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# *Sydney Urban Freight*

Department of Infrastructure and Regional  
Development – Case studies of critical supply  
chains

October 2017

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## Illustrative case studies showing operational moves and associated bottlenecks for each stage of the supply chain:

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# *Overview*

# *1*

# Overview

## Scope and objectives

PricewaterhouseCoopers Consulting (Australia) and Ranbury Pty Ltd (Ranbury) have prepared a case study of the Sydney urban freight supply chain on behalf of the Department of Infrastructure and Regional Development (DIRD) as part of the National Freight Inquiry. This work is intended to assist the Inquiry in informing the forthcoming National Freight and Supply Chain Strategy.

The presentation provides an overview of:

- freight flows in the supply chain
- participants and associated infrastructure
- the regulatory framework
- a list of IA priority list projects which are relevant to this supply chain

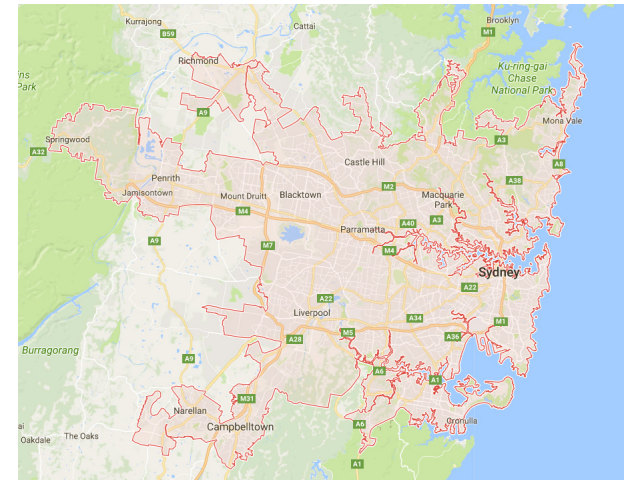
An illustrative case study provides a high level example of:

- supply chain operations
- potential bottlenecks

## Study area

This case study extends to urban freight transported to, from and within the Sydney Metropolitan area (below), for both domestic consumption and export.

