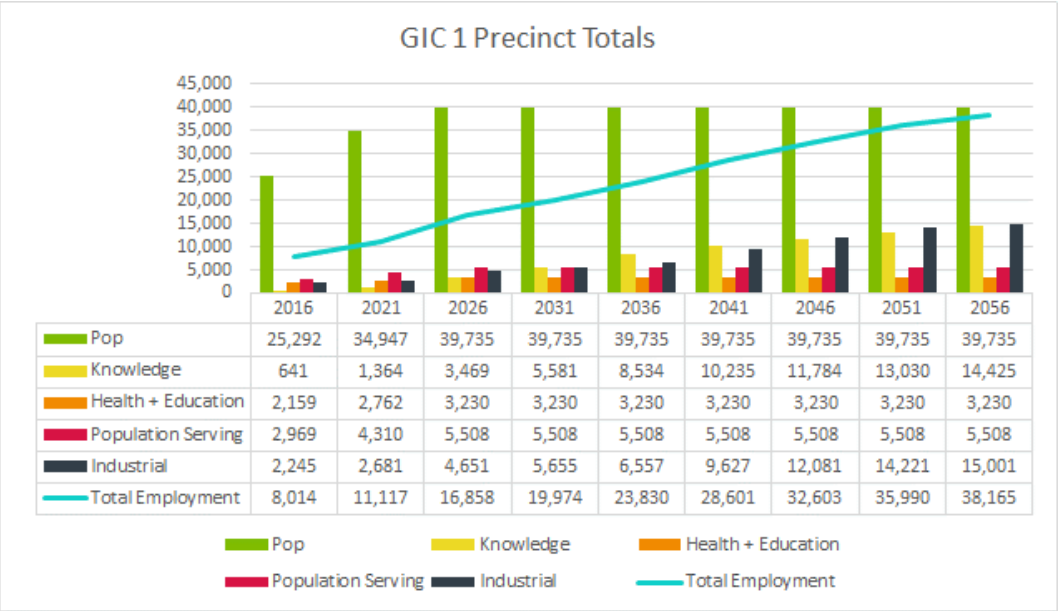
TABLE 1: GIC #1 PRECINCT 2056 CONSTRAINED BASE CASE SUMMARY

Precinct	Population	Dwellings	Jobs	Knowledge Intensive	Health and Education	Population Serving	Industrial
North Luddenham	104	35	299	123	12	82	82
Aerotropolis Core	1,307	383	1,203	347	55	278	523
Agriculture and Agribusiness	1,745	616	1,253	143	34	193	884
Northern Gateway	845	248	4,732	2,334	148	955	1,296
Badgerys Creek	171	63	385	87	7	57	234
Rossmore	2,434	764	898	75	123	246	453
Mamre Road	212	52	947	290	234	84	339
Kemps Creek	1,382	432	1,306	337	107	272	590
South Creek Sth	-	-	-	-	-	-	-
Western Sydney Airport	35	17	11,452	2,292	1	19	9,141
Austral	3,417	1,240	2,172	945	328	455	443
Leppington North	4,653	1,716	8,278	5,914	756	865	744
Edmondson Park	12,455	3,760	2,567	1,193	300	946	127
Glenfield	10,974	3,678	2,672	343	1,126	1,058	145
Total	**39,735**	**13,005**	**38,165**	**14,425**	**3,230**	**5,508**	**15,001**

Source: SGS Economics and Planning

Under the constrained base case, capacity is reached for population, dwellings, health and education and population serving jobs in the 2026 forecast year with knowledge intensive and industrial jobs continuing to grow to 2056, which can be seen in Figure 1, with approximately 11,000 knowledge intensive and 10,300 industrial jobs added between 2026 and 2056.

