



KWINANA

as a catalyst for economic
development

a FACTBase Special Report



THE UNIVERSITY OF
**WESTERN
AUSTRALIA**

ABOUT FACTBase

The FACTBase project is a collaborative research venture between the Committee for Perth and The University of Western Australia that commenced in 2008. Its objective is to explore Perth's liveability and global connectedness through an examination of its economic, social, demographic and political character.

The FACTBase team of researchers condense a range of existing information and databases on important issues, map what is happening in Perth in pictures as well as words, and examine how

Perth compares with, and connects to, other cities around the world.

Research findings are released regularly, providing an important resource for academics, planners and decision-makers on the following major aims:

- Examining the dynamics of Perth's regional economy;
- Exploring Perth's social and cultural landscape;
- Considering issues related to 'urban liveability' in Perth; and
- Examining governance and policy arrangements.

Committee for Perth and The University of Western Australia
April 2018

Cover image: Kwinana Beach. Image courtesy of Wesfarmers Chemicals, Energy & Fertilisers.

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Image courtesy of Kwinana Industries Council.

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ABOUT THE REPORT



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This FACTBase Special Report is a key input into the *Bigger & Better Beyond the Boom* project. It examines the development of the Kwinana Industrial Area, including an overview of its early origins, industry ecosystem and economic contribution.

The report shows that, since its establishment in 1952, Kwinana has been one of the most significant drivers of economic activity in Western Australia. Not only is it a key centre for employment, but a major

contributor to innovation, export earnings and economic growth.

The report also reflects on the importance of securing the long-term future of the Kwinana Industrial Area, particularly with regard to infrastructure, governance and long-term competitiveness.

The information in the report will be used to help shape a series of recommendations to be released at the end of 2018 and contribute to a roadmap for Perth and Peel's economic future.

ABOUT THE PROJECT

In 2017, the Committee for Perth commenced a new major research project focused on the current and future economy of the Perth and Peel region. The project, entitled *Bigger & Better Beyond the Boom: Perth's economic future as a region of 3.5 million people*, will examine the size, industry composition and spatial structure of the Perth and Peel and wider Western Australian economy at a fine grain level. It will challenge conventional wisdoms and identify strategies for a more economically diverse and robust future for the region.

The primary aim of *Bigger & Better Beyond the Boom* will be to identify industries that are growing; industries in decline; and emerging economic threats and opportunities for the future. It will examine and illustrate the importance of local, regional, national and international connections to and between industries in Perth and Peel and the role of new technology, innovation and entrepreneurship.

The work will be undertaken through the lens of an economic geographer, which will provide a fresh and approachable perspective of the economy of the Perth and Peel region. The outcome of *Bigger & Better Beyond the Boom* will be a major report which will identify targeted strategies associated with the specific strengths and weaknesses of key locations and industries within the region.

FROM THE CEO



Marion Fulker
CEO, Committee for Perth
Project Director, *Bigger & Better Beyond the Boom*
Adjunct Senior Research Fellow, The University of Western Australia

Almost 70 years after a State Agreement was signed to let BP Australia establish the state's first oil refinery in Cockburn Sound, the Kwinana Industrial Area (KIA) has proven to be incredibly resilient and has become a powerful driver of the Western Australian economy.

As well as the refinery, the KIA is home to significant additional industrial activities that are essential to our agricultural production, mining activities and construction industry. In 2016, there were 231 businesses, employing more than 5,600 workers operating within the KIA. This diversity of industries has been crucial to its success, with the Area injecting almost \$16 billion into the state's economy each year.

This FACTBase Special Report, *Kwinana as a catalyst for economic development*, examines the evolution of the KIA, the challenges it has faced,

those it is currently tackling and some of the issues it faces in the future and how it is working to solve some of them now. It is a reminder of what it takes to build new industries, jobs and capabilities.

Kwinana as a catalyst for economic development proves that a combination of strategic policy decisions, symbiotic relationships between co-located industries and the sharing of resources and knowledge can create a whole that is greater than the sum of its individual parts.

I commend this report to you as essential reading as part of the research conducted for the Committee for Perth's *Bigger & Better Beyond the Boom* project. A two-year endeavor to develop a roadmap for the region's future prosperity.

HISTORY & ECONOMIC OUTPUTS



Oil refinery established in 1952 by a State Agreement



The Kwinana Industrial Area (KIA) covers 2,400ha located approx. 30km south of the Perth CBD



Total direct and indirect employees



The KIA contributes \$15.77b per annum to the WA economy

BUSINESSES

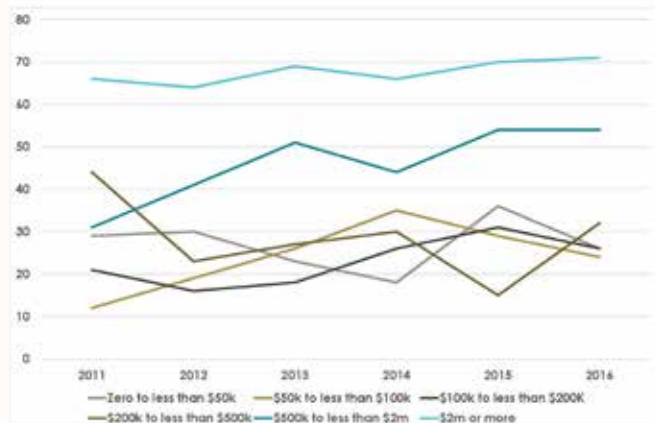


businesses in the KIA in 2016

13.79% increase in the number of businesses between 2011-2016



Number of Kwinana SA2 Businesses in each Turnover Category, 2011 - 2016



INDUSTRIES



Alcoa **exports 3%** of world demand for alumina from its Kwinana port



BP supplies **80%** of the fuel required for Western Australia's road, marine and aviation activities



Home to the Southern Hemisphere's **largest grain export** terminal



CSBP's major chemical and fertiliser production complex, supplies almost all **780,000 tonnes** of ammonium nitrate to the WA mining industry



Tianqi Lithium plant forecast to become the world's largest lithium hydroxide producer







Coogee Chemicals owns the largest Sulphuric Acid Storage facility in the southern hemisphere holding **70,000Mt**

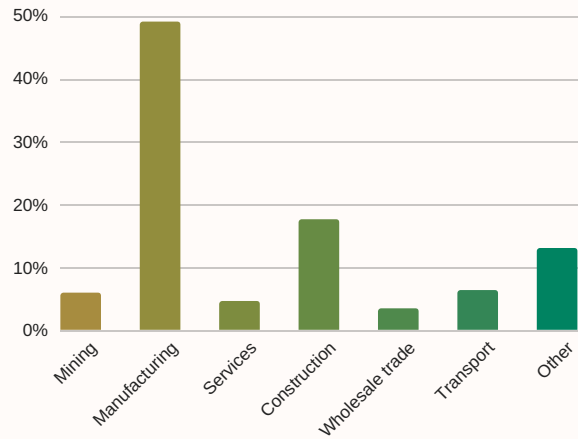


Water Corporation's Perth Seawater Desalination Plant produces **45b litres** of drinking water to **18%** of Perth and Peel residents

WORKFORCE

Kwinana Industrial Area (KIA) v Greater Perth (GP)

Earning > \$1,500/wk		KIA - 61.52% GP - 31.88%
Workers under 30		KIA - 16.83% GP - 26.53%
Born in the UK		KIA - 15.53% GP - 12.08%
Male workers		KIA - 83.90% GP - 50.78%



The primary industry of employment in 2016 was manufacturing at **43.57%**, followed by construction (17.61%), transport, postal and warehousing (6.33%) and mining (5.92%)

THE FUTURE



Potential new Outer Harbour facilities



High level of industrial symbiosis



Export opportunities and global markets



The Western Trade Coast will increase its demand for water from 28.5 to 36-52 gigalitres per year by 2031



Kwinana Industrial Buffer Zone



Energy costs are the third largest constraint on operations of industries at Kwinana



Image courtesy of Kwinana Industries Council.

EXECUTIVE SUMMARY

This FACTBase Special Report traces the 66-year history of development in the Kwinana Industrial Area and the wider region known as the Western Trade Coast, in the south-west of Greater Perth. It examines the magnitude of growth at Kwinana which has led to its significant economic contribution to the region, currently sitting at \$15.77 billion, and reflects upon critical strategic issues and challenges for the future.

The Kwinana Industrial Area was established under a State Agreement that would see the construction of Western Australia's

first oil refinery in 1952. The refinery became the catalyst for a significant agglomeration of industrial activity, who benefit from shared resources and the exchange of material and knowledge.

There are some unique demographic and economic components within the Kwinana Industrial Area, which is being influenced by the legacy of migrant workers from the United Kingdom. These workers are characterised by an ageing demographic, with higher than average weekly personal incomes.

They are typically employed in manufacturing, construction, mining, transport, postal and warehousing, and electricity, gas, water and waste services.

The challenges of an ageing workforce are already being addressed through a coordinated approach, with catchment high schools being engaged to understand local industries and future career opportunities.

The report revealed that businesses in the Kwinana Industrial Area are likely to be experiencing jobless

growth, with technological advancements leading to greater efficiencies and a requirement for fewer workers. Despite this, the Kwinana Industrial Area has a significant estimated output of \$15.77 billion per annum.

In addition, the report highlights a number of critical inputs and challenges that must be overcome to ensure stability and long-term success. Infrastructure, such as an Outer Harbour facility would contribute substantially to the industrial activities carried out at Kwinana and could have a positive effect on potential future investment opportunities.

Ensuring a secure location for future industrial activities is also essential and should be finalised through legislated confirmation of boundaries of the Kwinana Industrial Buffer Zone.

The research highlighted the need for clear governance arrangements, with a single governing body likely to have a positive impact on current and future operations.

The Kwinana Industrial Area plays a vital role in the State's global trade through both imports and exports and will require long-term planning and strategic governance to ensure this continues.



Image courtesy of BP Development Australia Pty Ltd.

ABOUT THE KWINANA INDUSTRIAL AREA

The Kwinana Industrial Area (KIA) covers approximately 2,400ha and falls within a larger industrial precinct known as the Western Trade Coast (WTC), located approximately 30km south of the Perth CBD. The WTC incorporates four industrial precincts, including the Latitude 32 Industry Zone to the north, the Rockingham Industry Zone to the south, the Australian Marine Complex at Henderson and the Kwinana Industrial Area, see Figure 1 (Western Trade Coast, 2017). It is Western Australia's primary industrial area and falls within the boundaries of three local governments, which include the City of Kwinana, the City of Rockingham and the City of Cockburn (KIC, 2012c).

The KIA is a significant contributor to the Western Australian economy and has an estimated output of \$15.77 billion per annum (KIC, 2012c). The primary focus of economic activity is heavy industry, through resource and chemical processing, and outputs include refined oil, alumina, nickel, fertiliser chemicals and others. More recently, the KIA has been used as a location for water reclamation and desalination with the introduction of facilities by the Water Corporation (WTC, 2014).

The Western Australian economy further benefits from the KIA as it is the location of the state's only oil refinery, owned and operated by BP Australia and the largest of the four remaining refineries in Australia (Williams, 2016). The BP refinery imports crude oil from the Middle East, West Africa, New Zealand, Indonesia and the north-west of Australia to produce 8,300 mega litres of product, including petrol, diesel, aviation fuel, fuel oil, hydrogen, kerosene, propane and butane (BP Australia, 2017; Williams, 2016). In total, this supplies Western Australia with 80% of its current fuel requirements for road, marine and aviation purposes (Parliament of Western Australia, Legislative Council, November 10, 2016).

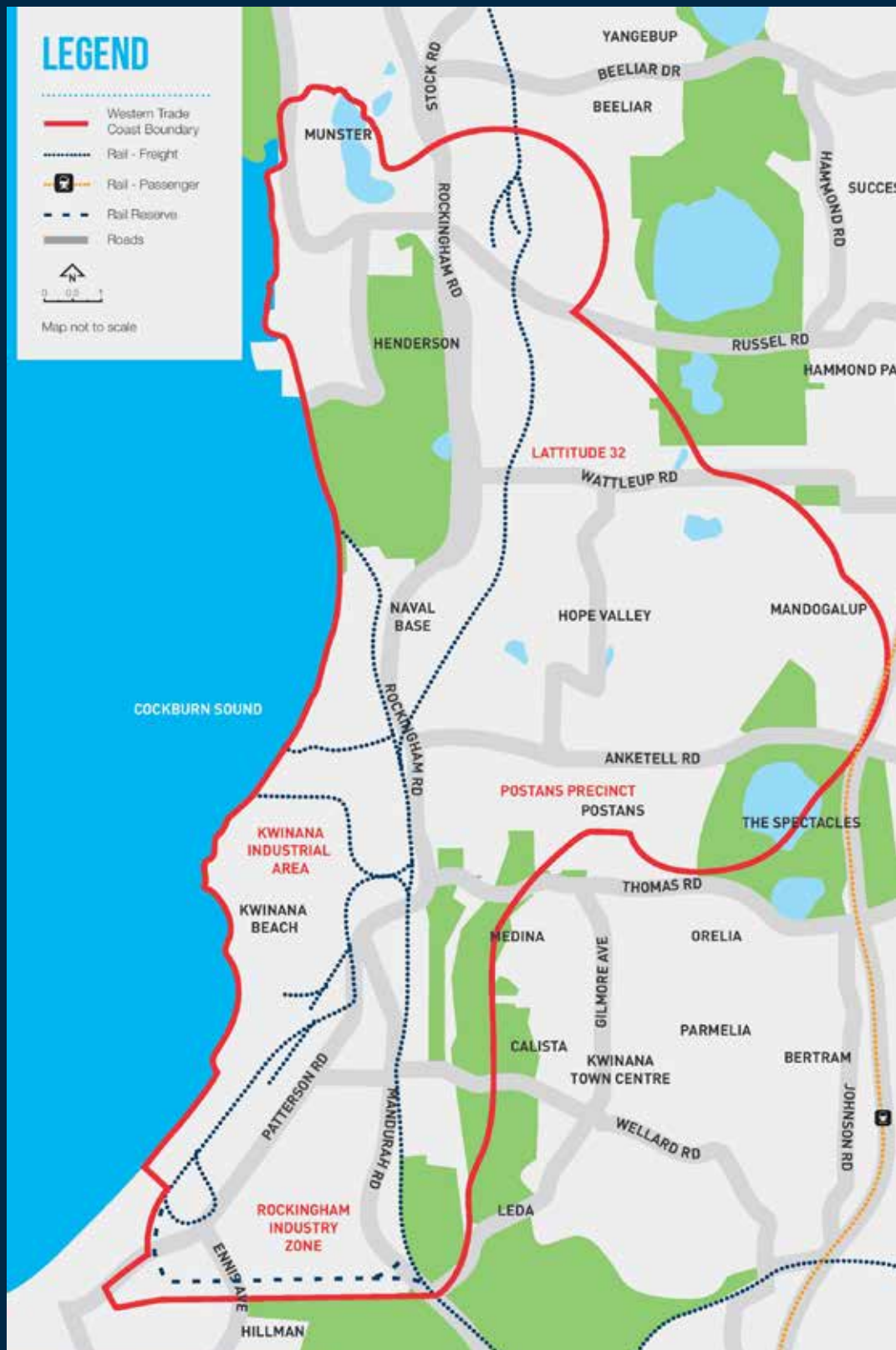
The list below describes some of the additional important industrial activities that the KIA accommodates:

- The Southern Hemisphere's largest grain export terminal, owned and operated by CBH Group and able to convey 5,000 tonnes of grain per hour;
- One of three Alcoa alumina refineries in the state, which combined supply 8% of the global alumina market, the world's single largest source, which is exported out of Kwinana and Bunbury (Alcoa, 2017);
- Water Corporation's Perth Seawater Desalination Plant, which produces 45 billion litres of drinking water to supply approximately 18% of Perth and Peel residents (Water Corporation, n.d.);



Image courtesy of BP Development Australia Pty Ltd.