### Study Area



Source: Google

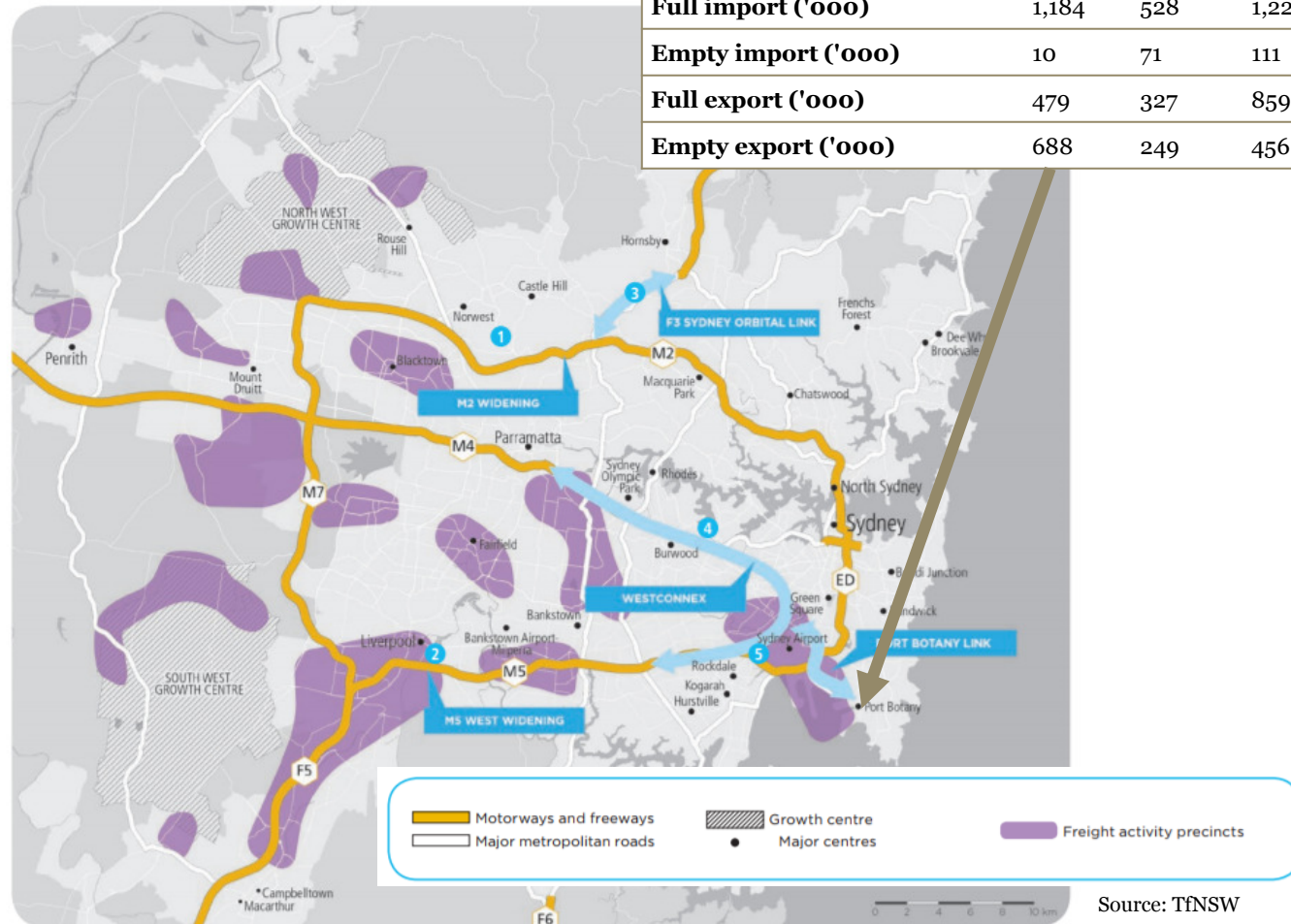
## The freight task

The Sydney urban freight task is predominantly driven by domestic consumption of imported goods. Therefore this case study of Sydney's urban freight supply chain will focus on imported containerised freight and the subsequent distribution task.

Many market segments (e.g. electrical goods) are almost wholly sourced from international suppliers through import supply chains. Additionally, many supply chains contain both imported products or components as well as locally sourced produce and goods as inputs. Equally, the outputs are marketed and distributed to local and international consumers.

Sydney's key freight precincts and container throughput for Port Botany are shown below.

*Sydney urban freight activity areas*



Source: TfNSW

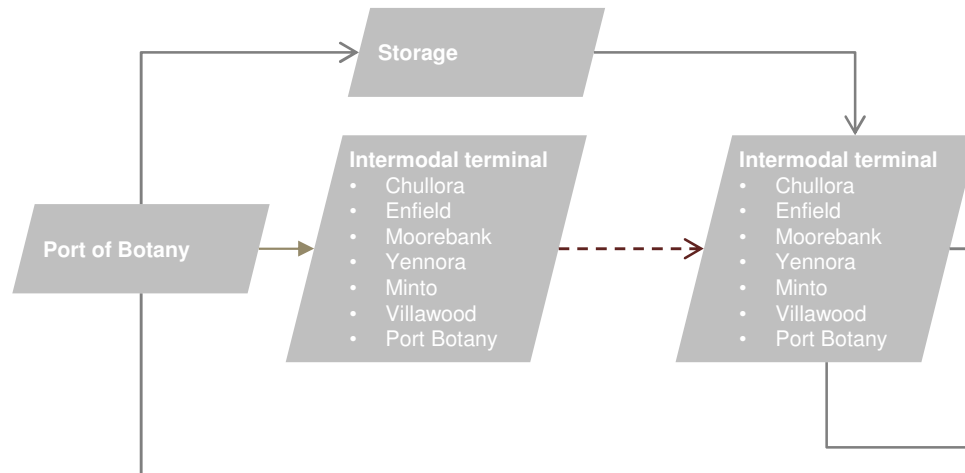
# The supply chain

The Sydney urban freight supply chain can be simplified into two key moves as shown in the supply chain schematic below.

