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ECONOMIC, SOCIAL AND ENVIRONMENTAL PROFILE: NORTHERN METRO REGION

APRIL 2019

PREPARED FOR:
INFRASTRUCTURE VICTORIA

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ABBREVIATIONS

Abbreviation	Description
AAGR	Average annual growth rate
ABS	Australian Bureau of Statistics
ACSC	Ambulatory Care Sensitive Conditions
AEDC	Australian Early Development Census
ANZSCO	Australian and New Zealand Standard Classification of Occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification
ARI	Annual Recurrence Interval
ASR	Age Standardised Rate
BMO	Bushfire Management Overlay
CBD	Central Business District
CMA	Catchment Management Authority
DBSCAN	Density-based spatial clustering of applications with noise
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DHHS	Department of Health and Human Services
DOTE	Dropping off the Edge (Jesuit Social Services Report)
DPH	Dwellings per hectare
EJD	Economic Jobs Density
EPA	Environmental Protection Authority Victoria
ESE	Economic, Social and Environmental
FER	Functional Economic Region
GP	General Practitioner (Medical doctor)
GRP	Gross Regional Product
GVA	Gross Value Added
HA	Hectare
HACC	Home and Community Care Services
HEX	SGS 30-hectare grid model
IT	Information Technology
IV	Infrastructure Victoria
LGA	Local Government Area
LQ	Location Quotient
MAC	Metropolitan Activity Centre
NEIC	National Economic and Innovation Cluster
NIEIR	National Institute of Economic and industry Research
POW	Place of Work
PSP	Precinct Structure Plan
PTV	Public Transport Victoria
PUR	Place of Usual Residence
SA	Statistical Area
SEIFA	Social and Economic Index for Areas
SSIP	State Significant Industrial Precinct
UGB	Urban Growth Boundary
VIF	Victoria in Future Report
VLUIS	Victorian Land Use Information System

VPA	Victorian Planning Authority
WHO	World Health Organisation
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

Context

Infrastructure Victoria (IV) is building its understanding of the regional and local trends that influence metropolitan Melbourne's regions. This will:

- inform the 2020 update of the 30-year infrastructure strategy, including IV's ability to spatially target infrastructure investment
- build on the analysis of regional Victoria completed earlier in 2018.

This **Northern Metro Region Economic, Social and Environmental** (ESE) report is one of six for each region of Melbourne, supported by an Inter-regional ESE report and a Functional Economic Region (FER) report that looks beyond administrative boundaries to analyse how Melbourne, as a whole, functions as an economic region.

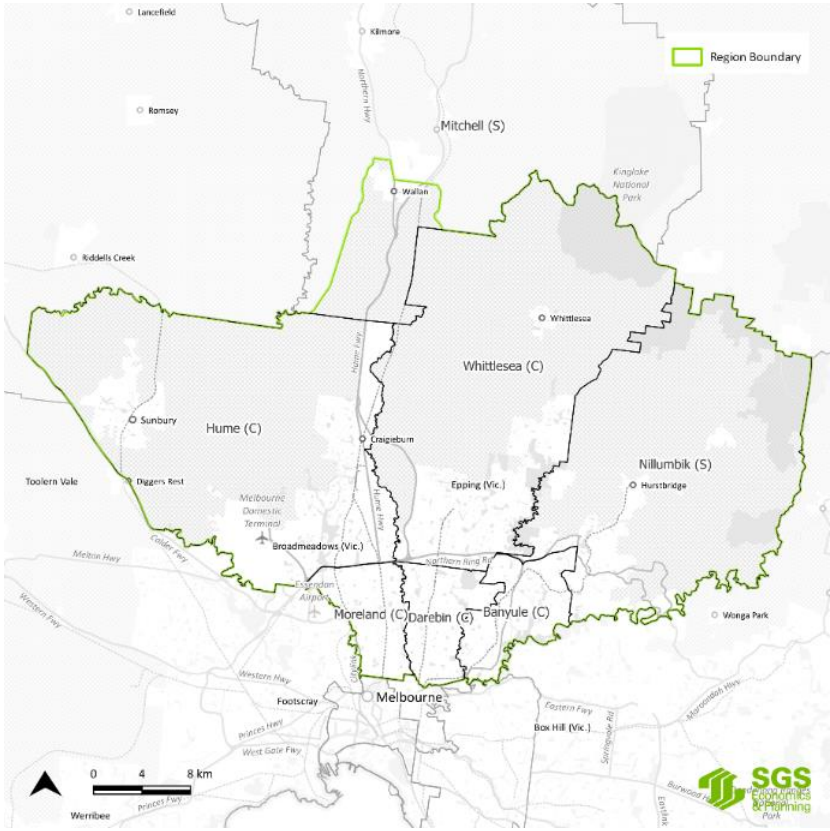
REPORT PACKAGE

Inter-regional ESE Report						FER Report
Inner ESE Report	Inner SE ESE Report	West ESE Report	North ESE Report	East ESE Report	South ESE Report	

This ESE report looks at overarching drivers of change and how they affect the Northern Metro Region. It measures performance against a range of indicators at varying geographic scales and identifies key characteristics, trends, challenges and opportunities within and across the region. It does not investigate nor provide recommendations on investments or solutions to address these matters.

The **Northern Metro Region** comprises seven local government areas (LGAs): Banyule, Darebin, Hume, Moreland, Whittlesea, Mitchell and Nillumbik. The region stretches from the inner suburbs of Brunswick, Northcote and Alphington to the outer areas of Craigieburn and Sunbury and the interface communities of Whittlesea and St Andrews.

NORTHERN METRO REGION CONTEXT MAP



Northern Metro Region summary

HEADLINE STATISTICS

	Number	%
Population	933,000	100%
0-14	180,000	19%
15-39	357,000	38%
40-64	277,000	30%
65+	119,000	13%
Jobs	333,000	100%
Knowledge	51,000	15%
HealthEdu	79,000	24%
Population	112,000	34%
Industrial	91,000	27%
Land (ha)	168,000	100%
Residential	28,000	17%
Employment	5,000	3%
Park/Rural	96,000	57%
Other	39,000	23%

Attributes

- The Northern Metro Region has a **highly skilled and diverse workforce**, with a rich and productive industrial history. Employment is focused predominantly around freight and logistics (linked to Melbourne Airport and surrounding industrial land), food production, innovation (Northern Hospital) and advanced manufacturing in the Northern Industrial Precinct along the Hume Highway State Significant Industrial Precinct (SSIP). In the inner areas of Moreland, Darebin and Banyule LGAs, post-industrial precincts have transitioned into creative (Creative Brunswick and RMIT, the Coburg Initiative, Melbourne Polytechnic, the Northland Urban Renewal Precinct) and research hubs (Heidelberg and the La Trobe National Economic and Innovation Cluster (NEIC)).
- The region's **urban structure** has changed over the last 20 years with expansion of the growth boundary in 2002, 2010 and again in 2012. The **Northern Growth Corridor** extends more than 50 kilometres north of Melbourne CBD, with future growth planned to Wallan.
- **Housing and rental affordability** varies across the region. As with other parts of metropolitan Melbourne, the inner suburban areas closest to Melbourne CBD are becoming relatively unaffordable (Brunswick, Coburg, Preston, Northcote, Ivanhoe, Eltham and Heidelberg), while housing in the New Growth Area LGAs is considered affordable (Sunbury, Craigieburn, Broadmeadows, Epping, Glenroy and Reservoir).
- The **transport network** varies and reflects growth area expansion along existing highway corridors, with few east-west connections to convey regional and subregional traffic. The region has a connection to the Hume Highway, focusing traffic movement in a north-south direction and emphasising the network's role in conveying goods and as long-distance transport routes. Traffic congestion and bottlenecks in the inner areas are created by vehicle traffic from growth areas where people rely on their car, while congestion on inner city train and tram routes reflects recent infill growth.
- The **topography and visual landscape character** are shaped by water and volcanic activity, with rivers and creeks running along north-south valleys from the hills to Port Phillip Bay, beyond Melbourne CBD. The gently undulating lands of the volcanic plain in the west around the City of Hume are punctuated with volcanic cones, while towards the north and over to the east, the region sits at the foothills of the Macedon Ranges (north-west) and the Alpine Region (north-east). People have access to abundant waterway corridors, notably the Yarra River and its catchment; Jacksons, Emu, Deep and Merri creeks; and the Plenty River and the Maribyrnong River. Agricultural and other activities in green wedge areas are highly varied due to the different landforms that underpin the region – from market gardens around Keilor on the border of the Western Metro Region, to food production and tourism activities in the Shire of Nillumbik.
- **Key tourist destinations** include Heide Museum of Modern Art, Gertrude Contemporary, Montsalvat, the Islamic Museum of Australia, Fairfield Boathouse and Ceres Community Environment Farm.

Strengths

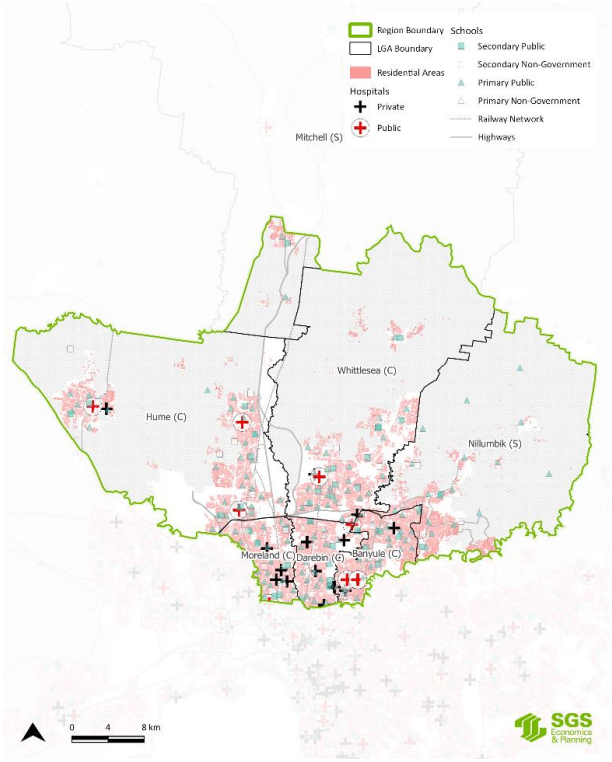
- A growing, diverse and skilled population
- Relatively affordable housing in middle and outer areas
- Growing numbers of culturally diverse and skilled migrants
- Increasingly diverse economy and capacity in inner areas to support highly skilled, creative, knowledge-intensive sectors including innovation around food production and advanced manufacturing at La Trobe University and in the Latrobe NEIC.
- Proximity to Ballarat, Bendigo, Seymour, Shepparton and peri-urban towns
- Major activity centres such as Preston Northland and employment locations, such as Tullamarine Business Precinct and Thomastown Industrial
- Major industrial areas along the Hume Highway and in SSIPs like Thomastown and Campbellfield allow for industrial and manufacturing activities that cannot occur elsewhere
- Access to a range of open space in residential areas from waterways to nature conservation areas like the Woodlands Historic Park, Plenty Valley Gorge and Craigieburn Grasslands
- Connections to diverse and picturesque landscapes defined by culturally significant waterways and volcanic activity.

Challenges

- Vulnerable workforce due to concentrations of lower employment skills in some part of the middle and outer areas, especially in places like Broadmeadows where manufacturing is in decline with the closure of Ford in 2016 and industry is in transition
- Higher than average (and increasing) housing stress in some LGAs and suburbs, particularly inner areas
- Limited employment access and choice, particularly for higher order jobs, in outer areas as activity centres take longer to diversify. More highly skilled jobs are available in Melbourne CBD, exacerbating north-south congestion
- Pockets of disadvantage related to social and physical isolation
- Risk and impacts of hazards associated with climate change such as bushfire and heat vulnerability
- Keeping key rivers and patches of remnant vegetation healthy, including the significant Craigieburn Grasslands and rare patches of Eucalypt Grassy Woodland

Insights

- A diverse region with some suburbs that are highly advantaged and others that are very disadvantaged.
- Significant population growth provides opportunities to build centres of critical mass
- Increasing youth engagement and growing tertiary education rate allows ongoing uplift of skills in LGAs that already have highly diverse workforces and skill levels
- Concentration of major industrial precincts around the Melbourne Airport, the Northern Industrial Precinct and the planned Beveridge Interstate Freight Terminal (BIFT), as well as the La Trobe NEIC will increase economic agglomeration
- Density and networking of centres in the region's inner area presents opportunities for more local connectivity.
- Limited inter-regional transport connections
- Difficult access to Melbourne's CBD from the outer north, limited public transport and long commutes by car


Region Boundary
LGA Boundary
Residential Areas
Hospitals
Private
Public
Schools
Secondary Public
Secondary Non-Government
Primary Public
Primary Non-Government
Railway Network
Highways
Mitchell (S)
Whittlesea (C)
Hume (C)
Nillumbik (S)
Moreland (C)
Darebin (C)
Banyule (C)
0 4 8 km
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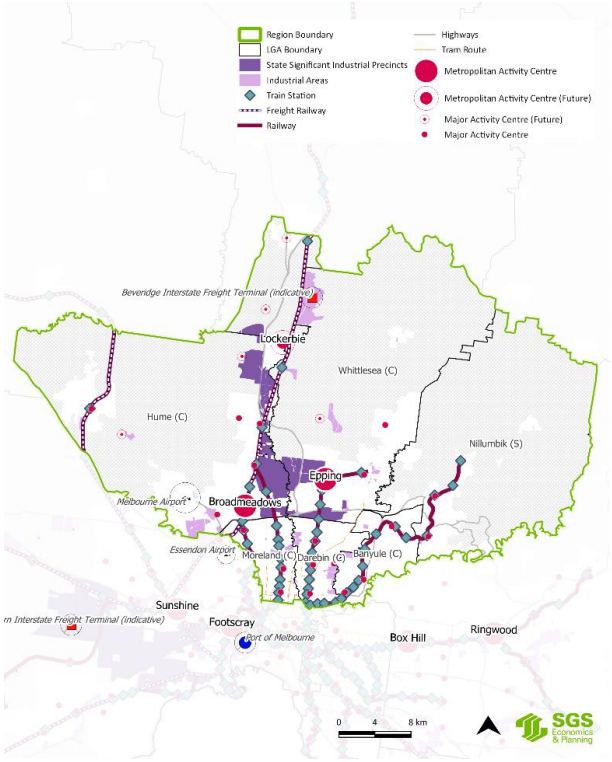
Region Boundary
LGA Boundary
State Significant Industrial Precincts
Industrial Areas
Train Station
Freight Railway
Railway
Highways
Tram Route
Metropolitan Activity Centre
Metropolitan Activity Centre (Future)
Major Activity Centre (Future)
Major Activity Centre
Beveridge Interstate Freight Terminal (indicative)
Lockerbie
Whittlesea (C)
Hume (C)
Nillumbik (S)
Epping
Melbourne Airport
Broadmeadows
Essendon Airport
Moreland (C)
Darebin (C)
Banyule (C)
Sunshine
Footscray
Port of Melbourne
Box Hill
Ringwood
0 4 8 km
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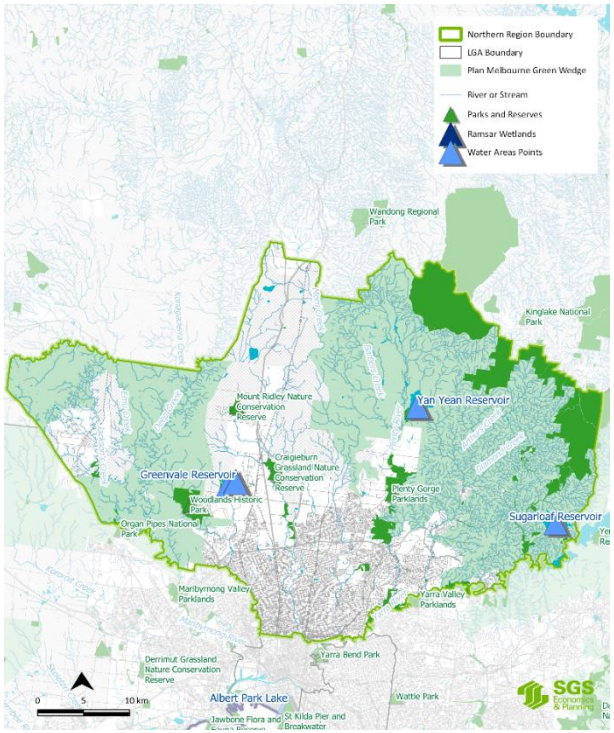
Northern Region Boundary
LGA Boundary
Plan Melbourne Green Wedge
River or Stream
Parks and Reserves
Ramsar Wetlands
Water Areas Points
Wandong Regional Park
Kinglake National Park
Mount Ridley Nature Conservation Reserve
Yan Yean Reservoir
Craigieburn Grassland Nature Conservation Reserve
Greenvale Reservoir
Woodlands Historic Park
Plenty Gorge Parklands
Organ Pipes National Park
Sugarloaf Reservoir
Maribyrnong Valley Parklands
Yarra Valley Parklands
Yarra Bend Park
Derrimut Grassland Nature Conservation Reserve
Albert Park Lake
Wattle Park
Jawbone Flora and
St Kilda Pier and Breakwater
0 5 10 km
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Northern Metro Region Economic, Social and Environmental Profile summary

Indicator	Likely impact of drivers of change	Description
ECONOMIC		
Economic performance	Favourable	The shires of Mitchell and Nillumbik and the cities of Hume and Whittlesea saw the greatest proportional change in working age populations from 2011 to 2016. Despite this, Darebin and Moreland LGAs have the highest population of working age people, with the region's proportions generally in line with the metropolitan Melbourne and Victorian averages. The biggest employment sector is population-serving followed by industrial sector jobs. Jobs in the health and education sector grew significantly between 2011 and 2016. This includes education income from international students and reflects the shift from an industrial-based economy. The industrial sector remains a large employment sector, but the quantum of jobs declined in Nillumbik, Banyule and Darebin LGAs from 2009-2017. Most locations experienced relatively stable exports, except for the City of Hume where exports increased significantly between 1997 and 2018, largely related to the emergence and strength of industrial, freight and logistics industries. Major economic locations in the Northern Metro Region include Roxburgh Park, Tullamarine Business Precinct, Thomastown Industrial, Epping, Preston-Northland and Heidelberg. Gross value add (GVA) in the industrial sector has been higher than the rest of the sectors in the Northern Metro Region. The pattern of effective job density (EJD) is highest in the inner LGAs (Moreland, Darebin and Banyule) due to public/private transport connections to Melbourne CBD job clusters. There are high EJDs clustered around Broadmeadows, the Northern Growth Corridor and towards Melbourne Airport. The highest growth in capital investment since 1996 occurred in Hume and Whittlesea LGAs, although a substantial decrease and recovery occurred there since 2000. The City of Hume contains Melbourne Airport and residential growth areas, while change in investment patterns in the City of Whittlesea may reflect the construction and growth area industry.

Indicator	Likely impact of drivers of change	Description
Economic wellbeing	Favourable	Household income was lower in the City of Whittlesea, Shire of Mitchell and City of Hume than other parts of the Northern Metro Region. The greatest change in median total weekly household income occurred in the cities of Moreland and Darebin (2011-2016), while the Shire of Mitchell also experienced income growth to a greater degree than the metropolitan or Victorian average, from a lower base. The unemployment rate is higher in the cities of Hume and Whittlesea around Broadmeadows and the southern parts of these LGAs, likely due to lower education and skill levels and lower EJDs. It is also higher in residential growth areas along the Northern Growth Corridor from Craigieburn north to Beveridge and Wallan. Small areas in Moreland, Darebin and Banyule LGAs also recorded higher levels of unemployment in 2016. Higher increases in the unemployment rate occurred in Hume and Whittlesea LGAs, with the City of Hume having the highest rate of unemployment at almost nine per cent. Bus, tram and train networks are most extensive in the inner LGAs. While bus networks also reach across the residential areas in the Northern Growth Corridor and the outer metropolitan LGAs (Hume, Whittlesea and Nillumbik), the frequency rates for service are lower than in the inner areas. Train lines align north-south, with east-west interregional connections limited.

Indicator	Likely impact of drivers of change	Description
Employment and skills	Favourable	The inner LGAs of Moreland, Darebin and Banyule had a higher share of population employed in Skill Level 1 jobs (where 1 is highest skill level and 5 is lowest skill level) in 2016. Whittlesea, Moreland, Darebin and Banyule LGAs saw a greater percentage change in Skill Level 1 and 2 than metropolitan Melbourne and Victorian averages. Growth in Skill Level 4 occurred in the City of Hume, while other LGAs saw a decrease in the proportion of people seeking Skill Levels 1-4 training over the same period. Skill levels are described in Section 4.4. Population-serving industries are the most highly concentrated in the region. Transport, postal and warehousing, and manufacturing, construction and wholesale trade continue to be well represented while agriculture, forestry and fishing declined as a key regional industry over 2011-2016. The region is underrepresented in knowledge-intensive sectors, in particular professional, scientific and technical services; information media and telecommunications; financial and insurance services; and arts and recreation services. Low rates of change in the location quotient from 2011-2016 suggests that the region risks falling further behind in these sectors.

SOCIAL

Indicator	Likely impact of drivers of change	Description
Population demographics	Favourable	The region's population had a higher average annual growth rate than metropolitan Melbourne between 2011 and 2016. The New Growth Areas are forecast for substantial growth to 2036. Population in each age group increased between 2011 and 2016, except in the Shire of Nillumbik, where the proportion of children and young adults decreased. An increase in the proportion of older people across all LGAs represents broader, national demographic trends. In New Growth Area LGAs, there is a higher change in the proportion of people aged 65 and over. This may reflect a growing number of retirement villages and residential aged care facilities in these areas or that the people living in established areas in these LGAs are getting older. Age dependency ratios grew in line with metropolitan Melbourne and Victoria between 2011 and 2016, reflecting the ageing population profile. The New Growth Area LGAs show a more pronounced increase in age dependency ratio due to the growing shares of population aged 0-14 and 65+ moving to more affordable suburbs in Hume, Whittlesea and Mitchell LGAs with families. The rate of people moving to the Northern Metro Region is highest in Whittlesea, Moreland, Hume and Darebin LGAs. In addition to having the smallest population of all the LGAs in the Northern Metro Region the Shire of Mitchell was the only LGA to have a relatively high proportion of people who have moved there from other places in Victoria.
Housing diversity	-	The dominant dwelling type is separate house. Moreland and Darebin LGAs have a higher proportion of townhouse/terrace and apartments and therefore a more diverse dwelling profile than metropolitan Melbourne and other parts of the region. Hume, Mitchell and Whittlesea are the only LGAs where separate houses continue to make up a higher proportion of new dwellings. The number of medium to high density dwellings in the region increased significantly between 2011 and 2016.
Housing stress	Adverse	Nillumbik, Moreland, Darebin and Banyule LGAs have a lower proportion of households in mortgage stress than metropolitan Melbourne and Victoria. The City of Hume has the highest proportion of households in mortgage stress in the region. Mortgage stress in the cities of Hume and Whittlesea rose noticeably between 2011 and 2016.
Disadvantage	Adverse	There are several areas of concentrated disadvantage clustered in the southern parts of Hume and Whittlesea LGAs, particularly around Broadmeadows and Thomastown. The region's inner areas have lower levels of disadvantage, although pockets do still exist, particularly in areas further away from Melbourne CBD.

Indicator	Likely impact of drivers of change	Description
Youth engagement	Adverse	Youth engagement increased from 2011 to 2016 across the region, except for in the Shire of Nillumbik. Youth participation in full-time work decreased in the region, just as it did in metropolitan Melbourne and Victoria, from 2011 to 2016. Participation rates in post-Year 12 qualifications is above 60 per cent in almost all LGAs, and participation in study or full-time work is above 90 per cent in all LGAs. The Shire of Mitchell has a higher than average proportion of people aged 15-19 who are employed full time compared to metropolitan Melbourne and Victoria.
Population health	Adverse	There is variation in people's ability to access community services and resources across the region – rates are lower in Hume, Whittlesea and Moreland LGAs than other parts of the region and the Victorian and metropolitan averages. All LGAs except Nillumbik have higher numbers of mental health clients than the metropolitan average. There are fewer general practitioners (GPs) per 1,000 people in Whittlesea, Moreland, Hume, Darebin, Mitchell and Nillumbik LGAs than the metropolitan Melbourne and Victorian averages. The prevalence of Type 2 diabetes is high in most LGAs when compared to the metropolitan Melbourne averages, particularly in Whittlesea, Hume, and Moreland LGAs.
Early childhood outcomes	Adverse	Early childhood outcomes are poor for Hume and Mitchell LGAs. The proportion of children in Hume and Mitchell LGAs who are developmentally vulnerable on more than two domains is significantly higher than metropolitan and state averages. Child protection substantiations per 1,000 people in Hume and Mitchell LGAs are also higher than the metropolitan average.
Crime	Adverse	Mitchell, Hume, and Darebin LGAs had the highest offence rates in 2018, and those rates are also higher than the metropolitan Melbourne and Victorian averages. The Shire of Nillumbik had a crime offence rate that was less than half of the metropolitan and Victorian averages, and lower than other LGAs in the region. Other parts of the LGA report crime offence rates that are comparable to metropolitan Melbourne and Victoria.
Wellbeing	Adverse	Nillumbik and Banyule were the only LGAs to score more highly than the Victorian average on the subjective wellbeing index. These two LGAs also have the lowest housing stress and highest household income in the region. Hume and Whittlesea LGAs scored lowest on the sense of safety walking alone after dark index, which aligns with the higher crime offence rate in those locations.

ENVIRONMENTAL		
Environmental assets	Adverse	The City of Whittlesea has the largest total area of open space in the region. The Shire of Nillumbik also has a large amount of open space relative to other LGAs in the region. Out of the inner LGAs, aggregate open space is the largest in the City of Banyule. Open space assets in outer LGAs are predominately green open space while open space assets in the inner LGAs are spread across mixed and green types of open space. Conservation reserves and natural and semi-natural open space are the largest aggregate types of open space in the region. Land use is varied in the Hume, Whittlesea, Mitchell and Nillumbik LGAs with land spread across conservation areas, agricultural land and residential land. Much of the agricultural land is zoned as green wedge. Banyule, Darebin and Moreland LGAs are primarily residential. In both rural areas and New Growth Areas, land is transitioning from primary production to residential. The area of land designated as conservation reserves has increased since 2006.
Environmental condition	Adverse	The Shire of Nillumbik and the City of Banyule both enjoy above average tree canopy cover. The cities of Moreland, Whittlesea and Hume are below the metropolitan average for tree canopy cover. A higher proportion of river reaches (the section of river between a beginning and ending point) in the Yarra River Basin are in good/excellent condition relative to the metropolitan average. A lower proportion of reaches in the Maribyrnong Basin are in good/excellent condition relative to the metropolitan average. The proportion of reaches in good/excellent condition appears to be declining over time.
Environmental risks and hazards	Adverse	Residential land use, primary production and conservation reserves are most at risk of flood during a 1 in 100-year rainfall event. Areas at risk are located near waterways in the Shire of Nillumbik and the City of Whittlesea. Large areas of the Shire of Nillumbik and the City of Whittlesea are also at risk of bushfire. Both conservation areas and agricultural land is at risk, with mapping suggesting that areas as far west (relative to the eastern boundary) as the City of Banyule are at risk. All LGAs have urban heat islands, with greater impacts in parts of the Cities of Whittlesea and Hume. Areas less affected include the Yan Yean and Greenvale reservoir. Areas in Hume, Whittlesea and Nillumbik LGAs include populations that are vulnerable to heat. Moreland and Darebin LGAs have concentrations of contaminated groundwater sites. EPA priority sites are concentrated in Hume and Whittlesea LGAs.

Environmental flows	Adverse	Most populated areas in the region have access to a diverse range of open space types. Residents from Nillumbik and Banyule LGAs visit green space more than residents in Darebin, Moreland, Hume, Whittlesea and Mitchell LGAs. Both Yarra Valley Water and Western Water consider multiple scenarios when forecasting supply and demand of water. In the worst-case scenario, augmentations to either system will be needed to service the region in the next 15-20 years. Some areas in the City of Hume have had a high number of small-scale solar installations since 2001 relative to other LGAs. There are three open landfills in the region. The total volume of kerbside garbage is largest in Hume and Whittlesea LGAs. The quantity of kerbside garbage has been increasing in the region since 2002.

1 INTRODUCTION

To support the update of Infrastructure Victoria's 30-year Infrastructure Strategy this report overviews the economic, social and environmental characteristics of the Northern Metro Region.

1.1 Project purpose

This project will help Infrastructure Victoria:

Prepare for the 2020 Strategy update and provide a rich economic, social and environmental evidence-base at a regional level within Metropolitan Melbourne. This will assist IV to understand relative regional strengths and challenges across the metropolitan area and (combined with the existing work done by others) across the state.

This report is one of six regional economic, social and environmental (ESE) profiles (see Figure 1) that will "identify the ESE strengths and challenges of Melbourne's regions on a geographical basis."

As well as the six regional profiles, the project also includes:

- a metropolitan Functional Economic Region (FER) profile, highlighting the strengths and challenges of metropolitan Melbourne's economy as a network
- a metropolitan inter-regional summary report that provides regional indicators against IV's 10 objectives to identify relative strengths and challenges within the metropolitan area.

FIGURE 1: REPORT PACKAGE

1.2 Report structure and approach

The report covers ESE domains, which reflect Infrastructure Victoria's 10 objectives:

1. Prepare for population change (Social)
2. Foster healthy, safe and inclusive communities (Social)
3. Reduce disadvantage (Social)
4. Enable workforce participation (Economic)
5. Lift productivity (Economic)
6. Drive Victoria's changing globally integrated economy (Economic)
7. Promote sustainable production and consumption (Environmental)
8. Protect and enhance natural environments (Environmental)
9. Advance climate change mitigation and adaption (Environmental)
10. Build resilience to shocks (Environmental, Social and Economic)

The report is structured as follows:

- Chapter 2: The various geographies used for the project
- Chapter 3: The major drivers of change that affect Australian cities and regions, and which will impact Melbourne's and the Northern Metro Region's growth and development
- Chapters 4-6: Economic, social and environmental indicators for the Northern Metro Region

1.3 Northern Metro Region

The Northern Metro Region comprises seven local government areas (LGAs): Banyule, Darebin, Moreland, Hume, Whittlesea, Mitchell and Nillumbik.

The region extends from the inner suburbs of Brunswick, Coburg, Preston, Northcote, Heidelberg and Ivanhoe, to some of the city's newest communities in Sunbury, Craigieburn, Mernda and Wallan.

The Northern Metro Region includes substantial green wedge areas, State and national parks, culturally diverse and historic established suburbs, and some of Melbourne's newest and fastest growing outer suburbs, particularly along the Northern Growth Corridor.

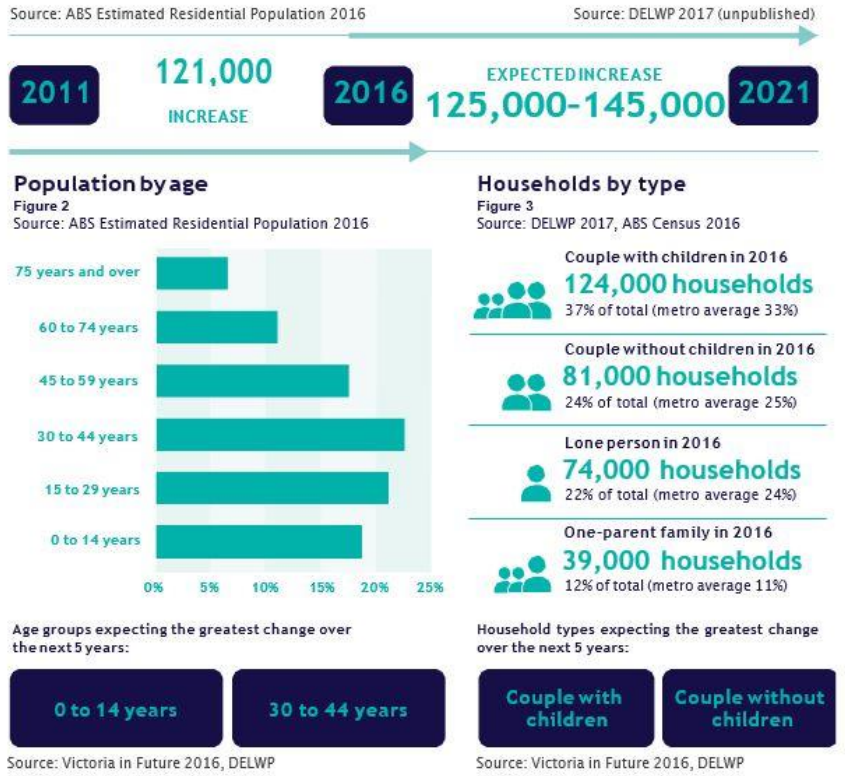
The region's suburbs provide a variety of housing, employment and lifestyle opportunities. These range from the established inner and middle suburbs such as Coburg, Preston, Northcote and Greensborough, Ivanhoe, Broadmeadows, Epping and Roxburgh Park, to growth area communities stretching from Craigieburn in the region's centre to Wallan in the far north, Wollert and Mernda in the east, and Sunbury South in the west.

The region is home to more than 951,000 people, approximately 19 per cent of metropolitan Melbourne's total. Over the five years to 2021, the region's population is expected to grow by more than 125,000 people to reach over 1 million residents by 2021, at a projected annual average growth rate of 2.6 per cent.

Population growth is not expected to be equally distributed across the region. The Northern Metro Region contains outer suburban growth areas including Craigieburn, Mernda, Sunbury South, Wollert and Wallan. These will house much of the region's population growth, while inner areas such as Coburg, Heidelberg and Preston are also expected to intensify and renew.

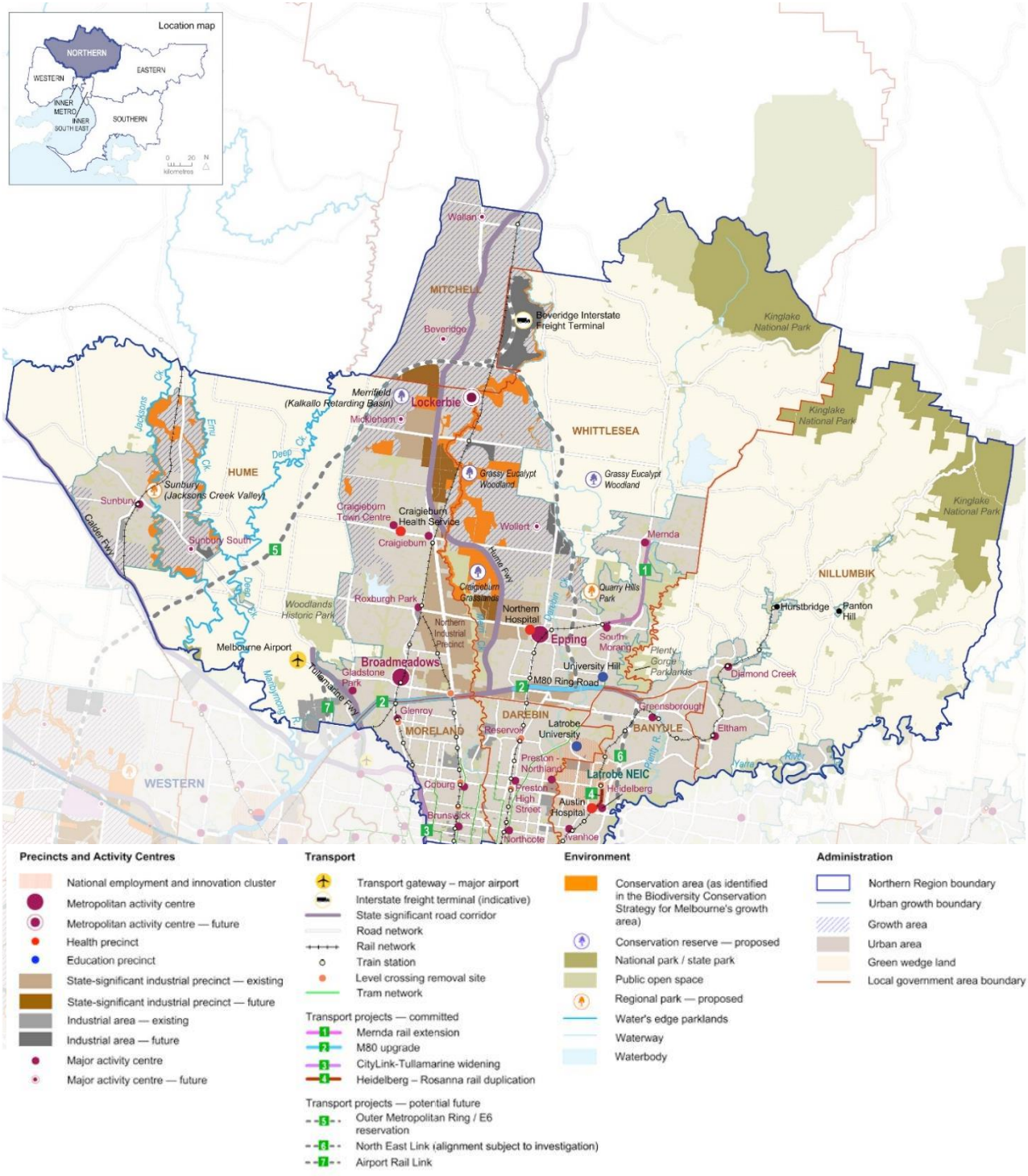
The Northern Metro Region has a large and diverse workforce. The proportion of residents who also work within the region was 47 per cent in 2011. It contained approximately 317,000 jobs in 2015, or 15 per cent of metropolitan Melbourne's jobs. Total land area of the Northern Metro Region is approximately 167,298 hectares, about 18 per cent of metropolitan Melbourne.

FIGURE 2: NORTHERN METRO REGION 2016 POPULATION



Source: Five Year Plan for Jobs, Services and Infrastructure 2017-2021 (Initial Investment Report), State Government of Victoria (2017).

FIGURE 3: NORTHERN METRO REGION CONTEXT MAP



Source: *Plan Melbourne* - State Government of Victoria (2017)

2 GEOGRAPHIES AND CATEGORIES

A range of reporting geographies are used to help understand how the Northern Metro Region functions.

Urban areas contain a mix of residential, economic, industrial, recreation, education, health and other spaces. The distribution of activity within these spaces, and the way people move within and between them, contributes to the demand for various types of infrastructure.

While standard local government and ABS defined areas are useful, consideration of different types of areas and the activities they accommodate can provide a more nuanced understanding of an area.

2.1 Key reporting geographies

Analysis against a range of geographies, as presented in Table 1, use definitions based on SGS's knowledge of urban development patterns.

The analysis has primarily been based around LGAs, due to data limitations, and location typologies.

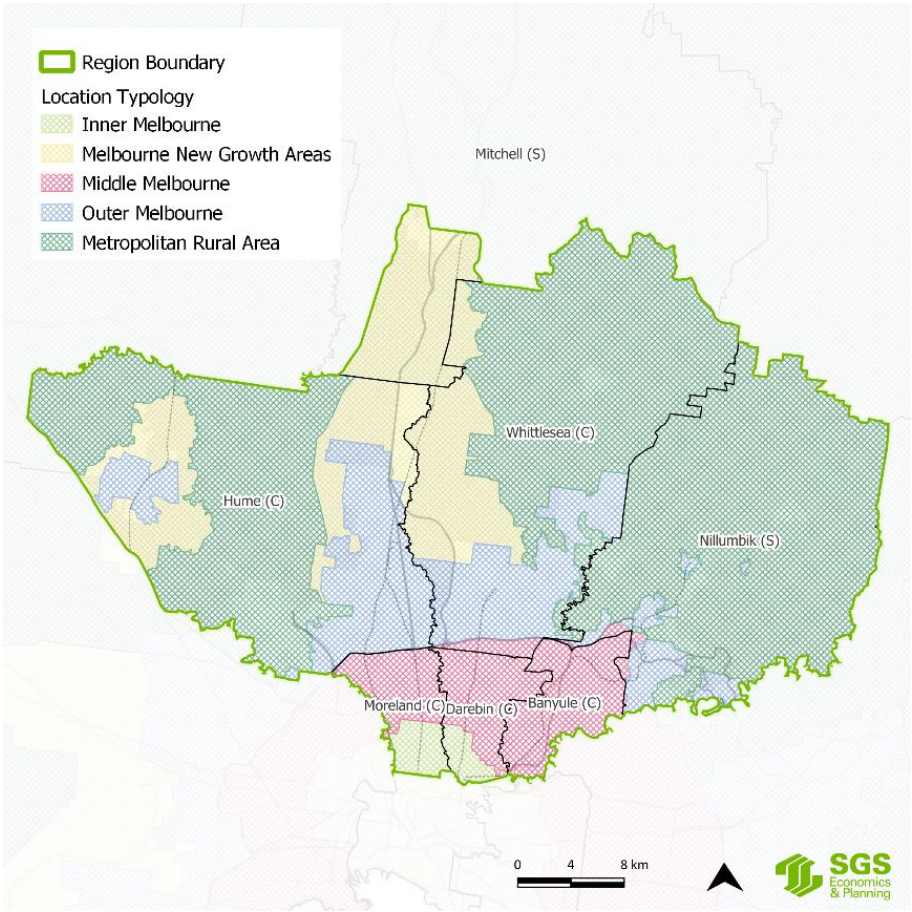
Different economic regions are used in the FER profile.

TABLE 1: SUMMARY OF REPORTING GEOGRAPHIES

Region	Approach to defining
Planning subregions	*Plan Melbourne* regions: groups of local government areas
Location typology (Figure 4)	▪ Inner: combination of tram network coverage, and 8km from CBD (e.g. does not include full extent of 86 tram to Bundoora, and extends further in to west where there is limited tram network) ▪ Middle: areas within the Western Ring Road, and other areas between Outer and Inner ▪ Outer: established outer suburbs within the urban growth boundary (UGB) ▪ Melbourne New Growth Areas: areas covered by Precinct Structure Plans (PSPs) ▪ Metropolitan Rural Areas: non-PSP areas within metropolitan Melbourne
'Current planning areas'	Defined planning and other geographies, including activity centres, NEIC boundaries and SSIPs as per *Plan Melbourne*
'Economic locations'	Based on current planning areas plus cluster analysis, includes economic nodes not yet designated (e.g. Tullamarine Business Precinct and Gladstone Park) and areas already designated, with limited employment (i.e. future planned centres). Draws on: ▪ existing employment land- based on ABS Mesh Block Land Use Categories: Commercial, Hospital/Medical, Industrial ▪ job density for 2016 by four broad industry classifications ▪ clustering analysis based on DBSCAN algorithm
Standard ABS geographies	▪ LGAs: local government areas (Figure 4) ▪ SA2: areas that represent a community that interacts socially and economically (generally 3,000-25,000 people) ▪ SA3: areas with similar regional characteristics, administrative boundaries or labour markets (generally 30,000-130,000 people) ▪ SA4: Used for output of labour force survey data, reflect labour markets within each State/Territory (generally 100,000+ people, sometimes 300,000-500,000 people in metropolitan areas)
SGS HEX Grid	▪ 30ha grid

Source: SGS Economics and Planning, 2018

FIGURE 4: NORTHERN METRO REGION LGAS AND LOCATION TYPOLOGIES



Source: SGS Economics and Planning, 2018.

2.2 Economic classifications

The 19 ANZSIC (1 digit) industry classifications have been aggregated into four broad industry classifications in this report. Creative industries are classified as knowledge-intensive. The tourism industry straddles a number of standard industry classifications. The contribution of tourism is often indirect, generating output and creating jobs in sectors such as retail trade, arts and recreation services, accommodation and food services in particular.

TABLE 2: BROAD INDUSTRY CLASSIFICATIONS

Classifications	ANZSIC 2006 1 digit industry
Knowledge-intensive	▪ Information media and telecommunications ▪ Financial and insurance services ▪ Rental, hiring and real estate services ▪ Professional, scientific and technical services ▪ Administrative and support services ▪ Public administration and safety
Health and education	▪ Education ▪ Health care and social assistance
Population-serving	▪ Retail trade ▪ Accommodation and food services ▪ Arts and recreation services ▪ Construction ▪ Other services
Industrial	▪ Agriculture, forestry and fishing ▪ Mining ▪ Manufacturing ▪ Electricity, gas, water and waste services ▪ Wholesale trade ▪ Transport postal and warehousing

3 DRIVERS OF CHANGE

3.1 Overview

A series of global megatrends is shifting the way people live and work, with implications for business and life in metropolitan Melbourne and in the Northern Metro Region.

Three key drivers of change have been identified:

- **Economic structural change:** The economy in the Northern Metro Region is shifting towards creative and services-led sectors, and these sectors are consolidating in the inner LGAs of Moreland and Darebin that are close to Melbourne CBD and major economic nodes. Other emerging and expanding sectors in the region include advanced food manufacturing and freight and logistics linked to the Hume Highway and Sydney, as well as the surrounding regional centres (Bendigo, Seymour, Ballarat, Shepparton) and Melbourne Airport. Technology is influencing the way people work, changing all types of jobs. The inner parts of the Northern Metro Region accommodate much of this growth, and this presents a challenge for more traditional industrial areas and other dispersed urbanised parts of the region. The Northern Metro Region has some structural vulnerabilities, and some parts of the region continue to focus on the traditional aspects of today's economy. Traditional industries are typically those that are described as being low-tech, less research intensive, and are generally low skill. Rapid growth and change could enable industries in the region to better adapt and become more resilient to change.
- **Rapid urbanisation**: Australian population growth continues to be concentrated in existing major urban centres, particularly in Melbourne and Sydney. This has resulted in rapid levels of urban expansion and infill development, especially in the inner parts of the Northern Metro Region such as Brunswick, Coburg, Northcote, Preston, Heidelberg and Ivanhoe. The growth areas in the cities of Hume and Whittlesea and the Shire of Mitchell pose other challenges. The Northern Metro Region, particularly the Northern Growth Corridor, is one of the fastest growing areas in metropolitan Melbourne; it is also forecast to accommodate a high proportion of overall growth for metropolitan Melbourne. New greenfield and infill renewal development will continue. This scale of growth and change is a defining feature of the region.
- **Impacts of climate change:** The impacts of climate change are being felt across the city. As rapid urbanisation continues, the effects of urban heat islands, decreasing tree canopy cover and scarce water resources will be felt by many residents. The Northern Metro Region is home to key reservoirs (Yan Yean and Sugarloaf) and has stunning waterway and open space assets that, if protected, may become carbon and heat sinks over time. Access to resources such as water, land and energy will affect how and where businesses and people locate and operate.

3.2 Structural economic changes

Growth in new jobs

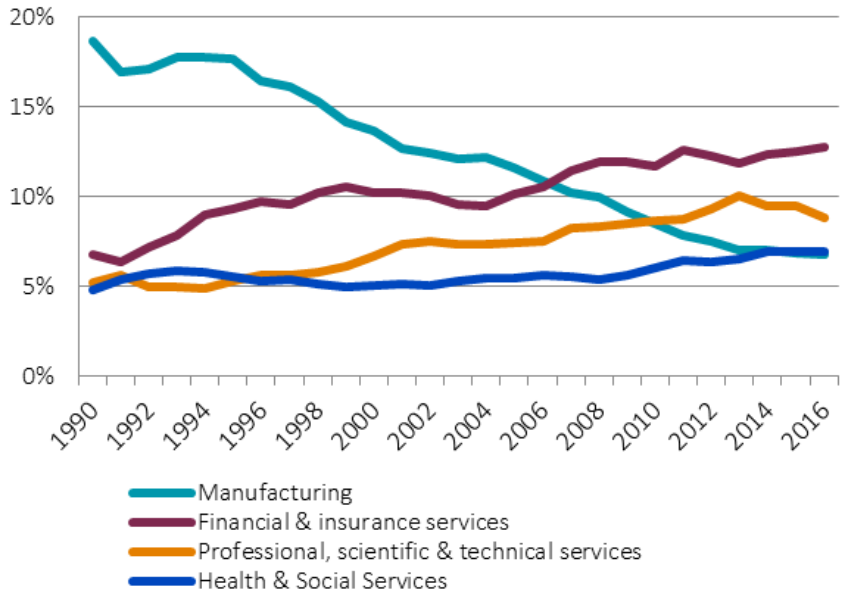
Melbourne's economy, like that of many other cities, has undergone significant change over the past few decades. Previously dominated by manufacturing and industrial activities, it has been transformed into one more reliant on knowledge-intensive activities and services (see Figure 5). These professional services include a range of business functions involving finance, design, engineering, architecture, IT, marketing, law, accounting, universities and research and development institutions.

Despite this, manufacturing and other primary industries will remain and must be highly innovative to prosper. This will demand, directly or indirectly, heavy involvement by professional services. Likewise, population-serving sectors like retail, health and hospitality will require access to analytical and creative services if they are to boost productivity and continue to innovate.

Knowledge-intensive activities require access to diverse skills and client bases to specialise and build resilience. They also need to attract and retain highly skilled/specialised labour. For these reasons they typically locate (or agglomerate) in highly accessible, high amenity and diverse environments.

The massing and clustering of professional services improves businesses' ability to innovate, boosting their productivity and, in turn, that of their customers. Agglomeration benefits are one of the main attractions for the growing professional services industries to locate in central city areas and near major institutional and economic nodes.

FIGURE 5: SHARE OF MELBOURNE'S GDP, SELECTED INDUSTRIES



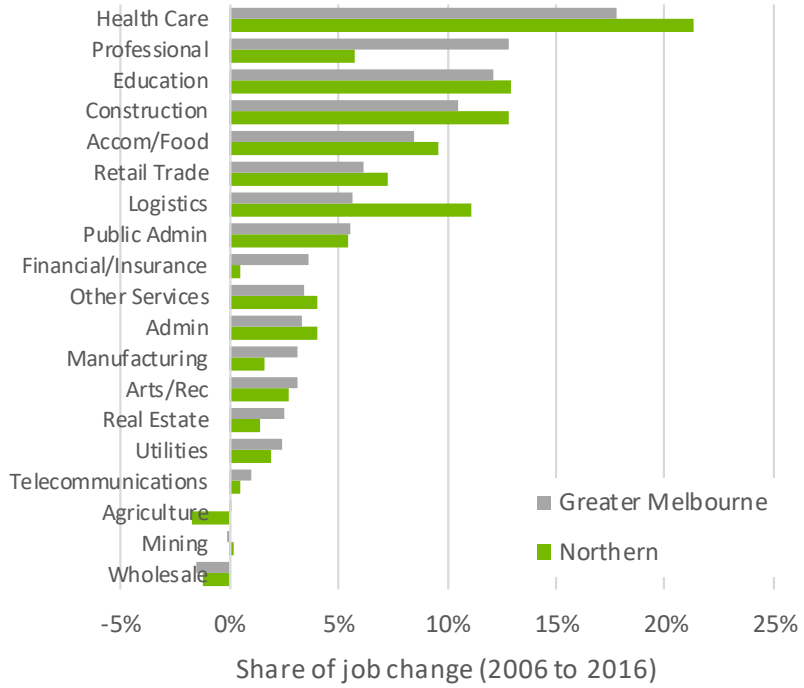
Source: SGS Economics and Planning

The Northern Metro Region contained 317,000 jobs in 2016. This represents 15 per cent of jobs across metropolitan Melbourne.

Figure 6 presents the share of jobs growth over the last decade by industry for the Northern Metro Region and metropolitan Melbourne. This illustrates the structural change occurring in the economy where many of the top industries are services based – health care, professional, education, retail, accommodation and food, and public administration.

The industry profile of the Northern Metro Region is broadly consistent with this overarching trend. It has seen higher growth in construction and retail - linked to strong population growth - and logistics, wholesale and manufacturing – linked to a strong industrial heritage. The share of professional and financial services growth is notably lower than the metropolitan Melbourne average, highlighting the Northern Metro Region is yet to fully engage with this knowledge-led economy.

FIGURE 6: SHARE OF REGIONS EMPLOYMENT GROWTH, 2006 TO 2016



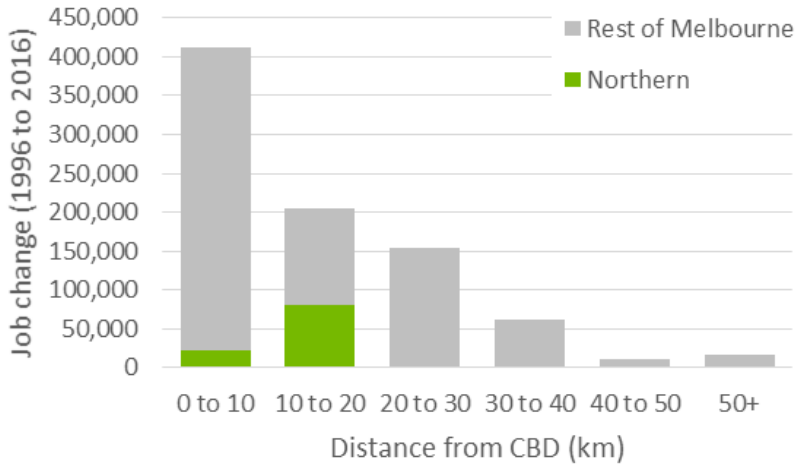
Source: SGS Economics and Planning, derived from NIEIR (2018)

The changing industry structure has a direct spatial implication for metropolitan Melbourne and the Northern Metro Region. Figure 7 provides a high-level overview, presenting the change in jobs (1996 to 2016) by distance to the CBD. Employment location is further investigated in Section 4.2.

