A FOCUS ON FREIGHT ON QUEENSLAND'S INLAND HIGHWAY

January 2015

QTLC

QUEENSLAND TRANSPORT AND LOGISTICS COUNCIL

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ROAD OVERSIZE TRAIN

CONTENT

Foreword		6
About the Queensland Transport and Logistics Council (QTLC)		6
Glossary		7
1	Executive summary	8
2	Background	10
3	Scope and objectives	17
4	Methodology	18
5	Appraisal - Queensland Inland Highway (QIH)	20
6	Economic benefits	40
Appendix A		45
Appendix B		46
Appendix C		50

LIST OF FIGURES AND TABLES

Figure 1: Queensland water courses 11

Figure 2: Queensland road freight flows 14

Figure 3: General freight movements Queensland 23

Figure 4: Bulk commodity flows Queensland 25

Figure 5: Heavy vehicle routes Queensland 26

Figure 6: Queensland north: historical floods 2011, 2012, 2013 27

Figure 7: Queensland south: historical floods 2011, 2012, 2013 28

Figure 8: Preferred inland freight route 30

Figure 9: Innisfail - Hann Highway - St George - Melbourne 31

Figure 10: Innisfail - Bruce Highway - Sydney - Melbourne 31

Figure 11: Innisfail - Cunnamulla - Melbourne 31

Figure 12: Daily freight tonnage on road network by region 32

Figure 13: Daily movements by region 32

Figure 14: Daily tonnage by vehicle type 32

Figure 15: Queensland road safety statistics - serious incidents 2007-11 34

Figure 16: Queensland road safety statistics - casualties 2007-2011 35

Figure 17: Queensland road network public de-coupling yards 36

Table 1: Resource coal growth 20

Table 2: QTRIP Investment Program 2014/15 21

Table 4: Travel times and distances on inland routes and Bruce Highway 29

Table 3: Daily inland freight movement 24

Table 5: Vehicle mass profile - tonnes 32

Table 6: Inland north-south HPV route 33

Table 7: Toowoomba Northern Territory HPV route 33

Table 8: Central Queensland HPV OSOM route 33

Table 9: Daily inland freight movements summary 37

Table 10: Inland route in the economic analysis (via St George) 40

Table 11: Trip savings via inland routes 41

Table 12: Productivity benefits (4% discount rate) 43

Table 13: Economically justified upgrades in Queensland 43

Foreword

As Queensland's peak freight transport and logistics advisory body to government, the Queensland Transport and Logistics Council (QTLC) is committed to representing industry to influence policy, regulation, infrastructure planning and investment to achieve sustainable and productive supply chains.

Central to this remit, the QTLC seeks to adopt a proactive approach in contributing to the freight agenda within Queensland, through the development and progression of various working papers and reports that will document the freight and logistics issues for both industry and government.

In line with this objective, the QTLC has developed a series of reports focusing on Queensland supply chains.

As Queensland seeks to increase its economic competitiveness in the global marketplace, it is critical that the productivity of our supply chains are optimised through the ongoing development of an efficient and resilient freight system.

To better understand supply chains in Queensland, the drivers of change, and the policy and infrastructure requirements to support future growth, the QTLC has undertaken an analysis of the global supply chain characteristics and policy imperatives driving economic development and growth and how these relate to proposed and existing infrastructure.

This report focuses on identifying a flood resilient inland freight route, connecting South East Queensland to Northern Australia and to the key nodal infrastructure that supports Queensland's major supply chains.

Supply chains are the cornerstone of the Queensland economy. Efficient and productive supply chains underpin economic growth and are critical to servicing the needs of Queenslanders and reaching global markets.

Because Queensland has a population geographically dispersed across large area, it is important that supply chains are resilient to network interruptions, particularly during catastrophic environmental events.

The Bruce Highway – the current key freight route that connects north Queensland to southern markets and nodal infrastructure – is vulnerable to road safety, flooding and capacity issues that threaten supply chain security.