## Stage 1 – first move

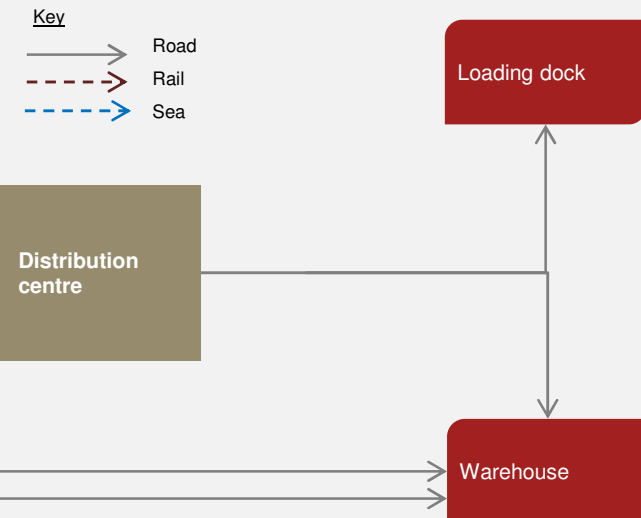
This involves the transport of freight from Port Botany to a processing facility to distribution centre warehouse by road or rail transport in truck load or container load configurations. A NSW Infrastructure Capability Assessment indicated that 85 per cent of the containers being transported to or from Port Botany are packed or unpacked within a 40km radius of Port Botany (GHD 2011).

	Total	Trucks	Rail	Landside
Total containers handled ('000)	1540	910	236	394



## Stage 2 – Second move

This involves the transport of freight consignments from Depots, DCs or Warehouse to retail stores/outlets and other end destinations by road. Consignments are generally either full vehicle loads (FTL), part truckloads or consignments that would be pallet loads or less.



## Key infrastructure

### 1. Port

The facilities at Port Botany include:

- 3 container terminals operated by independent stevedores (DP World, Patrick Stevedores, Hutchison Ports)
- 12 container vessel berths
- 3,793 metres of container quay line
- 147ha of container terminal land
- 8 kilometres of road network

The ports also contains liquid and dry bulk facilities.

### 2. Road

Key corridors in the Sydney freight delivery system include:

- Westlink (M7)
- Western Mwy (M4)
- South Western Mwy (M5)
- Hume Hwy
- King Georges Road.

### 3. Rail

Sydney's metropolitan rail freight system is a standard gauge network consisting of both dedicated freight and shared freight/passenger lines.

The following metropolitan lines are dedicated to freight and managed by the Australian Rail Track Corporation (ARTC):

- Port Botany Rail Line
- Southern Sydney Freight Line
- Metro Freight Network

Southern Sydney Freight Line provides a dedicated freight link from the south to Chullora and onto Enfield and Port Botany as well as a connection into the new Moorebank terminal.

The Australian standard over the ARTC network (excluding the Hunter Valley coal lines) is 21 TAL at 115 kph and 23 TAL at 80 kph. The remaining lines are shared with the passenger network and managed by Sydney Trains.