Figure 7 illustrates that employment growth in the Northern Metro Region has been geographically diverse. This reflects the locations of industrial and population-serving employment sectors and larger employers in places like Melbourne Airport and Tullamarine Business Precinct, the Northern SSIP and La Trobe NEIC – all beyond 10 kilometres from Melbourne CBD.

Despite this diversity, the region has not been able to capture a substantial share of the significant inner-city employment growth, which is largely liked to knowledge services.

FIGURE 7: EMPLOYMENT GROWTH BY DISTANCE TO CBD



Source: SGS Economics and Planning, derived from NIEIR (2018)

Automation and the changing nature of work

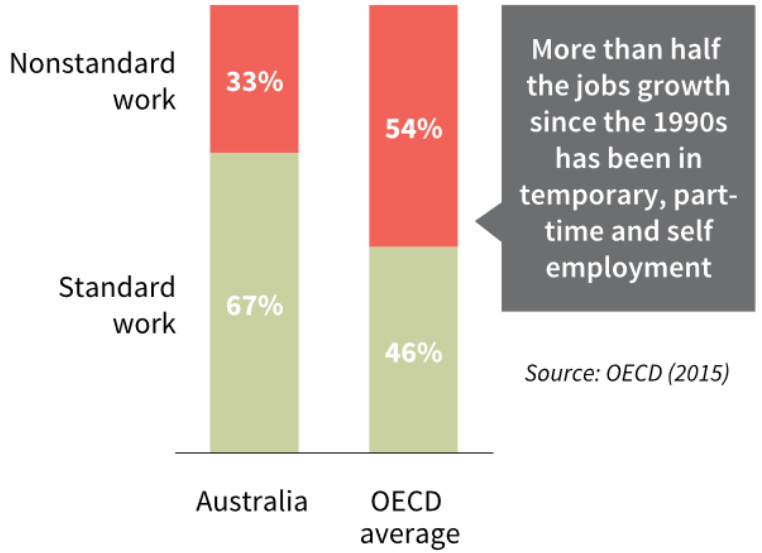
Technology is changing all types of jobs and how people work. Automation is an ongoing process with continual technological development that will impact all sectors of the economy.

Jobs that will be difficult to automate include those that require human thinking, creativity and problem solving and high levels of skills training, as well as those that require human touch and highly developed vocational skills. The next wave of jobs likely to be automated are not necessarily lower-skilled manufacturing, but routine white-collar jobs such as call centre workers, legal clerks, accountants and retail workers.

'Task-biased technical change' is the leading framework for analysing the impact of technology on work.[1] It is used to measure the intensity of *abstract*, *routine* and *manual* tasks across different occupations. While abstract and manual tasks are hard to automate, routine tasks can be easily broken down and codified into a computer program because they follow precise, well-understood procedures. These trends cannot be neatly aligned to the structural shifts in the industry composition of metropolitan Melbourne's economy. These issues are further investigated in the Functional Economic Report (FER) report.

There has been a gradual increase in non-standard or alternative working arrangements (see Figure 8) such as self-employment, temporary agency work, seasonal work, independent contracting, fixed term contracts and on call work *(Independent Inquiry into Insecure Work*, 2012). Increasingly people are also piecing their incomes together from a portfolio of activities, including platforms like Air Tasker, Freelancer, Uber, WeWork, Deliveroo and Airbnb[2].

FIGURE 8: PERCENTAGE OF JOBS GROWTH IN NON-STANDARD AND STANDARD WORK, 1990-2015



Source: FYA, 2015.

For the Northern Metro Region, this could impact the skills and education required to participate in this rapidly changing and innovative new economy. There will continue to be opportunities for hands-on sectors including construction trades, health care services and education, particularly in the expanding and establishing major activity centres throughout the Northern Growth Corridor such as Craigieburn Town Centre, Mernda, Wallan, South Morang, Wollert and Sunbury South.

[1] TBTC first proposed by Autor, et al. (2003) and further by Goos and Manning (2007), Autor, Katz and Kearney (2006, 2008), and Acemoglu and Autor (2011).

[2] McKinsey and Company (2016), Independent Work: Choice, necessity, and the gig economy.

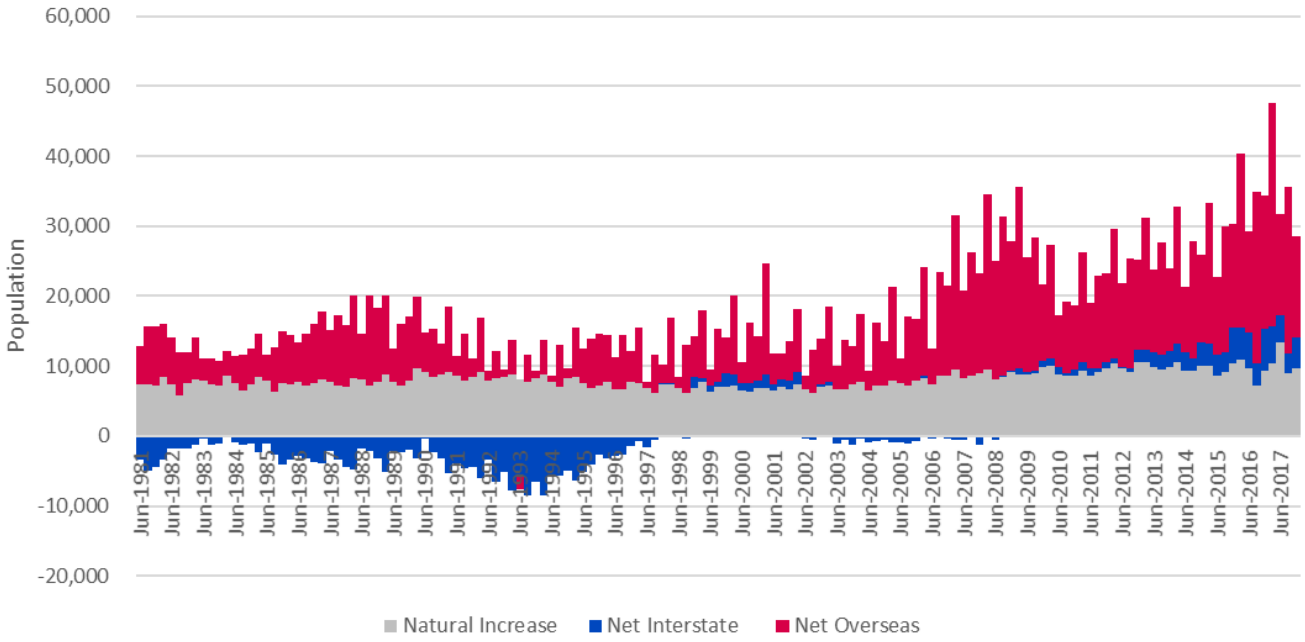
3.3 Rapid urbanisation and demographic shifts

People are choosing to live in urban environments to access jobs and a higher standard of living. Australia is one of the most urbanised countries in the world and population growth is expected to continue in the capital cities (PWC, 2015).

Figure 9 presents the components of population growth for Victoria over the last three decades. While natural increases in population have remained stable, both net overseas and net interstate migration have increased. In the 1980s and 90s, Victoria experienced a net outflow of interstate migrants, largely to Queensland and Western Australia. This trend has since reversed largely driven by strong economic opportunities available in Melbourne and Sydney. Over this period, there has also been a rise in overseas migration driven by the above factors and increases in national intake level.

In terms of population growth, metropolitan Melbourne has been the fastest growing capital city in Australia since 2012. Factors driving the population boom include strong economic growth, a high standard of living, high amenity lifestyle and good infrastructure.

FIGURE 9 COMPONENTS OF POPULATION GROWTH, VICTORIA



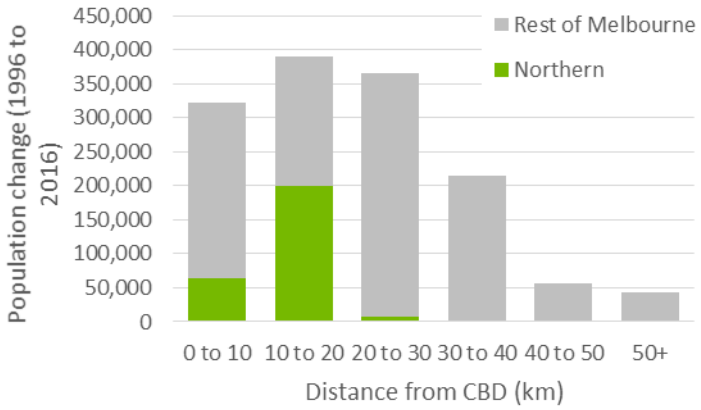
Source: ABS Regional Population Growth (Cat. 3218.0)

Population growth has been accommodated in growth areas around the fringe of metropolitan Melbourne, as well as the renewal of established parts of the city. Figure 10 shows a more dispersed pattern of residential settlement than that seen for employment growth (seen in Figure 7 earlier).

The Northern Metro Region was home to 951,000 people in 2016 and added 125,000 people over the last five years. This represents 19 per cent of Melbourne's population growth over that period.

For the Northern Metro Region, much of the population growth to date has been accommodated in new suburbs on the fringe of the urban area, including locations more than 30 kilometres from Melbourne CBD. Some growth has occurred at this distance due to the Northern Growth Corridor policies, highlighting just how large that area is relative to the inner parts of the region and compared to other parts of Melbourne. However, planned residential development is also occurring in inner city locations as large post-industrial lots in the City of Moreland and City of Darebin transition to residential and mixed uses.

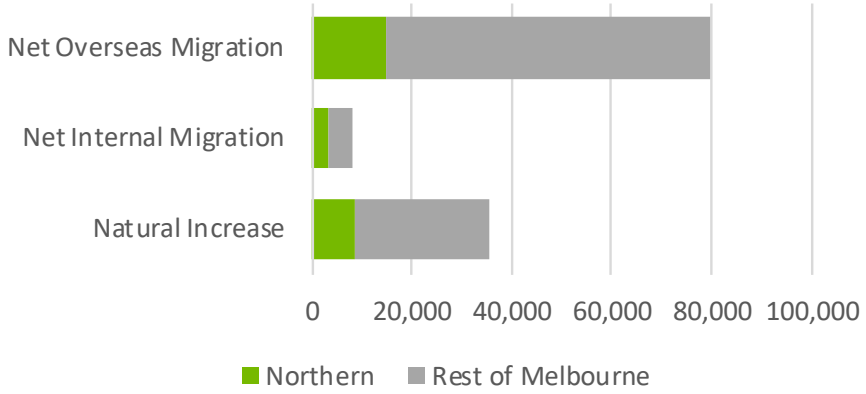
FIGURE 10 POPULATION GROWTH BY DISTANCE TO CBD



Source: SGS based on ABS Census, 2016.

Population growth has significant implications for the demographic profile of a region. Figure 11 presents the components of population growth for Melbourne and the Northern Metro Region in 2017. It shows the impact that net overseas migration has on demographic change. The Northern Metro Region had 18 per cent of Melbourne overseas migration and 24 per cent of the natural increase. Historically, some parts of the Northern Metro Region attracted a significant number of overseas migrants, resulting in a diverse multicultural population (further detailed in Section 5.2).

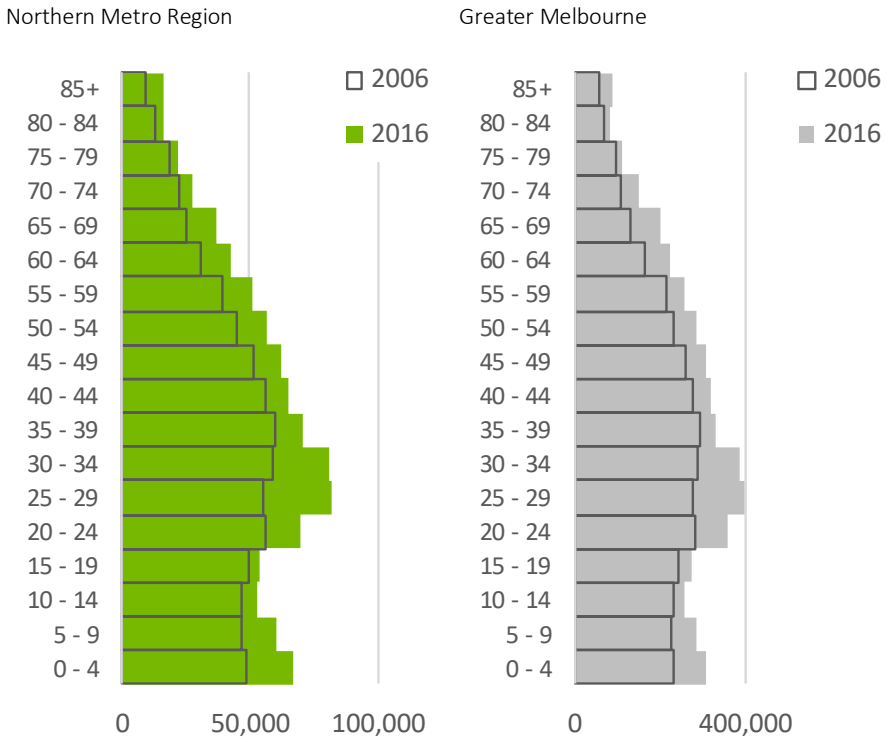
FIGURE 11 COMPONENTS OF POPULATION GROWTH, 2017



Source: ABS Regional Population Growth (Cat. 3218.0)

Figure 12 presents a population pyramid for the Northern Metro Region and metropolitan Melbourne between 2006 and 2016. It shows that growth occurred across all age groups in Northern Metro Region with the largest increase in people aged 20-34. Larger increases also occurred for young children, both of which reflect the number of new detached houses that have been developed over the same period, predominantly in new greenfield suburbs (see Section 5.3).

FIGURE 12 POPULATION AGE STRUCTURE, 2006 AND 2016



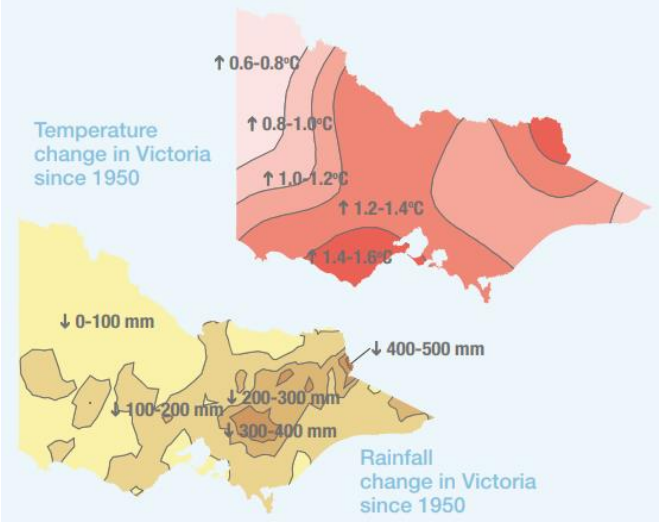
Source: SGS based on ABS, 2016

3.4 Climate change

Climate change has resulted from decades of unsustainable human activity. Its effects are largely attributed to emissions from the use of non-renewable energy sources. As most people now live in urban centres, cities and urban activities are the greatest contributors to climate change.

Consequently, global climates are becoming increasingly volatile and extreme, and the impacts of climate change are felt in all areas. Climate change in Australia manifests as temperature rises, and increased incidences and intensity of extreme weather events. In other instances, it manifests as higher incidences of nuisance flooding, or unpredictable bushfire behaviour. For Victoria this includes heatwaves, fires, droughts, storms and. Historical temperature and rainfall changes, as illustrated in Figure 13, show the impacts of climate change in Victoria.

FIGURE 13: TEMPERATURE AND RAINFALL CHANGE FROM 1950-2015



Source: Climate Ready Victoria 2015

This has consequences for the natural environment, including a decrease in species diversity and abundance, vegetation structure and genetic loss. Climate change also has implications on the safety and livelihoods of communities. This includes risks for infrastructure as well as primary production, tourism, health and the community (Climate Ready Victoria, 2015).

Key risks to infrastructure from climate change include increasing sea levels, fire weather, flooding, hot days, heat waves and storm surges. These damage infrastructure, increase maintenance costs and disrupt services (Climate Ready Victoria 2015).

Extreme temperatures increase the likelihood of damage or loss of energy infrastructure which could limit supply of energy, or further exacerbate capacity issues during peak times. Heatwaves may also degrade structures, buckle train tracks or cause overheating at water purification plants.

Droughts may result in faster degradation of bridges, roads and tunnels from changing groundwater levels, shifting foundations of buildings or cracking of underground pipes. Increasing water insecurity may have implications for the integrity of ecological systems and biodiversity, economic production and consumption, and the health and wellbeing of communities.

Infrastructure near the coast may be impacted by sea level rises and coastal erosion, causing corrosion of pipes through salt water intrusion, roads to be washed away, ports flooded and degraded, flooding of exchange stations, sub stations, manholes and underground pits (Commissioner of Environmental Sustainability Victoria, 2013).

For the Northern Metro Region, this will mean:

- increased risks due to extreme heat, due to the vegetation profile in some parts of the region (for example, the foothills of Kinglake National Park and other agricultural areas throughout the green wedges)
- risks to the population, particularly in areas with low vegetation coverage and relief from heat.

4 ECONOMIC

ECONOMIC INDICATORS

The Infrastructure Victoria economic indicators that underpin this section are:

- Employment location
- Economic location
- GRP
- GVA by industry
- Exports
- Business formation
- Effective job density
- Capital investment
- Labour productivity
- Participation rate
- Unemployment
- Change in working age population
- Household income
- Public transport
- Travel origins and destinations
- Freight and road networks
- Freight and business trips
- Households with vehicles
- Access to internet
- Skill levels
- Employment concentration of industries
- Location quotient
-

REGIONAL OVERVIEW

The economic profile of the Northern Metro Region is characterised by:

- inner LGAs with vibrant mixed-use areas, knowledge-intensive precincts and diverse employment options.
- outer areas focused on industry with some health or education clusters.
- traditional rural areas with core agriculture and rural activities.

ECONOMIC STRENGTHS

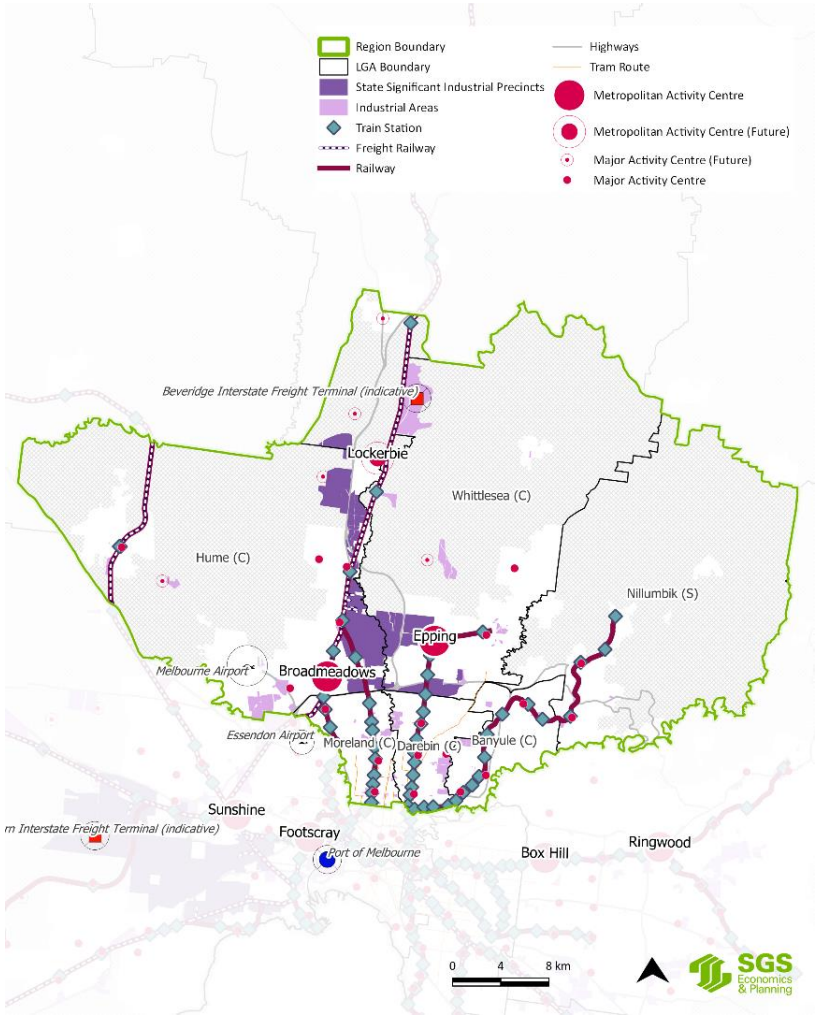
- Inner areas have a diverse economy and capacity to support higher order, creative, knowledge-intensive sectors.
- Gateway infrastructure includes Melbourne Airport and the planned Beveridge Interstate Freight Terminal (BIFT).
- Major industrial areas that allow for industrial, resource recovery and manufacturing activities that cannot occur elsewhere.
- Growing health and education clusters in La Trobe NEIC and Epping.

ECONOMIC CHALLENGES

- Limited employment and services choice, particularly for those in outer areas.
- Vulnerable workforce due to lower skill levels in some part of the region.
- Amenity issues and pockets of disadvantage.

4.1 Overview and key economic features

FIGURE 14: KEY ECONOMIC FEATURES – NORTHERN METRO REGION



Source: SGS Economics and Planning, 2018

The region is home to the La Trobe NEIC and gateway infrastructure such as Melbourne Airport.

The main north-south connection is provided by the Hume Freeway connecting the region with Melbourne CBD, regional Victoria and NSW. The M80 Western/Metropolitan Ring Road is a critical east-west link across the region. The airport is connected to Melbourne CBD via the Tullamarine Freeway and CityLink. These links also connect with the Calder Freeway to Sunbury and the north west of Victoria.

The rail network in Northern Metro Region includes:

- Metro passenger services to Sunbury, Upfield, Mernda, Hurstbridge and Craigieburn
- regional passenger services to Bendigo, Albury and Shepparton
- interstate passenger and freight lines between Sydney and Brisbane (via Albury) and Melbourne.

The Northern SSIP is a large and active industrial area concentrated in Broadmeadows, Epping and the Northern Growth Corridor and has capacity for significant additional growth in the coming decades.

The planned BIFT will reinforce the economic functions of the Northern Growth Corridor.

In addition to industrial activity, Broadmeadows and Epping are identified as metropolitan activity centres (MACs) in *Plan Melbourne* with Lockerbie identified as a future MAC. MACs are higher-order centres intended to provide a diverse range of jobs, activities and housing.

4.2 Economic performance

Table 3, Figure 15 and Figure 16 show current employment numbers, employment density and employment growth in the Northern Metro Region.

- The outer areas of the Northern Metro Region absorbed the highest total regional growth in employment between 1996 and 2016. Hume and Whittlesea LGAs absorbed 40 per cent and 28 per cent of the increase in employment respectively.
- In the Northern Metro Region, Outer Melbourne has the biggest proportion, the highest number of additional jobs, and the largest concentration.
- The New Growth Areas grew by 15 per cent, reflecting population-driven demand for retail and other services.
- The Northern Metro Region contains more rural areas than the Western, Southern and Eastern metro regions

TABLE 3: EMPLOYMENT BY LGA AND LOCATION TYPOLOGY (1996-2016)

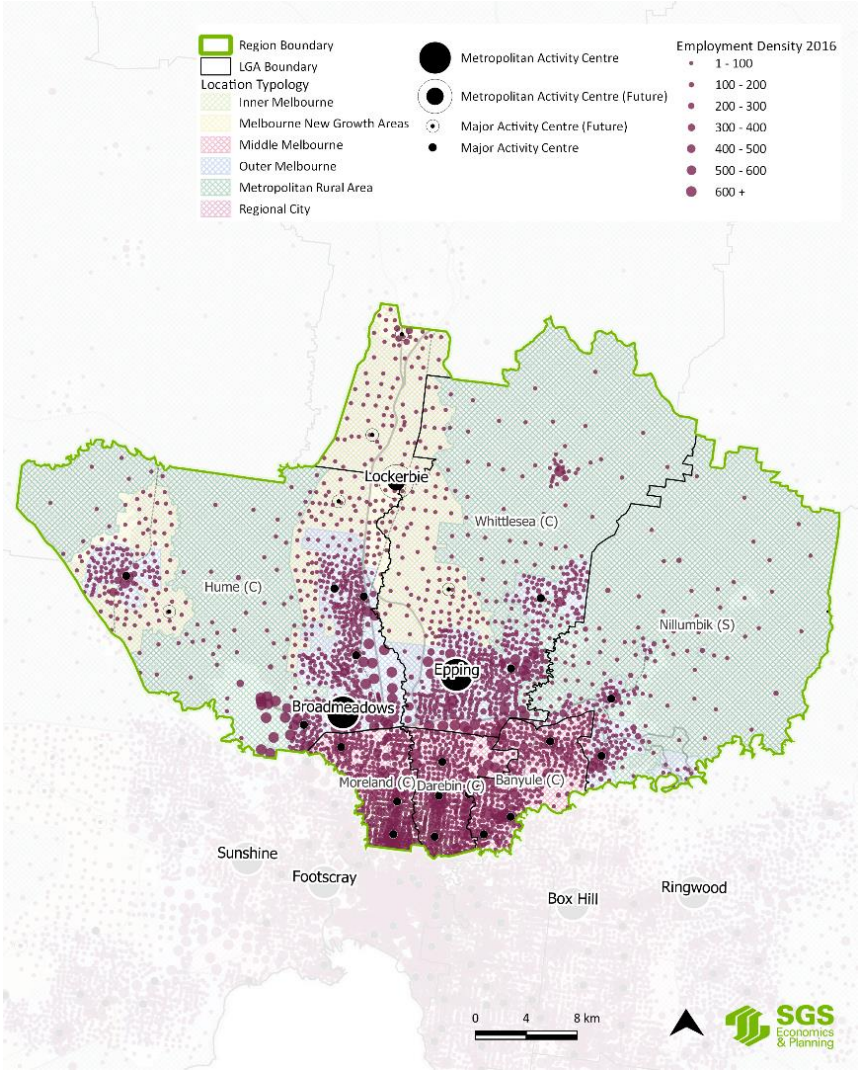
	1996	2016	1996-16		
			Change	% regional	AAGR
LGA					
Banyule (C)	39,073	46,347	7,273	6.8%	0.9%
Darebin (C)	46,265	55,341	9,076	8.5%	0.9%
Hume (C)	64,449	107,308	42,859	40.2%	2.6%
Mitchell (S)	8,900	12,381	3,480	3.3%	1.7%
Moreland (C)	32,408	45,003	12,595	11.8%	1.7%
Nillumbik (S)	14,035	15,633	1,598	1.5%	0.5%
Whittlesea (C)	32,118	61,841	29,723	27.9%	3.3%
Northern Metro Region	237,249	343,854	106,604	100.0%	1.9%
Location Typology[3]					
Inner Melbourne	29,064	37,845	8,782	8.4%	1.3%
Middle Melbourne	100,671	125,221	24,550	23.5%	1.1%
Outer Melbourne	75,516	135,957	60,440	58.0%	3.0%
Melbourne New Growth Areas	2,351	5,643	3,292	3.2%	4.5%

[3] Due to concordance between study areas, the figures between LGA and Location Typology areas in Table 1 differ slightly. This is due to the Shire of Mitchell as the balance of the LGA is not located within the Northern Metro Region.

	1996	2016	1996-16		
			Change	% regional	AAGR
Metropolitan Rural Areas	21,347	28,536	7,188	6.9%	1.5%
Northern Metro Region	228,949	333,201	104,252	100.0%	1.9%
Victoria	2,045,773	3,032,148	986,375	-	2.0%

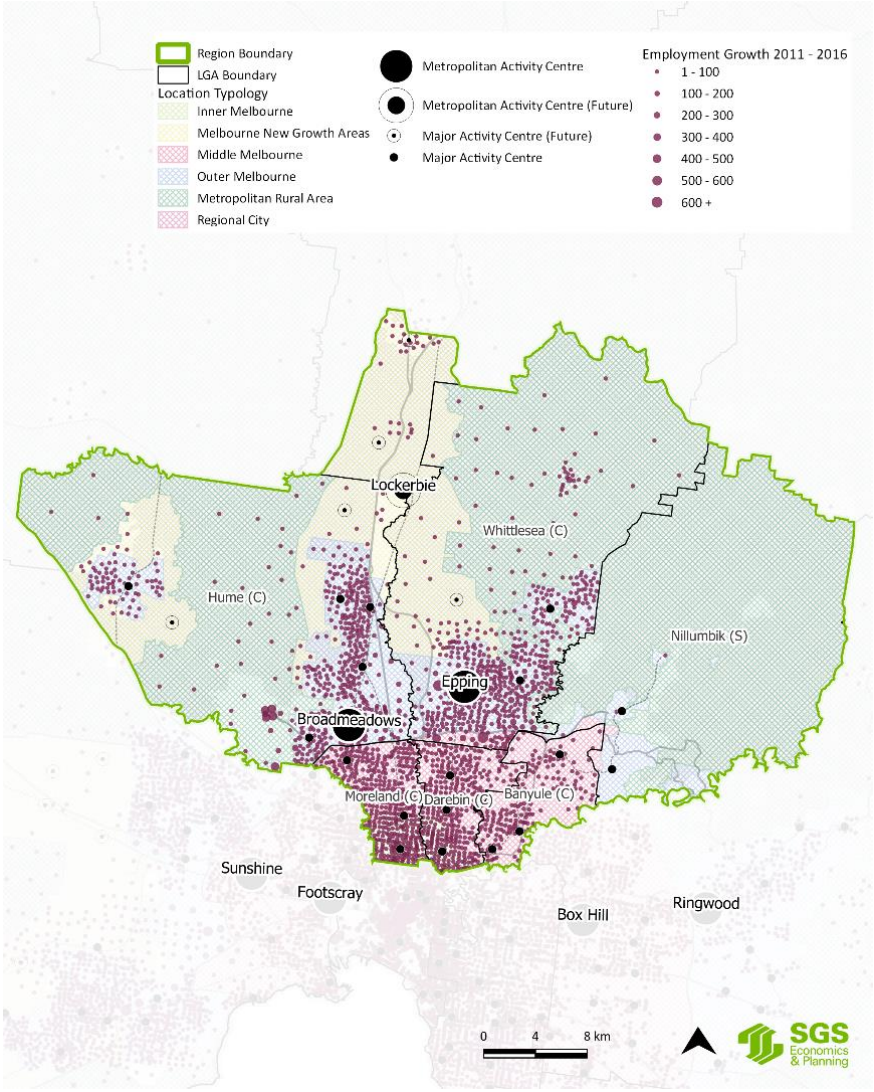
Source: SGS Economics and Planning, 2018

FIGURE 15: EMPLOYMENT DENSITY (2016)



Source: SGS Economics and Planning, 2018

FIGURE 16: EMPLOYMENT GROWTH (2011-2016)



Source: SGS Economics and Planning, 2018

FIGURE 17: EMPLOYMENT DENSITY BY INDUSTRY SECTOR (2016)

Source: ABS 2016

Economic locations

Economic locations are areas with a dense cluster of economic and employment activity. These clusters have unique economic profiles, which reflect the attributes and endowments of their catchment area workforces and historic legacy, and different levels of development maturity. The locations capture many places of state significance identified in *Plan Melbourne*, including NEICs, SSIPs and MACs. While they do overlap with the *Plan Melbourne* locations, the boundaries are not identical. They also capture clusters that are not in *Plan Melbourne*.

Economic locations are employment clusters with a minimum of 5,000 jobs within a one-kilometre radius. See Table 1 for further information.

The economic locations driving production and employment in the Northern Metro Region are shown in Figure 18. Table 4 lists the number of jobs and industry breakdowns for each economic location.

The largest economic locations (in terms of number of jobs) in the Northern Metro region are all dominated by the industrial sector, highlighting the reliance of the region's economy on these industries (see Table 2 for industry to sector definition).

Roxburgh Park (cluster ID 24) had the most jobs in the region, with 31,593, 63 per cent of which were industrial. However, representation of the knowledge-intensive and health and education sectors, which are typically the most productive, is the lowest (seven per cent combined) across all economic locations in the Northern Metro Region.

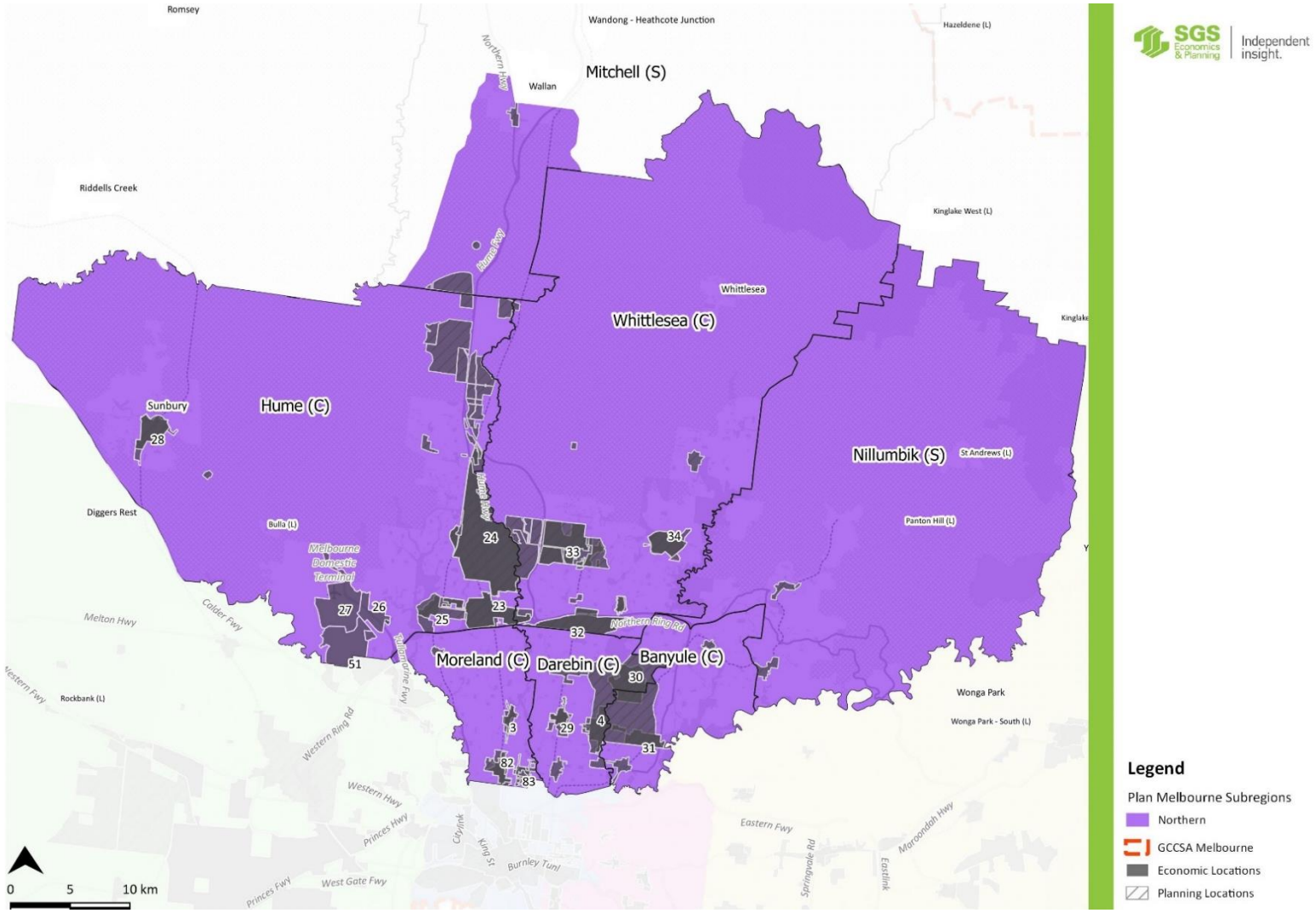
Tullamarine Business Precinct (cluster ID 51) had the second highest employment, 18,848 jobs, 63 per cent of which were also industrial. The precinct has valuable linkages to the adjacent locations of Gladstone Park (cluster ID 26) and Melbourne Airport (cluster ID 27) which are also primarily industrial.

Thomastown Industrial and Preston-Northland also accommodate more than 10,000 jobs have a high proportion of industrial sector employment (52 per cent and 37 per cent respectively). However, Preston-Northland also has a high proportion (46 per cent, and second only to Sunbury) of population-serving employment, which is primarily driven by retail trade employment at the Northland shopping centre and along Bell Street.

Of the economic locations in the Northern Metro Region, Preston-High Street and Broadmeadows West have the highest proportions of jobs in the knowledge-intensive sector (33 per cent and 28 per cent respectively). The health and education sector is also strongly represented, likely driven by agglomerated employers such as Melbourne Polytechnic (campuses located in both economic locations) and Broadmeadows Hospital.

Heidelberg and La Trobe University, which overlap with the La Trobe NEIC, have the highest proportion of employment in the health and education sector. These jobs are primarily comprised of the health and social assistance jobs located in the hospital precinct of Heidelberg, and education jobs concentrated in the La Trobe University campus.

FIGURE 18: ECONOMIC LOCATIONS



Source: SGS Economics and Planning, 2018

TABLE 4: ECONOMIC LOCATIONS BY INDUSTRY (2016)

Cluster ID	Economic locations	LGA	Knowledge-intensive	Industrial	Population-serving	Health & education	Total jobs
3	Coburg	Darebin	29%	9%	37%	25%	3,570
4	Preston-Northland	Darebin	11%	37%	46%	6%	13,392
23	Broadmeadows East	Hume	12%	58%	27%	3%	8,157
24	Roxburgh Park	Hume	6%	63%	29%	1%	31,593
25	Broadmeadows West	Hume	28%	14%	28%	30%	6,233
26	Gladstone Park	Hume	15%	47%	31%	7%	5,428
27	Melbourne Airport	Hume	13%	70%	16%	0%	4,730
28	Sunbury	Hume	15%	12%	54%	19%	4,552
29	Preston-High Street	Darebin	33%	10%	29%	29%	7,057
30	La Trobe University	Banyule	15%	29%	19%	37%	9,471
31	Heidelberg	Banyule	9%	3%	14%	75%	13,952
32	Thomastown Industrial	Whittlesea	9%	52%	37%	3%	14,982
33	Epping	Whittlesea	9%	24%	35%	31%	13,960
34	South Morang	Whittlesea	26%	9%	44%	22%	4,909
51	Tullamarine Business Precinct	Hume	13%	63%	23%	1%	18,848
82	Brunswick	Moreland	17%	19%	43%	20%	8,184
83	Brunswick East	Moreland	20%	20%	46%	14%	1,754

Source: SGS Economics and Planning, 2018

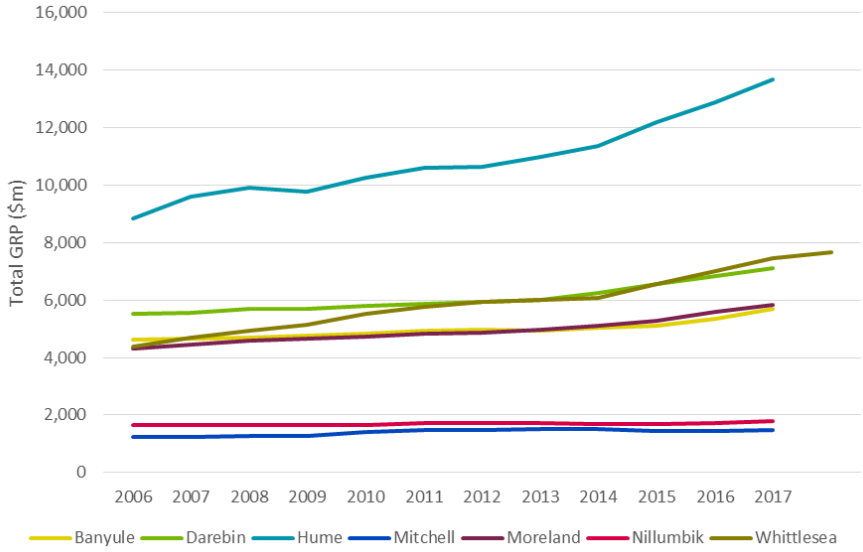
Gross regional product (GRP)

Gross regional product (GRP) measures the total quantity of economic production (goods and services in dollar terms) within a region. The GRP of a metropolitan area is a good measure of the size of its economic output, but not necessarily its value added or productivity (gross value added and labour productivity are discussed separately in this chapter). This section discusses GRP measured at place of work by LGA.

Figure 19 shows total GRP for each LGA for 2006-2017.

- From 2006 to 2017, the City of Hume reported the highest GRP for the region. Its economy is supported by Melbourne Airport and employment clusters along the Hume corridor including Broadmeadows and Craigieburn. It also contains large areas of state significant industrial land.
- Although starting from a substantially lower base than the City of Hume, Whittlesea and Darebin LGAs have also sustained year on year increases in GRP since 2014. This could be explained by the growing population-serving sector.
- Despite the increase in GRP in Moreland and Banyule LGAs, this is not to the same extent as the City of Whittlesea, even through they started from a similar base in 2006.
- Mitchell and Nillumbik LGAs reported the lowest level of GRP over the period, likely due to the high proportion of green wedge zoned land and limited employment land and economic assets.

FIGURE 19: TOTAL GRP (2006 -2017)



Source: NIEIR 2018

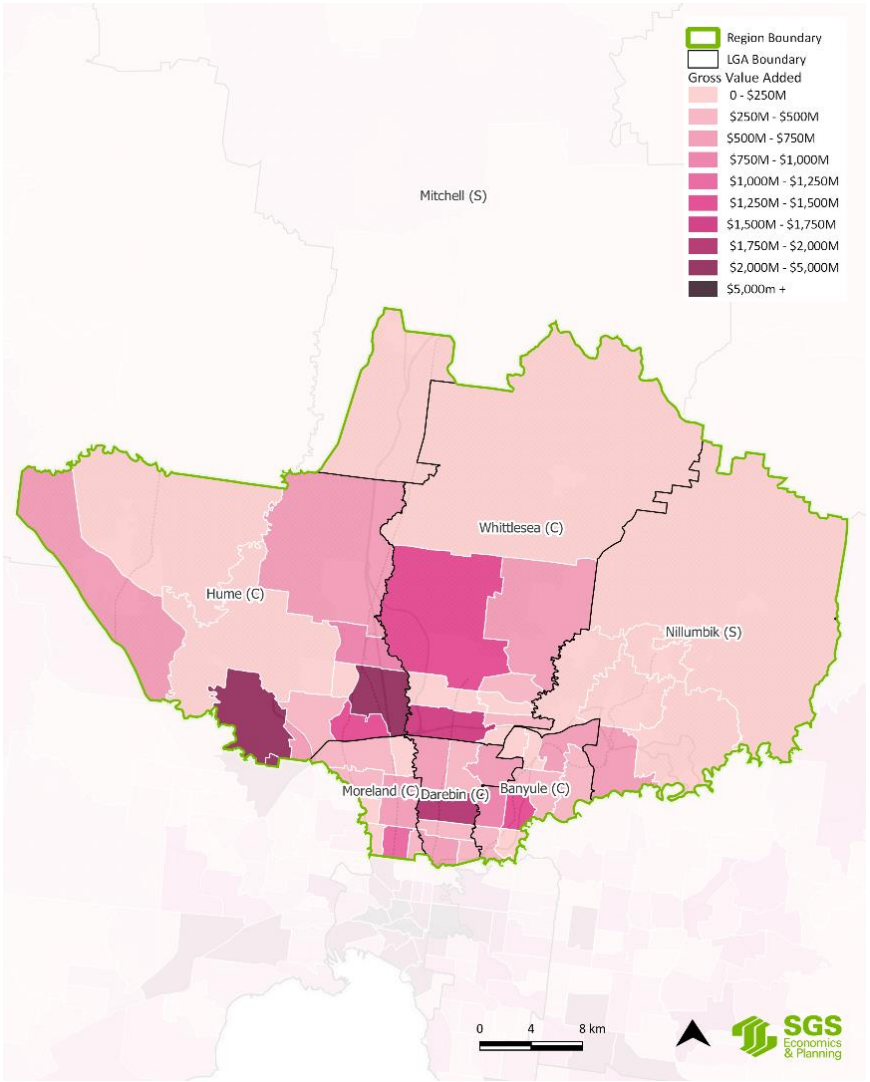
Gross value added (GVA) by industry

Gross value added (GVA) represents the total value added for all goods and services produced within a region. The difference between GRP and GVA is similar to the difference between the sales revenue and profits of a single firm. For example, a region may have a high level of output (GRP) but low value added (GVA), meaning that a large quantity of resources was used in the production process.

Figure 20 illustrates the total GVA across the Northern Metro Region.

- Areas with the highest GVA are found in the City of Whittlesea around Epping and the SSIPs (Thomastown, the Northern Industrial Corridor), around Latrobe NEIC and Melbourne Airport. Other industrial and transitioning creative precincts have higher GVA such as Broadmeadows (also population-serving and civic functions), Brunswick and Preston-Northland.
- The inner areas showing higher GVA are linked to La Trobe University and Latrobe NEIC, or emerging advanced manufacturing and creative industries.
- The City of Hume and the Shire of Nillumbik also have areas with high GVA, predominantly linked to industry, or freight and logistics uses.

FIGURE 20: TOTAL GVA (2016)

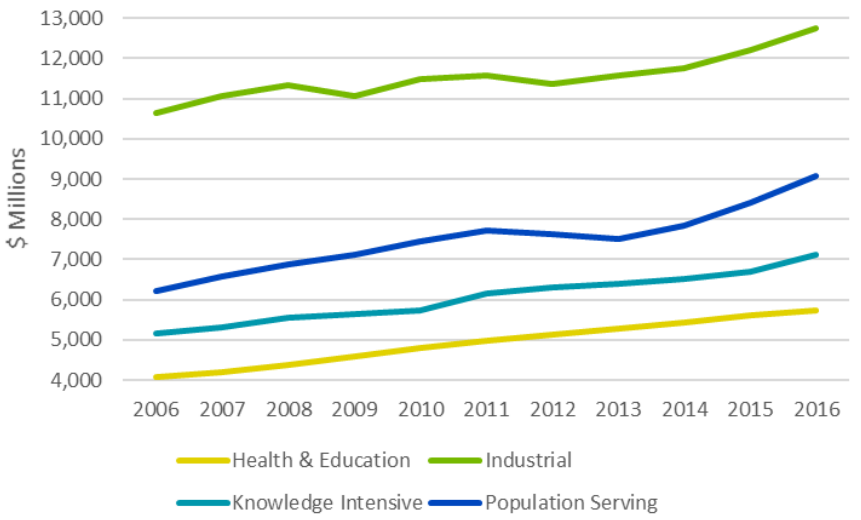


Source: SGS Economics and Planning, derived from various ABS datasets

Key industries across the Northern Metro Region are:

- **Knowledge-intensive:** Coburg (Coburg Initiative), Latrobe NEIC, Brunswick, Northcote, Preston, Heidelberg.
- **Health and education**: Latrobe NEIC (La Trobe University, the Austin Hospital); Northern Hospital; Melbourne Polytechnic (Preston), Brunswick RMIT.
- **Industrial:** Melbourne Airport, Northern SSIP along the Hume Highway, West Heidelberg Industrial Precinct, Thomastown, Campbellfield and Meadowlink.
- **Population-serving:** clustered around MACs and major activity centres.
-
- Figure 21 presents the breakdown of historic GVA by the four industry classifications.
- GVA in the industrial sector has been prominently higher than the rest of the sectors.
- While upwards trends are observed in every sector between 2006 and 2016, the population-serving sector experienced a steeper increase from 2013, likely due to the increase of dwelling stock and population in new growth areas and major transport corridors (Sydney Road, High Street, Upfield and Craigieburn train lines).

FIGURE 21: GVA BREAKDOWN BY INDUSTRY CLASSIFICATIONS (2006-2016)



Source: NIEIR 2018

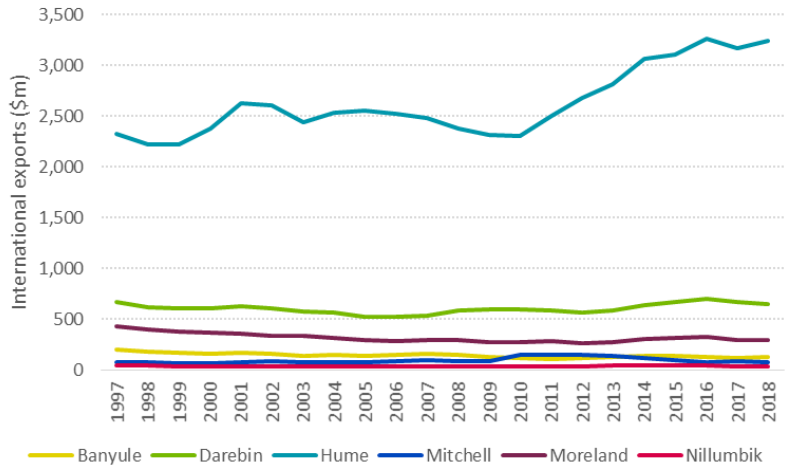
Exports

Exports are goods transferred between countries and are essential to a country's economy. High international exports contribute to the growth of a region and help boost employment.

Figure 22 shows international exports for all municipalities in the Northern Metro Region, and Figure 23 shows the top-five industries contributing to international exports in the Northern Metro Region.

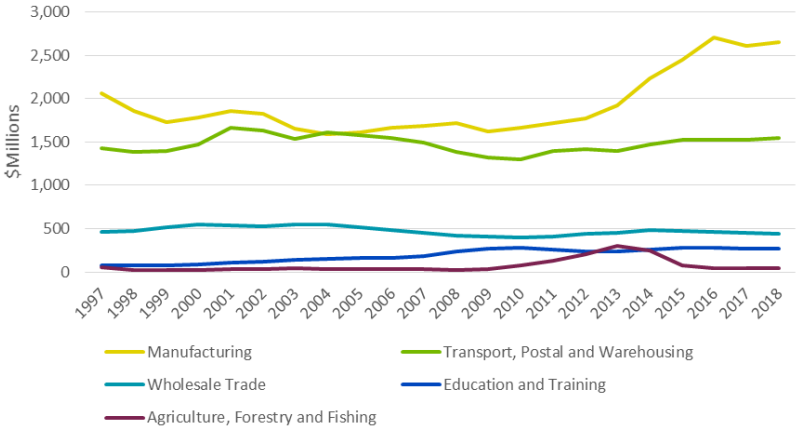
- The City of Hume has higher international exports due to the presence of Melbourne Airport and the Northern SSIPs.
- Darebin and Moreland LGAs have remained reasonably consistent since 1997; however, both LGAs have seen a gradual decrease over the past two years.
- Nillumbik, Mitchell and Banyule LGAs have lower international exports, with below $500m annual income and generally flat rates, suggesting this is not a large component of local economic activity.
- Manufacturing contributes to the highest amount of international exports in the Northern Metro Region, followed by transport, postal and warehousing, operating from various industrial precincts in the region.

FIGURE 22: INTERNATIONAL EXPORTS BY LGA (1997-2018)



Source: NIER 2018

FIGURE 23: TOP 5 INTERNATIONAL EXPORTS INDUSTRIES (1997-2018)



Source: NIEIR 2018

Business formation

Business formation is the registration and de-registration of businesses by different industries. To measure the growth of business in the Northern Metro Region, the industry is broken down into the four industry classifications.

Table 5 shows business formation by industry from 2009 to 2017.

- The highest growth is seen in the health and education sector in every municipality except for the Shire of Mitchell. This is attributed to increased demand for these services by the growing population. Education income from international students also influences the growing health and education sector.
- Business formation in the knowledge-intensive sector also grew in the Northern Metro Region, indicating the shift from an industrial-based economy to a knowledge-based economy.
- The growth of the population-serving sector is also notable in Hume, Whittlesea and Mitchell LGAs.
- There was a decrease in the industrial sector in the inner areas of Banyule and Darebin LGAs.

TABLE 5: BUSINESS FORMATION (GROWTH RATE) BY INDUSTRY (2009-2017)

LGA	Health and education	Industrial	Knowledge-intensive	Population-serving
Banyule	26.1%	-6.8%	17.7%	5.4%
Darebin	69.3%	-4.0%	29.3%	18.5%
Hume	112.1%	24.3%	38.5%	27.0%
Mitchell	34.3%	21.2%	38.3%	26.4%
Moreland	67.3%	4.2%	35.1%	20.0%
Nillumbik	23.9%	-15.9%	9.1%	3.5%
Whittlesea	128.7%	24.1%	47.3%	40.0%
Metro Melbourne	45.3%	6.1%	25.4%	18.9%
Victoria	42.2%	1.2%	24.3%	15.2%

Source: ABS Counts of Australian Businesses, including Entries and Exits 2009 and 2017

TABLE 6: BUSINESS FORMATION (COUNT) BY INDUSTRY (2009-2017)

LGA	Health and education	Industrial	Knowledge-intensive	Population-serving
2009				
Banyule	869	1,550	3,776	3,456
Darebin	561	2,259	3,395	3,757
Hume	348	3,769	2,794	4,305
Mitchell	116	979	524	1,118
Moreland	619	2,553	3,367	3,800
Nillumbik	339	984	2,280	2,539
Whittlesea	345	3,067	2,415	3,795
2017	Health and education	Industrial	Knowledge-intensive	Population-serving
Banyule	1,096	1,445	4,446	3,641
Darebin	950	2,168	4,390	4,453
Hume	738	4,687	3,870	5,466
Mitchell	156	1,187	724	1,412
Moreland	1,036	2,660	4,550	4,562
Nillumbik	420	828	2,488	2,627
Whittlesea	789	3,806	3,558	5,313

Source: ABS Counts of Australian Businesses, including Entries and Exits 2009 and 2017

Effective job density

Effective job density (EJD) is a measure of a location's concentration of jobs based on its accessibility, which is closely linked to the transport networks and infrastructure.