On average, annual flood events typically close the highway at nine locations for greater than 48 hours at a time, with at least six locations closing for more than five days at a time.

The QTLC's Strengthening Queensland's Supply Chains report recommends the identification, assessment and establishment of an inland north-south freight corridor capable of accommodating high productivity vehicles.

To this end, the QTLC has identified and considered potential inland routes according to flood resilience, safety and supply chain benefit. It has also identified policy and infrastructure gaps required to achieve a feasible inland highway.

This preliminary analysis suggests that an inland road route from central and northern Queensland to South East Queensland and interstate could deliver a range of benefits relevant to productivity, safety and supply chain security, particularly to the agricultural and resources sectors.

About the Queensland Transport and Logistics Council (QTLC)

The QTLC is a cooperative industry and government advisory body that provides advice to industry stakeholders and state and federal governments on the development, planning, regulation and operation of freight and logistics transport, infrastructure and services in Queensland.

The QTLC is jointly funded by the Queensland Department of Transport and Main Roads (TMR) and the Australian Government's Department of Infrastructure and Regional Development (DIRD).

As the peak industry body representing the views of the freight transport and logistics industry, the QTLC advocates for the provision of infrastructure, regulation and policy that will support sustainable freight transport and logistics in Queensland.

The QTLC supports the efficient movement of freight in order to support sustainable and productive economic development and prosperity by pursuing:

- appropriate and ongoing investment in supply chain infrastructure
- integrated regional and urban planning frameworks that secure land for current and future freight corridors
- an access policy and regulation environment that facilitates productivity and innovation
- efficient integration and linkage of freight and logistics systems across the whole supply chain.

The QTLC works towards operational and strategic solutions to impediments and issues within the freight supply chain with both long term and immediate benefits for industry.

More information on the QTLC and its activities can be found at www.qtlc.com.au or by emailing admin@qtlc.com.au.

Glossary

BHAP	Bruce Highway Action Plan
CBD	Central business district
CQ	Central Queensland
CSG	Coal seam gas
CQTSCS	Central Queensland Transport Supply Chain Strategy
DAFF	Department of Agriculture, Fisheries and Forestry
DIT	Department of Infrastructure and Transport
FMCG	Fast-moving consumer goods
GRP	Gross regional product
GVM	Gross vehicle mass
HML	Higher mass limits
HPV	High productivity vehicles
HVAP	Heavy Vehicle Action Plan
HVS&PP	Heavy Vehicle Safety and Productivity Program
KPI	Key performance indicator
LNG	Liquefied natural gas
NHVR	National Heavy Vehicle Regulator
NSW	New South Wales
NT	Northern Territory
OSOM	Over-size over-mass
PBS	Performance-based standards
PoB	Port of Brisbane
QIH	Queensland's Inland Highway
QTLC	Queensland Transport and Logistics Council
QTRIP	Queensland Transport and Roads Investment Program
SEQ	South East Queensland
TEU	Twenty Foot Equivalent Unit
TMR	Queensland Department of Transport and Main Roads
TSRC	Toowoomba Second Range Crossing
WHUS	Warrego Highway Upgrade Strategy

1 Executive summary

As Queensland seeks to increase economic competitiveness in the global marketplace, it is critical we have a freight system that supports resilient, effective and efficient supply chains, and which can meet the current and future demands.

To that end the QTLC has undertaken an analysis of the global supply chain characteristics and policy imperatives that are driving economic development and growth, to understand how these relate to proposed and existing infrastructure.

Objective

In summary, the QTLC's objective is to:

Better understand supply chains in Queensland, the drivers of change, and the policy and infrastructure requirements to support future growth.

This analysis from the project is presented in three reports:

Future Freight in Queensland from a Global Supply Chain Perspective

This examines the major Queensland supply chains, global supply chain trends, policy imperatives and freight infrastructure. Eleven of Queensland's major supply chains are detailed through 'Supply Chain Perspectives', with this information informing the subsequent investigations.