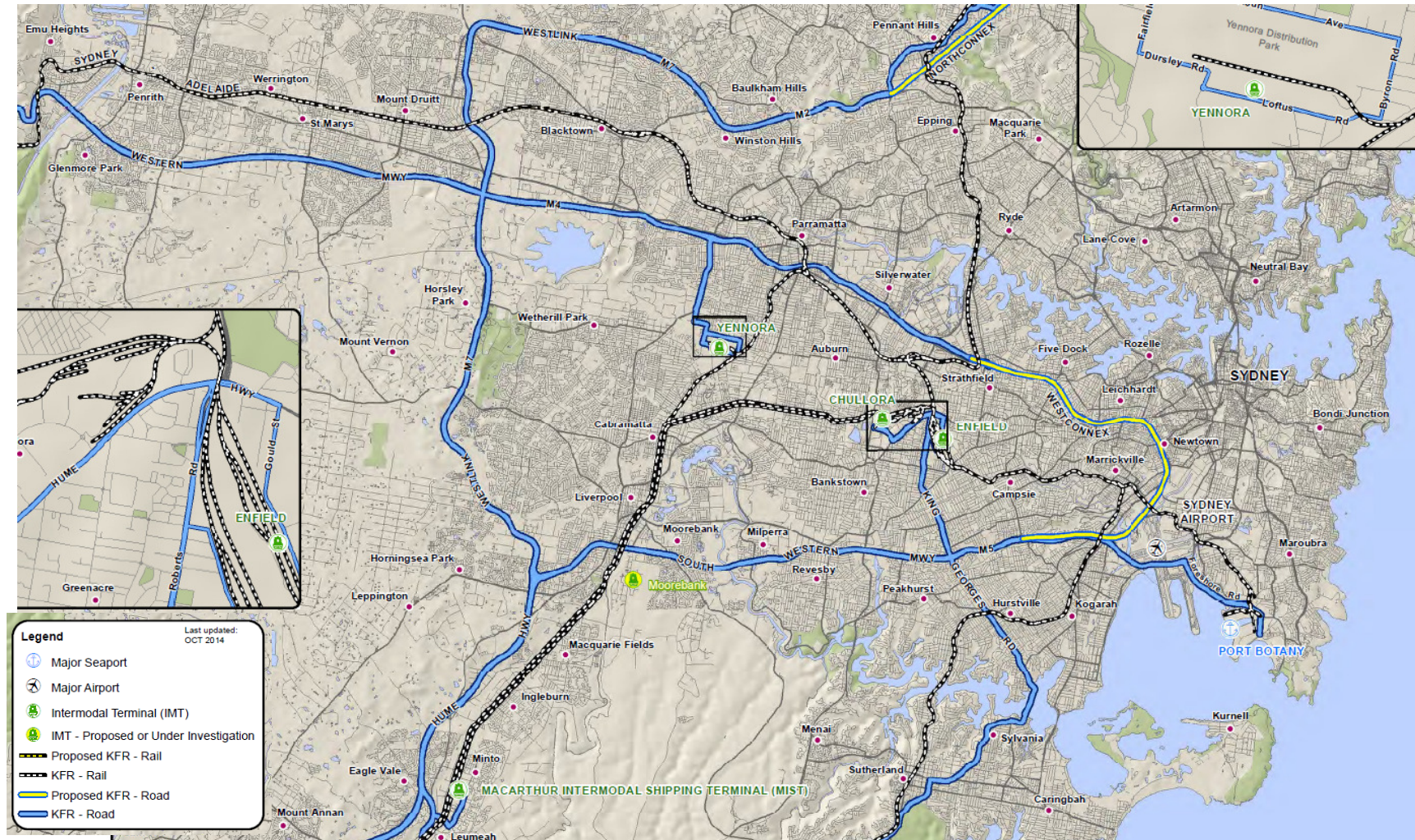
### 4. Intermodals

Key intermodal terminals and their short term capacities (TEU p.a.) include:

- Chullora – 0.6m+
- Enfield – 0.3m+
- Moorebank – 1.5m+
- Yennora – 0.2m
- Minto – 0.2m
- Villawood – 0.1m
- Cooks River – 0.1m
- Port Botany – 0.8m+

## Key infrastructure – freight roads and rail

The key road and rail corridors in the Sydney urban freight supply chain are shown in the map below.



Source: Transport and Infrastructure Council (2014)

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## *Regulatory frameworks*

The following table outlines the regulators with oversight of monopoly infrastructure and their key access and pricing arrangements.

	Road	Rail	Ports and Terminals
<b>Regulators</b>	<ul style="list-style-type: none"><li>Roads and Maritime Services (RMS)</li></ul>	<ul style="list-style-type: none"><li>National Rail Safety Regulator (ONRSR)</li><li>The Independent Transport Safety Regulator (ITSR)</li></ul>	<ul style="list-style-type: none"><li>ACCC</li></ul>
<b>Remit &amp; Powers</b>	<ul style="list-style-type: none"><li>National Heavy Vehicle Regulator</li><li>Vehicle standards and access</li></ul>	<ul style="list-style-type: none"><li>Rail safety laws</li></ul>	<ul style="list-style-type: none"><li>Access and pricing</li></ul>

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# *Case studies*

# 2

## *The freight task for the major retail chain (MRC)*

### **MRC freight task**

Retailers in major cities such as Sydney have a huge task to undertake to ensure the freight required by consumers are resupplied in retail networks on both a reliable and cost efficient basis. MRC has multiple Distribution centres in Sydney to address all of the major market segments. These include:

- ambient groceries
- refrigerated groceries
- produce
- milk
- confectionery
- meat
- liquor.

MRC has thousands of stores across Australia resulting in:

- a transport fleet that undertakes thousands of vehicle movements
- the need to carry millions of pallets and cartons
- millions of kilometres of travel each year.

Approximately 80 per cent of the transport task undertaken by MRC occurs within the capital city metropolitan areas. As a result, the urban transport infrastructure is critical to the ability of MRC to undertake logistics tasks efficiently. The quality of the urban infrastructure is a major determinant as to whether MRC can:

- reduce distance travelled on road networks
- reduce CO2 emitted through reduced travel distances and less traffic congestion delays
- lower transport operating costs through increased efficiency
- improve road safety and reduce vehicle accidents and incidents.