FIGURE 1. WESTERN TRADE COAST BOUNDARY AND INDUSTRIAL AREAS



Source: KIC, 2016.



Image courtesy of BP Development Australia Pty Ltd.

- The Southern Hemisphere's largest Sulphuric Acid Storage facility, with a capacity of 70,000Mt, owned by Coogee Chemicals;
 - CSBP's major chemical and fertiliser production complex, which supplies almost all 780,000 tonnes of ammonium nitrate to the WA mining industry as a blasting agent and specifically develops a variety of fertilisers based on the Western Australian soil profile (CSBP, 2015a; CSBP, 2015b);
 - Tianqi Lithium has commenced construction on the second stage of its lithium hydroxide processing plant, which when complete, 'will make the Kwinana plant the world's largest lithium hydroxide producer' to manufacture lithium batteries (Tianqi Lithium, 2017); and
 - A nickel sulphate production facility has been proposed by South32 which could allow Kwinana to become a major hub for renewable battery manufacturing (KIC, 2016; KIC, 2017).
- Founded under a State Agreement in the 1950s, the refinery at Cockburn Sound became the catalyst for the development of Kwinana as an industrial hub, which drove economic development, created new infrastructure and jobs, grew the skilled worker base and the development of the surrounding suburbs.
- Today, the KIA is a mature industrial precinct, home to many organisations with symbiotic relationships. The KIA has grown to become critical to Western Australia's export earnings in processed goods and is a key link in the state's global trade connections.

HISTORY OF PLANNING AND DEVELOPMENT

The Kwinana Industrial Area was established in 1952 through the ratification of the *Oil Refinery Industry (Anglo-Iranian Oil Company Limited) Act 1952*, which set out details of a State Agreement between the Western Australian Government and the Anglo-Iranian Oil Company, now BP Australia, which would see the establishment of an oil refinery on the shores of Cockburn Sound (Western Australia, 1952).

Prior to the establishment of the BP Refinery, Western Australia was the least industrialised mainland Australian state and was

well-known for being deemed the 'Cinderella state', at a financial and/or political disadvantage compared with the rest of Australia (MacLachlan, 2013). Indeed, the three major sources of economic wealth in Western Australia prior to the establishment of the oil refinery were wool, gold and wheat, with 76.5% of the state's net value of production attributed to primary industries in 1950-51 (Stephenson & Hepburn, 1955). In order to address concerns regarding Western Australia's economic future, the State Government entered into negotiations with the Anglo-Iranian Oil

Company to secure the state as the location for what would be, and still is Australia's largest oil refinery.

The decision to locate the oil refinery in Western Australia was influenced by a number of conditions at the time. A post World War II global market led to an increasing number of countries implementing 'resource nationalism', which is defined by Stevens (2008) as both a limitation placed on the 'operations of private international oil companies' and 'asserting a greater national control over natural resource development' (Stevens, 2008, p. 5).

FIGURE 2. THE KWINANA INDUSTRIAL AREA PRIOR TO INDUSTRIAL DEVELOPMENT, 1 NOVEMBER 1952



Image courtesy of BP Development Australia Pty Ltd.

This was particularly true for Iran, which was the location for the Anglo-Iranian Oil Company's largest oil refinery in Abadan. Growing conflict arose over issues in oil concessions between large companies and the countries in which they were located, which led companies to source alternative locations for operations offering less volatile market conditions (MacLachlan, 2013; Stevens, 2008).

Negotiations between the Western Australian Liberal Government and the Anglo-Iranian Oil Company began in 1951, after the state government sent representatives to the eastern states to argue the case for Western Australia as a potential location for the refinery (Parliament of Western Australia, Legislative Assembly, March 6, 1952; The Argus, 1955). The location of Kwinana was favoured because of a number of qualities including: the deep waters found at Cockburn Sound; the large amount of unsettled land and flat topographical settings adjacent to the site; and, the ability of the state to provide the electricity and water requirements for the establishment and operation of the refinery (Parliament of Western Australia, Legislative Assembly, March 6, 1952).

The final State Agreement outlined a number of conditions that the state would meet to guarantee the £40 million investment, worth \$1.45 billion in 2017, required to establish and construct the Kwinana Refinery (Reserve Bank of Australia, 2017; Western Australia, 1952). These conditions included:

- The dredging of Cockburn Sound in three stages to allow ships access to the industrial area, to a final depth of 38 feet and a bottom width of 450 feet within 6 years;
- The provision of 333 houses per year for three years to be used by employees of the company, who would largely have emigrated from the United Kingdom;
- The construction of all roads and infrastructure necessary to maintain both the Kwinana Refinery and the new houses being erected, including fencing, sewerage and electricity services;
- The provision of electricity, up to 12,000 kilowatts, and a minimum water supply of 200,000 gallons per day; and
- The construction and maintenance of a railway connecting to the existing line to be used for industrial purposes (Western Australia, 1952).

The total cost to the State Government in securing the initial investment is estimated to have been approximately £10-12 million, which is worth between \$363-\$436m in 2017 (MacLachlan, 2013; Reserve Bank of Australia, 2017). The Kwinana Refinery was constructed and completed in 1955.

The first planning document to guide future land use and development in Perth coincided roughly with the establishment of the BP Kwinana Refinery at Cockburn Sound, in 1955. Looking back to the Stephenson-Hepburn Plan provides an understanding of the impact of the then recently ratified decision, in that it outlined the significance of the 'vast works' at Kwinana to 'have far reaching repercussions both on the economy of the State and the physical pattern of the Metropolitan Region' (Stephenson & Hepburn, 1955, p. 1). A great emphasis was placed on industrial employment, which was identified by Stephenson and Hepburn as the most important aspect of Perth's future employment. The manufacturing industry was expected to grow largely due to the new capacity of oil refining in the State, which was anticipated to bring new industry into the region (Stephenson & Hepburn, 1955, p. 46).

FIGURE 3. THE ANGLO-IRANIAN OIL COMPANY REFINERY NEARING COMPLETION



Source: Stephenson & Hepburn, 1955, p. 19.

The plan proposed that the 'largest industrial area in the region' be located within the KIA and incorporate the boundaries of the new Kwinana Refinery (Stephenson & Hepburn, 1955, p. 236). In addition, it identified an employment capacity at Kwinana of 54,000 out of a total 322,500 industrial workers in the Perth metropolitan region, 16.7% (see Figure 4).

The establishment of the Kwinana Refinery and the newly released Stephenson-Hepburn plan for Perth saw a significant amount of investment during the ensuing years. Figure 5 provides a timeline of when

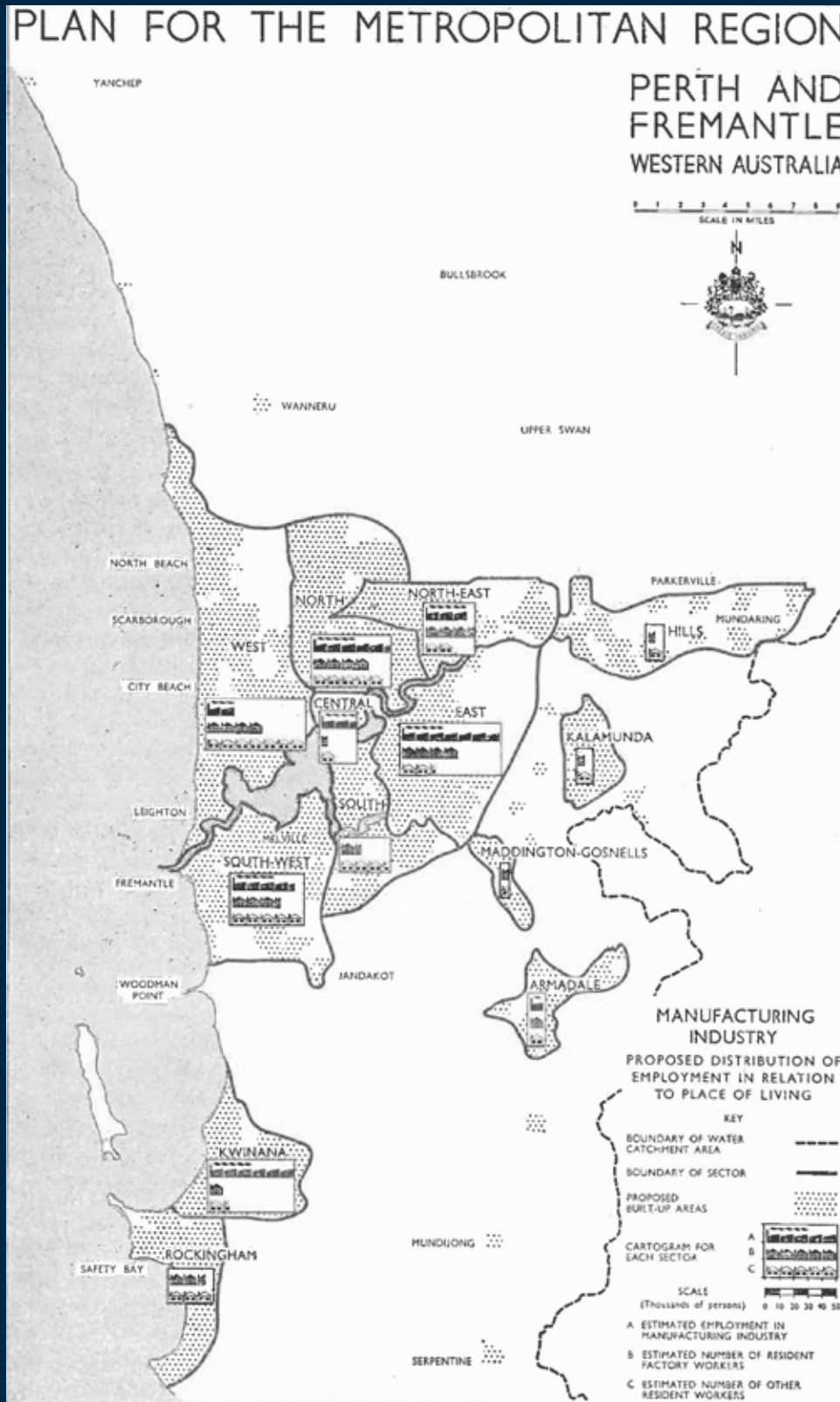
major processing plants were opened/closed within the KIA.

Between 1955 and 1963, the KIA accommodated a number of new industries including: the processing of local limestone by Cockburn Cement in 1955; a steel rolling mill by BHP in 1956; and Alcoa's first Western Australian alumina refinery in 1963, also established with the assistance of a State Agreement, the *Alumina Refinery Agreement Act 1961* (MacLachlan, 2013; Western Australia, 1961).

Following this period of early investment, the State

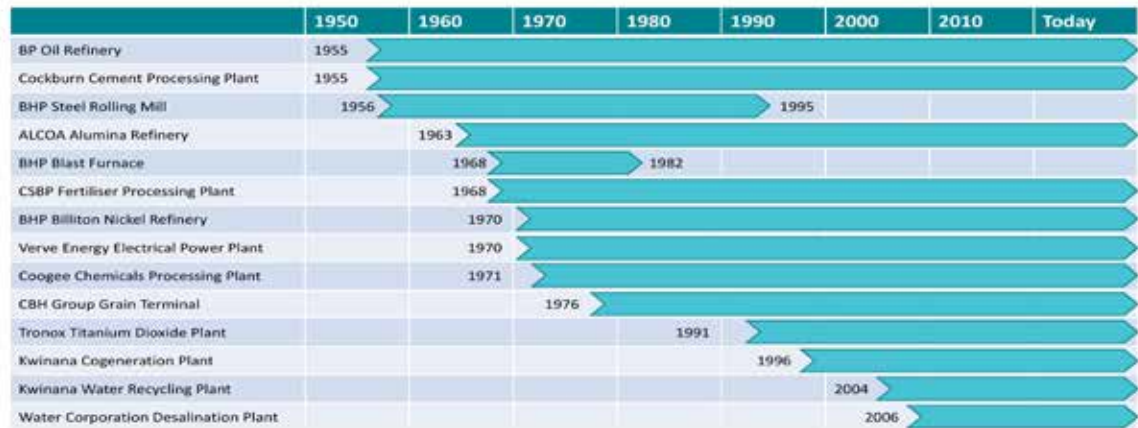
Government gazetted the 1963 Metropolitan Region Scheme (MRS), a statutory planning document governing land use planning through the use of zoning in Perth and Peel. Figure 6 provides a visual comparison of industrial land use zones between the 1963 and the current MRS, identified by the purple areas. Comparing the two maps, it can be seen that the KIA was of much greater significance in 1963, being the most prominent area of land zoned for industrial purposes. In the subsequent 54 years, a number of additional locations of industrial activity have been expanded or rezoned.

FIGURE 4. PROPOSED DISTRIBUTION OF EMPLOYMENT, RESIDENT FACTORY WORKERS AND OTHER RESIDENT WORKERS AS PER STEPHENSON-HEPBURN PLAN



Source: Stephenson & Hepburn, 1955, p. 67.