This indicator helps to understand how accessible a city is, how employment is distributed and whether residents enjoy a range of employment opportunities. It is also a measure of how connected a person is to the benefits of the city, as people who live in areas where they can access a higher proportion of a city's jobs have a greater chance of matching their skills and aspirations to available jobs.

An area with fewer jobs can also have high EJD by locating near an area with high EJD.

A better match of skills to job is likely to increase skill development and job satisfaction.

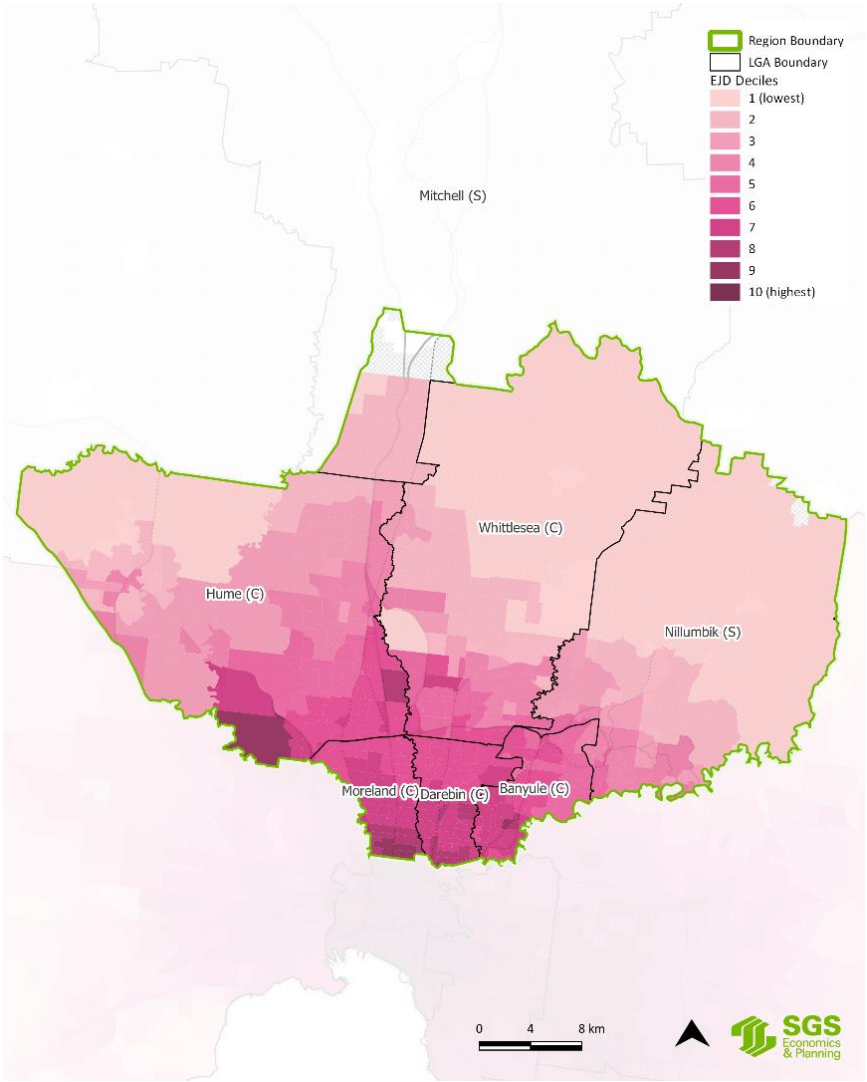
Figure 24 shows EJD for 2018 for the Northern Metro Region.

- Moreland, Darebin and parts of Banyule LGAs have relatively high levels of EJD due to their proximity to the CBD and superior access to the transport network. These areas also have the highest levels of EJD to knowledge-intensive jobs.
- The City of Hume has high levels of EJD concentrated along the Hume Highway and in and around Broadmeadows.
- The Middle Melbourne areas of Whittlesea, Hume and Nillumbik LGAs have medium access while the Outer Melbourne and New Growth Areas have lower accessibility to jobs and averagely longer work commutes.
-

Figure 25 illustrates the EJD by the four industry classifications. The industrial sector has higher EJD on the border of Hume and Whittlesea LGAs and Tullamarine, accounted by the presence of the Campbellfield – Thomastown industrial precincts and Melbourne Airport.

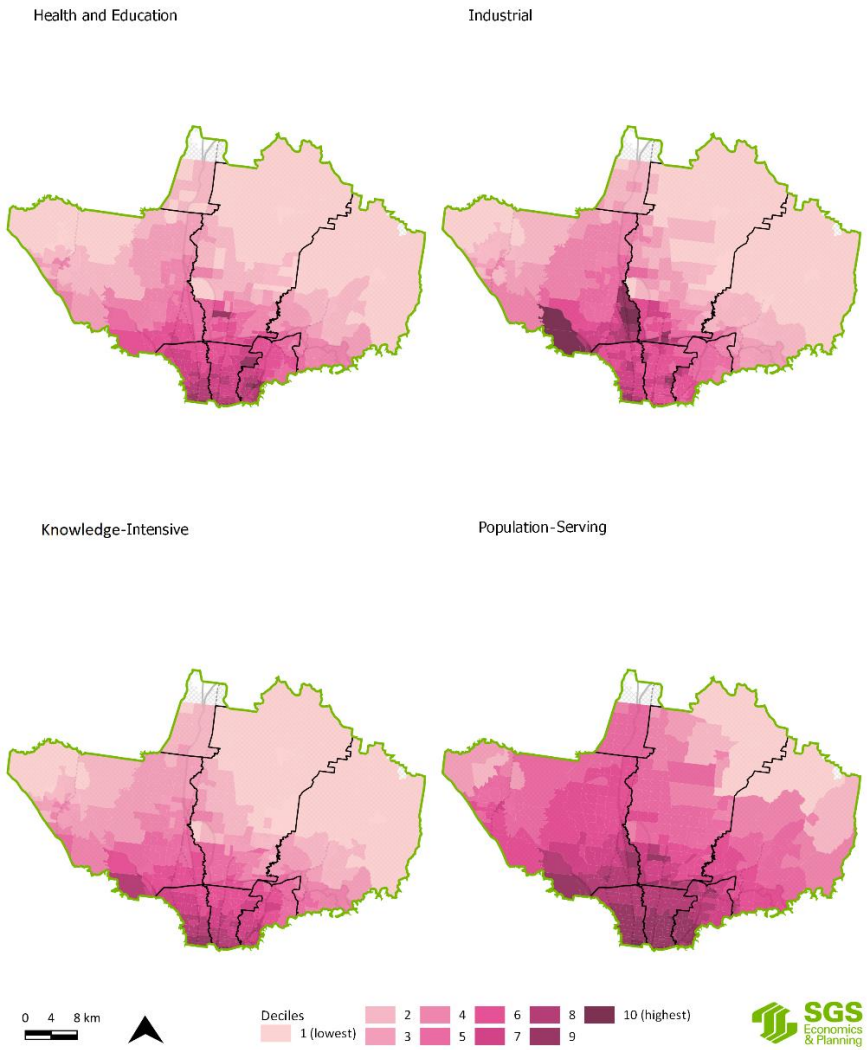
- EJD for the population-serving sector displays a ring-shaped pattern as jobs in this sector are mainly located with people and communities.
- EJD for the knowledge-intensive sector is highest in the south of Moreland, Darebin and Banyule LGAs as the CBD accommodates many jobs in this sector

FIGURE 24: EFFECTIVE JOB DENSITY (2018)



Source: SGS Economics and Planning, 2018.

FIGURE 25: EFFECTIVE JOB DENSITY BY SECTOR (2018)



Source: ABS 2016

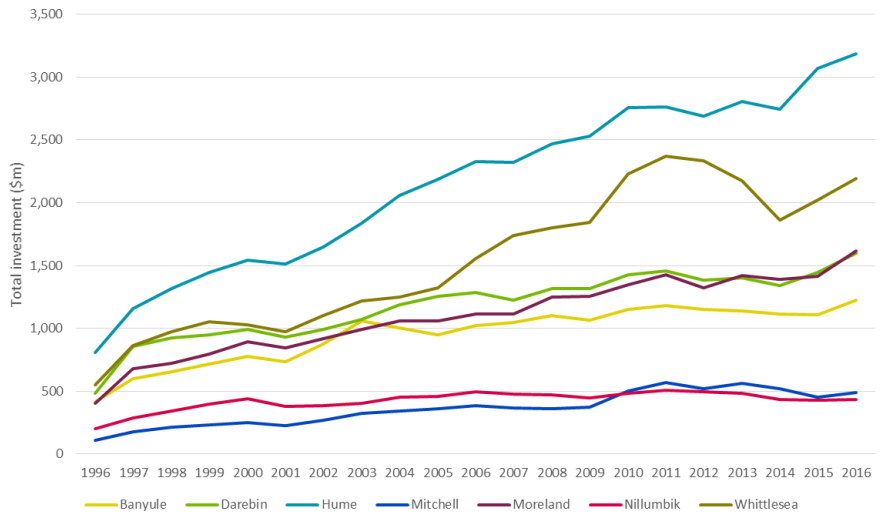
Capital investment

Capital Investment refers to funds invested in enterprise. High levels of investment indicate a growing economy as firms are investing more funds into their businesses.

Figure 26 shows total investment for each LGA.

- Hume and Whittlesea LGAs both experienced growth in capital investment, likely due to the construction boom associated with growth area development since 2014.
- Moreland and Darebin LGAs and to a lesser extent Banyule LGA have seen a spike in growth since 2015 likely associated with infill development and urban renewal.
- The shires of Nillumbik and Mitchell have seen relatively flat investment over the period and modest growth since 2015. The former is accounted by the higher shares of elderly population and residential zones, whereas industries in the latter are primarily focused on agriculture and farming.

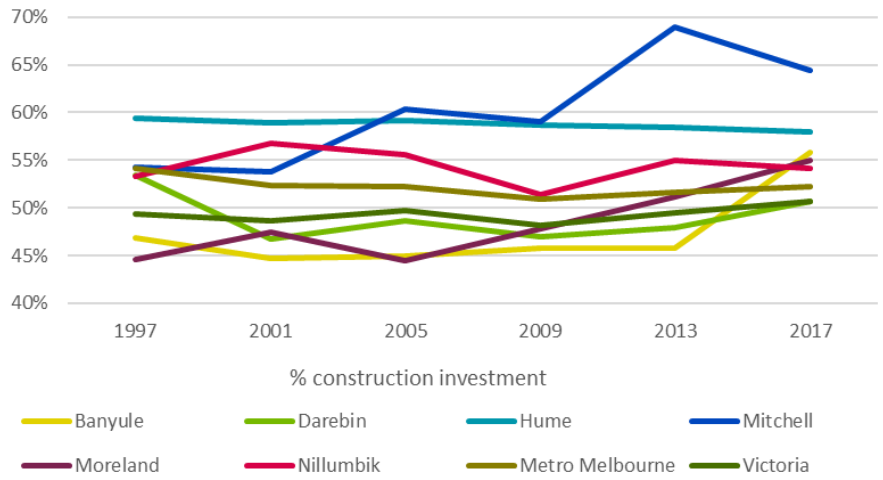
FIGURE 26: TOTAL INVESTMENT (1996-2016)



Source: NIEIR

Figure 27 illustrates the breakdown of capital investment by LGA, showing the proportional change from 1996 to 2017.

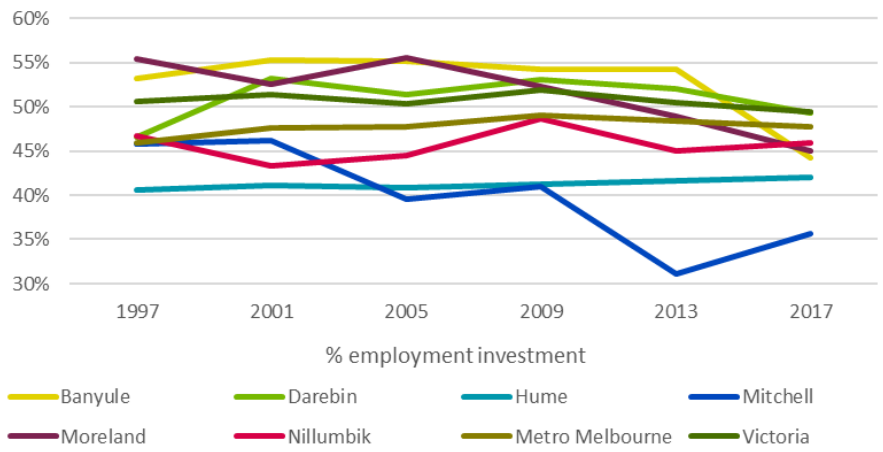
FIGURE 27: CONSTRUCTION INVESTMENT (1996-2017)



Source:NIEIR 2018

Figure 28 shows a generally stable rate of investment with annual peaks and troughs throughout the Northern Metro Region.

FIGURE 28: EQUIPMENT INVESTMENT (1996-2017)



Source: NIEIR 2018

Labour productivity

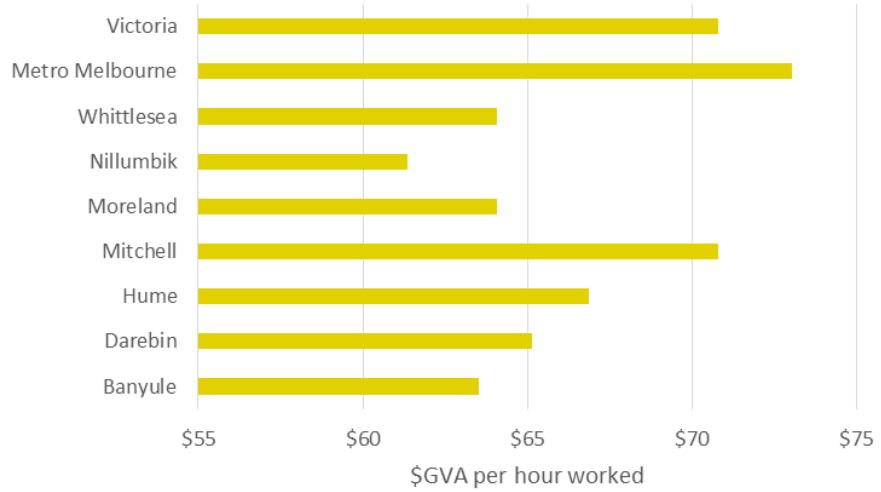
Labour productivity is a measure of efficiency of labour, expressed as the GVA generated per hour worked. Variations in labour productivity can relate to factors such as worker skills, quality of capital, infrastructure available and adoption of technology.

A location's productivity informs understanding of how efficient and effective its workers are at producing goods and services.

- Increased productivity in the growth area LGAs may reflect the new service sectors moving to these locations as new activity centres establish (for example, in the City of Hume)
- The proportion of residential development in the New Growth Areas (part of the Shire of Mitchell and City of Hume) has contributed to increased labour productivity (Figure 30). However, in the City of Whittlesea this is not the case; this may be because growth areas are identified but yet to be developed, and therefore yet to attract associated jobs and services.
- The Shire of Mitchell shows a higher rate of GVA per hour worked due to the extent of productivity in the peri-urban and agricultural areas of the LGA (outside the Northern Metro Region), where cattle and sheep farming contributed significantly to the GVA.

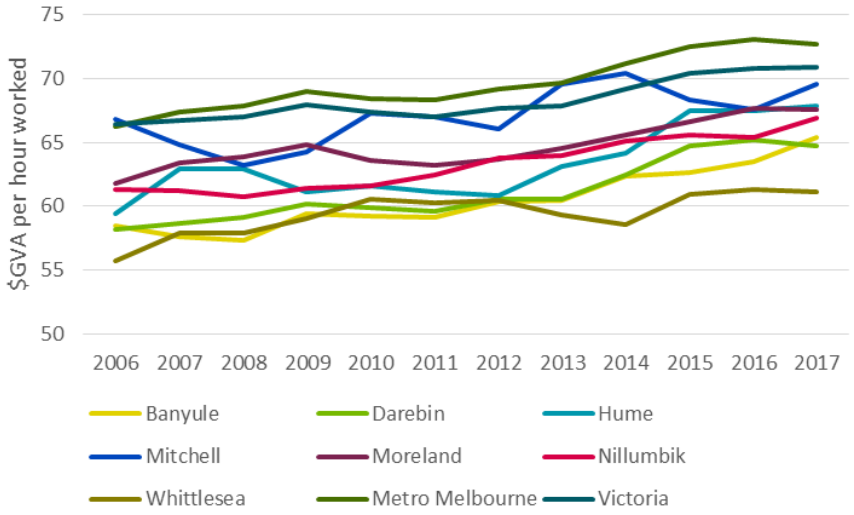
The most productive areas of the Northern Metro Region are Melbourne Airport (City of Hume) and La Trobe NEIC (City of Banyule), containing the Austin Hospital and La Trobe University.

FIGURE 29: LABOUR PRODUCTIVITY BY LGA (2016)



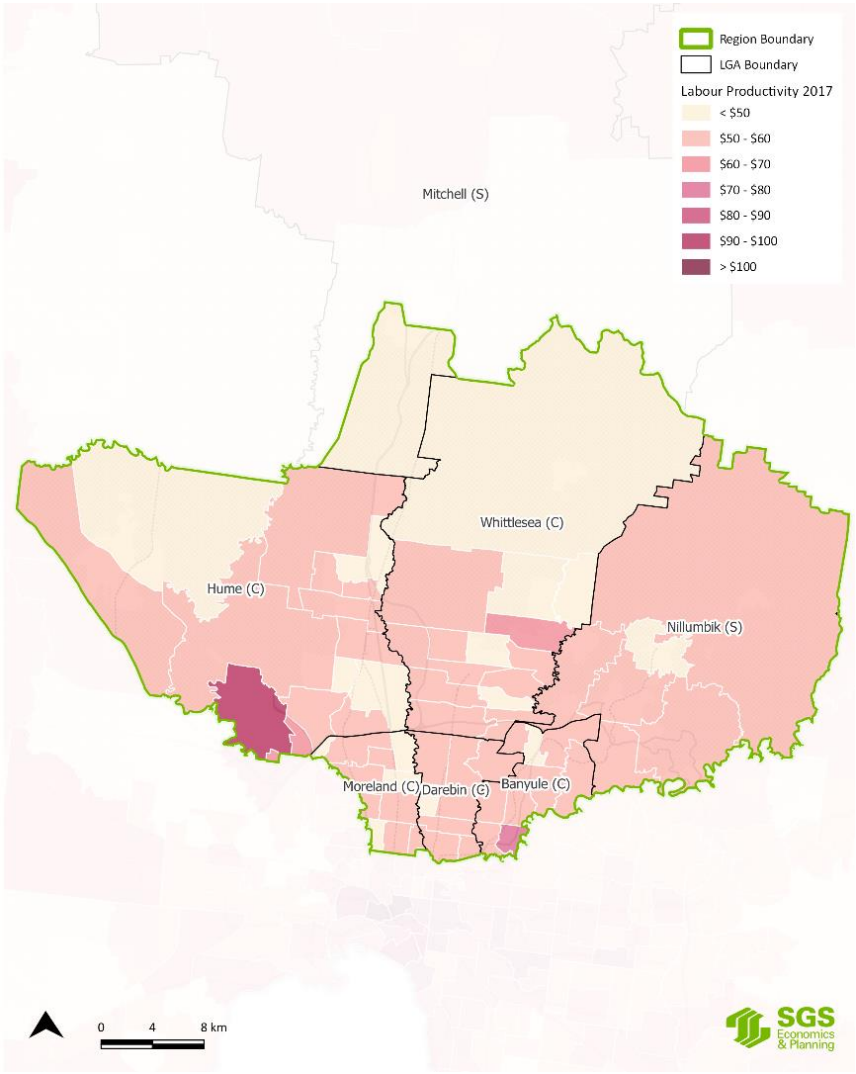
Source: NIEIR 2018

FIGURE 30: LABOUR PRODUCTIVITY (2006-2017)



Source: NIEIR 2018

FIGURE 31: LABOUR PRODUCTIVITY (2016)



Source: ABS Census 2016

Participation rate

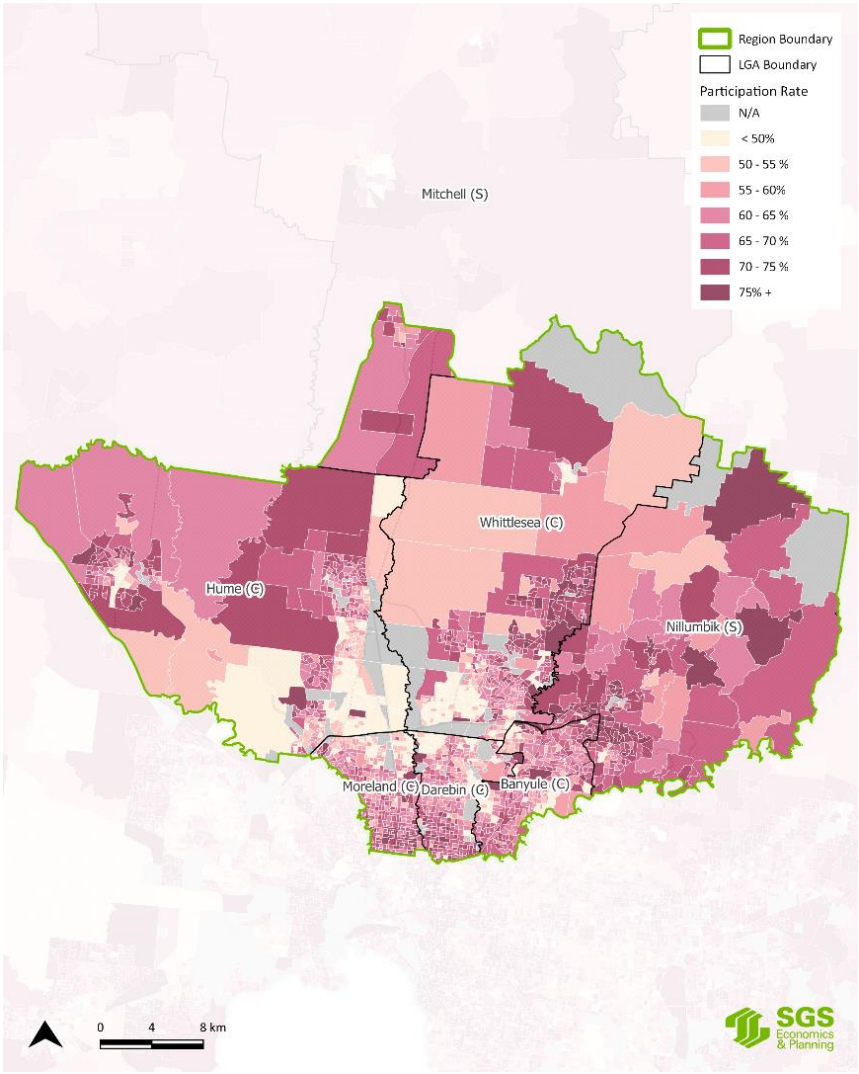
The participation rate is a measure of the proportion of the population that is active in the economy's labour force. It refers to the number of people either employed, underemployed or actively looking for work as a percentage of the total working age population. The participation rate informs understanding of labour utilisation and dependency, and the strength of the local economy.

As a benchmark, participation rates for Victoria and metropolitan Melbourne is 56 per cent and 62 per cent respectively.

Figure 32 illustrates the participation rate across the Northern Metro Region at SA1 geography for 2016.

- The participation rates vary across the region and are focused in the residential areas around MACs and major activity centres (Sunbury, Heidelberg and Preston) as well as areas with larger residential populations (Craigieburn, South Morang, Mernda and Eltham).
- In areas with a larger proportion of people over 65, including Hume, Mitchell, Nillumbik and Whittlesea LGAs, the participation rate is generally lower and varied. These LGAs experienced the highest average annual growth rates of this age group compared to other age groups between 2006 and 2016.
- The cities of Whittlesea and Hume have pockets with low participation rates in and around Broadmeadows and industrial precincts in the middle suburbs. These are also disadvantaged areas with lower socio-economic conditions and skill levels.

FIGURE 32: PARTICIPATION RATE BY SA1 (2016)



Source: ABS Census 2016

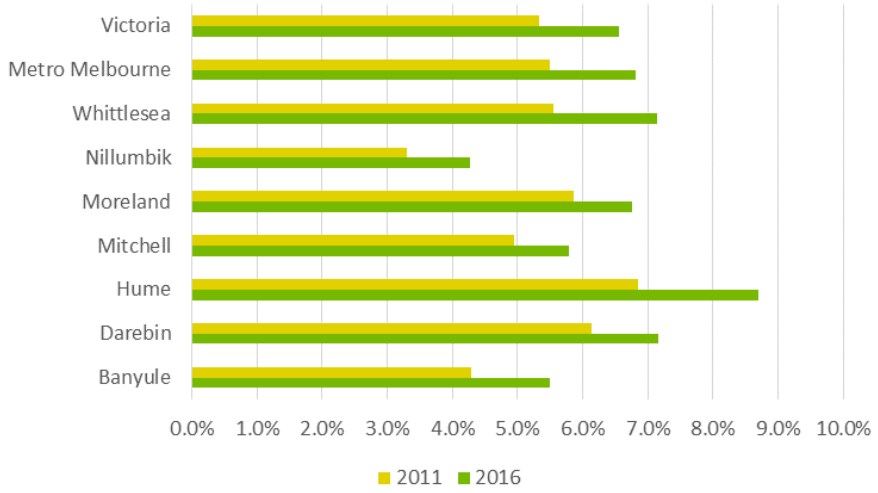
Unemployment

The unemployment rate is a measure of the people in the labour force actively looking for work.

Figure 33 shows the change in the unemployment rate from 2011 to 2016, while Figure 34 shows the spatial distribution of unemployment rates in 2016.

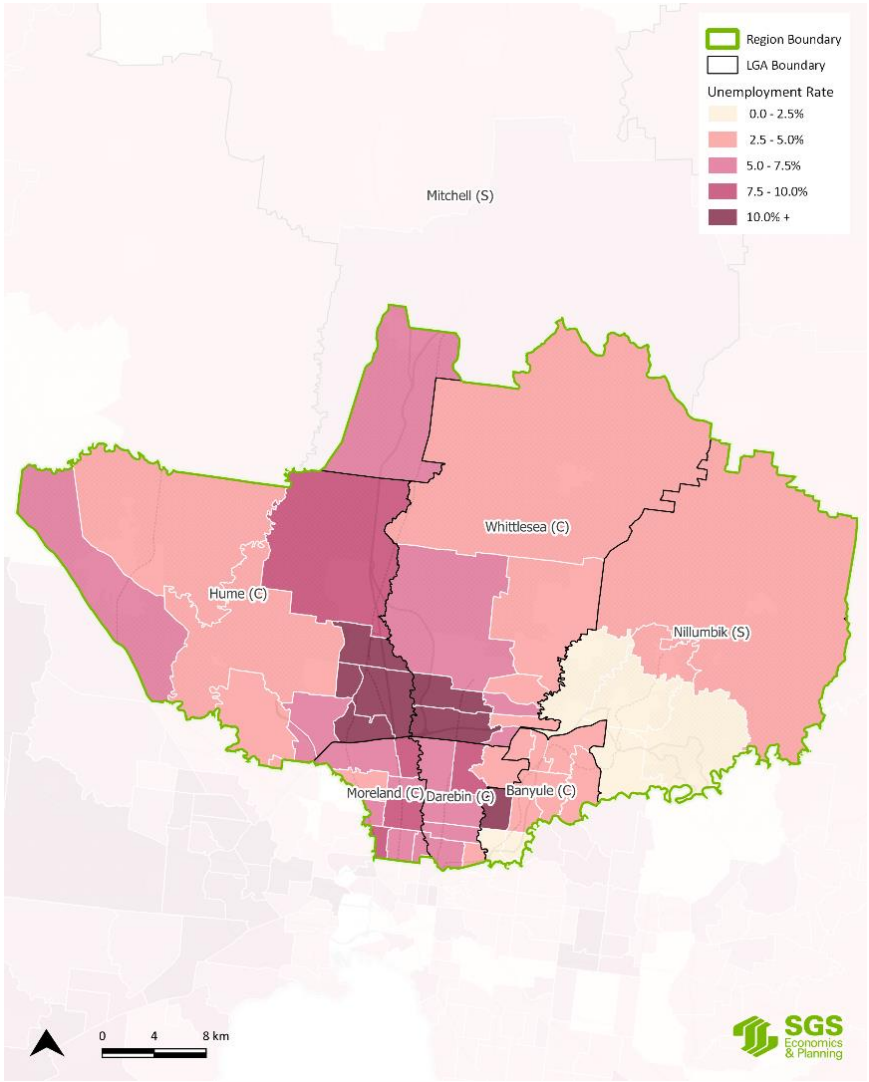
- The rate of unemployment has increased in all municipalities across the Northern Metro Region between 2011 and 2016, in line with broader trends across Victoria.
- The most significant increases were seen in Hume and Whittlesea LGAs, with the City of Hume having the highest rate of unemployment. This is accounted by the averagely lower working skill levels in these LGAs discussed in Section 4.4 Employment and skills.
- The City of Banyule and the Shire of Nillumbik have the lowest rates of unemployment. In the City of Banyule, this reflects the city's higher working skill levels and good access to employment opportunities in the CBD.

FIGURE 33: UNEMPLOYMENT RATE BY LGA (2011-2016)



Source: ABS Census 2011 and 2016.

FIGURE 34: UNEMPLOYMENT RATE 2016



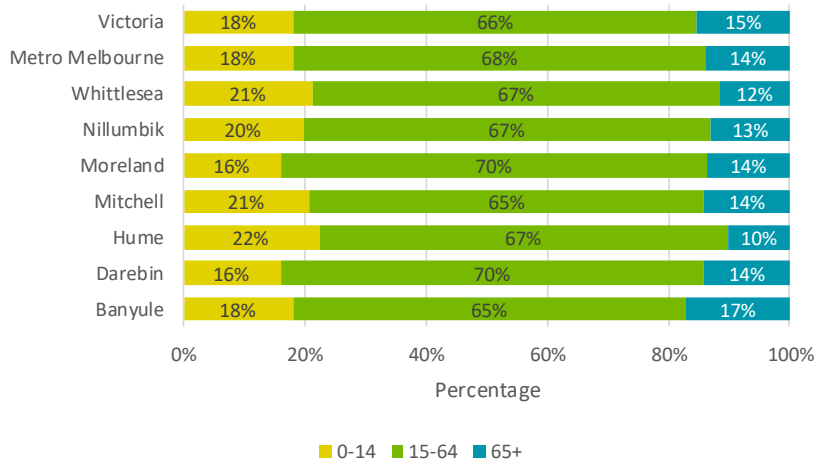
Source: Australian Government, Department of Jobs and Small Business 2018

Change in working age population

Working age population is defined as the population aged between 15 and 64. The proportion of working age population in an area provides an insight into its labour force composition. Figure 35 shows the age distribution in 2016, while Figure 36 presents the share of change (between 2011 and 2016) that occurred in each age group.

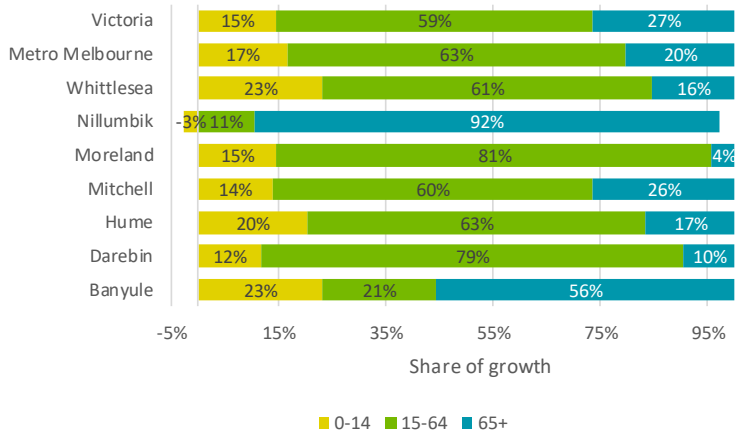
- Most LGAs in the Northern Metro Region have a higher proportion of working age people than the metropolitan Melbourne average.
- The Moreland and Darebin LGAs have a working population that is 70 per cent of total population. These two LGAs are close to the CBD and have experienced substantial growth in apartments in recent years, which are more likely to attract young singles or couples without children.
- The Whittlesea, Hume, Mitchell and Nillumbik LGAs have a higher proportion of children aged 0-14. Household composition in these areas tends to have higher share of families with children due to a higher share of detached dwellings with more space.
- The Shire of Nillumbik had the largest share of growth in the age bracket 65+ compared to their existing share of this population, and a share of growth much smaller than elsewhere in the age group 15-64. This suggests the LGA has a higher share of older people and outmigration of population in the workforce. This trend was less profound but also observable in the City of Banyule.
- Banyule, Hume and Whittlesea LGAs recorded a greater share of children, while the largest share of working age group change occurred in the Moreland and Darebin LGAs.
- The working age range (15-64 years) has some limitations. While there are still a greater number of older Australians who are not in the labour force, many work beyond 65.

FIGURE 35: AGE GROUP POPULATION DISTRIBUTION (2016)



Source: ABS Census 2016, SGS Economics and Planning, 2018

FIGURE 36: SHARE OF POPULATION CHANGE BY AGE (2011-2016)



Source: ABS Census 2011 and 2016, SGS Economics and Planning, 2018

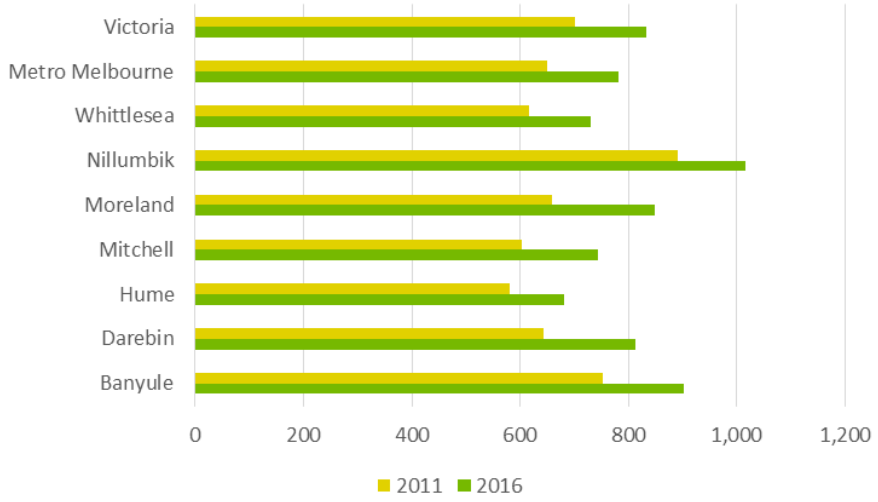
4.3 Economic wellbeing of residents

Household income

Figure 37 and Figure 38 show the equivalised[4] total weekly household income by LGA in the Northern Metro Region between 2011 and 2016.

- The equivalised total weekly income in the Northern Metro Region increased between 2011 and 2016 in line with metropolitan Melbourne and Victoria. In general, increase in household income can be a result of inflation to some extent.
- Growth in household income across the Northern Metro Region is also due to the growing number of jobs and skilled workers in the health and education sector.
- As shown in Figure 37, household income is lower in Hume and Whittlesea than other LGAs in the Northern Metro Region.
- Moreland and Darebin LGAs experienced the greatest positive percentage change in median total weekly household income between 2011 and 2016 as shown in Figure 38. This can be accounted by the increase in population with higher skill levels moving to these areas where there is better access to transport and jobs.

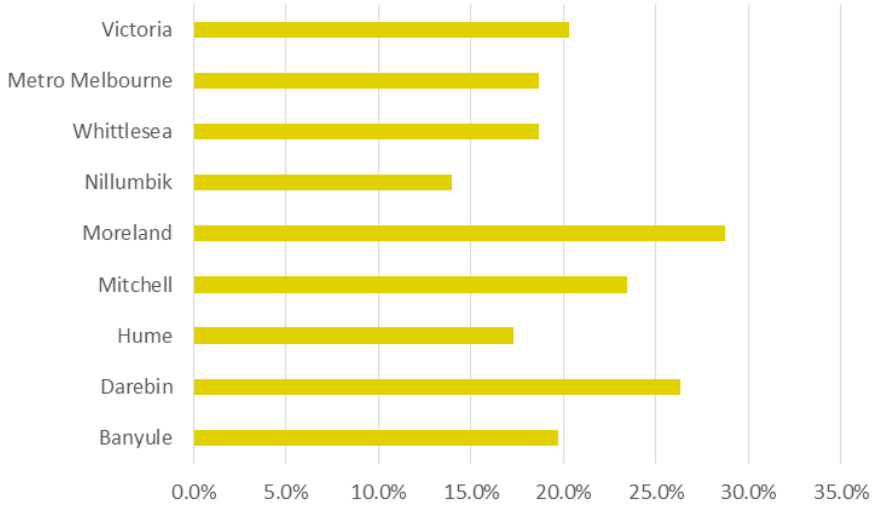
FIGURE 37: MEDIAN TOTAL WEEKLY HOUSEHOLD INCOME (EQUIVALISED) (2011-2016)



Source: ABS Census 2011 and 2016

[4] Equivalised total household income is household income adjusted to facilitate comparison of income levels between households of differing size and composition, reflecting that a larger household would normally need more income than a smaller household to achieve the same standard of living.

FIGURE 38: CHANGE IN MEDIAN TOTAL WEEKLY HOUSEHOLD INCOME (EQUIVALISED) (2011-2016)



Source: ABS Census 2011 and 2016

Public transport

The level of access to public transport influences an area's access to a range of services and facilities.

Figure 39 illustrates the public transport routes that service the Northern Metro Region.

- The Northern Metro Region is serviced by the Sunbury, Craigieburn, Upfield, Mernda and Hurstbridge train lines.
- Shepparton and Seymour regional train services provide access to the city and the regions from Donnybrook and Wallan. Hubs at Broadmeadows and Sunbury provide connections between regional and metro services.
- The inner Melbourne areas are well connected by trains and trams; however, services and facilities are lacking in Middle Melbourne areas and the Northern Growth Corridor.
- Three orbital SmartBus routes provide east-west connectivity including the 903 Altona-Mordialloc, 902 Airport West-Chelsea and 901 Melbourne Airport-Frankston.
- Melbourne's New Growth Areas and the Northern Growth Corridor are poorly serviced by public transport.

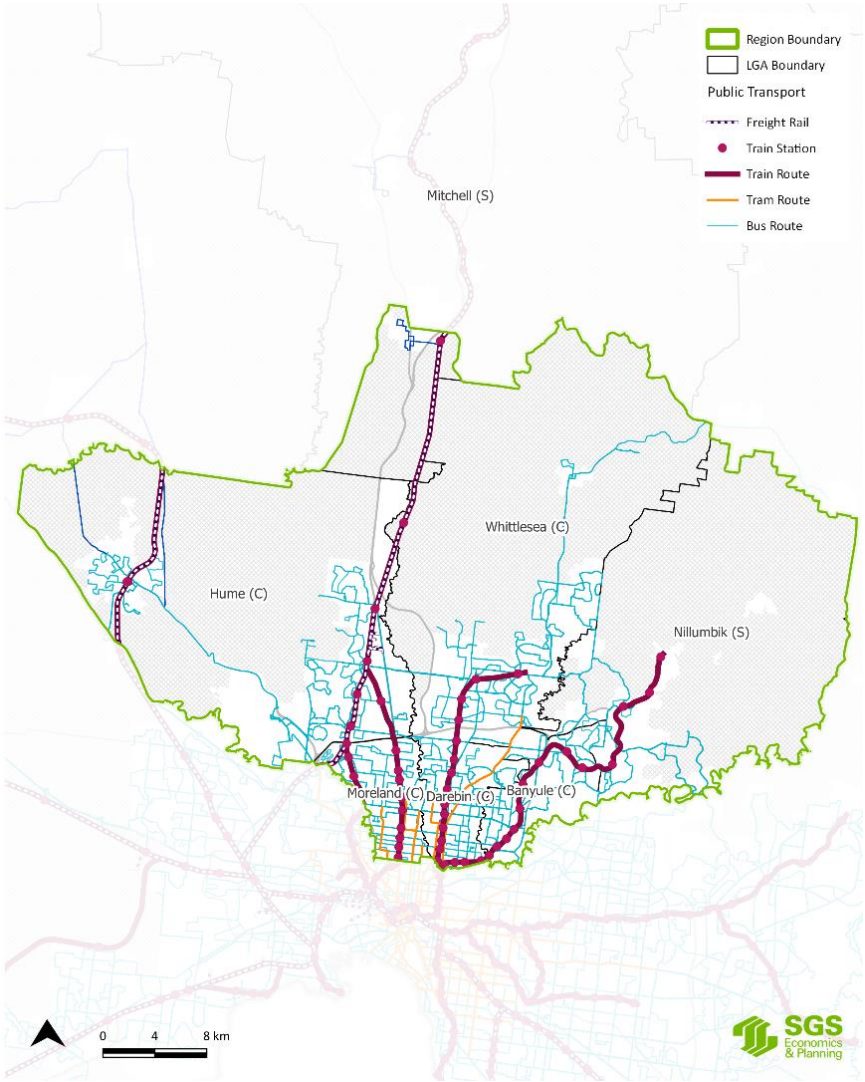
Figure 40 shows the average hourly services per public transport stop and station by LGA between 7am to 7pm. Figure 41 illustrates the public transport service levels, reflecting service frequency and effective access the transport service provides.

- Whittlesea, Nillumbik and Hume LGAs have the lowest average hourly services of public transport per stop.5 This reflects the insufficient public transport services in these LGAs, particularly in the New Growth Areas.
- On the contrary, Moreland, Darebin and Banyule LGAs have the highest average hourly services per public transport stop in the Northern Metro Region. These LGAs cover part of the Inner Melbourne area, where there are more grid-shaped networks and better connectivity.

Public transport networks in the Northern Growth Corridor and outer Melbourne are also more circuitous and lack east-west connections.

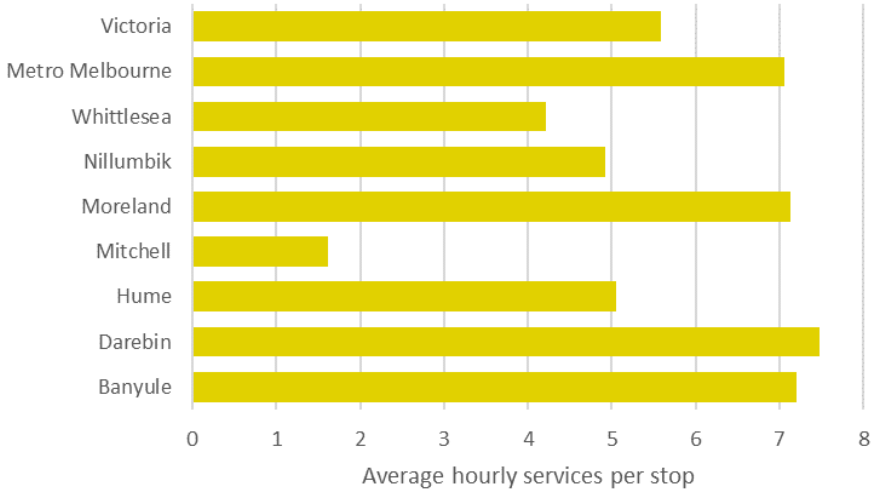
[5] The Shire of Mitchell is excluded in the analysis due to its limited coverage in the Northern Metro Region.

FIGURE 39: PUBLIC TRANSPORT ROUTES (2017)



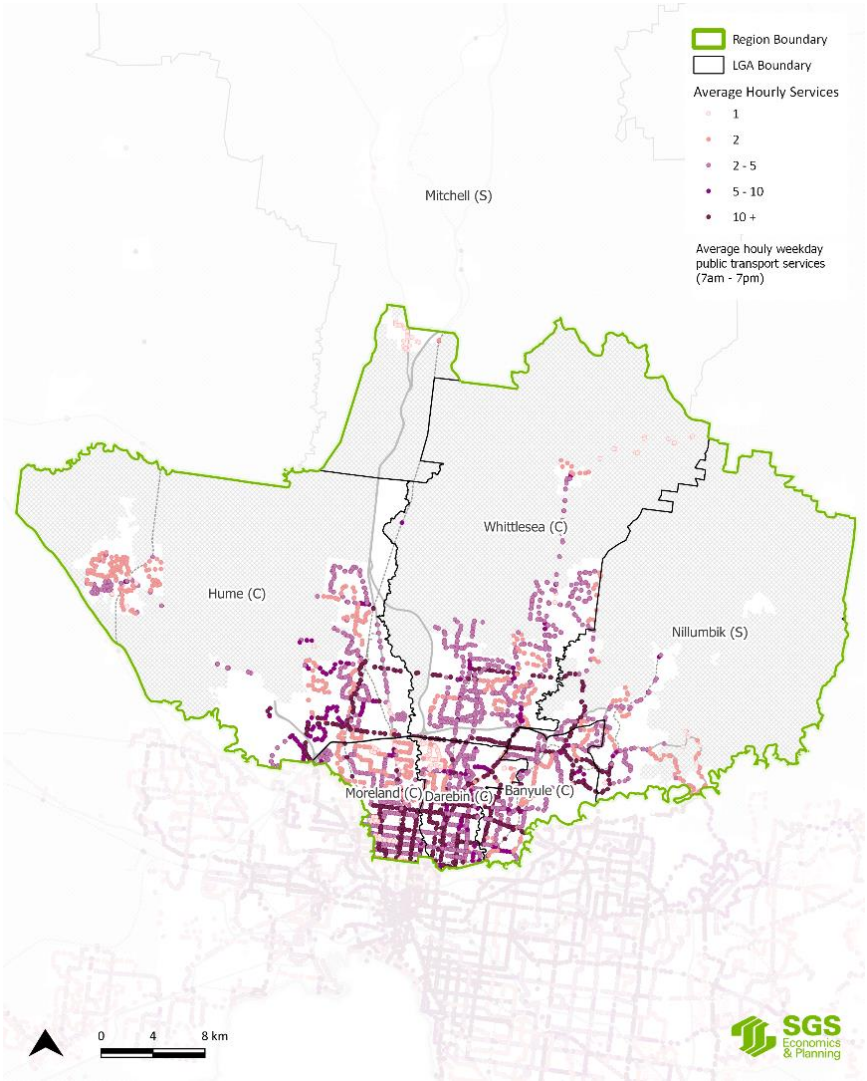
Source: Public Transport Victoria 2017

FIGURE 40: AVERAGE HOURLY SERVICES PER STOP (2017)



Source: Public Transport Victoria 2017

FIGURE 41: PUBLIC TRANSPORT SERVICE LEVELS (2017)



Source: Public Transport Victoria 2017

Travel origins and destinations

Travel origins and destinations refer to the journey to work origins and destinations. Figure 42 and Figure 43 illustrate the most common work destinations and origins for residents in the Northern Metro Region, respectively.

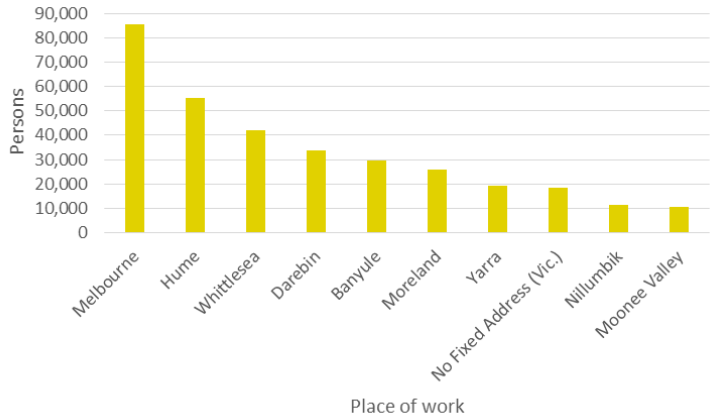
- Hume and Whittlesea LGAs are the most common work destinations for Northern Metro Region residents, each with over 50,000 workers. This is followed by Darebin, Banyule and Moreland LGAs with each between approximately 20,000 and 30,000 workers.
- More than 80,000 residents in the Northern Metro Region access work destinations in the City of Melbourne. Yarra and Moonee Valley LGAs are also in the top ten work destinations.

Whittlesea and Hume LGAs have the highest numbers of workers working in the Northern Metro Region, while these two LGAs also have the lowest public transport service frequency levels.

- Many workers reside in the Inner and Middle Melbourne suburbs and enjoy easy access to Moreland, Darebin and Banyule LGAs.

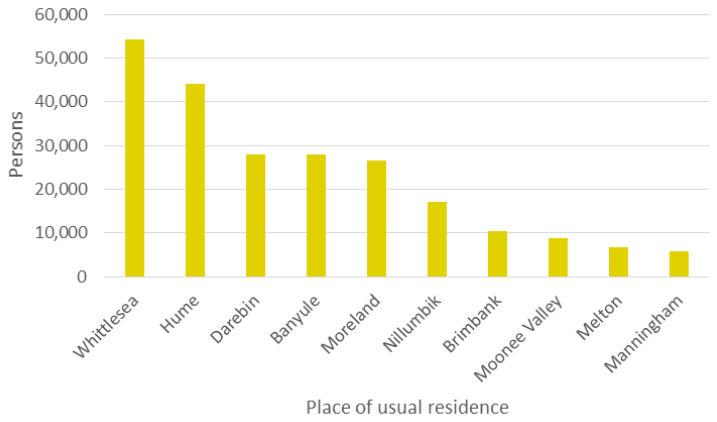
A substantial number of workers also travel from outside the region, including from Brimbank, Moonee Valley, Melton and Manningham LGAs.

FIGURE 42: TOP 10 WORK DESTINATIONS (PLACE OF WORK) BY LGA (2016)



Source: ABS Census 2016

FIGURE 43: TOP 10 WORKER ORIGINS BY LGA (2016)

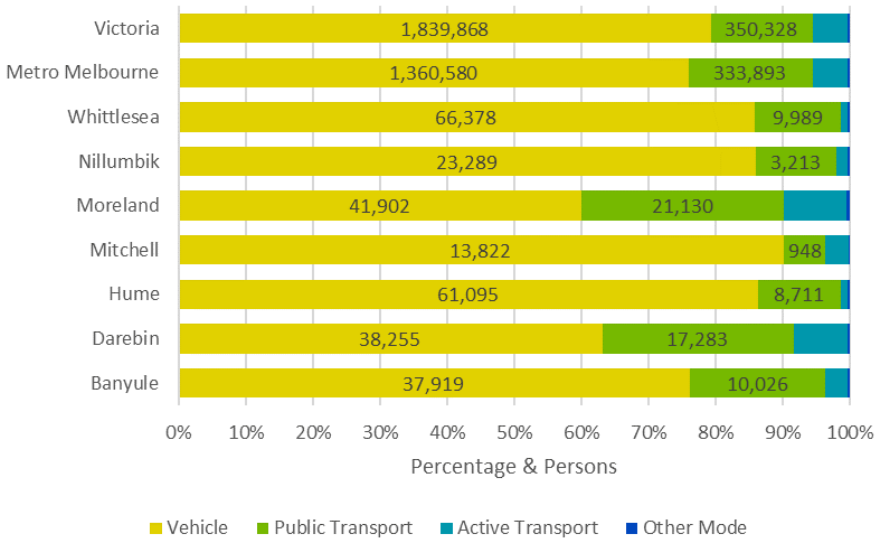


Source: ABS Census 2016

Figure 44 illustrates the shares of different modes of journey to work in each LGA.

- Journey to work by vehicle has the largest share in each LGA, especially in Whittlesea, Nillumbik, and Hume LGAs[6]. Moreland and Darebin LGAs have the highest proportions of journey to work by public transport accounted by their highest service frequency levels and hourly services per public transport stop.

FIGURE 44: MODES OF JOURNEY TO WORK (2016)



Source: ABS Census 2016

[6] The Shire of Mitchell is excluded in the analysis due to its limited coverage in the Northern Metro Region.