The Toowoomba Second Range Crossing (TSRC)

Using information derived from the Supply Chain Perspectives and an Industry Forum, this report examines the supply chain benefits, freight efficiency opportunities and broader economic opportunities provided by the TSRC.

Queensland's Inland Highway (QIH)

This report identifies a flood resilient inland freight route, connecting South East Queensland to Northern Australia, and to key nodal infrastructure that supports Queensland's major supply chains.

The focus of this document is Queensland's Inland Highway (QIH), with the overall objective to:

- **identify potential inland routes that are resilient during flooding, provide Queensland supply chains feasible and safe alternatives, and connect points of origin with domestic and export markets**
- **nominate any policy and infrastructure gaps required to achieve a QIH.**

As the Commonwealth Government and Queensland Government seek to increase economic performance through agriculture and expansion of the resources sector, there is a need to establish a viable alternative to the Bruce Highway, which is vulnerable to a raft of road safety, flooding, capacity and congestion issues.

The QIH is an existing road network, comprising a series of highways and developmental roads that connect north-south to provide a viable alternative to the Bruce Highway. The location of these inland routes is also closer to major economic supply chains for agricultural and horticultural production, and the resources sector.

Supply chains currently operating throughout inland Queensland that would benefit from the productivity gain available from an inland freight spine include:

Current daily inland freight movements summary

Supply chain	Daily inland movements
General freight	7,777
FMCG	671
Livestock and feed	528
Fuel	463
Cotton	21
Horticulture - southern markets	208
OSOM	72
Grain - farm to hub	106
Total return trips	9,846
Total trips - traffic census	11,179

The QTLC undertook an appraisal of possible QIH route options, considering flood resilience, road safety, freight flows, level of access, travel time and distance. This analysis identified a number of advantages for movements to and from Melbourne via an inland corridor. While the benefits were not as well defined, the QIH also provides an alternative for movements to and from Brisbane, Sydney and northern Queensland.

QIH routes include:

- Castlereagh Highway
- Carnarvon Highway
- Dawson Highway
- Gregory Highway
- Gregory Developmental Road
- Flinders Highway

The advantages of a QIH for planned growth in agriculture, resources and associated supply chains include:

- Inland HPV routes road safety performance is better than the Bruce Highway.
- Current inland HPV routes could form a QIH that offers time improvements of around 10% to 25% over the Bruce Highway from Far North Queensland to Sydney and Melbourne.
- Current inland HPV routes could form a QIH with a small time disadvantage over the Bruce Highway from Far North Queensland to Brisbane, which could be offset by increasing HPV access.
- Inland HPV routes are resilient to natural disasters, providing options for additional routes.
- Inland HPV routes experience lower freight volumes and traffic flows than the Bruce Highway, and a transfer of freight to a QIH would reduce network impacts on the Bruce Highway.
- HPV vehicles on the QIH could lead to productivity gains of around 23% for PBS Level 3 and 49% for PBS Level 4.

A high productivity vehicle is defined as any multi-combination vehicle used for the purpose of moving freight, as per the Heavy Vehicle Action Plan.

Further analysis of the economic benefits of an established QIH indicates that the potential productivity benefits (travel time and vehicle operating cost savings) in shifting heavy vehicle traffic to an inland highway would be approximately $642 million over 30 years. Adding safety and environmental benefits, the total benefits over the 30 year period would be $689 million.

During a flood event in central/north Queensland, a larger proportion of coastal traffic might be expected to use the inland route than would normally be the case. Based on the traffic figures used in this report, and making assumptions regarding the expected destination of these vehicles, the delay cost for a seven-day flood event where the Bruce Highway is closed entirely would be $9.5 million. Were this event to occur annually, the benefit of diverting vehicles inland would be around $196 million.

The potential productivity benefits of an inland highway in normal weather conditions, representing savings in time and vehicle operating costs, appear to be much greater than those associated with provision of a more flood-resilient alternative to the Bruce Highway. The analysis has focused on one inland route – Townsville to Melbourne via St George – to illustrate the potential of the concept. Achievement of a modest diversion of heavy vehicle traffic to that route could yield benefits sufficient to justify an upgrade program in Queensland of between $237 million and $355 million.