FIGURE 5. MAJOR PROCESSING PLANTS WITHIN THE KWINANA INDUSTRIAL AREA



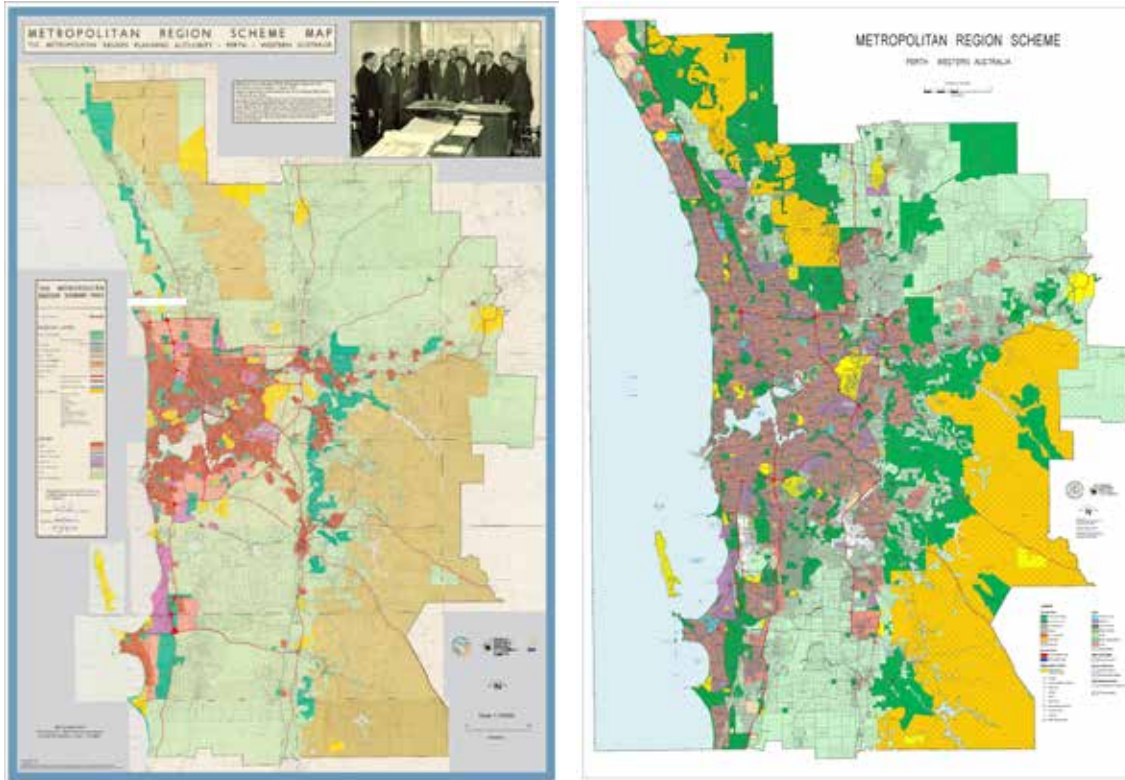
Source: MacLachlan, 2013.

Despite the growth of additional industry, the KIA still remains Western Australia's primary area of industrial activity. In the current land use strategy for Perth and Peel, *Directions 2031*, the KIA is recognised within the boundaries of the WTC as one of four 'Strategic Industrial Centres', which are defined as having the 'highest level of industrial activity throughout the metropolitan area' (Department of Planning & Western Australian Planning Commission, 2010, p. 37). The primary aim in *Directions 2031* with regards to Strategic Industrial Centres is to support them by ensuring they have sufficient levels of infrastructure, including road, rail and intermodal facilities and have accessibility to an appropriately skilled workforce (Department of Planning & Western Australian Planning Commission, 2010).

The draft *South Metropolitan Peel Sub-regional Planning Framework* (the Framework) forms part of the *Perth and Peel@3.5million* suite of strategic planning documents, currently being finalised by the Department of Planning, Lands and Heritage and Western Australian Planning Commission. These Sub-regional Planning Frameworks provide more detail than *Directions 2031* for the planning of population and employment growth, and with regards to industrial centres they set out proposals to 'strengthen key activity centres and employment nodes to meet the future needs of industry, commerce and the community' (Department of Planning & Western Australian Planning Commission, 2015a, p. 6).

The Framework designates the WTC to remain as Western Australia's premier industrial area, as it contains a significant amount of investment in infrastructure including port and freight transportation. Figure 7 identifies locations proposed for expansion of the KIA and WTC as per the Framework. It shows the KIA will remain largely unchanged with a projected 775ha required when Perth and Peel reaches a population of 3.5 million, however it also identifies further opportunities for industrial agglomeration, proposing areas nearby for expansion and for further investigation. It also predicts that the economic profile of the KIA will stay relatively unchanged in terms of the distribution of industry of employment (see Figure 7).

FIGURE 6. METROPOLITAN REGION SCHEME MAP, 1963 AND CURRENT



Source: Department of Planning & Western Australian Planning Commission, 2015b.

Some of the key investment initiatives identified within the Framework for the WTC include:

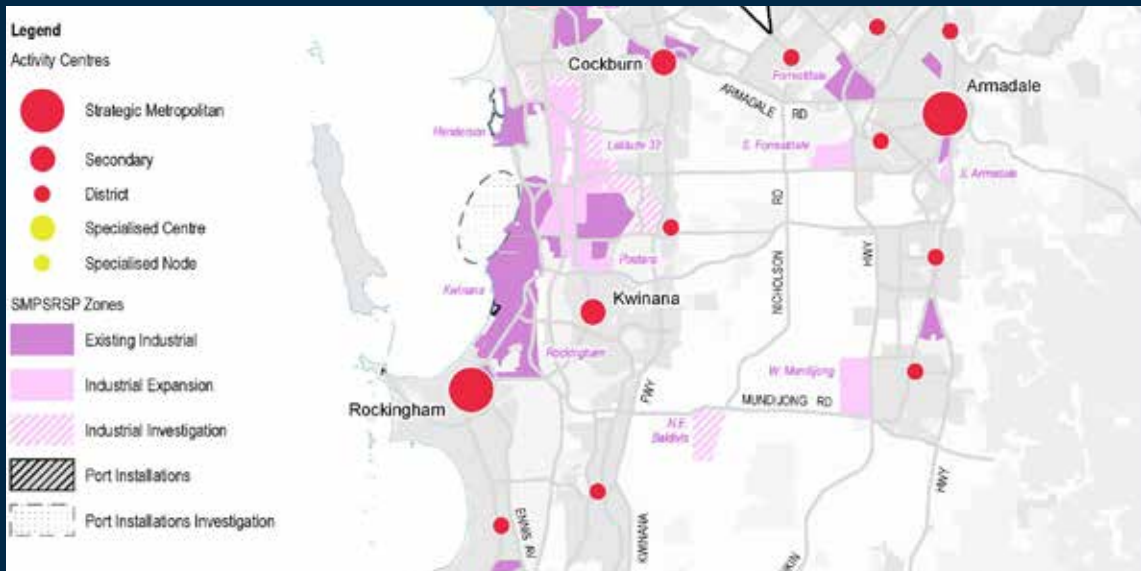
- New container facilities in the Outer Harbour within Cockburn Sound;
- Intermodal freight transfer facilities for the industrial area at Latitude 32; and
- Improving the freight transport network links between the southwest and southeast (Department of Planning & Western Australian Planning Commission, 2015a).

It is clear from Figure 5 that the establishment of the BP oil refinery at Kwinana was a catalyst for the further growth and expansion of

the KIA, with a significant amount of industrial activity further developing from 1955 onwards. The initial investment from the state government meant that locating within the KIA provided many benefits over alternative locations, such as access to the necessary infrastructure and connectivity requirements for heavy industry. It also clearly demonstrated the willingness of the Western Australian government to support industrial activities such as the refinery, which potentially increased the attractiveness of Perth and Peel as a key location for major industrial infrastructure investment during a time of volatile market conditions globally.

Ultimately, the establishment of the BP oil refinery in 1955 was the starting point for an agglomeration of large and small industrial businesses at Kwinana. In addition, it set a precedent for a much broader pattern of regional development in the south-west corridor of Perth and Peel. Today, the location accommodates a significant agglomeration of further industrial activities in Henderson, Latitude 32 and Rockingham, in addition to activities in the KIA. Together, these activities form the state's premier industrial precinct, known as the Western Trade Coast, which contributes substantially to the Western Australian economy.

FIGURE 7. EXISTING INDUSTRIAL, INDUSTRIAL EXPANSION AND INDUSTRIAL INVESTIGATION AREAS FOR THE WESTERN TRADE COAST AS DESIGNATED IN THE DRAFT SOUTH METROPOLITAN PEEL SUB-REGIONAL PLANNING FRAMEWORK



Source: Department of Planning & Western Australian Planning Commission, 2015a.

Image courtesy of Kwinana Industries Council.

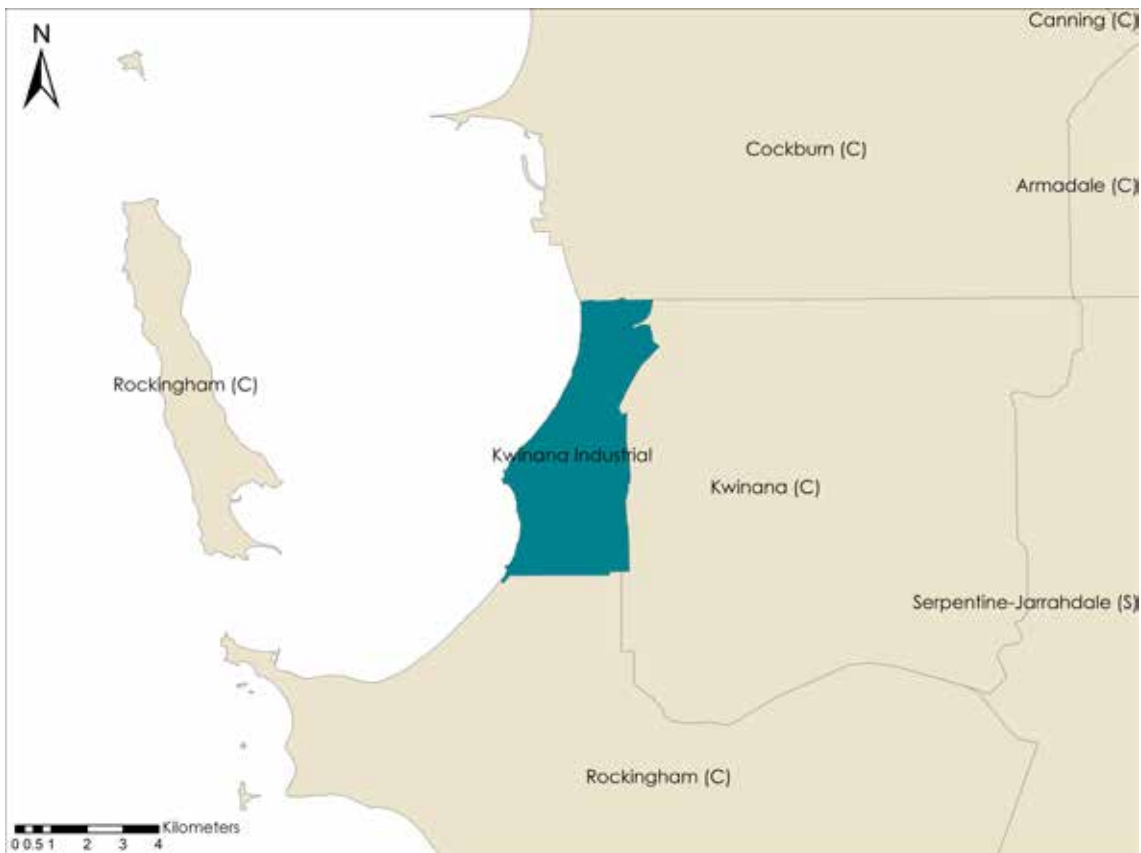


DEMOGRAPHIC AND ECONOMIC ANALYSIS

For the purpose of this report, the Kwinana Industrial Statistical Area Level 2 (KI SA2) geographical area was used to determine the profile of workers within the KIA between 2011 and 2016,

as it represents the closest geographical boundary of the KIA as delineated by the Australian Bureau of Statistics (see Figure 8). Prior to 2011, ABS data is only available for the region at a local government area level.

FIGURE 8. KWINANA INDUSTRIAL STATISTICAL AREA LEVEL 2 AND LOCAL GOVERNMENT BOUNDARIES INCLUDED IN ANALYSIS OF DATA



Source: ABS, 2016a.

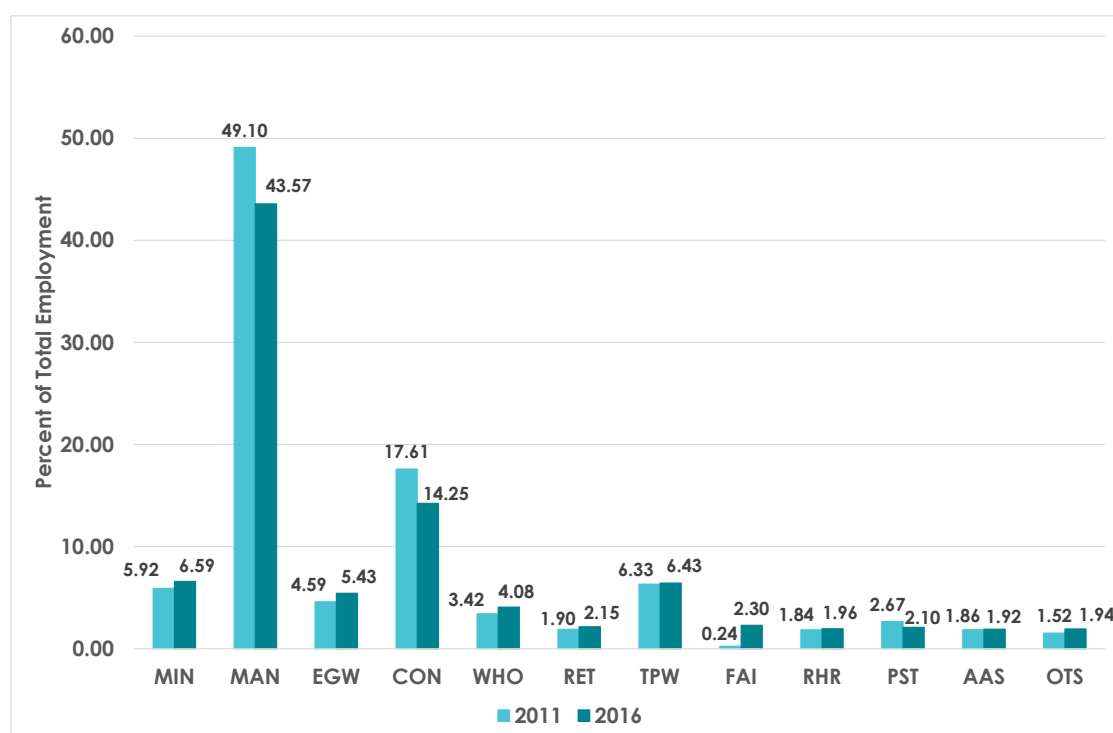
WORKERS IN THE KWINANA INDUSTRIAL AREA

In 2016, the KI SA2 employed a total of 5,616 workers of which 83.90% were male. This figure is lower than in 2011, when there were 7,221 workers. This reduction in workers does not necessarily indicate that the overall economic output of the

KIA has reduced, especially given the global nature of enterprise and the likely restructuring of work and technological advances. It is however likely to reflect a trend towards jobless growth.

The primary industry of employment in the KI SA2, as shown in Figure 9 was manufacturing, which accounted for 49.10% and 43.57% of the total employment in 2011 and 2016 respectively.

