Metropolitan Road Freight Hierarchy on the State Road Network Practice Note

NSW GOVERNMENT | Transport


IVECO

Contents

Foreword

This Practice Note is the result of an initiative suggested by the Road Freight Advisory Council (RFAC).

RFAC is an expert stakeholder group, convened and chaired by the Chief Executive of the Roads and Traffic Authority (RTA). It is made up of representatives of industry, unions and peak road transport advocacy groups, who advise the RTA on the needs of the road freight industry, the needs of road freight vehicles and desirable directions in road policy and infrastructure to support economic growth in NSW.

RFAC suggested that a consultant be engaged to conduct interviews with a wide range of people within the freight industry to identify priority needs.

Arising out of that report in mid 2009, the need was identified to define a road freight hierarchy for the State Road network in NSW. This would assist in the identification and prioritisation of initiatives to support road freight.

A draft rural road freight hierarchy had already been developed as input to the RTA's Strategy for Major Heavy Vehicle Rest Areas on Key Rural Freight Routes in NSW, however little work had been done on a metropolitan road freight hierarchy for Newcastle-Sydney-Wollongong.

An initiative was immediately commenced to define an urban road freight hierarchy for the State Road network in Newcastle-Sydney-Wollongong.

The metropolitan road freight hierarchy described in this Practice Note is the output of that work. It has been developed by staff within the Department of Transport and the RTA. It will assist in giving appropriate weight to the needs of freight in Newcastle-Sydney-Wollongong, and in prioritising works and policies. This will ensure that the economic benefits accruing from improved freight efficiency will be captured for the benefit of all people in NSW.

I commend the use of this Practice Note for use in transport planning for the major freight routes in Sydney's Greater Metropolitan Area.

Les Wielinga
Director General
Department of Transport


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1. Introduction

The State Road system in NSW is being subjected to ever increasing demands as our population and economy grow. In most parts of the urban area of Newcastle-Sydney-Wollongong, the dense patterns of homes and other buildings together with environmental constraints lead to the result that there is little opportunity to provide significant new infrastructure. Where traffic volumes are large and it is not feasible to provide additional infrastructure, road managers need to balance demands for road space to obtain optimal overall community results.

The vision of the NSW Department of Transport (DoT) is 'a transport system that maximises benefits for the community and economy'. To achieve this, there is a need to recognise the competing needs for road space, and deliver a balanced response.

Roads have a variety of roles and functions and have a wide range of users. Often, conflicts arise when trying to ensure that the needs of all road users are met. Road hierarchies can assist in defining the function of the road and in balancing the needs of various road users and allocating priorities.

Across the metropolitan region, a mix of private vehicles, business vehicles, freight vehicles and bus public transport uses the road system. On each link in the road system, the balance between the needs of these different road users varies. In some places, the needs of buses are crucial, and some priority for buses may be considered. In other places, it is the needs of freight that are dominant, and special consideration is required to ensure that our economy remains efficient. In many places, the needs are more general and the traffic stream may be left to find its own balance. Bicycles and pedestrians also need to be considered.

This *Practice Note* sets out the RTA's defined road freight hierarchy on the State Road network in the Greater Metropolitan Area (GMA). It focuses on the needs of freight. It will help to understand and respond to the needs of freight in Sydney's GMA. This will assist practitioners to identify where the needs of freight vehicles are strongest, and will assist in giving appropriate weight to freight initiatives.

The freight road hierarchy provides a structured definition of functionality on the State Road system. It will be used to assist DoT and RTA planners, policy advisers and program managers to manage, plan and prioritise appropriate activities on the State Road network in order to more effectively achieve the RTA's community results as set out in the RTA Corporate Plan.

Background

Our standard of living is reliant on the efficient and effective movement of goods and services. With a current population of approximately 5.3 million, the GMA represents around 25% of Australia's population. The freight industry ensures that food, clothing, fuel and other products are delivered locally.

Approximately half of all road freight and three quarters of all interstate road freight in Australia moves through NSW for at least part of its journey, reflecting the significance of NSW to the Australian economy and the nation's reliance on NSW roads. Sydney is located at the centre of this freight activity, strategically located between South-East Queensland, Canberra and Melbourne.

The total national road freight task in 2030 is expected to be 1.8 times its 2008 level, with the capital city task at 1.7 times (BITRE Report 121). The road freight task is highest in Sydney and Melbourne. Growth is forecast at approximately 2% pa for these cities.

All State Roads are available for general access vehicles, however some roads such as motorways are more readily used by freight. Establishing a freight hierarchy on the urban State Road network gives due weight to the importance of freight movement and shows which State Roads are of primary, secondary and tertiary importance.

As the road freight industry strives to be more efficient, specialist high performance vehicles are emerging. Some of these may be longer than usual, or higher, or of higher mass. These vehicles have restricted access to the network and are only allowed on specifically designated routes. Those special routes are outside the scope of this document.

2. The objectives of a freight hierarchy

The objectives of a metropolitan road freight hierarchy are:

1. To support the pattern of industrial lands and activities that lead to varying freight flows on the road network by providing suitable road infrastructure.
2. To provide for the specific needs of freight vehicles in operating the road network as a safe, sustainable and efficient road transport system for all road users.
3. To supplement the administrative classification of roads by recognising the varying intensity of freight generating activities and heavy freight vehicle demand on roads within the State Road classification.

The context of these objectives provides useful background to assist in their application.

2.1 Incorporating freight needs into land use and community planning

Sydney has emerged as Australia's only global city over the last few decades. The population of Newcastle-Sydney-Wollongong is now more than 5.3 million people, and is forecast to rise to 6.9 million up to 2036. This represents around one quarter of Australia's population. Sydney's economy is now larger than that of Singapore. The gateways to this global city are our ports and the international airport. Large volumes of goods and people move through these gateways daily, and move to and from regions within and beyond Sydney. We rely on these facilities to support our exports and imports. Planning our land use patterns with freight clearly in mind will lead to greater economic efficiency.

We also expect to have access to the many goods that are produced locally and within NSW. Consumer goods including household goods, food and clothing must all be moved to retail centres near us so that we can carry on our daily activities.

Supporting business and industry, freight vehicles also move industrial goods, building materials, commercial supplies and warehousing facilities. Although householders have little direct contact with this component of the freight industry, it is crucial in keeping businesses going.