The QIH would clearly deliver supply chain advantages. To deliver economic benefit in alignment with the agriculture and resource growth plans, and be regarded as catalytic infrastructure, a number of policy settings need to be aligned including:

- alignment of infrastructure investment and QIH access (as outlined in the Heavy Vehicle Action Plan) to strategies and plans for growth in the agriculture and resource sectors
- engagement with industry to inform investment and QIH access arrangements, and to promote use of the QIH
- planning settings that encourage establishing processing and value-adding facilities and logistics hubs near the QIH to minimise local road network access issues
- destination access for HPV at or in proximity to ports, airports and processing facilities, which should be planned to meet supply chain requirements.

This preliminary analysis suggests that the QIH should be given due consideration as an alternative route to the Bruce Highway. It identifies a range of network resilience and productivity benefits that will strengthen and support Queensland's supply chains.

2 Background

2.1 Supply chain resilience

Supply chains are the cornerstone of the Queensland economy. Efficient and productive supply chains underpin economic growth and are critical to servicing the needs of Queenslanders and reaching global markets.

Because Queensland has a population geographically dispersed across a large area, it is important supply chains are resilient to network interruptions, particularly during catastrophic environmental events.

In 2012, the Federal Department of Agriculture, Fisheries and Forestry (DAFF) commissioned a study into the resilience in the Australian food supply chain. This included a detailed and specific examination of the 2010/11 Queensland flood event and Tropical Cyclone Larry.

The DAFF report[1] supports the potential for a resilient inland freight route. It identified that restocking the food supply chain was possible by routing stock through the far west of Queensland from Sydney and Melbourne. The report also considers a number of other issues such as:

- stronger links to sea freight, as it was successfully used during the flood crisis to deliver emergency food and health supplies
- a closer understanding of how to supply animal feedlots during natural disasters
- the impact of reduced refrigerated rail transport capacity, and increased reliance on southern states to supply road-based refrigerated transport
- the need for additional storage capacity for specific foods (predominately imported) in Far North Queensland
- the major potential risk of fuel shortages, and the need for a corresponding contingency plan.

Policy and governance issues were also identified, relating to the lack of timely and accurate information on closures of supply routes.

1 Resilience in the Australian Food Supply Chain, Department of Agriculture, Fisheries and Forestry, Australian Government, February 2012

2.2 The Bruce Highway

An inland freight route has been discussed[2] as a potential solution to resilience problems associated with Queensland's Bruce Highway.

The Bruce Highway is regarded as a major priority area given its issues relating to road safety, flooding and capacity. It is one of the most dangerous roads in Australia, accounting for 17% of all national network fatalities on 7.5% of the national network.

Significant flooding is an annual reality along the Bruce Highway between Brisbane and Cairns, resulting in road closures at creek and river crossings[3]. In the 2011 flood event, eight sections of road were closed on the network. Closures ranged from two to 14 days, with a total of 56 outage days, delaying an estimated 1.8 million tonnes of freight[4]. This flooding issue on the Bruce Highway is significant, and to solve it via infrastructure solutions alone would require a significant long-term investment. Other options must be considered.

In the 2010/11 flood event, more than 78% of Queensland was declared a disaster zone. More than 2.5 million people were affected and 29,000 homes and businesses suffered inundation[5]. Across the Queensland transport network, 9,170 km of road, 4,784 km of rail and 89 state-owned bridges and culverts were affected[6].