FIGURE 9. INDUSTRY OF EMPLOYMENT OF KWINANA INDUSTRIAL SA2 WORKING POPULATION, INCLUDES INDUSTRIES WITH >1% EMPLOYMENT, 2011 AND 2016



AGR Agriculture, forestry and fishing

MIN Mining

MAN Manufacturing

EGW Electricity, gas, water and waste services

CON Construction

WHO Wholesale trade

RET Retail trade

AAF Accommodation and food services

TPW Transport, postal and warehousing

IMT Information media and telecommunications

FAI Financial and insurance services

RHR Rental, hiring and real estate services

PST Professional, scientific and technical services

AAS Administrative and support services

PAS Public administration and safety

EAT Education and training

HAS Health care and social assistance

AAR Arts and recreation services

OTS Other services

Source: ABS, 2012a; ABS, 2017a.

Behind manufacturing, industries with the highest proportion of total employees in 2016 included: construction, 14.25%; mining, 6.59%; transport, postal and warehousing, 6.43%; and electricity, gas, water and waste services (EGW), 5.43%.

Between 2011 and 2016, the number of workers employed contracted across most industries, including sectors with a large number of employees such as

mining, manufacturing, EGW and construction. The only industry to record notable increases in the total number of employees between 2011 and 2016 was financial and insurance services, which grew by 112 workers.

An examination of the types of roles carried out in the KIA is displayed in Table 1. When analysed, industries which grew in terms of the total number of employees included: metal ore mining, 412.96%;

waste collection, treatment and disposal services, 53.42%; basic material wholesaling, 12.87%; and finance, 1,333.33%. All other industrial activities experienced a decrease in employee numbers, contributing to the total loss of workers in the KIA by 1,601 between 2011 and 2016.

The table below lists industries with more than 100 employees in 2011 and/or 2016 and shows the percentage change.

TABLE 1. BREAKDOWN OF INDUSTRY OF EMPLOYMENT IN KWINANA INDUSTRIAL SA2, INCLUDES INDUSTRIES WITH OVER 100 EMPLOYEES, 2011 AND 2016

	2011	2016	Change (%)
Mining			
Oil and gas extraction	119	12	-89.92
Metal ore mining	54	277	412.96
Exploration and other mining support services	214	32	-85.05
Manufacturing			
Manufacturing, nfd	141	89	-36.88
Petroleum and coal product manufacturing	493	252	-48.88
Basic chemical and chemical product manufacturing	1,086	818	-24.68
Primary metal and metal product manufacturing	1,286	907	-29.47
Fabricated metal product manufacturing	236	164	-30.51
Electricity, gas, water and waste services			
Electricity supply	227	133	-41.41
Waste collection, treatment and disposal services	73	112	53.42
Construction			
Heavy and civil engineering construction	464	176	-62.07
Construction services	656	454	-30.79
Wholesale trade			
Basic material wholesaling	171	193	12.87
Transport, postal and warehousing			
Road transport	242	179	-26.03
Financial and insurance services			
Finance	9	129	1,333.33
Rental, hiring and real estate services			
Rental and hiring services (except real estate)	128	107	-16.41
Professional, scientific and technical services			
Professional, scientific and technical services (except computer system design and related services)	184	112	-39.13

Source: ABS, 2012a; ABS, 2017a.

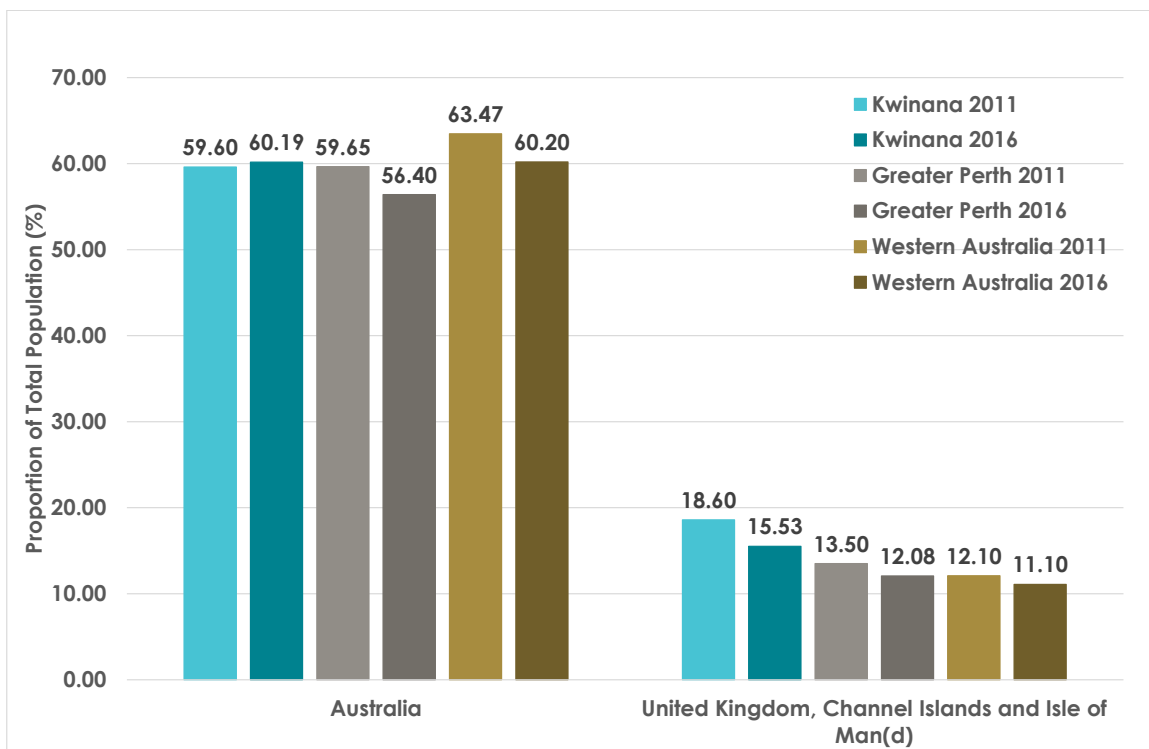
Without a local workforce of any size or scale, many skilled workers were attracted to Western Australia to work at BP and other global entities in the early days of the KIA. This has resulted in a concentration of overseas born workers that lingers. A comparison of Australian and United Kingdom born workers, displayed in Figure 10 reflects the history of the KIA, with a higher proportion of workers from the United Kingdom compared with Greater Perth and Western Australia. In 2011, 18.60%

of KIA workers were born in the United Kingdom, compared with 13.50% in Greater Perth and 12.10% in Western Australia. This proportion decreased slightly in 2016, with 15.53% of workers born in the United Kingdom, however this was still higher than the average for both Greater Perth, 12.08% and Western Australia, 11.10%, both of which also experienced a proportional decrease. The number of workers of Australian background in 2016 was 60.19% and is generally consistent with the

Greater Perth and Western Australian averages. For all other nationalities, the KIA employed relatively similar proportions of workers to Greater Perth and Western Australia.

A comparison of the age profile of workers within the KIA with Greater Perth and Western Australia identifies some key differences, as shown in Figure 11. In 2011 and 2016, the average age of the Kwinana workforce was significantly older than in Greater Perth or Western Australia, with a much larger

FIGURE 10. AUSTRALIA AND UNITED KINGDOM ORIGIN OF WORKERS IN KWINANA, GREATER PERTH AND WESTERN AUSTRALIA, 2011 AND 2016



Source: ABS, 2012a; ABS, 2017a.

number of workers falling into the 40-44, 45-49, 50-54 and 55-59 age categories. In total, Kwinana had 59.79% of its workforce over the age of 40, compared with 50.33% in Greater Perth and 51.73% in Western Australia in 2016, see Table 2. In addition, the number of workers in the younger age categories is lower, with workers under 30 years of age only representing 16.83% of the Kwinana workforce, compared with 26.53% in Greater Perth and 25.37% in Western Australia.

This poses potential implications for industries within the KIA, with a high number of expected retirees within the workforce as per 2016 Census data.

While this can be seen as a potential threat for the future of industries within the KIA, it is worth noting that the structure of the local and broader economy will likely change as technological advancements progress. What this means is that the needs of the future labour force for the KIA will be different. Labour mobility will need to be a bigger part of that change and of course there will need to be targeted training and education of key skills that are not automated or enhanced through technological advancement.

A positive attribute of the Kwinana Industrial workforce is the significantly higher weekly personal income of workers, see Figure 12. In both 2011 and 2016, the number of workers with a weekly income greater than \$1,500 almost doubled that of Greater Perth and Western Australia. In 2016, 61.52% of KI SA2 workers earned more than \$1,500 per week, compared with Greater Perth, 31.88% and Western Australia, 33.47%.

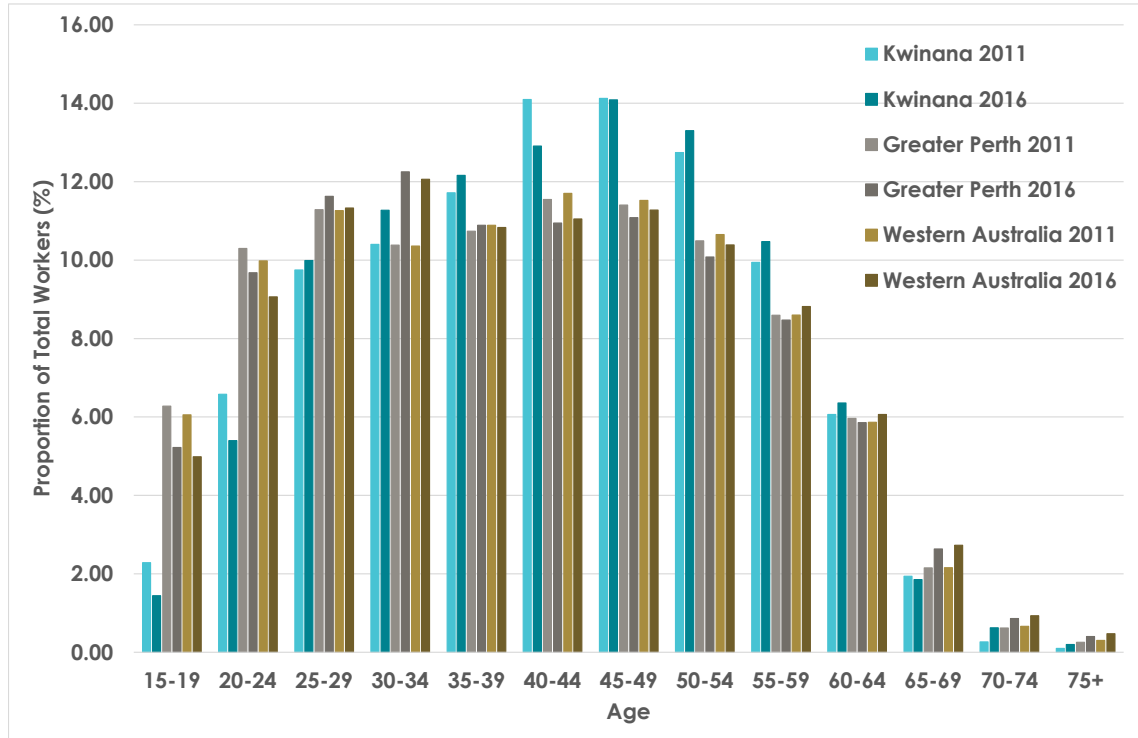
In addition, the number of workers with a lower weekly total personal income were fewer, with only 14.96% of the workforce earning under \$999 weekly compared with 43.16% in Greater Perth and 42.22% in Western Australia.

TABLE 2. PROPORTION OF WORKERS OVER 40 AND UNDER 30, KWINANA, GREATER PERTH AND WESTERN AUSTRALIA, 2011 AND 2016

		Kwinana	Greater Perth	Western Australia
2011	Age over 40	59.27%	51.02%	51.46%
	Age under 30	18.61%	27.86%	27.30%
2016	Age over 40	59.79%	50.33%	51.73%
	Age under 30	16.83%	26.53%	25.37%

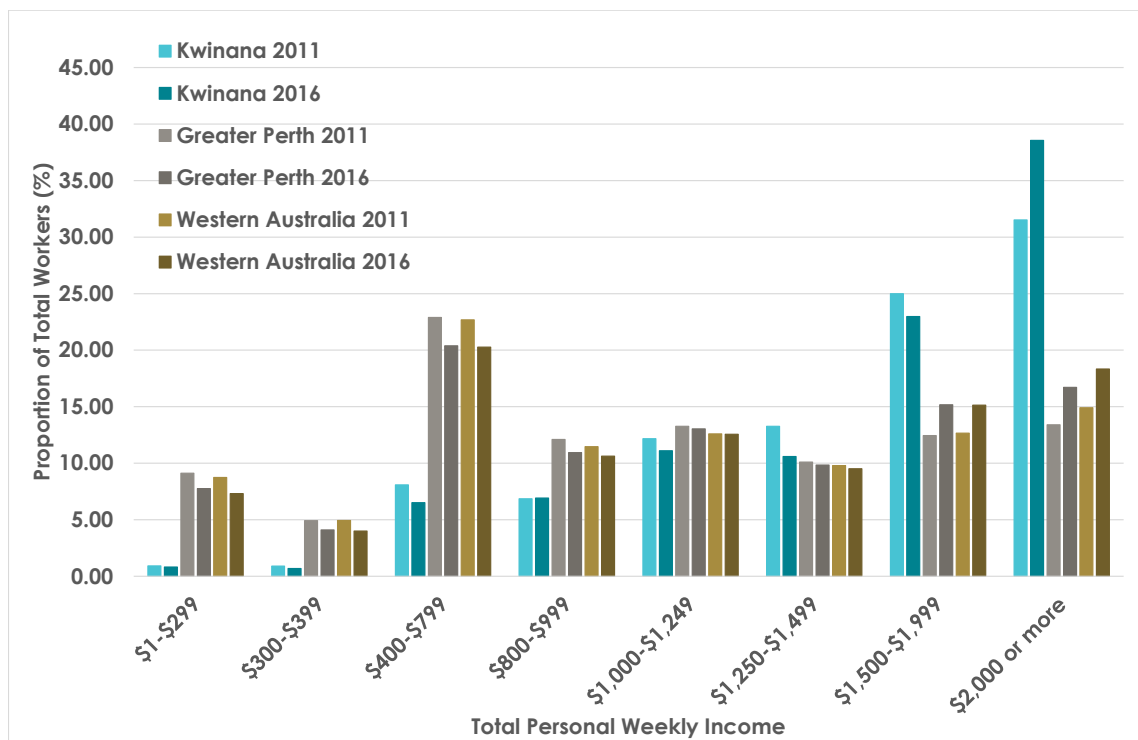
Source: ABS, 2012a; ABS, 2017a.

FIGURE 11. AGE OF WORKERS IN KWINANA, PERTH AND WESTERN AUSTRALIA, 2011 AND 2016



Source: ABS, 2012a; ABS, 2017a.

