

Future of Freight for Sydney's Trade Gateways

Managing Industrial Land Zoning in the vicinity of Port Botany and Sydney Airport

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An aerial photograph of a large container ship sailing on a deep blue ocean. The ship is viewed from above, showing its deck and the colorful stacks of shipping containers. The ship is moving towards the bottom of the frame, leaving a white wake behind it. The sky is not visible, as the image is focused on the ship and the water.

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EXECUTIVE SUMMARY

1. EXECUTIVE SUMMARY

Sydney's Eastern Economic Corridor stretches from Macquarie Park in the north, through the Sydney CBD and on to Sydney's two nationally significant trade gateways – Port Botany and Sydney Airport (collectively referred to as 'PBSA') - in the south. Described by the Greater Sydney Commission in the *Greater Sydney Region Plan* as NSW's greatest economic asset, the corridor contributed two-thirds of NSW's economic growth in the 2015-16 financial year¹.

Both the Port and Airport play a crucial role in the supply chains that serve the Greater Sydney Area, New South Wales, and eastern Australia.

Port Botany is the key container terminal for New South Wales, supporting the import of critical containerised goods and the export of valuable regional produce from Australia's largest city. The Port currently handles 99.6% of New South Wales's container volume (2.7 million TEU each year²) and has the capacity to handle over seven million TEU³. In addition, the Port also handles 100% of New South Wales' bitumen, 98% of LPG, 90% of bulk chemicals, and 30% of refined fuels.⁴

In addition to serving as "The Gateway to Australia", Sydney Airport processes 45% of Australia's air freight imports and exports⁵, with high priority goods ranging from overseas retail items to high-value fresh produce, including seafood, meat, fruit, and vegetables through its facilities each day.

Bounded by the ocean to the east, Botany Bay to the south, and facing increasing encroachment from the densely populated and residentially desirable metropolitan areas to the immediate north, east and west, the Port and Airport Precinct already has a short supply of industrial zoned land (IZL). Several emerging trends are forecast to place even greater demand on this already constrained resource.

Although the Greater Sydney Area population is forecast to continue to grow strongly, freight volume through the trade gateways is forecast to grow even

faster to meet strong consumer demand for imported manufactured goods.

The anticipated growth in freight volume alone would put pressure on the industrial-zoned land around the PBSA precinct, while critical changes in supply chain operations would further heighten the demand for scarce industrial property. In particular:

- Driven by the rapid growth in eCommerce (accelerated more recently by COVID-19), consumers are demanding faster, more cost-effective methods of delivery for online purchases. In response, retailers are establishing micro-fulfilment centres close to dense population centres to provide cost-effective last-mile delivery. Many of these will be in the IZLs in the PBSA Precinct to serve the Eastern Harbour City cost-effectively
- Emerging transport technologies, such as robot and drone delivery, will further advance the case for placing micro-fulfilment centres closer to customers
- Growth in fresh food exports will require additional refrigerated storage close to the Airport to enable rapid loading of time and temperature-sensitive freight
- The imbalance in Australia's trade mix will continue to generate surplus empty containers. It will also create greater demand for storage "parks" located close to the Port to allow for rapid transport to ships
- Growth in the size of container ships will require a combination of additional storage space and infrastructure to support higher throughput for rapid loading and unloading requirements
- Greater emphasis on supply chain resilience will create demand for secure land close to densely populated areas with robust transport infrastructure ensuring national

¹ NSW Government Greater Sydney Commission, Greater Sydney Region Plan (2018)

² NSW Ports, Trade statistics (2020)

³ NSW Ports 30 Year Master Plan, p. 44

⁴ NSW Ports 30 Year Masterplan, p. 14

⁵ Sydney Airport, Facts and figures (accessed 2021)

stockpiles are safe and can be effectively distributed when needed

Sydney is not unique in facing increasing demand for limited IZL; almost all ports and airports worldwide are under pressure from urban encroachment. Key gateways such as Schiphol Airport in Amsterdam and ports in Rotterdam and Antwerp have effectively managed the trade-off between demand for residential and commercial property while maintaining sufficient IZL. In doing so, these cities have facilitated the continued growth of their trade gateways and realised significant economic and employment benefits. In contrast, other freight and logistics hubs including the Port of Los Angeles, Port of Vancouver and Miami and Los Angeles airports, provide cautionary examples of how restrictions, constraints, and costs can spiral when urban encroachment comes at the expense of preserving IZL.

Over many decades, Sydney has lost significant IZL around its key trade gateways. Given the expected future growth in import/export (IMEX) volumes and emerging trends in distribution and fulfilment, any further reduction in IZL will inevitably increase supply chain costs and delivery times.

In sum, these trends will unnecessarily suppress the growth of economic activity in both the Eastern City District and the Greater Sydney area (GSA) generally. It is therefore critical the Greater Sydney Commission maintain its "retain and manage" policy for IZL in the Eastern Harbour City, to ensure reliable and cost-effective trade gateways into the future and attract new businesses to locate near PBSA.





INTRODUCTION AND CONTEXT

- Availability of appropriate IZL around the Sydney Airport and Port Botany Precinct is essential for effective and efficient operations, and contributes significant value to the NSW economy.
- Ensuring the future availability of IZL also will support the growth of these nationally significant trade gateways and facilitate employment growth.

2. INTRODUCTION

Sydney's Eastern Economic Corridor stretches from Macquarie Park in the north, through the Sydney CBD and on to Sydney's two nationally significant trade gateways – Port Botany and Sydney Airport (collectively referred to as 'PBSA') - in the south. Described by the Greater Sydney Commission in the *Greater Sydney Region Plan* as NSW's greatest economic asset, the corridor contributed two-thirds of NSW's economic growth in the 2015-16 financial year⁶.

Both the Port and Airport play a crucial role in the supply chains that serve the Greater Sydney Area, New South Wales, and eastern Australia.

Port Botany is the largest container port in New South Wales and includes Australia's largest common user bulk liquid facility. It provides infrastructure for containers, and bulk liquid / gas, and includes facilities for warehousing and storage, bulk liquid / gas handling, wharf services and container parks. Port Botany operates 24 hours a day, seven days a week, to import goods to support the people and businesses of New South Wales and to export goods to international customers. Port Botany directly contributes c.AU\$3.7 billion towards NSW Gross State Product (GSP) and c.25,000 direct full-time jobs from its precinct activities.⁷

Sydney Airport is Australia's international gateway airport, handling more than 44 million passengers⁸ in 2019 (pre-COVID-19) and over 500,000 tonnes p.a. of air freight⁹. While freight volume through the Airport is small relative to the Port, air freight is very high in value, playing a vital role in supporting eCommerce and exports of fresh produce. Airport traffic is forecast to continue growing (including after Western Sydney Airport opens in 2026) with passenger numbers forecast to rise to nearly 66 million by 2039.¹⁰ Aircraft movements are forecast to increase from around 350,000 in 2019 to over 408,000 during the same period.

In 2019, Sydney Airport generated c. AU\$11.2 billion in direct value to the economy and supported c.56,600 direct full-time employment (FTE) jobs from its precinct activities. When combined with indirect precinct activities, this generates c. AU\$42 billion of economic value and creates 336,400 FTE jobs; this is equivalent to c.6.7% of NSW Gross State Product (GSP) in 2019.¹¹ The Sydney Airport Master Plan 2039 states that economic activity from the Airport is forecast to increase to over AU\$52.6 billion in 2039; total employment will increase to 414,600 by 2039.¹²

⁶ NSW Government Greater Sydney Commission, Greater Sydney Region plan (2018)

⁷ BIS Oxford Economics, The Economic contribution of NSW Ports (2015-16)

⁸ Sydney Airport, Facts and figures (accessed 2021)

⁹ BITRE, Airport Traffic data (2019)

¹⁰ Sydney Airport, Master Plan 2039 (April 2019)

¹¹ Deloitte Access Economics, Economic Contribution of Sydney Airport 2019

¹² Sydney Airport Master Plan 2039 (April 2019)

As a major international gateway and significant contributor to Sydney's economy, Sydney Airport's occupies c.900 hectares on the northern shore of Botany Bay. The Airport operates under various operational regulations, including a nightly curfew on commercial passenger flights and an hourly movement cap.

Led by the Greater Sydney Commission ("GSC"), the NSW Government is currently reviewing its employment lands policy impacting the zoning of land across Sydney, including the Eastern Harbour City, which includes IZL around PBSA.

As detailed herein, a reduction in IZL around PBSA could cause costly and irreversible consequences to Sydney's import and export (IMEX) supply chain trade

by increasing logistics costs for imports and exports, exacerbating existing operational constraints, and constraining the ability of PBSA to meet the future demands of Sydney's growing population. The case studies in this document, particularly Los Angeles Airport and Port of Vancouver, provide real life examples of such consequences.

Decisions driven by the GSC's current employment lands policy review potentially risk negatively impacting the growth of Sydney's IMEX supply chains. As a result, this report seeks to provide insight into the answer to two questions fundamental to the development of a successful and policy:

- How will freight trends affect the demand for IZL in and around the Port Botany and Sydney Airport precincts?
- What are the potential negative impacts on supply chains within NSW resulting from the rezoning of IZL around PBSA?



3. CONTEXT

The need for industrial zoned land (IZL)

Port Botany and Sydney Airport do not operate in isolation. They are gateways for trade in a much larger freight supply chain. PBSA requires supporting activities and infrastructure such as warehousing, fulfilment, maintenance, and container storage to be co-located or in the vicinity of their respective precincts to operate efficiently and provide maximum value to their communities.

Most of the activity and infrastructure associated with PBSA is sensitive to changes in freight volume (and passengers and aircraft movements). Specifically, Port or Airport traffic growth requires a proportional increase in space required in or around the precinct. For example, as the number of flights to and from Sydney Airport grows, it may become necessary to add flight catering capacity to support additional demand.

As PBSA continues to grow, this will drive demand for IZL in three main categories.

Storage and logistics activities

Storage and logistics activities require the support of distribution centres (e.g., Qantas Sydney distribution centre), cold storage facilities, empty container parks, truck marshalling areas (TMA) and more. With the overall IMEX volume forecast to grow at c.4% p.a.¹³, storage and logistics activities around the PBSA precinct will have to increase proportionally to accommodate the additional volume of goods going

through Sydney's imports and exports supply chains. Moreover, several trends are expected to change how Sydney's supply chains are configured, further increasing the need for IZL in the Eastern Harbour City. These are discussed in detail in subsequent sections of this report.

Commercial airline activities

Commercial airline activities such as catering, flight training, maintenance support and other airport or aviation support-related activities, are also expected to expand to support growing aeronautical activity. For example, Dnata Catering and Gate Gourmet provide essential in-flight catering services to airlines that fly to Sydney Airport, and therefore the demand for their services is expected to grow in line with the volume of flights to and from Sydney airport.

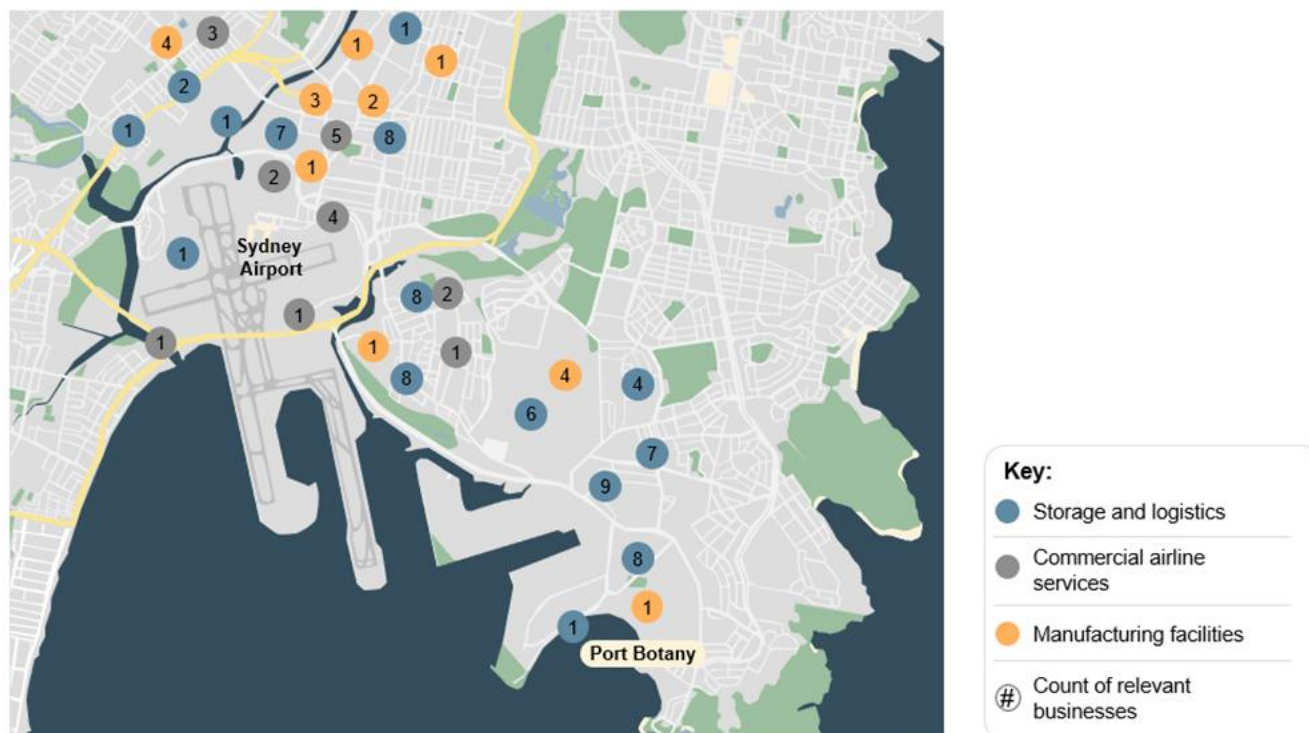
Access infrastructure

Access infrastructure requires consistent growth to accommodate increasing traffic and freight volume. Recent examples of such investments include the Sydney Gateway project and the Port Botany rail duplication project (including the Cabramatta passing loop), which deployed c.AU\$2.6 billion and c.AU\$400 million respectively of public investment to accommodate growth in the Airport and Port Precinct. This investment in capacity represents the pattern Sydney can expect to continue as demand for Port and Airport facilities grows.



¹³ Infrastructure Australia, NSW Moorebank intermodal terminal (2016)

Figure 1: Map of commercial activities around Sydney Airport and Port Botany ¹⁴



Another essential role of IZL is to provide a buffer between PBSA and residential communities, helping to protect local communities from the impact of port and airport activities (e.g., noise) while simultaneously enabling productive use of the land by generating long term employment. These jobs especially benefit those living in nearby communities. Learnings from ports and airports worldwide show the loss of IZL to urban encroachment around the port and airport often leads to the imposition of operational restrictions, and ultimately, supply chain inefficiencies.

Several Australian and NSW Government agencies, policies, strategies or inquiries and local government have also recently highlighted the growing need for preserving IZL around PBSA. They each present compelling arguments to prevent any further loss of IZL.

National Freight and Supply Chain Strategy

Infrastructure Australia identified the need for a National Freight and Supply Chain Strategy in 2015. In response, an expert panel was appointed by the Australian Government to conduct an inquiry to inform the development of the strategy. In 2018, the expert panel found that:

"Conversion of former industrial areas near ports and airports has led to potential conflict between freight activities and residential development in freight corridors and near key terminals."¹⁵

In its priorities for planning for current and future needs, the expert panel recommended to:

"Ensure all tiers of government integrate appropriate land use planning protections for existing freight related activities such as: preservation of industrial land; buffer zones around key freight hubs to allow 24-hour freight operations; ...protection of sites for future freight

¹⁴ Google Maps (2021)

¹⁵ Final report of the Inquiry into National Freight and Supply Chain Priorities (March 2018), p. 38

purposes; protection of existing freight areas from urban encroachment."¹⁶

Based on the inquiry report, on May 18, 2018, the Council of Australian Governments' Transport and Infrastructure Council agreed a framework for developing the 20-year National Freight and Supply Chain Strategy. The Australian, State, Territory and local governments have been working together on its implementation since 2019.

Infrastructure Australia

In its 2019 Infrastructure Priority List, Infrastructure Australia has designated implementation of the National Freight and Supply Chain Strategy and its recommendations as a high priority initiative.¹⁷

Infrastructure NSW

Infrastructure NSW has recommended that:

*"The Department of Planning and Environment update the relevant state environmental planning policies by the end of 2019 to further protect strategically important ports, airports, industrial lands, freight corridors from incompatible uses to ensure the efficient movement of freight in Sydney and NSW, now and into the future."*¹⁸

NSW Freight and Ports Plan 2018-2023

This plan includes a goal to protect land needed for freight and logistics uses and infrastructure and says:

"The State's growing freight task needs to be supported by effective long-term planning to:

- protect existing freight corridors, and industrial and urban services land for freight uses*
- meet future requirements, including the future supply of land for freight uses*
- minimise negative impacts on local communities..."*

In some areas, such as around Port Botany and Sydney Airport, demand for land for residential housing and

other commercial uses has seen tracts of freight and logistics land converted into mixed-use residential/commercial zones. This has resulted in a reduction in the amount of freight and logistics land available in these areas, increased prices for the remaining freight and logistics land and greater congestion ... For these reasons, it is critical to protect the remaining lands that are zoned for industrial use to ensure the efficiency of increasing freight activities. ¹⁹
[Emphasis added]

Bayside and Inner West Councils

Sydney Airport is located predominantly in the Bayside local government area (LGA), with a small portion in the Inner West LGA. Port Botany is partially located in the Bayside and Randwick City LGAs.

Bayside Council's Local Strategic Planning Statement (LSPS), adopted as recently as March 2020, includes Planning Priority 14, which is to "[p]rotect and grow the international gateways", with the following specific action:

*"Manage potential land use conflict by preventing residential and commercial encroachment on the industrial and urban services areas and along freight corridors through land use controls."*²⁰

To give effect to this action, the draft Bayside Local Environmental Plan 2020 (draft BLEP) includes a specific new aim:

*"To enhance and protect the functions and roles of the international trade gateways of Sydney Airport and Port Botany."*²¹

The following new objective in the draft BLEP's Land Use Table - Proposed Zones IN1 (General Industrial) and IN2 (Light Industrial) is also proposed:

*"To support and protect industrial land for industrial uses."*²²

In its LSPS, Inner West Council has said:

"The employment lands in the Inner West support Sydney's trade gateways and provide essential urban

¹⁶ See recommendation 3.4, p. 12

¹⁷ See 2019 Infrastructure Priority List, (February 2019), p.12, 47

¹⁸ See State Infrastructure Strategy 2018-2038, recommendation 59, p.140

¹⁹ See NSW Freight and Ports Plan 2018-2038, Goal 4, pp. 66, 67

²⁰ See Bayside Council LSPS, p.69

²¹ See draft BLEP, clause 1.2.