2 New Push for Inland Highway, ABC Rural, 29 April 2014; Northern Australia Renewed Push to Seal Inland North Queensland Highway, ABC News, 19 August 2014
3 Bruce Highway Action Plan 'Out of Crisis' TMR October 2012
4 Queensland Floods 2011 Impact Analysis for Freight Vehicles, Queensland Department of Transport and Main Roads, December 2011
5 Queensland Floods Commission of Inquiry, Final Report, March 2012
6 Resources for Reconstruction, Discussion paper No 1, Queensland Government, September 2011

While this was a significant event in itself, it is not an isolated occurrence. The Insurance Council of Australia reports that since 1973, Queensland has experienced 57 combined major natural disasters (21 storms and hail events, 19 cyclones and 17 flood events[7]). Of these disasters:

- 26 covered South East Queensland and Northern New South Wales
- 18 were spread across north and Far North Queensland
- 13 were in the Wide Bay, central, western and south west Queensland regions.

Figure 1 shows the proximity of the major water courses in Queensland to the Bruce Highway, demonstrating the vulnerability of the network to flooding

Figure 1: Queensland water courses

The Bruce highway is also vulnerable to congestion bottlenecks and vehicle queuing in the following road sections:

- Brisbane to Maryborough
- Gladstone north to Rockhampton
- Sarina to Mackay
- North of Townsville
- Gordonvale to Cairns.

7 Historical Disaster Statistics, Insurance Council of Australia, http://www.insurancecouncil.com.au/industry-statistics-data/disaster-statistics/historical-disaster-statistics, October 2014

Queuing and the resultant delays continue to increase due to growth in freight transport and general traffic volumes. For example, around 80 daily northbound and southbound over-size over mass (OSOM) movements travel along the Bruce Highway between South East Queensland, and central and northern Queensland[8]. These movements reduce overtaking and, with the increasing duration and frequency of road rehabilitation works, impact on queuing and result in transit delays.

Such issues are common the length of the Bruce Highway and this report will investigate alternative routes to mitigate delays in freight transport associated with flooding and congestion. While the 10-year upgrade program to the Bruce Highway will overcome current deficiencies, upgrades will not necessarily provide for a longer term solution to cater for substantial growth, as identified in Moving Freight[9]. Driven by strong economic activity, including population growth and international trade, Queensland's freight task is expected to increase from 871 million tonnes in 2010/11 to between 1,643 and 1,741 million tonnes by 2026.

Currently, access across the full length of the Bruce Highway is restricted to PBS2A/B-Double combinations. The infrastructure capacity improvements covered by the Bruce Highway Action Plan (BHAP) predominately relate to additional overtaking lanes in regional areas and upgrading from two to four or six lanes in more populous areas. The infrastructure flood improvements are primarily to address flood immunity and therefore resilience for sections of highway that are impacted by regular flooding. The BHAP does not address issues relating to increased access for high productivity vehicles (HPV) vehicles.

A key focus of the upgrade program is to ensure that supply chains for food and vital emergency supplies are open during times of flood. The BHAP identifies that a risk of inaction would have a detrimental impact on Queensland and local economies due to traffic delays, unreliable travel patterns and the perceived danger of the highway. Major projects reliant on the Bruce Highway may also be at risk as they incur loss of economies of scale due to delays.

Annual freight volumes reliant on sections of the Bruce Highway range from:

- 55 to 96 million tonnes in South East Queensland
- 25 to 45 million tonnes north towards the Wide Bay and Burnett region
- 10 to 15 million tonnes between Gin Gin and Rockhampton
- 5 to 10 million tonnes to Far North Queensland[10].

8 OSOM Permit Data 2012-13 Queensland Department of Transport and Main Roads

9 Moving Freight, Queensland Government, Transport and Main Roads, December 2013

10 Road Freight Tonnage Map Department of Transport and Main Roads, 2010

A portion of these volumes is comprised of movements generated by the following supply chains:

- fast-moving consumer goods
- sugar
- fuel
- OSOM and mine inputs
- TEU and general freight
- project and construction cargo
- livestock and meat
- horticultural.

The Bruce Highway underpins an estimated economic contribution of $11.5 billion per year and supports more than 60,000 jobs in Queensland[11].