FIGURE 12. TOTAL WEEKLY PERSONAL INCOME IN KWINANA, PERTH AND WESTERN AUSTRALIA, 2011 AND 2016



Source: ABS, 2012a; ABS, 2017a.

BUSINESSES IN THE KWINANA INDUSTRIAL AREA

Undertaking an analysis of businesses within the KI SA2 between 2011 and 2016 highlights some important differences between workers within the KIA and their employers.

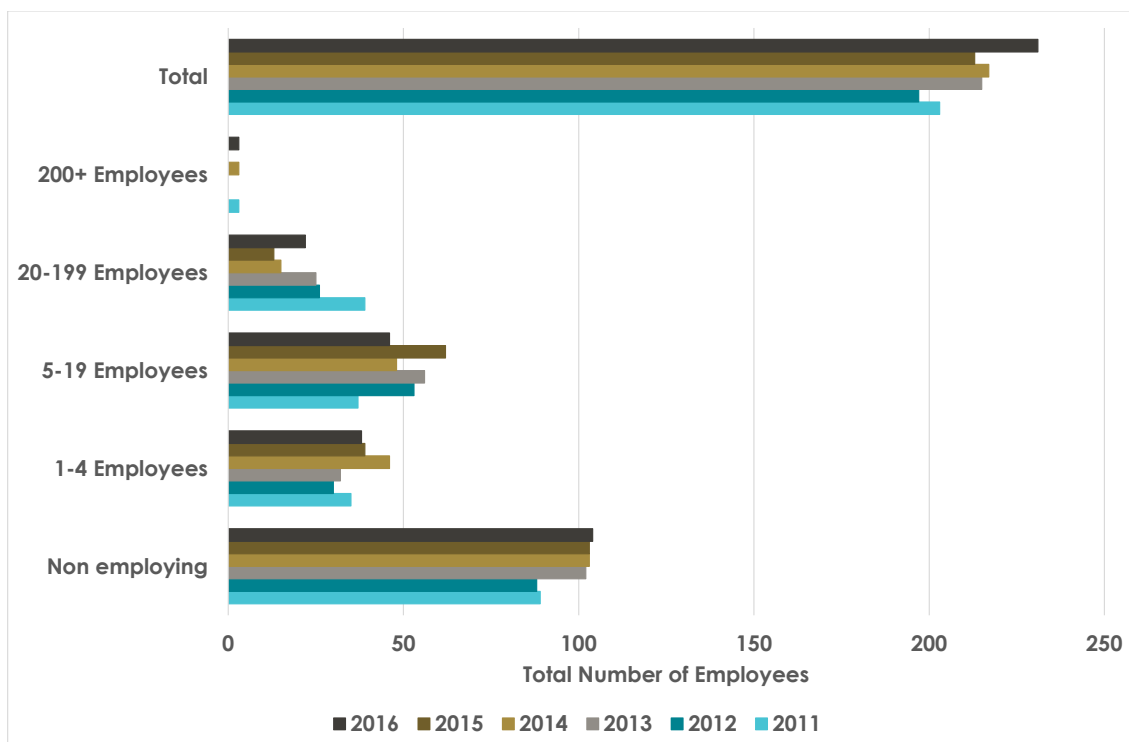
In 2016, there were 231 businesses within the KIA, with 104 of these falling into the non-employing category, approximately 45.02%, see Figure 13 and Table 3. The number of businesses in Kwinana has increased from 203 in 2011 to 231 in 2016, 13.79%. Interestingly, this increase in the number of businesses

was not matched by increases in the number of employees, which fell by 28.58% between 2011 and 2016. The increase in business numbers and associated decline of workers can likely be attributed to improved efficiencies through technological advances and efficiency measures. BP Australia is on record acknowledging that a smaller workforce is due to upgrades and technical improvements whilst at the same time as increasing overall capacity (The West Australian, 2016).

With a mix of small, medium and large enterprises, most of the businesses within the KIA employed less than 200 people in 2016, with 16.45% or 38 businesses employing 1-4 workers, 19.91% or 46 businesses employing 5-19 workers, 9.52% or 22 businesses employing 20-199 workers and only 1.30% or 3 businesses employing over 200 employees (see Figure 13).

This indicates that, while the KIA employs a large number of workers overall, they are spread across a vast number of businesses throughout the industrial precinct.

FIGURE 13. NUMBER OF BUSINESSES IN EACH EMPLOYEE SIZE CATEGORY, 2011 TO 2016



Source: ABS, 2017b; ABS, 2016b; ABS, 2015; ABS, 2012b.

TABLE 3. PROPORTION OF BUSINESSES IN EACH EMPLOYEE SIZE CATEGORY, 2011 TO 2016

	Non- employing	1-4 Employees	5-19 Employees	20-199 Employees	200+ Employees
2011	43.84%	17.24%	18.23%	19.21%	1.48%
2012	44.67%	15.23%	26.90%	13.20%	0.00%
2013	47.44%	14.88%	26.05%	11.63%	0.00%
2014	47.47%	21.20%	22.12%	6.91%	1.38%
2015	48.36%	18.31%	29.11%	6.10%	0.00%
2016	45.02%	16.45%	19.91%	9.52%	1.30%

Source: ABS, 2017b; ABS, 2016b; ABS, 2015; ABS, 2012b.

Table 4 below compares business employment size ranges within the Kwinana Industrial SA2 to the Western Australian average for 2016. It is clear that overall, the KIA has a higher proportion of businesses with larger

employee numbers compared with Western Australia, which has a higher number of businesses in the non-employing and 1-4 employee categories, a combined 87.35% compared to 61.47%.

TABLE 4. BUSINESS EMPLOYMENT SIZE RANGES FOR KWINANA SA2 AND WESTERN AUSTRALIA, 2016

	Non- Employing	1-4 Employees	5-19 Employees	20-199 Employees	200+ Employees
Kwinana SA2	45.02%	16.45%	19.91%	9.52%	1.30%
Western Australia	62.27%	25.08%	9.65%	2.86%	0.18%

Source: ABS, 2017b.

Figure 14 below, shows the number of businesses falling into each industry between 2011 and 2016 and includes industries with more than 20 businesses at any point between this timeframe. In 2016, the KIA had 52 manufacturing businesses, 41 rental, hiring and real estate businesses, 29 construction businesses and 14 wholesale trade businesses. Examining the correlation between the number of businesses by industry and the number of employees, it was found that while there is a link between the number of businesses and employees in manufacturing, construction and wholesale

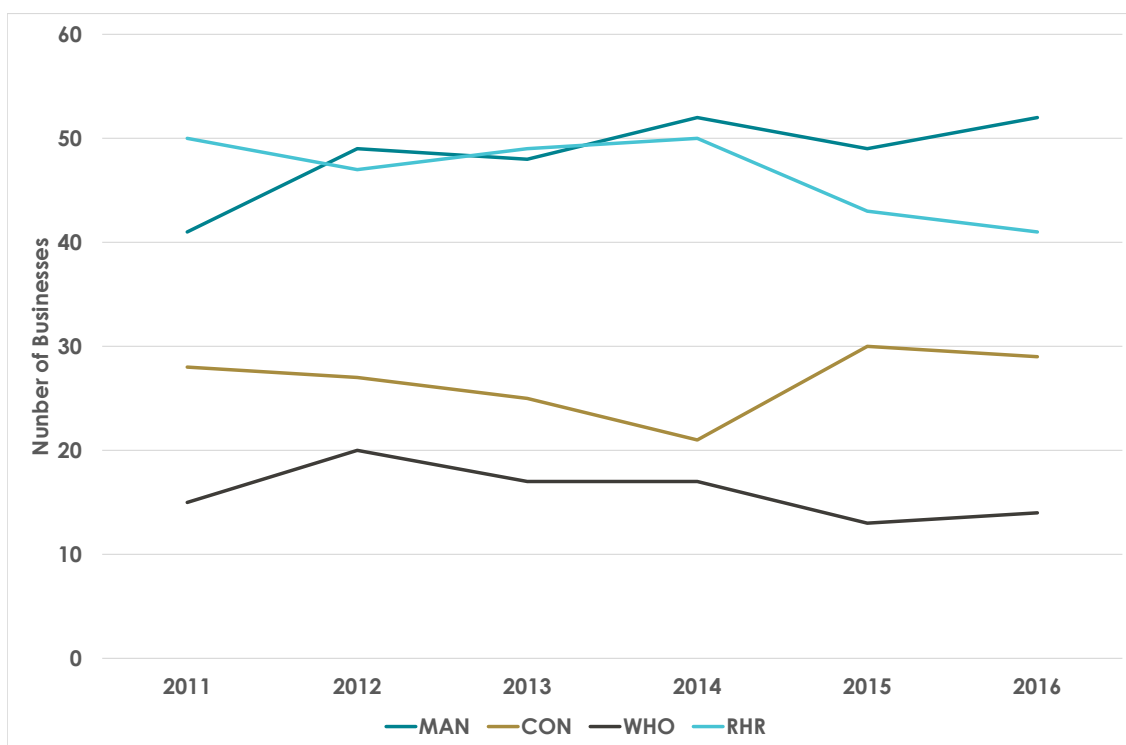
trade, the same cannot be said for rental, hiring and real estate businesses, see Figure 9 and Figure 14. While there were 41 businesses classified under rental, hiring and real estate services, only 1.96% of workers within the KI SA2 were employed by the same industry. Further investigation identified that 87.80% of the businesses that fall into the category RHR are non-employing, which somewhat limits their ability to contribute to the Perth and Peel economy.

Businesses in the KIA have a high degree of revenue turnover, with just over half having a revenue greater

than \$500,000 annually, see Figure 15. Comparatively, the number of businesses in the lower earning turnover categories are fewer, and proportionally decreased between 2011 and 2016.

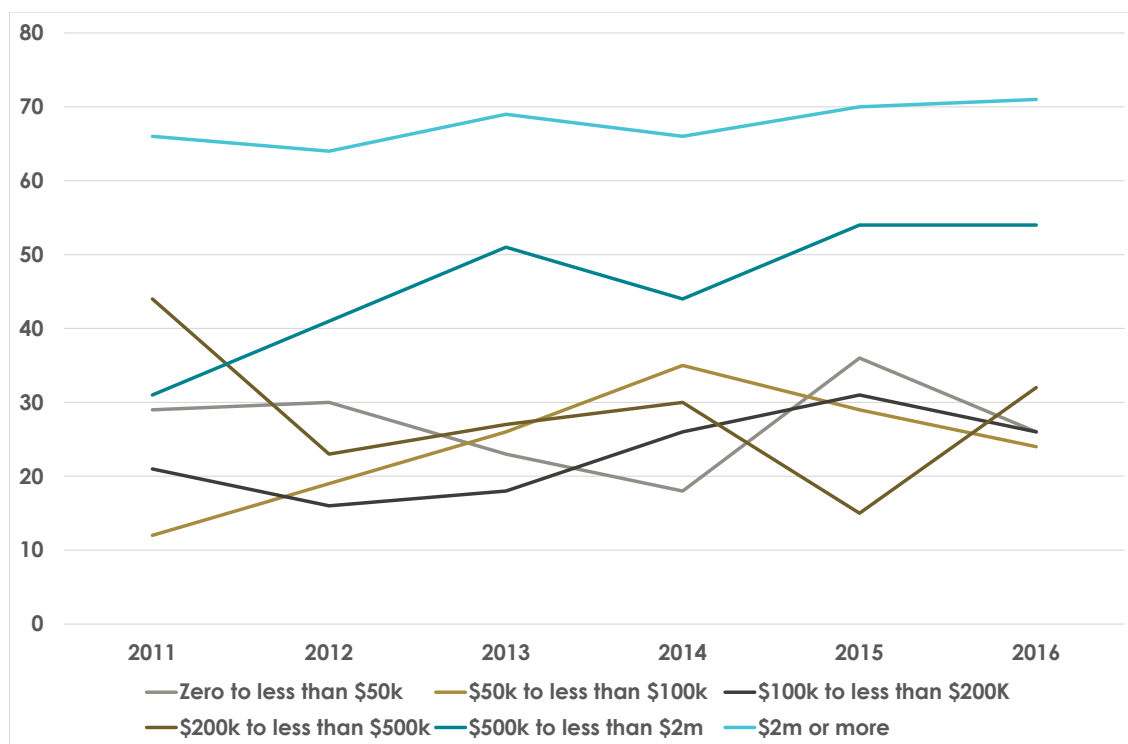
Table 5 highlights the changing ratio of businesses falling into each turnover category between 2011 and 2016. Proportionally, there were a greater number of businesses in the \$50k to less than \$100k with a growth of 4.48% and those earning \$500k to less than \$2m grew by 8.11%, while those businesses in the \$200k to less than \$500k proportionally decreased by 7.82%.

FIGURE 14. KWINANA SA2 NUMBER OF BUSINESSES BY INDUSTRY DIVISION, 2011 TO 2016



Source: ABS, 2017b; ABS, 2016b; ABS, 2015; ABS, 2012b.

FIGURE 15. NUMBER OF KWINANA SA2 BUSINESSES IN EACH TURNOVER CATEGORY, 2011 TO 2016



Source: ABS, 2017b; ABS, 2016b; ABS, 2015; ABS, 2012b.

TABLE 5. PROPORTION OF BUSINESSES IN EACH TURNOVER CATEGORY, 2011 TO 2016

	Zero to less than \$50k	\$50k to less than \$100k	\$100k to less than \$200k	\$200k to less than \$500k	\$500k to less than \$2m	\$2m or more
2011	14.29%	5.91%	10.34%	21.67%	15.27%	32.51%
2012	15.54%	9.84%	8.29%	11.92%	21.24%	33.16%
2013	10.75%	12.15%	8.41%	12.62%	23.83%	32.24%
2014	8.29%	16.13%	11.98%	13.82%	20.28%	30.41%
2015	16.90%	13.62%	14.55%	7.04%	25.35%	32.86%
2016	11.26%	10.39%	11.26%	13.85%	23.38%	30.74%

Source: ABS, 2017b; ABS, 2016b; ABS, 2015; ABS, 2012b.

A significant difference exists between businesses within the Kwinana Industrial SA2 and Western Australia in terms of business turnover size ranges. While the Kwinana Industrial SA2 is largely made up of high turnover businesses and an increasing proportion of businesses in the higher turnover categories up to \$2m or more, Western Australia shows the opposite trend, see Table 6. Western Australia has the highest proportion of businesses, 23.88%, falling into the \$0-\$50k earning categories, while Kwinana Industrial SA2 has its highest proportion of businesses, 30.74%, within the \$2m or more turnover size range. This shows the significance of the KIA to the state economy, as a small number of businesses can have a significant output and are of high value add.

AGGLOMERATION ECONOMIES AND COMPETITIVE ADVANTAGE

Agglomeration economies may occur when similar organisations or industries locate within close proximity to one another. The benefits provided by agglomeration economies can be offered not only through transport and logistics savings, but also additional knowledge capacity through shared intelligence and enhanced access to appropriately skilled personnel (Glaeser, 2010; MacLachlan, 2013).