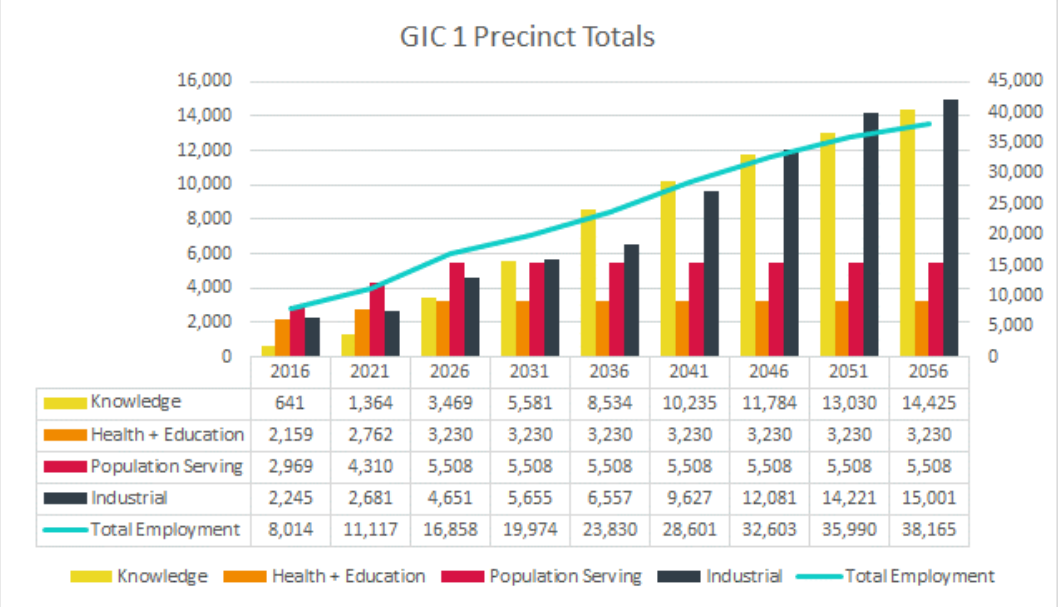
FIGURE 1 GIC #1 CONSTRAINED BASE CASE FORECAST SUMMARY



	2016	2021	2026	2031	2036	2041	2046	2051	2056
Pop	25,292	34,947	39,735	39,735	39,735	39,735	39,735	39,735	39,735
Knowledge	641	1,364	3,469	5,581	8,534	10,235	11,784	13,030	14,425
Health + Education	2,159	2,762	3,230	3,230	3,230	3,230	3,230	3,230	3,230
Population Serving	2,969	4,310	5,508	5,508	5,508	5,508	5,508	5,508	5,508
Industrial	2,245	2,681	4,651	5,655	6,557	9,627	12,081	14,221	15,001
Total Employment	8,014	11,117	16,858	19,974	23,830	28,601	32,603	35,990	38,165

Figure 2 shows the employment by industry forecast in more detail.

FIGURE 2 GIC #1 CONSTRAINED BASE CASE EMPLOYMENT FORECAST SUMMARY



	2016	2021	2026	2031	2036	2041	2046	2051	2056
Knowledge	641	1,364	3,469	5,581	8,534	10,235	11,784	13,030	14,425
Health + Education	2,159	2,762	3,230	3,230	3,230	3,230	3,230	3,230	3,230
Population Serving	2,969	4,310	5,508	5,508	5,508	5,508	5,508	5,508	5,508
Industrial	2,245	2,681	4,651	5,655	6,557	9,627	12,081	14,221	15,001
Total Employment	8,014	11,117	16,858	19,974	23,830	28,601	32,603	35,990	38,165

Source: SGS Economics and Planning

Difference to Base Case

A comparison to the Base Case shows that by 2056 the Constrained Base Case in the GIC #1 precincts has approximately 96,000 less people and 21,000 less jobs.

TABLE 2: GIC #1 COMPARISON TO BASE CASE

	2016	2036 Base	2036 Constrained Base	2036 Difference	2056 Base	2056 Constrained Base	2056 Difference
GIC #1 Population	25,292	81,394	39,735	-41,660	136,229	39,735	-96,494
GIC #1 Dwellings	8,337	27,632	13,005	-14,627	46,030	13,005	-33,025
GIC #1 Employment	8,014	31,928	23,830	-8,098	59,005	38,165	-20,840

Source: SGS Economics and Planning

2.2 GIC #2 Area

Table 1 shows a summary of the 2056 constrained base case forecast for the GIC #2 precincts which shows a forecast population of almost 342,000 people and 101,000 jobs.