²² See draft BLEP, land use table

services for local residents and those of surrounding areas. However, this land has been incrementally rezoned for residential development or replaced with State infrastructure. It will be important to protect the remaining areas of employment lands from competing land uses in order to continue stimulating local jobs, enterprise formation and retain local spending.”²³

The draft *Inner West Local Environmental Plan 2020* also retains vitally important employment lands in the vicinity of the airport within the Inner West LGA.

Pressure for rezoning already scarce IZL in the Port and Airport area

Despite the growing demand for IZL to support PBSA operations, the area continues to be under pressure for further rezoning by those who see it as an attractive opportunity for high density residential and mixed-use development in areas close to the Sydney CBD.

Research from 1971 found that on a section of c.2,087 hectares of land on the Mascot/Botany side of PBSA, approximately 22%²⁴ was residential land. Since then, residential land has expanded to cover c.35% of the same area. Areas that have been rezoned include parts of Mascot, Botany, Wolli Creek, Alexandria, with plans to also rezone parts of Waterloo.

Residential and commercial developers argue that rezoning the PBSA IZL in favour of residential housing could help to address housing demand in metropolitan Sydney. There are recent examples of planning proposals that have sought to replace areas of employment lands with high density residential development. Such residential development may add pressure for businesses to limit existing industrial operations.

Most recently, the NSW Productivity Commission’s 2021 white paper “Rebooting the Economy” crisply summarised both the pressures and the need to preserve IZL around Port Botany and Sydney Airport:

“Business and development industry stakeholders ... highlighted the need for land use to adapt to Sydney’s changing economic and social needs. Development industry groups raised the potential for mixed residential and commercial uses, a mix that has been successfully achieved in other countries.”

“... [However, in certain precincts] there are strong grounds for land to be retained against encroachment from competing and incompatible uses. The Sydney Airport and Port Botany facilities, for example, will serve the State’s growing freight task, which is projected to increase from 443 Mt per year in 2018 to 569 Mt per year in 2038 (NSW State Infrastructure Strategy, 2018). IZLs in and around these logistical hubs:

- *serve the supply chain for import/export activities*
- *provide contingency for potential future needs of the Port-Botany/Sydney Airport precinct*
- *act as a buffer against land uses likely to conflict with heavy industrial and waterfront activities, especially residential...”*

²³ See Inner West Council’s LSPS, p.14

²⁴ The Impact of Port Botany (1965-1991)



FUTURE OF FREIGHT FOR SYDNEY'S TRADE GATEWAY

- Freight supply chains under significant pressure from population growth, shifting mix and volume of exported goods and the volume imbalance between imports and exports
- This pressure will continue to grow, exacerbating demand on already constrained IZL

4. FUTURE OF FREIGHT FOR SYDNEY'S TRADE GATEWAYS AND THE ROLE OF INDUSTRIAL ZONED LAND

4.1. GROWTH IN FREIGHT VOLUMES AND THE IMPACT ON INDUSTRIAL ZONED LAND

Population growth

Current state

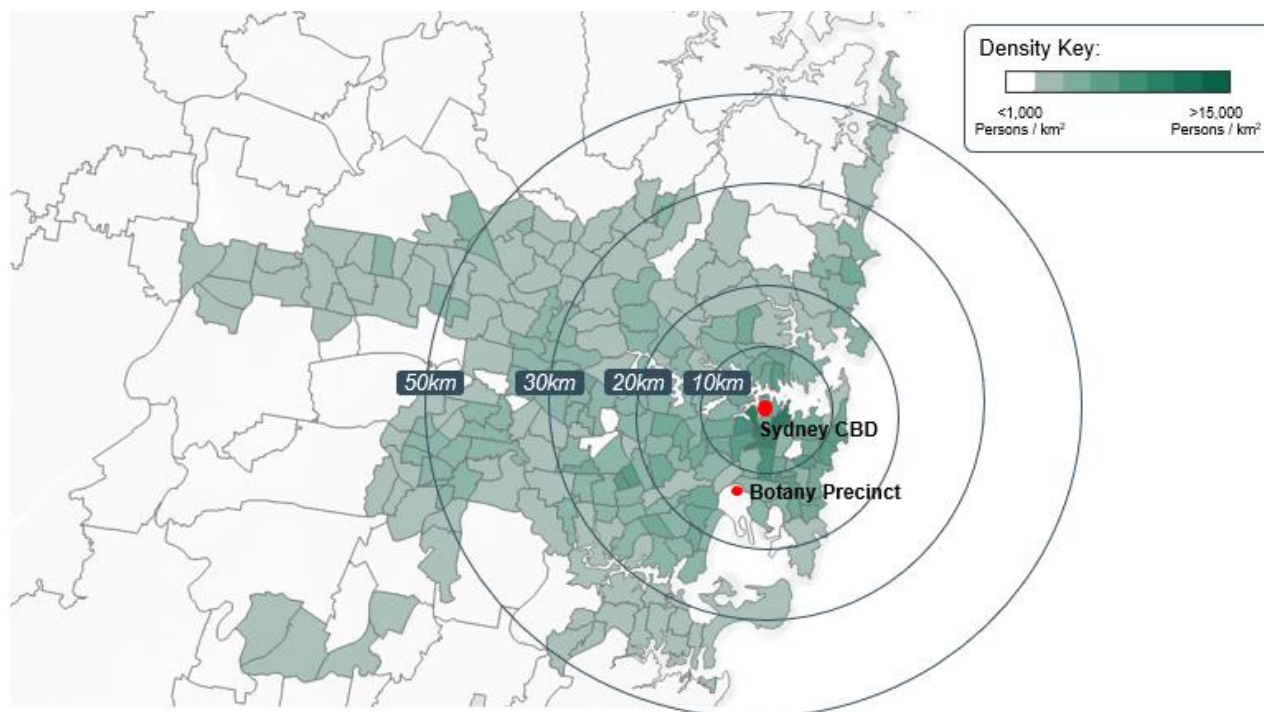
New South Wales and the Greater Sydney Area (GSA) population has grown consistently over several decades. Today, Greater Sydney is one of the top ten fastest-growing regions in the Western world and is projected to be home to another 1.7 million and 3.2 million more people by 2036 and 2056 respectively.²⁵

PBSA sits within the Eastern City District, which is responsible for generating c.45% of the economic activity in the GSA²⁶. As shown in Figure 2, the Eastern

suburbs, Sydney CBD and the PBSA precinct are among the most densely populated areas. In recent years, significant high-density residential areas such as Wolli Creek and Mascot Town Centre have been established close to the PBSA precinct on former IZL.

Although population density of the GSA has gradually shifted away from the East and North toward regions further West and South during this period, most New South Wales residents (c.86% of GSA) continue to reside within a 50 km radius of the Sydney Gateway precinct.²⁷

Figure 2: Population density by SA2 in Greater Sydney Area in 2020 ²⁸



²⁵ Greater Sydney Commission – A Metropolis of Three Cities – Past, Present and Future (accessed 2021)

²⁶ Infrastructure NSW, Sydney Gateway program final business case summary (2019)

²⁷ Australian Bureau of Statistics (2020)

²⁸ Australian Bureau of Statistics, NSW population data by SA2 (2020)

The Port and Airport are the primary IMEX facilities serving NSW. Port Botany currently handles 99.6% of New South Wales container volume (2.7 million Twenty-foot Equivalent Units ("TEU") each year²⁹). In 2019, the IMEX volumes for Sydney Airport and Port Botany were 396,433 tonnes and 25,536,213 tonnes, respectively.³⁰ Additionally, the Port handles 90% or 4.2 million metric tonnes of the state's bulk liquids and gas. A broad mix of goods is represented in these volumes, including agricultural produce, electronics, consumer durables, machinery, plastic products, fuel, and furniture.³¹ Notably, 42% of Sydney household goods,³² 100% of New South Wales' bitumen, 98% of LPG, 90% of bulk chemicals, and 30% of refined fuels come through Port Botany.³³

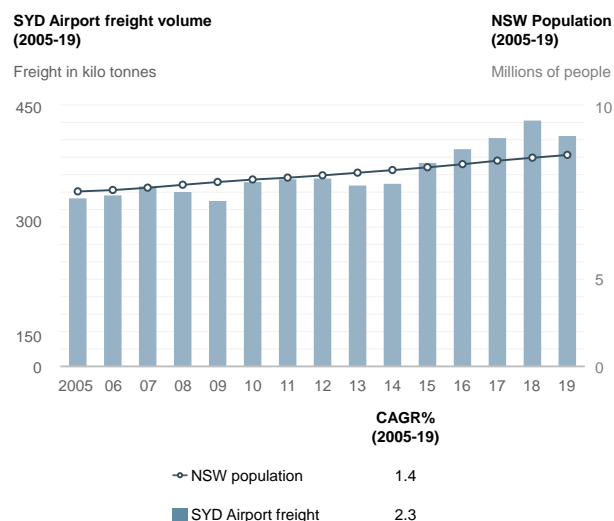
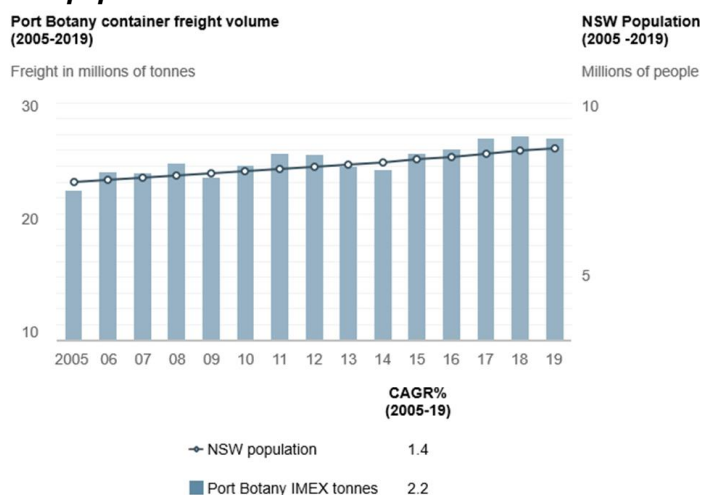
As shown in Figure 3 and Figure 4, the growth in the volume of IMEX through PBSA has materially outpaced population growth by nearly one percent per annum (2005-2019).

Trends

Despite the mitigating impact of COVID-19 on immigration to Australia, the population of New South Wales and the GSA is forecast to grow by 0.8% and 1% CAGR (Compound Annual Growth Rate), respectively, between 2019-2030.³⁴ Population growth has been accompanied by a shift in population toward the West and South and is rapidly creating a more population-diffuse GSA. For example, Parramatta's population increased by 32,130 people (16.6%), an average growth rate of c.3.1% per year between 2011-2016. However, because this shift has occurred alongside population growth, it has had a minimal impact on density in the traditionally populous areas to the North and East of the city.

Indeed, despite its challenges (e.g., high real estate prices, congestion, regional inflation for goods and services), the City of Sydney remains internationally recognised as a highly desirable place to live.³⁵ This is reflected in the fact that Metropolitan Sydney³⁶ is expected to remain home to over 3m people through 2032.

Figure 3-4: Growth in the volume of freight through Sydney airport vs NSW population, and Port Botany v. NSW population³⁷



²⁹ NSW Ports

³⁰ Transport for NSW – Freight data for Port Botany and Sydney Airport (2019)

³¹ Transport for NSW Freight data (accessed July 2021)

³² NSW Ports, Port Botany overview

³³ NSW Ports

³⁴ Centre for Population – Population Forecasts central scenario (December 2020)

³⁵ "Top Ten Best Cities in the World", Conde Nast Traveller's annual Readers' Choice Award, 2020

³⁶ For purposes of this paper, we define "Metropolitan Sydney" as the area within a 20km radius of Sydney city centre

³⁷ ABS population data and Transport for NSW Freight data (accessed July 2021)

Metropolitan Sydney itself remains one of the wealthiest urban centres in Australia. There is no evidence to suggest that shifting population concentrations will change current demographics or that the shift will have a material effect on the volume of goods purchased in Metropolitan Sydney.³⁸ On the contrary, economic activity and the corresponding volume of IMEX freight through PBSA will increase as

the Metropolitan Sydney and the GSA population continue to grow,³⁹ even after the Western Sydney Airport opens in 2026, as demonstrated in Figure 6 and Figure 7. Furthermore, the reduction in local manufacturing throughout Australia has translated to an increased reliance on imports of goods and components, leading to faster growth in imports than population growth alone would suggest.

Figure 5: Population density by SA2 in Greater Sydney Area in 2032 ⁴⁰



³⁸ Australian private consumption is forecasted to grow by c.8.3% between 2020-2025. Considering NSW population is c.32% of the total Australian population, it is expected that the purchases will grow in NSW

³⁹ Australia 5-year forecast report, The Economist Intelligence Unit (June 2020)

⁴⁰ Australian Bureau of Statistics, NSW population data by SA2 (2020)

Figure 6: Forecast Port Botany freight import volume growth in TEU ⁴¹

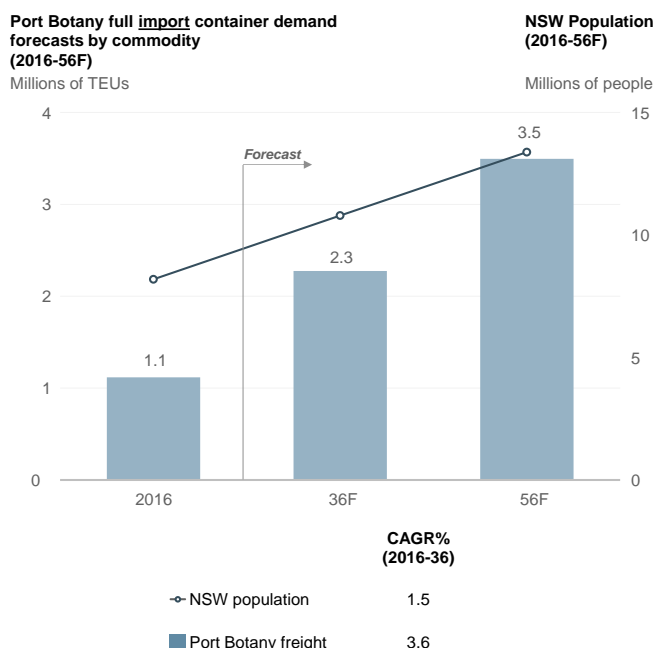
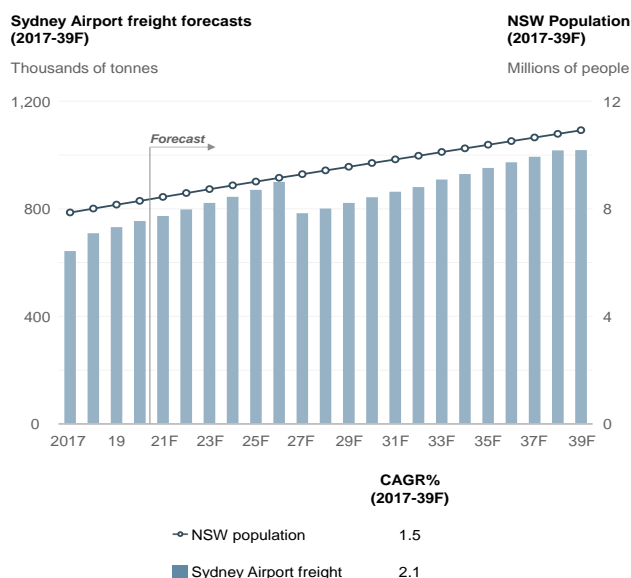


Figure 7: Sydney Airport freight volume ⁴²



⁴¹ ABS, Transport for NSW, NSW Freight Commodity Demand Forecasts 2016-56 (2018)

Impact on industrial zoned land

Sydney's forecast population growth will drive consumer demand from new residents. As a result of Australia's limited domestic manufacturing capability, it is likely that the percentage of goods imported will likely remain at or above current levels. Consequently, import volumes into the PBSA will increase to service the needs of the GSA population. The volume growth will also put pressure on existing supply chain infrastructure (e.g., warehouses, empty container parks, support facilities) and the need for IZL.

Growth in exports of fresh produce by air

Current state

Australia's exports of premium fresh (as opposed to frozen) produce have been growing strongly over the last decade, including those from NSW. Sydney Airport is the critical transport link for NSW exports by air, as it serves an extensive network of global destinations with frequent flights. Approximately 45% of all Australia's air freight imports and exports in both value and volume go through Sydney.⁴³ Over 80% of freight is carried in the holds of passenger aircraft, with the remainder transported in dedicated freight aircraft.

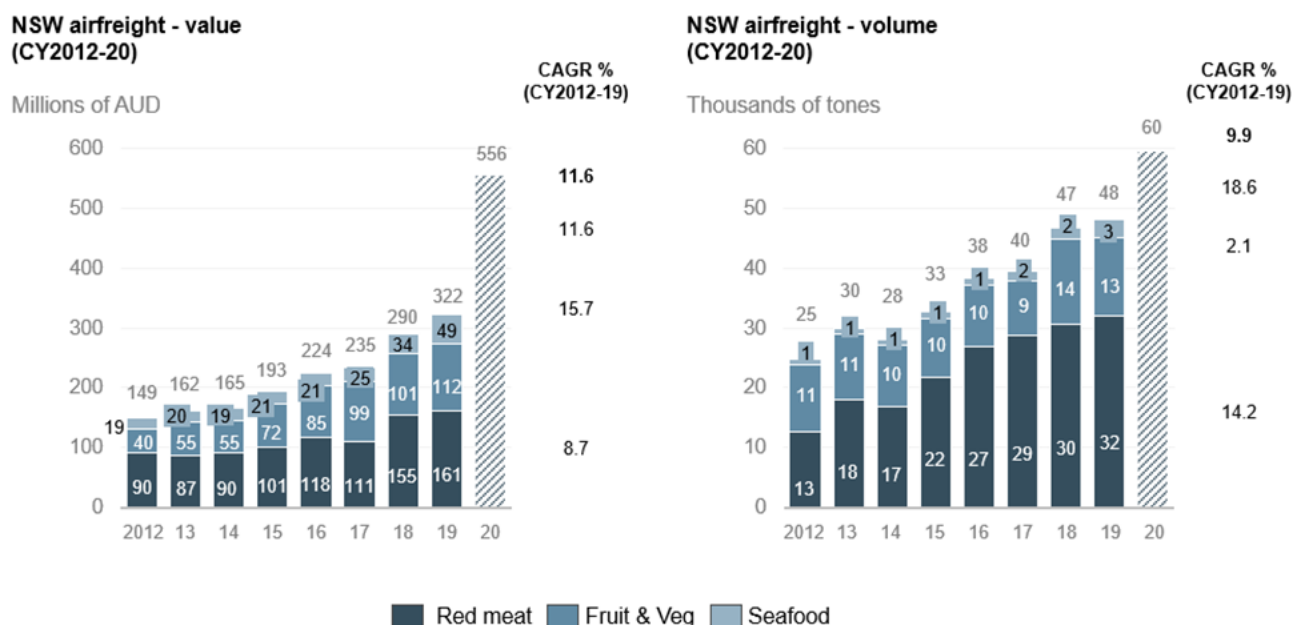
Key fresh produce exported by air includes high-value chilled seafood, red meat and fresh fruit and vegetables destined primarily for markets in Asia and the Middle East. Chilled exports of fresh produce require specialised refrigeration containers for transportation as these products have a short shelf life (e.g., seafood has a shelf-life of 2-3 days).