2.3 Economic development

2.3.1 Northern Australia

Agriculture, worth an estimated $13.7 billion annual gross value to the Queensland economy, is key in the Queensland Government's four pillar strategy for economic growth. The strategy aims to double agricultural production by 2040[12]. The Commonwealth Government has a focus on the '2030 Vision for Developing Northern Australia'[13], with a large component of this vision relating to inland, coastal and northern Queensland. The Commonwealth vision is to develop a premium produce food bowl which would be supported by actions relating to bilateral free trade, water development projects and appropriate infrastructure. These economic infrastructure projects include dams, roads, rail, air and ports to service northern Australia.

It is estimated that there are five to 17 million hectares that could be developed for primary production in northern Australia, spanning from the Dawson, Burdekin, Flinders and Gilbert Rivers in Queensland across to the Ord River in the East Kimberley.

In March 2014, the Queensland Government made a submission to the Commonwealth Government stating: *'The timely and cost effective provision of catalytic infrastructure will be a critical factor in achieving sustainable economic growth for Northern Australia'*[14].

A further submission on agricultural competiveness[15] identifies a number of specific projects and opportunities for northern Australia including:

- identification of crops best suited to growing conditions in northern Australia, including the market, economic potential and supporting supply chain infrastructure required
- construction of an abattoir in northern Queensland to process 100,000 head of cattle per year
- CSIRO research into transport and logistics in the proposed development province, focused on transport routes for the beef industry.

The resource sector, worth $38 billion gross regional product[16] to the Queensland economy, operates from a number of key provinces[17]. These provinces are located in remote and inland locations such as:

- North West Mineral Province, serviced from Mount Isa and Townsville
- Weipa and Cape York, serviced from Weipa and Cairns
- Charters Towers district, serviced from Townsville
- Bowen, Surat and Galilee Basins, serviced from north, central and southern Queensland centres including Mackay, Moranbah, Dysart, Emerald, Blackwater, Clermont, Toowoomba, Dalby, Miles and Chinchilla
- Cooper and Eromanga Basins, which are remote and serviced from western centres such as Roma and Charleville, and from South Australia.

The forecast and potential growth in the resource sector is substantial, with the investment projected to be $34 billion[18] between 2014 and 2017. This investment is spread across infrastructure such as:

- mines and processing facilities for both coal and other minerals
- coal seam gas (CSG) and liquefied natural gas (LNG) infrastructure
- rail, ports and harbours.

This investment will increase the resource sector output and add to the Queensland economy through direct and indirect expenditure during construction and operational phases, providing royalties for the life of the resource.

11 2030 Vision for Developing Northern Australia, Brian Loughnane, Liberal Party, June 2013
12 Queensland's Agriculture Strategy DAFF 2013
13 The Coalition's 2030 Vision for Developing Northern Australia June 2013
14 Inquiry into the Development of Northern Australia, Queensland Government Submission 219, March 2014
15 Agricultural Competiveness White Paper Submission – IP690, Queensland Government May 2014
16 Economic Contribution of the Resources Sector 2012/13 Fast Facts, Queensland Resources Council
17 ResourcesQ Foresight Study, Queensland Government Department of Natural Resources and Mines, 2013
18 Major Projects Report 2014, Queensland Major Contractors Association (BIS Shrapnel) February 2014

To support current and future growth objectives, the Queensland Government has developed a Central Queensland Transport Supply Chain Strategy (CQTSCS)[19]. The CQTSCS is a multimodal strategy for managing future transport demand within the Galilee and Bowen Basins and primary production regions.

Development of an inland port is also a consideration of this strategy.[20] The inland port would be established to facilitate the modal shift from road to rail of mining inputs and agricultural exports. Further, it would act as a hub for value adding activities for both the resource and primary production sectors. A preferred location for this inland port is near Emerald in Central Queensland.

An inland freight route would enable a number of these economic growth strategies to link existing networks and freight corridors to access domestic and export markets.