The planning of the future of Sydney is set out in documents such as the 'Metropolitan Plan for Sydney 2036' produced by the Department of Planning and Local Environmental Plans produced by Councils. These deal with land use decisions which provide the structure within which urban development takes place. They define where residential areas, retail centres and industrial areas are located, and lead to the pattern of transport that emerges as the areas are developed.

In particular, the pattern of industrial lands leads to the freight flows that must be managed on the transport system. Some roads emerge as more or less significant freight routes. Sometimes there are community concerns about freight movements on roads. While planning to balance the desires of the general community against the economic need for the efficient movement of goods, we must recognise that community planning based on land use zoning will of necessity lead to significant freight movements in some locations.

2.2 Recognising the operational needs of freight vehicles

Overall, it is desirable to achieve a safe, sustainable and efficient road transport system. On different roads, the balance of efficiency will vary. The State Road system is the system of major roads that permit general access for all legal classes of vehicles, and allows movement and access to all facilities across the GMA. However, on some State Roads the primary function may be the movement of people while on others it may be the movement of goods.

Foreshore Road at Port Botany, serving vital import and export industries, is a crucial road for freight efficiency, while Sunnyholt Road at Blacktown, with its modern transitway, is a crucial corridor for the movement of people. The way in which Foreshore Road is managed and developed will be significantly different from the way Sunnyholt Road is managed, because of the differing objectives that relate to the two roads.

On roads where the freight role is paramount, the road pavement must be very strong. Traffic signals and traffic islands are designed to accommodate the larger turning circles required by long trucks. Special attention is needed to provide parking opportunities for truck drivers who need to stop to check their load or manage their hours of work and rest.

On roads where people movement is paramount, bus priority systems such as bus lanes, bus jump starts and traveller information systems at bus stops are needed.

In each case, connection to local communities via footpaths or the protection of residential areas using noise walls will lead to the different types of road having their own unique detail design.

The operational objectives for differing roads will result in differing characteristics on the roads themselves. The road freight hierarchy provides the framework within which the special needs of freight vehicles on particular roads can be recognised and addressed.

2.3 Supplementing the administrative classification of roads with a freight hierarchy

In NSW, roads are grouped into classes under the three administrative classifications of State Roads, Regional Roads and Local Roads. The State Government is generally accountable for the management and funding of the State Roads. A subset of these roads is the National Network of roads, for which the Federal Government provides significant assistance. Local Government is generally accountable for the management and funding of Regional Roads, although State grants are available to assist. Local Government is generally accountable for the management and funding of Local Roads, although State and Federal funds are made available for certain types of work.

This administrative system is useful in relation to high level planning and funding questions. Further categorisation within administrative classes can assist transport practitioners in managing, planning and prioritising works of various types. For example, a State Road in one area may be quite different from a State Road in another area in terms of its strategic importance and transport function. It is clear that Parramatta Road at Leichhardt is quite a different road from Barrenjoey Road at Newport, and yet both are within the administrative class of State Road.

To assist in identifying the most economically important freight roads, and in managing, planning and prioritising works across the State Road system, an urban freight hierarchy of State Roads has been developed.

3. Definitions

The following definitions of road functions for primary, secondary and tertiary freight routes have been adopted.

3.1 Primary Freight Routes

- Serve the needs of freight for access interstate and to strategically important ports, airports, industrial areas, freight terminals, intermodal terminals and hubs within the Sydney, Newcastle and Wollongong urban area.
- Link major regions throughout the GMA and connect the GMA to rural regions across the State and to other States.
- Include the National Network and other major arterials.
- Carry typically high volumes of heavy freight vehicles (>4000 heavy vehicle AADT) and concentrations of road freight including high concentrations of live-haul, long distance, high capacity trucks.

Foreshore Road, Botany


M4 Motorway, Blacktown


Tourle Street and Tourle Street Bridge, Newcastle


Victoria Street, Wetherill Park


Picton Road at the Hume Highway Interchange

3.2 Secondary Freight Routes

- Provide links within regions for significant flows of freight.
- Serve the numerous major business and freight origins and destinations within a regional area.
- Carry medium volumes of heavy vehicles (1000-5000 heavy vehicle AADT) and concentrations of road freight.

Hoxton Park Road, Hoxton Park

Rookwood Road, Chullora

Spit Road, Mosman

3.3 Tertiary Freight Routes

- Provide connections from the general Local Road system and the lower order elements of the State Road system to the primary and secondary freight routes.
- Serve the numerous major business and freight origins and destinations within a subregion.
- Carry lower volumes of heavy vehicles (< 2000 heavy vehicle AADT) and road freight volumes.

Sunnyholt Road, Parklea

Victoria Road, Balmain

3.4 Other State Roads

- Provide for use by general access vehicles.
- Serve all elements of our land use pattern.

4. Criteria

The criteria that were used to define the metropolitan freight road hierarchy are set out in Table A. Each of these criteria was considered in relation to elements of the network. Where numbers are stated within the criteria, they offer a broad guide and are not individually meant to be taken literally. The place of each link in the hierarchy has been based on an overall assessment of all of the criteria on an overarching basis.

TABLE A: CRITERIA FOR GMA ROAD FREIGHT HIERARCHY

CRITERIA	PRIMARY	SECONDARY	TERTIARY	OTHER STATE ROADS
Road functionality for land use and freight	Connects regions, and services strategically important ports, airports, industrial areas, freight terminals, intermodal terminals and hubs	Connects within regions, and services significant clusters of major business and freight origins and destinations within a region	Connects within major subregion, and services groupings of business and freight origins and destinations within a subregion	Connects generally, and services general freight needs within a locality
Heavy vehicle volumes (AADT)	> 4000	1000 to 5000	200 to 2000	
Light commercial vehicle volumes	Very high	High	Medium	Low
Spacing	Approx 5 km	2 to 4 kms	1 to 3 kms	
Number of lanes	4 or more	4 or more	2 or more	2 or more
Intersection treatment	Grade separated or traffic signals	Traffic signals	Roundabouts or Uncontrolled	Uncontrolled
Speed limit	60, 80, 100, 110	60, 80	60	60

While these criteria were initially used in identifying the place of each road within a metropolitan freight hierarchy, the criteria may also be useful in future in specifying the required characteristics that will guide the development of particular roads.