# MRC – The Retail Supply Chain and Transport Industry Issues

## Process

Critical to MRC is the reliability of replenishment of the retail network. The retail supply chain is forecast driven based on sales data collected from the stores in the network. Replenishment purchase orders are generated on aggregated store demand. Given the stores and distribution centres (DCs) hold minimal inventory, the replenishment cycle is dependent on the ability to have goods delivered into store as planned.

Reliability of transport services are critical. Both inbound freight into DCs and outbound freight to retail outlets must meet delivery timeframes to prevent stock shortages and stock

## Potential bottleneck 1: Transport

MRC has a significant retail store network, the majority of which are located in major core urban areas in the major cities. Challenges arising from this are twofold.

### Road Network Issues:

- disconnected or incomplete major arterial trunk road networks
- significant and increasing road congestion including Sydney
- bottlenecks and missing links in major motorway infrastructure
- reliance of secondary local road networks
- reduced transit speed resulting in slower delivery times
- eroded freight transport productivity

### Urban Constraints:

- deliveries through urban areas
- conflicts with peak traffic periods.
- delivery restrictions on vehicles
- delivery time restrictions
- council transport delivery curfews
- lack of noise abatement standards and guidelines.



## Potential bottleneck 2: Regulatory frameworks

There are a range of regulatory frameworks that impact MRCs transport tasks and broader business activities. These occur in fields of safety, road use requirements, vehicle standards and specification, and compliance activities. While improvements have occurred over recent years, the ability to harmonise regulatory frameworks across states and transport modes will be beneficial to industry.

# ***MRC – Multiple regulatory and planning frameworks and encroachment on freight activity***

## **Process**

Critical to MRC is the reliability of replenishment of the retail network. The retail supply chain is forecast driven based on sales data collected from the stores in the network. Replenishment purchase orders are generated on aggregated store demand. Given the stores and distribution centres (DCs) hold minimal inventory, the replenishment cycle is dependent on the ability to have goods delivered into store as planned.

Reliability of transport services are critical. Both inbound freight into DCs and outbound freight to retail outlets must meet delivery timeframes to prevent stock shortages and stock

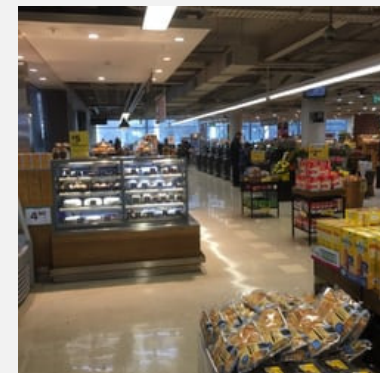
## **Potential bottleneck 3: Planning frameworks**

Planning regulations also exhibit inconsistencies across different Government jurisdictions. The ability to achieve streamlined planning and approval processes will add value and improve infrastructure planning and delivery. In addition, establishing the appropriate regulatory preservation of major transport corridors and precincts in major cities through preventing residential developments encroaching into industrial transport precincts is also essential for long term transport optimisation in major cities.



## **Potential bottleneck 4: Encroachment**

In the inner city precinct of Sydney, MRC has established smaller scale retail outlets that provide convenience due to the proximity of the store to city residential occupants and businesses. Access to service the store was constrained by delivery window curfews and difficulties in obtaining access to loading zones during normal business hours. Solutions were required to change delivery times to late night windows to enable the efficient operation of the store. Collaboration and approval from both Transport for NSW and the City of Sydney was required.



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# *Appendix: Infrastructure Australia priority list projects & the Sydney Urban Freight Supply Chain*

# A

## ***A new Sydney airport + orbital rail and road investment would be influential on supply chains***

IA Status	Infrastructure type	Project Title	Project description*	Impact	Timing
High Priority Initiative	Airport	Western Sydney Airport	The project includes initial construction of a 3,700 m runway with a parallel taxiway, and associated aviation terminal infrastructure and support precincts. Subsequent stages of development would ensure the Airport could meet longer-term passenger demand in the Sydney basin. The final design of Stage 1 and the nature and timing of subsequent developments will be at the discretion of the airport operator, subject to contractual and regulatory requirements.	Airports are freight gateways for interstate and international flows of goods. The construction of a new airport in Sydney's west will add a new point in the Sydney urban freight supply chain. As air freight demand grows the Western Sydney Airport is likely to absorb additional volumes, relieving pressure on capacity at existing airports and on freight connections to existing airports.	Medium term (5–10 years)
High Priority Initiative	Transport network	Preserve corridor for Outer Sydney Orbital road and rail/M9	This initiative proposes to conduct a planning study to identify a preferred alignment for a multi-modal transport corridor comprising a motorway, a north-south freight rail line, and where practical, passenger rail, and to preserve the preferred corridor.	Increased road and rail freight capacity on this corridor would benefit urban freight operators.	Near term (0–5 years)