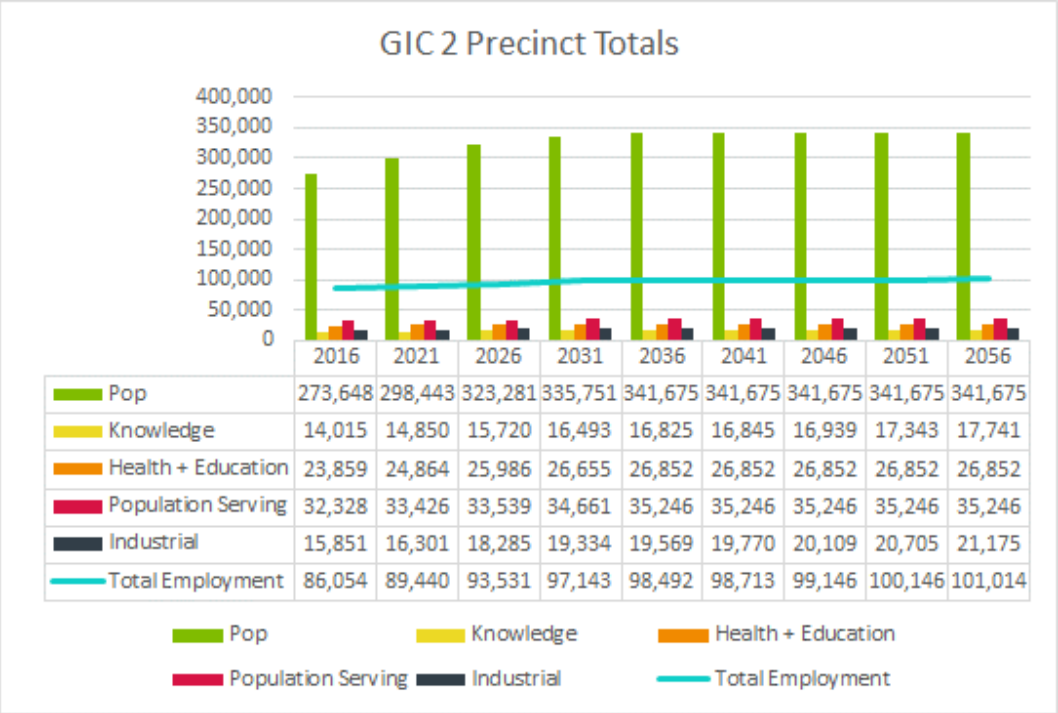
TABLE 3: GIC #2 PRECINCT 2056 CONSTRAINED BASE CASE SUMMARY

Precinct	Population	Dwellings	Jobs	Knowledge Intensive	Health and Education	Population Serving	Industrial
Mount Druitt Centre and Rooty Hill	43,911	13,597	20,261	3,306	4,753	6,750	5,452
Ropes Crossing	6,462	2,018	560	87	227	218	28
Luxford	63,991	20,601	5,686	602	2,964	1,958	162
Australian Defence	1,641	399	1,299	578	93	141	487
Cranebrook and Werrington Downs	29,903	10,797	2,606	408	753	1,216	229
Jordan Springs	14,326	5,030	1,031	199	110	588	134
Kingswood and Werrington	28,912	10,847	11,749	1,596	8,121	1,413	620
Orchard Hills	9,825	2,969	1,438	179	465	482	311
Penrith Centre	15,990	8,224	17,916	6,418	4,157	5,764	1,577
Penrith Lakes	1,771	636	389	51	109	87	142
Penrith Riverside	4,369	1,876	12,512	959	606	6,298	4,650
South Penrith and Glenmore Park	47,044	16,217	5,574	847	1,253	2,832	642
St Clair	28,313	9,148	3,175	529	1,040	1,315	291
St Marys	45,217	18,120	16,818	1,983	2,202	6,186	6,448
Total	**341,675**	**120,478**	**101,014**	**17,741**	**26,852**	**35,246**	**21,175**

Source: SGS Economics and Planning

Under the constrained base case, capacity is reached for population, dwellings, health and education and population serving jobs in the 2036 forecast year with knowledge intensive and industrial jobs continuing to grow slightly more to 2056, which can be seen in Figure 34, with approximately 900 knowledge intensive and 1,600 industrial jobs added between 2036 and 2056.

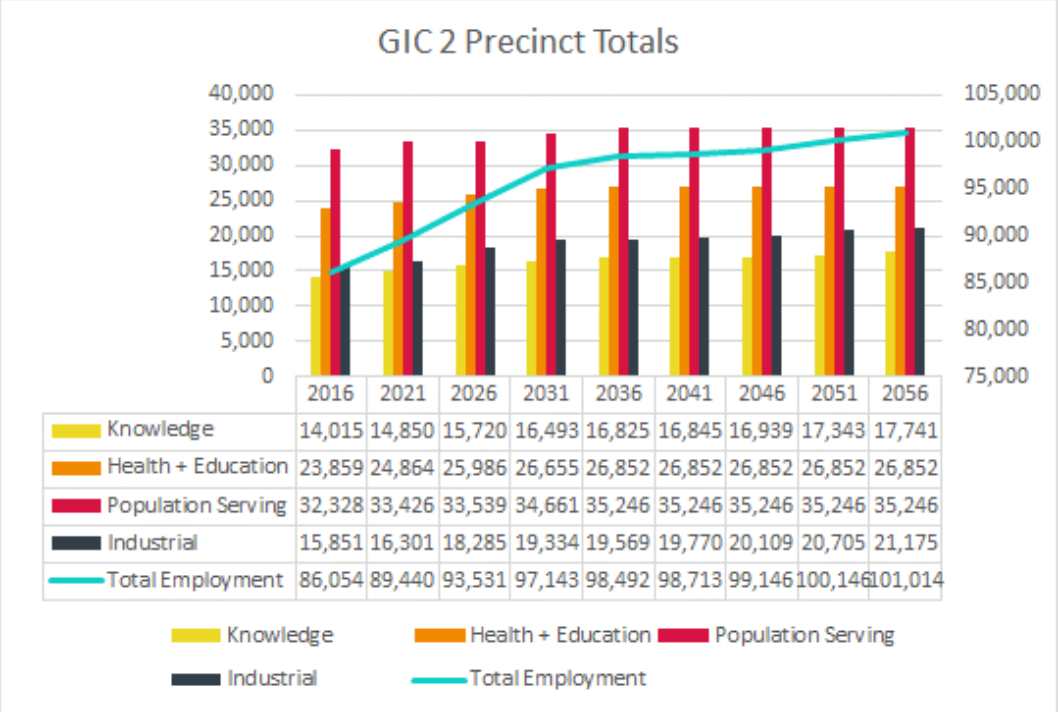
FIGURE 3 GIC #2 CONSTRAINED BASE CASE FORECAST SUMMARY



	2016	2021	2026	2031	2036	2041	2046	2051	2056
Pop	273,648	298,443	323,281	335,751	341,675	341,675	341,675	341,675	341,675
Knowledge	14,015	14,850	15,720	16,493	16,825	16,845	16,939	17,343	17,741
Health + Education	23,859	24,864	25,986	26,655	26,852	26,852	26,852	26,852	26,852
Population Serving	32,328	33,426	33,539	34,661	35,246	35,246	35,246	35,246	35,246
Industrial	15,851	16,301	18,285	19,334	19,569	19,770	20,109	20,705	21,175
Total Employment	86,054	89,440	93,531	97,143	98,492	98,713	99,146	100,146	101,014

Figure 2 shows the employment by industry forecast in more detail.

FIGURE 4 GIC #2 CONSTRAINED BASE CASE EMPLOYMENT FORECAST SUMMARY



	2016	2021	2026	2031	2036	2041	2046	2051	2056
Knowledge	14,015	14,850	15,720	16,493	16,825	16,845	16,939	17,343	17,741
Health + Education	23,859	24,864	25,986	26,655	26,852	26,852	26,852	26,852	26,852
Population Serving	32,328	33,426	33,539	34,661	35,246	35,246	35,246	35,246	35,246
Industrial	15,851	16,301	18,285	19,334	19,569	19,770	20,109	20,705	21,175
Total Employment	86,054	89,440	93,531	97,143	98,492	98,713	99,146	100,146	101,014

Source: SGS Economics and Planning

Difference to Base Case

A comparison to the Base Case shows that by 2056 the Constrained Base Case in the GIC #2 precincts has approximately 55,000 less people and 8,500 less jobs.