Agglomeration economies can be further broken down and categorised into three main types, which are localisation economies, transfer economies and urbanisation economies, as defined below.

- Localisation economies: the cost benefits that firms receive from being within the same industry and location that allows them to share production inputs such as labour,

suppliers or infrastructure requirements.

- Transfer economies: the cost benefits that arise from locating close to a supplier or customer, removing procurement or distribution demands.
- Urbanisation economies: the cost benefits that are gained from locating within a large and diverse market, i.e. an urbanised setting such as the Perth and Peel metropolitan region allows for a greater choice of labour, production and goods (MacLachlan, 2013).

Industrial symbiosis is a term used to specifically describe the exchange of material and energy between industrial firms located in close proximity to one another. These relationships are described as symbiotic exchanges between industries, and differ from agglomeration economies in that the benefits are

TABLE 6. BUSINESS TURNOVER SIZE RANGES FOR KWINANA SA2 AND WESTERN AUSTRALIA, 2016

	\$0 - <\$50k	\$50k - <\$100k	\$100k - <\$200k	\$200k - <\$500k	\$500k - <\$2m	\$2m or more
Kwinana SA2	11.26%	10.39%	11.26%	13.85%	23.38%	30.74%
Western Australia	23.88%	15.75%	18.50%	19.01%	15.30%	7.45%

Source: ABS, 2017b.

not only cost related but include others such as environmental outcomes (MacLachlan, 2013). The KIA has been referred to as one of the most successful and studied examples of industrial symbiosis; it has been operational over a significant amount of time and there is large complexity in terms of count, diversity and maturity of synergies in the relationships between and among firms located in the industrial area (Chertow, 2007; Harris, 2007; Van Beers *et al.*, 2007).

These symbiotic exchanges collectively provide industries located in close proximity with a competitive advantage, as they are able to share resources, knowledge, labour, by-products and materials (Harris, 2007). The importance of symbiotic relationships within the KIA has been identified by the Kwinana Industries Council¹ (KIC) for their ability to contribute to sustainable development, linking financial and environmental performance. An interview with Mr Des Gillen of BP Australia identified some of the competitive advantages that arise from the co-location of industry activities at Kwinana. These include:

- The enhanced ability of new businesses to get off the ground, as a number of essential infrastructure services are readily available;
- Shared emergency response services, manpower and resources through the Kwinana Industries Mutual Aid (KIMA) committee, who implement a Total Hazard Control Plan in the event of an emergency (KIC, 2012d);
- The use of by-products and supply of outputs to various industries within Kwinana, outlined below; and
- A buffer zone that is shared by industries within the KIA creates overlap which results in a significantly reduced overall industrial footprint.

These important synergies were discussed during an interview with Mr Ian Hansen, Chief Operating Officer of WesCEF who identified CSBP's move to the KIA in 1968 as a 'watershed moment' due to various benefits offered by Kwinana, including the possibility of synergies with other local manufacturing businesses.

The KIC has facilitated substantial efforts to increase industrial synergies within the KIA. Previously

this was carried out through their now ceased Eco Efficiency Committee, which acknowledged that 'an improved understanding of materials and energy flows [...] would be beneficial in respect to economic and environmental outcomes' (KIC, 2012b). The KIC have also contributed to research that has sought to further identify potential industrial synergies, including the Cooperative Research Centre for Sustainable Resource Processing (now ceased operations) and the Australian Research Council.

The number of industrial synergies were examined over four independent studies conducted by Sinclair Knight Merz between 1990 and 2013 within the 'Kwinana Cluster', an area which includes Rockingham Industrial Zone and Latitude 32 Industry Zone (see Figure 1 for reference). Over 23 years, the number of existing interactions, i.e. an exchange of materials, grew from 27 in 1990 to 158 in 2013, or by 485%². Most of these new interactions were identified between 1990 and 2002, when 79 new exchanges were established (SKM & REU, 2014). A map of the interactions between firms within the Kwinana Cluster is provided at Appendix 1 and demonstrates the complexity of relationships within the industrial area.

1 The KIC was established in 1992 to 'promote and contribute to the sustainable co-existence of the Kwinana Industry, the Community and the Environment' and has its membership base drawn from industries within the KIA (KIC, 2012a).
2 Synergies identified depended upon information provided by industries who participated in the study and may be higher than reported.

Despite being the longest established industry within the KIA, the BP Refinery does not have the highest level of industrial symbiosis compared with other existing industries. However, it still exchanges approximately 35 resources between firms. The inputs and outputs (see Figure 16 and Appendix 1) include supplying: hydrogen to BOC Group; lube oil, fuel gas and diesel oils to International Power Mitsui; waxes to Summit Fertilizers; diesel and kerosenes to CBH Group; lube oil to Kleenheat Production Facility; diesel oils and lube oils to Pentair; diesel oils to Ciba Specialty Chemicals; lube oil to Air Liquide; LPG, sulphur, degreaser, grease, lube oil, hydrogen, waxes and diesel to CSBP; diesel oils, kerosenes, hydrogen and sulphur to Nickel West;

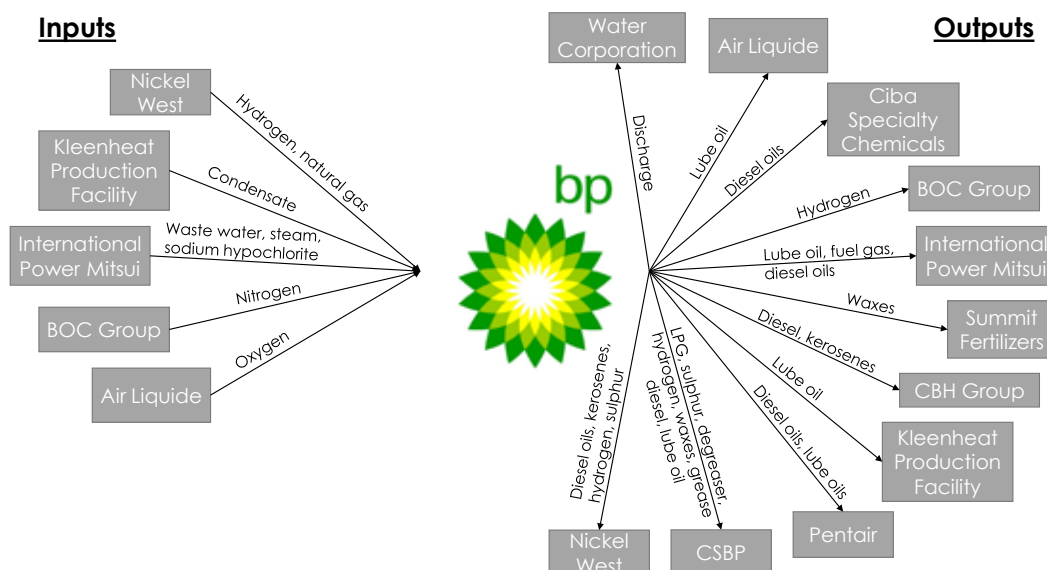
and discharge to Water Corporation. In addition, the BP Refinery sources: nitrogen from BOC Group; waste water, steam and sodium hypochlorite from International Power Mitsui; condensate from Kleenheat Production Facility; oxygen from Air Liquide; and hydrogen and natural gas from Nickel West (SKM & REU, 2014, Figure 4-4, p. 4-7).

The connections identified for just one major processing industry, such as the BP Refinery, highlights the significance of industrial symbiosis between firms located at Kwinana. It also demonstrates the reliance of industry upon others in close proximity and the potential detrimental impact from the loss of any given firm.

This is perhaps why a number of industrial locations worldwide are prone to industrial inertia, a phenomenon whereby the benefits of industrial agglomeration ensure that industries stay within a specific location, even when the location ceases to offer advantages or may even present costs to the company. This inertia is enhanced through the significant amount of upfront investment usually required for industrial operations, such as those carried out at Kwinana (MacLachlan, 2013).

The addition of new industries, such as the expansion of Tianqi Lithium, have the potential to increase the number of synergies and enhance the economic competitiveness of industries both at Kwinana and throughout Western Australia.

FIGURE 16. INPUTS AND OUTPUTS OF BP AUSTRALIA'S KWINANA OIL REFINERY

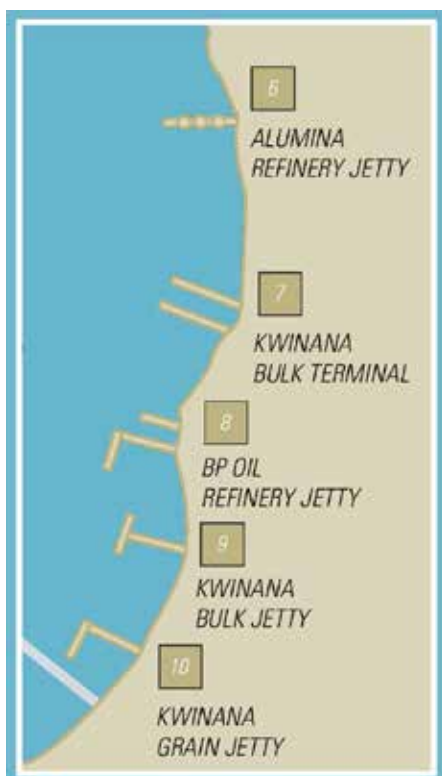


Source: Adapted from SKM & REU, 2014.

THE FUTURE OF THE KWINANA INDUSTRIAL AREA

The future of the KIA is an important consideration for the Western Australian economy, as it makes significant contributions to Gross State Product, employment, major Western Australian industries such as mining and agriculture, and global connectivity (WTC, 2014). The discussion below identifies some of the challenges the KIA will need to overcome in order to ensure its future success and continued growth.

FIGURE 17. PORT FACILITIES IN THE KWINANA INDUSTRIAL AREA



Source: Fremantle Ports, 2017.

INFRASTRUCTURE

There are a number of port facilities operating within the KIA. Fremantle Ports owns and operates the Kwinana Bulk Terminal (KBT) and Kwinana Bulk Jetty (KBJ) on behalf of the State Government, while Alcoa, BP Australia and CBH Group privately own and operate the Alumina Refinery Jetty, the BP Oil Refinery Jetty and the Kwinana Grain Jetty (see Figure 17).

The KBT and KBJ are primarily used for the import and export of bulk goods, which includes iron ore, coal, cement clinker, gypsum, liquefied natural gas, petroleum and fertiliser (Fremantle Ports, 2015). In 2016-17, total trade throughput was 2.45 million tonnes at the KBJ and 5.6 million tonnes at the KBT (Fremantle Ports, 2017). The Kwinana Grain Jetty, operated by CBH Group, exported 6.7 million tonnes of grains in 2016-17.

In addition to operations associated with the KBT and KBJ, Fremantle Ports are responsible for importing and exporting a majority of Western Australia's

containerised cargo, through the Inner Harbour at Fremantle.

As the Perth and Peel metropolitan population has continued to grow, the future of Western Australia's primary import and export facilities has been considered by a number of studies, which identified various locations as suitable for development of an Outer Harbour facility (Department of Transport, 2017).

Recently, discussions regarding the viability of developing the Outer Harbour as a second port were hindered by the proposed Perth Freight Link, Roe 8 and Roe 9, which would connect Fremantle Port to the Perth Airport and alleviate some of the congestion issues arising from the movement of bulk goods. Disagreements arose between opposing sides of government over the road project, which became one of the key focus issues of the March 2017 election with then opposition leader Mark McGowan pledging to scrap the proposal and spend \$20 million planning



a new Outer Harbour at Kwinana (WA Labor, 2016). Since winning government, Labor has made good on its promise. On 12 September 2017, Minister for Transport; Planning; Lands the Hon. Rita Saffioti MLA announced the formation of the Westport Taskforce to oversee the completion of planning for an Outer Harbour facility. The Taskforce will ultimately deliver the Westport: Ports and Environs Strategy which will address the location, size, operational models and timing requirements for both the Inner Harbour at Fremantle and a future

expanded Outer Harbour at Kwinana as well as the future of the port at Bunbury (Saffioti, 2017). In the 2017-18 State budget, a total of \$6 million was allocated towards the planning of an Outer Harbour, with these funds to be delivered over a staged period between 2017-18 and 2020-21 (Government of Western Australia, 2017).

The project would provide solutions to a number of issues facing Kwinana and the broader metropolitan region including increased congestion from freight movements, lack of

certainty for industry, decline in the quality of operational port facilities as technological advances occur and the hazards involved with transporting dangerous goods from the port in Fremantle to the KIA (City of Kwinana, 2015).

Indeed, a report by Regional Development Australia Perth released in 2016 identified the Kwinana Outer Harbour as one of three nation building initiatives, being 'game changing' and requiring strong government intervention (RDA, 2016, p. iii).

WATER AND ENERGY INFRASTRUCTURE

In addition to the major infrastructure investment required for an Outer Harbour facility, there are a number of additional infrastructure inputs that the KIA requires in order to remain competitive. Interviews with key industries identified increased demand for water and energy as potentially limiting factors in future operations.

The Department of Water estimated that the WTC would increase its demand for water from 28.5 to 36-52 gigalitres per year by 2031. An associated reduction in groundwater allocation

from the Cockburn Groundwater Area due to a drying climate and reduced groundwater recharge has meant the KIA will need an alternate water supply.

Significant research has been conducted into potential water resources to replace and contribute towards the increased demand for water in the KIA. In 2015, the CSIRO led a study to determine the suitability of a managed aquifer recharge scheme for the KIA, using recycled wastewater that is currently pumped out into the ocean (Department of Water, 2016).

Interviews also uncovered that the cost of energy is a key driver for new process plant investments, and ensuring long-term access to competitively priced wholesale energy is a strong attractor for new investment at Kwinana. Indeed, the KIC identified that the rising costs of energy is becoming a critical issue for industries within the KIA (KIC, 2017).

This was highlighted in the Sinclair Knight Merz study, in which industries identified energy costs as the third largest constraint on their operations within the WTC, behind urban encroachment and road access (SKM, 2014).

KWINANA INDUSTRIAL BUFFER ZONE

The Kwinana Industrial Buffer Zone is another key consideration for the future of the KIA. The need for a buffer zone around Kwinana was first prescribed in 1992 by the *Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992*, which sought to negate the impacts of sulphur emissions from the KIA to nearby residential areas, an issue that arose in the late 1970s (EPA, 2017b). In 1984, almost all industries located within the KIA unanimously converted to the use of

natural gas in order to reduce their environmental impact, however air quality continued to decline. This led to the decision in 1992 to regulate a buffer zone around the KIA, largely dealing with the emission of sulphur dioxide and suspended particulates (EPA, 2017b).