These export categories have been growing strongly, reaching a combined total value of AU\$322 million in 2019. During 2020, fresh food exports from Sydney by air have surged even further due to reduced domestic consumption, transshipment from other states with substantially reduced flights and the support of the Australian Government's International Freight Assistance Mechanism.

⁴² ABS Population Projections (base 2017); Sydney Airport Masterplan 2039; L.E.K. analysis

⁴³ Transport for NSW, Kingsford Smith Airport (2021)

Figure 8: Fresh produce exports via Sydney airport ⁴⁴



Trends

Between 2012 and 2019, the volume of fresh produce exported by air grew 19% p.a. for seafood, 14% p.a. for red meat and 2% p.a. for fruit and vegetables. Commentators expect fresh food exports to expand further due to growing international markets,⁴⁵ with airfreight providing access to new and growing markets (e.g., Asian consumers for quality fresh produce).

Impact on industrial zoned land

To maximise shelf life and the viability of exporting perishable goods, industrial refrigeration close to the

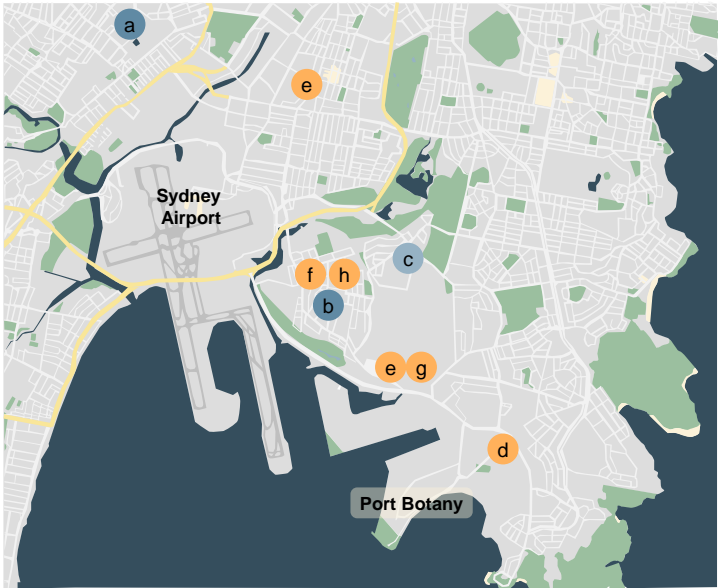
point of departure is essential to maintaining perishable foodstuffs. For example, freight units cooled using dry ice are needed to preserve fresh produce during routine flight delays. Consequently, many exporters and freight forwarders serving these high value trade flows have cold storage facilities on IZL close to the Airport. Although some fresh produce freight will move through Western Sydney Airport after it opens in 2026, Sydney Airport will maintain significant and growing freight volumes over the long term. This is largely due to the Airport's extensive network of international destinations and carriers, and the fact that c.80% of all airfreight is carried in passenger aircraft, with the remainder in dedicated freight aircraft.

⁴⁴ National Freight Data Hub, 2021

⁴⁵ Transport for NSW, NSW Freight Commodity Demand Forecasts 2016-56, 2018

Figure 9: Map of fresh produce exporters and refrigeration facilities ⁴⁶

Cold storage facilities near Sydney Airport



Company	Details
a JD's Seafood	Seafood exporter
b AWC Seafood	China specific seafood supplier
c Haverick Meats	Red meat exporter
d DHL	Major logistics company with cold storage facilities
e C.T. Freight	Freight forwarding service with cold storage facilities
f Control Global logistics	Freight forwarding service with cold storage facilities
g GEFCO	Freight forwarding service with cold storage facilities
h Freight Company Sydney	Freight forwarding service with cold storage facilities

⁴⁶ Google Maps (2021)

Accumulation of empties

Current state

Similar to Australia generally, New South Wales has relatively limited local manufacturing capability. As a result, NSW imports high volumes of manufactured goods such as electronics, clothing, and industrial equipment to meet domestic demand. In contrast, NSW exports mainly primary products such as coal, grain, meat, and wine, reflecting the country's richness in land and natural resources.

Manufactured goods, which make up the bulk of imports, are typically transported in containers offering protection from physical damage and the ability to load and unload goods with basic equipment (e.g., forklifts, pallet jacks). Primary products, which

make up the bulk of exports, are typically transported in bulk due to their high volume and weight. Therefore, the state has a surplus of empty containers ("empties") that need to be transported, stored, maintained, and accounted for while awaiting shipping offshore to the next customer.

A disparity in demand for the specialised containers required to export goods (i.e., standard, food-grade, and refrigerated containers) exacerbates the complexity of handling the surplus containers and increases the accumulation of empties. In 2016 alone, there was a surplus of more than 700k TEU of standard and food-grade containers, while refrigerated containers were largely unavailable.

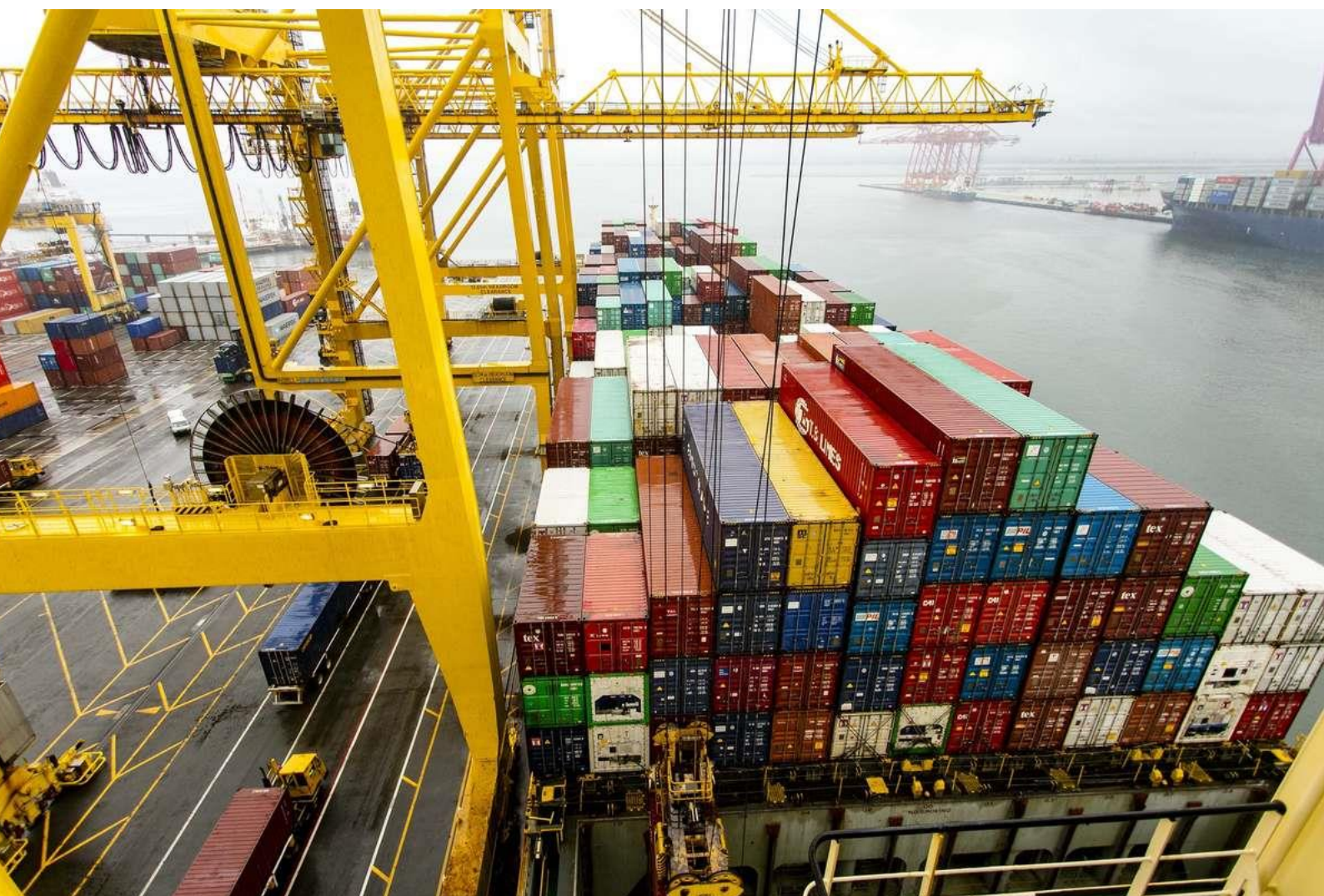


Table 1: Port Botany container imports and exports, by type of container and commodity ⁴⁷

Exports		Import (thousands TEUs, CY2016)	Export (thousands of TEUs, CY2016)	Imbalance (thousands of TEUs, CY2016)
Standard 40-foot containers	Intermediate goods	22	7	
	Consumer & household goods	46	45	
	Paper and timber	-	60	
	Construction products	51	-	
	Mineral ores and metals	-	50	
	Cotton lint	-	14	
	Fertiliser	2	-	
	Other	45	45	
	Total	966	301	665
Food-grade 20-foot containers	Grain, flour, sugar, and starches	-	58	
	Other food	151	40	
	Total	151	98	53
Refrigerated containers	Meat	-	14	(14)

NSW's large surplus of empty containers is stored and managed in dedicated storage facilities called Empty Container Parks (ECPs). Most of Sydney's ECPs are near Port Botany as co-location provides three advantages:

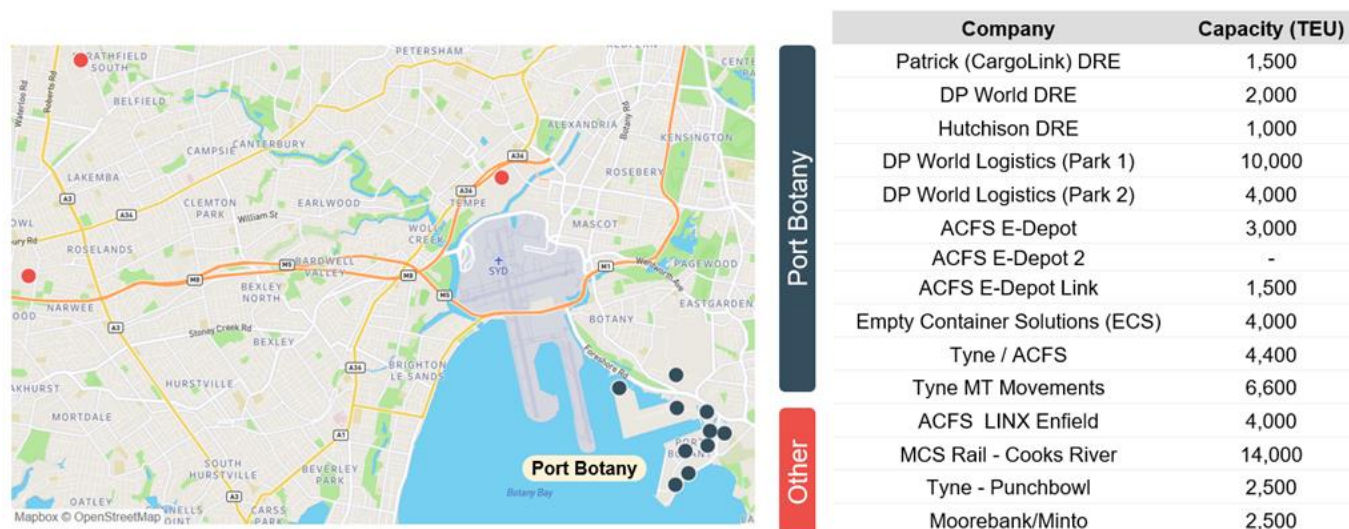
- Freight companies can pick up full containers after dropping off empties, lowering the cost of transport across the supply chain. Transport operators favour the delivery of empties to ECPs close to Port Botany as this provides an ability to return an empty container and collect a full import container within a single return trip to the Port. This enables transport operators to charge lower fees as the round-trip cost is split between the drop-off and the pick-up legs.
- Reduced logistics costs of moving empty containers to the loading area. Numerous truck movements are required to shift

empty containers to the Port. Being close to the Port reduces the cost of transport as the task can be completed with fewer vehicles and drivers

- Containers can be loaded opportunistically, filling the empty capacity of ships about to leave the Port. In circumstances where shipping lines have additional capacity due to unforeseen events (e.g., cancellations), containers can be loaded opportunistically. For this type of empty loading, quick access to the Port is essential. This function is primarily completed by the empty container pool located within stevedore terminals and nearby ECPs. Although, it should be noted that opportunistic loading of empties occurs less frequently than scheduled loading of empties.

⁴⁷ Transport for NSW, NSW Freight Commodity Demand Forecasts 2016-56, 2018

Figure 10: 2020 ECP distribution and capacity across Greater Sydney ⁴⁸



ECP storage capacity in Sydney has been largely static between 2015 and 2019 at approximately 60,000 TEU.⁴⁹ An additional 5,000 TEU of space was built at Port Botany in 2020, but the investment was not sufficient to offset the loss of Tyne St. Peters (10,000 TEUs) to the Sydney Gateway project,⁵⁰ bringing the total ECP capacity to c. 55,000 TEU today.⁵¹ A further 5,000-10,000 TEUs are concurrently stockpiled in similarly proximate transport yards and the port.

The average ECP utilisation currently exceeds 90% in most Sydney ECPs during peak periods and is expected to increase given capacity losses.

Trend

NSW IMEX forecasts indicate that the proportional mismatch between imported and exported goods will remain constant over the next decade. As a result, the surplus of empty containers will grow consistent with underlying IMEX volume growth. In 2036, the difference between containerised imports and exports is forecast to be c.1.6m TEU. By 2056, it is forecast to reach 2.5m TEU.⁵² In sum, the container imbalance, and the need for space to store and manage them will not be resolved in the short or medium term.

⁴⁸ Transport for NSW, NSW Empty Container Supply Chain Study, 2020

⁴⁹ Transport for NSW, NSW Empty Container Supply Chain Study, 2020

⁵⁰ Qube Logistics, Sydney Gateway Environmental Impact Statement, 2019

⁵¹ NSW Ports, New empty container park at Port Botany creates supply chain efficiencies, 2020

⁵² Transport for NSW, NSW Freight Commodity Demand Forecasts 2016-56, 2018

Figure 11: Port Botany container import and export forecasts, by container type ⁵³

Imports: Port Botany full container demand, by container type (2016-56F)

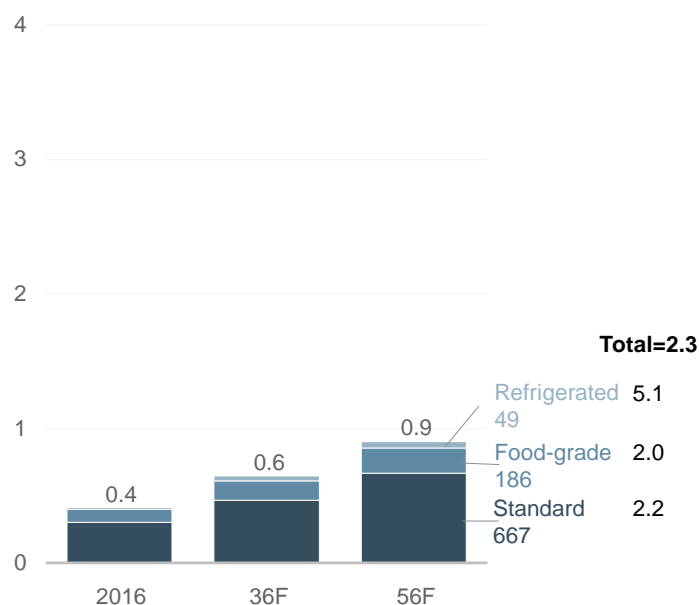
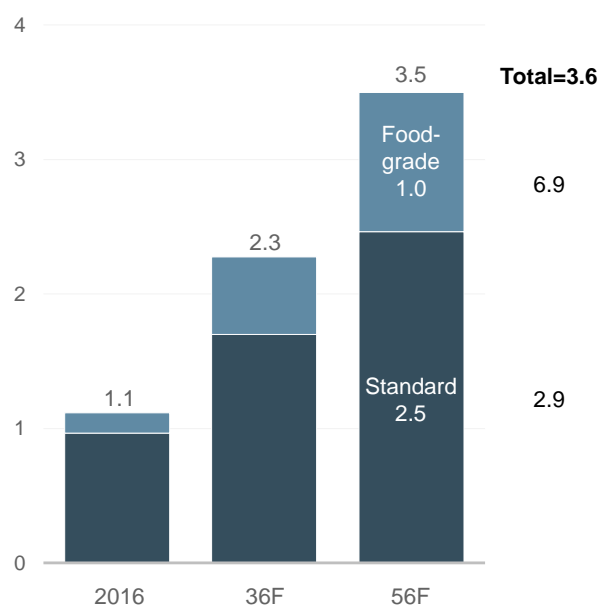
Millions of TEUs

**CAGR %
(2016-36F)**

Exports: Port Botany full container demand, by container type (2016-56F)

Millions of TEUs

**CAGR %
(2016-36F)**



Impact on industrial zoned land

With NSW's ECP capacity fully utilised, new ECP capacity will be required to support NSW's IMEX trade growth. A study from Transport for New South Wales (TfNSW) on the empty container supply chain estimated that over the next decade, ECP capacity needs to grow by an additional 12,000 TEU in the vicinity of Port Botany to avoid shortfalls in storage by 2031. However, this assumes several operational improvements, making it an optimistic scenario.⁵⁴

Considering the ratio of storage capacity to the volume of empties generated remains the same, the additional capacity required by 2031 could be as high as c.60,000 TEU or c.60 hectares of land. By 2050, the capacity requirements could grow by another 75,000 TEU.