2.4 Freight flows

A number of supply chains are heavily reliant on inland routes to move between sources of production and value adding nodes, and finally to domestic or export markets or points of consumption. The supply chains that move product north-south and west-east on inland routes include:

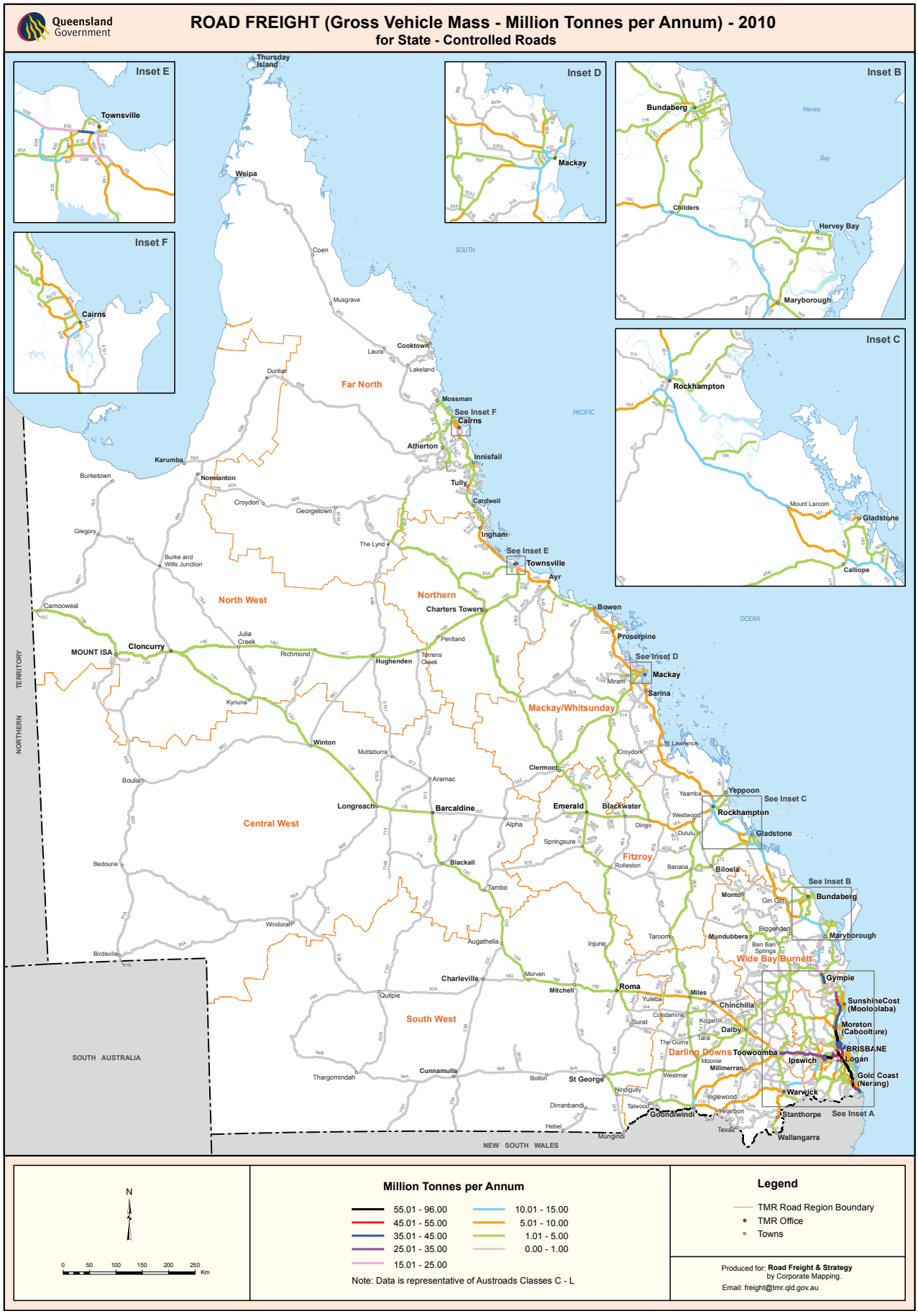
- livestock, moving from the Northern Territory and outback Queensland to pastoral leases, sale yards, feedlots and abattoirs, typically in a west-to-east flow, with movements across the New South Wales border in both directions
- grains, moving north to south from inland growing regions in central and southern Queensland and southern states to feedlots, and then west to east to reach domestic and export markets
- cotton from inland growing regions in central and southern Queensland and northern New South Wales, with seed moving north to south to feedlots; and lint and seed moving west to east to reach export markets
- fuel, moving west from ports and the Brisbane refinery to reach population centres, agricultural, mining, transport and industrial operations
- project, construction, OSOM and mine inputs, moving west from ports and industrial estates to reach project and mining sites
- horticulture from production regions in the Lakeland Downs, Atherton Tablelands, Innisfail, Tully, Bowen, Bundaberg, Gympie, Caboolture, Gatton, Lockyer Valley, Darling Downs and the Granite Belt, moving in all directions to access domestic markets in all Australian states and export hubs at airports and ports
- general freight, moving east to west to service outback Queensland and the Northern Territory.