4.1 Road functionality

The more importance that is placed on an individual link to provide for movement and access to serve the freight industry, the higher the link is in the road freight hierarchy.

At the top of the hierarchy, motorways provide excellent mobility and accessibility for freight vehicles, and provide the major links between regions. They also provide links beyond the GMA to regional NSW and to other States. In locations where the motorway system does not extend, some arterial roads serve this high-level function. Some motorways, such as the Sydney Harbour Tunnel, do not serve freight needs of the highest order because of their location away from the major industrial areas and because of their restrictions for high vehicles and for vehicles transporting dangerous materials.

As with all land uses in a major metropolitan area like Sydney, there is a range in scale and importance of freight generating land uses. Nationally significant generators like the gateways of Port Botany and Sydney Airport require the highest quality access via primary routes for freight vehicles, as do the most significant freight hubs such as the Smithfield-Wetherill Park Industrial Area.

Roads which provide links for freight within regions, or which provide for freight connections at a more localised level, are naturally at a lower level in the road freight hierarchy.

Significant clusters of freight generating activities like Fairfax Printers, News Ltd and the Australia Post Mail Centre at Chullora still require high quality access via secondary routes for freight vehicles, although road space and priority may be balanced with the needs of other road users such as buses.

Some roads may have a very important role in the supply chain even though they may be narrow and pass through residential areas. By virtue of their strategic importance in linking key facilities and regions, several of these roads have been placed at a high level in the hierarchy.

Less significant generalised groupings of businesses and freight generating activities that typically occur in urban areas like smaller workshops, factory units and retail stores require State Road access via tertiary routes, although in these cases freight vehicles are generally considered as part of the general traffic stream with perhaps some priority around parking, loading and deliveries.

4.2 Heavy freight vehicle flows

The roads which carry the highest volumes of heavy freight vehicles are the most important freight routes, and are placed at the top of the road freight hierarchy. As volumes of heavy freight vehicles fall, the standing of the route in the hierarchy also declines.

For roads in the Sydney region, the broad ranges of heavy vehicle AADTs shown in Table A have been found to be appropriate guides in identifying the standing of a particular link within the hierarchy. These numbers are not hard and fast, but give good guidance without dominating the other criteria.

4.3 Light commercial vehicle volumes

It must be remembered that not all freight moves on very large articulated vehicles. Much freight in the GMA, especially freight being delivered to small retail outlets, offices and dwellings, is carried on light commercial vehicles (LCVs). Although there is very limited data available on LCV origins and destinations across the GMA, practitioners are aware of the importance of this function for freight and commerce, and can take this aspect of road function into account in a broad manner.

4.4 Spacing

Spacing depends on the intensity of trip generation and attraction. Nonetheless, hierarchies operate on the basis that there is a notional grid of routes, with major routes at more distant spacing, supported by lesser routes spaced in between, and minor routes filling in to connect to local areas.

The distances in Table A can be taken as a guide.

4.5 Number of lanes

The number of lanes on State Roads varies considerably across the GMA, and has its origin partly in historic road development over the past two centuries and partly in more recent road upgrades to serve specific traffic generators and attractors.

The major freight links are generally of four or more lanes, and can range up to eight lanes on some motorways. Some of the least important freight routes can be of just two lanes, one in each direction. Intermediate routes generally have two to four lanes, but can have more lanes if they perform an important function in terms of the movement of general traffic.

4.6 Intersection treatment

The major freight routes serve high volumes of freight vehicles and provide a high-level of service by offering intersection treatments that facilitate the efficient flow of through vehicles. High order freight routes are therefore often provided with grade separated intersection treatments to reduce stopping and starting and allow vehicles to move steadily along the route.

Secondary routes may have traffic signals to regulate traffic flows, but lower order routes will have roundabouts and unsignalised intersections.

Roundabouts are less expensive to operate and reduce delays for small vehicles outside of peak hours, but small roundabouts are inappropriate for long vehicles because they have large swept paths and need lots of space to accommodate the tracking of their rear wheels.

Smooth flow of traffic and a less interrupted operating environment reduce the costs of freight.

4.7 Speed limit

The value of travel time is high in the overall operational costs for freight transport. Higher speed routes are attractive for heavy vehicles, because they allow reduced travel times and therefore reduced costs for the products that are being delivered.

Higher order freight routes operate at higher speed limits to serve freight while recognising the needs for road safety. Lower order routes operate at lower speed limits.

4.8 Other matters

Some other matters that could have been used in identifying and defining an urban road freight hierarchy have not been included. These include lane widths, signal phasing to adjust for the slower initial acceleration of heavy trucks and ease of turning or tracking at channelised intersections.

Sydney, Newcastle and Wollongong have road networks that in many places were constructed before the invention of motor vehicles and trucks. In some places there are large challenges for trucks, which still need to access businesses and even residences.

5. Use of the hierarchy

Road hierarchies assist in decision making about the development, operation, maintenance and standards on each road. For example, road hierarchies help to decide whether grade separation, traffic signals, roundabouts or traffic calming are appropriate measures on various classes of roads.

The administrative classes of roads (State, Regional and Local) assist in high level road planning, but the usage of State Roads is very complex and varied. A further categorisation of administrative classes can give practitioners guidance about how to balance the needs of buses, cars, trucks and other road users at specific locations.

By defining a freight road hierarchy on the State Road system specifically to serve the needs of freight and the freight industry, guidance to practitioners can be given about the relative importance of giving freight movements specific priority, benefits or advantages while balancing the needs for facilities for other classes of road users.