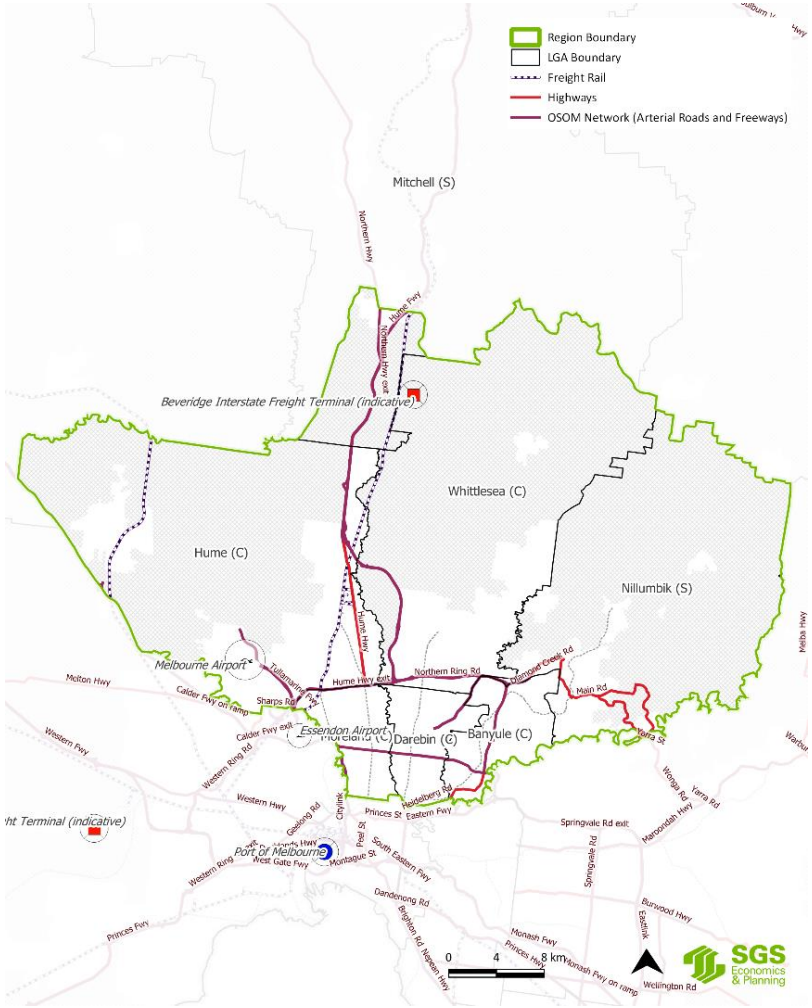
Freight and road networks

The rail and road network, made up of arterial roads and freeways, is the supporting infrastructure for the local, regional, interstate and overseas movement of goods.

Figure 45 shows the freight and road network in the Northern Metro Region.

Major roads in the Northern Metro Region include Hume Freeway, Hume Highway, Metropolitan Ring Road and Tullamarine Freeway. These roads connect the economic locations in the northern part of the region, where there is higher employment density in the industrial sector, such as Thomastown Industrial Precinct, Roxburgh Park and Melbourne Airport

FIGURE 45: FREIGHT AND ROAD NETWORKS



Source: SGS Economics and Planning 2018

Freight and business trips

Table 7 illustrates the origins and destinations of freight and business trips by LGA.

- In 2015, Whittlesea and Hume LGAs had the highest numbers of freight and business trips in the Northern Metro Region. This reflects the large scale of industrial activities in the Northern SSIPs.
- The Shire of Nillumbik had the lowest number of freight and business trips due to absence of industrial precincts and relatively smaller proportion of commercial zones.

TABLE 7: ORIGINS AND DESTINATIONS OF TRIPS BY TYPE AND LGA (2015)

Column heading	Freight		Business	
LGA	2015 Origin	2015 Destination	2015 Origin	2015 Destination
Banyule	1,851	7,538	1,852	7,091
Darebin	3,231	11,720	3,255	10,760
Hume	17,352	12,026	17,368	13,894
Mitchell	6,456	880	6,476	1,472
Moreland	2,184	11,982	2,068	10,781
Nillumbik	279	4,170	311	5,721
Whittlesea	11,177	12,468	11,096	12,560

Source: MABM (KPMG) 2018

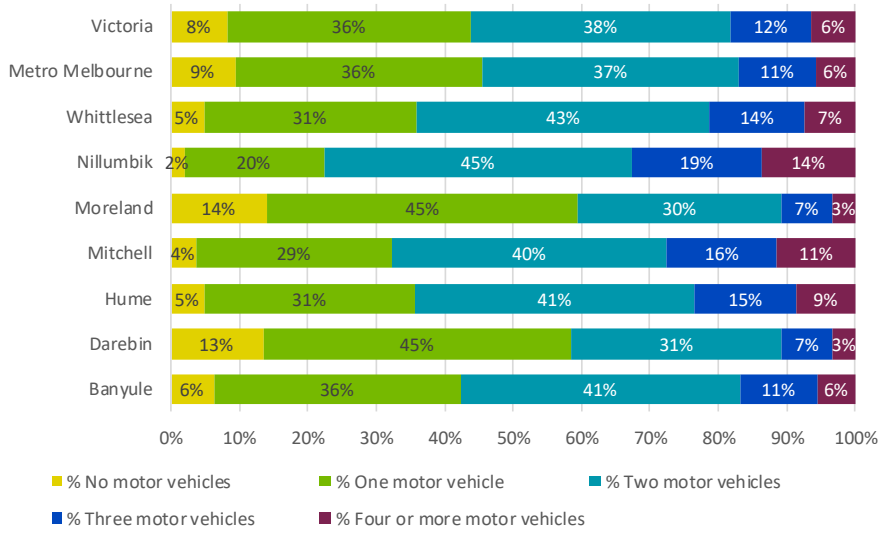
Households with vehicles

Households with vehicles measure the number of motor vehicles households own. Household motor vehicle ownership often closely correlates with the diversity of transport modes available in an area. Households in areas with less transport options tend to own more motor vehicles and vice versa.

Figure 46 shows the percentage of households with motor vehicles for each of the LGAs in the Northern Metro Region in 2016. Figure 47 shows the changes in the numbers of households owning different numbers of motor vehicles between 2011 and 2016. Figure 48 shows the spatial distribution of journey to work by private vehicles.

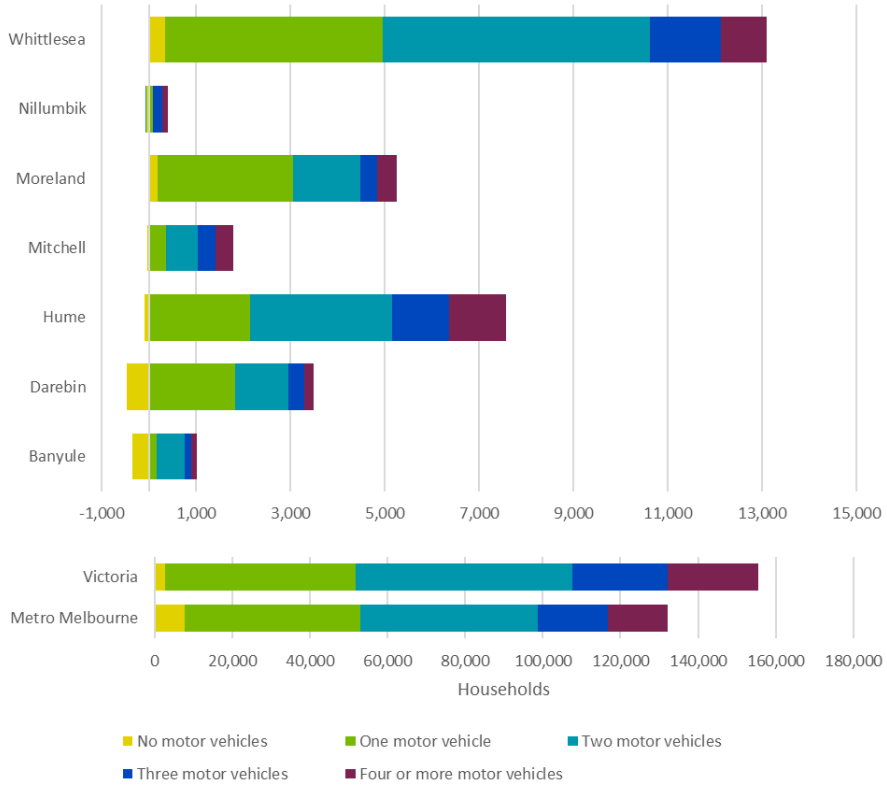
- Whittlesea and Hume LGAs experienced the highest increase of households with vehicles, reflecting the lower public transport service frequency levels in these areas.
- Vehicle ownership is increasing across all municipalities. Hume and Whittlesea LGAs have seen the highest increase in the number of households with four or more motor vehicles, indicating higher car dependence.
- Darebin and Banyule LGAs saw a decrease in the number of households with no motor vehicles.
- Hume, Whittlesea and Nillumbik LGAs have higher shares of work commutes by private vehicles.

FIGURE 46: PERCENTAGE OF HOUSEHOLDS WITH MOTOR VEHICLES (2016)



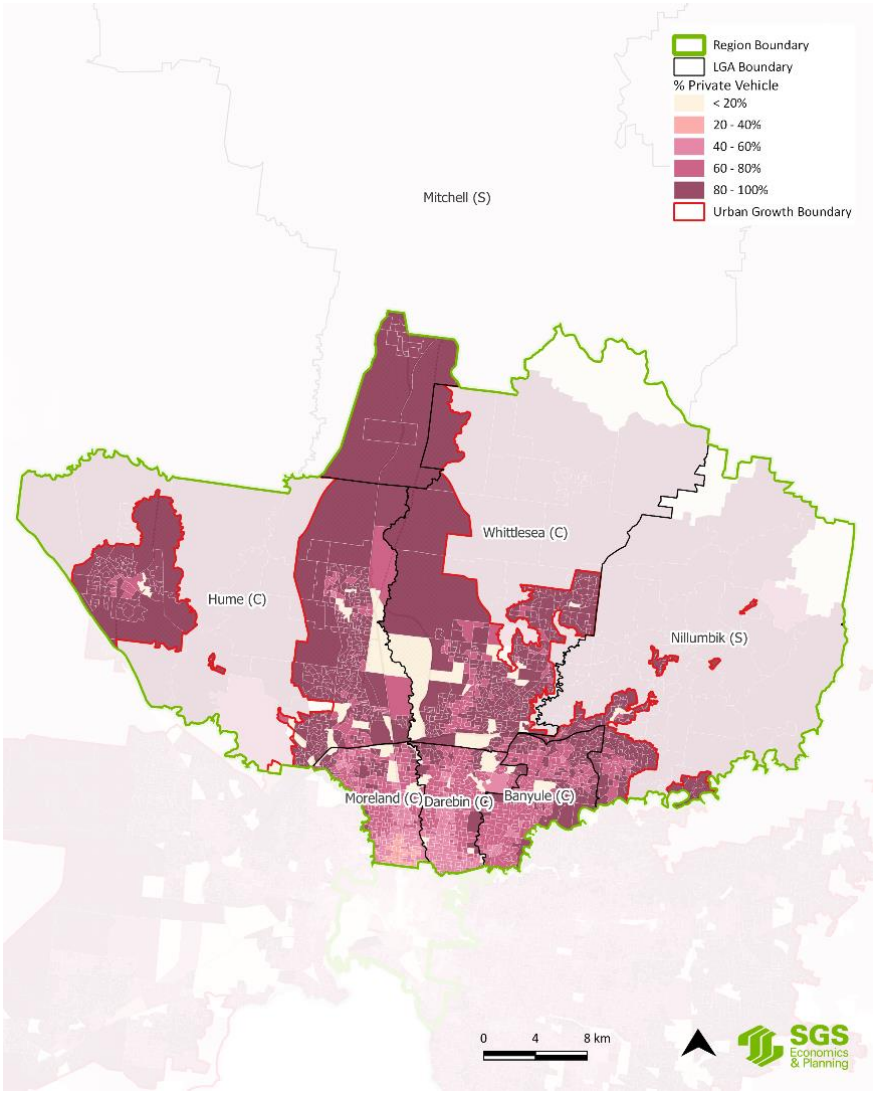
Source: ABS Census 2016

FIGURE 47: CHANGE IN HOUSEHOLDS WITH MOTOR VEHICLES (2011-2016)



Source: ABS Census 2011 and 2016

FIGURE 48: JOURNEY TO WORK BY PRIVATE VEHICLE (2016)



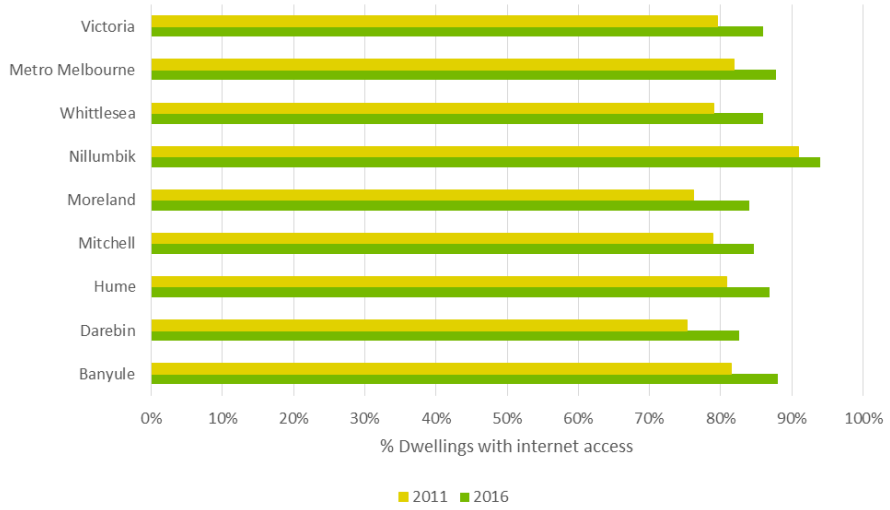
Source: ABS Census 2016

Access to internet

Access to internet suggests level of access to and engagement with digital media and communication of households, as well as the level of access of households to online services, including health and education. Figure 49 shows the percentage of dwellings with internet access between 2011 and 2016.

- The percentage of dwellings with internet access shows minor differences between metropolitan Melbourne and the municipalities across the Northern Metro Region.
- The percentage of dwellings with internet access has generally increased from 2011 to 2016 across the Northern Metro Region.

FIGURE 49: DWELLINGS WITH INTERNET ACCESS (2011-2016)



Source: ABS Census 2011 and 2016

4.4 Employment and skills

Skill levels

The Australian and New Zealand Standard Classification of Occupations (ANZSCO) classifies employment skill levels into 5 categories, with Skill Level 1 being the highest, and Skill Level 5 being the lowest (Table 8).

TABLE 8: SKILL LEVEL DESCRIPTIONS

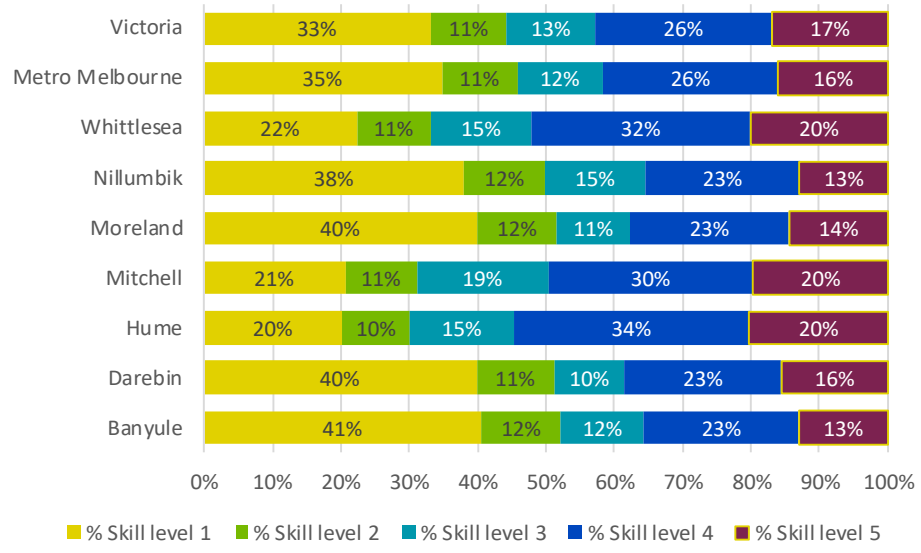
Skill Level	Skill Level Description
Skill Level 1	Occupations at Skill Level 1 have a level of skill commensurate with a bachelor's degree or higher qualification. At least five years of relevant experience may substitute for the formal qualification.
Skill Level 2	Occupations at Skill Level 2 have a level of skill commensurate with either an Associate Degree, Advanced Diploma or Diploma. At least three years of relevant experience may substitute for the formal qualifications listed above.
Skill Level 3	Occupations at Skill Level 3 have a level of skill commensurate with a Certificate IV or Certificate III including at least two years of on-the-job training. At least three years of relevant experience may substitute for the formal qualifications listed above.
Skill Level 4	Occupations at Skill Level 4 have a level of skill commensurate with Certificate II or III. At least one year of relevant experience may substitute for the formal qualifications listed above.
Skill Level 5	Occupations at Skill Level 5 have a level of skill commensurate with Certificate I or compulsory secondary education. In some instances, no formal qualification or on-the-job training may be required.

Source: ANZSCO

Figure 50 shows skill level in 2016 as a percentage of the total working population. Figure 51 (over page) presents the share of change captured by each skill level.

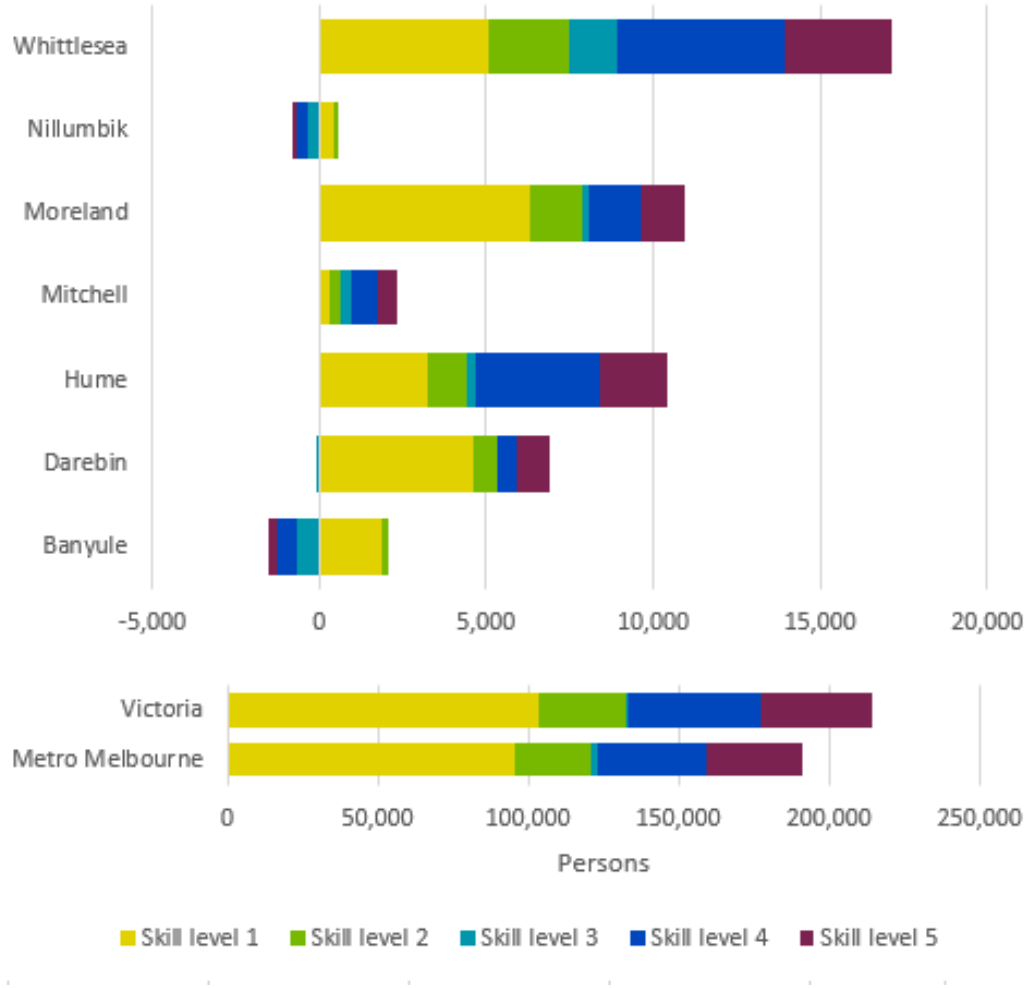
- The Moreland, Darebin and Banyule (inner LGAs) have a higher share of population employed in Skill Level 1 jobs in 2016 compared with other parts of the region.
- Mitchell, Hume and Whittlesea LGAs had a higher share of population employed in Skill Level 4 jobs in 2016, reflecting the larger proportion of industrial and manufacturing activities that occur in these LGAs.
- The proportion of Skill Level 4 jobs in the Shire of Mitchell and the cities of Hume and Whittlesea are followed by Skill Level 1 jobs, highlighting a diversity of skill levels within these LGAs.
- Growth in Skill Level 1 jobs occurred in every municipality in the Northern Metro Region except for the Shire of Mitchell between 2011-2016. This can be partly explained by the Australian immigration policy which is focused on skilled migration, and the large proportion of the Shire of Mitchell in rural and agricultural areas outside of the Northern Metro Region.
- The Whittlesea, Moreland and Darebin LGAs have seen an increase in workers with Skill Level 1 and 2. This may also be influenced by trends in skilled migration and the transition of many industries in these areas to post-industrial activities, especially in the cities of Moreland and Darebin.
- Nillumbik and Banyule LGAs experienced decrease in in Skill Level 3 to 5 but increase in Skill Level 1 and 2. This suggests that people working in jobs requiring less skills are moving away from these LGAs.

FIGURE 50: SKILL LEVELS AS PERCENTAGE OF TOTAL WORKING POPULATION (PLACE OF USUAL RESIDENCE) (2016)



Source: ABS Census 2016

FIGURE 51: SHARE OF CHANGE IN SKILL LEVELS (PLACE OF USUAL RESIDENCE) (2011-2016)



Source: ABS Census 2011 and 2016

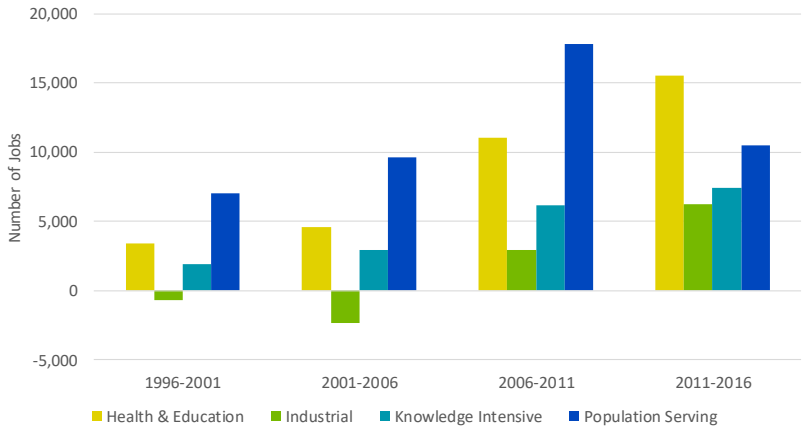
Employment concentration of industries

Figure 52 shows the historic change in the number of jobs by the four industry classifications

Figure 53 illustrates the changes in the share of each sector in the Northern Metro Region between 1996 and 2016.

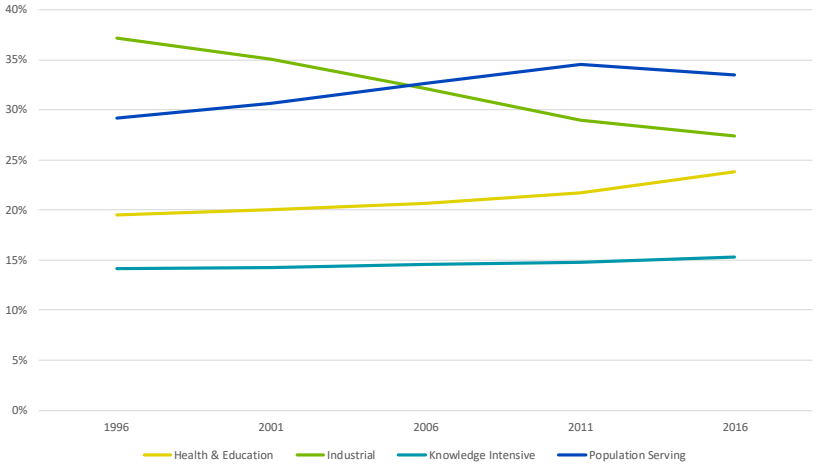
- Compared with metropolitan Melbourne, there is a greater concentration of jobs in population-serving industries than in 1996. This shift has occurred steadily over time.
- Key sub-sectors of employment in the region are construction; education and training; manufacturing; postal and warehousing; wholesale trade; and other services.
- Over 2011-2016 there was a relative decrease in population-serving sector in the region, although from 1996 to 2016 the industry share of employment in this sector has grown.
- Knowledge-intensive industries continue to occupy the lowest share of industry with very flat growth – a factor that may cause the region to be less resilient to industry changes in the future.
- There has been a steady increase in the industry share in health and education, while (as with other metropolitan areas) the industrial sector share has decreased despite the actual number of this sector jobs increasing in the last decade. This reflects the continuing growth and activities in the Northern SSIP.
- Despite the smaller industry share for the industrial sector, this remains one of the most dominant sectors in the Northern Metro Region.

FIGURE 52: CHANGE IN NUMBER OF JOBS BY INDUSTRY CLASSIFICATION (1996-2016)



Source: SGS Economics and Planning, 2018.

FIGURE 53: SHARE OF EMPLOYMENT BY INDUSTRY (1996-2016)



Source: SGS Economics and Planning, 2018.

Location quotient

Location quotient (LQ) is used to measure the relative concentration of industries in an area compared to a benchmark region. In this report, metropolitan Melbourne is the benchmark against which the Northern Metro Region is compared.

An LQ of less than 1 means an industry is underrepresented in the Northern Metro Region compared to metropolitan Melbourne. An LQ that is greater than 1 means that the Northern Metro Region has a higher concentration of that industry compared to metropolitan Melbourne. LQs in the Northern Metro Region are broken down into 19 industries, presented in

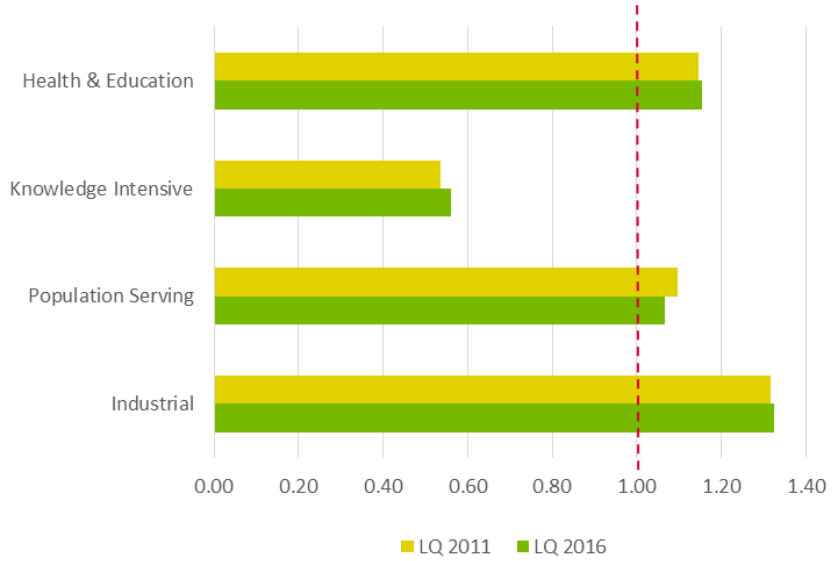
Figure 54 and Figure 55 show the LQ for the broad industry categories within the Northern Metro Region.

- The region is underrepresented in the knowledge-intensive sector, including in the Information media and telecommunications; financial and insurance services; and arts and recreation services.
- There has been a decrease in the LQ of the knowledge intensive sector between 2011 and 2016, indicating the region may be falling further behind in this sector.
- The LQ for transport, postal and warehousing; manufacturing; health care and social assistance; education and training; construction; and agriculture, forestry and fishing score greater than 1 on the LQ, meaning these sectors are stronger in the Northern Metro Region than other parts of metropolitan Melbourne (Figure 55).
- Figure 55 shows that the agglomeration of many industrial activities continues to be the strongest sector in the region, while population-serving specialisations decreased slightly from 2011-2016.
- Health and education and knowledge-intensive sectors grew over the period 2011-2016; however, knowledge-intensive activities continue to be represented at a lower rate in the Northern Metro Region than other metropolitan areas (see also section 4.2).
- The increasing LQ for the health and education sector is likely accounted by the growing employment opportunities in the hospital and university precincts (Bundoora RMIT, La Trobe University and Northern Hospital).

FIGURE 54: LOCATION QUOTIENT BY INDUSTRY (2011-2016)

Source: SGS Economics and Planning, 2018

FIGURE 55: LOCATION QUOTIENT BY SECTOR (2011-2016)



Source: SGS Economics and Planning, 2018.

5 SOCIAL

SOCIAL INDICATORS

The Infrastructure Victoria social indicators that underpin this section are:

- Population by age group over time
- Age dependency
- Migration
- Cultural mix
- Housing price
- Housing typology
- SEIFA – Index of Relative Socio-Economic Disadvantage
- DOTE index
- Education levels
- Engagement with work or study
- Hospital inpatient separations
- Access to Community Care Services
- Mental health and drug use
- Home and Community Care Services
- Ambulatory Care Sensitive Conditions
- Access to general practitioners
- Type 2 diabetes
- Life expectancy at birth
- Birth weight
- Immunisation
- Child protection substantiations
- Development vulnerability
- Crime
- Wellbeing

REGIONAL OVERVIEW

The Northern Metro Region's social profile is characterised by:

- New migrant communities and growth in urban fringe growth areas
- Varying socio-economic conditions across different municipalities
- Fragmented urban areas with rapid greenfield and infill growth
- Some of Melbourne's most advantaged suburbs, such as Ivanhoe and Doncaster, and most disadvantaged suburbs in the City of Hume.

SOCIAL STRENGTHS

- A growing, diverse and highly skilled population.
- Relatively affordable housing in middle areas.
- Growing cultural diversity due to different origins of overseas migrants.

SOCIAL CHALLENGES

- Giving people access to job choice and connections to health care and community services regardless of residential location.
- Vulnerable workforce due to lower employment skills in some part of Northern Metro Region.
- Higher than average (and increasing) housing stress in some municipalities and suburbs.

5.1 Overview and key features

The Wurundjeri people of the Kulin Nation are the Traditional Owners of the lands that now make up the Northern Metro Region of Melbourne.

The gently undulating lands and volcanic plains of the Northern Metro Region have been reshaped by agricultural expansion, the acquisition of grazing land and runs and limited industrial development. In the 20th century, the region more tightly linked to Melbourne's industrial needs.

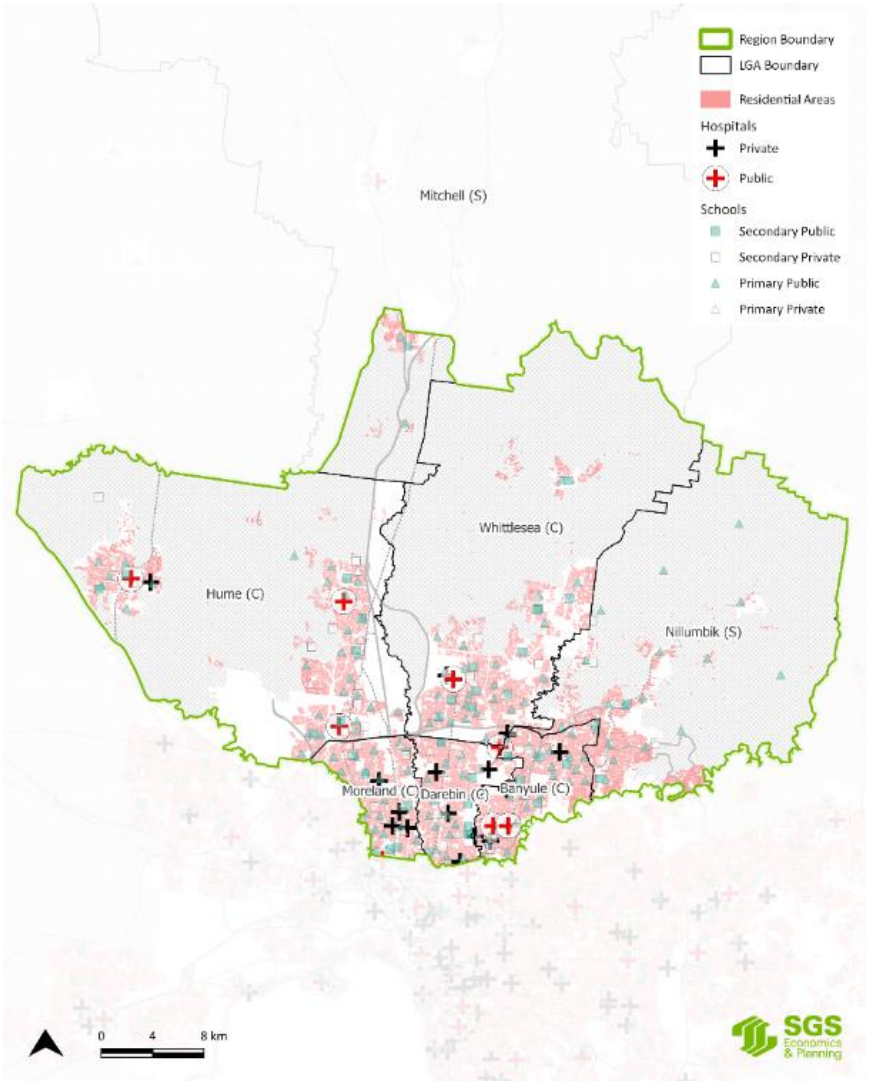
By 1930, Brunswick was already a textile hub with over 300 factories and, along with Coburg, would grow to dominate Australia's hosiery industry. Combined with a transformative influx of migrants from 1946 onward, the region was well-equipped for post-war expansion, which included the establishment of Ford's Broadmeadows car assembly plant in 1959.

The region contains some of Melbourne's most strategically important infrastructure, including the Melbourne Airport and Hume Highway.

The key features of the area shape the current profile of land use in the Northern Metro Region, which is broadly characterised by:

- an inner area which is undergoing transformation, linked to its proximity to the inner-city economy
- a middle region which retains major industrial areas and is experiencing residential growth
- some outer areas experiencing significant growth and change along with areas for rural and alternate use in the green wedge.

FIGURE 56: NORTHERN METRO REGION – URBAN STRUCTURE



Source: SGS Economics and Planning, 2018

5.2 Population demographics

Recent population growth

Current population and recent growth (2011 and 2016) are shown in Figure 9.

- Overall, the region has accommodated 14.7 per cent of metropolitan Melbourne's growth.
- The City of Hume and the City of Whittlesea had the largest populations in the region in 2016.
- The Shire of Nillumbik and the City of Banyule had the lowest average annual growth rate within the Northern Metro Region.
- The Shires of Mitchell and Nillumbik had the lowest population growth in the region, owing large areas agricultural or green wedge land.
- Despite this, the designation of growth areas in the Shire of Mitchell and the cities of Hume and Whittlesea mean these LGAs recorded the highest average annual growth rate from 2011 to 2016.
- The City of Hume accommodated 27.6 per cent of regional growth from 2011 to 2016, and the City of Whittlesea 38.9 per cent, reflecting the New Growth Areas In these LGAs.
- These growth trends are reflected in the distribution of population growth across the five location typologies.
- Outer Melbourne (which contains former growth areas) saw the highest growth rate at 46.6 per cent.
- Inner and Middle Melbourne experienced more sustained (but still high) rates of growth—between 10.2 and 18.5 per cent.

Figure 57 and Figure 58, overleaf, show existing and projected population density, illustrating that the trend of growth area population migration will continue towards 2031, especially in the emerging growth areas of Craigieburn West, Wallan, Beveridge, Mernda and Wollert.

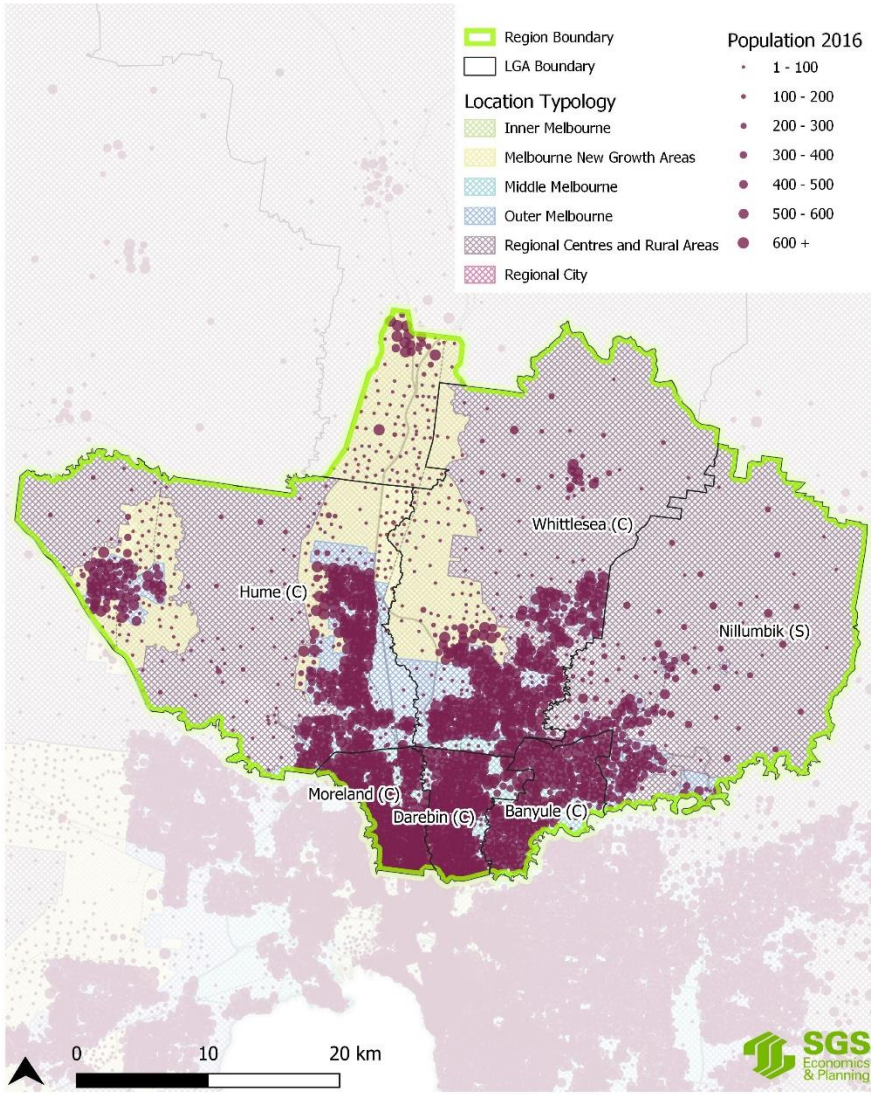
TABLE 9: POPULATION (2011-2016)

	2011	2016	2011-2016		
			AAGR	Change	% Regional
Location Typology					
Inner Melbourne	114,027	126,402	2.1%	12,375	10.2%
Middle Melbourne	321,037	343,437	1.4%	22,401	18.5%
Outer Melbourne	348,554	404,945	3.0%	56,391	46.6%
Melbourne New Growth Areas	15,273	43,172	23.1%	27,899	23.1%
Metropolitan Rural Areas	26,218	28,088	1.4%	1,869	1.5%
Northern Metro Region	825,109	946,044	2.8%	120,935	14.7%
LGA					
Banyule	122,815	127,508	0.8%	4,693	3.9%
Darebin	142,942	155,022	1.6%	12,080	10.0%
Hume	174,320	207,663	3.6%	33,343	27.6%
Mitchell	7,096	11,478	10.1%	4,382	3.6%
Moreland	154,252	172,027	2.2%	17,775	14.7%
Nillumbik	62,884	64,465	0.5%	1,581	1.3%
Whittlesea	160,800	207,881	5.3%	47,081	38.9%
Northern Metro Region	825,109	946,044	2.8%	120,935	14.7%
Metropolitan Melbourne	4,108,837	4,653,078	2.5%	544,241	
Victoria	5,537,817	6,179,249	2.2%	641,432	

Note: Mitchell LGA refers to the area included within the *Plan Melbourne* Northern Metro Region.

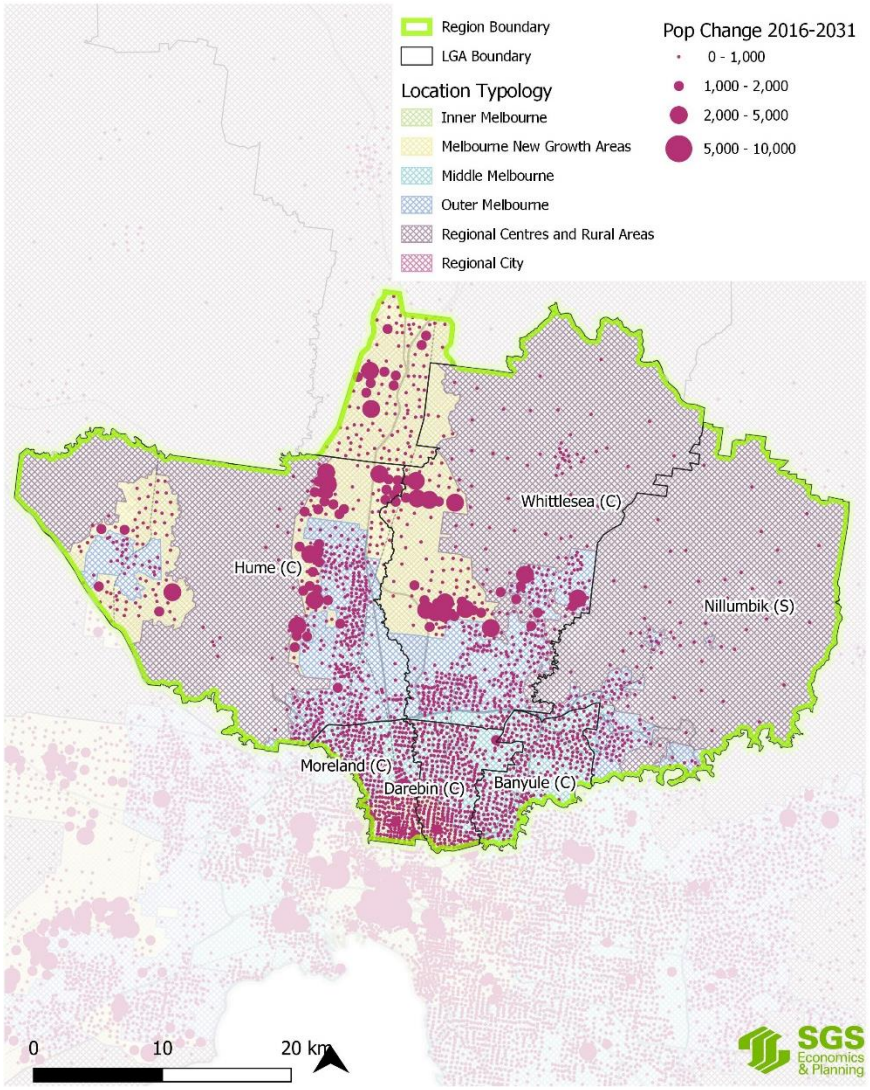
Source: SGS Economics and Planning, 2018. Note: The difference between the region totals of location typology and LGAs reflect different data grouping techniques to group small area data into target geographies.

FIGURE 57: POPULATION DENSITY (2016)



Source: SGS Economics and Planning, based on Victoria in Future 2016 and SALUP17, TfV

FIGURE 58: PROJECTED POPULATION CHANGE (2011-2031)



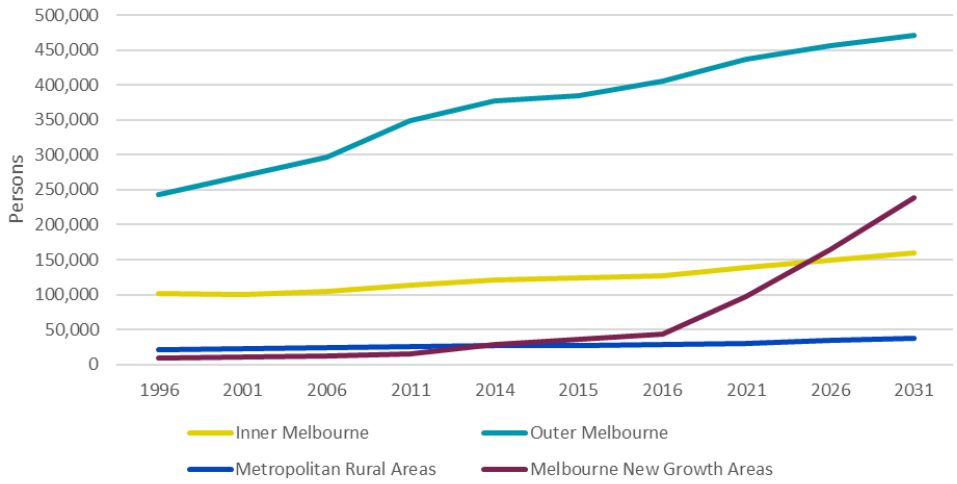
Source: S SGS Economics and Planning, based on Victoria in Future 2016 and SALUP17, TfV

Forecast population growth

Figure 59 presents recent and forecast population growth by location typology.

- Population forecasts to 2031 show an increase in residents in the Northern Metro Region's New Growth Areas.
- The inner, middle and outer areas of the Northern Metro Region will also experience increasing but sustained growth into the future.
- The population in the metropolitan rural areas is projected to remain relatively stable to 2031.

FIGURE 59: FORECAST POPULATION CHANGE (1996-2031)



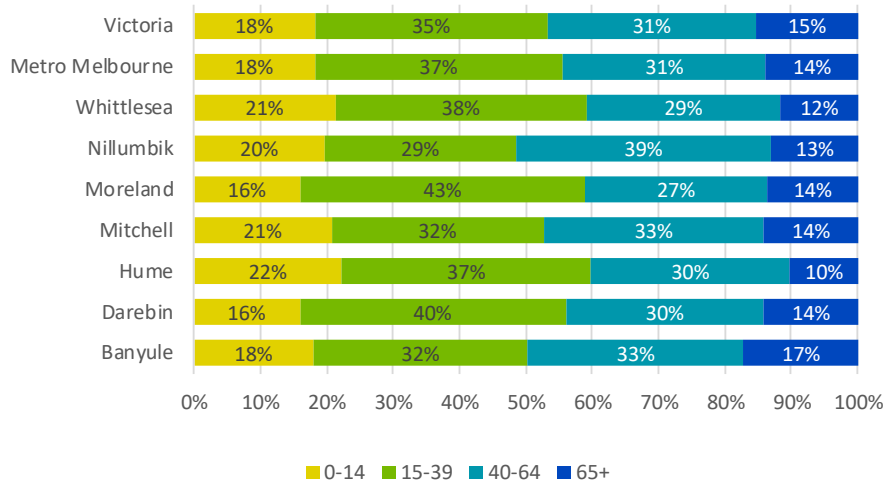
Source: SGS Economics and Planning, based on Victoria in Future 2018 and ABS (cat. 3218.0)

Population by age groups over time

Figure 60 shows:

- Hume and Whittlesea LGAs, as New Growth Area LGAs, have the lowest proportion of people over the age of 65 and largest number of young adults and children.
- The City of Moreland has the highest rate of people aged 15-39 and the Shire of Nillumbik the largest proportion of adults aged between 40 and 64.

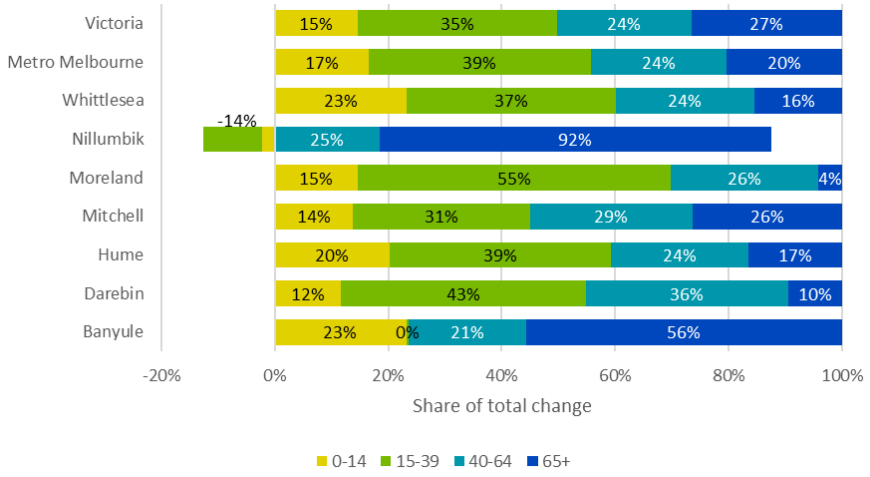
FIGURE 60: PROPORTION OF POPULATION BY AGE GROUP (2016)



Source: ABS Census 2011 and 2016

- Figure 61 shows the percentage change in population by age groups between 2011 and 2016.
- Population in each age group increased between, except in the Shire of Nillumbik where there was a decrease in the proportion of children and young adults.
- An increase in the proportion of older people across all LGAs is representative of broader, national demographic trends.
- In growth area LGAs, the growing proportion of people aged 65 and over may reflect new retirement villages and residential aged care facilities in these areas, or that people living in established areas in these LGAs are getting older.
- The number of people over 65 increased most in Whittlesea, Hume, Nillumbik and Mitchell LGAs. While the share of people over 65 years increased most significantly in the City of Nillumbik they only make up a small proportion of the population (see Figure 60). This is also reflected in the City's declining age dependency ratio between 2011 and 2016 (see Figure 63).

FIGURE 61: SHARE OF POPULATION CHANGE BY AGE (2011-2016)



Source: ABS Census 2011 and 2016

Table 10 shows the average annual growth rate of each age group in each LGA and the Northern Metro Region from 2006 to 2016.

- The region had a lower total growth rate than the Victorian average.
- The growth area LGAs (City of Hume, City of Whittlesea, and (part) Shire of Mitchell) recorded annual average growth rates well above Victorian averages.

TABLE 10: AVERAGE ANNUAL POPULATION GROWTH RATES BY AGE GROUPS OVER TIME (2006–2016)

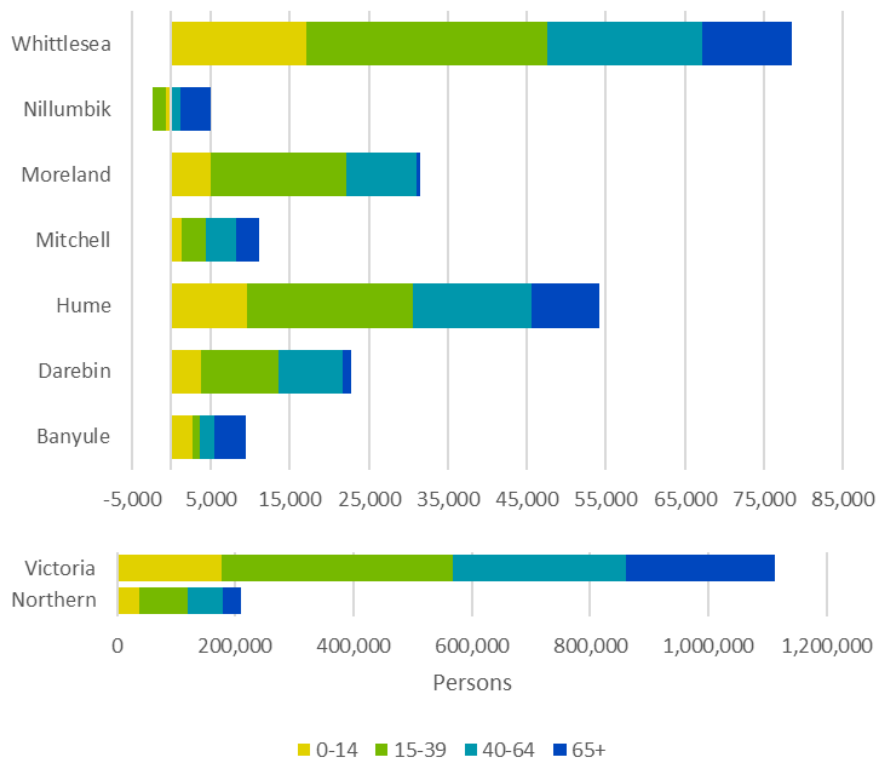
	2016				AAGR 2006-2016			
LGA	0-14	15-39	40-64	65+	0-14	15-39	40-64	65+
Banyule	23,359	41,996	40,615	21,477	1.2%	0.2%	0.5%	2.1%
Darebin	24,941	63,163	45,416	21,606	1.6%	1.7%	2.0%	0.5%
Hume	46,311	78,947	61,029	20,754	2.3%	3.1%	2.9%	5.5%
Mitchell	8,872	13,629	13,612	5,682	1.6%	2.6%	3.3%	7.5%
Moreland	27,763	74,861	46,584	23,086	2.0%	2.6%	2.1%	0.1%
Nillumbik	12,834	19,027	24,198	8,115	-0.6%	-0.8%	0.5%	6.5%
Whittlesea	44,475	79,477	59,464	23,642	6.2%	6.3%	4.9%	9.2%
Northern Metro Region	**188,555**	**371,100**	**290,918**	**124,362**	**2.3%**	**2.5%**	**2.3%**	**3.0%**
Victoria	**1,140,064**	**2,200,757**	**1,903,876**	**928,475**	**1.7%**	**2.0%**	**1.7%**	**3.2%**

Source: ABS Estimated Resident Population

Figure 62 shows the population growth by age groups between 2006 and 2016.

- The Hume and Whittlesea LGAs saw the largest growth in absolute population numbers.
- Shire of Nillumbik saw a decline in people aged 15 to 39 and to a lesser degree in children aged 0 to 14 between 2006 and 2016.
- Moreland, Hume and Darebin LGAs experienced the most increase in people aged 15 to 39 and 40-64 years.
- Banyule and Nillumbik LGAs have smaller populations and proportionally had the greatest increase in people aged 65+.