Both estimates conclude that the demand for ECP's will grow for many years requiring IZL near the PBSA precinct.

⁵³ Transport for NSW, NSW Freight Commodity Demand Forecasts 2016-56, 2018

⁵⁴ Transport for NSW, NSW Empty Container Supply Chain Study, 2020

4.2. CHANGES IN FREIGHT MOVEMENT AND THE IMPACT ON INDUSTRIAL ZONED LAND

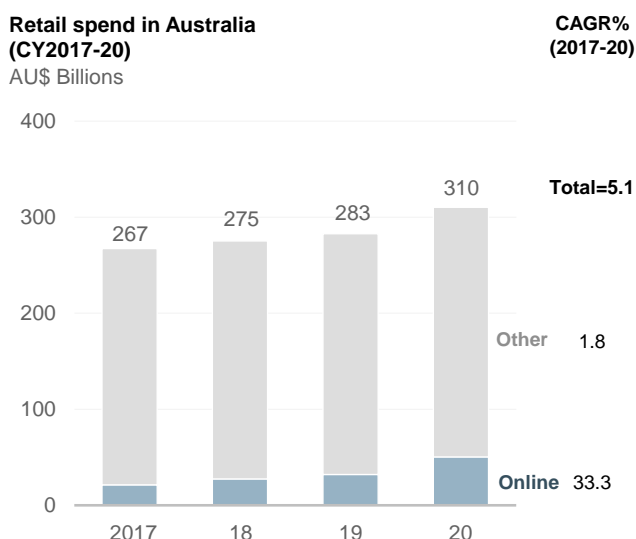
Increasingly demanding customers are driving changes in supply chain operations

Current state

A substantial shift in Australian consumer behaviour is occurring, in part due to the growth in eCommerce.⁵⁵ Technology that enables consumers to identify alternate suppliers, compare fully loaded prices, and obtain real-time information on product availability (e.g., Google Shopping), has forever changed how Australians purchase goods. This trend has been accelerated by COVID-19, as lockdowns and health concerns have led to a rapid uptick in online shopping.

This evolution has in turn driven substantial change in the IMEX supply chains which support retail operations.

Figure 12: Growth in eCommerce & retail spend⁵⁶

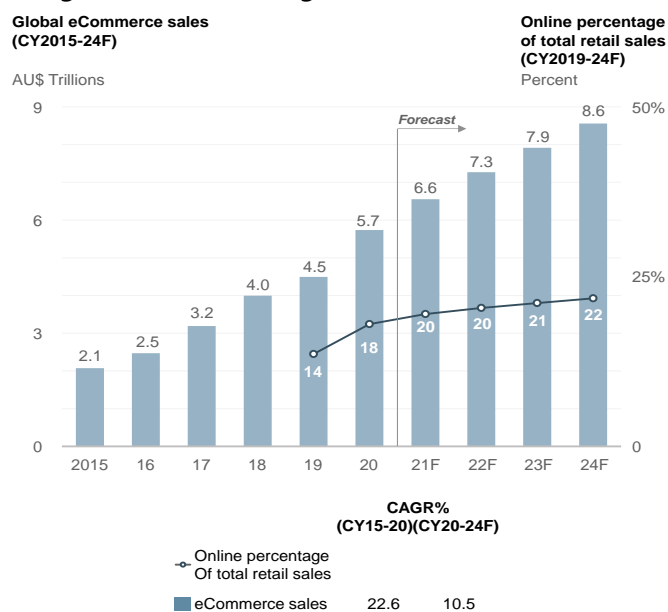


Today, as one prominent eCommerce executive stated: in the mind of Australian consumers, "speed, low cost, and better selection" are requirements, not differentiators.⁵⁷ Consumer expectations around rapid

delivery have been heightened by same and next day delivery service offerings (e.g., Big W, The Iconic, Dan Murphy's, Myer, among others).⁵⁸ Consumers also have become accustomed to using internet-based research to determine and request the lowest price available in the global marketplace (which expectations have become so ingrained that a recent study found that 14% of consumers believe not having free delivery is a "deal-breaker").⁵⁹

In addition to changes in purchasing behaviour, eCommerce has facilitated consumer access to a global marketplace. Leveraging global retail platforms such as eBay, Amazon, DH Gate and Wish, consumers now purchase goods directly from overseas vendors in a way that was previously impractical and cost prohibitive. The result is that "borders" have become irrelevant and consumers buy based on goods being available for a lower price in a foreign country or

Figure 13: Growth in global eCommerce sales⁶⁰



⁵⁵ Australia Post, Inside Australian Online Shopping (2018-2021)

⁵⁶ eMarketer, Statista, Australia Post

⁵⁷ Interview with industry participant

⁵⁸ Company websites

⁵⁹ Emarsys x Google, Surveys Report (2021) n= 1,001

⁶⁰ eMarketer, Statista

because the product or brand is not available domestically.⁶¹

Trend

Although consumer spending is generally expected to return to pre-COVID growth rates over time, COVID-19 will have irreversibly accelerated the size of Australian eCommerce. Approximately 1.3m new households entered the eCommerce market in the last two years, and consumers have indicated they expect to shop online 28% more frequently than before COVID-19.⁶² Australian penetration of online shopping (c. 13%)⁶³ still lags well behind international leaders, including the United States (c. 22%), the United Kingdom (c. 24%) and China (c. 27%), but it is closing the gap at a faster pace than any time in its history.⁶⁴ Along with this growth will come the expectation for the low cost and rapid delivery methods highlighted above.

Figure 14: CY2020 Global eCommerce penetration compared to online retail sale size and growth⁶⁵



Low cost

These market forces have put pressure on Australian businesses which actively seek to reduce the costs of their fulfilment processes and infrastructure to ensure profitability. Because material handling and transportation costs are key drivers of the cost of

goods sold, businesses are particularly interested in lowering costs in traditionally labour-intensive material handling through process optimisation, automation, and optimising transportation to reduce fuel, driver, maintenance, and environmental costs. Travelling shorter distances between fewer waypoints reduces material handling costs.

Evidence suggests that material handling, logistics and transportation operations are under active review by many supply chain participants. For example, after a period of high growth, Australian online bookseller Booktopia has significantly invested in its automated packing system to reduce handling time, boost distribution capacity, and speed up last-mile delivery services.⁶⁶

Rapid delivery

Given Australia's unique and remote geography, it is evident that holding bulk domestic inventory can better enable cost-effective, rapid delivery. Without a bulk domestic inventory position, the only option for rapid import or export of goods is air freight. Air freight provides an essential service when end-consumers are willing to pay the associated cost or where businesses decide that the opportunity cost of a lost sale outweighs the cost of single delivery fulfilment. However, generally, bulk air freight supply chain operations are cost-prohibitive for most businesses.⁶⁷

For most businesses, the balance between the cost of working capital needed to hold bulk inventory positions and the customer demand for cost-effective, rapid delivery is delicate. However, recent evidence suggests businesses are increasingly adopting a similar approach to addressing this issue by locating inventory close to purchaser density in smaller or "micro-fulfilment" centres ("MFC") (e.g., Woolworths, Coles).

⁶¹ International Post Corporation, Cross-Border eCommerce Shopper Survey (2019), n=35,737

⁶² Australia Post, Inside Australian Online Shopping (2021)

⁶³ Australia Post, Inside Australian Online Shopping (2018-2021)

⁶⁴ CBRE, Australia's eCommerce trend and trajectory (June 2021)

⁶⁵ CBRE, Australia's eCommerce trend and trajectory (June 2021)

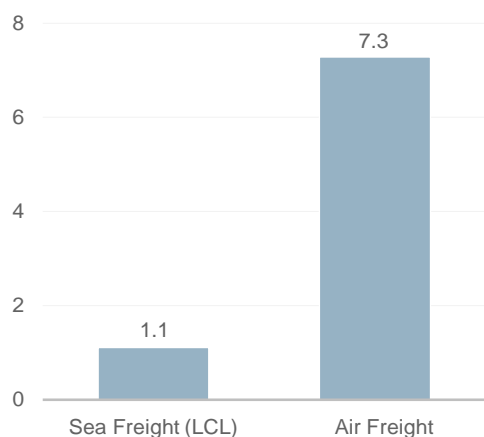
⁶⁶ Knight Frank, The last mile race challenging Urban Logistics (July 2021)

⁶⁷ Freightos, International Cargo Express (Accessed July 2021)

Figure 15: Cost of shipping 250kg load of household goods worth c.AU\$28,000 ⁶⁸

**Freight cost comparison
(November 2020)**

AU\$ Thousands



Note: LCL refers to less than container load

Micro-fulfilment refers to compact warehousing facilities located near dense urban population centres, designed to provide fast online order fulfilment, click-and-collect and home delivery services. MFCs are typically smaller than traditional fulfilment centres, taking up c.1,000 to 2,500 square metres compared to upwards of 30,000 square metres. MFCs also use advanced automation technology and purpose-built tall shelving systems to pick and dispatch products nearly ten times faster than traditional in-store methods while moving five times the volume.⁶⁹

Moreover, by locating inventory close to its ultimate destination, businesses can reduce total delivery length. Less distance travelled will enable lower delivery time, fuel, tolls, stress on transportation assets, and emissions. In 2020, Target US was able to cut 30% from the average unit cost for digital fulfilment by utilising its store footprint as MFCs and the maturation of its same-day delivery service.⁷⁰

Moreover, compared to delivery from large central warehouses, micro-fulfilment centres allow smaller, fuller trucks to travel shorter distances between storage facilities and end-users, reducing delivery costs. Replenishing inventory positions in micro-fulfilment centres can also be done by fewer, fuller trucks as they typically house only 80-90% of top "in demand" products.⁷¹ Ultimately, throughput becomes the critical metric to unlocking working capital, with some automated systems that can process c.4,000 online orders each week.⁷² The faster a business "turns" the goods, the quicker it gets paid.

Finally, urban MFCs have been shown to offer more energy-efficient operations than large distribution centres due to their reduced lighting, heating/cooling, and other electricity needs.⁷³ When combined with the more efficient truck movements, the increased energy efficiency of MFCs can provide material contributions to businesses environmental agendas, therefore adding to the attractiveness of the MFCs.

In Australia, MFCs have also partially emerged in response to ongoing shortages in the volume of industrial and logistics land, with vacancy rates in Sydney some of the lowest in Australia, c.1.4% in the first half of 2021.⁷⁴ Moreover, of the limited 1,198 ha of IZL across the Eastern Harbour City's largest industrial precincts, less than 3% is currently undeveloped.⁷⁵ Property investors understand the emerging demand and are purchasing and developing land to enable businesses looking to build MFCs. For example, the leading property investment groups, Goodman Group and Charter Hall, purchased property north of Sydney Airport in 2020 for future infill redevelopment and development of last-mile multi-storey warehouse facilities.

⁶⁸ Movehub, International Shipping Costs (Accessed July 2021)

⁶⁹ Knight Frank, The last mile race challenging Urban Logistics (July 2021)

⁷⁰ Fortna, Six Things to Consider Before Implementing Micro-Fulfilment Solutions (2020)

⁷¹ Knight Frank, The last mile race challenging Urban Logistics (July 2021)

⁷² Knight Frank, The last mile race challenging Urban Logistics (July 2021)

⁷³ International Journal of Production Research, Environmental impact of warehousing, p. 2 (July 2016)

⁷⁴ CBRE, Vacancy Report (H1 2021)

⁷⁵ Greater Sydney Commission, Our greater Sydney 2056 Eastern City District Plan (March 2018)

Impact on industrial zoned land

Given that the population will continue to be densely concentrated in and around the metropolitan Sydney area, businesses will increasingly seek micro-fulfilment centres close to population centres to meet customers' rapid delivery expectations and reduce their transportation and logistics costs.

The cost of real estate may not mitigate the impact of this trend, as some suggest. While Sydney real estate is costly compared to other regional and national locations, evidence indicates that the value of location proximate to customers is greater than the increased land cost. A 2019 report by Deloitte analysed the cost of providing same-day delivery from a location in New York City compared to a New Jersey distribution centre. The report found that the high demand from Manhattan made it c.22% more cost-effective to serve from a Bronx location just North of Manhattan, despite having higher rent and operating labour costs compared to a New Jersey location to the West.⁷⁶ The distance from PBSA to the Sydney CBD is equivalent to that between Manhattan and the Bronx.

As a market leader in logistics and eCommerce, Woolworths provides a useful example of the trend towards urban-based fulfilment in Australia. Following substantial growth in its online offering in recent years, Woolworths opened a dedicated online store in the Mascot industrial precinct around Sydney Airport in 2014. The property includes 9,750 sqm of combined warehouse and office space, 7,000sqm of which is dedicated to the Woolworths online store. According

to Goodman who leases the space to Woolworths, the location gives Woolworth's access to thousands of customers living in the property's catchment area across inner Sydney.

As the Woolworths example suggests, the industrial area around PBSA is ideal for the establishment of fulfilment centres to metropolitan Sydney. PBSA's IZL is among the most desirable due to its proximity to the densely populated north and east and the growing south and west. Moreover, the PBSA is adjacent to robust road infrastructure to support delivery to these areas.

Australian supply chain operations are rapidly evolving to meet the growing demand for rapid, cost-effective delivery; it is therefore critical to develop fulfilment capability near densely populated locations to enable this evolution. There is a growing trend towards the use micro-fulfilment for businesses to reduce transport costs while optimising delivery speed.

Micro-fulfilment centres require IZL for their operations, but this land is limited in and around the most populated areas of Sydney. The industrial zones adjacent to PBSA remain one of the few areas where businesses seeking to locate their micro-fulfilment capability can be found. Further restricting the supply of this land through rezoning could have significant economic consequences.

"...Our estimates show that for every \$1 billion increase in online sales, this generates approximately 85,000 sqm of demand for warehouse space. With online retail sales expected to grow by around \$31 billion over the next five years, demand of 520,000 sqm per annum from online retail groups alone is expected to be required over the period..."
- Luke Crawford, Director, Industrial Research, Colliers Research

⁷⁶ Deloitte, Urban fulfilment centres (2019)

Key examples

International Market Leader: Amazon

Amazon, the global eCommerce giant, is leading the world in terms of distribution logistics. It acts as a prime example of what business models of the future may look for, with many competitors looking to replicate their models.

In 2020, Amazon USA announced plans to expedite consumer's online shopping experience through c.1,500 hubs located across suburbs and cities around the country. To accomplish this, Amazon has planned an estimated ten delivery stations across highly populated areas of New York, including Brooklyn, Queens, and the Bronx. Amazon sends packages to delivery stations, where they are loaded onto trucks for home delivery.

In Australia, Amazon is focused on building Australia's largest warehouse (200,000 sqm), a robotic fulfilment centre in Western Sydney that will house c.11m shopping products. The facility demonstrates the demand eCommerce creates for warehouse space and is designed to theoretically deliver to 85% of the population in 12 hours, effectively doubling its Australian operational footprint. In the future, as population density in Sydney increases along with local competition, it can be expected that Amazon may look to copy its American distribution model to enhance its customer service through urban fulfilment centres.

International logistics space provider: GLP

GLP, a leading investor and developer of logistics warehouses and distribution parks, acquired a 2.4 ha plot in Silverton, adjacent to London City Airport. Subject to planning, the facility will have three storeys and over 39,000 square metres of space, allowing for multiple or single customer occupancy. The building is

designed as a 'last mile' logistics hub for London and surrounding areas, targeting eCommerce, distribution, and logistics customers. If the latest plans are approved, the facility will have unparalleled access to serve the City of London, with 5.6m inhabitants within a 30-minute drive. Plans for the innovative new hub have been held back due to resident concern over noise and traffic, demonstrating the impact of trying to reclaim IZL near urban centres.

Leading logistics property provider: Goodman

Goodman, a leading global logistics and business property provider, believes that the South Sydney Precinct is currently more valuable than ever. They have two multi-storey sheds in the planning stages at Alexandria to capitalise on the available land in the precinct to meet customer demand in response to Airport and Port growth.⁷⁷ Multi-level warehousing has emerged as a solution to a shortage of industrial sites and high land values. However, as demonstrated in the case of GLP above, they are often unpopular with residents due to noise/traffic concerns. Despite this, multi-level warehousing may help to reduce the cost of rent in valuable inner-city locations such as around Sydney Airport and Port Botany, encouraging third-party logistics providers and eCommerce retailers to consider locating there.

Global logistics platform: ShipBob

ShipBob, an eCommerce fulfilment solution provider for online brands, opened its first fulfilment centre in Melbourne on July 7, 2021, close to the Tullamarine Airport. The location near the Airport is strategically significant as it offers ShipBob's customers, primarily based in the US, easy access to the East coast where c. 80% of Australia's population lives. Proximity to customers enables ShipBob to provide 1-3 day fulfilment options.

⁷⁷ Goodman Australia – Kingsford Smith Distribution Centre



Inside Woolworth's 'dark-store', opened exclusively to facilitate fulfilment of online orders.
Image courtesy: 7News

Emergence of new modes of transport

Freight supply chain operators continuously seek to improve the efficiency of their operations and drive down costs by leveraging incremental improvements in technology such as fuel-efficient vehicles, GPS tracking, optimised routing, and higher mass vehicles.

The coming decades are likely to see significant disruption in transport technology from increasing levels of automation, pressure to de-carbonise, and the introduction of new modes of transport, including robot and drone delivery.

The maturity of these individual technologies varies significantly, and the timing of their widespread adoption remains uncertain. However, these technologies will have a material impact on Sydney's IMEX supply chains over the coming decades, with consequential effects on IZL use.

New technologies likely to have the most significant impact on supply chains include autonomous trucks, shorter-distance robot delivery vehicles and drone delivery.

Autonomous Vehicles: Trucks

Current state

Autonomous trucks are already widespread in some less publicly accessible environments, including mine sites and some port precincts. Australia is the market leader in deploying autonomous trucks on mine sites, and their use grew 61% in 2021. Today, 561 automated

trucks (73% of the global fleet) operate in Australian mines. These trucks deliver improved productivity, reduce accidents and operating costs, increase machine and tyre life and lower fuel consumption.⁷⁸

Trend

Autonomous technology is expected to be deployed in phases on public highways and roads, led initially by semi-autonomous technology (Level 1 to 3) followed by full automation (Level 4 and 5).⁷⁹ The five levels of automation for trucking are described in Figure 16.