Source: Infrastructure Australia, Infrastructure Priority List, July 2017

\*Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries, February 2017

# Investment in Sydney's rail freight network may increase mode choice for shippers

IA Status	Infrastructure type	Project Title	Project description*	Impact	Timing
High Priority Initiative	Freight Rail	Chullora Junction upgrade	The proposed initiative involves improvements to the current low speed at-grade junctions at Chullora, including possible duplication of the Chullora North/ Chullora West connection and a holding road between Chullora Junction and Flemington Junction. The proposed initiative would form part of a broader strategy designed to drive growth in rail mode share.	This initiative could increase modal choice for producers of containerised commodities in NSW – ie high value and low quantity metal products.	Near term (0–5 years)
		Northern Sydney Freight Corridor Stage 2	The initiative comprises additional tracks from West Ryde to Rhodes and from Thornleigh to Hornsby. Next steps Business case development	This initiative could increase modal choice for urban freight shippers seeking to transport goods to/from the north of Sydney.	Longer term (10–15 years)
		Port Botany freight rail duplication	The proposed initiative aims to upgrade the capacity of the Port Botany rail line by completing a duplication of 2.8 km of the line. The proposed initiative will form part of a broader strategy designed to drive growth in rail mode share.	This initiative could increase modal choice for producers of containerised commodities in NSW – ie high value and low quantity metal products. This initiative could increase modal choice for producers of containerised agricultural produce in NSW, such as containerised grain or refrigerated products.	Near term (0–5 years)
		Preserve corridor for Western Sydney Freight Line and Intermodal Terminal access	The Western Sydney Freight Line is a proposed dedicated rail freight line connecting Western Sydney to the Sydney Metropolitan Freight Network, with connections to intermodal terminals to service freight moving through Western Sydney from across NSW. The core objective of the initiative is to reduce growth in truck movements on the Sydney road network and reduce delays to freight trains on the main Western Line, where passenger trains have priority. Preservation of the corridor is the first step to achieving this objective.	A dedicated freight line in Western Sydney would increase the speed, reliability and capacity for freight rail services. Improvements to the urban rail freight network would strengthen mode choice for producers seeking to access the Port of Botany by rail from regional NSW.	Near term (0–5 years)
Priority Initiative		Southern Sydney Freight Line upgrade	The SSFL is a 36 km single line from Macarthur to Sefton. The proposed initiative involves track duplications and additional passing loops on the line. The initiative aims to support the movement of freight by rail through the city, particularly between Port Botany and the Moorebank Intermodal Precinct. It forms part of a broader strategy designed to drive growth in rail mode share.	The project supports mode choice for in Sydney's urban freight network by creating a rail link between key port and warehousing infrastructure and expanding capacity of the rail network.	Longer term (10–15 years)