FIGURE 62: POPULATION GROWTH BY AGE GROUP (2006–2016)



Source: ABS ERP 2006 and 2016

Age dependency ratio

Age dependency is the ratio between the population not in the labour force (typically between age group 0-14 and 65+) and the population in the labour force (age 15-64). A lower dependency ratio means there is less reliance on each working age person.

The dependency ratio helps to understand a location's economic potential as well as its welfare and service needs.

- The age dependency ratio increased from 2011 to 2016 in each LGA in the Northern Metro Region, except for Moreland and Darebin LGAs.
- This is in line with metropolitan Melbourne and Victoria, reflecting the ageing population profile over time.
- The growth area LGAs show a more pronounced increase in age dependency ratio due to growing shares of 65+ and 0-14 year olds moving to more affordable suburbs in Hume, Whittlesea and Mitchell LGAs.
- In the Shire of Nillumbik, it is likely the age dependency ratio has increased due to the growing share of people aged 65+ and the decreasing share of 15-39 year olds.

FIGURE 63: AGE DEPENDENCY RATIO (2011-2016)

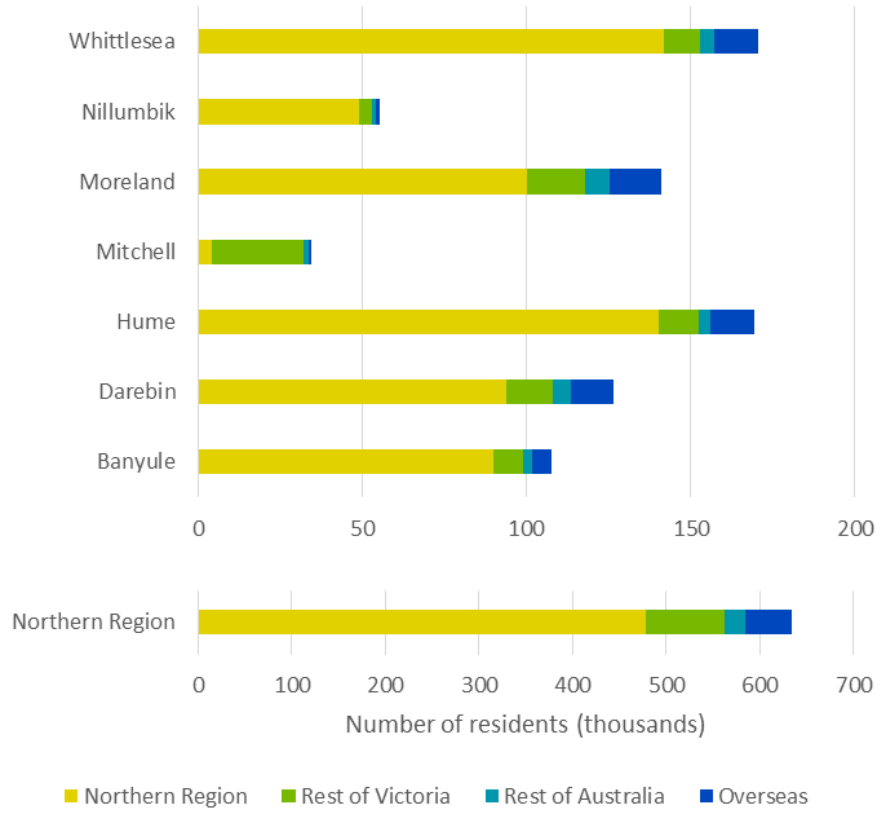
Source: ABS Census 2011 and 2016

Population migration flows

Figure 64 shows the place of origin of residents who moved to the Northern Metro Region between 2011 and 2016.

- The proportion of people who have moved to the region from somewhere else in Victoria or Australia is similar across most LGAs in the Northern Metro Region.
- Other than the Shire of Mitchell, all LGAs have significantly higher proportions of residents who moved in the five years to 2016 from within the Northern Metro Region.
- This reflects trends such as people moving from the inner LGAs (City of Darebin or City of Moreland) to the growth area suburbs due to housing affordability, and follows broader trends across Victoria. It also suggests that people tend to move within the region, rather than across Melbourne.
- The Shire of Mitchell has a high rate of people in the region who have moved from other places in Victoria. The proportion of residents from overseas or another place in Australia is marginal.

FIGURE 64: REGION OF ORIGIN FOR CURRENT RESIDENTS BY LGA (2016)



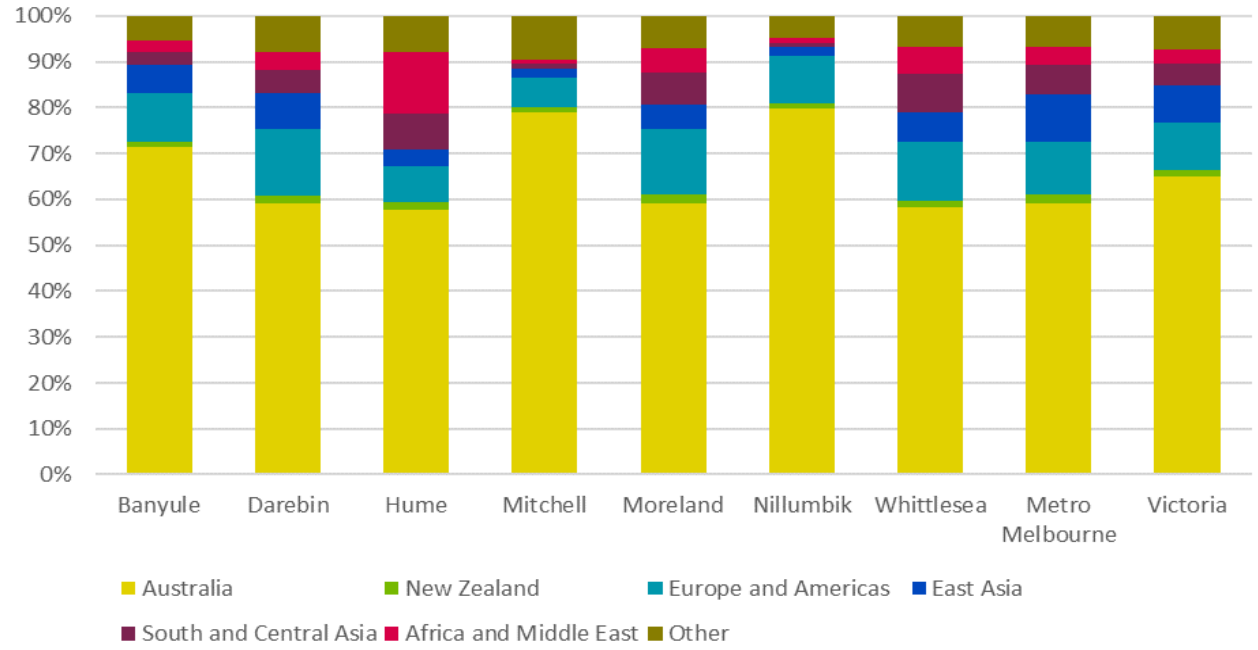
Source: ABS Census 2016

Cultural mix

Cultural mix is measured by the place of birth of the population as presented in Figure 65 and illustrated on the maps in Figure 66.

- Approximately 40 per cent of people living in Darebin, Hume, Moreland and Whittlesea LGAs were born overseas. While this is higher than the Victorian average (35 per cent), it is in line with the average for metropolitan Melbourne (41 per cent).
- Darebin, Hume, Moreland and Whittlesea LGAs also display greater proportions of people from different backgrounds and a higher cultural mix than other LGAs in the region.
- Banyule (71 per cent), Mitchell (79 per cent) and Nillumbik (80 per cent) LGAs have high proportions of Australian-born residents, especially when compared to metropolitan Melbourne (59 per cent) and Victoria (65 per cent).
- Looking at people born overseas, most LGAs (excluding the Shire of Nillumbik) also have a relatively high proportion of people born in South and Central Asia and East Asia.

FIGURE 65: PLACE OF BIRTH AS A PERCENTAGE OF TOTAL POPULATION (2016)



Source: ABS Census 2016

FIGURE 66 PLACE OF BIRTH (2016)

Source: ABS 2016 Census

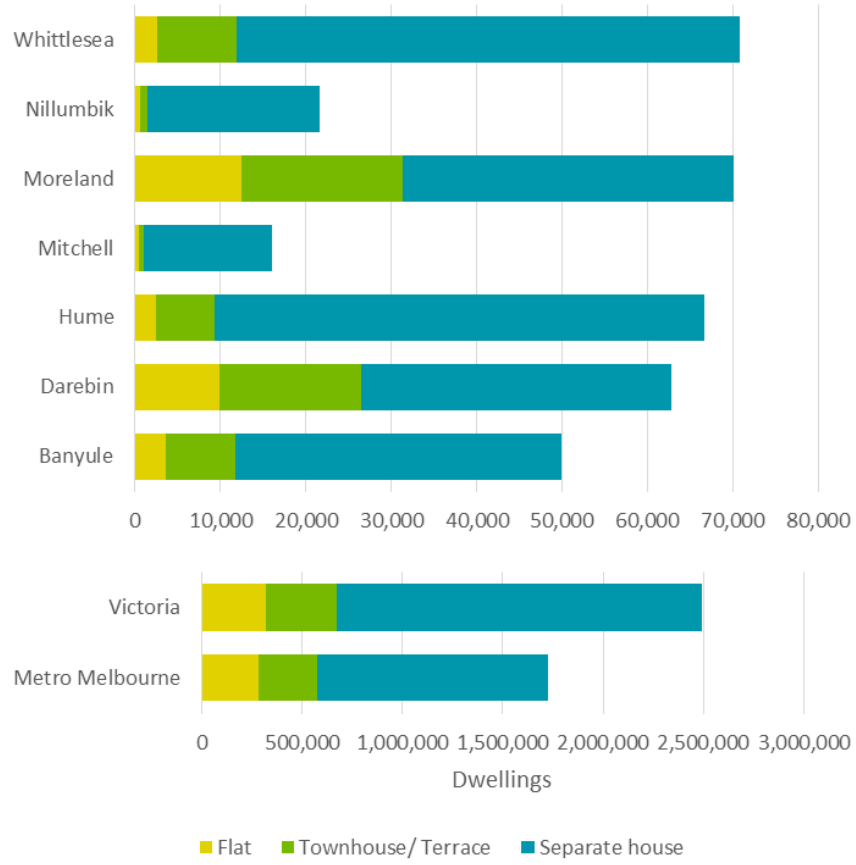
5.3 Housing diversity

Dwelling typology and activity

The diversity of housing in a location indicates the choices available to households. It is influenced by changes in property market and land available for residential development, but also the housing policy and regulations.

- As illustrated in Figure 67, the most common dwelling type in every municipality[7] is separate house.
- Moreland and Darebin LGAs have higher proportion of townhouse/terrace and apartments with higher densities closer to the inner areas of Melbourne and small pockets of low density areas.

FIGURE 67: DWELLING TYPE BY LGA (2016)



Source: ABS Census 2016

[7] Dwelling growth figure for the Shire of Mitchell is indicative due to availability of Housing Development Data coverage in 2006

Site density is one measure of housing diversity. It is derived from DELWP's Housing Development Data and is different to a gross or net density measure. It is based on the land (or lot) associated with each newly constructed dwelling only and does not include surrounding open space, roads, footpaths or other land required to support that residential use. While site density can provide some indication of the types of dwellings in an area, different dwelling types have overlapping site density ranges – for example a detached house on a small lot could have a higher site density than a development of large townhouses.

Site density is grouped in three broad ranges:

- High site density - greater than 60 dwellings per hectare (DPH)
- Medium site density - between 30 and 60 DPH
- Low site density - less than 30 DPH.

Figure 68 shows the net change in site density between 2005 and 2015. A negative number indicates there were fewer dwellings at a certain site density range in 2015 compared to 2005, possibly because a dwelling has been demolished or a site was subdivided or redeveloped to a higher density. For example, if one lower density dwelling is replaced by four higher density townhouses this would be measured as a reduction in lower site density and an increase in higher site density.

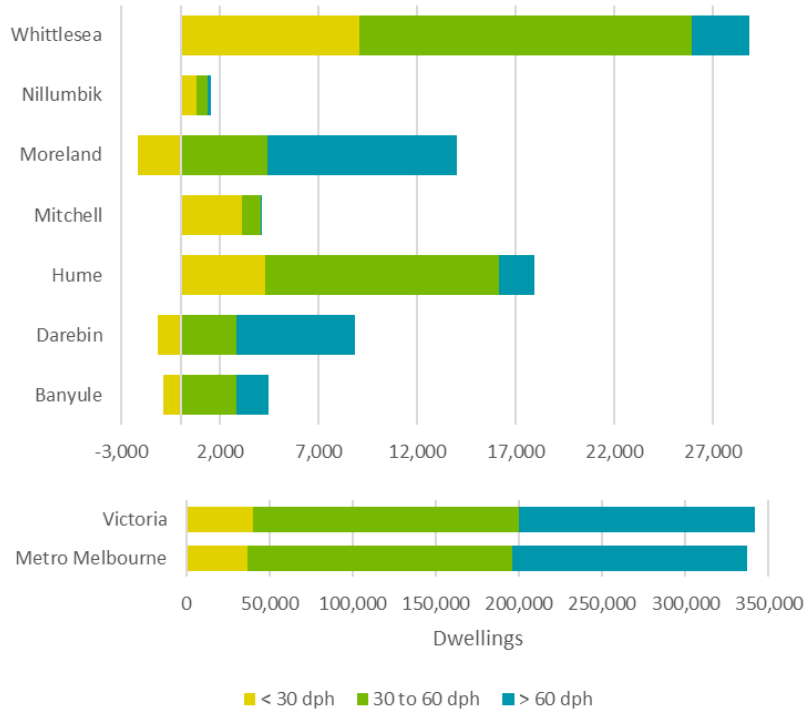
In the Northern Metro Region:

- The Northern Metro Region saw an increase in medium to high density dwellings between 2011 and 2016.
- Over the same period, there was a loss in low density dwellings in Moreland, Darebin and Banyule LGAs. This is likely due to the medium and high density developments in established areas that sometimes require demolitions of low density housing.
- Moreland and Darebin LGAs experienced higher shares of high density development. These LGAs have more transport options and higher public transport service frequency.
- In Whittlesea and Darebin LGAs, medium and high density development made up more than half of the dwelling supply in the last decade. This suggests that although townhouse and separate house are the dominant housing type in these areas, housing development density is increasing.

Figure 69 shows the densities at which housing growth has occurred in the 10 years between 2005 and 2015. It confirms that Moreland, Darebin and Banyule LGAs have the most diversity of housing types. There was some diversity among housing densities delivered in the City of Hume, and this was more limited in the City of Whittlesea.[8]

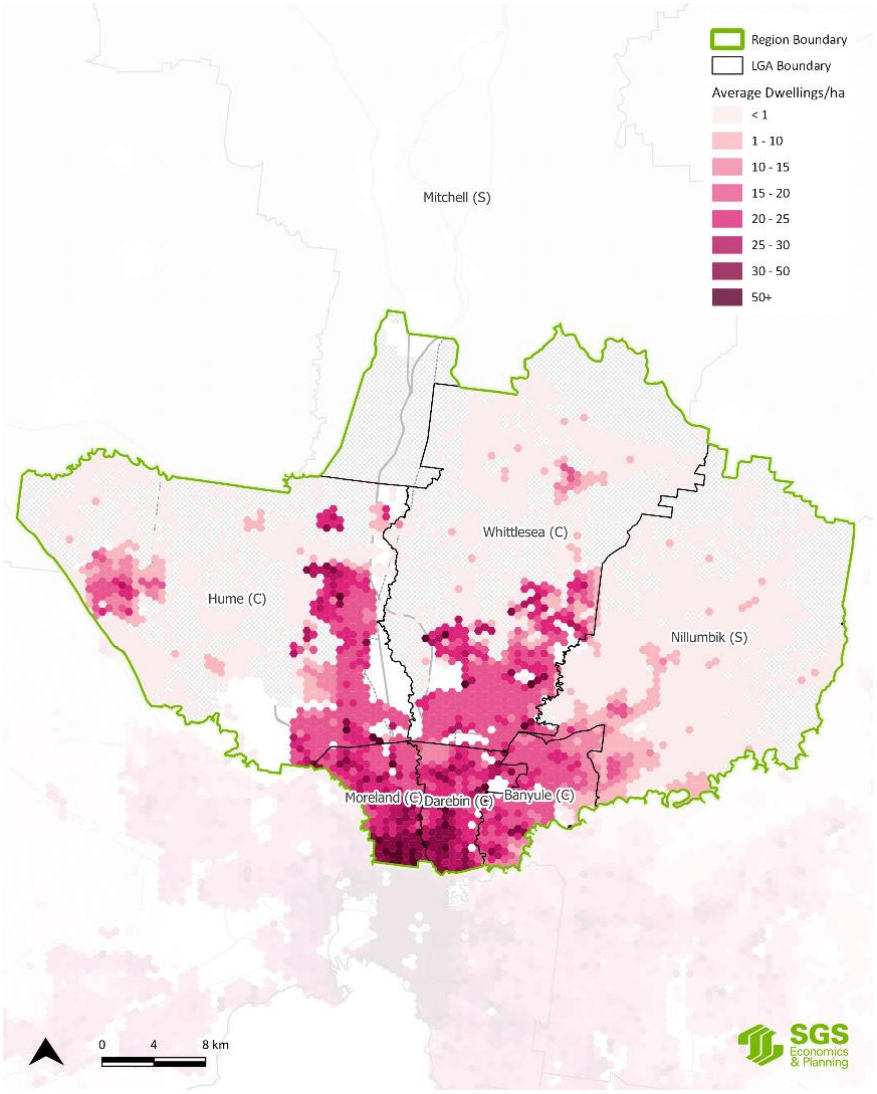
[8] It is noted that the Shire of Mitchell is not shown in Figure 68: CHANGE IN DWELLINGS BY SITE DENSITY (2005-2015), due to the availability of Housing Development Data (HDD), which is contained to the councils that as classified as being within Metropolitan Melbourne.

FIGURE 68: CHANGE IN DWELLINGS BY SITE DENSITY (2005-2015)



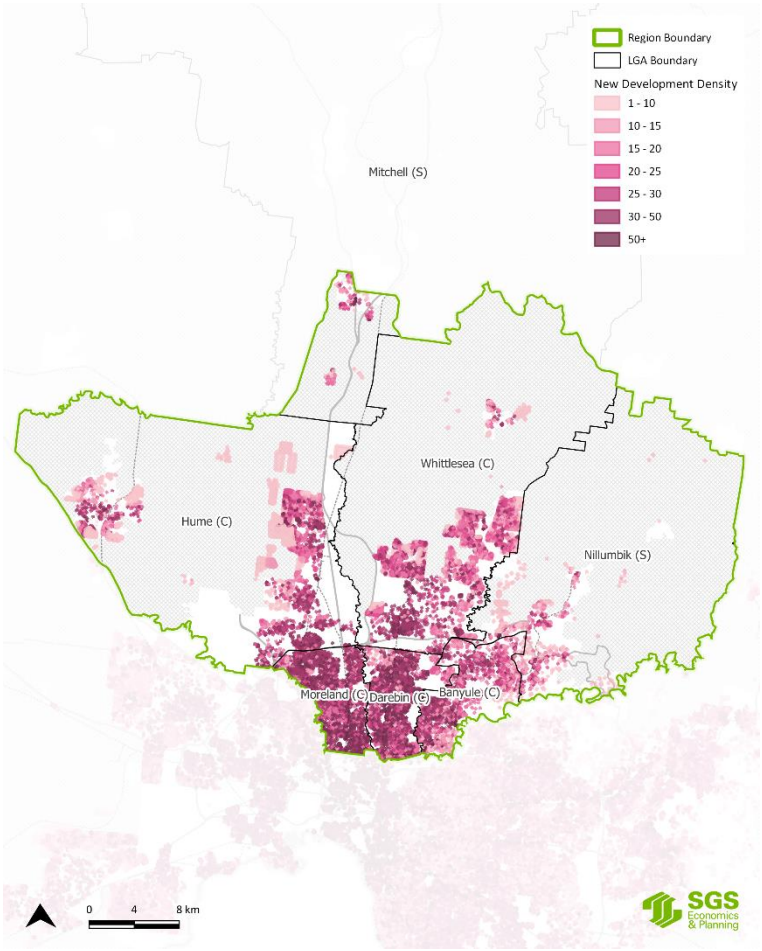
Source: DELWP Housing Development Data 2006 and 2016

FIGURE 69: AVERAGE DWELLINGS PER HECTARE (2016)



Source: DELWP Housing Development Data 2016

FIGURE 70: DEVELOPMENT DENSITY OF NEW PROJECTS (2005-2016)

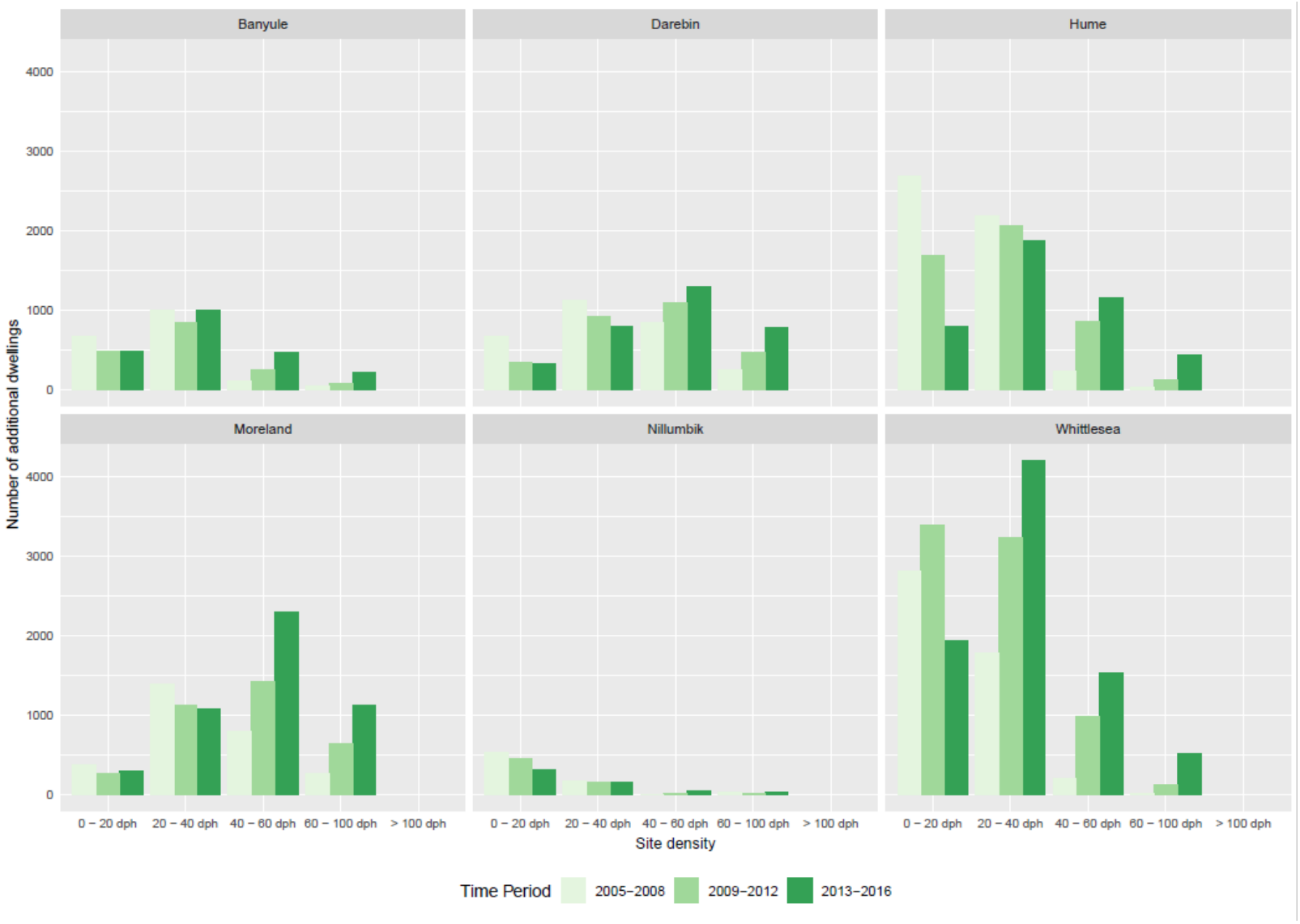


Source: DELWP Housing Development Data 2006 and 2016

Figure 71 (overleaf) shows the site densities for new dwellings in each LGA between 2005 and 2008; 2009 and 2012; and 2013 and 2016.

- The cities of Moreland and Darebin had the most new development with high site density.

FIGURE 71: DENSITY PROFILE OF NEW DWELLINGS (2005-2016)



Source: DELWP Housing Development Data 2006 and 2016

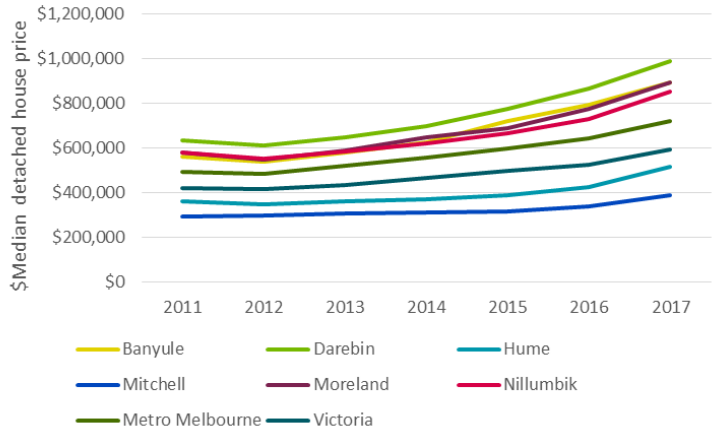
5.4 Housing prices and stress

Housing price

Figure 72 and Figure 73 present recent house price trends.

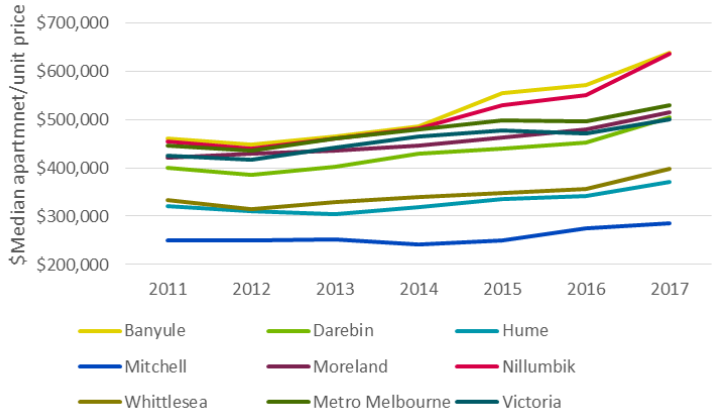
- The median price for detached houses in the Northern Metro Region reveals an upward trend between 2011 and 2017, while the median prices for apartments and units were more stable during the period, although this has started to increase in some LGAs since 2015 (Banyule, Darebin and Nillumbik LGAs).
- The increase in median apartment/unit prices between 2014 and 2017 in the City of Banyule and the Shire of Nillumbik may be associated with the smaller proportion of apartment development in recent years.
- By contrast, in the City of Darebin apartment and unit construction has grown and the likely increase is due to the desirability of many locations within the municipality.

FIGURE 72: MEDIAN DETACHED HOUSE PRICE (2011-2017)



Source: DELWP, 2017

FIGURE 73: MEDIAN APARTMENT/UNIT PRICE (2011-2017)



Source: DELWP, 2017

Housing stress

Housing stress reflects the balance between household income and housing expenditure. It can present both rental stress and mortgage stress and is defined as follows.

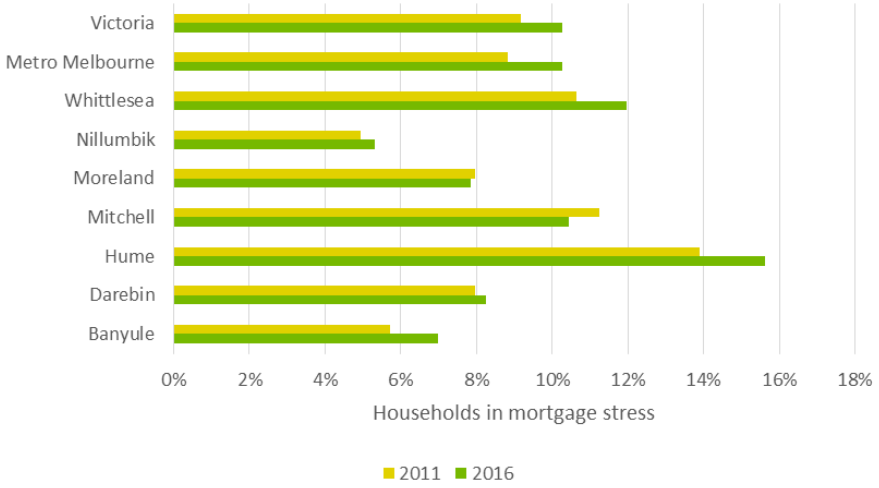
Households in rental stress are those which:

- are low income, defined as falling within the bottom 40th percentile of the household income distribution of Victoria
- spend at least 30 per cent of their household income on rent

Households in mortgage stress are those which:

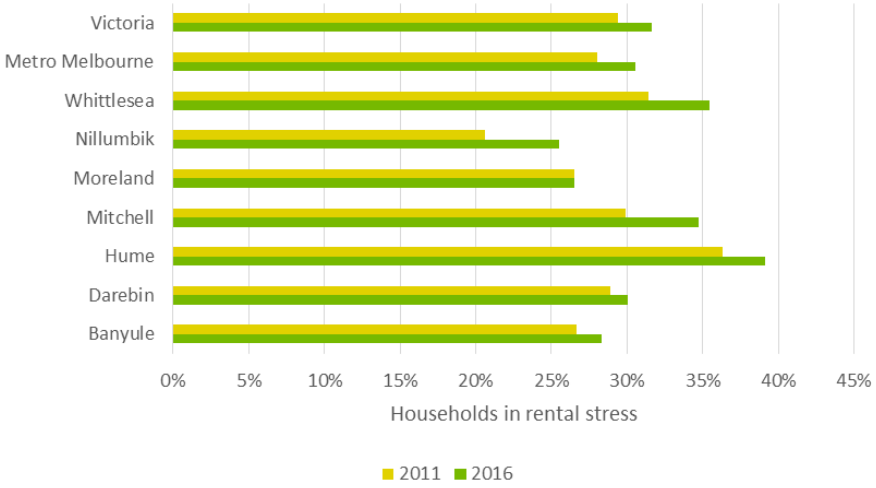
- are low income, defined as falling within the bottom 40th percentile of the household income distribution of Victoria
- spend at least 30 per cent of their household income on mortgage payments
- Figure 74 and Figure 75 present mortgage and rental stress by LGA, compared to the Victorian and metropolitan Melbourne averages. Figure 76 and Figure 77 illustrate the distribution of households with mortgage stress and rental stress in the Northern Metro Region.
- Nillumbik, Moreland (less than eight per cent), Darebin (approximately eight per cent) and Banyule (less than six per cent) LGAs have recorded a lower proportion of residents suffering mortgage stress than across metropolitan Melbourne or Victoria (averages between 8 and 10 per cent).
- The residential development patterns in these municipalities focus on apartments and units. Housing stock in areas close to the CBD also tends to attract investor-buyers who are less susceptible to housing stress.
- People living in the City of Hume have experienced the most profound change in mortgage stress (almost five per cent) from 2011 to 2016 and have the highest rate of mortgage stress in the region.
- Mortgage stress in the City of Whittlesea also rose noticeably between 2011 and 2016.
- The proportion of residents under rental stress (Figure 74) is highest in the City of Hume (approximately 38 per cent).
- Overall, the proportion of people experiencing rental stress is higher than those experiencing mortgage stress. Rental stress also tends to be higher in Outer Melbourne. This may be because the rental population is younger with a likely lower income, in a lower socio-economic bracket or in a temporary renting environment, reducing their need to secure lower long-term living costs.
- The more acute levels of rental or mortgage stress compared to the metropolitan or State average illustrated in the cities of Whittlesea and Hume may demonstrate more acute problems than other LGAs in the region.

FIGURE 74: LOW INCOME HOUSEHOLDS IN MORTGAGE STRESS (PERCENTAGE OF HOUSEHOLDS WITH A MORTGAGE) (2011 AND 2016)



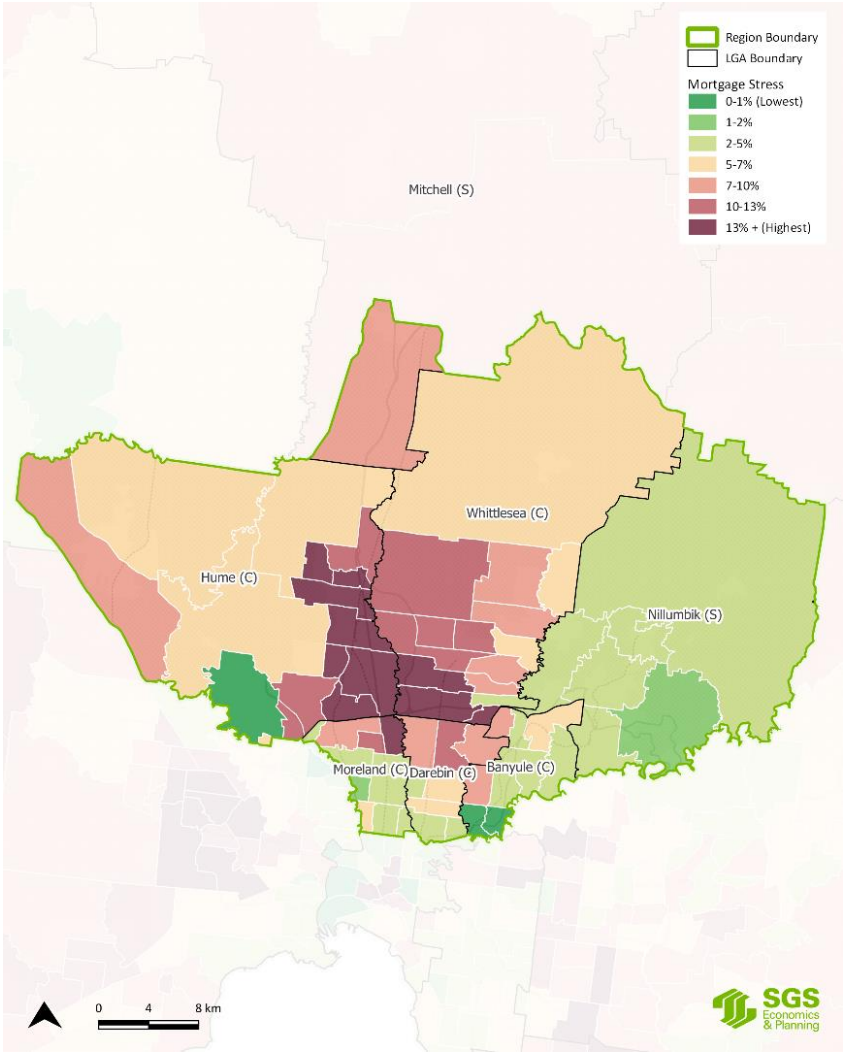
Source: ABS Census 2011 and 2016

FIGURE 75: LOW INCOME HOUSEHOLDS IN RENTAL STRESS (PERCENTAGE OF TOTAL HOUSEHOLDS RENTING) (2011 AND 2016)



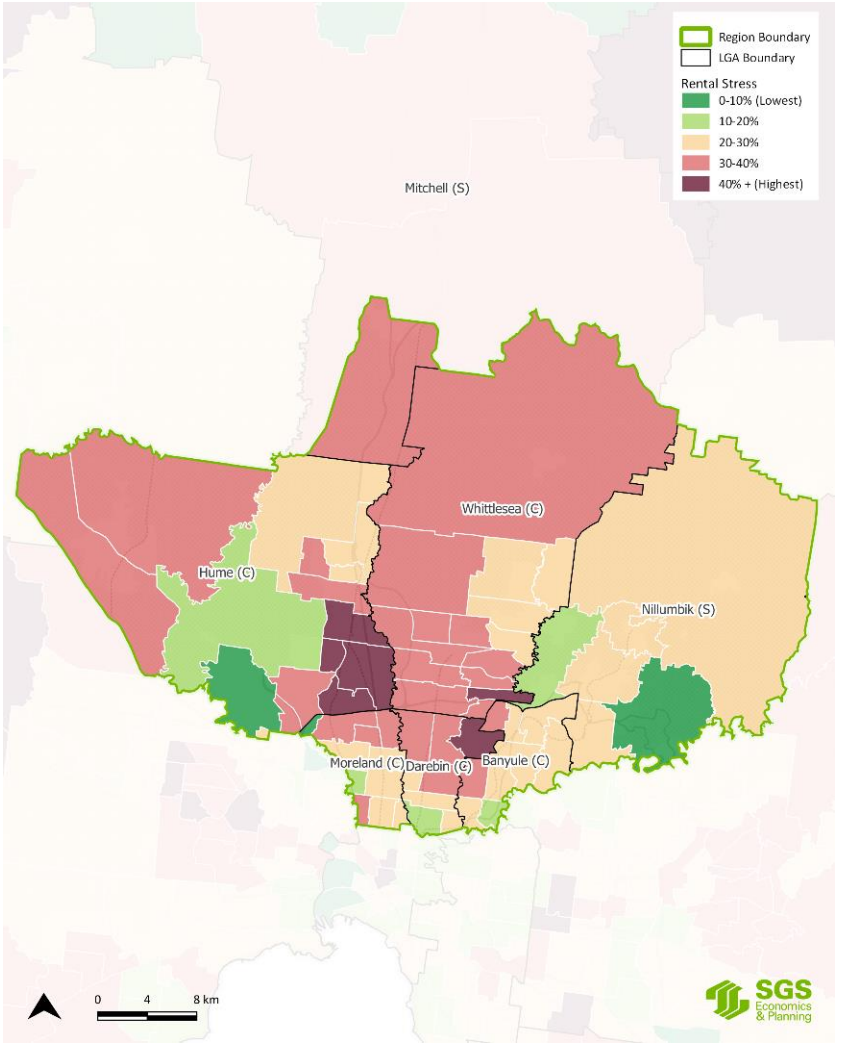
Source: ABS Census 2011 and 2016

FIGURE 76: HOUSEHOLDS IN MORTGAGE STRESS (PERCENTAGE OF TOTAL HOUSEHOLDS WITH MORTGAGE) (2016)



Source: ABS Census 2016

FIGURE 77: HOUSEHOLDS IN RENTAL STRESS (PERCENTAGE OF TOTAL HOUSEHOLDS RENTING) (2016)

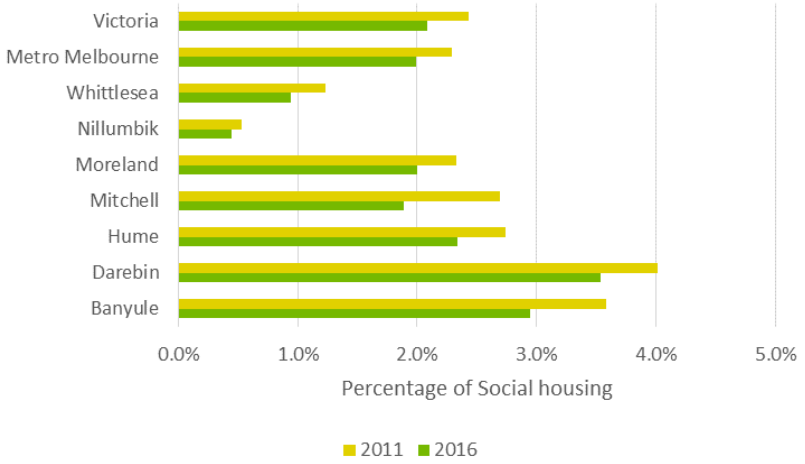


Source: ABS Census 2016

Figure 78 and Figure 79 present current trends in social housing (as a proportion of total dwellings) and homelessness (as a proportion of the total population).[9]

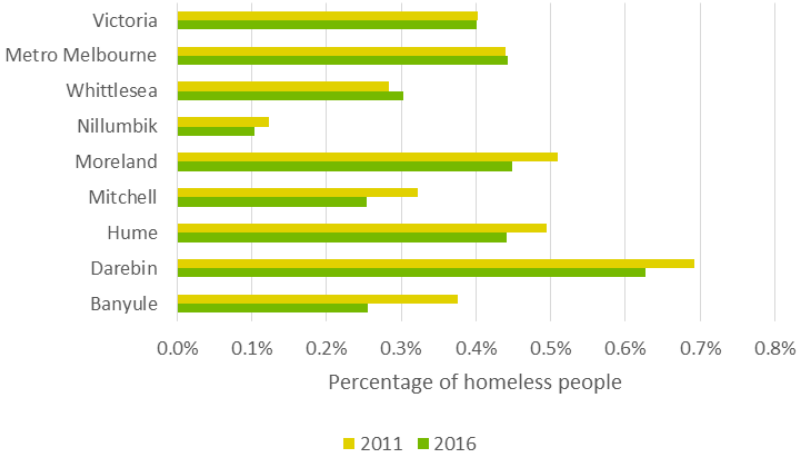
- The proportions of social housing are highest in Darebin and Banyule LGAs. However, the proportion of dwellings decreased between 2011 and 2016.
- The City of Whittlesea (a growth area council) and the Shire of Nillumbik have the lowest rates of social housing compared to metropolitan Melbourne, Victoria and other parts of the region.
- The proportions of homeless people in most LGAs decreased between 2011 and 2016, compared to stagnating rates for metropolitan Melbourne and Victoria.

FIGURE 78: SOCIAL HOUSING (PERCENTAGE OF TOTAL DWELLINGS) (2011 AND 2016)



Source: ABS Census 2011 and 2016

FIGURE 79: HOMELESS PEOPLE (PERCENTAGE OF TOTAL POPULATION) (2011 AND 2016)



Source: ABS Census 2011 and 2016

[9] Homelessness is defined as living in an inadequate dwelling, having no tenure, when initial tenure is short and not extendable or tenure does not allow people to have control of, and access to, space for social relations. ABS 2012

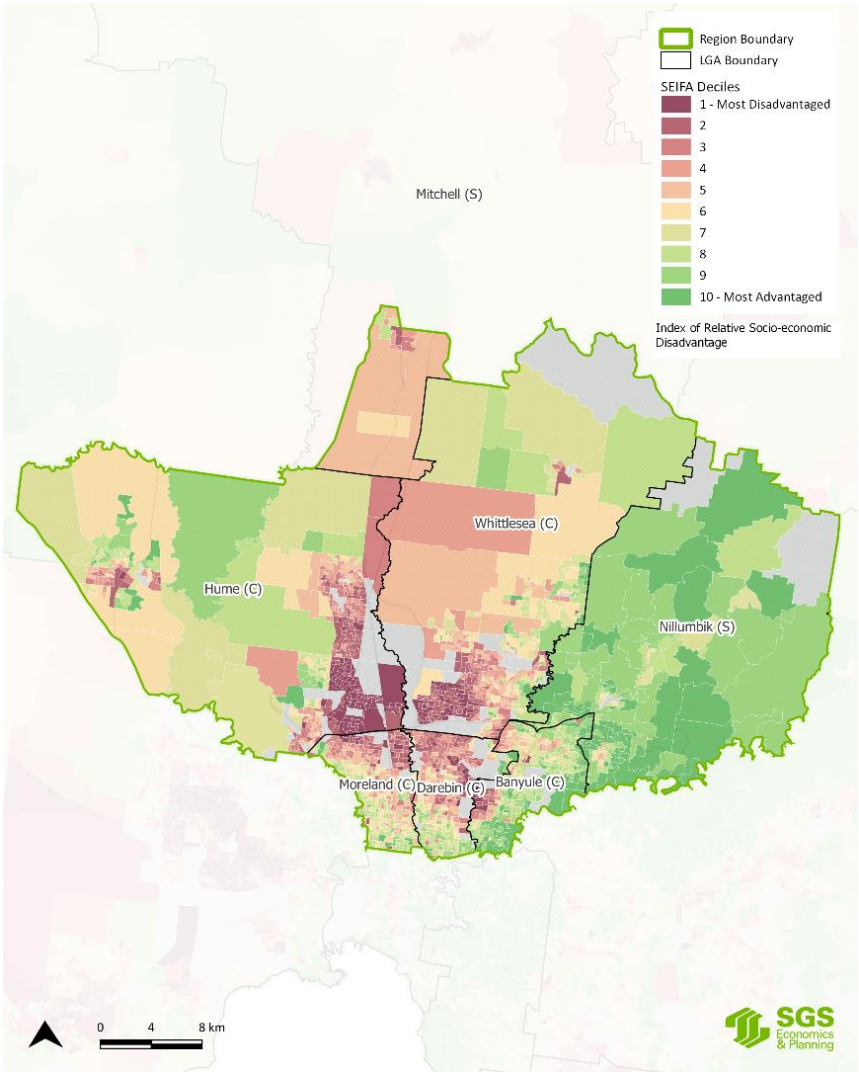
5.5 Disadvantage

SEIFA - Index of Relative Socio-Economic Disadvantage

Figure 80 shows the SEIFA Index of Relative Socio-Economic Disadvantage for the Northern Metro Region. It illustrates the rate of disadvantage relative to the national average, and considers occupation, education, housing, health status, English language proficiency, marital status, health and disability status, household composition, internet access and household income.

- The Northern Metro Region has several areas of concentrated disadvantage, clustered around Broadmeadows (City of Hume), Thomastown (City of Whittlesea) and the northern parts of the cities of Moreland and Darebin.
- The eastern parts of the City of Banyule are also more disadvantaged than many other areas across that LGA and the region.
- The inner parts of Moreland, Darebin and Banyule LGAs are less disadvantaged than many other densely settled parts of the region.
- The pattern of disadvantage is focused on areas experiencing, or whose populations are most affected by, broader structural economic changes (for example, parts of Broadmeadows and Epping, Glenroy, Greensborough, South Morang, Reservoir and West Heidelberg).

FIGURE 80: SEIFA INDEX OF RELATIVE SOCIO-ECONOMIC DISADVANTAGE (2016)



Source: ABS Census 2016

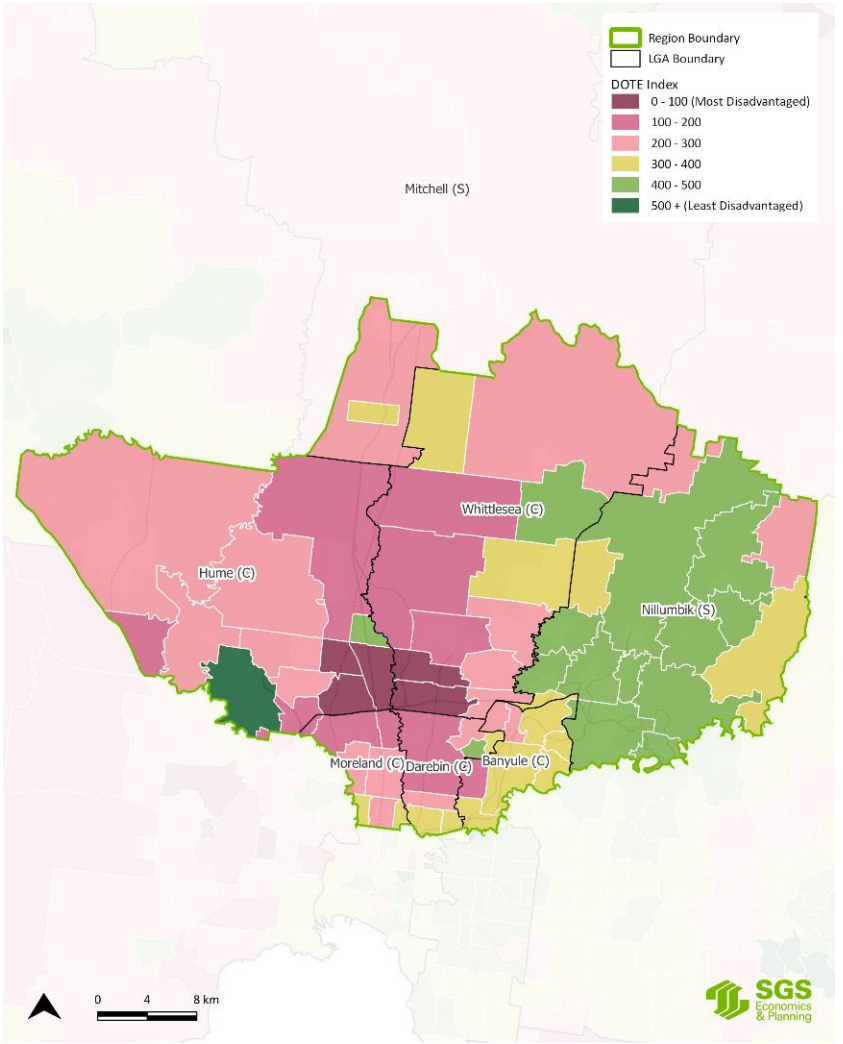
DOTE index

Jesuit Social Services and Catholic Social Services Australia developed the Dropping Off the Edge (DOTE) Index to measure disadvantage levels.

The DOTE Index consists of a range of indices, such as internet access, housing stress, overall education, juvenile convictions, and domestic violence. The Average Rank of the DOTE Index is used to evaluate the level of disadvantage based on postcodes.

- The DOTE Index Average Rank shows that the east of the Northern Metro Region appears to be the least disadvantaged.
- The western and northern parts of the Northern Metro Region in Hume and Whittlesea LGAs and the northern parts of Moreland and Darebin LGAs seem to be less advantaged due to lower skill levels and income.
- The Broadmeadows-Epping area appears to be the most disadvantaged, corresponding to Hume and Whittlesea LGAs' on-average lower employment skill levels and higher housing stress.

FIGURE 81: AVERAGE RANK, DOTE INDEX (2015)



Source: Jesuit Social Services and the Catholic Social Services Australia 2015 (note that 2015 data is latest available)

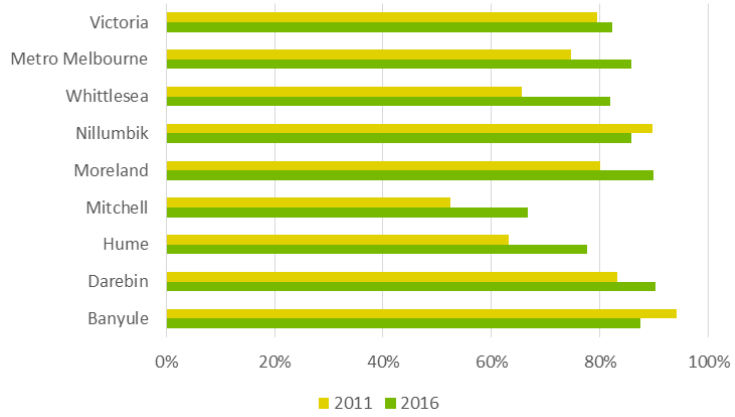
5.6 Youth engagement with work or study

Education levels

Education levels correlate to skill level, especially for people in the younger working age groups. The On Track survey conducted by Department of Education shows the study or work plans of high school completers six months after they finish high school.

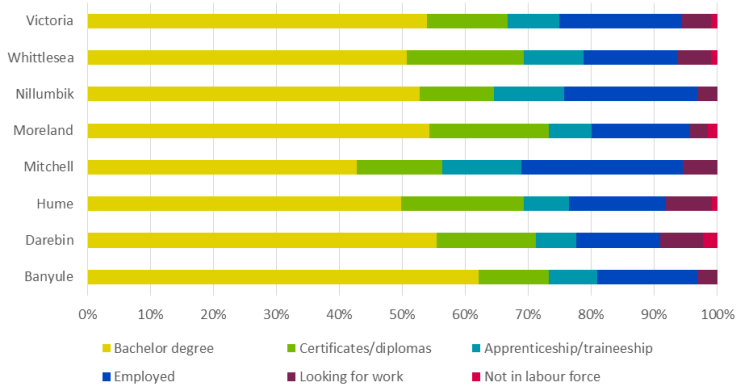
- The Shire of Mitchell and City of Hume have lower than average levels of people aged 20-24 with Year 12 or higher qualification compared to metropolitan Melbourne.
- Despite this, the chart also shows that the proportion of people who have attained Year 12 or a higher qualification increased more significantly in those LGAs than in other parts of the region.
- The increase in the population aged 20-24 with Year 12 or higher education in Mitchell, Whittlesea and Hume LGAs may be explained by skilled migrants moving into these growth suburbs.
- Most Year 12 completers in the Northern Metro Region subsequently sought tertiary education.
- The City of Banyule had the highest proportion of students enrolled at university after completing Year 12, possibly due to the municipality's relative socio-economic advantage (see Figure 80).