While the initial deployment of autonomous trucks is expected on line-haul highway trips, the use of the technology is likely to expand over time to include a wide range of vehicles and roads. It is estimated that automated trucks will have 70% fewer collisions,⁸⁰ reduce transport costs by 29-45%,⁸¹ and increase truck utilisation from current levels of 29% to 78%.⁸²

Impact on industrial zoned land

The anticipated reduction in line-haul transport costs would potentially allow large warehouses to move even further away from dense urban areas to access cheaper land. However, some goods may require an additional trip from the west to the population centres in the east potentially negating the benefits of reduced transport costs. Furthermore, since most major freight warehouses are already in Western Sydney, this is unlikely to impact IZL in the port precinct directly.

⁷⁸ GlobalData Mining Intelligence Centre, May 2021

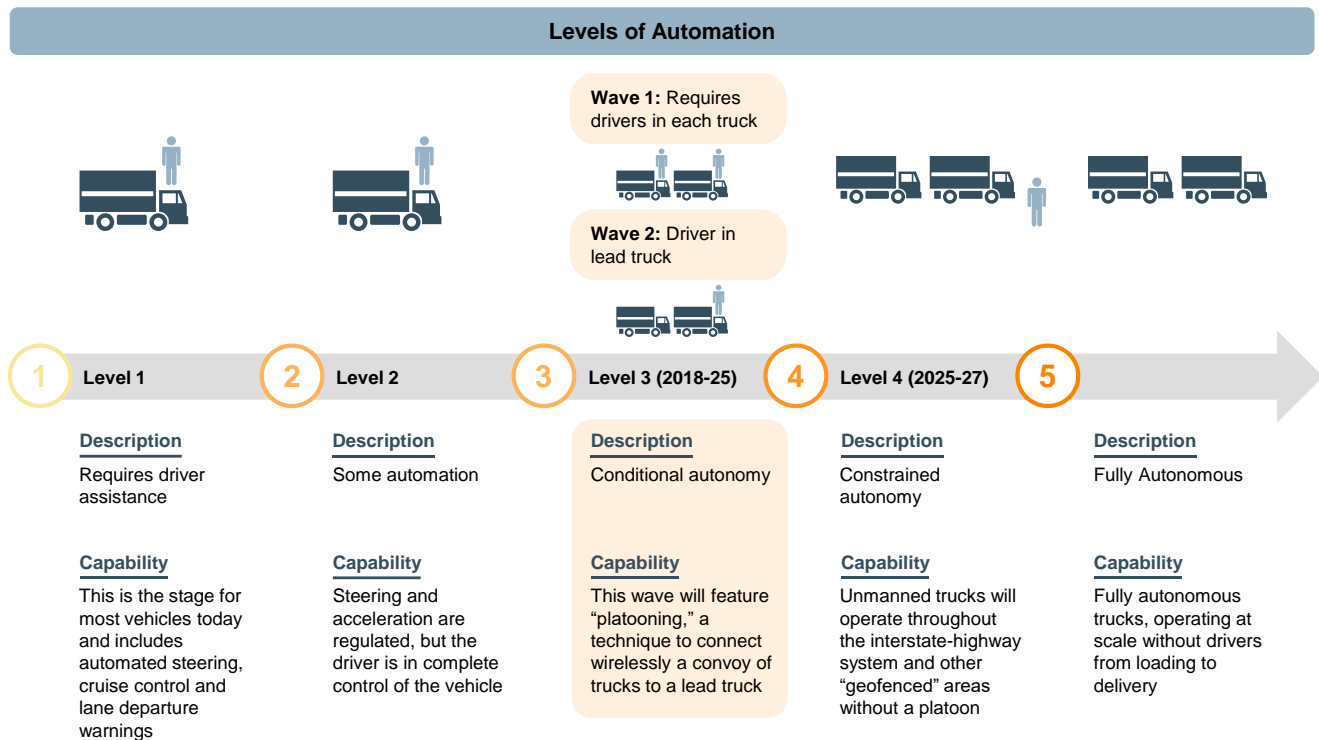
⁷⁹ Verified Market Research, Global Autonomous Truck Market, July 2021

⁸⁰ Daimler AG

⁸¹ Transport Research Board

⁸² Strategy&

Figure 16: Levels of automation ⁸³



Autonomous Vehicles: Robot Delivery

Current state

Autonomous robots for last-mile delivery are well advanced, and extensive trials have already been undertaken, including by Australia Post in Brisbane.⁸⁴ This market is expected to grow strongly over the next decade as consumer expectations for faster delivery increase, robot technology improves, and logistics operators seek to drive down last mile delivery costs.⁸⁵ Last-mile delivery is estimated to account for 41-53% of overall delivery costs.⁸⁶

Starship Technologies, a leader in last-mile robots, has now performed 1.5m autonomous deliveries and has

services operating in multiple geographies in the U.S. and Europe.⁸⁷

Figure 17: Australia Post's parcel delivery robot trialled in 2017



⁸³ World Economic Forum; Transport Drive; L.E.K. Analysis

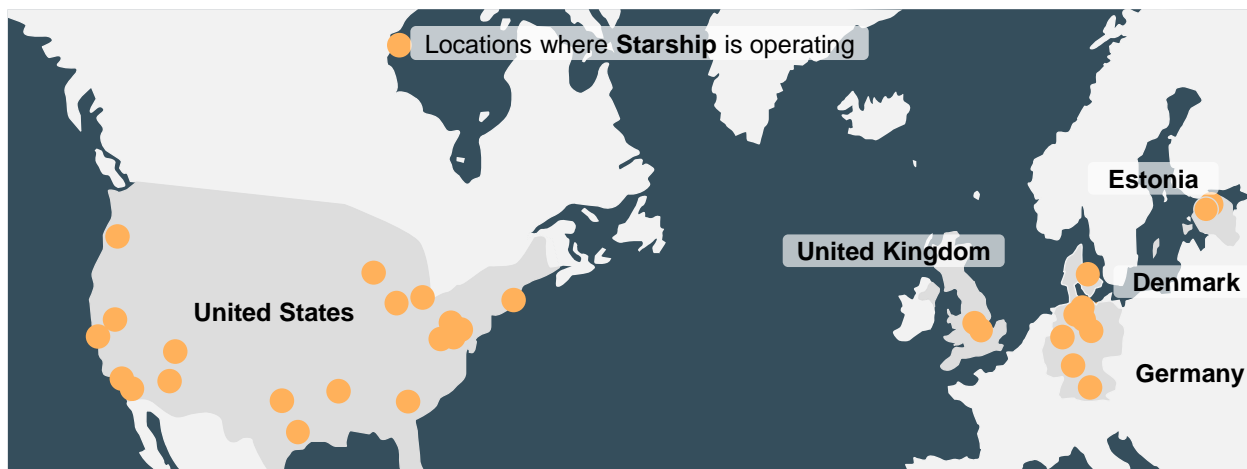
⁸⁴ AusPost Annual Report, 2018, Pg. 49

⁸⁵ Inkwood Research, Global Autonomous Vehicle Delivery Market Forecast, 2021

⁸⁶ Mordor Intelligence and Capgemini Research Institute

⁸⁷ Medium.com, Starship Technologies – one million autonomous deliveries milestone

Figure 18: Starship Technologies operating areas ⁸⁸



Trend

The market for ground-based autonomous delivery robots was valued at US\$4.56 billion in 2021 and is estimated to reach US\$34.9 billion by 2030.⁸⁹

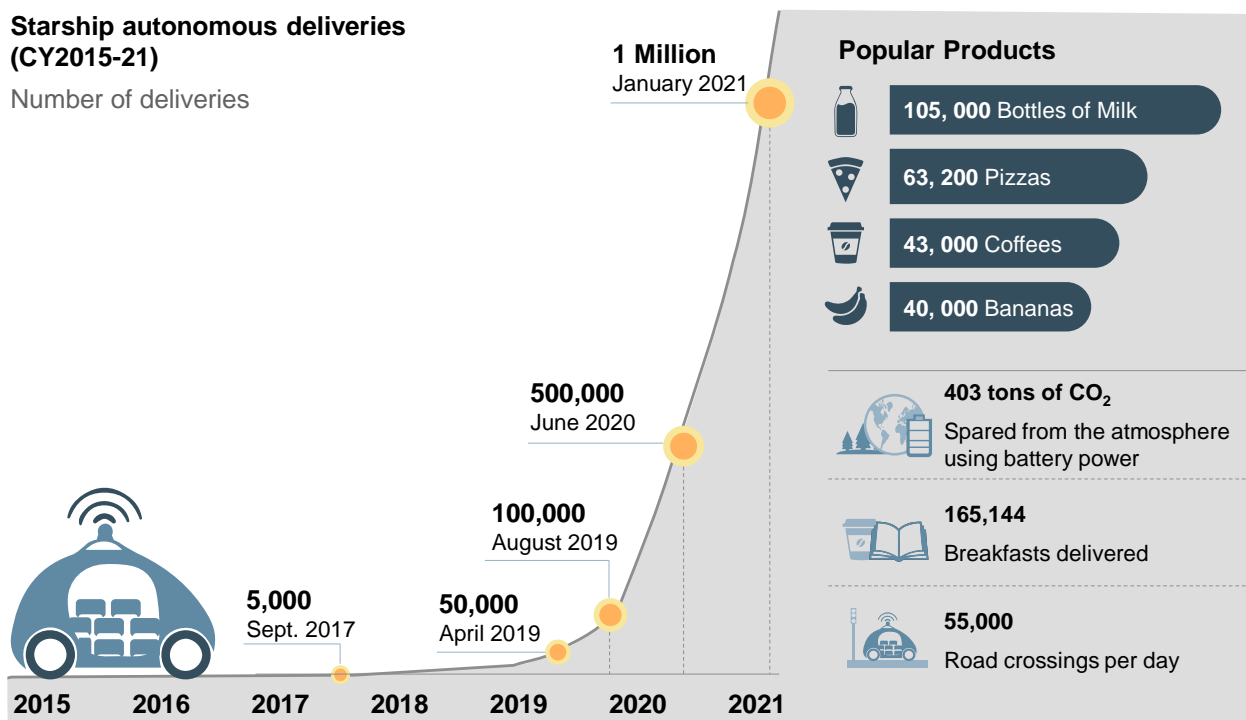
Impact on industrial zoned land

Adopting robot technologies for last-mile delivery will create further demand for Micro Fulfilment Centres (MFCs) close to dense urban population centres to provide a suitable local environment for robot terrain navigation.

⁸⁸ Starship Technologies website

⁸⁹ Allied Market Research, 2021

Figure 19: Starship deliveries worldwide ⁹⁰



Autonomous Vehicles: Drone Delivery

Current state

The use of Unmanned Aerial Vehicles (UAVs) or drones is growing across military, commercial, and industrial applications. In commercial settings, drones are already widely used in applications like construction, agriculture, and real estate. Drone delivery of small parcels is slowly gaining momentum around the world. For small packages, drones can offer faster, cheaper, and lower emissions than delivery by cars or vans and could help reduce road-based congestion.⁹¹

Depending on the operation, small drones can carry between 1-12kg with an operating range of 1-25km.

In Australia, Google Wing is already operating drone delivery for small parcels in the Northern suburbs of Canberra and Logan, Brisbane.⁹² Wing's deliveries in Logan grew fivefold between 2020 and 2021, with 18,000 deliveries made between Jan-May 2021.⁹³

Trend

The global drone package delivery market is expected to grow from US\$528 million in 2020 to US\$39 billion in 2030,⁹⁴ and there are at least nine commercial drone operators in various stages of trial, pilot, and initial rollout, including Google Wing, Amazon Prime Air, UPS, DHL, and Boeing. Electric drones are part of Amazon's plan to make all shipments net zero carbon, a goal it intends to have 50% complete by 2030.⁹⁵

While there are many uncertainties about regulation, community acceptance and commercial application, as customers seek faster delivery times, the momentum is building for some level of drone delivery to support last-mile logistics.

⁹⁰ Starship Technologies website

⁹¹ The potential benefit of delivery drones in the ACT, Alpha Beta, Nov 2018

⁹² wing.com

⁹³ Brisbane Times, 26th May 2021

⁹⁴ Markets and markets, Drone Package Delivery Market, April 2021

⁹⁵ Logiwa.com, Drone deliveries in logistics, June 2021

Impact on industrial zoned land

This trend will lead to changes in warehouse configuration on the ground, with the need to incorporate charging points, roof hatches or sky lights or create more space outside for drone landing pads.⁹⁶ Small drone delivery facilities can be relatively compact, but operating at scale, such facilities would need a larger footprint to ensure safe take-off and landing for multiple drones. The relatively limited

operating range of drones means that drone bases will need to be near major population centres, further increasing the appeal of MFCs. Drone bases need to be strategically located to avoid interfering with airport operations, and therefore, some parcels of land around Sydney Airport might be unsuitable for such use.

"They're (drones) on their way now and the level of discussion among supply chain players has risen ... With more trials underway, the coming months will give us more clarity as to how big a delivery role drones can actually play in future logistics networks..."

- Ashley Smart, Director, EMEA Logistics Development, JLL (June 2021)

Figure 20: Parcel moving drone



Movement of goods from Port Botany and Sydney Airport

Current state

PBSA requires efficient ground transport infrastructure to facilitate efficient operations. In addition to traffic related to PBSA itself, there is considerable movement through the precinct due to nearby residential intensification and its geographic location on major roads to the north, south and west of Sydney.

Approximately 23,000 vehicles per day enter and exit the Port Botany Precinct. Most of these vehicles arrive from the west (turning right from General Holmes Drive into Foreshore Drive) and depart towards the west. The movement of freight dominates traffic in the

precinct. Indeed, commercial vehicles account for c.39%⁹⁷ of the traffic on Foreshore Drive compared to an average of c.6% across all Greater Sydney roads.⁹⁸

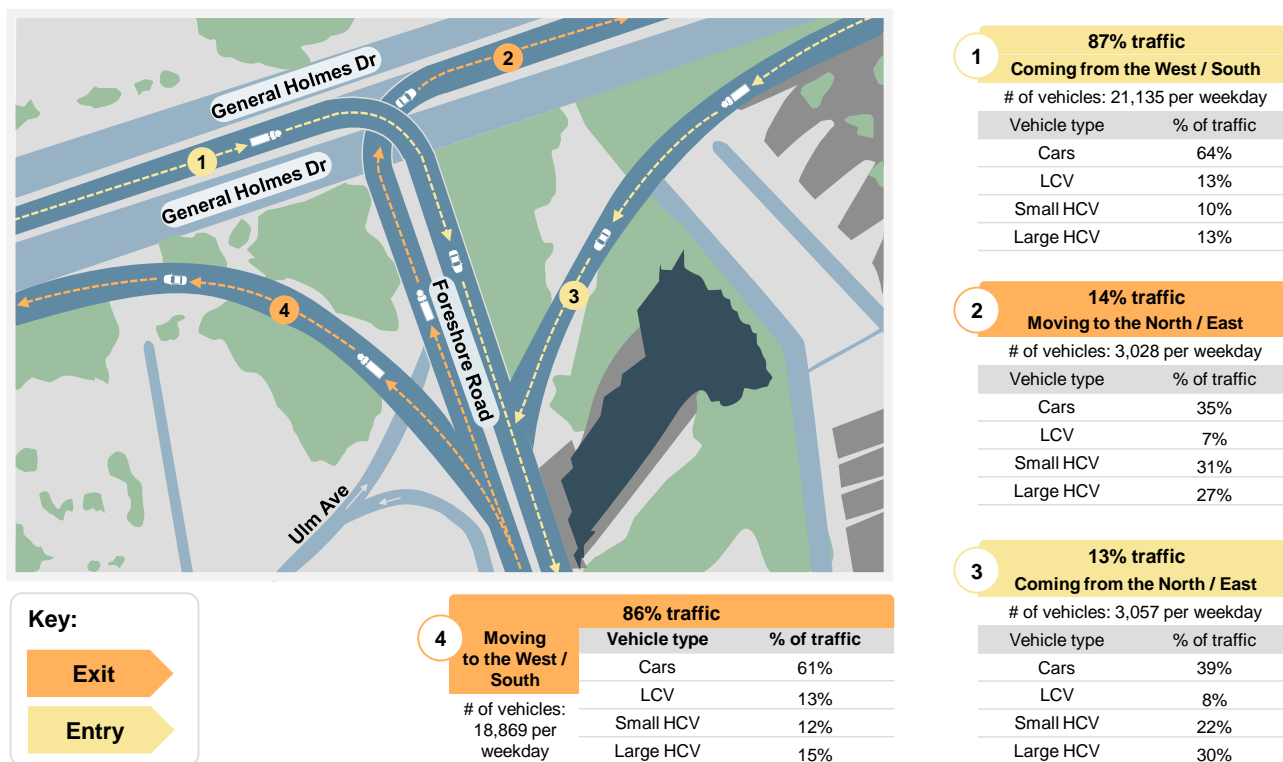
As demonstrated in Figure 21, a considerable volume of non-freight vehicles enter and exit Foreshore Road from General Holmes drive, impacting the movement and access of large commercial vehicles to and from Port Botany. This situation is exacerbated during peak hours (refer to Figure 22), driven by urban encroachment in areas around the Port, resulting in travel delays for commercial freight vehicles and impacting the supply chain timelines.

⁹⁶ JLL, The Drones are Coming but can they deliver? June 2021

⁹⁷ Port Botany Freight Study – NSW Ports and Aurecon (2017)

⁹⁸ Traffic volume viewer – Transport for NSW (2021)

Figure 21: Daily vehicle movements at General Holmes Drive / Foreshore Rd ⁹⁹



Sydney Airport is one of the primary generators of traffic in the Greater Sydney Area. In 2019, more than 44 million airline passengers travelled through the airport¹⁰⁰. With the 33,000 people who work on the airport site and multiple airport visitors, c. 150,000 people travel daily to or from Sydney Airport. The three key Airport routes (General Holmes Drive, O'Riordan Street and Marsh Street) carry c. 148,000 car trips per day.¹⁰¹ These same routes are used to move 547,000 tonnes of freight per day on commercial vehicles.