TABLE 4: GIC #2 COMPARISON TO BASE CASE

	2016	2036 Base	2036 Constrained Base	2036 Difference	2056 Base	2056 Constrained Base	2056 Difference
GIC #2 Population	273,648	359,146	341,675	-17,471	397,065	341,675	-55,390
GIC #2 Dwellings	95,634	126,540	120,478	-6,062	139,516	120,478	-19,037
GIC #2 Employment	86,054	100,317	98,492	-1,825	109,454	101,014	-8,440

Source: SGS Economics and Planning

2.3 Summary of GIC Areas

Combining the shifts in the Constrained Base Case in Table 5 shows a difference of 152,000 people and approximately 29,000 jobs by 2056.

TABLE 5: GIC AREAS COMPARISON TO BASE CASE

GIC #1 + #2	2016	2036 Base	2036 Constrained Base	2036 Difference	2056 Base	2056 Constrained Base	2056 Difference
Population	298,940	440,540	381,410	-59,131	533,294	381,410	-151,885
Dwellings	103,971	154,172	133,483	-20,689	185,546	133,483	-52,063
Employment	94,068	132,245	122,322	-9,923	168,459	139,179	-29,280

Source: SGS Economics and Planning

2.4 LGA

Table 6 and Table 7 shows a comparison of the growth to 2056 by LGA in the Western Sydney Planning Partnership area. LGAs which encompass the GIC areas have reduced population and employment, particularly Liverpool and Penrith, with overall approximately 152,000 less people and 30,000 less jobs by 2056.

TABLE 6: WSPP LGA POPULATION GROWTH COMPARISON

LGA	2016	2056 Base	2016-2056 Base	2056 Constrained Base	2016-2056 Constrained Base	2056 Difference
Blue Mountains	78,622	90,591	11,969	90,591	11,969	0
Camden	80,099	252,750	172,651	244,470	164,371	-8,280
Campbelltown	162,288	269,825	107,537	260,067	97,779	-9,758
Fairfield	206,399	307,146	100,748	307,146	100,748	0
Hawkesbury	67,039	88,473	21,434	88,473	21,434	0
Liverpool	211,504	435,535	224,031	366,637	155,133	-68,898
Penrith	201,046	318,465	117,419	273,916	72,870	-44,549
Wollondilly	49,920	79,521	29,601	79,521	29,601	0
Blacktown	350,795	641,576	290,781	621,021	270,226	-20,554
WSPP	**1,407,713**	**2,483,882**	**1,076,170**	**2,331,843**	**924,130**	**-152,039**

Source: SGS Economics and Planning

TABLE 7: WSPP LGA EMPLOYMENT GROWTH COMPARISON

LGA	2016	2056 Base	2016-2056 Base	2056 Constrained Base	2016-2056 Constrained Base	2056 Difference
Blue Mountains	21,300	26,212	4,912	26,212	4,912	0
Camden	29,173	80,178	51,005	76,921	47,748	-3,257
Campbelltown	57,040	86,620	29,580	85,609	28,569	-1,011
Fairfield	69,318	100,061	30,743	100,061	30,743	0
Hawkesbury	28,838	40,058	11,219	40,058	11,219	0
Liverpool	80,694	155,954	75,260	143,231	62,537	-12,724
Penrith	80,812	117,027	36,215	106,656	25,844	-10,371
Wollondilly	13,430	29,159	15,730	29,159	15,730	0
Blacktown	127,244	231,743	104,499	229,625	102,381	-2,118
WSPP	**507,849**	**867,013**	**359,163**	**837,531**	**329,682**	**-29,481**

Source: SGS Economics and Planning

Maps on the following figures (Figure 5 thru Figure 8) show the locations of growth reduction in the Constrained Base Case that has been redistributed outside of the Western Sydney Planning Partnership area.