In addition to the 1992 regulations, the Western Australian government sets state-wide standards for industrial buffers through its *Statement of Planning Policy No. 4.1 – State*

Industrial Buffer Policy, SPP 4.1. This requires all local governments to pay due regard to the requirements contained within SPP 4.1 in preparing and amending a local planning scheme. SPP 4.1 aims to safeguard the long-term security and protection of industrial areas while also ensuring the surrounding land uses are not negatively impacted. Local governments will determine an appropriate industrial buffer zone following consultation with then Ministry for Planning and the Department of

Environmental Protection, which is subject to assessment from the EPA and finally approved by the Minister for Planning (WAPC, 1997). In the case of the WTC area, this would require the inclusion of a buffer zone in the local planning schemes of the City of Kwinana, the City of Rockingham and the City of Cockburn.

The continued development of the Perth metropolitan region has led to uncertainty in the protection of the KIA, with pressure to develop land for residential purposes within the current standing boundary set by the regulations, which were reviewed and re-issued in 1999 under the title *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* (EPA, 2017b).

In 2011, a Parliamentary inquiry was conducted by the state government to examine the operations of Cockburn Cement, a construction materials production facility located within the WTC. Throughout 2010, seven petitions bearing a total of 1,231 signatures were tabled in the Legislative Council to stop dust and odour emissions, which were leading to complaints of adverse health impacts from surrounding residents. A key finding of this inquiry

was that 'the Kwinana Air Quality Buffer has not been well implemented' (Parliament of Western Australia, 2011, p. vii).

In seeking to resolve uncertainty for both industry and land owners within the buffer zone, the state government sought public comment on draft legislation that would 'formalise a Protection Area around one of Western Australia's most important industrial areas' (Barnett & Day, 2015). The draft *Planning and Development Legislation Amendment (Western Trade Coast Protection Area) Bill 2015* sought to legislate the current WTC buffer that stands from 1992 in order to separate sensitive land uses and set regulations for all new development applications within the existing boundary.

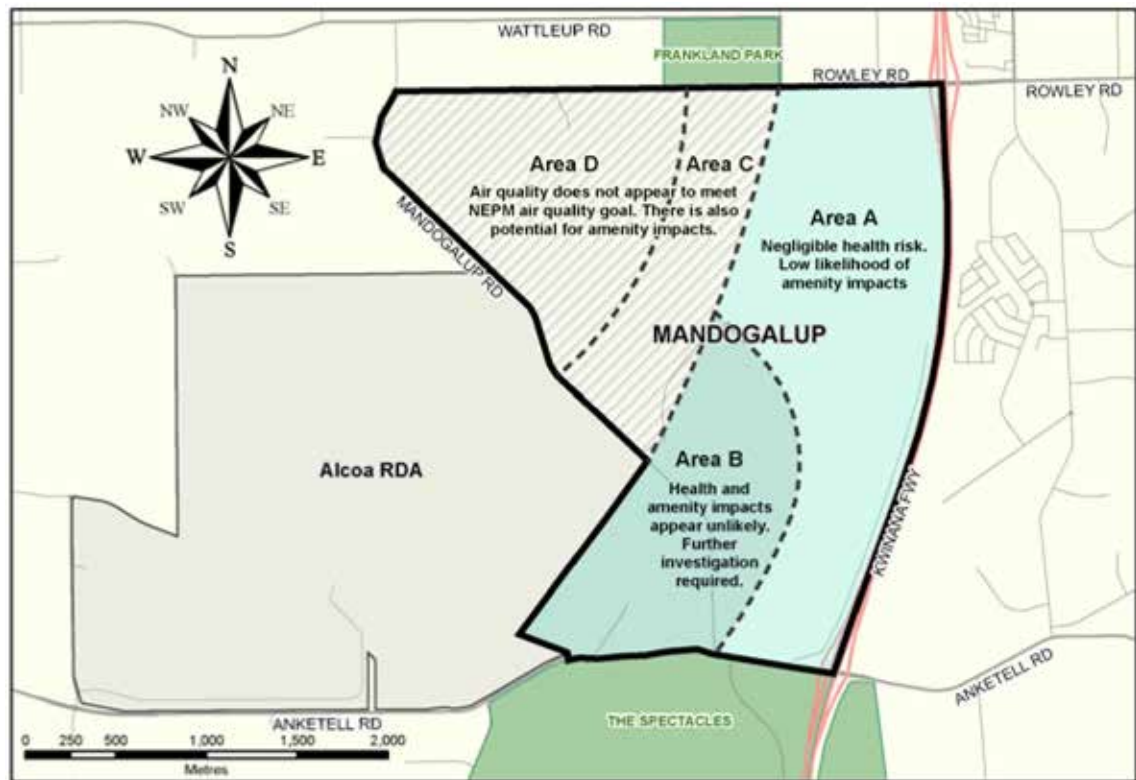
This amendment was released for public comment in October 2015 and received a total of 175 submissions in response from residents, landowners, businesses, industry groups and local government authorities (Department of Jobs, Tourism, Science and Innovation, n.d.).

Concerned residents within the suburb of Mandogalup, an area of land currently under consideration for inclusion in the buffer zone, pushed against its formal

inclusion in the legislation, as it had the potential to restrict future development and decrease land values (The West Australian, 2017). However corporate owners wrote to government ministers, organised local rallies and protested decisions made by WAPC in the State Administrative Tribunal with regards to the subdivision of land within the buffer zone (Perpitch, 2016; WASAT, 2011).

The primary cause of concern from an environmental protection perspective were dust emissions from the nearby Alcoa operations. In August 2017, the Environmental Protection Authority (EPA) made an assessment on the health and amenity impacts on dust for the Mandogalup area. Figure 18 below outlines the determination by the EPA, with both Area A and Area B identified to have unlikely health risk or unreasonable amenity impacts from dust. At the time of this assessment, there was no air quality monitoring being undertaken in both of these locations. However, since this time, the Department of Water and Environmental Regulation commenced an investigation on the potential sources of dust impacting the Mandogalup area through a short-term campaign in summer 2017/18. This was under the recommendation of the EPA

FIGURE 18. EPA ASSESSMENT OF POTENTIAL HEALTH AND AMENITY IMPACTS FROM DUST ON THE MANDOGALUP AREA



Source: EPA, 2017a, p. 7.

that further investigation is required (Dawson, 2017; DWER, 2017; EPA, 2017a).

In February 2018, the State Government announced that an improvement plan would be drafted to cover much of the contested land in Area's B, C and D in Figure 18. This would potentially allow this land to be up-zoned in the Metropolitan Region Scheme from rural to industrial and will allow the Western Australian Planning Commission control of land use planning in this location (Department of Planning, Lands and Heritage, 2018).

Providing certainty for industry through a legislated buffer zone was identified during interviews as critical in sending a message to current and potential future investors that the KIA is protected and will remain so. The ultimate outcome to legislate a finalised buffer zone around the KIA will ensure future investors will be confident to invest the significant amount of capital required to establish industrial activities.

GOVERNANCE

The KIA falls into three separate local government areas, the City of Kwinana, the City of Rockingham and the City of Cockburn. Ultimately, this means that development applications must be lodged with the appropriate council and may be assessed by varied standards depending on the governing authority. In the past there have been differing viewpoints on issues affecting the KIA, which causes confusion and uncertainty for the community and current and future industry.

During interviews, the Australian Marine Complex (AMC) was referenced as a successful way of administering an industrial area, which is managed by the Western Australian government through leadership of the Attorney General; Minister for Commerce and supported by the Department of Commerce (AMC, 2010). The AMC promotes partnerships with the private sector to incentivise investment and supports clustering through provision of common infrastructure and training.

Through the identification of one high level governing body, the state government has the ability to remove confusion with regards to application requirements and the requirements of varied local planning schemes. Consideration and investigation to consolidate the KIA under one decision-making body could provide benefits for Kwinana and Western Australia.

LABOUR MARKET

As identified in an analysis of the demographic make-up of the KIA, there is a trend towards an ageing workforce, which will require the replacement of a significant proportion of workers over the next two decades. Companies within the KIA have taken an integrated approach to addressing this issue through the KIC, who have implemented a number of programs to assist in the attraction and retention of a younger workforce (KIC, 2012a). Interviews with BP Australia and WesCEF highlighted the success of the KIC's Education Development Program (EDP), which includes iProjects and the

Career Pathways Program and has achieved an increased awareness of the role of Kwinana for students enrolled across 18 catchment high schools and was developed to promote local careers in industrial activities.

The EDP has received significant recognition, winning the State Training Awards category for Industry Collaboration and both the Oceania Region Youth Employability Skills and Creative and Innovative Partnerships categories at the 2016 International Partnership Network biennial awards program (KIC, 2017).

This is especially significant given the high levels of youth unemployment within the City of Kwinana local government area. Previous FACTBase research undertaken by the Committee for Perth identified the Kwinana Statistical Local Area to have the highest youth unemployment rate in the Perth and Peel region. In both 1991 and 2011, unemployment stood at 35.2% and 14.1% respectively for those aged between 15 to 24 years old (Huddleston & Maginn, 2014). An examination of 2016 Census data identified a continued trend of high youth unemployment rates in the City of Kwinana local government area, with 19.47% of 15 to 24-year olds unemployed.

EXPORT OPPORTUNITIES AND GLOBAL MARKETS

While there continues to be new opportunities to expand exports and gain access to global markets, such as the recent proposed expansion of the Tianqi Lithium facilities at Kwinana to meet the growing demand for car batteries, amongst others, the fluctuating and uncertain demand and prices of commodities is an ongoing risk. The Chamber of Commerce and Industry WA (CCIWA) commended the release of the Commonwealth Government's 2017 Foreign Policy White Paper, the first

comprehensive review of Australia's international engagement for 14 years, suggesting that the paper will play a significant role in boosting WA's economic growth and trade relations.

With WA accounting for up to 40% of Australia's merchandise exports, as Australia's 'western gateway', the shared knowledge and synergies of companies located in the KIA positions it competitively to take advantage of new markets. This advantage is somewhat subject to the KIA overcoming other

barriers already discussed such as adequate port and transport infrastructure, labour availability, adequate power and water supplies, and so forth.

Figure 19 below displays global trade connections of the two ports operated by Fremantle Ports in 2017, the KBT and KBJ discussed earlier. The significant amount of global connectedness created by just two of the five ports at Kwinana signifies the importance of the KIA in enhancing Western Australia's international trade connections and maintaining international relationships.

FIGURE 19. KWINANA'S GLOBAL CONNECTIONS THROUGH FREMANTLE PORTS' KBT AND KBJ IMPORTS AND EXPORTS, 2017



Source: Fremantle Ports, 2018

CONCLUSION

In looking back, the signing of the State Agreement in 1952 and the establishment of the Kwinana Industrial Area set Western Australia on a pathway to benefit significantly from the operations of what is now the state's premier industrial area.

Since this decision, the KIA has grown and in 2016 was home to a total of 231 businesses, with an estimated combined financial output of \$15.77 billion annually.

This case study is timely given the state government's plans to grow and diversify the WA economy to create new jobs and industries of the future. It has highlighted the importance and long-term impact of government intervention and strategic economic and industry decision-making. Western Australia, previously deemed the 'Cinderella' state, has been able to leverage the outputs of the KIA in some of its most important industries, including agriculture, mining and construction to increase its economic output.

A demographic analysis shows the KIA provides direct employment to approximately 5,600 Perth and Peel residents, providing opportunity in

industries, predominantly in manufacturing, construction and transport, postal and warehousing.

The KIA will have a challenge in addressing its workforce capability and expertise, as it continues to age at a proportion greater than the rest of the Perth and Peel region. Offsetting this is that the higher total personal weekly income of KIA workers could be a potential solution to attract a younger workforce and replace the outgoing retirees.

Symbiotic industrial relationships were highlighted as an important component of doing business within the KIA, which contributes to the success of industries located within the Western Trade Coast precinct. Interviews with industry and stakeholders identified a competitive advantage to doing business within the KIA and provides an incentive for the expansion of new industries, with established essential infrastructure services able to offset some of the large capital investment necessary.

The long-term, viable and sustainable future of the KIA will rely on addressing a number of key challenges such as resolving the need,

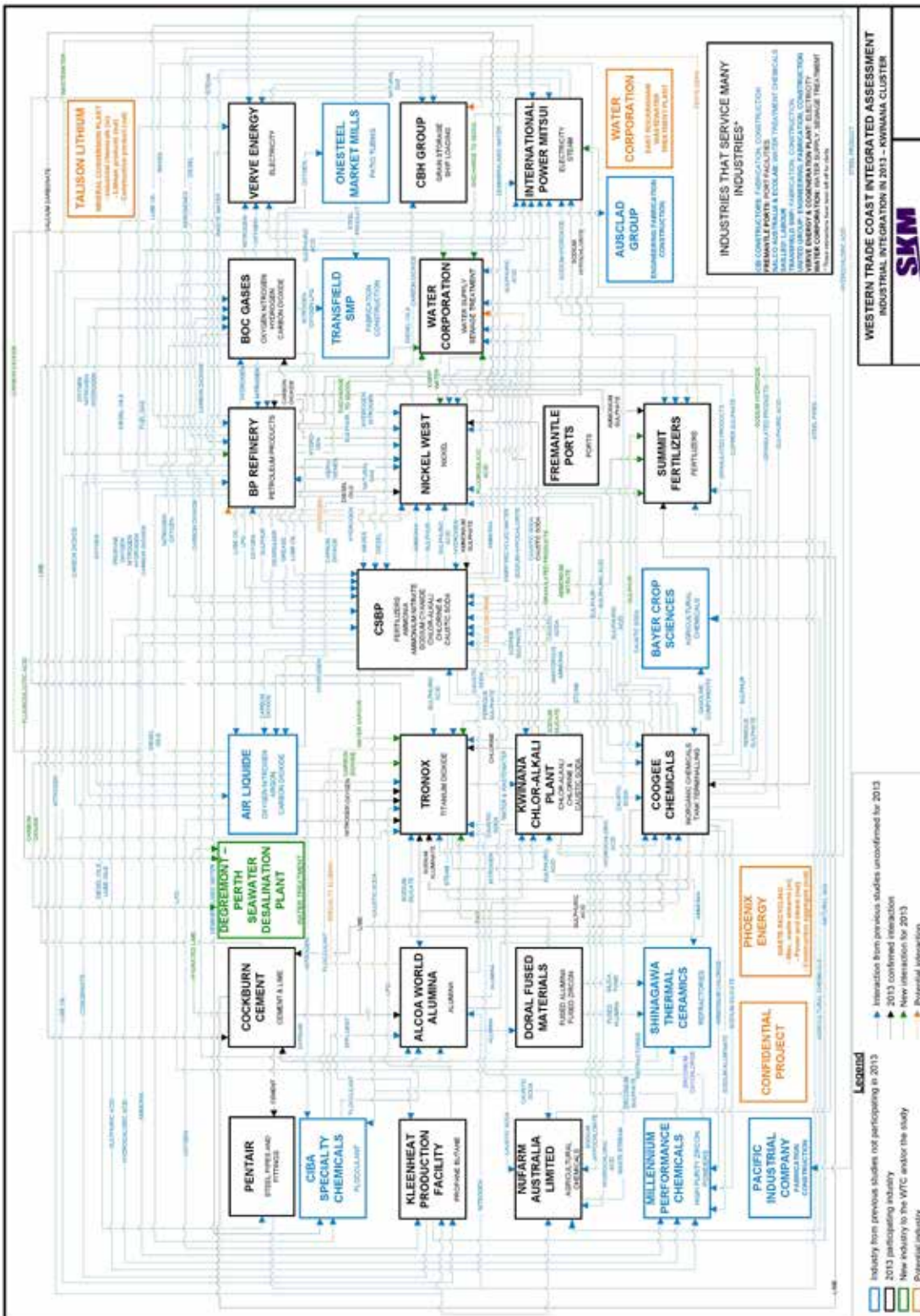
location and timing of a second harbour facility; bringing the buffer zone controversy to a satisfactory conclusion; and refining governance structures to name a number of critical immediate issues.