Trends

NSW is five years into a period where general freight volume is forecast to grow by c. 28%, increasing from 482m tonnes in 2016 to 618m tonnes in 2036.¹⁰² Freight through PBSA is also expected to increase by c.2.1% p.a. (2017-2039) for Sydney Airport and by c.3.6% p.a. for Port Botany (2016-2036). This growth will place a significant demand on IMEX land transport and associated infrastructure.¹⁰³

Increased congestion along these key freight routes will have a corresponding effect on the length of freight delivery times. With average vehicle speeds on the Airport route previously falling to just 46km/hr

⁹⁹ Port Botany Freight Study – NSW Ports and Aurecon (2017)

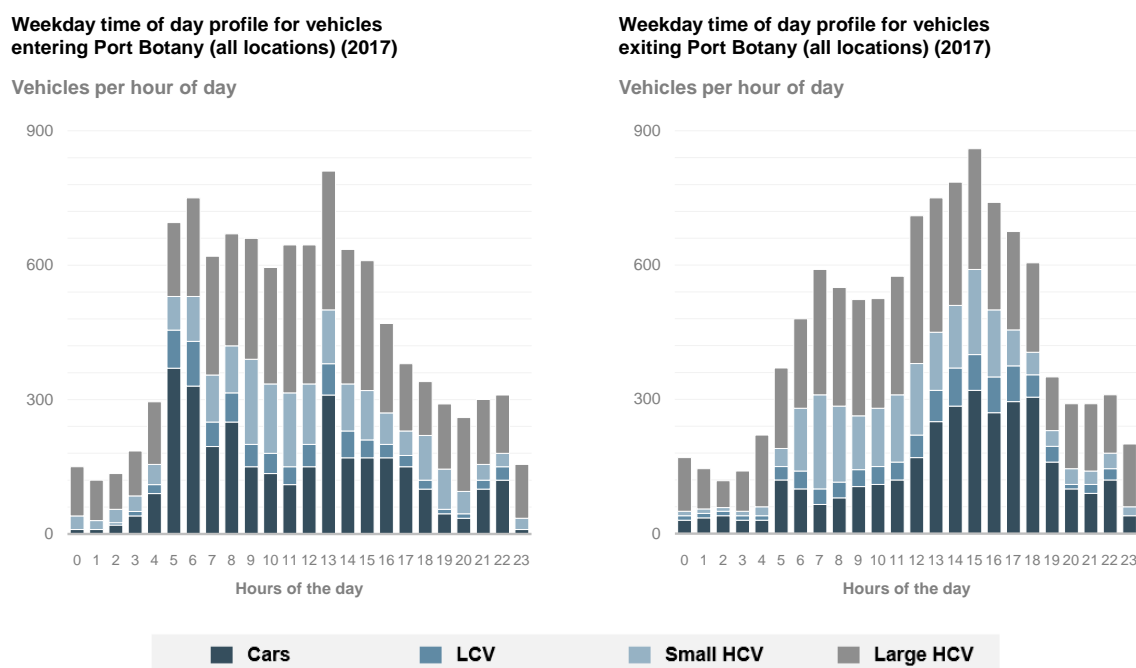
¹⁰⁰ Sydney Airport, Facts and figures (accessed 2021)

¹⁰¹ Traffic volume viewer – Transport for NSW (2021)

¹⁰² Transport for NSW, Planning for the long haul: A smarter freight sector to deliver more for NSW (September 2018)

¹⁰³ c.80% of Greater Sydney freight task is undertaken by road; NSW Freight and Ports Plan 2018-23

Figure 22: Movement of vehicles through the Port Botany precinct by the time of day and vehicle type ¹⁰⁴



before noon and 51km/hr in peaks, respectively,¹⁰⁵ increasing road congestion is likely to increase travel times for passengers and freight, driving increasing economic inefficiency.

Time is, indeed, money in the field of freight and logistics, and the effect of increased traffic across Sydney is estimated to cost an additional AU\$6.1 billion per year.¹⁰⁶ Unsurprisingly, due to the central role PBSA plays in freight movement, congestion across the proximate route network will account for a large proportion of this figure.

Over the last five years, significant work has been undertaken to relieve congestion around the PBSA precinct and the south-western corridor. These investments are focused on reducing road congestion and increasing rail mode share to improve overall supply chain efficiency.

The NSW Government and Sydney Airport invested around AU\$500m in 2016 to significantly upgrade on and off-airport roads to help alleviate congestion

around PBSA, constructing new and wider roads. Road widening on the WestConnex Motorway and the Sydney Gateway project also represent significant investments by the Australian and NSW Governments in upgrading road access to the PBSA precinct. WestConnex (in conjunction with other projects) has doubled the capacity of the M5 East corridor with the construction of the new M8 tunnel and addition of extra lanes to the M5 East, helping to reduce congestion in the PBSA area.

The Sydney Gateway project is being undertaken to ease congestion and facilitate more efficient freight movement around PBSA. It will also add additional network capacity of up to c.60,000 vehicle trips per day by 2036, equivalent to the current daily traffic volume on Marsh Street (one of the key routes to and from the Airport) and enable c.10,000 heavy vehicles to shift from their current route through the heavily residential area of Mascot. This shift in heavy vehicle traffic will also reduce traffic along the Port Botany–Cooks River route by c.25-30% by 2036,¹⁰⁷ enabling the city to avoid additional congestion and reduce travel time to

¹⁰⁴ Port Botany Freight Study – NSW Ports and Aurecon (2017)

¹⁰⁵ Australian Automobile Association, AAA Congestion Report 2018 (October 2018)

¹⁰⁶ Transport for NSW, Sydney Airport Project Update (December 2016)

¹⁰⁷ Transport for NSW, Sydney Gateway Road Project (May 2020)

the Sydney Airport by c.22 minutes from Campbelltown or Bankstown via the new M5.¹⁰⁸

With an ambition to move c.40%¹⁰⁹ of future container volumes by rail, NSW Ports and Patrick are investing in expanding existing railway infrastructure to grow capacity in and out of the Port, lower freight costs, and keep exports competitive. Patrick Terminals will receive the first stage of such investment, which is expected to double the existing Port Botany rail capacity to 1.5 million TEU, reduce turnaround time by c.33% and increase rail loading/unloading windows. In addition, NSW Ports is investing AU\$250 million to develop the Enfield Intermodal Logistics Centre, which will house an intermodal terminal and logistics warehouses connected to the Port exclusively through freight rail. The intermodal terminal is fully operational, and warehouses are in the construction phase.

The Commonwealth is funding a AU\$400 million project by the Australian Rail Track Corporation to duplicate the 2.9 km Port Botany rail freight line and construct a new passing loop at Cabramatta. This project will further support the growth in rail freight to

and from Port Botany, improve the rail network's resilience and enhance the capacity to and from the Moorebank Intermodal Terminal in Western Sydney, which is being developed by QUBE.

Impact on industrial zoned land

Rail and road infrastructure projects may provide short-term relief from the pressure of population growth and density around PBSA. However, such relief is likely to be temporary as traffic volumes associated with private vehicle movements are expected to continue to place pressure on the road network to and from the PBSA precinct. Further reduction of the IZL around PBSA would also contribute to pressure on road infrastructure by pushing businesses further west and adding freight volume currently contained within the PBSA precinct to the broader road network. Together these forces will lead to further expansion of the road infrastructure and the need for expanded public transport services.

¹⁰⁸ Transport for NSW, Sydney Gateway Road Project – Traffic document (November 2019)

¹⁰⁹ Infrastructuremagazine.com.au – Port Botany on track to support NSW (August 2020)

Larger container ships

Current state

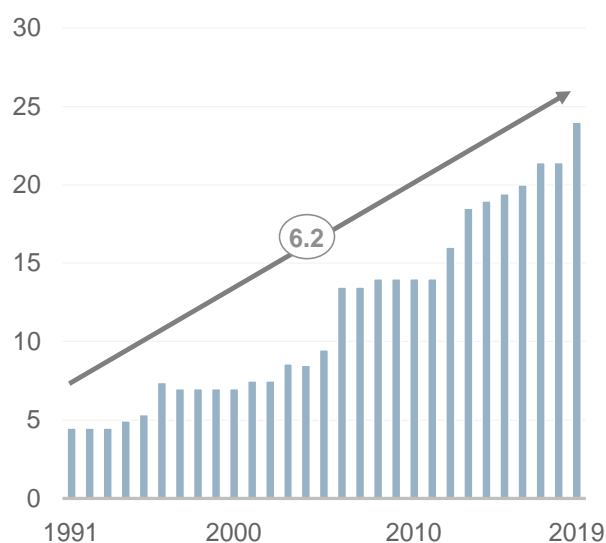
In 2018, the capacity of the largest container ship entering Port Botany was c.8,800 TEU. Two years later, Port Botany has moored several ships with a capacity exceeding 10,000 TEU.¹¹⁰

The growth in container ship capacity reflects a global trend in the container shipping industry. Globally, average container ship sizes from 2016-19 increased from 3,828 TEU to 4,655 TEU.¹¹¹ Additionally, the largest containership size has evolved from 5,500 TEU in 1995 to more than 23,000 TEU in 2019.¹¹²

Figure 23: Size of the largest containership ¹¹³

Size of largest container ship
(CY1991-19)

Thousands of TEUs



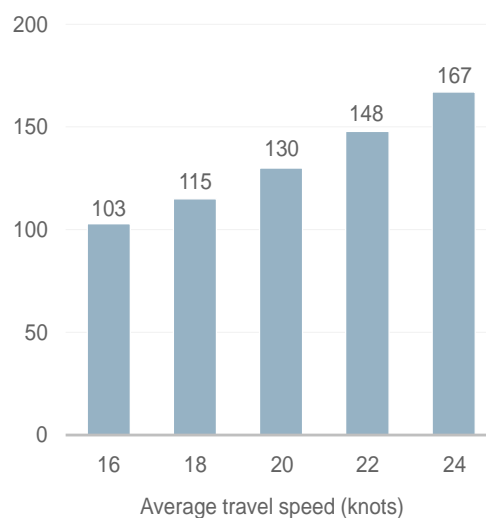
The economic benefits of scale are the main driving force behind this trend. Larger ships can carry more profit-generating freight to offset only marginally higher overall costs. A study from the International Transport Forum has found that capital costs, operational costs (e.g., cost of the crew), and propulsion costs (e.g., fuel) decreased on a per TEU basis with larger ships.

Based on this study, the savings of using a 15,000 TEU vessel instead of an 8,000 TEU vessel could range from c.AU\$100 to c.AU\$170 per TEU, depending on the average travel speed of the vessel.¹¹⁴

Figure 24: Estimated total cost savings per TEU (operation, capital, and propulsion consumption) ¹¹⁵

Cost savings when moving from 8.5k TEU to 15k TEU ships, by average travel speed

AU\$ per TEU



¹¹⁰ NSW Ports

¹¹¹ Statista, L.E.K. Analysis

¹¹² Ge, J., Zhu, M., Sha, M. et al. Towards 25,000 TEU vessels, Marit Econ Logist (2019)

¹¹³ OECD – International Transport Forum (2015)

¹¹⁴ International Transport Forum, The Impact of Mega Ships (2015)

¹¹⁵ Ibid

Trend

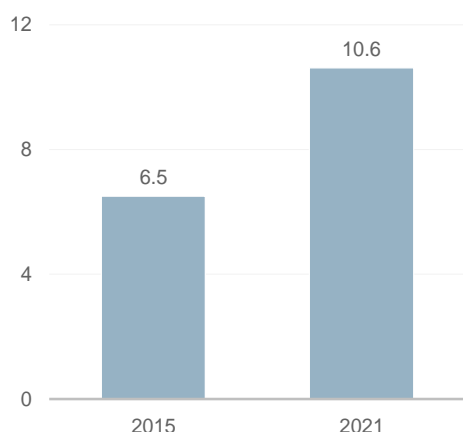
Forecasts suggest the trend in ship size growth will continue well into the future. A study from the OECD estimates that container ships with a capacity of 10,000 TEU or more will make up c.18% of the global fleet by 2025, increasing almost 50% over the share of the fleet they have today.

Indeed, Port Botany's 2015 master plan recognises this likelihood and forecasts that the largest ship size mooring in Sydney will grow. As discussed above, when container demands increase to appropriate levels, there is an opportunity for larger, more energy-efficient ships carrying more than 14,000 TEU to serve Australian ports. This has the potential to create cost reductions and efficiency improvements.

Figure 25: Port Botany largest mooring ship size ¹¹⁶

Port Botany's capacity of largest container ship moored (2015-21)

Thousands of TEUs



Impact on industrial zoned land

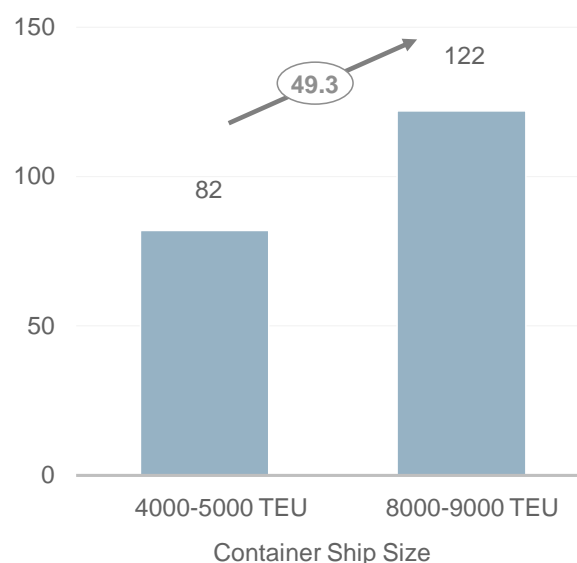
Larger ships are not directly linked to the increase in the overall volume of goods flowing through the Port (1,000 TEU arriving on three vessels is equivalent to 3,000 TEU arriving on one vessel). Instead, larger ships will put pressure on Port Botany's throughput capability, a critical driver of cost-efficient port operations. Compared to ships moored at Port Botany, container ships with 8,000-9,000 TEU capacity on average unloaded c.49% more TEU per hour than ships

with a capacity between 4,000-5,000 TEU,¹¹⁷ putting pressure on the rest of the operation to handle the higher volume.

Figure 26: Implied TEU throughput per hour at Port Botany ¹¹⁸

Implied TEU throughput per hour at Port Botany (FY2020-21)

TEU per hour



Ports have only a small number of options to accommodate the momentary spikes of demand associated with larger ships. The two main approaches are:

1. Increase container storage areas (i.e., Staging areas, ECPs) to accommodate the increased volume of larger ships while the rest of the supply chain operates at current throughput rates; or
2. Increase Port throughput by investing in more efficient equipment (e.g., automated gantry cranes, more efficient truck movements, increased train capacity, etc...), increased customs clearance capacity, and optimising integrated supply chain operations (creating

¹¹⁶ NSW Ports

¹¹⁷ NSW Ports

¹¹⁸ NSW Ports – Container Ship Mooring Log (FY 2021)

an ecosystem of connected, collaborative data partners, whereby information gets collected and analysed utilised in real-time).

Option 1 is inefficient and requires typically expensive space for storage. Option 2 requires less space but is capital intensive and may involve a more extended period before it delivers a return on investment. Therefore, it is likely that a combination of both options will be observed in Port Botany, whereby targeted investments and supply chain optimisation are made where financially sensible, but some increase of storage will be required to keep capital cost at reasonable levels.

As a result, demand for IZL around Port Botany is expected to increase to accommodate the spikes in the volume of trucks in and out of the port (e.g., larger Truck Marshalling Area). Furthermore, part of the port's internal empty container storage might be pushed out to the nearby IZL in order to free up space in the port area to accommodate momentary peaks in container throughput associated with the larger ships.

Finally, the impact of larger ships will extend beyond the port's operations, as warehouses and logistics operations in general will also require more on-site space (e.g., staging area, truck marshalling area) to accommodate the larger volumes of containers arriving / departing at a single time, further increasing the demand for IZL.

Growing concern with supply chain resilience

Current state

The Commonwealth is actively examining products and sectors prone to global supply chain disruptions from external shocks like COVID-19 as part of its Supply Chain Resilience Initiative (SCRI). Biopharma, MedTech, Agribusiness, Packaged Food, Energy, Public Safety, and Emergency Services are among the categories undergoing review. As part of this effort, risk mitigation measures are being identified for categories critical to maintaining the health, safety, and wellbeing of the community during crises.

Trend

The Commonwealth's work in this area is not finished, and there is no public record of specific recommendations being adopted in response to the SCRI. However, it is reasonable to conclude that any assessment of actionable risk mitigation steps will consider cost, ease of implementation, time to execute and scale of potential improvement to supply chain resilience. Two interventions are likely to be suggested going forward:

1. Improve domestic manufacturing capability in critical supply chain areas:

Developing Australia-based manufacturing would significantly boost the resilience of the supply chain and reduce dependency on imports. In addition to developing full manufacturing capability, capacity could be improved by importing raw materials, components or intermediary products and manufacturing final products domestically.

2. Create a 'National Stockpile' of critical goods likely to be affected by supply chain disruption:

In addition, the Australian Government may choose to establish a National Stockpile serving as a strategic reserve of critical products which could be drawn upon in national emergencies. In doing so, the Government would purchase and stockpile specific goods to ensure it is more self-sufficient during a supply chain disruption and meet need-based demand.

Impact on industrial zoned land

Either of the two interventions suggested above is likely to increase volume flowing through PBSA and place greater demand on the need for IZL.

Suppose the Commonwealth chooses to support the growth of domestic manufacturing capability. In that case, raw materials and subcomponents will likely continue to be imported, especially for intermediate products such as chemicals, where Australian environmental laws may restrict cost-effective manufacturing. Therefore, Imports through Port Botany, whether they are containerised or bulk chemicals, are likely to increase to support the government's supply chain resilience initiative.

To create National Stockpiles, there will be a particular need for secure industrial space proximate to both population centres, the point of importation, and logistics networks. Such a space must enable fast and efficient distribution of stockpiled goods to where they are needed in a critical situation. In this regard, PBSA is ideal.

PBSA facilities are likely to play a significant role in importing goods for a National Stockpile as Commonwealth assets (e.g., Customs; Border Patrol; Federal Police) are located at both the Port and the Airport, and enhanced security is already common practice. Moreover, as discussed in prior sections, the GSA is home to a significant percentage of Australia's population. The PBSA itself would be critical in distribution of goods, and the surrounding road and rail infrastructure is already robust. National and Regional distribution from areas proximate to the PBSA would be ideally suited for rapid response.



THE RISK OF URBAN ENCROACHMENT

- The supply of land around PBSA is fixed and very limited, but demand continues to grow
- Rezoning will have repercussions for NSW's supply-chain efficiency and the economy, and may lead to additional operational constraints for PBSA
- Upon rezoning, reverting this land may not be feasible

5. THE RISK OF URBAN ENCROACHMENT

The supply of land around PBSA is fixed and very limited, but demand continues to grow

With only c.11% of Sydney's industrial floor space within 15km or 30 minutes of the Sydney CBD,¹¹⁹ the supply of IZL in Sydney's inner-South (including PBSA) is very tight. There is only c.8.6 hectares of undeveloped IZL in the entire Southern Sydney region and none of this is in the inner-South precinct which stretches from Alexandria to Botany and Banksmeadow.¹²⁰ Accordingly, Colliers estimated there to be fewer than three years of IZL supply left in the region due to a combination of land shortages and an anticipated 48% increase in demand.¹²¹

Notwithstanding the supply shortage, the demand for the PBSA IZL is showing no signs of slowing down. Sitting within the Eastern City District, which currently generates c.45% of economic activity in the GSA, the demand for land around PBSA will continue to increase fuelled by strong population growth and the associated increase in IMEX volumes.