FIGURE 5 2036 POPULATION DIFFERENCE MAP

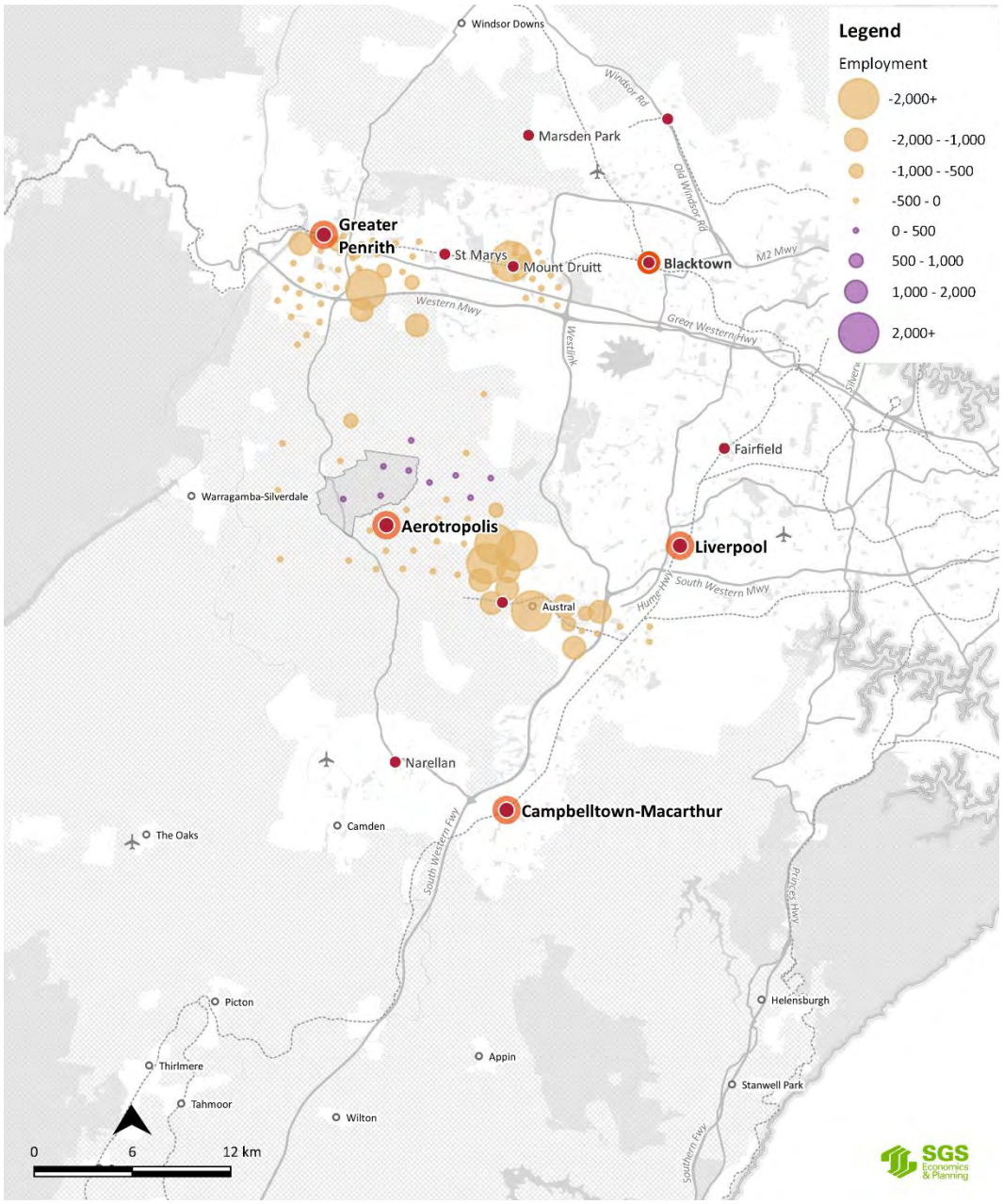


FIGURE 6 2056 POPULATION DIFFERENCE MAP