Source: Infrastructure Australia, Infrastructure Priority List, July 2017

\*Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries, February 2017

## ***Road investment: major and near term projects are planned that will expand the network***

IA Status	Infrastructure type	Project Title	Project description*	Impact	Timing
High Priority Project	Road	M4 Motorway upgrade (Parramatta to Lapstone)	<p>The project encompasses a range of measures aimed at making better use of the existing M4 infrastructure, and increasing capacity, along a 35 km section of the M4 between Mays Hill near Parramatta, and Lapstone at the base of the Blue Mountains. The 'better use' components include:</p> <ul style="list-style-type: none"> <li>• The introduction of Intelligent Transport System measures, including ramp signals, vehicle detection devices, and electronic signage</li> <li>• Upgrades to entry and exit ramps</li> <li>• New freight bypass lanes at three entry ramps, westbound at the M7 and the Prospect Highway, and eastbound at Roper Road, Colyton</li> <li>• A new communications and power 'backbone' along the motorway.</li> </ul> <p>The project also includes the construction of an additional lane in each direction in the median along a 4.3 km section of the motorway between the Roper Road and Westlink M7 interchanges.</p>	By improving connections to key freight infrastructure (port; major motorways) the project supports the capacity and efficiency in the Perth road freight supply chain.	Near term (0–5 years)
		WestConnex	<p>WestConnex is a program of interconnected road projects that involves:</p> <ul style="list-style-type: none"> <li>• Stage 1: Widening the existing M4 Motorway and extending the motorway from Strathfield towards Sydney's inner-west (13.8 km, including a 5.5 km tunnel)</li> <li>• Stage 2: Widening the M5 (surface section east of Kings Georges Road) and duplicating the tunnels to St Peters (11 km, including a 9 km tunnel)</li> <li>• Stage 3: Linking the two motorways with a new tunnel under the inner western suburbs of Sydney (9.2 km tunnel)</li> <li>• 'Sydney Gateway' – road improvements between an interchange at St Peters and the Airport precinct, which would also provide some improvement in access to Port Botany. WestConnex was the major priority project put forward in Infrastructure NSW's 2012 State Infrastructure Strategy, and was subsequently identified in the NSW Government's Long Term Transport Master Plan as an immediate priority in a longer term vision to complete the critical links in Sydney's motorway network.</li> </ul>	By improving connections to key freight infrastructure (port; major motorways) the project supports the capacity and efficiency in the Perth road freight supply chain.	Near term (0–5 years)

Source: Infrastructure Australia, Infrastructure Priority List, July 2017

\*Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries, February 2017

## ***Road investment: major and near term projects are planned that will expand the network (cont'd)***

IA Status	Infrastructure type	Project Title	Project description*	Impact	Timing
Priority Project	Road	Bringelly Road Upgrade Stage 2	The proposed project complements an earlier project to upgrade Bringelly Road between Camden Valley Way and King Street (Stage 1), which was previously listed on the Infrastructure Priority List and is now under construction. The Stage 2 project would upgrade the remaining 4.3 km of two-lane rural road between King Street and The Northern Road to a four-lane divided carriageway with a wide central median. This would allow for future widening to six lanes if required. The project is part of a broader program of works, the Western Sydney Infrastructure Plan, which includes significant upgrades to The Northern Road, and development of the M12 Motorway linking The Northern Road and the M7. The broader program is listed as a Priority Initiative on the Infrastructure Priority List.	Upgrades to the road network will support the efficiency of the road freight supply chain by increasing capacity and safety and addressing congestion.	Near term (0–5 years)
		The Northern Road Upgrade	The Northern Road project involves staged upgrades to 35 km of road, with construction expected to be completed by 2020. The project will increase capacity and improve journey times with additional lanes and intersection improvements, as well as dedicated north south bus lanes and other bus priority measures. The project also provides for cyclists and pedestrians. The Northern Road will also play an important role in providing access to the construction site of the Western Sydney Airport at Badgerys Creek. This project is part of the broader Western Sydney Infrastructure Plan, which is listed on the Infrastructure Priority List as a Priority Initiative.	Upgrades to the road network will support the efficiency of the road freight supply chain by increasing capacity and safety and addressing congestion.	Near term (0–5 years)