FIGURE 82: PERCENTAGE OF PEOPLE AGED 20 TO 24 WITH YEAR 12 OR HIGHER QUALIFICATION (2011-2016)



Source: ABS Census 2011 and 2016

FIGURE 83: DESTINATIONS OF 2017 YEAR 12 OR EQUIVALENT COMPLETERS (2017)



Source: On Track, Department of Education, 2017

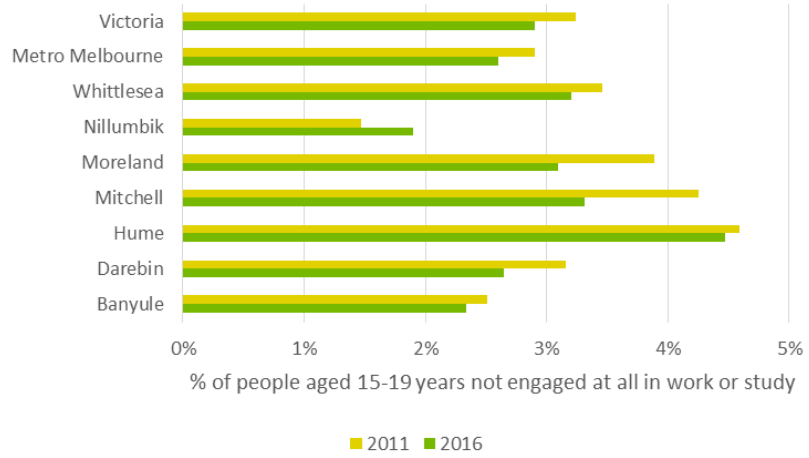
Engagement with work or study

The youth engagement rate in work or study can signify an area's level of education resources and the level of skills generally required to be employed in the local job markets.

Youth disengagement from work or study can stem from taking time off from studies, travel, illness and disability, or family commitment. The youth disengagement rate can also inform investments in education and professional training services.

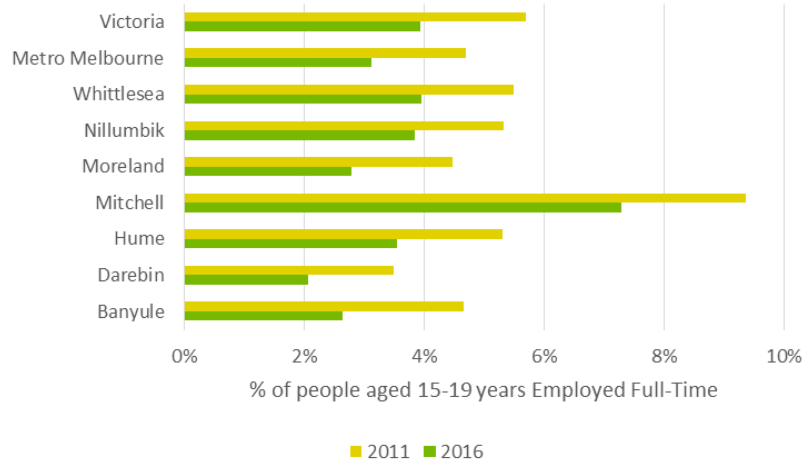
- Youth disengagement decreased from 2011 to 2016 across the Northern Metro Region, except for the Shire of Nillumbik (Figure 84).
- Youth participation in full-time work (Figure 85) decreased across the Northern Metro Region, metropolitan Melbourne and Victoria from 2011 to 2016. This corresponds to Figure 83, which shows participation rates in post-Year 12 qualifications above 60 per cent in almost all Northern Metro Region LGAs, with participation in study or full-time work is above 90 per cent in all LGAs.
- The Shire of Mitchell has a higher than average proportion of people aged 15-19 who are employed full time, compared to metropolitan Melbourne and Victoria. This is reflected in the higher rates of employment as shown in Figure 83.

FIGURE 84: YOUTH DISENGAGEMENT (2011-2016)



Source: ABS Census 2011 and 2016

FIGURE 85: YOUTH LABOUR PARTICIPATION (2011-2016)



Source: ABS Census 2011 and 2016

5.7 Population health

Hospital inpatient separations

In-patient separations are a measure of the number of instances a patient leaves a hospital because of death, discharge, sign-out against medical advice or transfer. It is a common measure of the utilisation rate of hospital services.

- The number of in-patient separations and the change from 2011 to 2016 is relatively consistent throughout the Northern Metro Region, and comparable to the Victorian and metropolitan Melbourne averages.
- The Shire of Nillumbik has the lowest rate of in-patient separations, while the Whittlesea, Darebin and Banyule LGAs are highest.

FIGURE 86: IN-PATIENT SEPARATIONS PER 1000 POPULATION (2011-2016)

Source: DHHS Local Government Area Statistical Profiles, 2011 and 2015 (note that 2015 data is latest available).

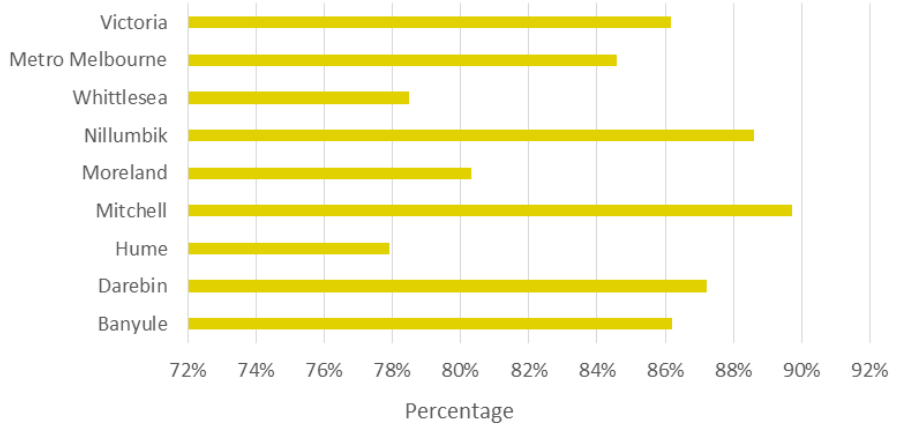
Access to community and health care services

Community health services are provided to the community alongside general health practitioners and are privately funded services that support primary health services in Victoria.

The scope of community health services can include human services such as drug and alcohol rehabilitation, post-acute care and disability care. The level of access to community and health care services indicates a region's social advantages and disadvantages.

- There is a profound difference in community service accessibility across the Northern Metro Region based on where people live.
- People living in the growth area councils (Hume and Whittlesea LGAs) have the lowest rate of accessibility compared to elsewhere in the region and the metropolitan and Victorian average.
- People living in the City of Moreland also have less access to community services and resources than elsewhere.

FIGURE 87: PERCENTAGE OF PEOPLE WHO COULD DEFINITELY ACCESS COMMUNITY SERVICES AND RESOURCES BY LGA (2015)



Source: DHHS Local Government Area Statistical Profiles, 2015 (note that 2015 data is latest available)

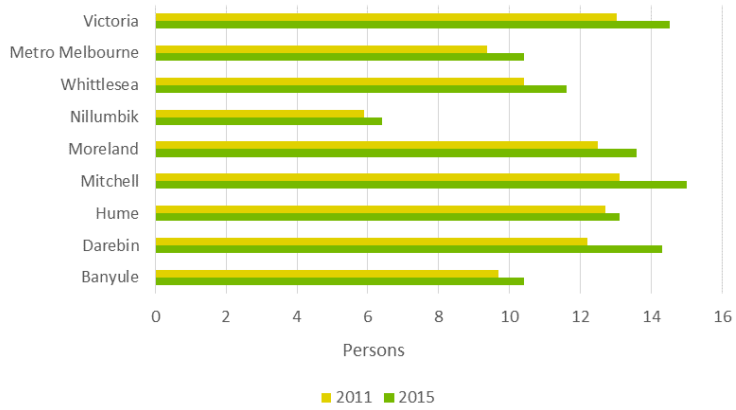
Mental health and drug and alcohol use

Drug and alcohol use and/or poor mental health can lead to adverse health and wellbeing outcomes.

There are limitations to this data. A shortage of services may hide the extent of true demand and the dataset only includes public patients. More affluent areas are likely to have mental health and drug and alcohol patients seeking private care; conversely, the availability of more services may mean higher demand. High utilisation of services might also reflect the availability of a service, a high quality service, and/or a highly accessible service.

- Few municipalities across the Northern Metro Region have higher numbers of mental health clients than the Victorian average. However, most have higher numbers than the metropolitan Melbourne average, excluding the Shire of Nillumbik.
- Other than the Shire of Nillumbik and the City of Hume, the remaining LGAs recorded a decrease in the ratio of drug and alcohol clients. This pattern is in line with broader trends across Victoria and Melbourne.

FIGURE 88: REGISTERED MENTAL HEALTH CLIENTS PER 1,000 PEOPLE BY LGA (2011-2015)



Source: DHHS Local Government Area Statistical Profiles 2011 and 2015 (note that 2015 data is latest available)

FIGURE 89: DRUG AND ALCOHOL CLIENTS PER 1,000 PEOPLE (2011-2015)

Source: DHHS Local Government Area Statistical Profiles 2011 and 2015 (note that 2015 data is latest available)

Home and Community Care Services (HACC)[10]

Home and Community Care (HACC) services provide outreach services to allow people aged 65 and over and people with a disability to live in their communities for longer. Services may include centre-based day respite, transport, basic in-home services and social support.

The HACC 'target population' indicates the number of people eligible to receive services from a HACC program funded by the Victorian or Australian Government and usually delivered by local government. To determine service levels, a needs assistance measure examines the proportion of 'older and frail people with moderate, severe or profound disabilities'. The size and location of the target population in Victoria is estimated from responses to Census questions on 'need for assistance' with self-care, mobility or communication, counted at an LGA geography.[11]

The rate per 1,000 indicates a relative need of service provision in different LGAs, and this can be used to compare LGAs in the relative extent of HACC provision compared to the population. Because of the multiple occasions of service, it is possible for a given LGA to show more people getting a HACC service in a year than the count of individuals in the HACC target population.[12]

- In the Northern Metro Region, the Shire of Nillumbik has the largest ratio of HACC clients per 1,000 people, while the City of Whittlesea has the lowest. Numbers of HACC are also higher in the City of Banyule and the Shire of Mitchell.
- The lower ratios in Darebin, Hume, Moreland and Whittlesea LGAs reflects the lower proportion of older people in those LGAs generally, and the low growth rates of this age group between 2011 and 2016 (see Figure 60 and Figure 61).

There appears to be some correlation between the percentage change in age groups (Figure 61) and areas where the ratio of older people using HACC services is higher – as, for example, is the case in the shires of Nillumbik and Mitchell and the City of Banyule.

TABLE 11: HACC CLIENTS (2015)

Geography	HACC client aged 65+/1,000
Banyule	794.1
Darebin	492.9
Hume	503.6
Mitchell	852.6
Moreland	553.6
Nillumbik	1006.1
Whittlesea	421.4
metropolitan Melbourne	688.5
Victoria	973.3

Source: DHHS Local Government Area Statistical Profiles 2015 (note that 2015 data is latest available)

[10] On 1 July 2016 funding and management of HACC services for older people were replaced by Commonwealth Home Support Programme (CHSP) and by HACC Program for Younger People (HACC PYP). The use of former HACC data will therefore not set a future benchmark to measure progress.

[11] The target population is adjusted by removing those living in residential aged care or DVA card holders.

[12] Department of Health and Human Services, *Data item definitions: 2015 local government area profiles*, 'Home and Community Care (HACC) clients', November 2015.

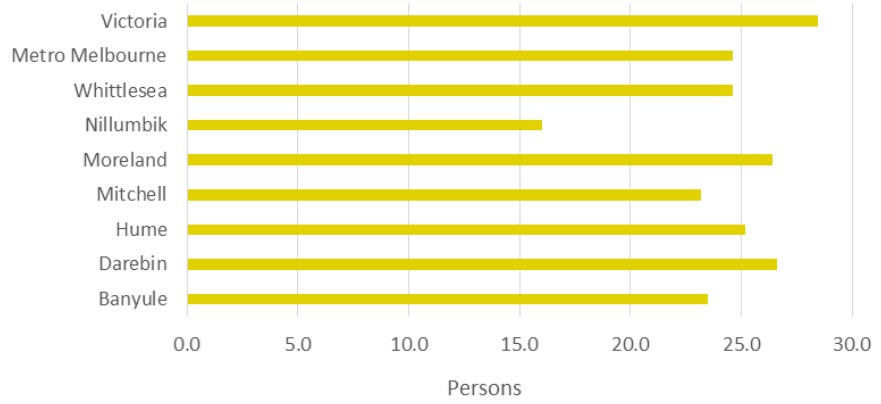
Ambulatory Care Sensitive Conditions (ACSC)

Ambulatory Care Sensitive Conditions (ACSC) describe conditions for which hospitalisation could be avoided through public health interventions and early disease management, usually delivered in an ambulatory setting such as primary care (PPH or Potentially Preventable Hospitalisations).

High rates of hospital admissions for ACSCs may provide indirect evidence of problems with patient access to primary healthcare, inadequate skills and resources, or disconnection with specialist services.[13]

- The rate of ACSC is higher than the metropolitan Melbourne average in Moreland, Darebin and Hume LGAs. As described above, this may reflect the transport options and access in these locations.

FIGURE 90: ACSC (PPH) SEPARATIONS FOR ALL CONDITIONS PER 1,000 POPULATION



Source: DHHS Local Government Area Statistical Profiles 2015 (note that 2015 data is latest available)

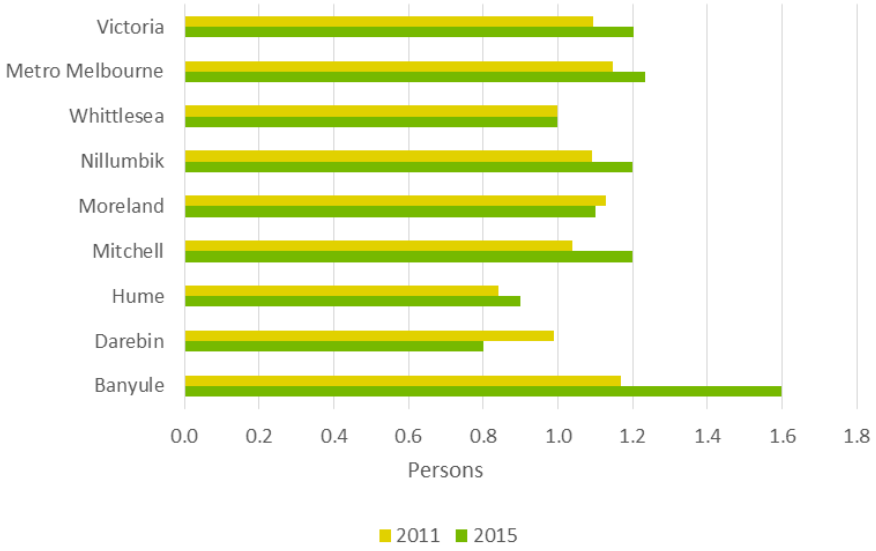
[13] Source: Victorian Admitted Episode Dataset (VAED), Department of Health and Human Services; Estimated Resident Population (ERP, Australian Bureau of Statistics (ABS).

Access to general practitioners (GPs)

Access to general practitioners (GPs) contributes to a region's community services and resident wellbeing. It also helps describe an area's level of healthcare resources.

- The City of Banyule currently has the highest provision of GPs per 1,000 people in the region.
- There are fewer GPs per 1,000 people in the all other LGAs than the metropolitan Melbourne and Victorian averages.

FIGURE 91: NUMBER OF GENERAL PRACTITIONERS PER 1,000 PEOPLE BY LGA (2011-2015)



Source: DHHS Local Government Area Statistical Profiles 2011 and 2015 (note that 2015 data is latest available)

Type 2 diabetes

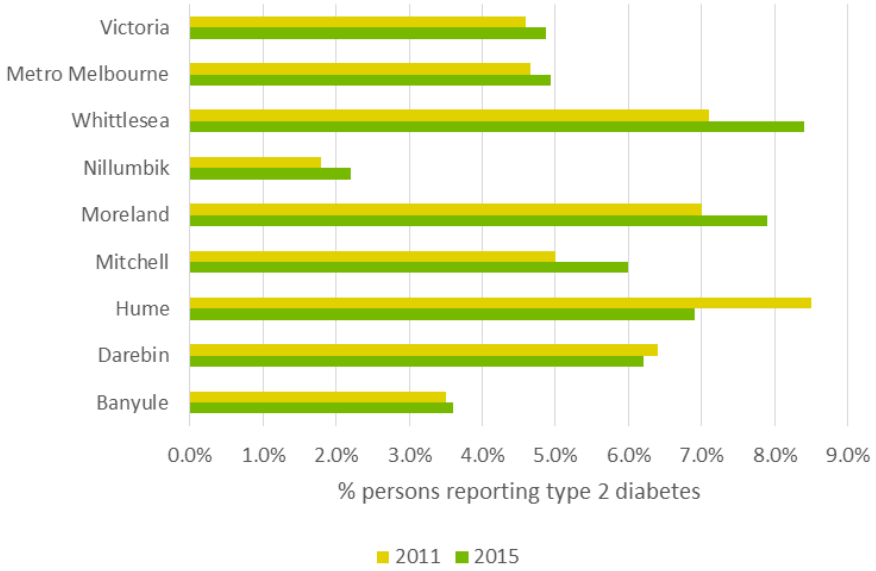
People with diabetes are at greater risk of chronic health conditions and its occurrence is closely linked with the prevalence of obesity. The number of diabetes cases in the population indicates a higher risk of chronic health conditions, including cardiovascular disease, blindness, amputation, kidney disease and depression.

People from the most socioeconomically disadvantaged areas are more likely to have Type 2 diabetes. Males in the lowest socioeconomic group were almost twice as likely to report Type 2 diabetes as those in the highest socioeconomic group. For females, the rate in the lowest socioeconomic group is 2.5 times that in the highest socioeconomic group.[14].

The number of new cases of diabetes helps to predict future needs for health services and to evaluate the effectiveness of prevention programs.

- The prevalence of Type 2 diabetes is pronounced in Whittlesea and Moreland LGAs, while in the City of Hume prevalence reduced between 2011 and 2016, although it remains higher than the State average.
- There was an increase in the prevalence of Type 2 diabetes in Whittlesea and Moreland LGAs between 2011 and 2016, while the City of Hume recorded a decrease.

FIGURE 92: INCIDENCE OF TYPE 2 DIABETES BY LGA (2011-2015)



Source: DHHS Local Government Area Statistical Profiles 2011 and 2015 (note that 2015 data is latest available)

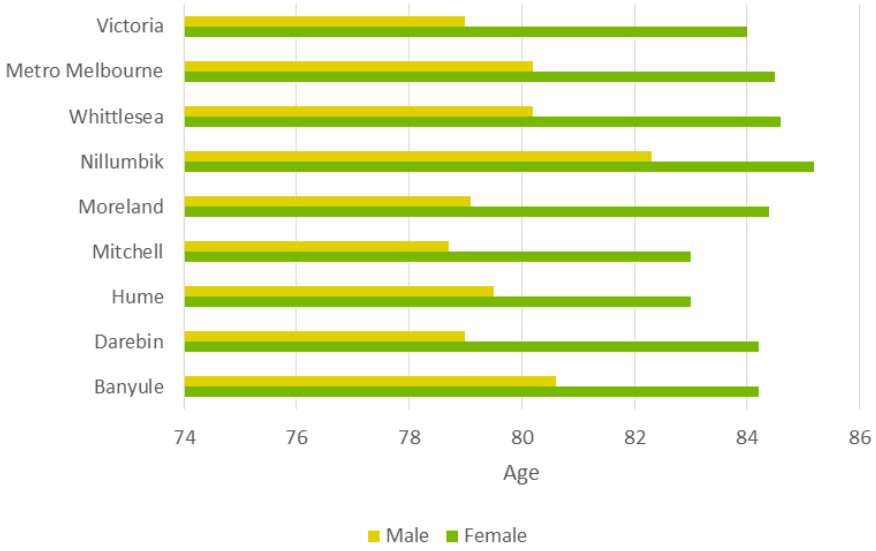
[14] AIHW 2002

Life expectancy at birth

Life expectancy at birth is an indicator of living standards, lifestyle and education factors, as well as access to quality health services.

- Across the region, life expectancy at birth is higher for females than males – consistent with the metropolitan Melbourne and Victorian averages
- Life expectancy for males is lower than the metropolitan Melbourne average in Moreland and Darebin LGAs, as well as in the Shire of Mitchell.
- Life expectancy for females is lowest in the Shire of Mitchell and the City of Hume – lower than the State and metropolitan averages.

FIGURE 93: LIFE EXPECTANCY AT BIRTH (2015)



Source: DHHS Local Government Area Statistical Profiles 2015 (note that 2015 data is latest available)

5.8 Early childhood outcomes

The importance of the early years of childhood development is clear, with early life experiences affecting lifelong health and wellbeing in several ways.

Birth weight and immunisation

Birth weight is the bodyweight of a newborn at birth. It can be affected by the mother's health during pregnancy, pharmaceutical consumption or lifestyle (Table 12). Birth weight has also been theorised to correlate to obesity and diabetes.

The Australian Childhood Immunisation Register (ACIR) provides information about vaccine coverage at 12 months, 24 months and six years of age. The immunisation rate is measured as children who have received all the standard immunisations appropriate to their age.

- The percentage of babies born with low birth weight is low throughout the region and relatively consistent with the state and metropolitan averages – between five and seven per cent.
- The incidence of low birth weight is slightly higher in Hume, Mitchell and Whittlesea LGAs.
- Rates of immunisation are also relatively consistent across the region. The proportion of children immunised fully immunised by the age of 24 months decreased at a rate that was largely consistent across the region.

TABLE 12: LOW BIRTH WEIGHT AND IMMUNISATION RATE BY LGA (2015)

LGA	% Low birth weight babies 2012-14	% Children fully immunised at 12 months 2015	% Children fully immunised at 24 months 2015
Banyule	5.4%	92.6%	91.9%
Darebin	6.4%	92.8%	87.8%
Hume	7.2%	91.5%	88.8%
Mitchell	7.2%	93.4%	91.0%
Moreland	5.9%	91.5%	90.4%
Nillumbik	5.7%	92.7%	91.0%
Whittlesea	7.0%	93.7%	90.8%
Metropolitan Melbourne	6.3%	92.0%	89.5%
Victoria	6.3%	92.2%	89.7%

Source: Social Health Atlases, 2015 (note that 2015 data is latest available)

Child protection substantiations

Child protection substantiations refer to children who receive child protection services, including those subject to an investigation of notification, on a care and protection order, and/or in out-of-home care.

- The LGAs with the highest ratio of child protection substantiations are the City of Hume and the Shire of Mitchell. These LGAs are in line with the Victorian average, but above the metropolitan Melbourne average.
- All other LGAs in the Northern Metro Region have incidence ratios of child protection substantiations lower than the metropolitan and state averages.

TABLE 13: CHILD PROTECTION SUBSTANTIATIONS (2015)

LGA	Child protection substantiations / 1,000 head
Banyule	6
Darebin	8
Hume	12
Mitchell	11
Moreland	7
Nillumbik	4
Whittlesea	8
Metropolitan Melbourne	9
Victoria	12

Source: Social Health Atlases, 2015 (note that 2015 data is latest available)

Development vulnerability

The Australian Early Development Centre (AEDC) identifies five domains of early childhood development, measured at the commencement of primary school:

- physical health and wellbeing
- social competence
- emotional maturity
- language and cognitive skills (school-based)
- communication skills and general knowledge.

Table 14 illustrates the levels of developmental vulnerability faced by children across the Northern Metro Region.

- Early childhood outcomes are poor in the Northern Metro Region when considering the AEDC domains. Hume, Moreland and Mitchell LGAs have higher percentages of children who are developmentally vulnerable across two or more domains, or who are vulnerable in the emotional domain specifically compared with the Victorian and metropolitan Melbourne averages (which are relatively consistent).
- The rate of child vulnerability is substantially lower in the Shire of Nillumbik, much lower than the Victorian and metropolitan Melbourne average.

TABLE 14: PERCENTAGE OF DEVELOPMENTALLY VULNERABLE CHILDREN (2015)

LGA	% Children developmentally vulnerable in two or more domains	% Children developmentally vulnerable in emotional domain
Banyule	6.0%	5.6%
Darebin	7.2%	6.5%
Hume	13.5%	9.3%
Mitchell	12.0%	11.8%
Moreland	10.3%	7.9%
Nillumbik	3.6%	4.6%
Whittlesea	9.9%	6.4%
Metropolitan Melbourne	9.5%	7.6%
Victoria	9.9%	8%

Source: Social Health Atlases, 2015 (note that 2015 data is latest available)

Crime

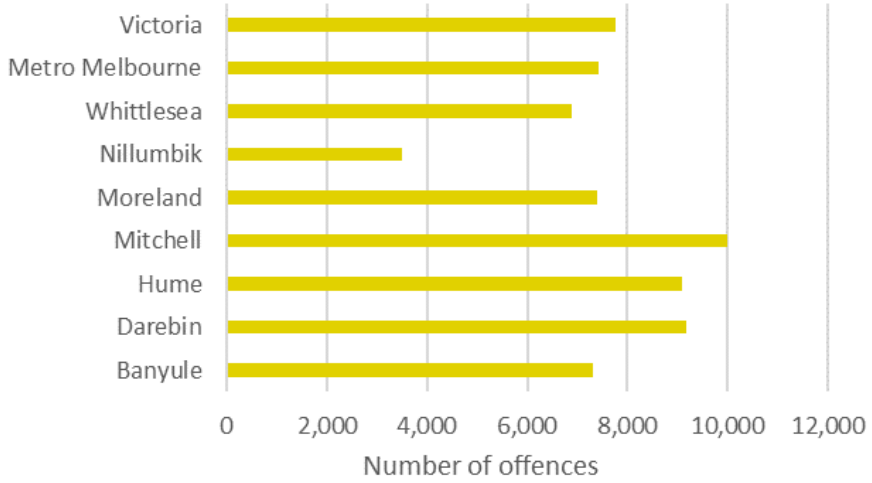
The rate of crime in an area may correlate with its level of socio-economic disadvantage, where a higher crime rate can be associated with higher socio-economic disadvantage and vice versa. Understanding an area's crime rate allows policymakers to allocate policing resources or evaluate other measures that might help to reduce crime rates.

There is a discrepancy between publicly-perceived crime rates and recorded crime statistics. Crime rate incorporates myriad offence types, which could mean varying growth trends between different offences. For instance, the increasing rate of a certain offence can co-exist with an overall dropping crime rate.

The Crime and Statistics Agency provides data on crime statistics. Offence rate is often measured with offence counts per 100,000 population during a given period, using the latest estimated resident population.

- Mitchell, Hume, and Darebin LGAs have the highest offence rates in the Northern Metro Region, and those rates were higher than the metropolitan Melbourne and Victorian averages in 2018.
- The Shire of Nillumbik had an offence rate that was less than half of the metropolitan and State averages, and it is significantly lower than other LGAs in the region.

FIGURE 94: OFFENCE RATE PER 100,000 POPULATION (2018)



Source: Crime Statistics Agency, 2018

Wellbeing

The Self-Reported Personal Wellbeing Index, also known as the Subjective Wellbeing Index, is published in the VicHealth Indicators Survey. It measures not only illness but also people's mental health and their perceptions about their lives.

According to the Victorian Health Promotion Foundation, a higher score on the Subjective Welling Index indicates better mental and physical health, higher productivity and stress-coping abilities, and higher engagement in social and humanitarian activities.

'Sense of safety walking alone after dark' is an indicator published by Social Health Atlases to understand how people feel about their community during night time. The level of sense of safety walking alone after dark can inform the provision of infrastructure to address low feelings of safety, such as street lights and emergency reporting systems.

- Nillumbik and Banyule LGAs were the only LGAs to score above the Victorian average on the Subjective Wellbeing Index. These two LGAs also have the lowest housing stress and highest household income in the region.
- The City of Hume has the lowest sense of safety walking alone after dark in the region, and it is also markedly lower than metropolitan and State averages, despite having similar offence rate to Mitchell and Darebin LGAs.

TABLE 15: SUBJECTIVE WELLBEING INDEX

LGA	Subjective wellbeing index
Banyule	78.4
Darebin	75.6
Hume	75.9
Mitchell	76.6
Moreland	76.1
Nillumbik	78.3
Whittlesea	76.9
Victoria	77.3

Source: VicHealth Indicators Survey, 2015

TABLE 16: SENSE OF SAFETY WALKING ALONE AFTER DARK

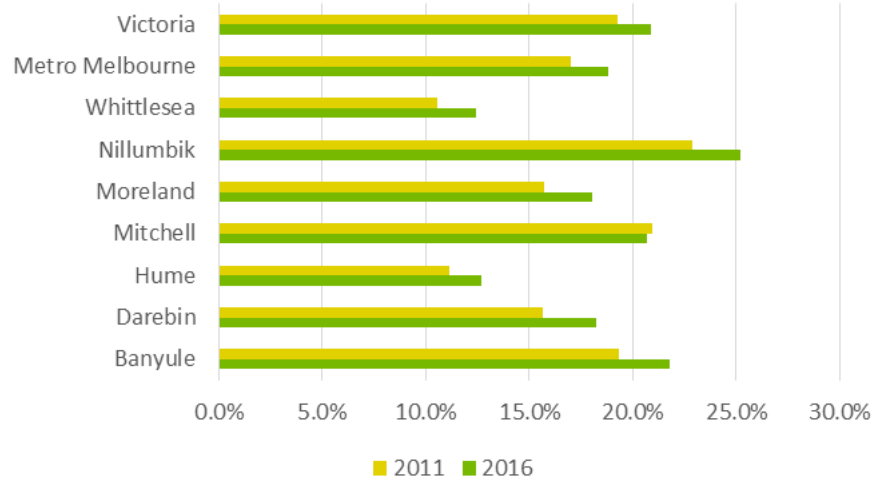
LGA	ASR per 100 (Age standardised rate)
Banyule	54.4
Darebin	49.8
Hume	39.8
Mitchell	52.1
Moreland	52.8
Nillumbik	61.4
Whittlesea	41.9
Metropolitan Melbourne	51.9
Victoria	53.0

Source: Social Health Atlases, 2018

The volunteering rate reflects an area's level of participation in volunteer work. It is calculated based on the number of people who volunteer out of the total population.

- Although the rate of volunteering increased in most LGAs from 2011 to 2016, the Northern Metro Region generally reports lower rates of volunteering than the metropolitan or State average, except in the Shire of Nillumbik and the City of Banyule.

FIGURE 95: PERCENTAGE OF POPULATION VOLUNTEERING



Source: ABS Census 2011 and 2016

6 ENVIRONMENTAL

ENVIRONMENTAL INDICATORS

The Infrastructure Victoria environmental indicators that underpin this section are:

- Open space, including green space
- Land
- Water assets
- Canopy cover
- Stream condition
- Coastal and bay health
- Air quality
- Flood risk
- Sea level rise
- Bush fire
- Urban heat island effect and heat risk
- Contaminated groundwater and other sites
- Access and use of green space
- Visitation to parks
- Water security
- Renewable energy
- Extractives industry
- Waste

REGIONAL OVERVIEW

The environmental profile of the Northern Metro Region is characterised by:

- diverse environmental assets including concentrations of green space in north east, and rivers and reservoirs critical to water security
- agricultural land in middle to outer areas and especially the west
- several operational landfill sites
- Natural Temperate Grasslands, an endangered ecological community.

ENVIRONMENTAL STRENGTHS

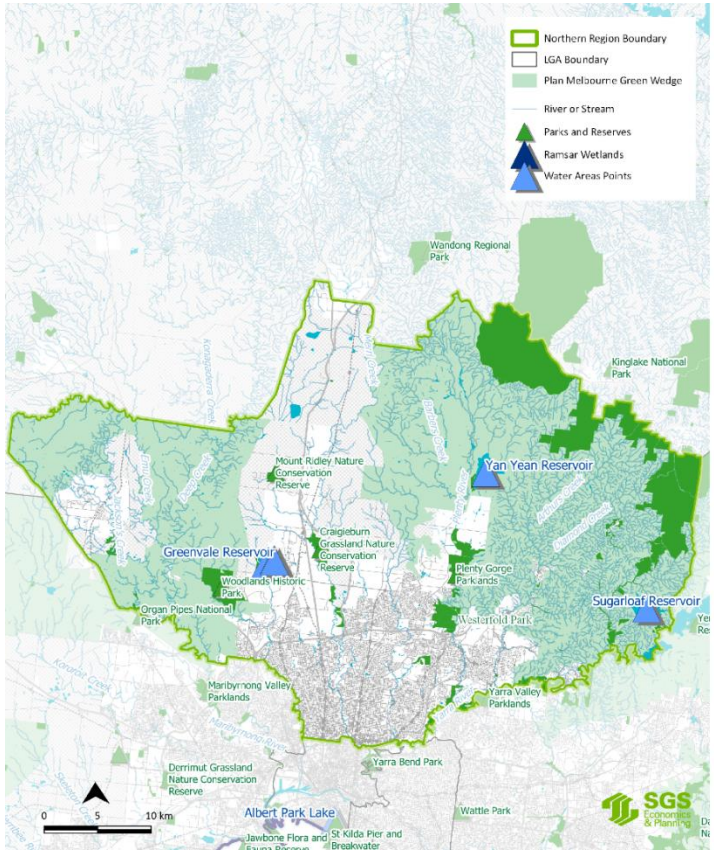
- Land available for urban development
- A large proportion of residents within the UGB (excluding New Growth Areas) with access to at least one type of open space.
- Access to a range of national parks outside Melbourne

ENVIRONMENTAL CHALLENGES

- Limiting risk and impacts of hazards associated with climate change such as bushfire hazard and heat vulnerability
- Maintaining and/or improving tree canopy cover, waterway health, and atmosphere pollution.
- Managing the impact of economic activity on the environment, including contaminated sites, waste water and physical waste.
- Managing relationships with the environment to ensure current and intergenerational wellbeing. For example, water and climate security.

6.1 Overview and key environmental features

FIGURE 96: KEY ENVIRONMENTAL FEATURES, NORTHERN METRO REGION



Source: (Department of Environment, Land, Water and Planning, 2018a) *Map does not cover full portfolio of key environmental assets

Prior to European settlement, the Northern Metro Region was home to several ecological communities including grassy woodland, plains grassland and dry forests.

Like other metropolitan regions, the Northern Metro Region developed as agriculturally before becoming urban.

The region's growth corridors include environmentally significant flora and fauna, with implications for the shape of the region's urban development. For example, Sunbury is surrounded by areas of Grassy Eucalypt Woodland and habitat of the Golden Sun Moth, and Wollert surrounds include the habitat of the Striped Legless Lizard and the Growling Grass Frog.

Figure 96 shows key environmental terrestrial assets in and outside the Northern Metro Region. The region is home to several parks and reserves. Key environmental assets include:

- Craigieburn Grassland Nature Conservation Reserve
- Mount Ridley Nature Conservation Reserve
- Westerfold Park
- Yarra Valley Parklands.

Outside the region natural areas that are accessible to residents include Wandong Regional Park, Kinglake National Park and Yarra Bend Park.

In addition to these landmarks, substantial tracts of land in the region is zoned as green wedge. Generally, these non-urban areas outside the UGB perform environmental functions and may contain endangered ecosystems.

The region is also home to a range of water assets including:

- the Yarra River
- Diamond Creek, Merri Creek and Emu Creek
- Sugarloaf reservoir, Yan Yean reservoir and Greenvale reservoir.

6.2 Environmental assets

The Northern Metro Region's stock of environmental assets underpins the capacity of the region to provide ecosystem services that benefit the metropolitan population.

Open space and green space

The Northern Metro Region includes 31,612 hectares of land defined as open space,[15] of which approximately 84 per cent can be classified as green space (Victorian Planning Authority, 2017c).[16] Out of the regions in metropolitan Melbourne, it has the fourth largest share (19 per cent) of open space.

The Victorian Planning Authority (VPA) open space dataset defines open space across 12 categories. A typology of green, mixed and built open space has been applied across the 12 open space categories (see Figure 98 for the groupings of categories into the typology).[17]

Figure 97 and Figure 98 show the different types of open space existing across the region in 2017. Accessibility to open space is discussed in section 6.5. Key points include:

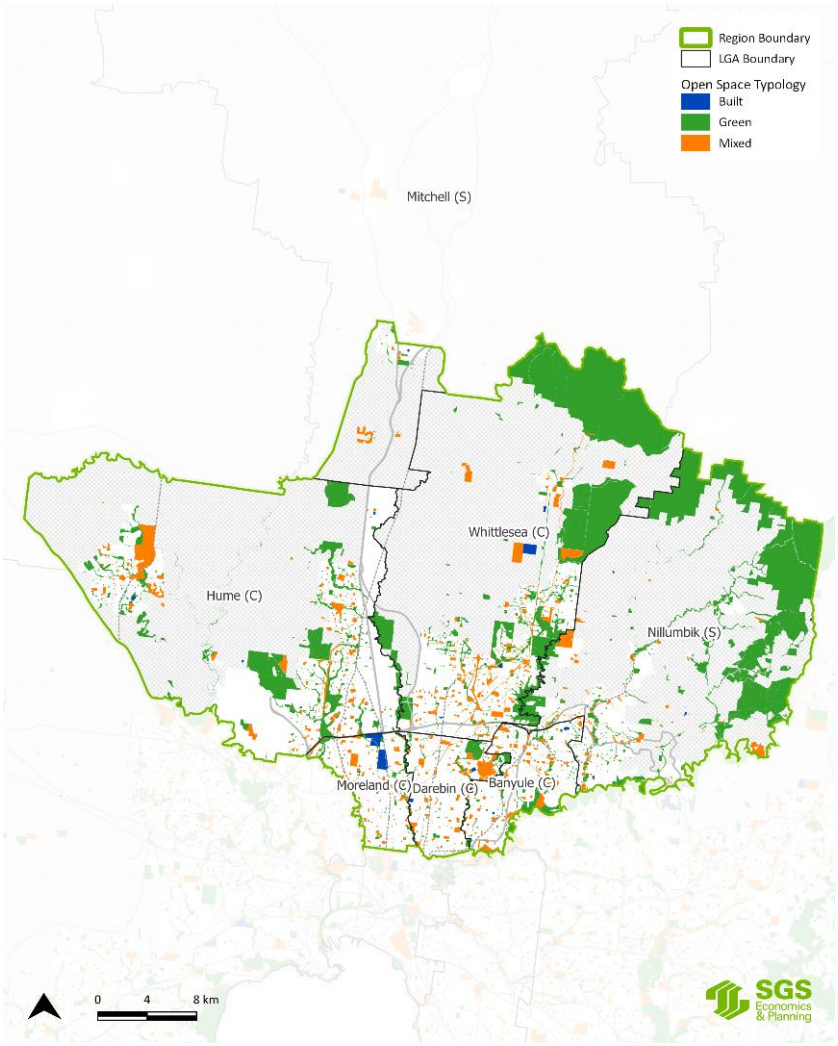
- There is a combination of green, mixed and built open space near central Melbourne.
- There are some large areas of green space in the middle of the region. For example, Plenty Gorge Parklands and Craigieburn Grassland Nature Conservation Reserve.
- There are large concentrations of green space along the north west boundary of the region.
- Conservation reserves, and natural and semi-natural reserves dominate the green space category.
- Mixed assets include sports fields and organised recreation.
- Areas where there is no open space are likely due to low population and the use of land for agriculture.
- The Shire of Nillumbik and the City of Whittlesea are among the ten highest metropolitan LGAs with respect to the percentage of open space relative to total land area
- The City of Hume and the Shire of Mitchell are among the ten lowest metropolitan LGAs with respect to the percentage of open space relative to total land area

[15] Open space is any piece of land that is provides some natural or cultural benefit. Green wedge zones that are primarily used for agriculture are not considered as open space because of the potential disamenity arising from agricultural activity.

[16] The interpretation of green space in this report relates to a vegetated variant of open space. Urban vegetation in the form of house gardens/yards and agriculture is not considered to be open space.

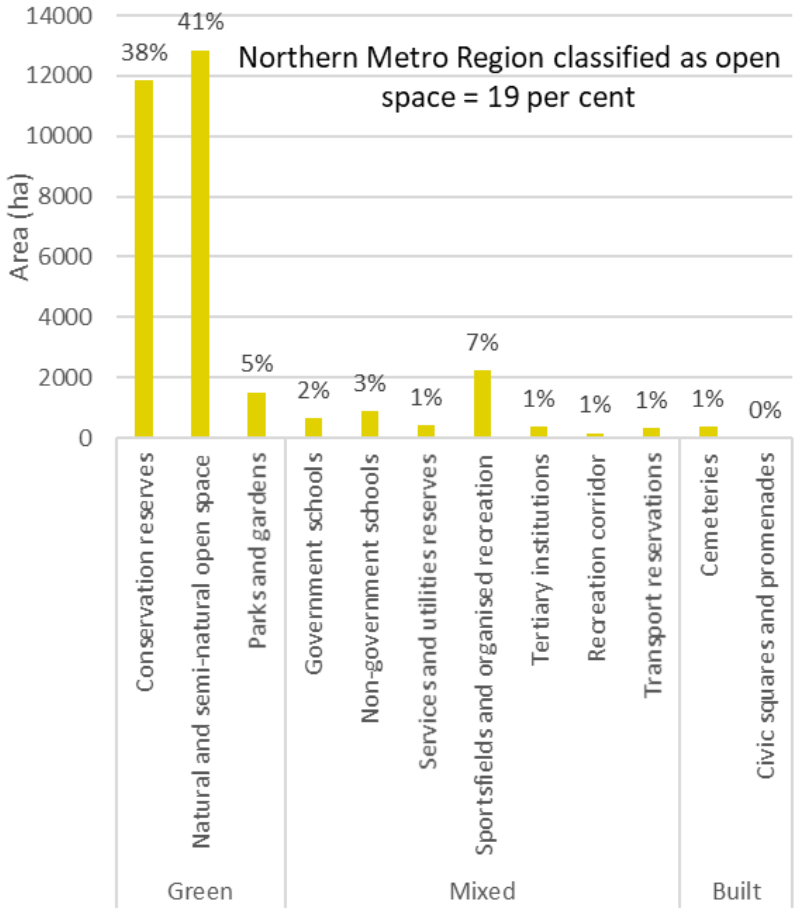
[17] Green space refers to areas that are predominately natural and contain little built infrastructure, mixed space refers to areas that have been altered from their natural state for economic purposes but still contain areas of green space, and built space refers to areas that contain predominately built infrastructure.

FIGURE 97: OPEN SPACE CATEGORIES (2017)



Source: (Victorian Planning Authority, 2017c)(Victorian Planning Authority, 2017c)

FIGURE 98: EXISTING OPEN SPACE TYPES (2017)



Source: (Victorian Planning Authority, 2017c). *Share of total green space in the region is provided on top of the green space type bars. This graph does not consider proposed open space.

Table 17 and Figure 99 illustrate the VPA open space data by LGA. Table 17 shows the area, in hectares, of open space in each LGA, while Figure 99 shows the share of open space in each LGA that can be attributed to green, mixed and built open space.

- Green open space is the dominant category in the cities of Whittlesea and Hume and the Shire of Nillumbik
- Mixed open space is the dominant category in Mitchell and Darebin LGAs.
- The Shire of Nillumbik and the City of Whittlesea have large areas of open space compared to other LGAs
- There is a large percentage of built open space in the City of Moreland.

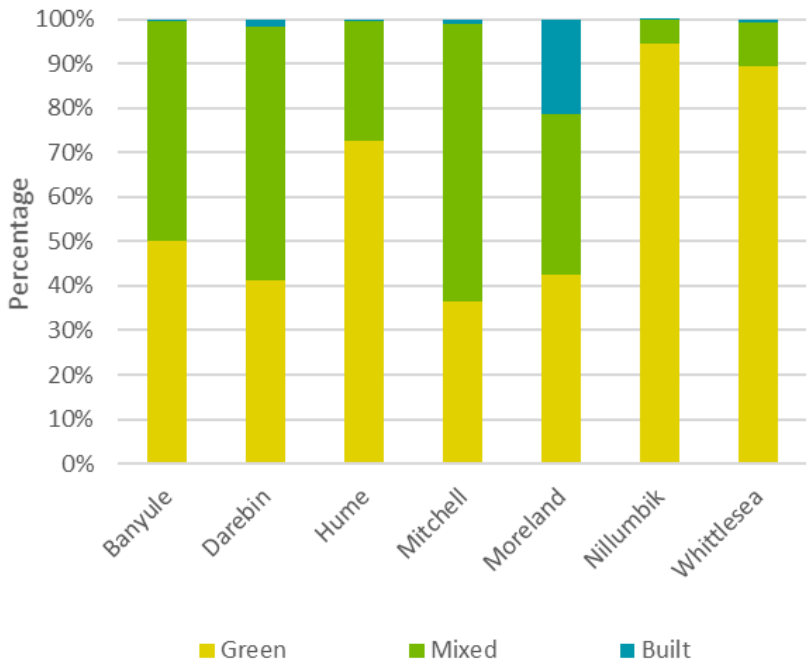
Assessment of trends would highlight whether the share of open space is changing with respect to residential development.

TABLE 17: OPEN SPACE TYPE (HA) BY LGA (2017)

LGA	Green	Mixed	Built	Total
Banyule	650	645	4	1,299
Darebin	465	640	20	1,125
Hume	3,564	1,315	21	4,900
Mitchell	67	114	2	183
Moreland	398	341	199	938
Nillumbik	10,214	583	13	10,810
Whittlesea	11,038	1,214	105	12,357

Source: (Victorian Planning Authority, 2017c) *This table does not consider proposed open space.

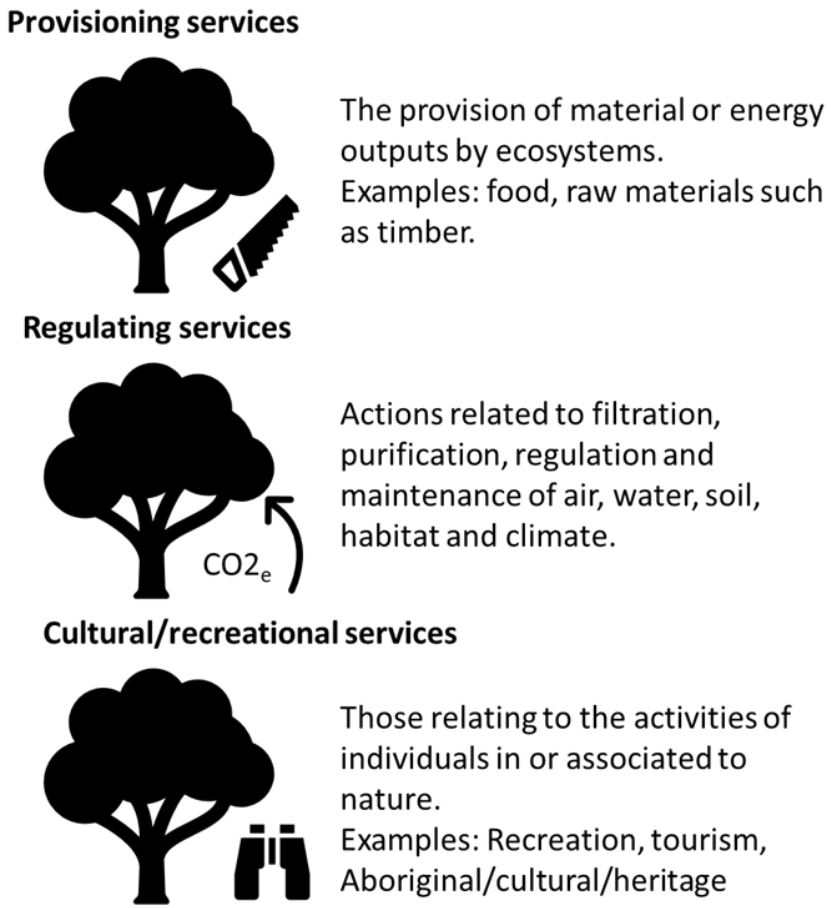
FIGURE 99: OPEN SPACE TYPE BY LGA (2017)



Source: (Victorian Planning Authority, 2017c). *Note that this graph does not consider proposed open space.

The provision of ecosystem services, as defined in Figure 100, varies by environmental asset type and depends on the extent (size) and condition of the asset.

FIGURE 100: ECOSYSTEM SERVICE CLASSIFICATION



Source: IDEEA Group

For example, green open space is likely to provide a range of ecosystem services including provisioning services, regulating services (such as mitigation of urban heat island effects) and cultural/recreation services, while mixed open space is likely to be concentrated on cultural/recreation services that have positive effects on health and wellbeing. Built open space is even more likely to be concentrated on cultural/recreation services.

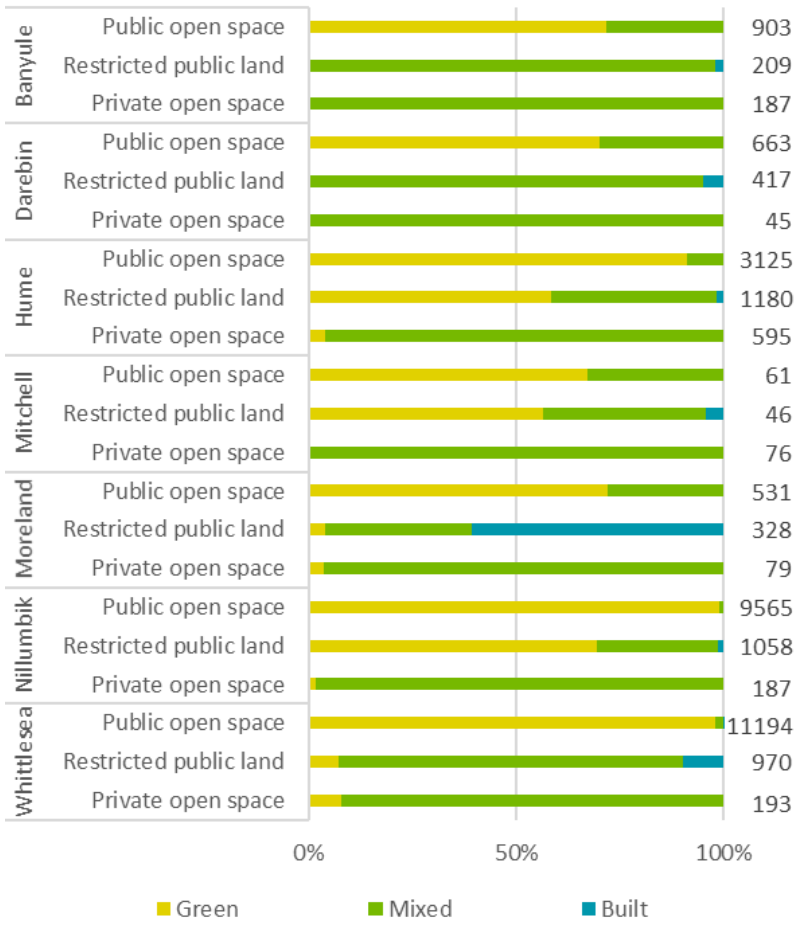
The ability of the environmental assets to provide ecosystem services can be affected by barriers such as accessibility, human activity and degradation. Additional benefits can be realised if assets are made more accessible.

Demand for ecosystem services will continue to rise with population growth. Land is fixed in supply, meaning that under-utilised assets (which can include government and non-government school ovals outside of school hours, as well as other government and some private land) are a source of supply to meet this demand.

Figure 101 illustrates the percentage of open space assets in the region that are either private, restricted public land or public.[18] A large percentage of green space is public, while built and mixed space is a mix of public, private and restricted. The spatial distribution of public, restricted public, and private land is shown in Figure 102.

Respectively, Figure 102 and Figure 103 indicate the locations of private and restricted open space in the region. It is evident that government and non-government schools are both accessible to populated areas.