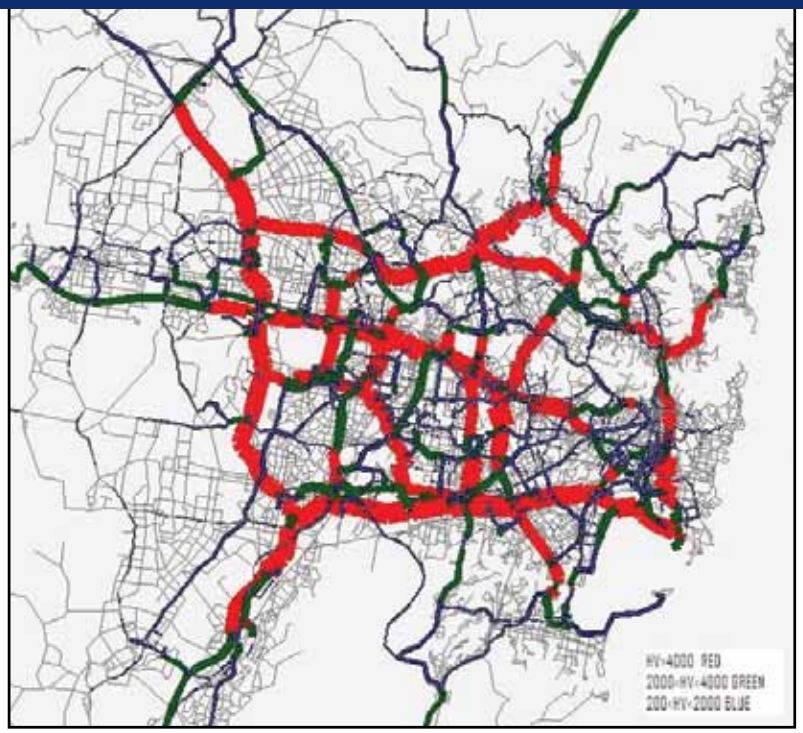
The freight road hierarchy will inform the planning, maintenance, operation and enhancement of State Road infrastructure. It will assist in relation to intersection design, traffic assessment, pavement design and maintenance, vertical clearances, directional signposting, road safety assessments and identifying needs for major road infrastructure. It will also assist in identifying appropriate levels of investment in freight infrastructure.

5.1 Specific uses for the metropolitan freight hierarchy include:

- Road design standards for higher order freight routes should be adequate for the efficient movement of large vehicles including B-Doubles. Characteristics such as lane numbers, lane widths, intersection types, curvature, gradient and traffic island layouts require particular attention to ensure that truck needs are met.
- Pavement strengths and pavement design lives for higher order freight routes should be adequate to meet the needs of the expected volumes of heavy vehicles, including Higher Mass Limits (HML) vehicles.
- Bridge and culvert strengths for higher order freight routes should be adequate to meet the needs of the expected volumes of HML vehicles.
- Pavement maintenance standards on major freight routes should be kept at a high level to ensure that vehicle operating costs of freight vehicles are not adversely affected.
- Overpasses and underpasses on higher order freight routes should be constructed with sufficient vertical clearances to meet the needs of the largest common legal modern trucks. A vertical clearance of 4.6 metres on these routes is highly desirable. Where there are low clearances that cannot be treated, clear high vehicle detours should be signposted, and warning detectors may be warranted.
- The vertical clearances provided in tunnels can be financially challenging, and must be developed having regard to the clearances on approach roads, however on major freight routes every attempt should be made to achieve a general clearance of 4.6 metres.
- New and upgraded intersections on major freight routes should be designed to accommodate heavy vehicles so that they can safely mix with other road users. As traffic demands grow (or change) on freight routes, roundabout configurations may need to be converted to signalised intersections and in other cases signalised intersections may need to be grade separated.

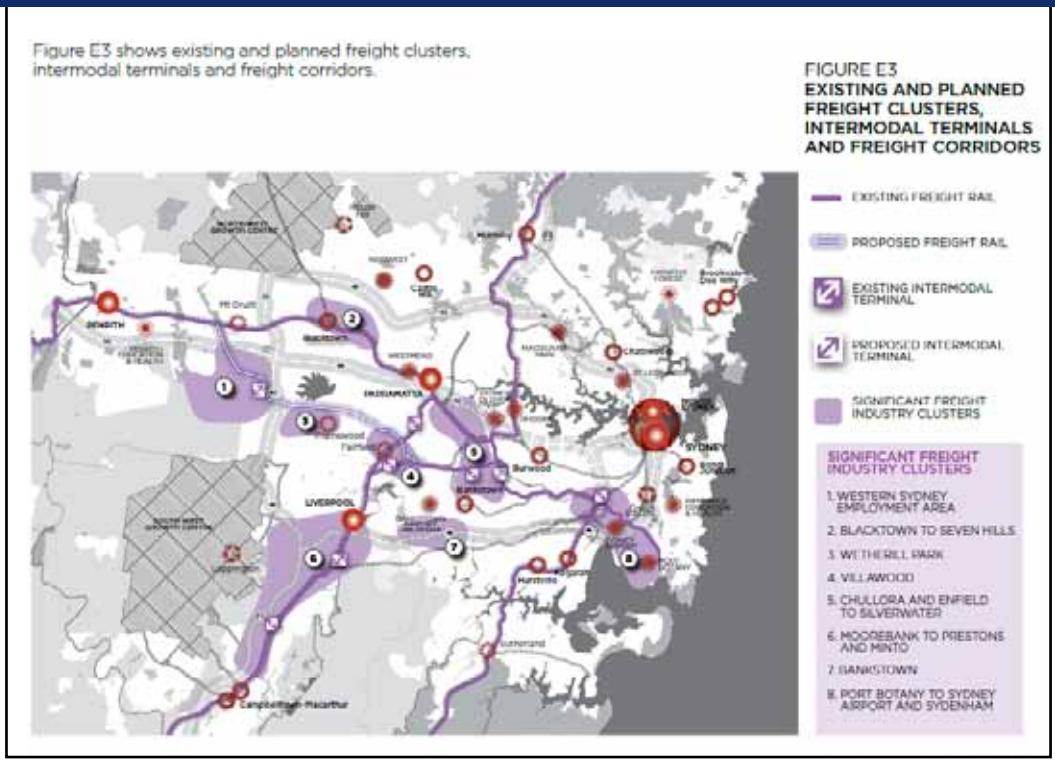
- Way finding signage on major freight routes should recognise the needs of the freight industry by signposting larger freight destinations such as ports and intermodal terminals. Standard detours should be provided for over-height or over-dimension vehicles as required.
- On high-speed roads where a driver is likely to have a lower level of concentration, long lengths of road with no shoulders or pull-over areas should be avoided to reduce the risk of severe rear end collisions.
- An appropriate configuration and layout of pedestrian, bicycle and vehicular access to various schools should be developed recognising the differing levels of routes in the freight hierarchy to ensure the safety and security of children and adults when in proximity to schools, while giving appropriate support to freight efficiency.
- In identifying bicycle routes and bicycle infrastructure, due recognition should be given to the road freight hierarchy in order to minimise conflicts between cyclists and heavy vehicles.
- Management of access to the road from adjoining land should reflect the freight function of roads. At the highest level, motorway standards of boundary control or the limitation of frontage access is very desirable to reduce the number of driveways or intersections which might disrupt flows. On routes of intermediate standing, it is appropriate to direct access onto side roads or to consolidate accesses to reduce their overall number.
- The hierarchy will assist in identifying the need for freight-focused investment, or for freight-focused programs of work to maintain and enhance our state-wide productivity.
- Planning, prioritising and developing minor and major enhancements to the State Road Network in a way that reinforces an urban freight hierarchy, caters for freight needs and seeks to sustain benefits for heavy vehicles.
- Responses to major development applications should be prepared within the context of the road freight hierarchy, so that the locations and configurations of accesses are appropriate to the road freight hierarchy.
- In balancing the needs for scarce road space between private vehicles, trucks and buses, higher order freight routes should not disadvantage truck movements.
- Planning and prioritising for freight facilities such a pull-over bays, rest areas, enforcement areas and service centres should be given due recognition to the road class within the road freight hierarchy.
- Support the integration with other modes especially at rail intermodal terminals.
- The use of urban road freight hierarchy guides practitioners in identifying inappropriate locations for installations and facilities that hamper freight movements, such as some traffic calming devices.