Source: Infrastructure Australia, Infrastructure Priority List, July 2017

\*Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries, February 2017

## ***Future road investment: documented IA road initiatives***

IA Status	Infrastructure type	Project Title	Project description*	Impact	Timing
High Priority Initiative	Road	Sydney Gateway	The initiative aims to provide a connection from Sydney Airport and Port Botany to WestConnex. It will provide an integrated high capacity road connection from the WestConnex–St Peters Interchange to the Sydney Airport and Port Botany precinct, allowing airport and port traffic to avoid local arterial roads when accessing WestConnex.	By connecting key freight infrastructure (airport; port; major motorways) the project supports the capacity and efficiency in the Sydney road freight supply chain.	Near term (0–5 years)
Priority Initiative	Road	F6 extension	The initiative is a motorway connection from the M1 at Waterfall to the Sydney motorway network.	Upgrades to the road network will support the efficiency of the road freight supply chain by increasing capacity and safety and addressing congestion.	Medium term (5–10 years)
Priority Initiative	Road	Moorebank Intermodal Terminal road connection upgrade	The initiative proposes a package of inter-related road infrastructure improvements to increase network efficiency and improve access to the MIT. The major components of the Program include: • Upgrades to the M5 interchanges at the Hume Highway and Moorebank Avenue • Connection improvements between the MIT and the M7 Motorway and M31 Hume Motorway • Upgrades to key intersections	By connecting key freight infrastructure (intermodal terminal; major motorways) the project supports the capacity and efficiency in the Sydney road freight supply chain.	Near term (0–5 years)
Priority Initiative	Road	Newell Highway upgrade	The initiative seeks to improve several sections of the highway to support safe Higher Productivity Vehicle access, and improve safety and reliability. The initiative will also consider first/last mile issues faced by Higher Productivity Vehicle operators in the corridor.	The Newell Highway is a key part of the road based supply chain. Improvements to allow Higher Productivity Vehicle access will increase the efficiency (carrying capacity) and reliability of road services, benefiting producers in the catchment.	Near term (0–5 years)
Priority Initiative	Road	Western Harbour Tunnel and Beaches Link	The initiative proposes a motorway crossing underneath Sydney Harbour, connecting WestConnex with the Warringah Freeway, and a motorway connection from the Warringah Freeway to Seaforth/Balgowlah on the northern side of Middle Harbour.	Upgrades to the road network will support the efficiency of the road freight supply chain by increasing capacity and safety and addressing congestion.	Longer term (10–15 years)
Priority Initiative	Road	Western Sydney Infrastructure Plan	The initiative proposes a suite of road projects including: • Upgrading The Northern Road to a minimum of four lanes • Building a new M12 Motorway with up to six lanes • Upgrading Bringelly Road to a minimum of four lanes • A package for local roads upgrades. Of these, Northern Road and Bringelly Road Stage 2 are included on the Infrastructure Priority List. Stage 1 of the Bringelly Road upgrade is now under construction. A separate initiative proposes the preservation of a rail corridor to the Western Sydney Airport.	Upgrades to the road network will support the efficiency of the road freight supply chain by increasing capacity and safety and addressing congestion.	Near term (0 – 5 years)

Source: Infrastructure Australia, Infrastructure Priority List, July 2017

\*Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries, February 2017

## ***Substantial public transport investments will increase the separation of passenger and freight networks***

IA Status	Infrastructure type	Project Title	Project description*	Impact	Timing
High Priority Project	Public Transport	Sydney Metro: City and Southwest	The Sydney Metro (City and Southwest) would provide single deck, fully-automated metro rail services connecting the Sydney Metro Northwest operations from Chatswood through Sydney's North Shore, under Sydney Harbour to the CBD and beyond to Sydenham Station. The proposed rail line would connect to the existing Bankstown Line, converting that line (13.5 km from Sydenham to Bankstown) to Sydney Metro operations.	This large scale public transport investment will create additional capacity for passengers on rail and so may relieve road congestion in the catchment.	Near term (0–5 years)
High Priority Initiative		Preserve corridor for Western Sydney Airport rail connection	Identify and preserve a rail corridor connecting the Western Sydney Airport to the Sydney rail network. The Australian and New South Wales Governments have jointly released a scoping study which considers six options for rail services to the Western Sydney Airport, including the proposed South West Rail Link extension.	Retaining a passenger rail corridor could allow for the construction in the future of public transport services to the Western Sydney Airport. By providing passengers mode choice passenger use of the road network could be lessened, allowing more capacity for freight movements.	Near term (0–5 years)
		Sydney Metro West	The initiative would provide a direct connection between Parramatta and Sydney, linking communities not previously serviced by rail as well as supporting growth between the two CBDs. Investigations are focused on a corridor between the Parramatta River and existing T1 Western Line, because of the potential to transform communities, create new ones and link them using a new state-of-the-art public transport system. A new metro rail service would be able to move about 40,000 people an hour in each direction, and would work together with the T1 Western Line to service the growing needs of Western Sydney, effectively doubling the rail capacity of the Parramatta to Sydney CBD corridor. The initiative would be integrated with long-term transport and land use planning for Western Sydney, including rail needs currently being investigated around the future Western Sydney Airport.	Expansions to the public transport network can positively affect capacity of the road network in the catchment of expanded services, benefiting road freight operators.	Medium term (5–10 years)
Priority Initiative		Western Sydney Airport public transport connection	Provide infrastructure to support bus connections between the proposed Western Sydney Airport and the nearby centres of Liverpool and Penrith, and connecting the airport to the broader Sydney rail and public transport network.		Longer term (10–15 years)

Source: Infrastructure Australia, Infrastructure Priority List, July 2017

\*Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries, February 2017