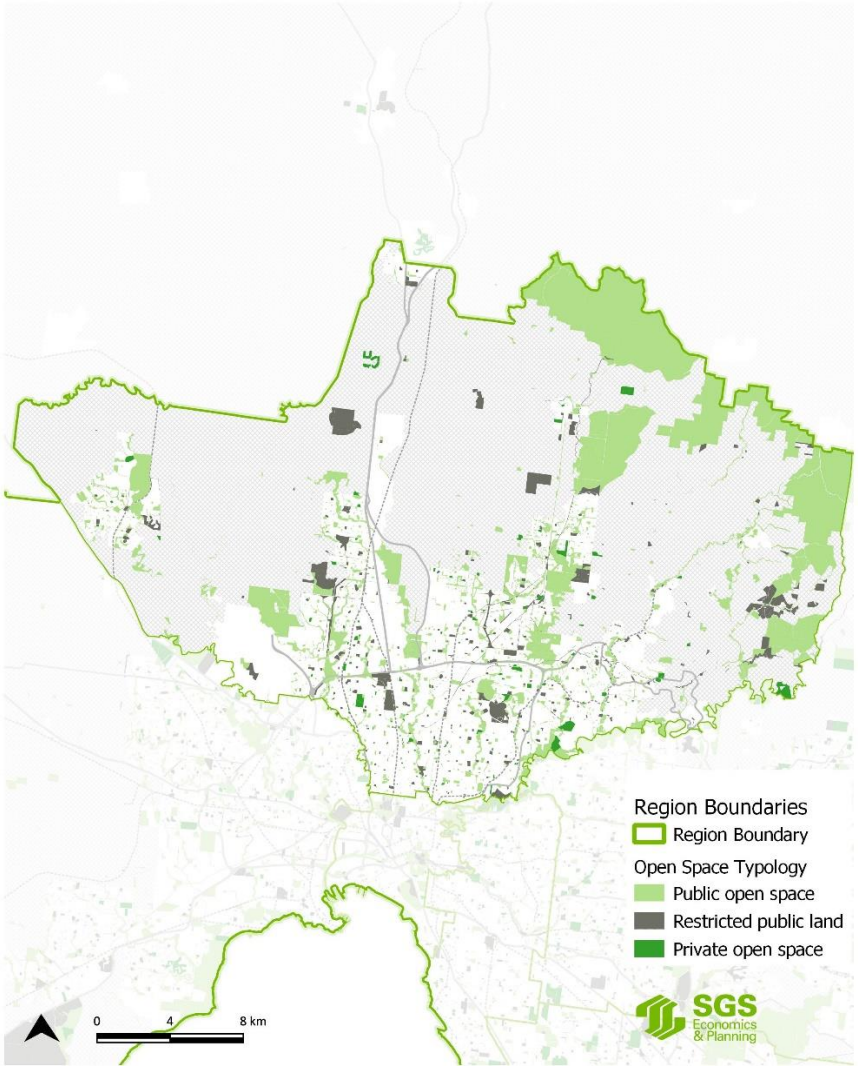
FIGURE 101: OPEN SPACE TYPE BY OWNERSHIP AND LGA (2017)



Source: (Victorian Planning Authority, 2017c) *Numbers to the right of bars are hectares

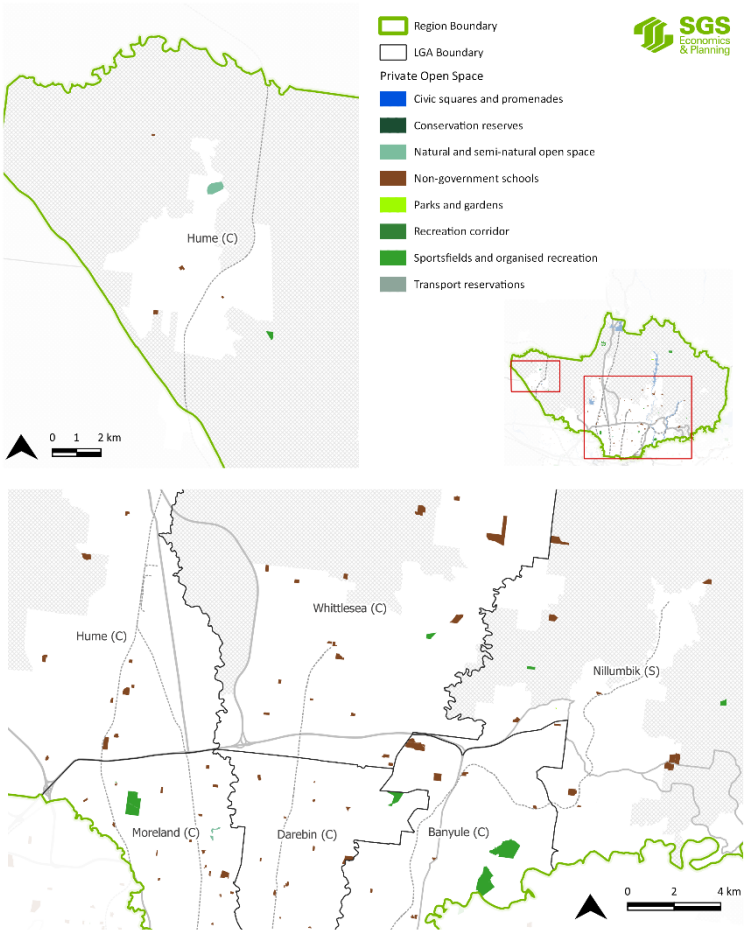
[18] Private open space does not include residential gardens – it includes private schools, private sportsfields, golf courses and race courses, and private conservation and private outdoor shopping plazas/malls.

FIGURE 102: OPEN SPACE BY OWNERSHIP (2017)



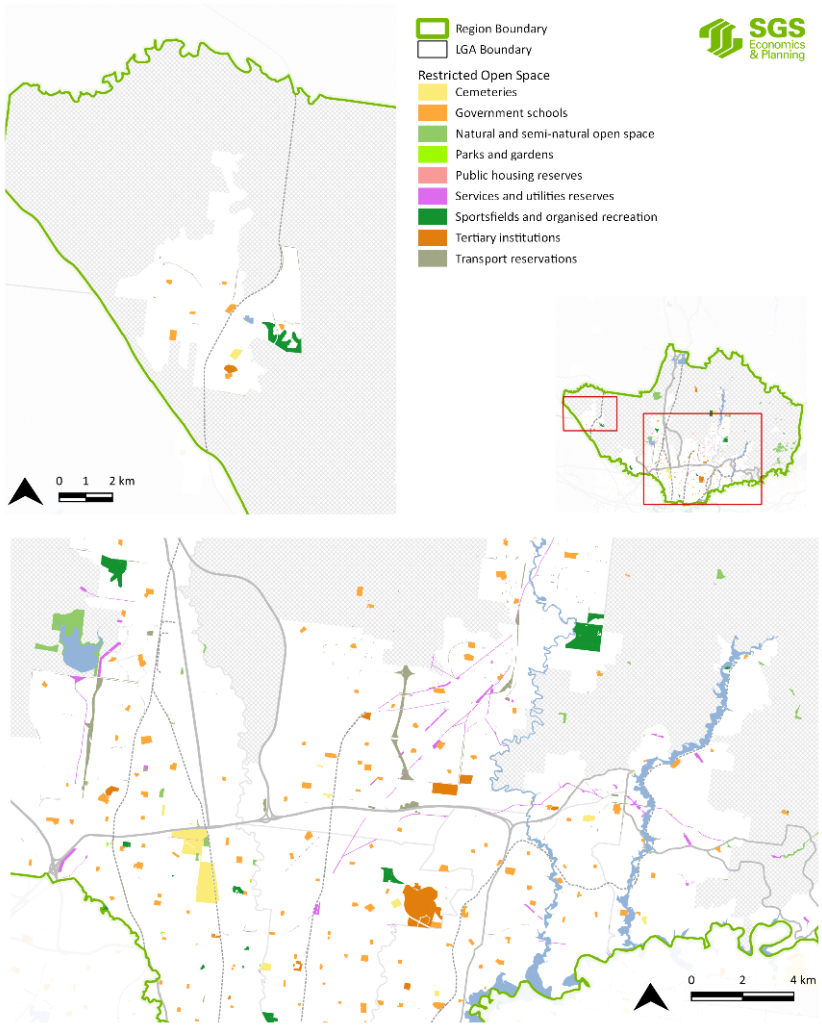
Source: (Victorian Planning Authority, 2017c)

FIGURE 103: LOCATIONS OF PRIVATE OPEN SPACE BY TYPE (2017)



Source: (Victorian Planning Authority, 2017c)

FIGURE 104 LOCATIONS OF RESTRICTED OPEN SPACE BY TYPE (2017)



Source: (Victorian Planning Authority, 2017c)

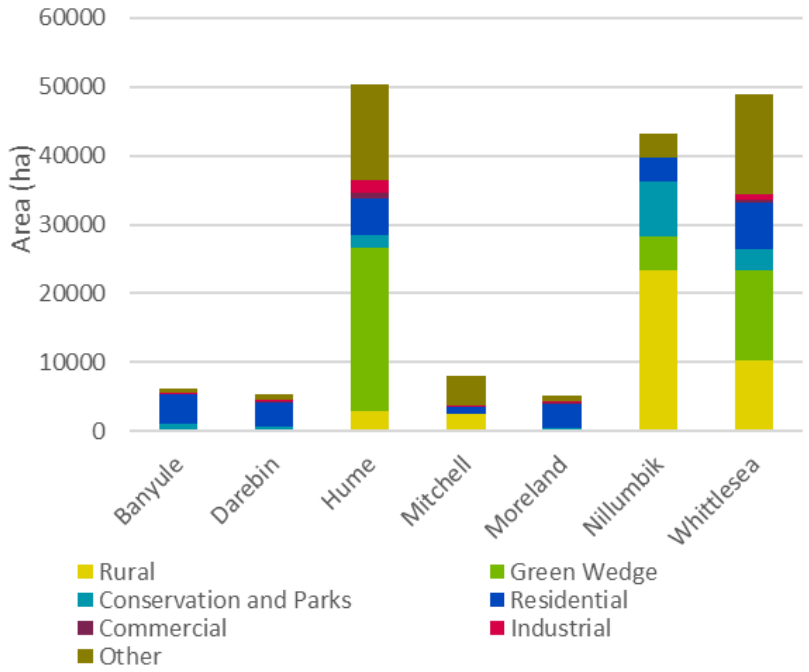
Land use

Land use has been characterised using planning zone data. This data is preferred to Victorian Land Use Information System (VLUIS) data as the VLUIS data does not have spatial specificity for inner metropolitan areas. However, the zoning data does have limitations as it represents preferred land use rather than actual land use and is not as specific in rural areas.

Figure 105, Table 18 and Figure 106 show the distribution of planning zones across the Northern Metro Region. The planning data shows:

- A large proportion of land in the inner LGAs is residential.
- A large proportion of land in the outer LGAs is either green wedge, rural, residential or conservation and parks.
- Areas of industrial land are adjacent to residential land. There are some instances where industrial land is adjacent to conservation and parkland.
- There is a large proportion of rural land in the Shire of Nillumbik.
- There is a large proportion of green wedge in the cities of Hume and Whittlesea.

FIGURE 105: PLANNING ZONES BY LGA (2016)



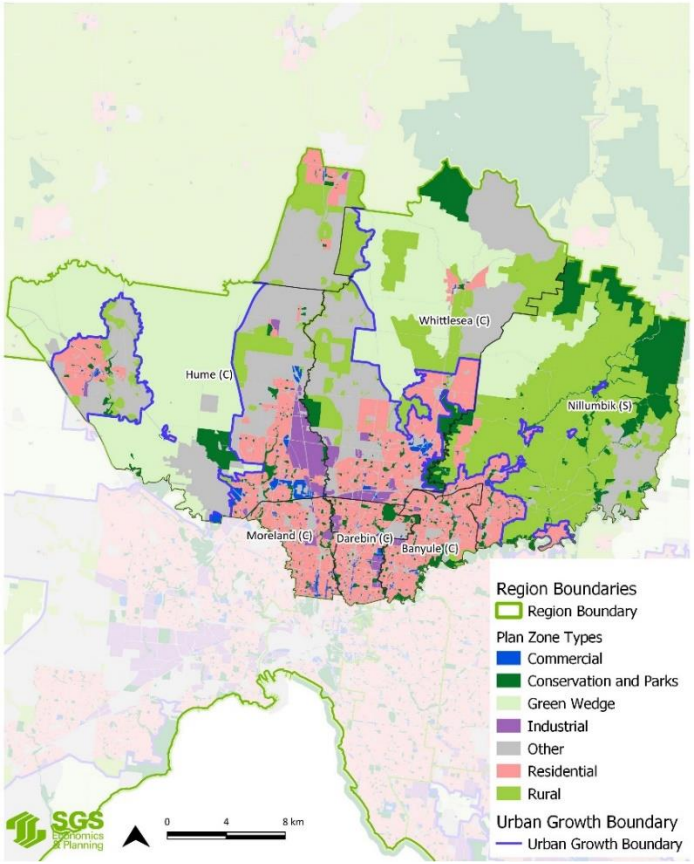
Source: (Department of Environment, Land, Water and Planning, 2018b). *Other includes both special purpose zones and public land zones (excluding parks and conservation). Examples of special purpose zones are activity centre zones and capital city zones. Examples of public land are education zones and health and community zones.

TABLE 18: SHARE OF TOTAL AREA BY DIFFERENT PLANNING ZONE TYPES (2016)

	Banyule	Darebin	Hume	Mitchell	Moreland	Nillumbik	Whittlesea
Commercial	1%	3%	1%	0%	3%	0%	0%
Conservation and Parks	14%	13%	4%	1%	9%	18%	6%
Green Wedge	0%	0%	47%	0%	0%	11%	27%
Industrial	2%	6%	4%	0%	5%	0%	2%
Other	12%	14%	28%	55%	14%	8%	30%
Residential	67%	63%	11%	13%	69%	8%	14%
Rural	3%	0%	6%	30%	0%	54%	21%
Total	100%	100%	100%	100%	100%	100%	100%

Source: : (Department of Environment, Land, Water and Planning, 2018b). *Other includes both special purpose zones and public land zones (excluding parks and conservation). Examples of special purpose zones are activity centre zones and capital city zones. Examples of public land are education zones and health and community zones.

FIGURE 106: PLANNING ZONES (2016)



Source: (Department of Environment, Land, Water and Planning, 2018b). *Other includes both special purpose zones and public land zones (excluding parks and conservation). Examples of special purpose zones are activity centre zones and capital city zones. Examples of public land are education zones and health and community zones.

Of the region's 167,351 hectares, 69,965 hectares are within the UGB. Of this, 25,160 hectares are in New Growth Areas (Victorian Planning Authority, 2017a). The remaining 97,360 hectares form the rural areas of metropolitan Melbourne.

Figure 107 shows the distribution of VLUIS land use types across the UGB, New Growth Areas and rural areas.[19] The VLUIS data set is used here as it provides greater insight into the types of conservation areas in the region. Table 16 presents this information numerically and overlays the open space data with the VLUIS data to better describe sensitive areas not recorded in the inner areas of Melbourne using the VLUIS data.

Table 19 and Figure 107 show that:

- the share of land used for primary production and conservation purposes is higher in rural areas compared to urban areas.
- There is a significant share of land classified as primary production in New Growth Areas and rural areas.
- There are significant shares of residential land in rural areas, especially in the Shire of Nillumbik.
- Green Wedge Zone (as shown in Figure 107) sometimes corresponds to the 'other' class in the VLUIS data meaning it may not have an environmental function.
- Large areas of primary production suggest that the rural areas of the Northern Metro Region are aligned with the rural areas described in the regional profiles.

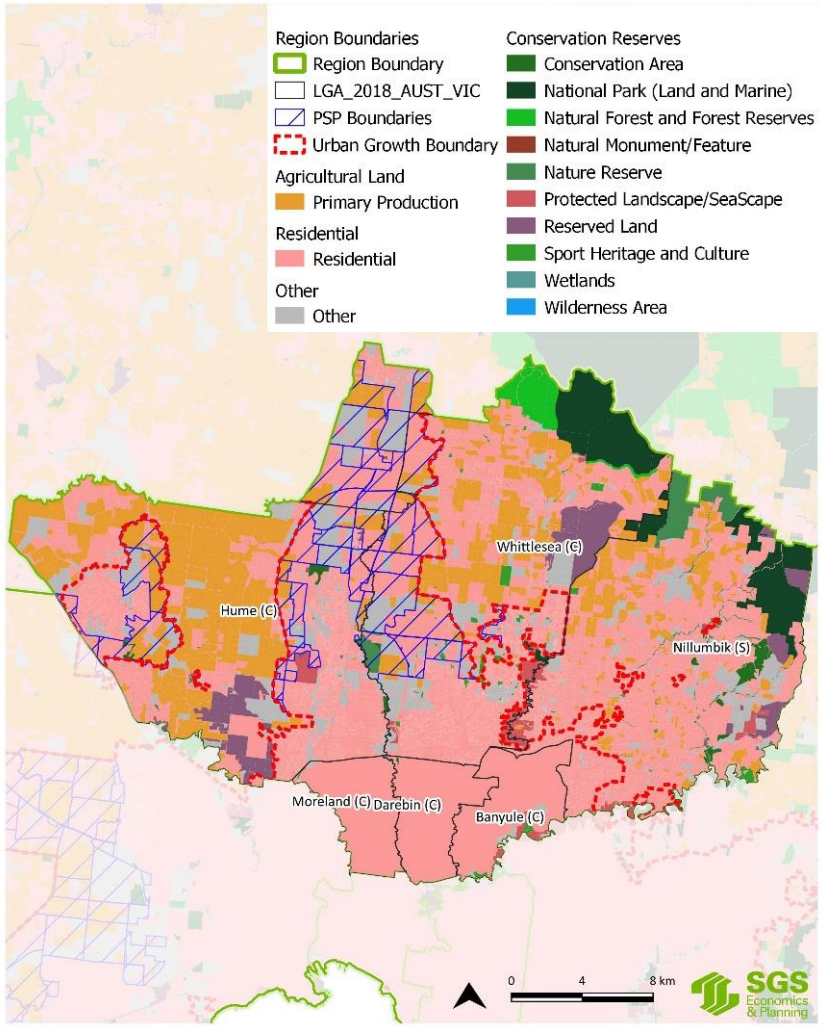
[19] Conservation reserves and primary production can be defined as sensitive land use types as their functions can be impacted by encroaching residential zones.

TABLE 19: LAND USE SHARES (2016)

VLUIS types	Inside UGB (excl New Growth Areas)	New Growth Areas	Rural
Residential	73%	49%	42%
Primary Production	0%	22%	28%
Conservation Reserves	2%	2%	20%
Other Open Space	17%	4%	4%
Other	7%	23%	7%
Grand Total	100%	100%	100%

Source: (Agriculture Victoria, 2018)

FIGURE 107: LAND USE (2016)

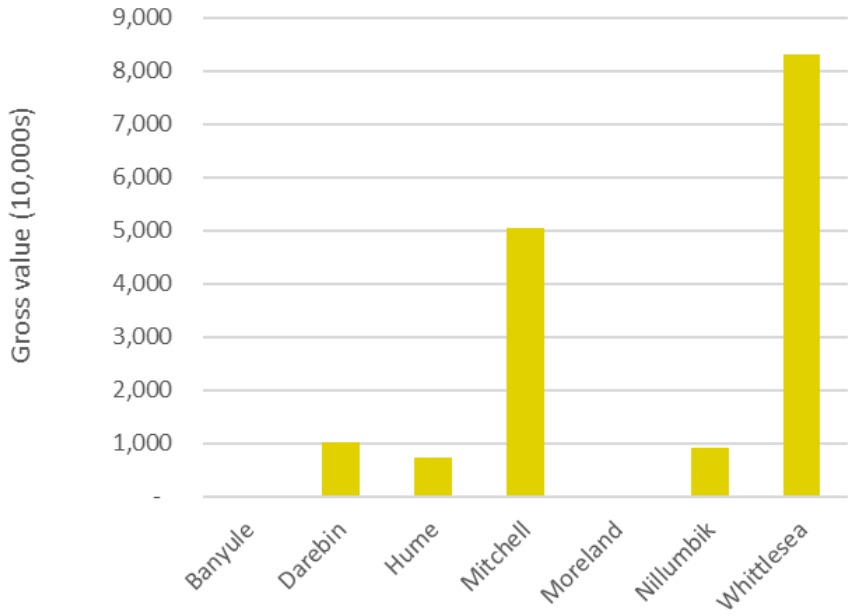


Source: (Agriculture Victoria, 2018). Note that the Other class refers to all other classifications under VLUIS

Figure 108 shows the value of agricultural production in 2015-16. Whittlesea LGA generates the highest gross value followed by Mitchell LGA.

Table 20 shows the share of value contributed by different agricultural products for each LGA. For Whittlesea LGA, a large share of this is vegetables. This is higher than the metropolitan and Victorian average. A higher percentage of Mitchell LGA's value is contributed by the slaughtered livestock category compared to the metropolitan and Victorian average

FIGURE 108: VALUE OF AGRICULTURAL PRODUCTS BY LGA ($10,000)



Source: (ABS, Value of Agricultural Commodities Produced, 2016-2017)

TABLE 20: SHARE OF TOTAL VALUE, BY AGRICULTURAL COMMODITY AND LGA (2016-17)

	Banyule	Darebin	Hume	Mitchell	Moreland	Nillumbik	Whittlesea	Metro	Victoria
Broadacre crops	0%	0%	6%	2%	0%	0%	0%	1%	9%
Fruit and nuts (excluding grapes)	0%	0%	0%	0%	0%	21%	3%	10%	10%
Hay	0%	0%	1%	2%	0%	1%	0%	3%	4%
Livestock products	0%	0%	7%	21%	0%	10%	1%	9%	29%
Livestock slaughtered and other disposals	0%	0%	32%	66%	0%	64%	3%	26%	37%
Nurseries, cut flowers or cultivated turf	0%	0%	18%	8%	0%	3%	2%	19%	4%
Vegetables for human consumption	0%	100%	36%	0%	0%	0%	91%	32%	8%
Total	0%	100%	100%	100%	0%	100%	100%	100%	100%

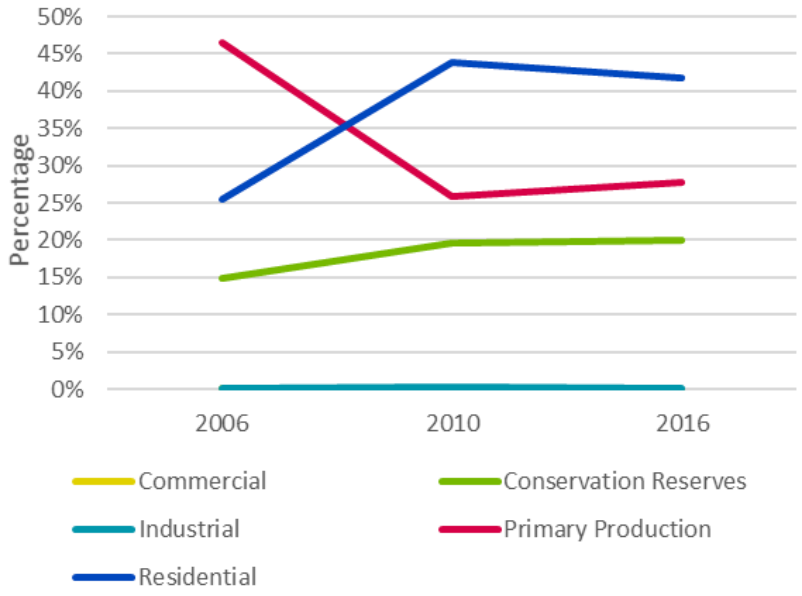
Source: (ABS, Value of Agricultural Commodities Produced, 2016-2017)

The rate at which land use is changing over time can better describe the reality of urban population growth and any related pressure on land use on the fringes of the UGB and New Growth Areas.

Figure 109 shows the trend in several VLUIS classes over time for rural areas. Note that the estimates are indicative only and should be interpreted with caution. The data suggests that:

- Primary production declined sharply between 2006 and 2010.
- Residential land increased sharply between 2006 and 2010.
- Conservation reserves increased slowly.
- Commercial and industrial land shares are low and stable.

FIGURE 109: LAND USE, RURAL AREAS (2006-2016)

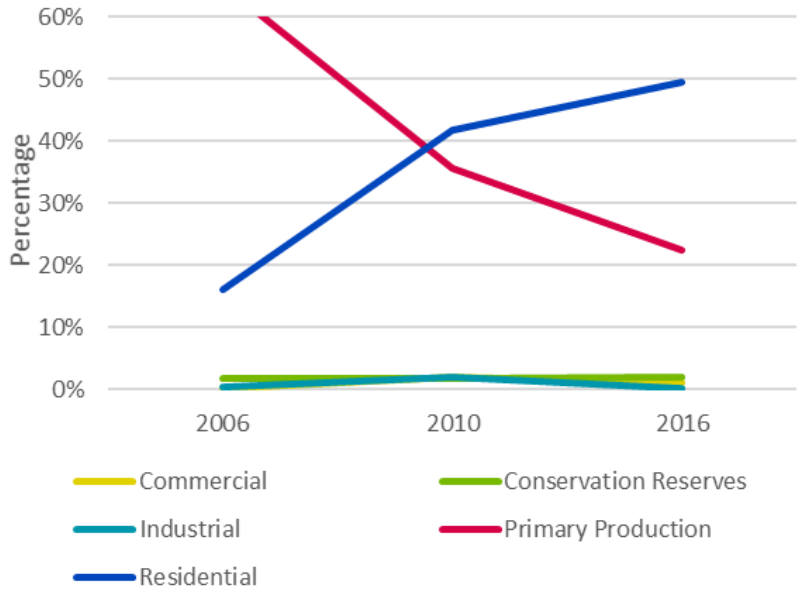


Source: (Agriculture Victoria, 2018)

Figure 110 shows the trend in several VLUIS classes over time for inside the New Growth Areas. These estimates are indicative only and should be interpreted with caution. The data suggests that:

- Primary production declined sharply between 2006 and 2016.
- Residential land increased sharply between 2006 and 2016.
- Conservation reserves, industrial and commercial land is low and relatively stable.

FIGURE 110: LAND USE, NEW GROWTH AREAS (2006-2016)



Source: (Agriculture Victoria, 2018)

Water and wetlands

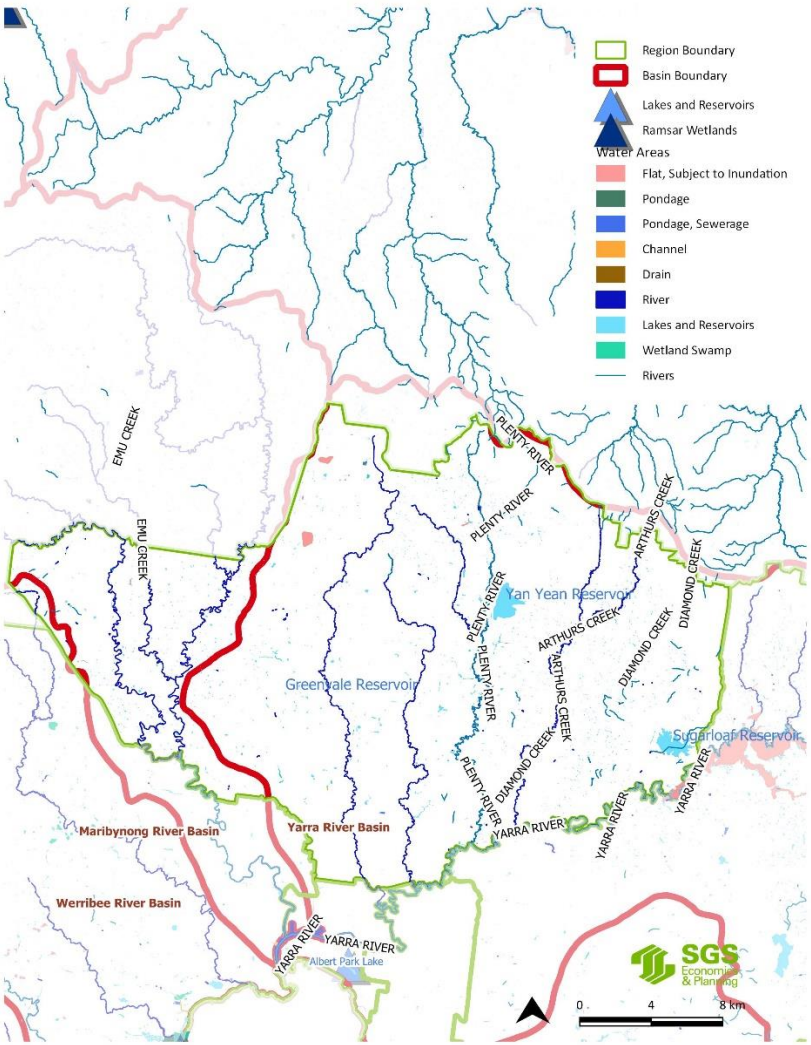
Water assets in the Northern Metro Region include lakes/reservoirs, rivers, wetlands and marine areas. They contribute to Melbourne's economy and provide amenity and recreation benefits.

The key water assets are shown Figure 111. There are multiple assets of interest in the region including the Yarra River, Plenty River, Diamond Creek, Emu Creek and Arthurs Creek. The Shire of Nillumbik has many small water bodies in comparison to other LGAs in the region. Many of the region's streams go through mountainous areas.

The three reservoirs in the region are Yan Yean, Greenvale and Sugarloaf. Protected catchments in State forests and national parks to the east of the region produce high quality water.

There are no Ramsar-listed or other significant wetlands in the region. Some flats are subject to inundation in the Shire of Mitchell as shown in Figure 111.

FIGURE 111: WATER AND WETLANDS (2016)



Source: (Department of Environment, Land, Water and Planning, 2018c; Department of the Environment, 2015)* Streams are not shown to maintain legibility of labels

6.3 Environmental conditions

The capacity of environmental assets to provide environmental benefits is related to asset condition. Environmental assets that have a higher condition relative to other assets have the capacity to provide a higher quantity of ecosystem services.

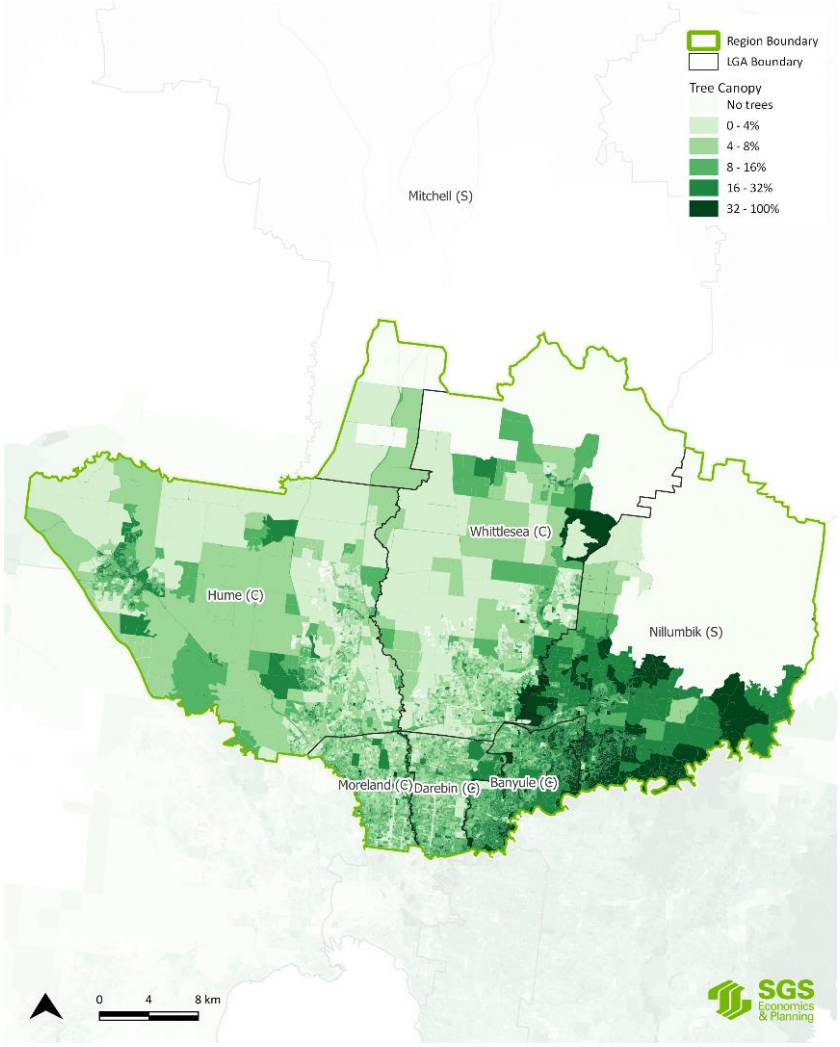
Canopy cover

Canopy cover is a measure of the condition of terrestrial ecosystems that is related to connectivity, shade, mature ecosystems and higher biodiversity. Canopy cover affects the capacity of the ecosystem to provide benefits related to regulating services (for example, urban heat island mitigation) and cultural services (for example, recreation).

Figure 112 shows the areas of the Northern Metro Region that include measurements of canopy cover. There are large areas of the Shire of Nillumbik and the City of Whittlesea for which there is no data.

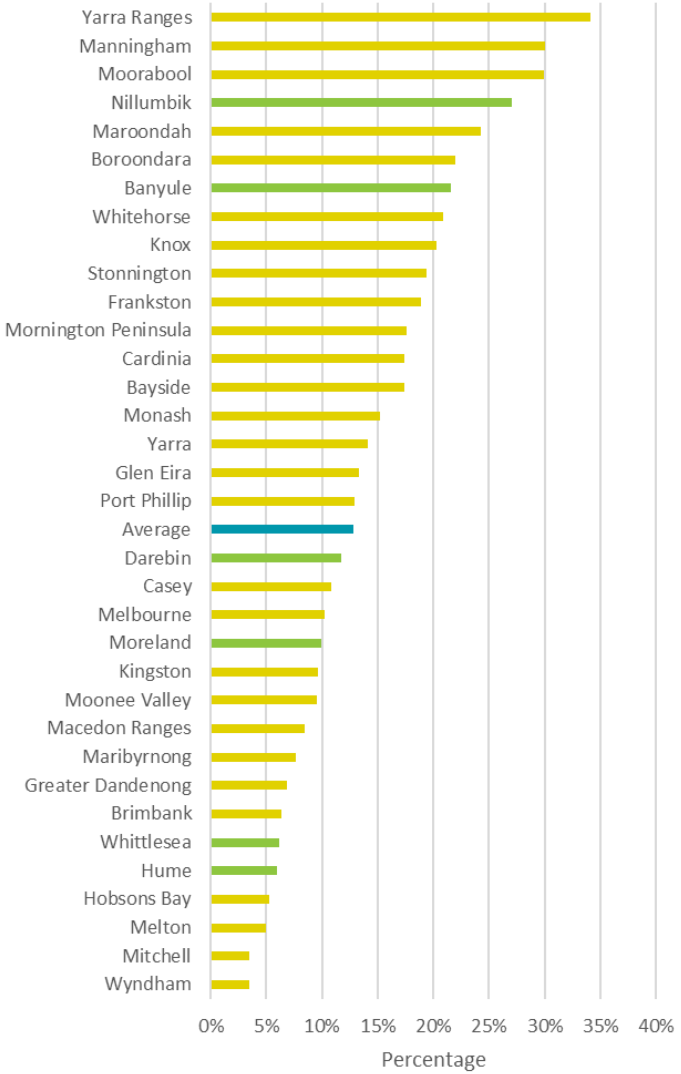
- The large areas to the north east for which there is no measurement are forested areas. It can be assumed they have relatively high tree canopy cover.
- The south east areas of the region have a high percentage of tree canopy coverage.
- The mix of low (cities of Hume and Whittlesea) and high (Shire of Nillumbik) canopy cover (Figure 113) is likely due to historical land use and the change in ecological communities from east to west when woodland moves to grassland.

FIGURE 112: TREE CANOPY COVER (2014)



Source: (Clean Air and Urban Landscapes Hub, 2018)

FIGURE 113: TREE CANOPY COVER BY LGA (%), ALL METRO LGAS (2014)

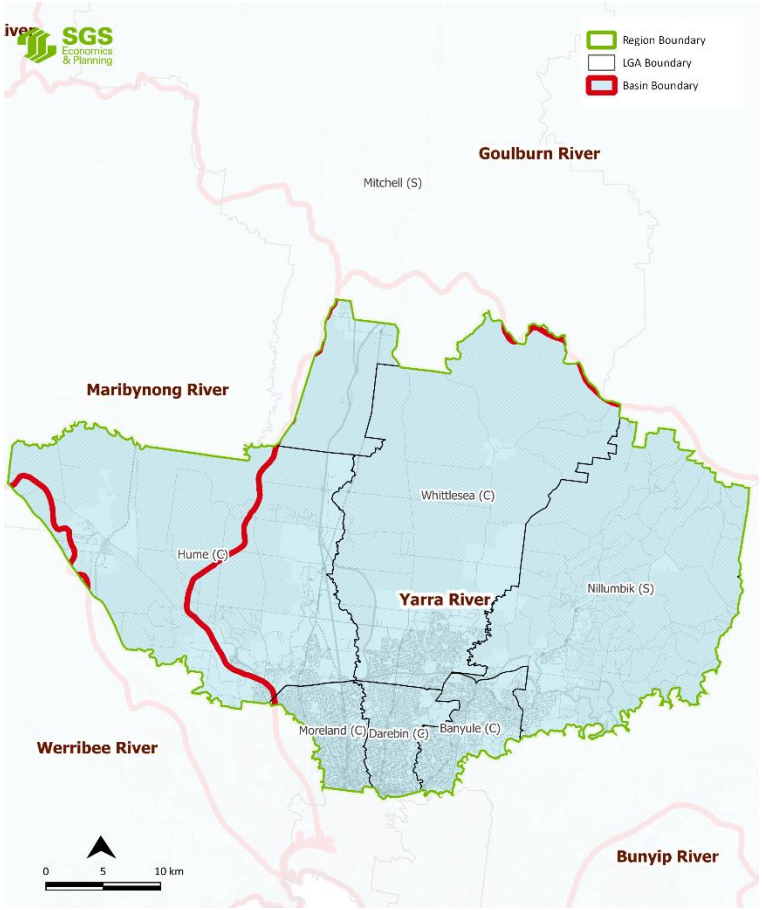


Source: (Clean Air and Urban Landscapes Hub, 2018)

Stream condition

The two distinct basins in the Northern Metro Region are the Maribyrnong River Basin and the Yarra River Basin (see the Western Metro Region report for a discussion on the Werribee river catchment). Figure 114 describes the extent of the basins.

FIGURE 114: KEY BASINS (2016)



Source: (Department of Economic Development, Jobs, Transport and Resources, 2015)

Condition of key reaches in each of the basins is measured using the index of stream condition (DELWP, 2014). The composite measure considers scores of hydrology, physical form, streamside zone, water quality and aquatic life. Data exists for 1999 to 2010.

The number and percentage of reaches where the index of stream condition for the Maribyrnong and Yarra River Basins is good or excellent is shown in Table 21 and Figure 115 respectively.

- Good/excellent stream condition is relatively rare in the Yarra and Maribyrnong River- most observations are in range of very poor to moderate.
- No reaches in the Maribyrnong River Basin were in good or excellent condition in 2010.
- The Yarra reaches are in better condition than the metropolitan average.
- There is a downward trend in the percentage of reaches classified as good/excellent condition.

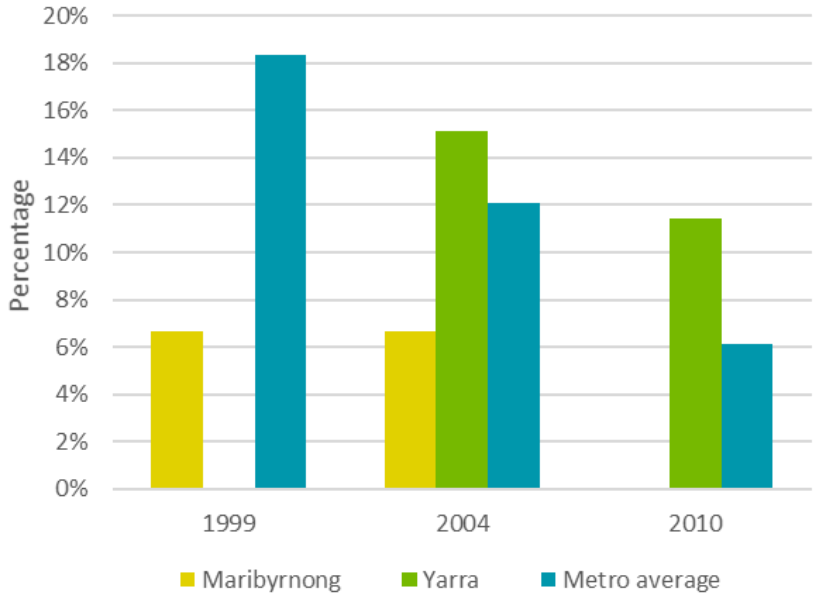
Urban development planned in the Yarra and Maribyrnong river catchments will be a challenge. The lower reaches of the Maribyrnong River have been exposed to industrial activity.

TABLE 21: NUMBER OF REACHES IN GOOD/EXCELLENT CONDITION (1999-2000)

Year	Maribyrnong	Yarra	Metro average
1999	1.00	0.00	3.82
2004	1.00	5.00	3.50
2010	0.00	4.00	2.01

Source: (Department of Environment, Land, Water and Planning, 2014) *Reaches with an environmental condition greater than 70 percent are deemed to be in excellent condition, while reaches with an environmental condition between 51-70% are deemed to be in good condition.

FIGURE 115: PERCENTAGE OF REACHES IN GOOD/EXCELLENT CONDITION (1999-2010)



Source: (Department of Environment, Land, Water and Planning, 2014) *Reaches with an environmental condition greater than 70 percent are deemed to be in excellent condition, while reaches with an environmental condition between 51-70% are deemed to be in good condition.

Air quality

By burning a range of materials in the production process, economic activity can impact the condition of the atmosphere. Numerous variables can be used to measure air quality including:

- particulate matter 2.5 (PM2.5) – small particles that can be breathed deep into the lungs
- particulate matter 10 (PM10) – larger particles that can irritate the eyes and throat, and affect symptoms for those with existing heart and/or lung conditions
- carbon monoxide (CO) – a colourless gas found in smoke that displaces oxygen in the blood
- nitrogen dioxide (NO2) and sulphur dioxide (SO2) – which can affect the throat and lungs.

Safe thresholds differ across the variables and by the length of exposure (that is, daily thresholds and yearly thresholds).The World Health Organisation air quality guidelines suggest an annual mean of 20ug/m3 and a daily mean of 50 ug/m3 as long and short-term thresholds for PM10. The notes below Figure 116 present information on other thresholds. Annual levels of pollution are presented graphically in this section while daily levels are only discussed in the text.

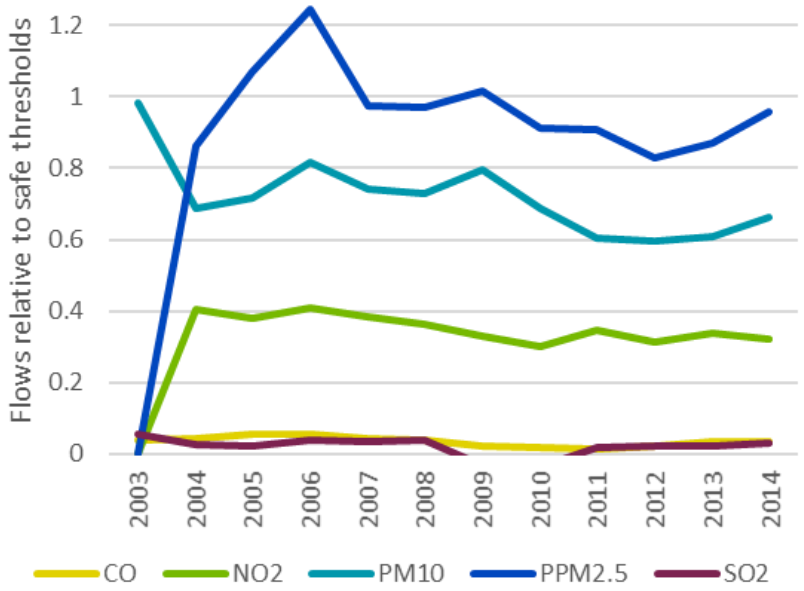
In the years from 2003 to 2014, air quality was monitored by the EPA at one location in the Northern Metro Region – Alphington. Depending on the location, data is only available for some of the variables. As a result, the data presented in this report is not comprehensive. Care should also be taken when interpreting the data. Air quality is measured at a point location and there may be variation in air quality across the geography.

Since the beginning of 2003, daily thresholds for either PM2.5 or PM10 have been exceeded annually at Alphington (with the exception of 2011 and 2012). The number of days exceeded has decreased/remained stable since 2010.

Trends in pollution relative to safe annual thresholds at Alphington are shown in Figure 116. Note that the level of the variable relative to safe thresholds is shown on the y-axis. A value less than 1 means that flows are less than the safe threshold, a value of 1 means that flows are equal to the safe threshold, and a value greater than 1 means that flows have exceeded the safe threshold.

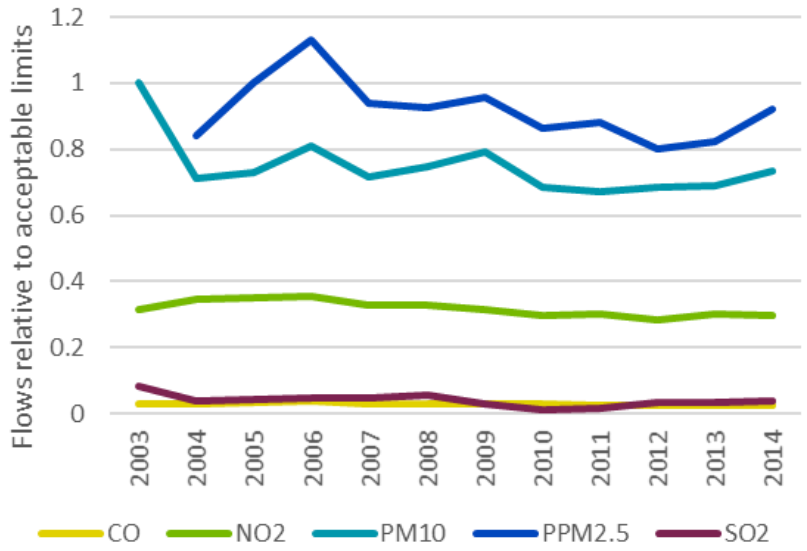
Air quality relative to the long-term threshold at Alphington is varied. Both PM2.5 and PM10 has been relatively high compared to safe long-term thresholds, while NO2 has been moderate, and CO and SO2 has been relatively low. Air quality at Alphington is similar to the metropolitan average (Figure 117).

FIGURE 116: LONG TERM AIR QUALITY THRESHOLD ALPHINGTON (2003-2014)



Source: (EPA Victoria, 2014), safe threshold is exceeded if PM2.5>8, PM10>25, O>9, NO2>30, SO2>20

FIGURE 117: LONG TERM AIR QUALITY THRESHOLD, METROPOLITAN AVERAGE (2003-2014)



Source: (EPA Victoria, 2014), safe threshold is exceeded if PM2.5>8, PM10>25, O>9, NO2>30, SO2>20

6.4 Environmental risks and hazards

The Northern Metro Region has been hit by a flood or storm most years since 2009 (Commonwealth of Australia, 2018). With climate change occurring, it is likely that this trend will continue, and the frequency of such events might rise.

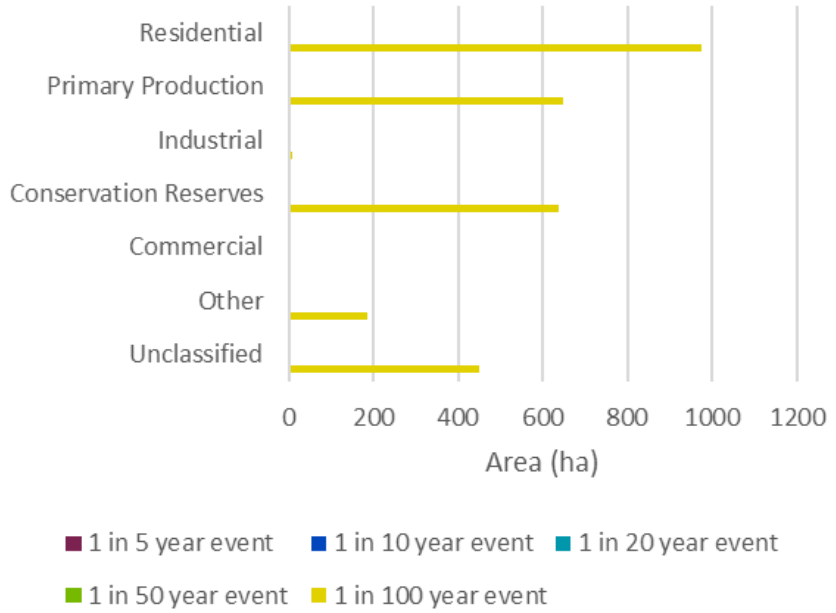
Flood

As the effects of climate change become increasingly felt, areas are at increased risk of flooding because of more extreme weather events. Figure 118, Figure 119 and Figure 120 show the projected flood extent for several different probabilistic events. For example, a five-year average recurrence interval (ARI) refers to a one in five-year event, a 10-year ARI refers to a one in ten-year event, and so on. The figures show that:

- There is no area at risk of a one in five-year to a 1 in 50 year event.
- In the event of a 1 in 100-year flood, the largest areas of land affected include residential, primary production and conservation reserves. Smaller amounts of other and unclassified land will be affected.
- Affected areas are located near rivers.
- There is a small area of land affected compared to other regions.
- ARIs are based on historical events; therefore, there could be an increasing chance of such events occurring associated with climate change.

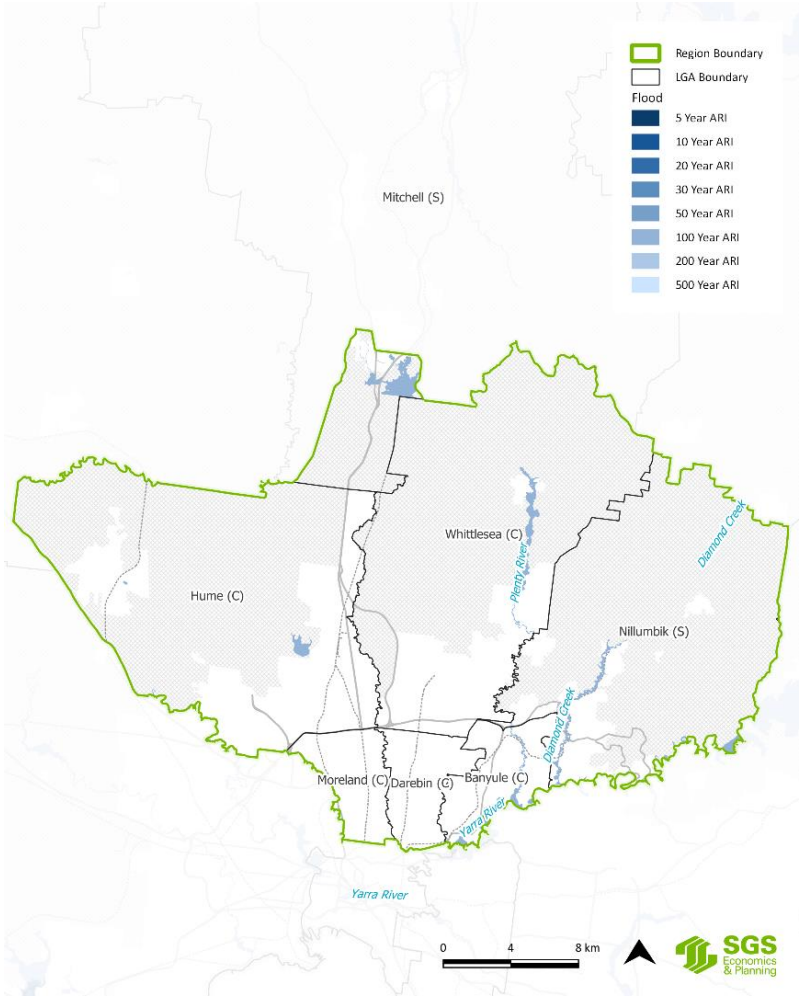
Building applications for properties likely to be affected by flooding are referred to Melbourne Water, which sets conditions on proposed development.

FIGURE 118: LAND AT RISK OF FLOOD (HA), MODELLED, BY LAND USE TYPE (2009)



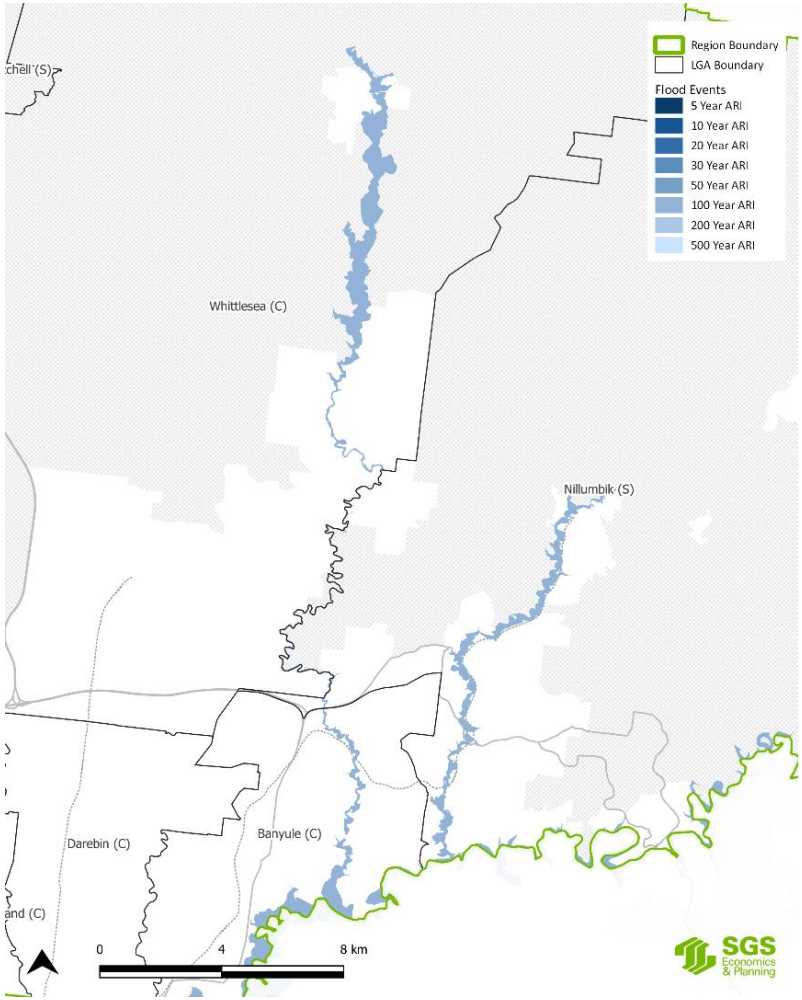
Source: (Department of Environment, Land, Water and Planning, 2018d) *VLUIS data has been used as hazards are primarily in the outer areas of the region (where the VLUIS data better describes land use).. Other includes Extractive industries, Community Services, Sport, Heritage and Culture, and Infrastructure and Utilities. Unclassified is land not requiring an active assessment or record for rate, tax or levy purposes. Data used is considered to the latest public dataset available. Nuisance and localised flooding may extend beyond what is shown by the data.

FIGURE 119: MODELLED FLOOD EXTENT (2009)



Source: (Department of Environment, Land, Water and Planning, 2018d) *Data used is considered to the latest public dataset available. Nuisance and localised flooding may extend beyond what is shown by the data.