Appendix A Current heavy vehicle traffic volumes Map for Sydney



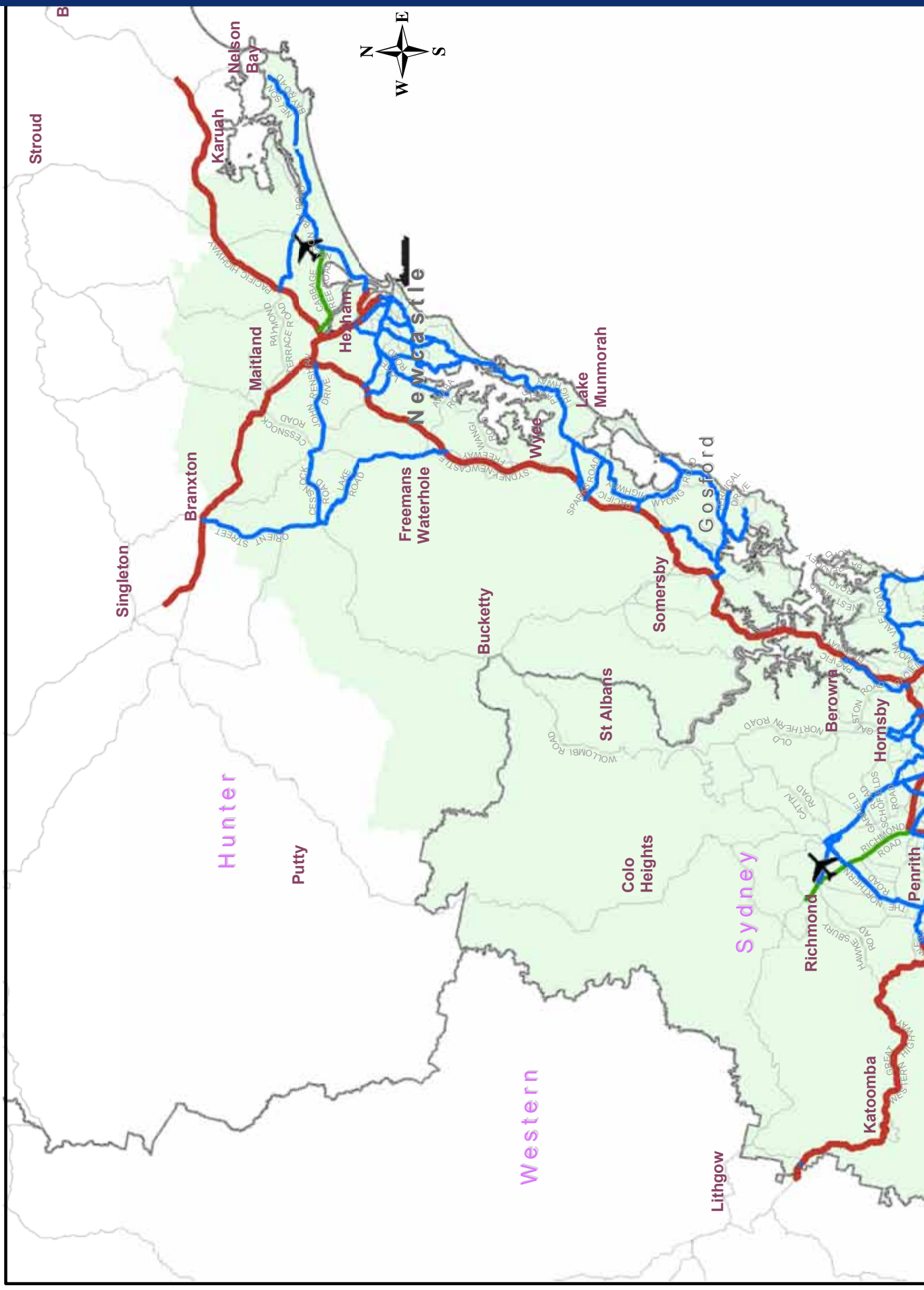
Source: Bureau of Transport Statistics Freight Movement Model