As extensively covered in the previous chapter, the demand for land around PBSA will be further exacerbated by several trends currently observed across Sydney's supply chains:

- Pressure for quick, low-cost deliveries will create demand for MFCs
- New modes of transport will further grow the demand for MFCs and may require additional space for new technology such as robots and drones
- Growing fresh produce exports will increase demand for cold storage around Sydney Airport
- The growing volume of empty containers will increase demand for ECPs
- The continued increase in the size of ships mooring in Port Botany will require

additional space to accommodate the spikes in container throughput

- The Commonwealth's focus on Supply Chain Resilience Initiative (SCRI) could lead to an increase in imports of intermediate goods and space required to accommodate additional stocks of goods of national importance

Given the shortage of IZL around PBSA, it will already be challenging to accommodate future freight growth. Rezoning the already scarce supply of land may result in costly consequences to all of Sydney's IMEX stakeholders and the community more generally.

Rezoning will have repercussions for NSW's supply-chain efficiency and the economy

Rezoning the IZL around PBSA would make the existing supply gap worse. The lack of available land would push more businesses towards the west, only to send a large portion of their products back to the PBSA precinct, where 45% of the region's activity lies, increasing total cost and lead time of supply chains. This would also make traffic congestion worse, prompting further road investment by the Government. A 2018 study from BIS Oxford Economics estimated that a one-hour delay in average freight time for the goods going through Port Botany results in an equivalent impact of c.\$100 million to NSW economy per annum.¹²² This figure does not consider the loss of sales associated with not meeting customer's expectations for timely delivery, the increased congestion for passenger and freight vehicles, and increased carbon emissions.

Even if the lack of available land does not directly prevent businesses from operating around PBSA, the increase in already high land prices will make the area financially unviable. The effects, however, would be essentially the same – businesses would move west, establishing suboptimal supply chains.

¹¹⁹ Commercialrealestate.com.au, Prices surge on shortage of undeveloped industrial land in Sydney's inner south by Alison Cheung (April 2019)

¹²⁰ Ibid

¹²¹ Australian Financial Review, Take-up of industrial land to surge 48pc in Sydney (June 2021)

¹²² Bis Oxford Economics, The Economic Contribution of NSW Ports – Phase 2 (February 2018)

At a more granular level, issues could arise in specific supply chains. For example, the lack of IZL to support fresh produce exports could impact the freshness of the produce, timeliness of exports, and the competitive advantage of NSW fresh produce exports in the global market.

Additionally, inadequate IZL supply may bring forward the need to create container capacity into Port Kembla before Port Botany reaches its capacity, leading to suboptimal use of Port Botany and its assets and increasing overall IMEX supply chain costs.

Finally, the failure to retain IZL may result in loss of container volume to other States. For example, Melbourne has retained IZL around Melbourne Airport where modern logistics facilities were developed¹²³ to attract businesses into the state (e.g., ShipBob has chosen Melbourne Airport's IZL as the location for their single Australian distribution centre). Similarly, the Port of Brisbane has available supply of IZL in the Fisherman Island¹²⁴ area. If Port Botany becomes unable to efficiently utilise its infrastructure assets due to insufficient adjoining IZL supply, this may hinder NSW's future economic growth through a loss of business to other states.

Upon rezoning, reverting this land may not be feasible

Rezoning PBSA IZL requires a high degree of confidence that future lands needs are well understood and likely to remain unchanged. Such confidence is vital because once IZL is repurposed in favour of high density residential or commercial land, there is no practical way to revert the lost land.

Reverting residential or commercial land for industrial purposes has proven to be unviable, as residential, or commercial land prices far outstrip the price of IZL and therefore deter potential IZL developers from repurposing the land to industrial use.

Even if cost is not the main barrier, several additional complexities would, in combination, prevent the repurposing of land. For example, it is highly likely that

a subset of residents would oppose the property sale altogether. Such a scenario is evident near Los Angeles Airport (LAX), where land rezoned from residential to industrial in the 1970s remains with several residential "pockets" that experience greater noise impacts as the airport continues to grow.

Further urban encroachment may lead to additional operational constraints

As previously mentioned in the context section, the Productivity Commission stated in its 2021 White Paper that "Industrial zoned lands in and around these logistical hubs act as a buffer against land uses likely to conflict with heavy industrial and waterfront activities, especially residential."¹²⁵ This statement reinforces the role of IZL as a barrier between nearby communities and the intrinsic environmental impacts of port and airport operations, such as noise. When such barriers are not present, airports and ports often become subject to operational constraints, as observed in numerous international examples.

Urban encroachment also brings costly noise mitigation expenses, such as installing noise barriers and compensating the local community. For example, Governments and Aviation authorities have spent an estimated AU\$2.1 billion on sound mitigation initiatives at LAX to protect residents near the industrial precinct.

In conclusion, PBSA is a crucial driver of Sydney's economy. They are in a unique position due to their proximity to the Sydney CBD, key urban population centres, and to each other. To maintain the efficiency of Sydney's supply chains, the Greater Sydney Commission should protect the IZL assets in the Eastern Harbour City area. Maintaining the critical assets in the PBSA precinct would also reduce the risk of having to once again change zoning to allow industrial use when demand requires it. Having available IZL in the attractive PBSA precinct also makes NSW an attractive destination for global companies eyeing Australia to set up operations and generate value for the nation's economy.

¹²³ Interview with commercial real estate executive

¹²⁴ Parliament of NSW, Containerised trade trends and implications for Australia (January 2019)

¹²⁵ The NSW Productivity Commission White Paper (2021)



CASE STUDIES - AIRPORTS

6. CASE STUDIES

The PBSA precinct is unique in having a port and an airport in close proximity and with nearby infrastructure to support their operations – sharing the PBSA precinct and its resources to handle NSW's growing freight IMEX volumes. In the case studies explored in this report, none of the ports and the airports has such a high level of co-dependence on freight operations. We have attempted to demonstrate the good and bad practices in management of industrial land and the associated impacts on the port or airport's ability to grow and operate efficiently. Where relevant, we have also highlighted the broader effects of poorly managed IZL, such as costly litigation from the community.

6.1. Airports

Four major international airports were profiled.

Table 2: Airport comparator summary ¹²⁶

Key Comparator	Changi (SIN)	Los Angeles (LAX)	Miami (MIA)	Schiphol (AMS)	Sydney (SYD)
Population (2019, million) ¹²⁷	5.7 (Singapore)	3.9	2.7	0.8	5.7
Proximity to city centre (km)	17.0	13.5	2.5	9.0	6.5
Passengers (million)	68.3	42.9	45.9	71.7	41.4
Freight volume (million tonnes)	2.01	2.2	2.3	1.6	0.5
Area of airport land (km ²)	13.0	13.9	13.5	27.9	9.1
Infrastructure (runways terminals)	2 4	2 9	4 3	6 1	3 3

¹²⁶ L.E.K. analysis

¹²⁷ Greater Los Angeles – 18.7m and Greater Miami – 6.6m

Changi Airport, Singapore

Figure 27: Aerial photograph of Changi Airport ¹²⁸



Singapore's population (c.5.7m) is similar to that of the greater Sydney region (5.3m) and is growing at c.1.1% per annum.¹²⁹ However, the greater Sydney region covers almost 17 times more land than Singapore (c.12,400 km² compared to 730km²).¹³⁰ A severe shortage of land has led to significant land reclamation over the last 50 years,¹³¹ with Changi Airport, located primarily on reclaimed land at the Eastern point of the main island.

Owned and operated by an independent entity of the Singapore Aviation Authority,¹³² the Airport is located 17km from the city's urban centre and is internationally recognised for its high operational efficiency and service levels. There is both residential and IZL on the Airport's Western side, while the East is earmarked for the construction of "Terminal 5" to support future passenger growth, also on reclaimed land.

Singapore manages its land zoning via the 'Concept Plan' and the 'Master Plan', both long-term plans to ensure the country has sufficient land to support the economy while ensuring residents continue to enjoy a high-quality living environment. The 'Concept Plan' takes a long-term view of land management, which is considered essential to remove 'noise' created by the more immediate demands of businesses and residents. The 'Master Plan' is formulated from the 'Concept Plan' and guides the permitted land use and density for developments in Singapore over the next ten years. Significant public consultation is conducted during the process to address concerns from stakeholders and the broader public.¹³³

Around 17km² of the land within a 5km radius of the Airport is zoned for light industrial operations, forming a buffer of sorts between the Airport and the closest communities, resulting in fewer noise complaints

¹²⁸ Unsplash (accessed 2021)

¹²⁹ World Bank, World Development Indicators (2019)

¹³⁰ Australian Bureau of Statistics, Sydney inner city region data (2006)

¹³¹ The Economist, Such quantities of sand (2015)

¹³² Changi Airport Group (2021)

¹³³ Singapore Government, Urban Planning Frameworks in Singapore (2016)

registered per annum relative to other international airports. Due to the limited availability of land in Singapore, the 'Concept Plan' highlights the importance of preserving the airport's IZL to ensure Singapore's continued economic success. In addition to protecting the existing land, Singapore plans to increase IZL around the Airport by 310km² and port/airport land by 220km² by 2030 through reclamation of land to support the growing

population.¹³⁴ Despite being strongly impacted by land shortages, because of Singapore's cohesive, long-term outlook on land zoning and management, the Airport will continue to support over 68 million passengers and 2 million tonnes of cargo a year. Recent reports have shown the strong economic contribution of the Airport to the nation, contributing AU\$48 billion to Singapore's GDP (12%) while generating c.375,000 direct or indirect jobs.¹³⁵

"...Through national-level land use planning, we safeguard land for Singapore's long-term aviation needs...to future-proof Changi Airport and ensure that it is correctly sized for Singapore's needs"

- Civil Aviation Authority Singapore, 2017¹³⁶

Key Findings:

- With a similar population size to Sydney and significantly less land space available, Singapore has been forced to reclaim land to support Airport and associated freight handling facility growth
- Singapore has strong policies and planning procedures in place to preserve substantial amounts of existing industrial zoned land surrounding the Airport, with plans to increase available land to continue to support the Airport's contribution to the local economy

¹³⁴ Singapore Ministry of National Development, Land Use Plan (2013)

¹³⁵ International Air Transport Association, The Importance of Air Transport to Singapore (2017)

¹³⁶ Civil Aviation Authority Singapore, Airport Development & Planning (2021)

Amsterdam Airport Schiphol, Netherlands

Figure 28: Aerial photograph of Schiphol Airport ¹³⁷



Schiphol is the third busiest airport in Europe and is considered a leader in the European aviation market. The Airport faces similar operational constraints to Sydney Airport due to the impact of aircraft-related noise on residents, with Schiphol recording over 12,000 complaints in 2019.¹³⁸ Restrictions aimed at minimising the effects of aircraft noise include a flight movement cap of 500,000 per annum and the restriction of operations to one runway between the hours of 11 pm and 6 am.¹³⁹

The Schiphol Area Development Company manages the development, distribution, and sale of land in Schiphol (SADC), owned in equal shares by the Schiphol Group, province of North-Holland, and the municipalities of Haarlemmermeer and Amsterdam. The 'Selective Location Policy', established by SADC in 1987, is a crucial driver of efficient industrial operations in the area. It permits developments in the

Schiphol region only where it has a direct or indirect relationship to businesses in the region and supports the desired business climate of the area.¹⁴⁰

Central to the policy is Schiphol Airport, which permits only airport-related businesses to operate on the surrounding IZL, whereby 19km² of the area within 5km is zoned as industrial. The policy maintains peak airport operations, minimises congestion and supports healthy business competition in the region. Local land management policies consider that industrial and commercial operations in the area must balance airport and local housing development, creating a good quality of life for residents.

As the Airport seeks to expand operations in response to growing volumes of passengers and freight, policymakers have considered the need to upgrade current infrastructure to support local businesses alongside strong public demand for ongoing noise

¹³⁷ Unsplash (accessed 2021)

¹³⁸ Bewonders Annsprekpunt Schiphol, Annual Figures (2019)

¹³⁹ European Commission, Schiphol Lelystad Distribution Rules Explanatory Memorandum (2017)

¹⁴⁰ Schiphol Area Development Company (2021)

management. Proposed solutions to meet demands include increasing the flight cap to 525,000, mitigated by newer aircraft models.¹⁴¹ However, these plans are not yet realised. Despite this, economic growth has been supported by strong IZL policies surrounding the

Airport. Schiphol remains a key driver of the Dutch economy, supporting c.64,000 jobs at the airport and c.164,000 jobs in the 400 transport and logistics companies located in the adjacent IZL.¹⁴²

Key Findings:

- Schiphol Airport faces similar operational restrictions to Sydney airport, including an approximately equivalent movement cap. However, strong IZL management plans around the Airport ensure that it is utilised to support the airports economic contribution to the region
- As a result, Schiphol Airport can contribute substantially to the local economy both directly through Airport related employment and indirectly through local freight and logistics businesses and employment

¹⁴¹ Airport Technology, Amsterdam Schiphol Airport: Finding the right way to grow (2019)

¹⁴² Amsterdam, The Logistics Industry in Amsterdam (2021)

Los Angeles International Airport, United States

Figure 29: Aerial photograph of Los Angeles International Airport ¹⁴³



Los Angeles International Airport (LAX) is owned and operated by Los Angeles World Airports (LAWA), a City of Los Angeles department. As the second largest and busiest Airport in the United States, it has a long history of noise complaints and traffic congestion. Therefore, it faces similar challenges to Sydney Airport, including urban encroachment (as close as 600m to the Airport) and operational constraints (e.g., flights arriving between midnight and 6:30am must approach over the ocean).¹⁴⁴

The initial opening of the LAX in 1928 saw the gradual depletion of agricultural lands surrounding the region be converted to urban developments. At present, within 5km of the Airport, 25km² of land is zoned as residential, whilst only 6km² (10%) is zoned for industrial operations. In recent decades, LAWA and the Federal Aviation Administration (FAA) have faced

several civil lawsuits, resulting in over AU\$2.1 billion spent on sound insulation for local residences and the imposition of flight restrictions.¹⁴⁵

The management of land use surrounding the Airport is coordinated by the Airport Land Use Commission (ALUC) to permit the orderly expansion of the Airport whilst reducing community exposure to excessive aircraft noise.¹⁴⁶ The ALUC prepares comprehensive land use plans which anticipate airport growth in the following 20 years. However, the implementation of these plans in 1970¹⁴⁷ was arguably too late as land surrounding LAX had already been claimed by highly dense urban development.

Poor local and federal zoning policies have further exacerbated the volume of noise complaints. In response to pressure for more IZL surrounding LAX,

¹⁴³ Unsplash (accessed 2021)

¹⁴⁴ Los Angeles World Airports (2021)

¹⁴⁵ LAX Sound Insulation Programs Status Update (2021)

¹⁴⁶ Los Angeles County Airport Land Use Commission (2021)

¹⁴⁷ State of California Department of Transportation, California Airport Land Use Planning Handbook (2011)

the rezoning of residential land bordering the Airport into industrial zoned land has left thousands of existing residents ineligible for soundproofing schemes. Residents describe the noise as enough to rattle windows and cease conversations with aircraft flying overhead every two to five minutes.¹⁴⁸

Current policies seek to locate airport activities that may affect residences as far away from adjacent residential neighbourhoods as possible; however, little can be done to support the existing residences bordering the Airport; therefore, noise complaints from residents remain an ongoing operational issue.

Due to the limited IZL surrounding the Airport, alongside the acceleration of e-commerce growth

following COVID-19, the area surrounding LAX has become one of the most expensive industrial regions in the United States in 2020.¹⁴⁹ Of the available IZL, 54% is occupied by third-party logistics operators and wholesalers; however, cities bordering LAX, such as Inglewood, are also looking to rezone IZL into residential zones to house over 3,000 new residents (proposed May 2021, pending approval).¹⁵⁰ Demand for IZL continues to increase, with vacancy rates as low as 1.7% across Los Angeles in Q2 2021.¹⁵¹ Ongoing land-use conflicts surrounding the Airport will impact the operational ability of the Airport. They could have been prevented by the earlier intervention of proper zoning policies and government initiatives to ensure that residents are protected without impacting airport operations.

Key findings:

- Insufficient IZL (10% within a 5km radius) has been maintained surrounding the Los Angeles airport, with substantial residential land in its immediate vicinity. Extensive noise complaints have impacted airport operations through costly lawsuits and operating constraints
- Significant demand for IZL has led to some rezoning of residential land; however, some residents have not moved away, creating ongoing challenges for port operations

¹⁴⁸ Los Angeles Times, Poor neighbourhoods ensure worst LAX noise but is left out of home soundproofing program (2019)

¹⁴⁹ CBRE Group, Air Cargo Submarkets Command Rent Premium (2021)

¹⁵⁰ City of Inglewood, Westchester/Veterans and Crenshaw/Imperial TOD Plans Environment Impact Report (2021)

¹⁵¹ Kidder Mathews, Market Trends Los Angeles Industrial (2Q 2021)

Miami International Airport, United States

Figure 30: Aerial photograph of Miami International Airport ¹⁵²



Owned and operated by the Miami-Dade County, Miami International Airport (MIA) is the travel hub for the South-East of the United States and is the nation's largest gateway to Latin America, responsible for handling over 75% of total imports and exports between the regions. Miami is somewhat like Sydney in terms of population with an urban density of c.1,000 persons per km² and similar volumes of passengers (see Four major international airports were **profiled**).

Table 2: Airport comparator summary)

In anticipation of handling 77 million passengers and 4 million tonnes of freight per annum by 2040, MIA has allocated AU\$6.7 billion for its growth.¹⁵³ However, the Airport is landlocked, and initiatives for expanding its operations are limited to the capital-intensive process of acquiring surrounding land. The most recent acquisition, completed in early 2021, was an office and warehouse building costing AU\$13.6 million.¹⁵⁴

The Miami-Dade County manages land zoning and policies through its 'Comprehensive Development Master Plan', which addresses how land will be developed or conserved in the next 10 to 20 years. An 'Urban Development Boundary' (UDB) is also in place to outline the division between permitted urban development and agricultural land within the county. The primary objectives of the master plan are to 'emphasise [the] concentration and intensification of development around centres of activity' within the UDB to conserve agricultural land.¹⁵⁵ At present, IZL comprises 1% of land use in Miami-Dade County, whilst conservation / recreational space (62%), undeveloped land (11%) and residential zones (9%) comprise the majority.¹⁵⁶ The disproportion of land use can be observed within 5km of MIA whereby 39km² of the land is zoned for residential use, with houses situated 400m from major runways, and only 18km² (28%) is zoned for industrial use.