FIGURE 120: MODELLED FLOOD EXTENT, ZOOM, (2009)



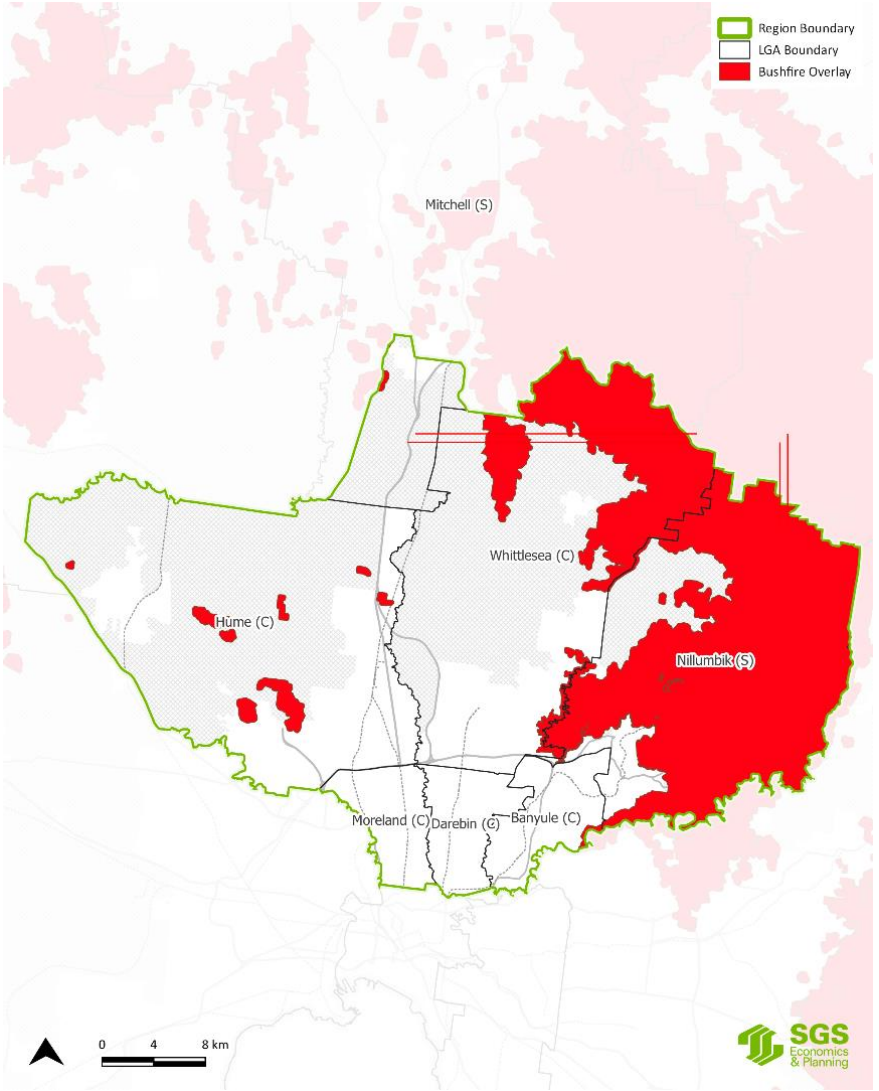
Source: (Department of Environment, Land, Water and Planning, 2018d) * Data used is considered to the latest public dataset available. Nuisance and localised flooding may extend beyond what is shown by the data.

Bushfire

Bushfire risk is extremely relevant for Melbourne. There are greater risks for particular vegetation that burns more easily. The Bushfire Management Overlay is a planning control applied to land with the potential to be affected by extreme bushfires. It does not specify which areas are at more risk although it is expected that highlighted areas will be at more risk as climate change occurs.

Figure 121 shows the area at risk of bushfire in the Northern Metro Region. Areas at risk of bushfire include areas of agriculture, residential and conservation reserves through the Shire of Nillumbik and the City of Whittlesea.

FIGURE 121: BUSHFIRE RISK OVERLAY (2016)



Source: (Department of Environment, Land, Water and Planning, 2018b)

Urban heat island effect and heat risk

Rising average temperatures and more extreme heat are some of the impacts felt by humans because of climate change. Further, removing natural environments for infrastructure means heat is absorbed and land temperatures rise.

The urban heat island effect measures the deviation of urban temperature relative to a non-urban baseline (Sun et al., 2018). It can affect the longevity of infrastructure, energy demand, health and water quality. Figure 122 shows the distribution of urban heat island in the region in 2014. It illustrates that most areas experience the urban heat island effect. Areas further away from the city experience greater levels of urban heating and urban cooling is experienced at large bodies of water.

Work by Sun et al. (2018) correlates vegetation (including tree canopy data) to urban heat island effect. Tree cover is a useful predictor of variation and grass and shrub vegetation poor predictors.

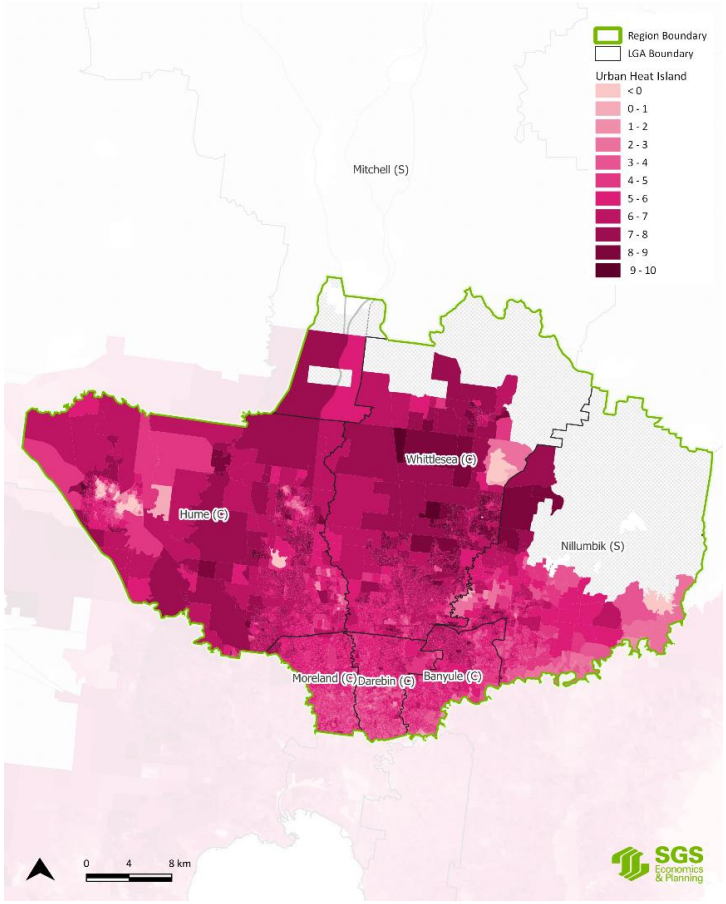
The effect of heat is described by a heat vulnerability index (HVI). The HVI consists of three input layers: heat exposure, sensitivity to heat, and adaptive capability (Sun et al., 2018). Figure 123 shows the spatial variation of the HVI in the region.

- Large areas of vulnerability exist in the middle to outer areas of the region. All regions have variation in vulnerability that ranges from low to high depending on the location.
- The HVI does not always overlap high UHI areas because other components of the HVI such as sensitivity to heat and adaptive capability can offset urban heat islands (and heat exposure).
- Urban heat island is sometimes higher in non-urban areas. One factor contributing to this is lower levels of tree canopy cover.
- Heat vulnerability is high in areas that are undeveloped. The index used considers the vulnerability of the population but does not weight the areas by population density to give relative importance.

Separate to work completed by Sun et al. (2018), Loughlan et al. (2013), describe areas that are vulnerable and how this is related to ambulance callouts on hot days. Loughlan used several environmental, health and demographic variables to develop the vulnerability index for heat stress by post code.

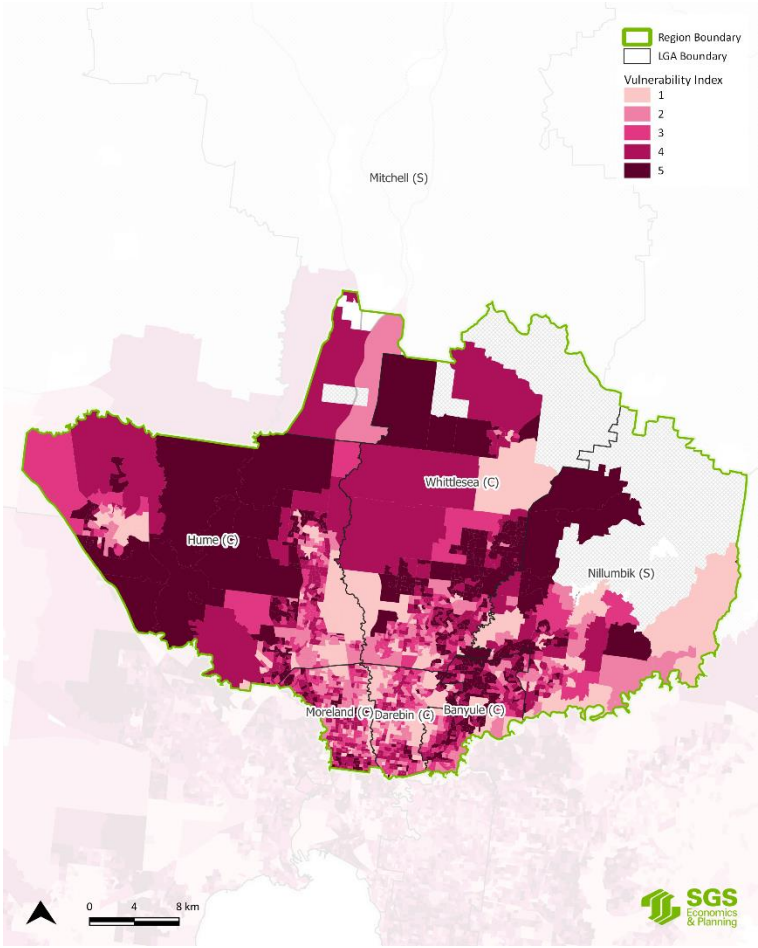
Analysis showed that heat vulnerability correlates with ambulance call outs on extreme heat days. It also shows that ambulance callouts are high in some coastal locations, which could be related to visitor numbers during hot periods.

FIGURE 122: URBAN HEAT ISLAND EFFECT (2014)



Source: (Sun et al., 2018) * Mean UHI in degrees Celsius shown in legend

FIGURE 123: HEAT VULNERABILITY INDEX (2014)



Source: (Sun et al., 2018)

Contaminated groundwater and other sites

The EPA has monitors sites for contamination and other risks, particularly in light of the potential impacts on health. At the time of writing this report there were 45 sites listed on the EPA priority register in the region.[20] Key reasons for being on the register include:

- former and current industrial sites that require management and or clean up
- former landfill sites that require clean up
- current service station that requires ongoing management
- illegal dumping that requires clean up.

Figure 124 only provides a snapshot of contamination in the Northern Metro Region. The available data does not include all sites known or likely to be contaminated

Collection of EPA priority site data over time may show areas that are more inclined to be contaminated and the time taken to manage them to reasonable levels.

Concentration of contaminated groundwater sites (also shown in Figure 125) can inform understanding of how economic activity is associated with the health of the environment.[21] Together, the spatial data shows that contaminated sites:

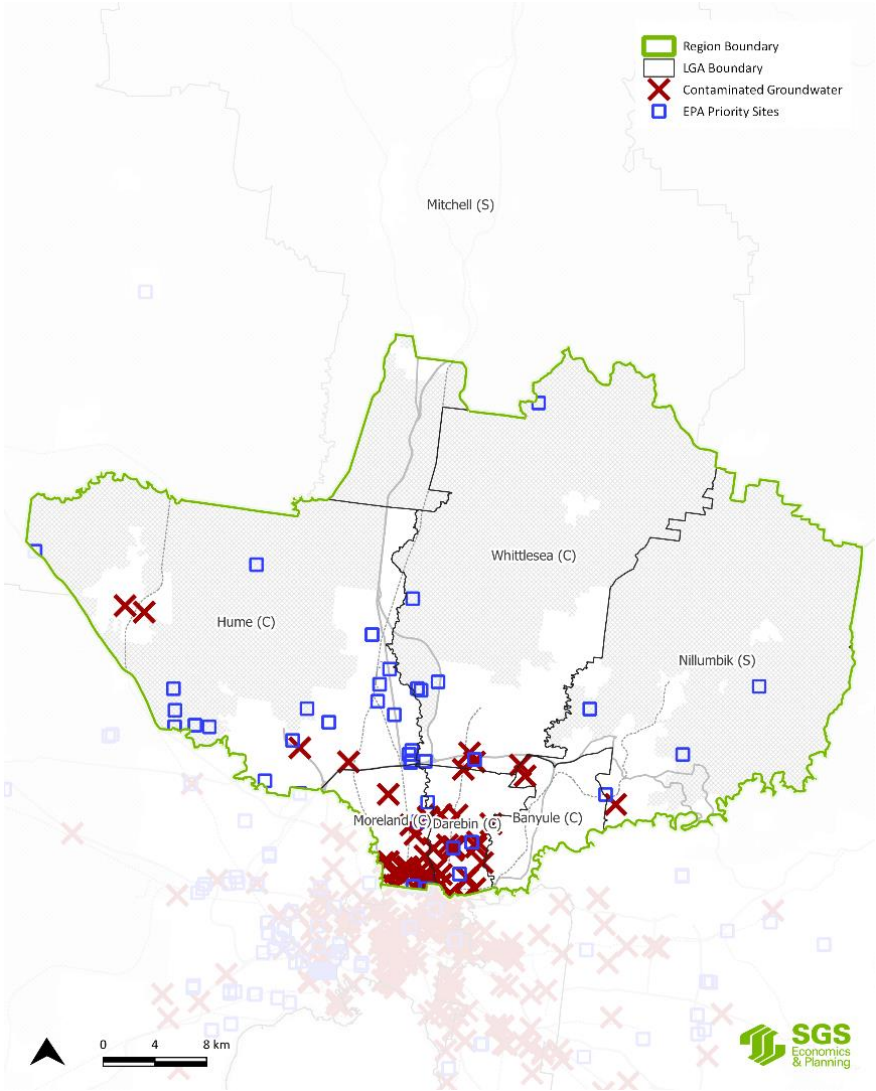
- are in the inner/urban areas of the region
- are likely to be where industry has previously operated.

Soil and groundwater contamination must be addressed and remediated to acceptable levels before land can be changed to more sensitive uses such as residential from industrial.

[20] http://www.vvg.org.au/

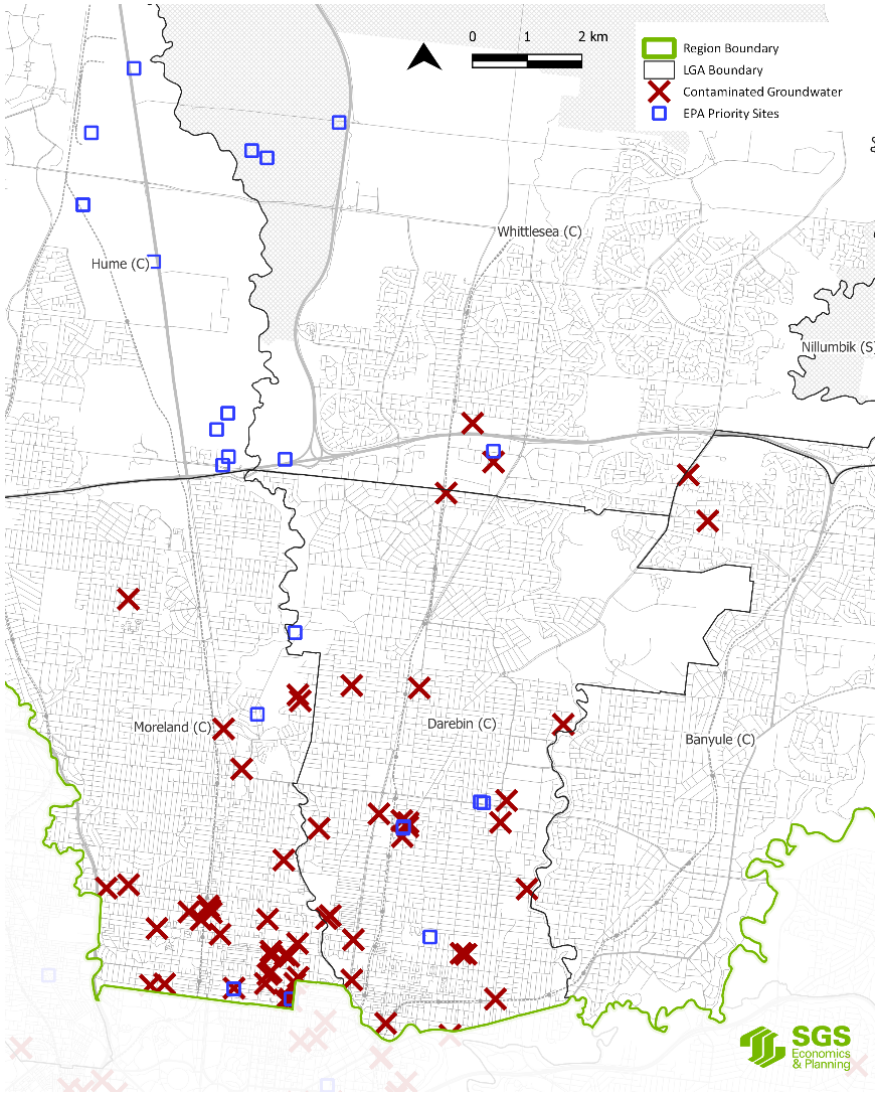
[21] Groundwater quality restricted use zones data used

FIGURE 124 EPA PRIORITY SITES AND CONTAMINATED GROUNDWATER SITES (2018)



Source: (EPA Victoria, 2018a, 2018c)

FIGURE 125 EPA PRIORITY SITES AND CONTAMINATED GROUNDWATER SITES, ZOOM, (2018)



Source: (EPA Victoria, 2018a, 2018c)

6.5 Environmental flows

From an economic perspective, much activity relies on natural capital along with human and physical capital to produce goods and services. For example, materials such as coal, timber and gas generate energy for almost any economic activity. Other basic needs such as food, water and shelter, all rely on the environment.

Further, the environment provides a host of other services, not recognised as being a part of the economy, that affect human wellbeing. This includes:

- provisioning services – likely covered as an input into economic activity
- regulating services – including carbon sequestration and flood regulation
- recreational and cultural services – including spiritual experiences and a sense of belonging.

Such services are often difficult to measure. They are sometimes not incorporated into decision-making and when they are, they may not be represented accurately.

Economic activity generates residuals such as waste, wastewater, air pollution, greenhouse gas emissions, and the environment is typically a sink for these flows. For example, effluent/wastewater is typically discharged into other water bodies, and carbon flows to the atmosphere. The environment can actively or passively process these residuals. Water waste is processed by the next ecosystem to some extent, while solid waste can consume space. The management of residuals and areas tasked with dealing with them can affect the condition of environmental assets and their capacity to provide services that humans benefit from.

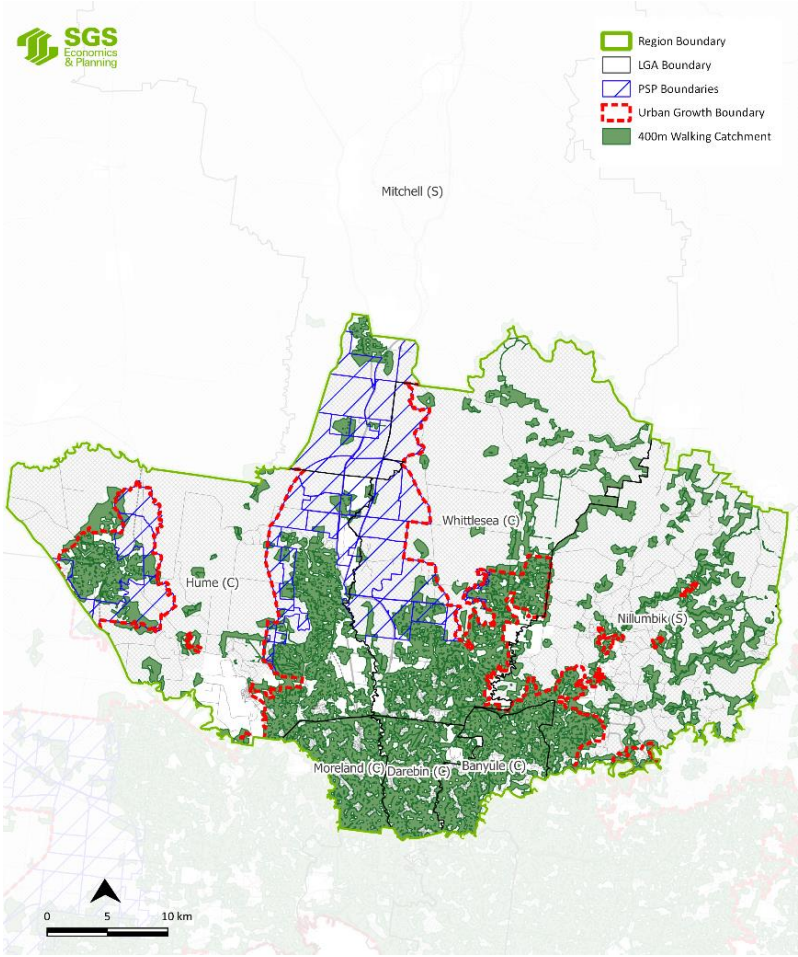
Access/use of green space

Green space and parks contribute to health, liveability and biodiversity outcomes. Figure 126 shows areas within the metropolitan Melbourne region that are within 400 metres from the nearest public open space feature.

A large percentage of inner areas have access to open space, while there are gaps in accessibility in New Growth Areas; however, planned open space is not represented in the data set used.

Care should be taken when interpreting the results. The data is mainly relevant for urban areas, where there are higher populations and walking paths to access open space.

FIGURE 126: 400 METRE WALKING CATCHMENTS (2017)



Source: (Victorian Planning Authority, 2017b)

Further, the diversity of open space can give people more choice and a diverse range of benefits. Table 22 shows the percentage of households with access to the open space type. There are six different types of open space in the table, with private open space removed from the classes described earlier as it is already inaccessible. Approximately 39 per cent of the Northern Metro Region had one type of green space accessible within 400 metres.[22] It is evident that:

- there are considerable differences across rural areas, New Growth Areas and UGB locations
- the region has relatively good access to open space within the UGB when compared to other regions
- access to open space is low in the New Growth Areas, however the data used does not consider planned areas of open space - these areas must be delivered and managed to give the growing population the benefits of open space.

Figure 127 further shows how the diversity of accessibility to the six types of open space varies across the Northern Metro Region. Access is relatively diverse in the inner areas of each of the LGAs.

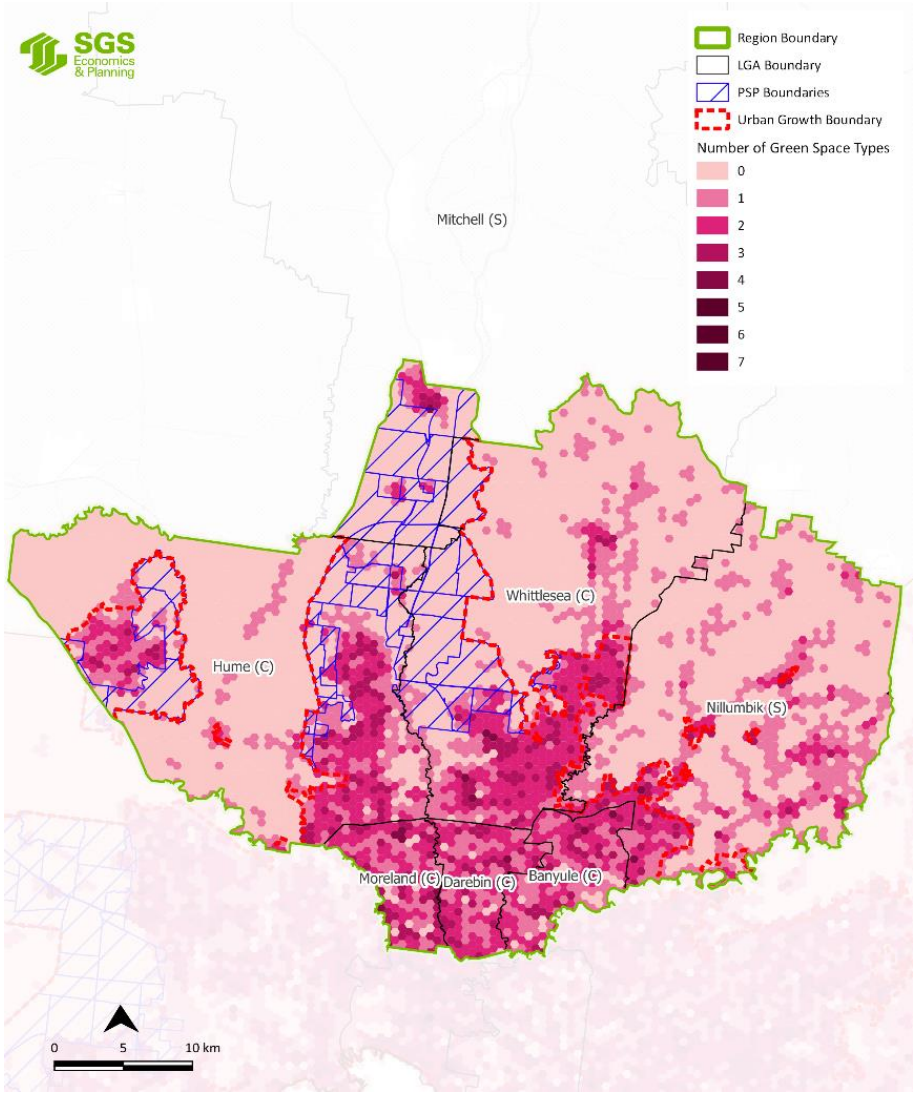
TABLE 22: PERCENTAGE OF REGION WITH GREEN SPACE WITHIN 400M BY GREEN SPACE TYPE (2017)

Open space Typology	Rural	New Growth Areas	UGB (excl. New Growth Areas)	All
Public and Built	0%	0%	0%	0%
Public and Green	17%	16%	83%	35%
Public and Mixed	0%	2%	25%	8%
Restricted and Built	0%	0%	2%	1%
Restricted and Green	3%	2%	4%	3%
Restricted and Mixed	3%	7%	51%	17%
Total with access to at least 1 category	21%	20%	90%	39%
No access to any category	79%	80%	10%	61%
Total	100%	100%	100%	100%

Source: (Victorian Planning Authority, 2017c) Note: open space definitions are the same as those used in figure x. Note that sum of each open space typology does not equate to the row named total with access to at least 1 category field. This is because one hex could have access to two of the open space types. Therefore, it does not equal the sum of its parts. Also note: the data used to measure New Growth Areas represents 119 precincts of declared growth areas – see https://data-planvic.opendata.arcgis.com/datasets/psp-boundaries

[22] The SGS Hex Pixel uses a small-scale hexagonal grid to represent spatial data. Hex centroids refer to the centre point of each SGS Hex Pixel. Distance has been measured from hex centroid to each of different types of VPA open space (not restricted to the west)

FIGURE 127: NUMBER OF DIFFERENT GREEN SPACE TYPES ACCESSIBLE WITHIN 400M (2017)



Source: (Victorian Planning Authority, 2017c)

Visitation to parks

Accessibility can help to alleviate barriers associated with public health benefits. Accessibility does not, however, mean that public benefits will be achieved. For instance, human behaviour and time are other barriers to public health benefits.

Figure 128 shows the percentage of the population in each of the LGAs that visits green space at least one time a week. It is evident that:

- A relatively low percentage of residents in the City of Whittlesea visit green space at least once a week.
- A relatively high percentage of residents in the City of Banyule and the Shire of Nillumbik visit green space at least once a week.

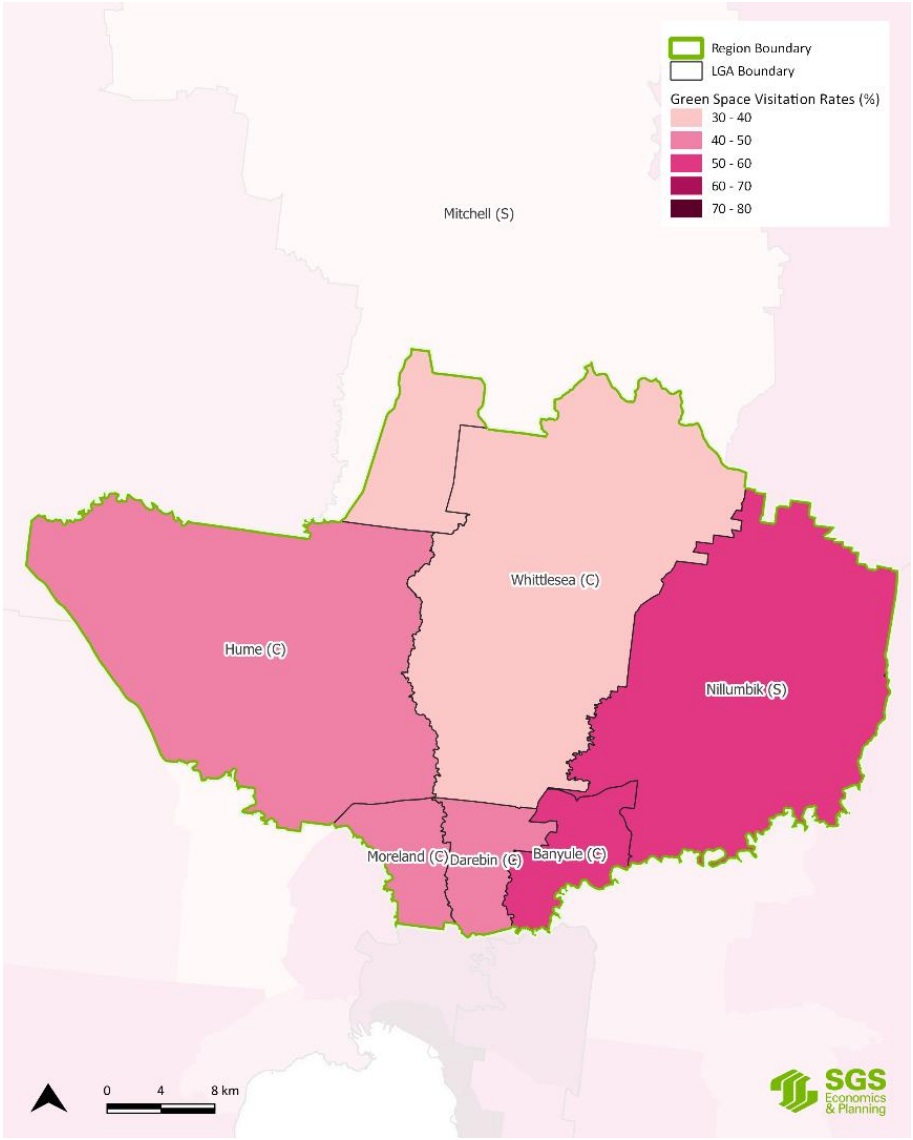
Concurrent analysis of the accessibility map and visitation map shows that despite having similar accessibility, a lower percentage of residents in the cities of Moreland and Darebin visit green space at least once a week compared to the City of Banyule.

There could be several reasons for this including the quality and attributes of parks and perceptions of safety. Further research is required to determine the factors that contribute to this difference.

Several Parks Victoria parks in and just outside the Northern Metro Region boundary receive many visitors annually. Werribee Park is the sixth most popular destination for visitors (400,000 per year), and Point Cook Coastal Park is ninth for visitors (275,000 per year). Tthe You Yangs are a popular destination just outside the region, with annual visitors estimated to be the same as Werribee Park and Westerfolds Park is the fifth most popular destination for visitors (494,200 per year) and the Plenty-Gorge Park is tenth for visitors (175,000 per year).

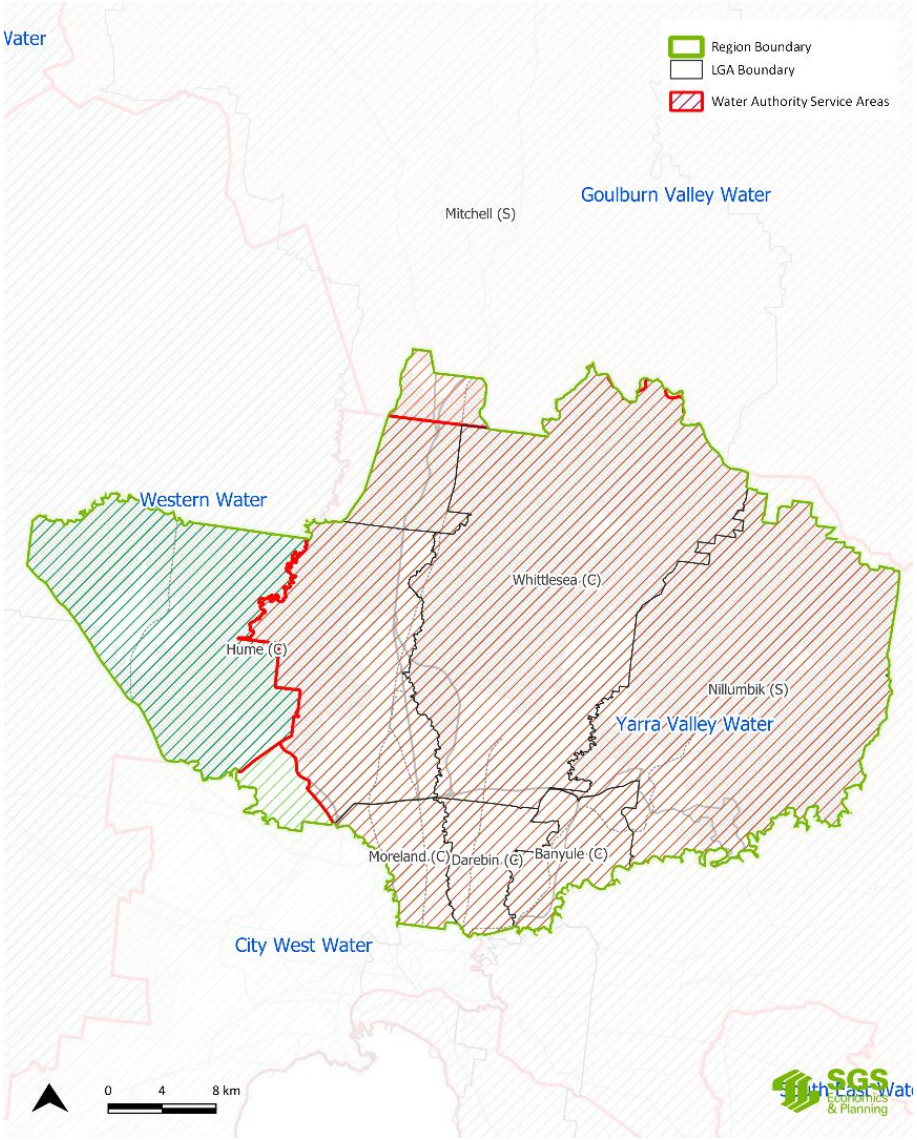
Further research is required to understand the users of these parks, where they originate from and future visitation patterns. This data does not give a full description of visitation of in the Northern Metro Region as it is only for Parks Victoria data.

FIGURE 128: % OF RESIDENTS VISITING GREEN SPACE (1+ TIMES A WEEK) (2011)



Source: (Victorian Health Promotion Foundation 2011-2014, n.d.)

FIGURE 129: URBAN RETAIL AND REGIONAL WATER AUTHORITY SERVICE AREAS (2016)



Source: (Bureau of Meteorology, 2015)

Water security

Urban water supply across the Northern Metro Region is managed by City West Water, Western Water, Yarra Valley Water and Melbourne Water (see Figure 129). Information on City West Water is provided in the Western Metro Region report.

Yarra Valley Water is serviced by Melbourne Water, which supplies bulk water. Yarra Valley has bulk entitlements at Greater Yarra System, Goulburn System and River Murray.

Western Water has access to a diversified water supply, including water harvested from local catchments, groundwater, recycled water and water from the Melbourne supply system. Two reservoirs are the key source of supply – Rosslynne and Merrimu Reservoir. The water supply system is also connected to the Melbourne Water Grid to enable water to be supplied from the Yarra-Thompson system throughout the region (Western Water, 2017).

There are multiple scenarios that Yarra Valley Water considers when forecasting demand and supply of water. The high demand, low supply scenario results in augmentation of water supplies by 2031, medium demand and medium supply results in augmentation by 2053 and low demand, high supply scenario results in no shortfall by 2065. Factors affecting these scenarios include population growth, climate change and efficiency.

Western Water estimates that new water supplies will be required between 2032 and 2040. This timing considers the volume of water stored in local reservoirs and the Greater Yarra-Thomson System. By the time new water supplies are required it is expected that an annual volume of around 7,000 million litres of new water will be required.

Future large-scale investments in water supply infrastructure are likely to occur in the Yarra Valley Water authority region to sustainably and cost-effectively service growth.

Renewable energy

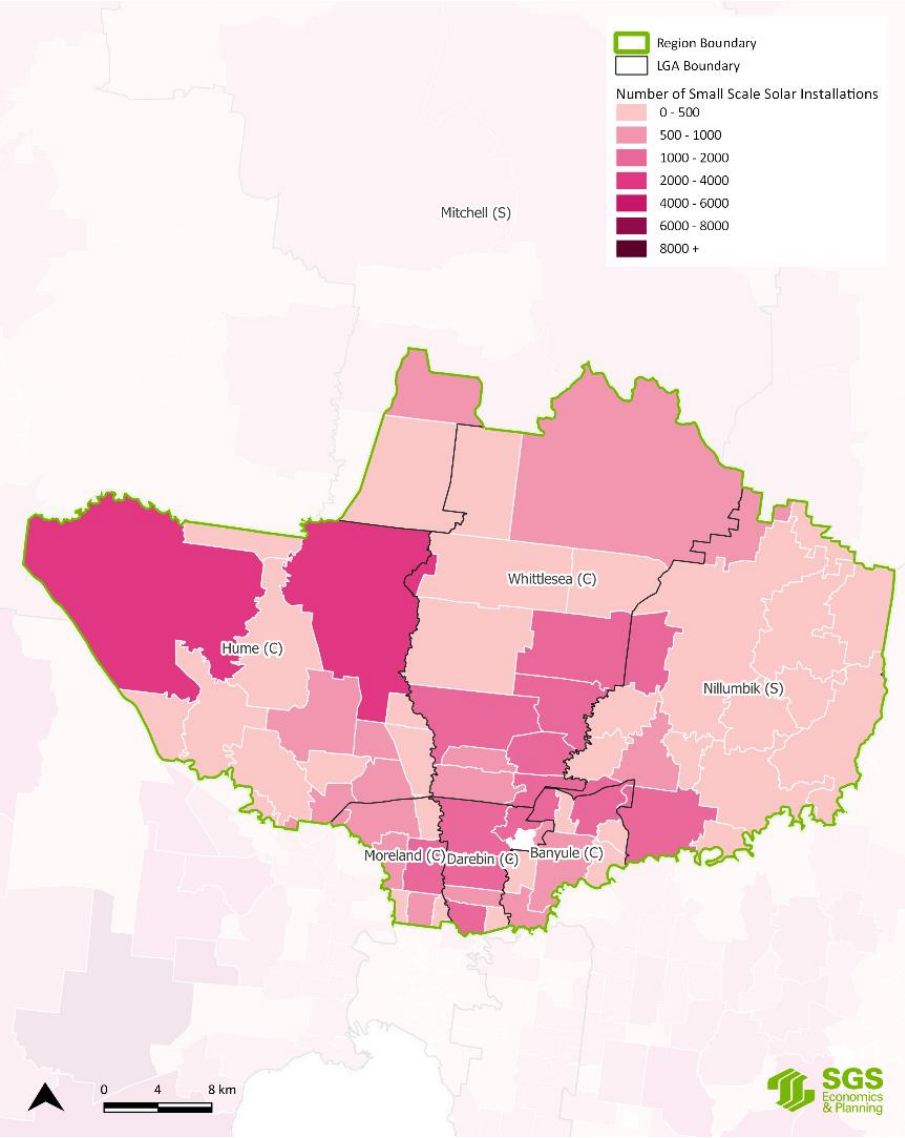
Renewable energy will emerge as traditional resources are depleted and the impacts of climate change increase. Figure 130 shows the number of small-scale solar installations from 2001 to 2016.

- The results are quite varied – no immediate pattern exists.
- Large areas of the Shire of Nillumbik have a small number of installations.
- A large number of installations is evident in two areas in the City of Hume.

Extractives industry

While spatial data for the extractives industry is available for metropolitan Melbourne, it does not identify quarries which are actively producing materials and the quantities produced. For this reason, the analysis has been left out of the report.

FIGURE 130: SMALL SCALE SOLAR INSTALLATIONS (2001-2016)



Source: (Clean Energy Regulator, 2018)

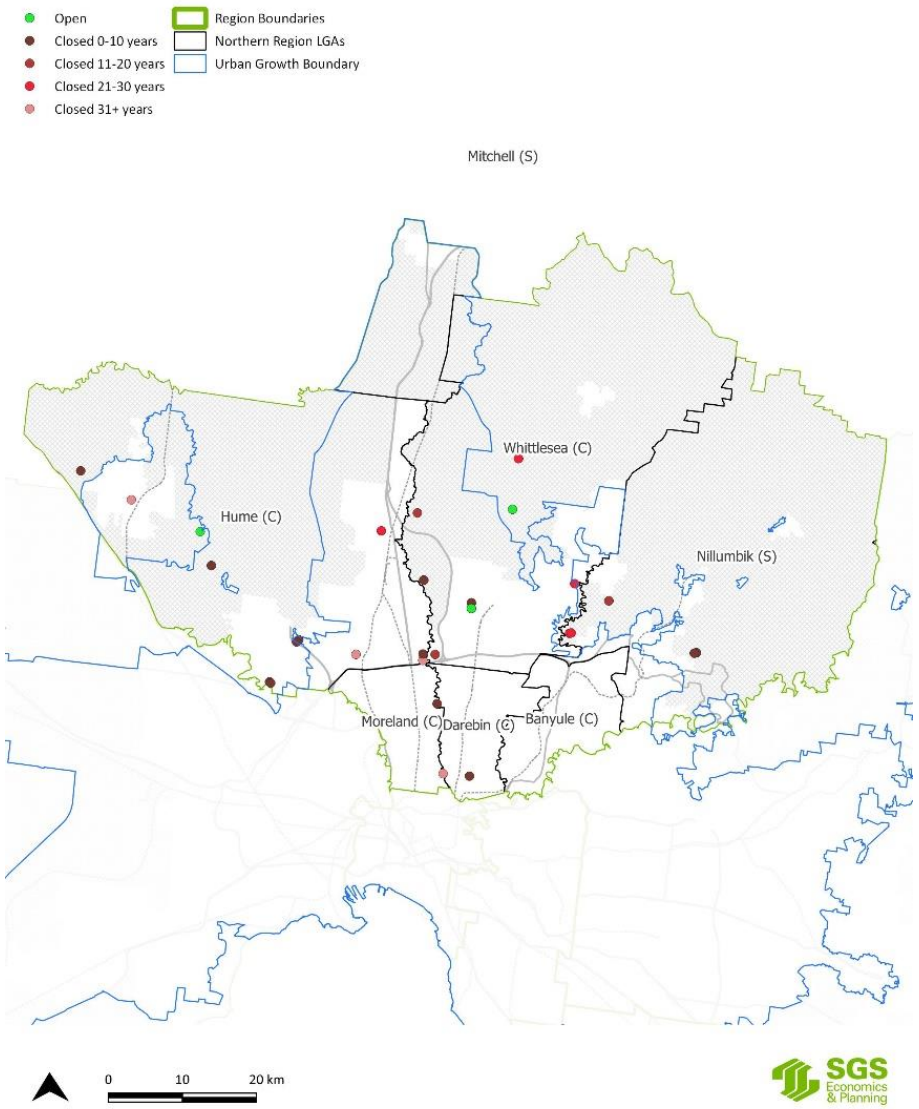
Waste

Multiple waste management locations across the Northern Metro Region require continued management. Waste sites can cause odours and contaminate water supplies if not managed properly. Figure 131 and Figure 132 indicates that three landfill sites are open in the region, and many landfill sites (closed and open) are within the UGB.

Kerbside garbage is one indication of the quantity of flows from the economy to the environment and the requirement on the environment to process the waste. Figure 133 and Figure 134 show that:

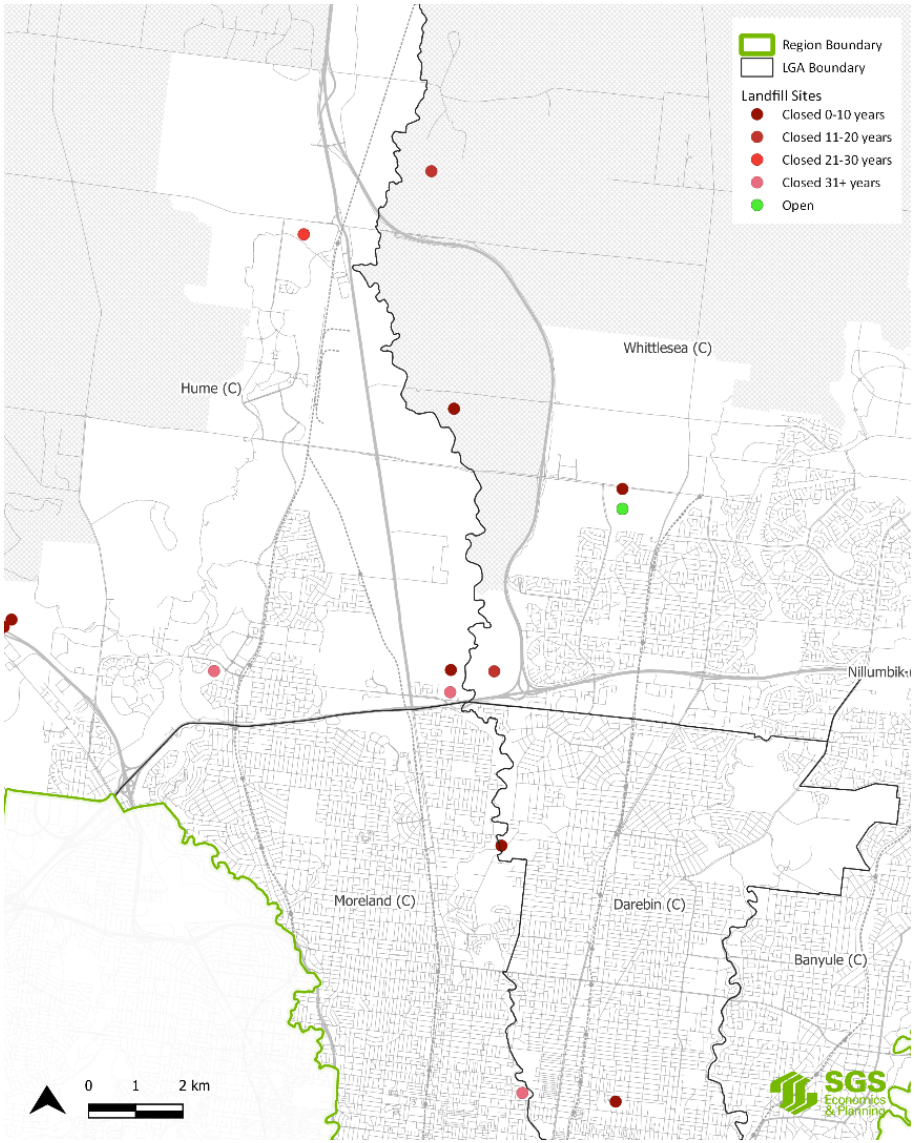
- Aggregate waste in the region steadily increased in the back end of the period, although the trend is relatively flat overall.
- Hume and Whittlesea LGAs are the largest aggregate contributors to waste in the region.
- The amount of kerbside garbage contributed per capita varies, with the City of Hume the largest contributor and the Shire of Nillumbik the lowest contributor in 2017.

FIGURE 131: LANDFILL SITES (2018)



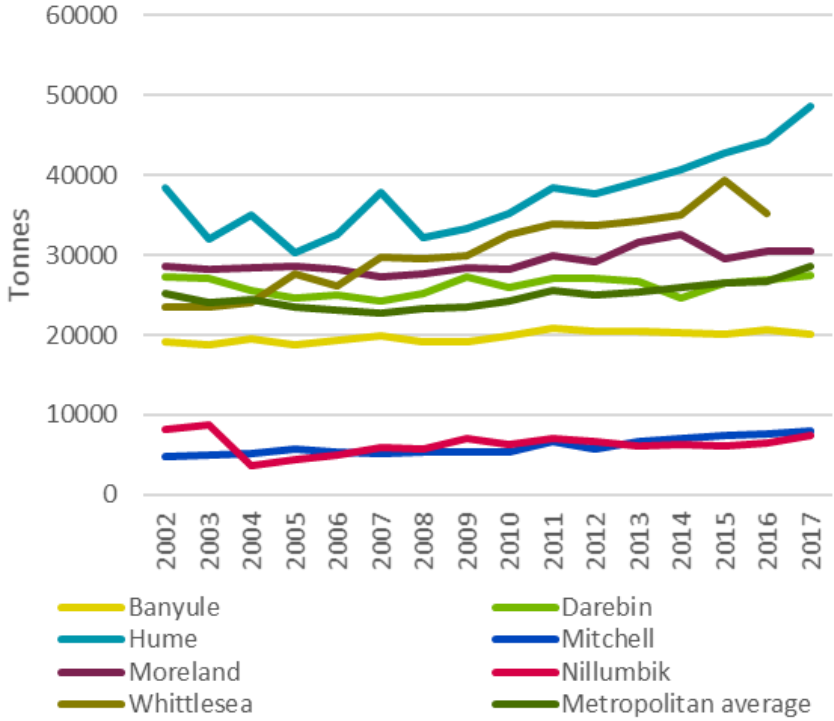
Source: (EPA Victoria, 2018b)

FIGURE 132: LANDFILL SITES, ZOOM, (2018)



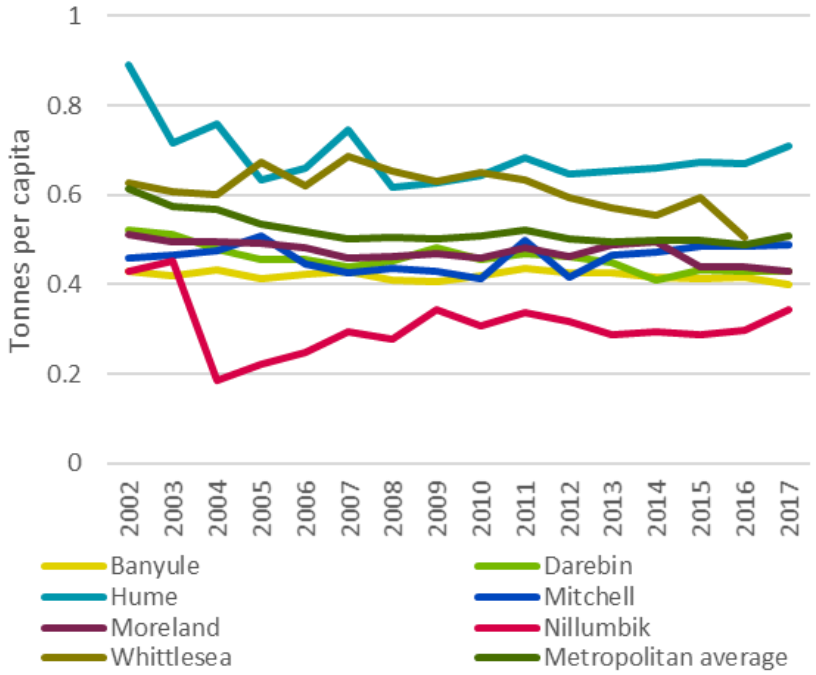
Source: (EPA Victoria, 2018b)

FIGURE 133: KERBSIDE GARBAGE (2002-2017)



Source: Sustainability Victoria *Note that spike in Whittlesea in 2017 (not shown) appears to be an error with the raw data.

FIGURE 134: KERBSIDE GARBAGE PER CAPITA (2002-2017)



Source: Sustainability Victoria *Note that spike in Whittlesea in 2017 (not shown) appears to be an error with the raw data.

Wastewater

Discharge of wastewater from treatment plants contributes to the environmental footprint of the Northern Metro Region. The condition of assets such as the Port Phillip Bay are affected by the flow of wastewater.

Approximately 130,000ML of wastewater was generated in Yarra Valley Water's catchment in 2015-2016. Fifty-four per cent is transferred to Melbourne water for treatment at its Western Treatment Plant while 38 per cent is transferred to Melbourne water for treatment at its Eastern Treatment Plant. The remaining eight per cent is received and treated by treatment plants owned and operated by Yarra Valley Water.

Western Water has seven recycled water plants, including locations in Melton, Gisborne and Sunbury, that collect and treat sewerage. As with water demand, it is expected that population growth will influence the level of wastewater and sewerage.

Approximately 9,000 ML of water is recycled by the water recycling plants per year. By 2065, 30,000GL of recycled water is forecast to be generated within the region per year.

The Western Metro Region and Southern Metro Region reports respectively describe the role of the Western and Eastern Treatment Plants in treating the wastewater.

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