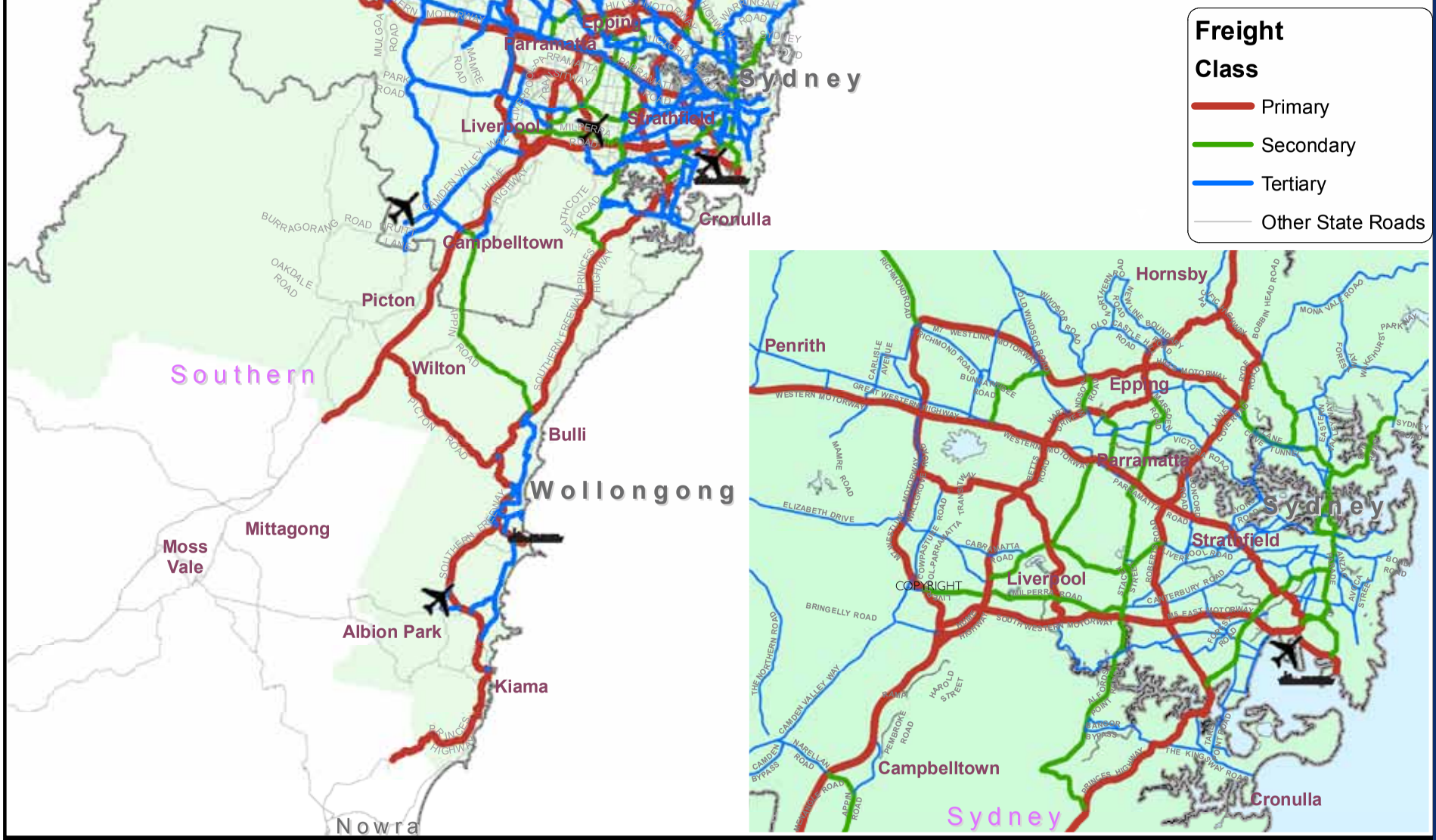
Appendix B Sydney Map highlighting industry clusters



Source: Department of Planning (2010) Metropolitan Strategy for Sydney 2036, p.144

Appendix C Greater Metropolitan Area Road Freight Hierarchy M





Greater Metropolitan Area Road Freight Hierarchy

Approximate Scale: 1:750000

10 5 0 10 20 Kms

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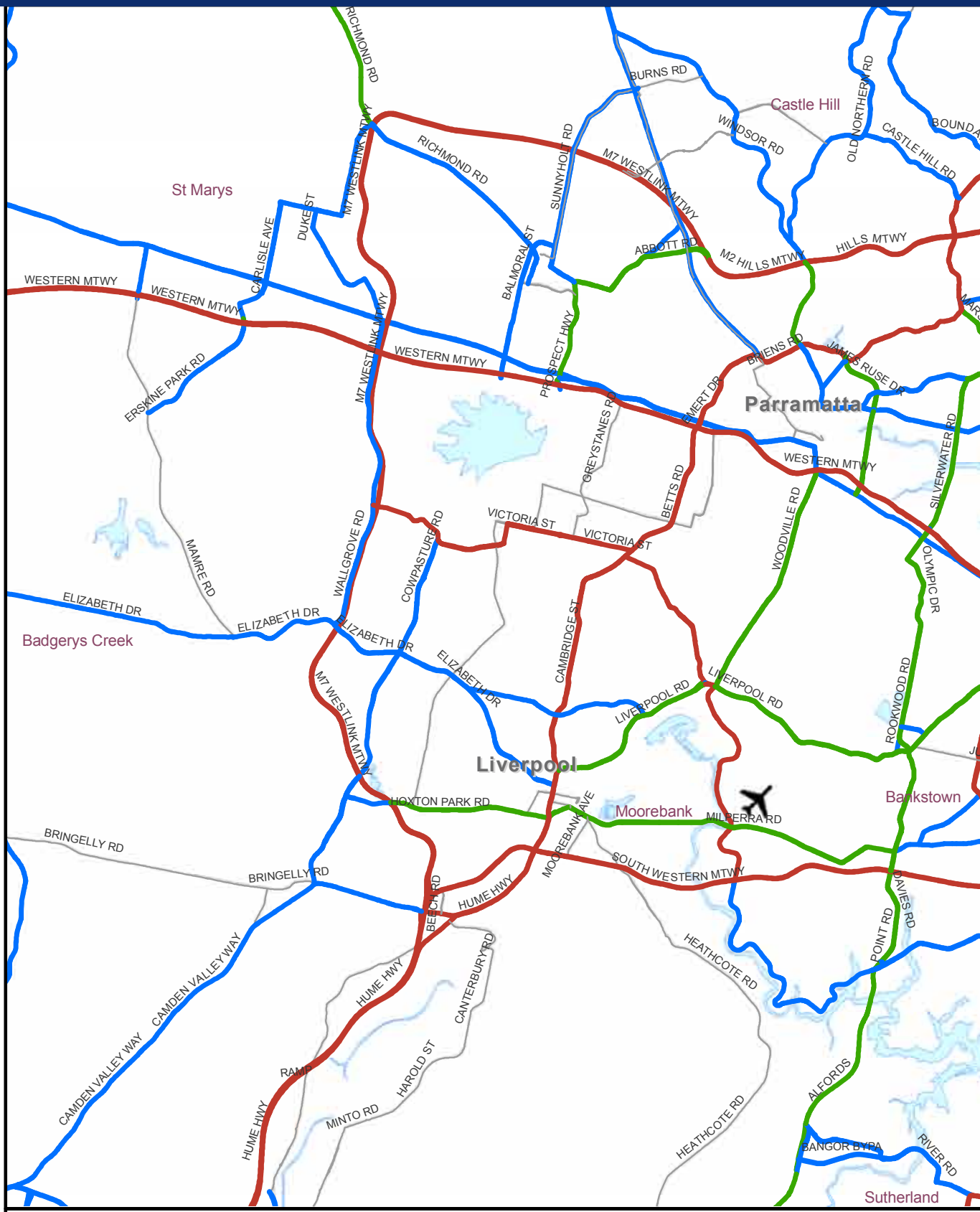
Appendix D Sydney Roads Freight Hierarchy Map