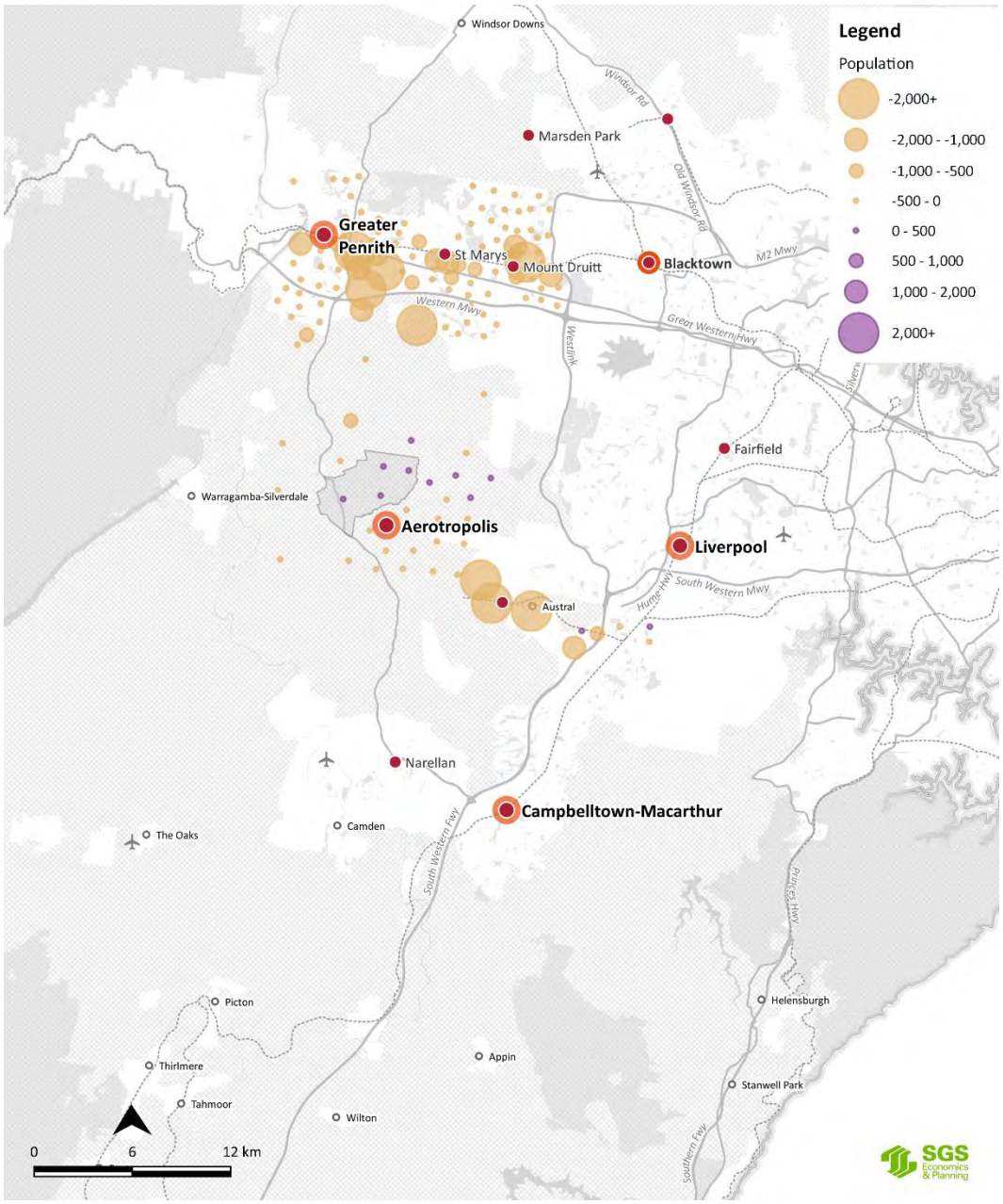


FIGURE 7 2036 EMPLOYMENT DIFFERENCE MAP

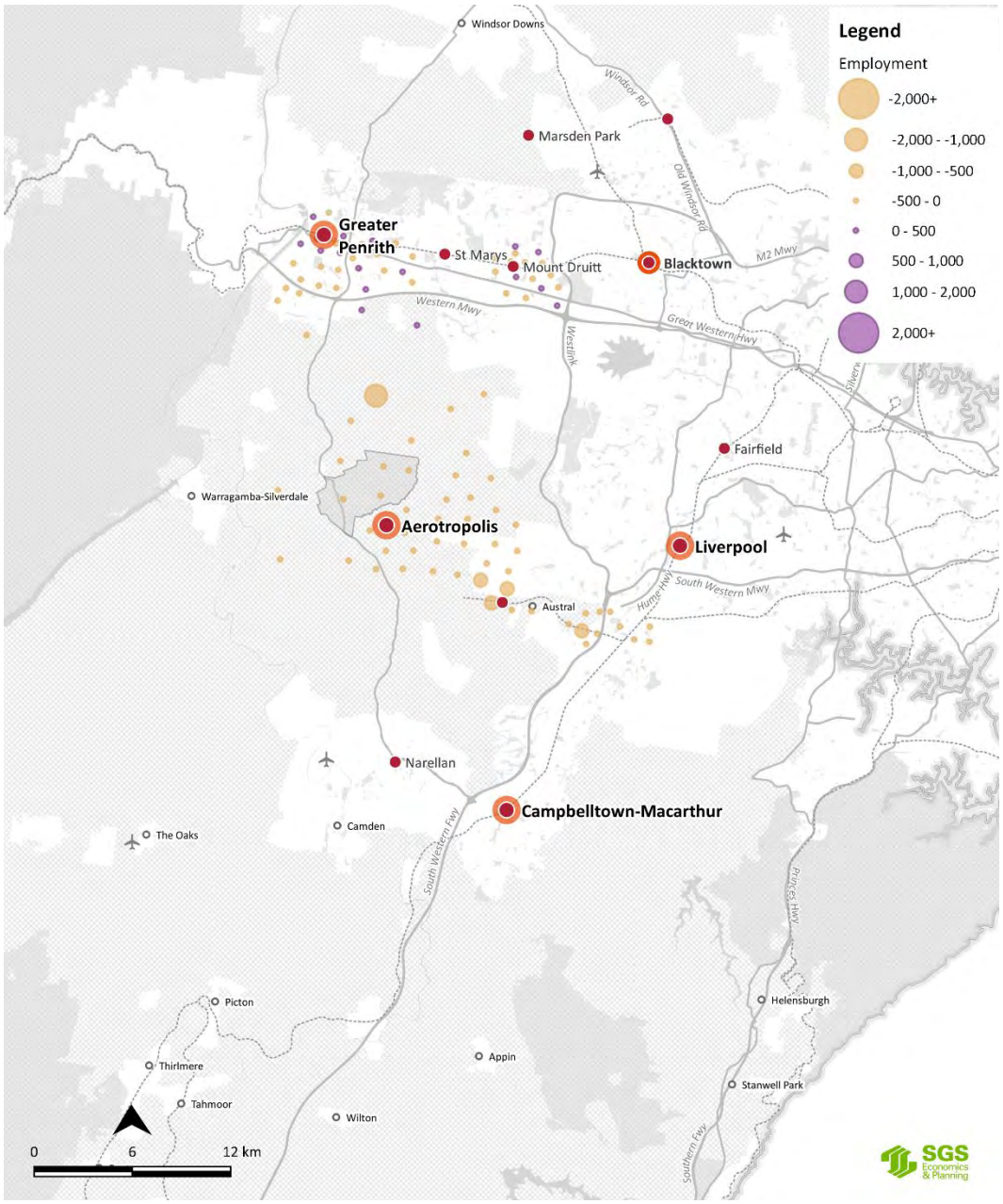
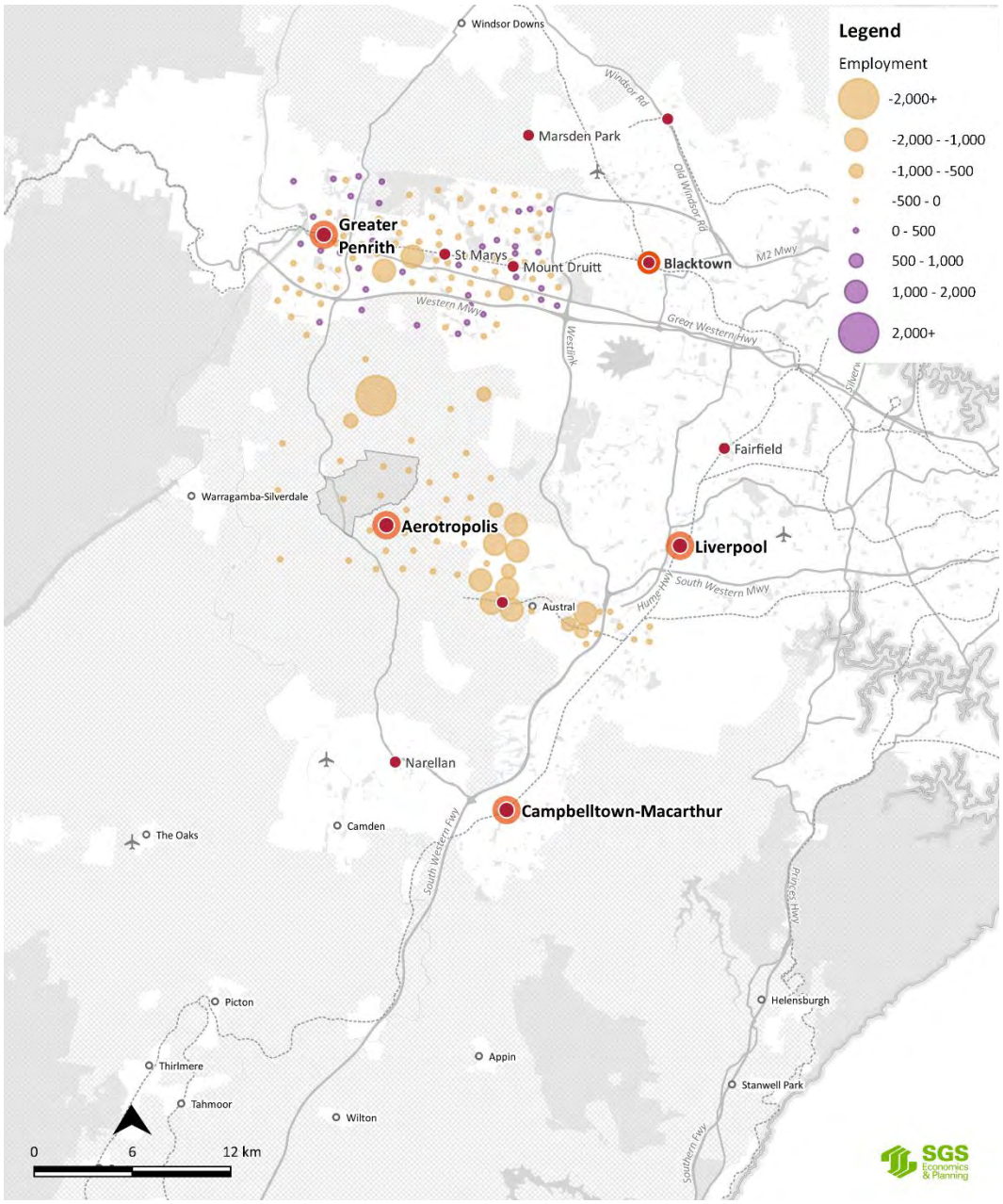