It is clear that the KIA contributes significantly to the Western Australian economy and its global connectivity. It is a crucial player in a number of our highest earning industries. Ensuring the continued success of this industrial hub is of critical importance for the future of our state.



Image courtesy of Wesfarmers
Chemicals, Energy & Fertilisers.

APPENDIX 1 – KWINANA CLUSTER INDUSTRIAL SYMBIOSIS



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Image courtesy of Kwinana Industries Council.

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To date, she has been involved in researching and coordinating a number of Committee for Perth projects including the landmark *Get a Move On!* report and the *What We Thought Would Kill Us* series. She is also responsible for coordinating the annual FACTBase Research program and the Committee's Working Groups and Project Steering Committees. Georgia is an Adjunct Research Fellow with The University of Western Australia.

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BIGGER & BETTER BEYOND THE BOOM STEERING COMMITTEE



**Steering Committee Chair:
Justin Carroll, Partner, PwC**

Justin is a PwC Perth Partner, having recently completed a five year term as PwC's Perth Managing Partner. During his 27 years with the firm, he has worked in their Singapore, London and Sydney offices, with a focus on corporate governance, financial reporting assurance and technical accounting advice in both the public and private sectors. Justin was previously the leader of the Perth Assurance practice and continues to lead the audits of several major Western Australian organisations and subsidiaries of large international groups.

Justin is also a director of St John of God Health Care and The University of Notre Dame Australia and chairs the University's Finance, Audit and Risk Committee.



**Steering Committee
Deputy Chair: Nadia van
Dommelen, Partner, PwC**

Nadia van Dommelen is a Partner in PwC's Infrastructure and Urban Renewal practice with over 20 years of industry experience focused in project direction of building and infrastructure projects. She has undertaken key roles on some of Perth's largest infrastructure projects, including Perth Stadium, WA Schools PPP, Midland Health Campus, Fiona Stanley Hospital and CBD Courts.

Nadia is a Member of the Board of Trustees of the Perth Theatre Trust, Member of the Consultative Committee for 'Project Management, Management Information Systems and Supply Chain & Logistics Management' at the School of Business and Law at Edith Cowan University, Member of the National Development Committee and Local Fundraising Committee of HeartKids Australia,

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She holds a Bachelor of Engineering (Civil and Construction) from Curtin University.



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Mr MacLennan joined the Western Australian Government in March 2015 and manages the Strategy and Engagement Division at the Department of Planning, Lands and Heritage. He leads the strategy, policy, research, legal and communications areas for the department.

David MacLennan is an experienced public sector leader and served in various roles in the Commonwealth Government in Australia and overseas before joining the Western Australian

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Mr MacLennan held the position of Head of the Political and Economic Branch at the Australian High Commission in London. Prior to that, Mr MacLennan was DFAT's State Director in Western Australia.

He holds a Masters in Management from the Australian National University and a Bachelor of Arts from The University of Western Australia.

In his current role, Mr MacLennan provides strategic direction for land use and infrastructure planning, policy and projects in Western Australia.



Fred Chaney, Western Australian Planning Commission

Fred Chaney is an architect who has worked in the UK, the Middle East, South East Asia and Australia.

In addition to his work as a practising architect, Fred

has held board positions with numerous industry and advocacy groups including the Green Building Council of Australia, the Australian Institute of Architects and the WA Museum Foundation. His recent appointment to the state's peak planning body, the Western Australian Planning Commission, reflects his keen interest in the relationship between planning, environmental outcomes, urban development and economic opportunity.

He is the current Chairman of UWA's Australian Urban Design Research Centre.



Jay Watson, State General Manager, Westpac Banking Corporation

Jay is a career banker, having worked for Westpac for more than 37 years. Jay has been fortunate to have worked in every State and Territory in Australia, and has the benefit of honing his banking skills through diverse geographies and industries.

Jay takes an active interest in the future direction of Western Australia and is

active with the Committee for Perth and its present project *Bigger & Better Beyond the Boom*, working to build strategies and recommendations in regards to broadening the economy of WA. Previously he was a member of *Filling the Pool*, a deep dive on gender imbalance and strategies to improve career opportunities for the female workforce.

Additionally, for the past three years he has been involved with Chamber of Commerce WA and its Business Advisory Board.



David Fisher, Chief Operating Officer, Juniper

David is a highly innovative, results driven and achievement orientated Executive Business Services / Chief Operating Officer (Deputy CEO) ex Group Financial Director, who holds a Bachelor of Accounting Science (Honours) and various other qualifications. He is recognised by CPA Australia as compatible, supplemented by more than 25 years of post-graduate experience in business, with the ability to

demonstrate a track record of success in small to large organisations across Property Management, Intellectual Property, Information Technology and Aged Care Industries.

He is a current member of Chartered Secretaries Australia (CSA), following the completion of a Certificate in Governance for Not-for-Profits and the Graduate Diploma of Applied Corporate Governance.



Nicholas Ozich, Regional Director – Property and Development, Brookfield

Nick is responsible for the property and development activities of Brookfield Property Partners in Western Australia, currently Perth's largest commercial landlord.

Prior to his current role with Brookfield, Nick worked for Multiplex and Lend Lease both in Australia and the UK, gaining an appreciation for the impact high-quality property developments can have on a city's culture.

Since returning to his hometown of Perth, Nick has been able to put this passion into action, playing a key role in the development of the

award winning Brookfield Place precinct, and is currently overseeing a number of large scale office, retail and mixed use developments in Perth's CBD at various stages of construction and planning.



Daniel Simms, Chief Executive Officer, City of Wanneroo

Daniel Simms is the Chief Executive Officer at the City of Wanneroo – Western Australia's fastest growing local government authority. He has extensive experience in local government in both metropolitan and regional Western Australia, working across many disciplines including planning and development, finance and administration, governance and strategic planning.

Daniel holds a Bachelor of Applied Science and a Graduate Diploma in Business in Local Government Management from Deakin University. He is Chairman of the Growth Alliance Perth and Peel Policy Forum, Executive Member of the National Growth Areas Alliance and a member of the Infrastructure Coordinating Committee (Western Australian Planning Commission).



David McCulloch, General Manager, Industry and Investment, Department of Jobs, Tourism, Science and Innovation

David's career has been almost exclusively in international business, investment attraction, exports, major events and industry development. Presently he is General Manager, Industry & Investment, in the Department of Jobs, Tourism, Science and Innovation.

David has responsibility for several priority sectors including energy and mining, and their respective equipment, technology and service sectors. Other sectors include infrastructure, financial services and aviation. He is Western Australia's representative on the National Investment Advisory Board (NIAB) and the National Trade Working Group (NTWG) and is Chair of the Resources & Energy Working Group which reports to NIAB.

He managed Western Australia's trade office in Mumbai from January – April 2015, and was actively involved in the Sister State Agreement recently signed by the Governments of Western Australia and Andhra Pradesh.



Shaun Griffin, Managing Director, Ipsos Australia Pty Ltd

Shaun is an accomplished commercial manager with 20 years' experience working across a range of local, regional and global roles spanning consulting, research, strategy, planning and analytics.

In recent years, Shaun has occupied senior roles in digital, running strategy and digital marketing for businesses in the financial services and consulting sectors.

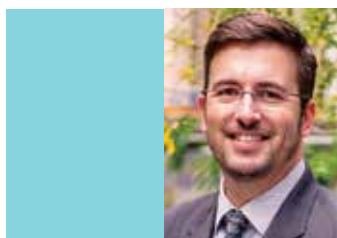
As General Manager of Ipsos Perth, Shaun is working to help clients understand how to capitalise on the commercial and social opportunities of a post-boom Perth market.

With a diversity of skills and experience across sales, marketing, strategy, analytics, operations, e-commerce and IT, he has a unique understanding of the challenges facing business and government in the digital age.



Ronak Bhimjiani, Manager, Economics and Research, Real Estate Institute of Western Australia (Inc)

Ronak Bhimjiani qualified with an Honours Degree in Financial Economics from the University of Leicester, UK. He spent 5 years in the Investment Banking Industry in London within Mergers and Acquisitions, before migrating to Perth in 2015. In his current role as Manager, Economics and Research at REIWA, Ron's chief function is to ensure REIWA and its members are well informed on the current economic and WA property climate. Ron is also a member of the Housing Industry Forecasting Group (HIFG) and Housing Industry Association (HIA).



Mark Stickells, Director, Innovation and Industry Engagement, The University of Western Australia

Mark Stickells is the Director of Innovation and Industry Engagement at The University of Western Australia and leads the development and stewardship of university partnerships with industry, the not-for profit sector, governments and communities.

Mark is an experienced executive and company director with more than 20 years' experience working in joint ventures, R&D and collaborative industry research programs. He has expertise and passion for energy and resource sector innovation and former roles include Director of UWA's Energy and Minerals Institute and Chief Executive of the WA Energy Research Alliance.

Mark has extensive national and international industry and innovation networks and is a highly effective communicator with a deep commitment to diversity, inclusion and innovation. Mark is a Board member or advisor to several UWA ventures and actively engaged in the innovation ecosystem in Perth. Mark is a thought leader and advocate for Perth's regional role as an energy city and innovation hub.



Professor Matthew Tonts, Pro Vice-Chancellor Executive Dean | Faculty of Arts, Business, Law and Education, The University of Western Australia

Matthew is Pro Vice-Chancellor and Executive Dean, Faculty of Arts, Business, Law and Education at The University of Western Australia.

His research is focused on urban and regional development, with much of his recent work concerned with the shifting geography of corporate power, spatial labour markets and economic development and regional policy.



Professor Fiona Haslam McKenzie, Co-Director, Centre for Regional Development, The University of Western Australia

Fiona is Professor of Geography and the co-director of the Centre for Regional Development at

The University of Western Australia. Her research interests are regional economic development and the analysis of remote, regional and urban socio-economic indicators. She is currently researching the socio-economic impact of different regional workforce arrangements and uneven economic development in Western Australia.



Tony Monaghan, Manager – Corporate Communications, The Brand Agency

Tony is the Manager of Corporate Communications at The Brand Agency. He has almost 30 years' experience as a journalist, political advisor and corporate communications consultant. He worked for ABC TV, Channel 9, Channel 7 and was Head of News for the Mirror Group TV in London. While working for State Government, he was a media advisor, chief of staff and principal policy advisor for the Department of Premier and Cabinet.



Marion Fulker, CEO, Committee for Perth

Marion Fulker is the inaugural Chief Executive of the Committee for Perth Ltd. She took up the position in January 2007 having previously been the Executive Director of the Urban Development Institute of Australia (UDIA) WA Division. Marion is an Adjunct Senior Research Fellow at The University of Western Australia and holds an MBA from Curtin Graduate School of Business. Aside from leading the Committee, Marion is the Chair of the Conservation & Parks Commission and a professional representative on the state's Infrastructure Coordinating Committee.

As an evidenced based organisation, Marion has led a number of landmark Committee for Perth research projects which have resulted in reports such as:

- *Towards a Bright Future* which outlines two scenarios for Perth as a region of 3.5 million people
- *A Cultural Compact*, the 10 year challenge which articulates a vision to

- make arts and culture part of the everyday lives of Western Australians
- *Filling the Pool*, a gender equality report aimed at growing the number of women participating and progressing in corporate life in Perth
 - *Fremantle as a reconnected city* which details the opportunities for the future of the Fremantle region.
 - *Get a Move On!*, the Committee's current transport and congestion project.



**Lisa Kazalac, Manager,
Research & Policy,
Committee for Perth**

Lisa Kazalac is the Manager of Research and Policy at the Committee for Perth. In her role Lisa oversees the development and publication of research and public policy positions which help to shape the future of Perth and Peel.

Trained as an economist at RMIT University, Lisa graduated with upper second class honours, and has recently graduated from Curtin University with an MBA.

Lisa's career has spanned 10 years in the Victorian public sector, where she developed and oversaw public policy development across a wide range of industries, including: transport infrastructure, social and public housing, regulation of the heavy vehicle industry and social policy issues, including the ageing population.

Lisa moved to WA five years ago and has held two positions in WA's corporate environment with CCIWA and REIWA, leading the advocacy and research agenda for the property industry.

She brings a passion for public policy, evidence-based research and is keen to influence decision makers for a more prosperous WA.



**Georgia Harford-Mills,
Research Officer,
Committee for Perth**

Georgia is a Research Officer for the Committee for Perth, joining the organisation in 2014. She holds a Bachelor of Science, Geography and received First Class Honours in Urban and Regional Planning from

The University of Western Australia. In addition, Georgia received the 2015 Patrick Armstrong Prize in Geography for her research thesis.

To date, she has been involved in researching and coordinating a number of Committee for Perth projects including the landmark *Get a Move On!* report and the *What We Thought Would Kill Us* series. She is also responsible for coordinating the annual FACTBase Research program and the Committee's Working Groups and Project Steering Committees.

COMMITTEE FOR PERTH MEMBERSHIP

GOLD MEMBERS



SILVER MEMBERS



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Aboriginal Productions
ACIL Allen Consulting
Amana Living
APP Corporation
Arcadis
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Cox Howlett & Bailey Woodland
DBNGP
DEXUS Property Group
FJM Property
Fraser's Property
Gold Corporation
Hames Sharley
HASSELL
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JAXON
John Holland
Jones Lang LaSalle
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Lester Group
Lux Events
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North West Shelf Australia LNG
Peet Limited
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Perth Theatre Trust
Programmed Group
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Real Estate Institute of Western Australia
RobertsDay
SAP Australia
Savills Australia
Screenwest
Silver Chain Group
Southern Cross Austereo
St John Ambulance WA
St John of God Health Care
Stockland
Town of Victoria Park
TPG + Place Match
Uber
Urbis
Western Australian Cricket Association
Woods Bagot
WSP

KWINANA AS A CATALYST FOR ECONOMIC DEVELOPMENT



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BIGGER AND BETTER BEYOND THE BOOM
Perth's economic future as a region of 3.5 million people

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