Sydney Road Fr

Approximate S

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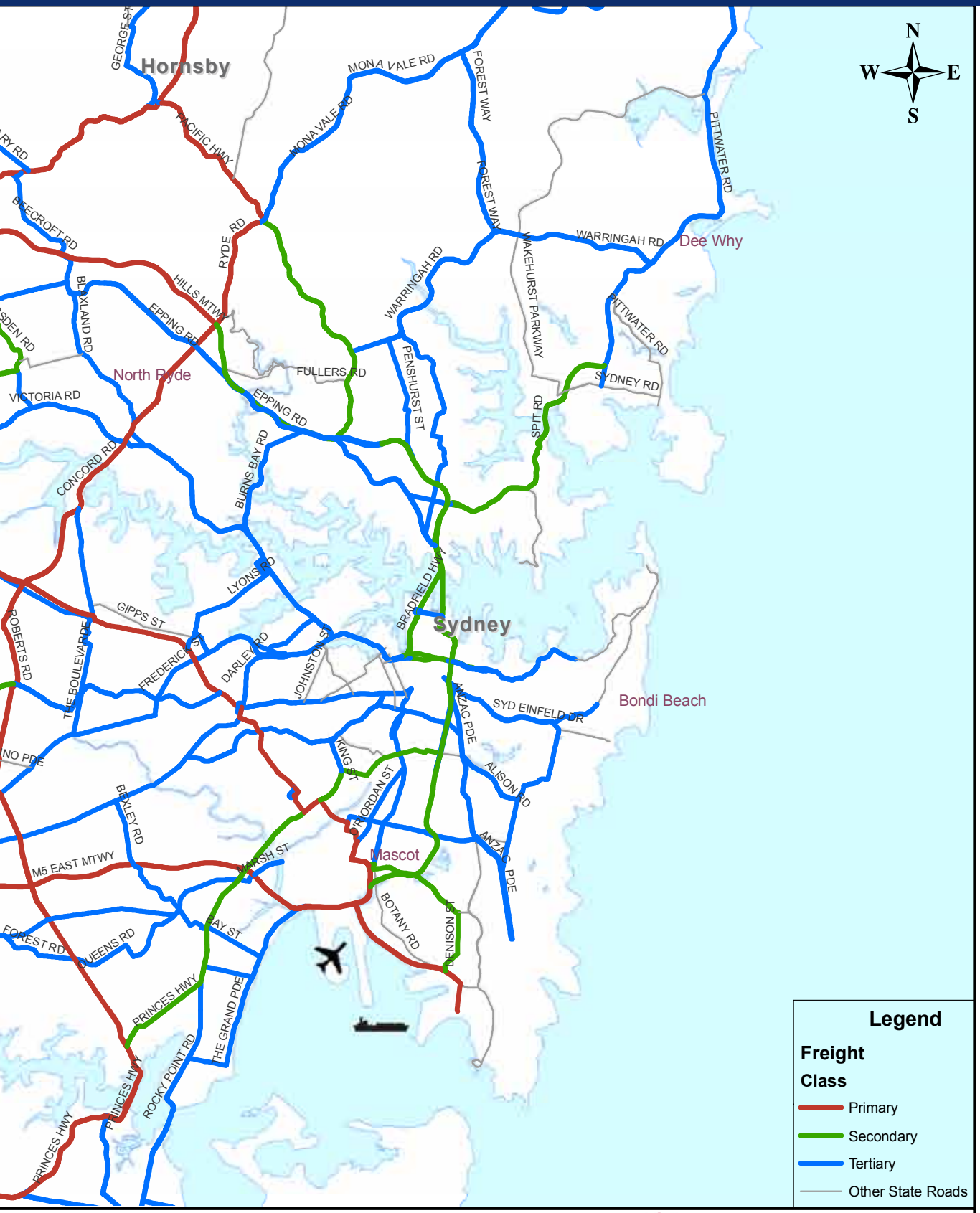