FIGURE 8 2056 EMPLOYMENT DIFFERENCE MAP



3. METHODOLOGY

3.1 Inputs

SGS was provided with two reports from CIE outlining the methodology for the capacity constraints applied to the precinct forecasts in the GIC #1 and GIC #2 precincts.

This methodology was based on "hard constraints' to growth based on the data provided by relevant agencies on existing infrastructure capacity as well as the capacity of committed infrastructure. Four major areas were considered for the analysis and the forecast variable they would impact:

- Schools
  - Impact population, population serving and health and education jobs;
- Fire stations
  - Impact population, population serving and health and education jobs
- Hospitals and ambulance stations
  - Impact population, population serving and health and education jobs
- State and regional roads
  - Impact knowledge intensive and industrial jobs

Table 8 shows a summary of the identified constraints and the forecast variable they have impacted for the GIC #1 precincts.

TABLE 8 GIC #1 CAPACITY ANALYSIS

Infrastructure Type	Identified Constraint	Year Capacity Reached	Population	Knowledge Intensive jobs	Population Serving jobs	Health and Education jobs	Industrial jobs
Schools	Primary School Capacity	2023	✓		✓	✓	
Roads	None						
Fire Stations	None						
Health Infrastructure	None						

Therefore, based on the analysis there was no adjustment to Knowledge Intensive and Industrial jobs compared to the Base Case, with growth in Population, Dwellings, Population Serving and Health and Education jobs constrained at 2023 in all precincts.

TABLE 9 GIC #2 CAPACITY ANALYSIS

Infrastructure Type	Identified Constraint	Year Capacity Reached	Population	Knowledge Intensive jobs	Population Serving jobs	Health and Education jobs	Industrial jobs
Schools	Primary and Secondary School Capacity	2036[1]	✓		✓	✓	
Roads	None						
Fire Stations	None						
Health Infrastructure	Local Health District investment	2036	✓		✓	✓	

Therefore, based on the analysis there was no adjustment to Knowledge Intensive and Industrial jobs compared to the Base Case, with growth in Population, Population Serving and Health and Education jobs constrained at 2023 in all precincts.