High density living subjects more of the population to aircraft-related noise and pollution. Current land-use

¹⁵² Unsplash (accessed 2021)

¹⁵³ Miami International Airport, Fly Safe, Fly Smart, Traveller Information (2021)

¹⁵⁴ South Florida Business Journal, Miami-Dade County buys buildings near airport to expand cargo operations (2021)

¹⁵⁵ Miami Dade County, Land Use Element (2021)

¹⁵⁶ Miami Dade County, Responsible Land Use & Smart Transportation (2020)

policies permit the construction of residences within regions experiencing aircraft noise of up to 65dB (equivalent to a noisy restaurant); however, studies conducted by the Federal Aviation Administration (FAA) show approximately 60% of residents find such

levels of aircraft noise to be 'highly annoying' and are 'startled, frightened or awakened by aircraft noise',¹⁵⁷ which supports the growing body of evidence showing aircraft-related noise results in sleep disturbances and cardiovascular diseases.

Key findings:

- Poor local land planning policies have resulted in twice as much residential land surrounding the Miami airport than IZL. High density living in these locations has resulted in significant numbers of residents impacted by aviation noise
- Furthermore, the Airport is landlocked and unable to expand to support significant future growth without purchasing adjacent properties. This land brings airport industrial operations even closer to residential developments, creating more land use conflicts

¹⁵⁷ Federal Aviation Administration, Analysis of Neighbourhood Environmental Survey (2021)



CASE STUDIES - PORTS

6.2. Ports

Table 3. Port comparator summary ¹⁵⁸

Key Comparator	Antwerp	Los Angeles	Rotterdam	Vancouver	Botany
Population (2019, million)	1.2	10.0	1.0	2.6	5.3
Port land area (km ²)	112	30	60	15	2.8
Available IZL area within 5km of port boundary (km ²)	High (30+)	Medium (c.10-15)	High (30+)	Low (<5)	Low (<5)
Proximity to city centre (km)	3.0	20.0	6.1	2.3	10.5
Throughput (millions of TEUs, 2019)	11.9	9.3	14.8	3.4	2.5
Empties exported (millions of TEUs, 2019)	2.0	2.7	NA	0.5	0.8 (2018)

¹⁵⁸ L.E.K. analysis, Port of Antwerp, The Port of LA, Delft University of Technology, Vancouver Fraser Port Authority, Richmond News, NSW Ports

Port of Antwerp, Belgium

Figure 31: Aerial view of Port of Antwerp harbour ¹⁵⁹



Historically, the Port of Antwerp ("PoA") has faced challenges due to IZL scarcity, similar to those which could be faced by Port Botany. However, through thoughtful planning and the proactive protection of IZL, PoA has overcome these challenges to become Europe's second largest seaport.

Between 1930-1950, PoA underwent residential development to fulfill the city's post-war modernisation ambitions.¹⁶⁰ This involved the construction of residential centres on the land surrounding the PoA, including a new housing estate on its "Marshall Dock". PoA experienced an acute shortage of industrial land as a consequence of this residential expansion.

By 1950, PoA was unable to accommodate cargo volume due to constrained port operating

infrastructure, including insufficient mooring length for larger ships and untenable spacing between sea vessels and inland traffic.

The inability to accept additional volume soon put PoA at a competitive disadvantage compared to Port Rotterdam, which had recently undergone a 2,000-hectare expansion. In response, the Antwerp municipality developed and implemented a "Ten Year Plan"¹⁶¹ ("Plan") seeking to secure the long-term viability of PoA as a commercial port.

PoA's Plan provided that land in neighbouring municipalities was thoughtfully protected while harbour industrial areas and supporting infrastructure were extended. The Plan addressed the needs of all constituents by introducing buffers between residential and industrial activity. More recent

¹⁵⁹ Aerial view harbour Antwerp Belgium, Shutterstock

¹⁶⁰ The Ten-Year Plan for the port of Antwerp (1956–1965): a linear city along the river, Routledge (2010)

¹⁶¹ The Ten-Year Plan for the port of Antwerp (1956–1965): a linear city along the river, Routledge (2010)

expansion initiatives including the ongoing Europa Terminal and Extra Container Capacity Antwerp (ECA) which will add 3.5 million TEU capacity to the Port,¹⁶² have also adopted PoA's approach to reconciling residential and industrial needs.

The PoA's Plan has been very successful. Availability of suitable areas for industrial settlement has allowed PoA to flourish, even during periods of rapidly

changing freight volume driven by the global COVID-19 pandemic whereby the port achieved record levels of throughput (12 million TEU in 2020).¹⁶³ Residential areas also continue to thrive in the area as a result of investment into public spaces and green zones.¹⁶⁴ In sum, PoA represents proof that proactive planning around IZL can yield a result that meets the needs of industrial and residential stakeholders.

Key Findings:

- The Port of Antwerp was facing significant growth constraints and an acute shortage of industrial land resulting in loss of volume to competing ports
- Proactive land planning, including the protection of industrial zoned land and creation of buffer zones has helped to facilitate the continued growth of the port

¹⁶² Extra container capacity, Port of Antwerp (2021)

¹⁶³ Record container throughput limits losses in 2020, the year of coronavirus, Port of Antwerp (2020)

¹⁶⁴ Port of Antwerp, Sustainability Report (2019)

Port of Los Angeles, United States

Figure 32: Aerial view of the Port of Los Angeles ¹⁶⁵



The Port of Los Angeles is the largest container port in North America and is owned by the Los Angeles Port Authority, a City of Los Angeles department. It is the main entry point for freight from Asia to North America, playing a similar role to Port Botany in Australia. Annual throughput at Los Angeles Port was 9.3 million TEU in 2019, c.5.1m of which were imported, creating a trade imbalance weighted towards imports. The Port differs somewhat from Sydney in that it is c.20km from the urban centre of Los Angeles and only 4km from the Port of Long Beach, a rival port owned and operated by the City of Long Beach.

The Los Angeles zoning code recognises the importance of protecting industrial-zoned land in order "to preserve IZL for light industrial uses and to

provide for non-retail businesses which enhance the City's employment base" as well as prohibit unrelated commercial and non-industrial businesses.¹⁶⁶ However, the Port of Los Angeles suffers from significant existing urban encroachment, like Port Botany. There is minimal buffering between the c.16km² of IZL and c.19km² of residentially zoned land in the local vicinity of San Pedro, and Wilmington which have a combined population of ~130,000 people. While the border of these communities extends c. 5.5km from the Port of Los Angeles, the PBSA is just 500m from neighbouring residential areas at its closest; this highlights the need for the Port to retain IZL to ensure an appropriate buffer.

While there is no indication of further threat to IZL, the Port is impacted by its proximity to residential land.

¹⁶⁵ Unsplash (accessed 2021)

¹⁶⁶ Los Angeles Zoning Code

The Port faces several demands from the local community of San Pedro, including access to the waterfront, traffic management and a reduction of noise, air, and water pollution. The Port of Los Angeles has responded by proposing the Wilmington Waterfront Promenade, costing the Port US\$71 million and imposing some restrictions on construction to limit the amount of noise.¹⁶⁷ Additionally, most port expansion plans (Yang Ming Terminal Redevelopment, Terminal Island land expansion, among others.) involve land reclamation, repurposing less useful land/facilities and upgrading current facilities to improve throughput capacity.¹⁶⁸ These expensive reclamations and repurposing plans exist due to earlier poor land management around the Port.

A lack of land supply continues to limit the Port of Los Angeles' capacity for growth. 2020 saw an abundance of issues arise from COVID-19, including vessel

bunching at the Port, congested marine terminals, shortages of skilled equipment operators, lengthy truck queues and distribution warehouses at capacity.¹⁶⁹ Due to the limited land available to expand the Port to alleviate these issues, the Port of Los Angeles has proposed solutions such as creating a chassis stop/start facility and for use as a temporary storage site for empty containers to reduce the time they need to be stored and increased collaboration with supply chain partners.¹⁷⁰ According to the final study of the Barracuda Chassis Depot, the existing 28,000m² of land generates on average around 84 truck roundtrips daily. Adding another 25,000m² site would add an estimated 258 truck roundtrips daily.¹⁷¹ This shows that even relatively small parcels of IZL near the Port can significantly impact the efficiency of port operations.

Key Findings:

- IZL surrounding the Port of Los Angeles was not adequately protected for industrial uses, resulting in significant urban encroachment, and limiting port expansion
- As a result, future growth can only be supported with reclaimed land and costly repurposing of existing facilities to improve throughput capacity

¹⁶⁷ Waterfront Los Angeles, City of Los Angeles website

¹⁶⁸ Port of Los Angeles Masterplan (September 2018)

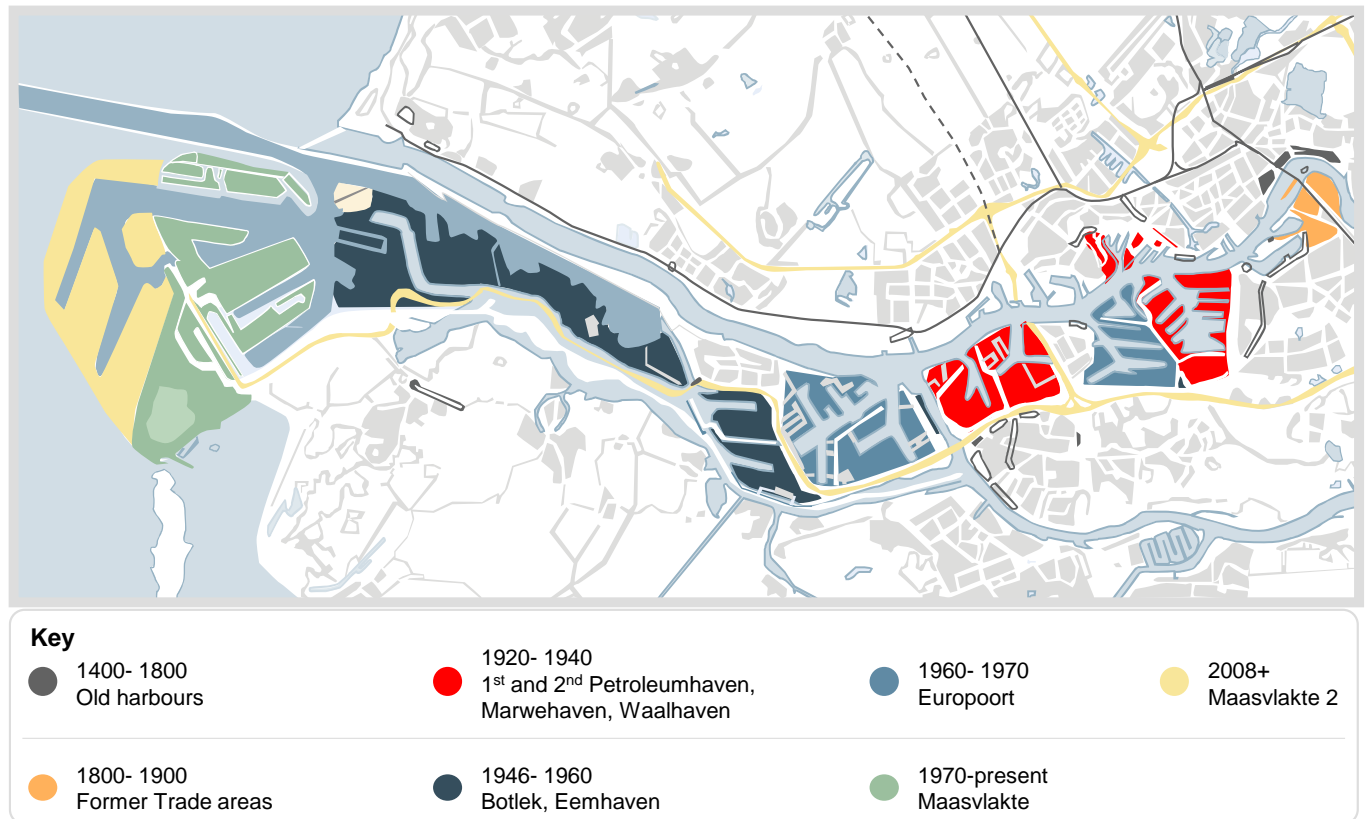
¹⁶⁹ Joc.com, Outlook 2021: No relief in sight for LA-LB congestion problems, December 2020

¹⁷⁰ Ibid.

¹⁷¹ Final Initial Study and Negative Declaration into the Barracuda Chassis Depot, October 2020.

Port of Rotterdam, Netherlands

Figure 33: Expansion over time of the Port of Rotterdam ¹⁷²



The Port of Rotterdam, the largest container port in Europe, is owned by an unlisted public company with shares held by the Municipality of Rotterdam (70%) and the Dutch Government (30%). Although the Port's total container throughput is significantly higher than Port Botany, at 14.8 million TEU, the Port is similarly located c.10km from the urban centre.

The Port of Rotterdam grew significantly in size as the heart of Europe's oil refining and petrochemical industrial after expanding in the 1950s and 60s. Its current footprint emphasises the extreme 20th century expansion experienced by the Port, despite strong opposition from urban developers who were concerned about the impacts on adjacent local communities.¹⁷³ The Port aggressively expanded West, away from the city, avoiding existing residential areas

towards the North and South, claiming significant amounts of public land in the process.

Over the past 40 years, the city and Port have seen substantial waterfront redevelopment projects aiming to reconnect the city with its waterfront identity.¹⁷⁴ The initial wave of redevelopment involved the urban transformation of centrally located abandoned port areas. The second "Stadshaven" plan focused on the outskirts of the urban centre and took a different approach, instead of pursuing large scale residential development that would conflict with established working businesses. Since 2015, the area has instead been developed as a "Makers District" where entrepreneurs, knowledge institutions and modern manufacturing industries work together on innovation and experimental projects.¹⁷⁵ In comparison to pure residential developments, these modern manufacturing and technology districts support a new

¹⁷² ResearchGate

¹⁷³ Port Economics, Evolution of the Port of Rotterdam

¹⁷⁴ Delft University of Technology and the Municipality of Rotterdam, Port-city development in Rotterdam: a true love story (2012)

¹⁷⁵ Strathaven's Rotterdam, The innovation district (2015)

generation of production companies that directly collaborate with the Port and support its future growth

Moreover, like Port Botany, container volumes in the Port of Rotterdam have continued to increase on the back of strong demand for consumer goods (4.5% increase in TEU handled in Q1 2021).¹⁷⁶ To accommodate ongoing growth in container freight, constructing an automated container terminal, "Maasvlakte 2", commenced in 2009.

The Dutch state-funded the EUR 2.9 billion construction project when they acquired ownership of 30% of the Port of Rotterdam in 2006.¹⁷⁷ The new industrial site is built on c.10km² of reclaimed land in the North Sea due to limited land availability. Despite protests from local environmentalists for over a decade, construction of the terminal has progressed, and the final phases of construction are due to be completed in 2030.

A lack of available land to accommodate port growth meant that the Port of Rotterdam was forced to rely on funding from the Dutch Government and an expensive land reclamation project to accommodate growth in throughput.

Key Findings:

- Recent growth in container throughput at the Port of Rotterdam has forced expansion onto reclaimed land in the North Sea, at significant cost to the national Government
- However, as the Port has shifted West from the city centre, the local government, in collaboration with the Port of Rotterdam, has turned to urban renewal in the form of modern manufacturing and technology districts to foster innovation and trade, and thereby avoid urban encroachment on port activities

¹⁷⁶ Port of Rotterdam website

¹⁷⁷ Ibid

Port of Vancouver, Canada

Figure 34: Port of Vancouver ¹⁷⁸



Owned by the Vancouver Fraser Port Authority federal agency, The Port of Vancouver is the 4th largest Port in North America and the largest in Canada. Port of Vancouver has some similarities to Port Botany. First, the annual throughput was 3.4 million TEU in 2019 (Port Botany 2.5 million). Second, it exports a high volume of empty containers - in 2019 alone, the Port exported 535,000 TEU of empty containers, representing 32.2% of all export containers from the Port of Vancouver and 15.7% of total container throughput. Third, the IZL area around the port is similarly limited at c.1-2 Km² (Port Botany has 3.9 Km² of IZL in its vicinity) Finally, the population of Metro Vancouver is currently c.2.6 million and is expected to grow by more than one million people in the next 30 years (c.1% p.a. compared to c.1.85% p.a. for Sydney).

As a result of the population growth, the Port of Vancouver has been under pressure to rezone its IZL for urban, commercial, and retail uses. Population increases have resulted in more housing, employment,

and trade volume. Between 2010 and 2015, Metro Vancouver approved the rezoning of over 350 hectares of IZL, most of which was close to and used by the Port of Vancouver.¹⁷⁹ Now, less than 7% of the land around the Port is industrial, with residential and commercial making up virtually all the remaining land. The land around the Port continues to be rezoned. In 2021, five proposals to rezone IZL into residential or commercial around the Port have been approved to date. As a result, industrial vacancy rates near the port reached historic low of 1% in Q1 2021, with prices going up to historic levels.¹⁸⁰

IZL is crucial for the Port of Vancouver, supporting c.23% of jobs in Metro Vancouver and thereby the local economy.¹⁸¹ Additionally, throughput continues to increase, despite COVID-19. In 2020, overall cargo through the Port increased by 1%, with significant growth in exports of wheat (+25%), speciality crops (+12%), and sulphur (+8%).¹⁸² These exports represent jobs in the agriculture, transport, and port sectors.

¹⁷⁸ Journal of Commerce

¹⁷⁹ Kerry Gold, BC Business, How Vancouver's industrial land crunch is pushing businesses out of town (December 2017)

¹⁸⁰ CBRE, Vancouver Industrial MarketView (Q1 2021)

¹⁸¹ Port of Vancouver website

¹⁸² Port of Vancouver press release (March 2021)

At current consumption rates, the Port of Vancouver predicts that IZL will run out within the decade because of zoning policy changes allowing more retail, commercial and residential land uses in areas zoned as "light industrial". To mitigate the impacts of the encroachment, the Port of Vancouver purchased 40

acres of land in 2017 at a high cost of c.AU\$24 million.¹⁸³ In subsequent years, the jump in throughput (both in tonnage and TEU) directly resulted from utilising this land to support smooth and efficient use of space for additional warehouse and logistics facilities.¹⁸⁴

Key Findings:

- The failure to protect IZL around Port of Vancouver is likely to result in expensive land reclamation or repurposing to allow it to continue growing.

¹⁸³ Port of Vancouver Financial Report (2017)

¹⁸⁴ Port of Vancouver press release (October 2017)



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