reight Hierarchy

Scale 1:154000

8 12 Km

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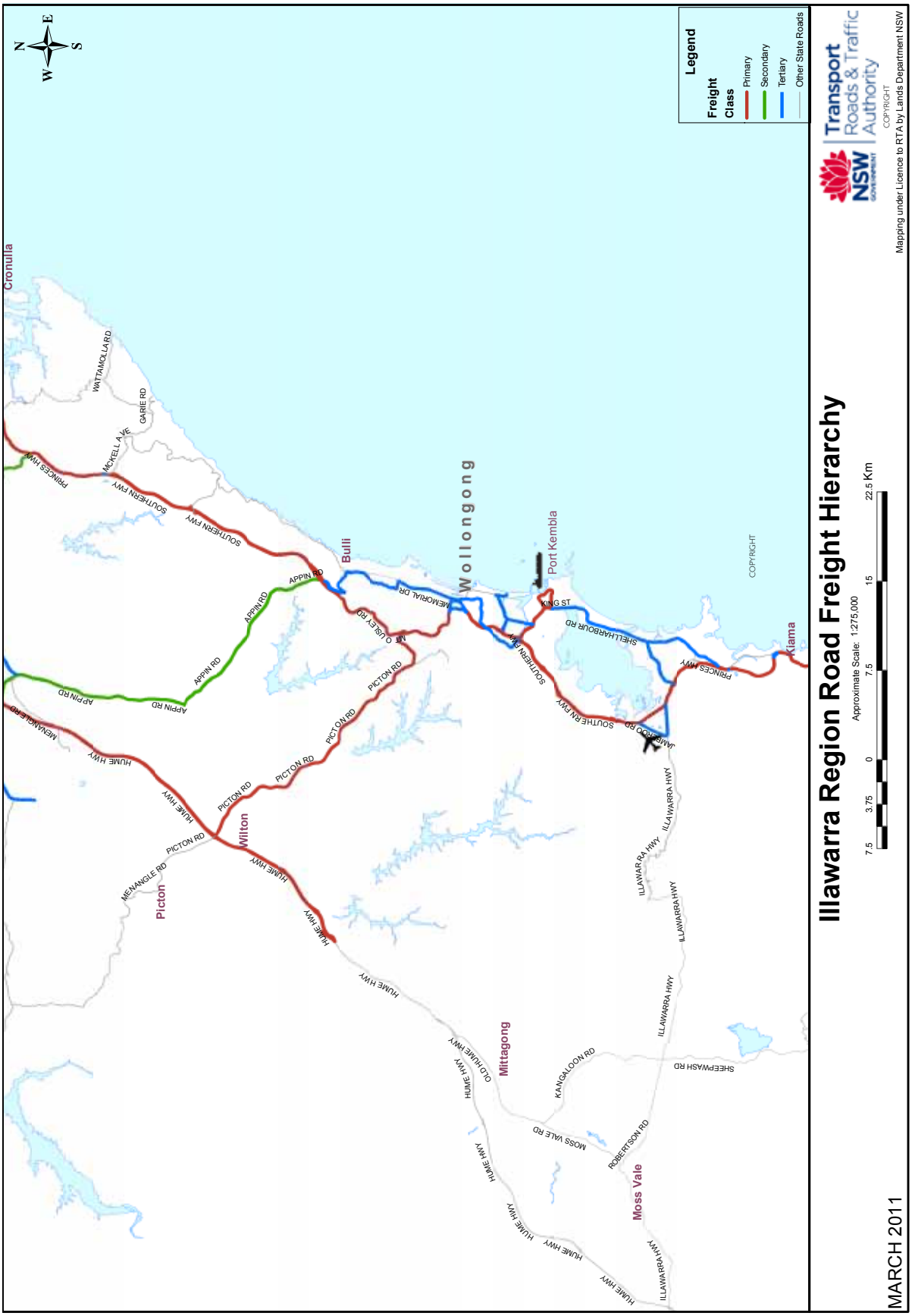
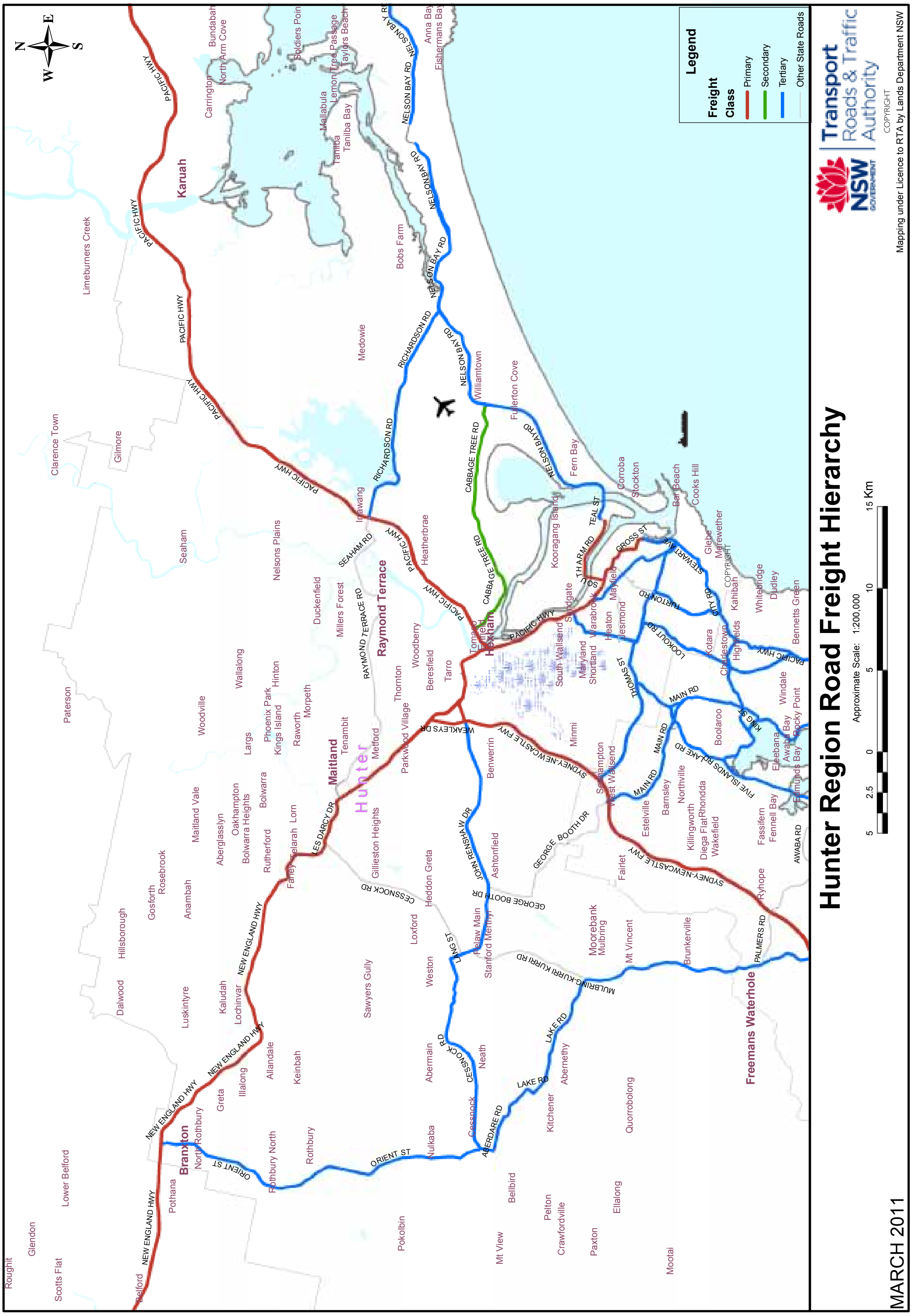
Appendix E
Illawarra Region Road Freight Hierarchy Map



Appendix F
Hunter Region Road Freight Hierarchy Map



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