Based on the above, updated precinct forecasts for Population and Employment by Industry were provided.

The GIC #1 precinct data was provided based on actual precinct boundaries which do not align with travel zone boundaries.

3.2 Assumptions

The original land use scenarios drew on several overarching data inputs and headline assumptions summarised in the table below.

TABLE 10 HIGH LEVEL DATA INPUTS AND ASSUMPTIONS

Input Area	Assumption
Planning Policy	Greater Sydney Region Plan, Western City District Plan
Transport	Future Transport 2056 infrastructure priorities and timing
Infrastructure Provision	As per Western Sydney GIC Program Macro Assumptions
Future Growth	Greater Sydney growth for Population, Dwellings and Jobs to 2056 as per TZP16v1.51 District housing targets as per Greater Sydney Region Plan
Household Sizes	Initial distribution as per TZP16v1.51 with adjustments for new growth areas. Household size calculated as Estimated Resident Population (ERP) divided by Structural Private Dwellings (SPD)

3.3 Base Case Methodology

Base Case (~Scenario 1)

To develop the base case scenario the following process was used:

- Current zoning and land release status for precincts within the WSPP study area was reviewed based on information provided by DPIE. The location and status of major infrastructure was also reviewed. Each precinct was then classified as: limit growth, slower growth or unchanged with respect to their outcome in the project scenario.

[1] Some precincts with negligible population growth not included i.e. Penrith Lakes, Australian Defence, Jordan Springs, Ropes Crossing

- Areas defined a 'limit growth' referred to precincts which had not yet been rezoned, such as Kemps Creek or Vineyard Stage 2. Growth in these areas was limited to 5% of current level to allow for a small degree of background/rural growth over the forecast period.
- Areas defined as 'slow growth' includes precincts that were only partly rezoned and/or were influenced by infrastructure/investment included in the GIC project scenarios. These areas had growth slowed to align with approved dwelling release information only or to reflect reduced growth rates consistent with other comparator areas.
- Areas defined as 'Unchanged' referred to precincts which were already zoned and/or established areas. This included areas such as Marsden Park, Penrith and Picton. There were unchanged from the minimum of the two GIC Scenarios.

Growth limited within the WSPP was redistribute on a pro-rata basis to areas outside the WSPP to maintain the Greater Sydney control total.

3.4 Constrained Base Case Methodology

The updated capacity constrained precinct forecasts necessitated a redistribution of total Greater Sydney growth forecast to align with the high level data assumptions outlined Table 10. Similar to the above base case methodology, growth was adjusted in GIC areas travel zones with the difference redistributed to areas outside of WSPP to the rest of Greater Sydney. Other locations in Western City District that had capacity constrained in the Base Case have not changed.

The new precinct totals were used to adjust the GIC #1 and GIC #2 areas. Due to the GIC #1 precinct totals being in a concorded precinct format (i.e. not aligned to travel zones) and with individual travel zones influencing multiple precincts, different methodologies for updating travel zone level forecasts for each GIC area was required.

GIC #1

- A manual adjustment process by travel zone was undertaken to align concorded precinct totals to the new constrained base case by precinct. It should be noted that as most travel zones contribute to 2 or 3 precincts (and not in equal measure), this process cannot be a direct pro-rata of travel zone data as any changes at a travel zone level they will influence precinct totals differently. Therefore, the travel zone and precinct totals are not in exact alignment.
- This produced new TZ level forecasts for the GIC area which were directly included into the whole of Sydney travel zone forecast.
- The new precinct control totals provided by CIE were for Population and Employment, therefore adjustments were required to calculate dwellings. Household sizes from the original base case were used to calculate dwellings until population growth was deemed to reach capacity. From this point household sizes were held constant. Thus, there are differences with the original base case Household sizes, which had growth in Pop/Dwellings and changes to household sizes over the duration of the forecast.

GIC #2

- As the precinct boundaries are in close or exact alignment with travel zone boundaries, the new precinct totals were added directly into the redistribution model with TZ proportions of precincts maintained. As above, household sizes were held constant once population capacity was reached.

4. SUMMARY

The infrastructure capacity review undertaken by CIE has indicated further constraints to growth based on a lack of school and health infrastructure that would support further population and jobs growth. The capacity review has highlighted a lack of committed infrastructure beyond 2026 in the GIC #1 area and 2036 in the GIC # 2 area to support people and associated population serving jobs as well as health and education employment. There are less constraints to continued jobs growth for knowledge intensive and industrial employment.

The constrained base case forecast results in a reduction in population and dwelling growth by approximately 152,000 people and 52,00 dwellings with a subsequent reduction of 29,000 jobs compared to the Base Case. To maintain Greater Sydney population and jobs totals, this difference has been redistributed to areas outside of the Western Sydney Planning Partnership area.

SGS Economics & Planning

Contact us

CANBERRA
Level 2, 28-36 Ainslie Place
Canberra ACT 2601
+61 2 6257 4525
sgsact@sgsep.com.au

HOBART
PO Box 123
Franklin TAS 7113
+61 421 372 940
sgstas@sgsep.com.au

MELBOURNE
Level 14, 222 Exhibition St
Melbourne VIC 3000
+61 3 8616 0331
sgsvic@sgsep.com.au

SYDNEY
209/50 Holt St
Surry Hills NSW 2010
+61 2 8307 0121
sgsnsw@sgsep.com.au