Freight volumes currently using these routes range from one to five million tonnes a year, significantly lower than volumes experienced on the Bruce Highway. Access on these inland routes is for Type 1 road trains and B Triples, with some access further north and west for Type 2 road trains and quad road trains.

Figure 2 shows that, based on the most recent Department of Transport and Main Roads (TMR) freight flow analysis, the inland road infrastructure network carries the lightest freight load of Queensland's state controlled roads. Despite the relatively low volumes, inland routes are critical for transporting commodities from rural point of origins to domestic and export markets, as well as moving fast-moving consumer goods (FMCG) to service rural and remote populations. For further information, refer Appendix A.

19 Central Queensland Transport Supply Chain Strategy AECOM Nov 2013
20 Central Queensland Transport Supply Chain Strategy AECOM Nov 2013

Figure 2: Queensland road freight flows



Source: Queensland Department of Transport and Main Roads

2.5 Existing inland infrastructure

Queensland has a long history of major natural disasters, typically involving cyclones and flooding that predominately impact coastal Queensland. This establishes the requirement for a resilient infrastructure network to support a number of Queensland's major economic supply chains, especially in times of natural disaster.

The supply chains most likely to be impacted during flooding and require alternate networks include:

- FMCG, food and perishable goods
- livestock and grain to feedlots
- fuel.

Supply chains that require alternate networks for continuation of economic activity include:

- livestock and meat production
- grain and cotton to reach ports for export
- horticulture for domestic and export markets.

Acknowledging that the Bruce Highway has safety, flooding and capacity issues, the need for an alternative, resilient inland freight route is apparent.

While the need for an inland highway has also recently been a topic of discussion in the media[21], such a route has existed and been used in some form for many years. There are a number of inland north-south routes that can support high productivity vehicles (HPV) including:

- New England Highway
- Carnarvon Highway
- Leichardt Highway
- Castlereagh Highway
- Landsborough Highway
- Gregory Highway
- Matilda Highway
- Mulligan Highway
- Kennedy Highway
- Mitchell Highway
- Carnarvon Development Road
- Fitzroy Development Road
- Gregory Developmental Road
- Kennedy Developmental Road
- Peninsula Development Road.

North-south routes connect Australia from east to west via:

- Warrego Highway
- Gore Highway
- Balonne Highway
- Cunningham Highway
- Dawson Highway
- Peak Downs Highway
- Capricorn Highway
- Flinders Highway
- Barkly Highway
- Palmerston Highway
- Gulf Developmental Road
- Burke Developmental Road.

These north-south and east-west major road corridors can combine in multiple ways to provide access from production to consumption and/or processing areas, providing a number of possible routes. The combination of roads used to form a route will provide varying performance in journey time, distance travelled and vehicle combination type access. This is discussed further in this report.

An initial step to establish a Queensland Inland Highway (QIH) is to identify what inland routes are resilient in times of flood and how they connect markets. The next step is to identify which of those routes is acknowledged by users of existing infrastructure (the Bruce Highway, for example) as a viable alternative. There is also a need to identify what else must be done to support a QIH as an alternative to the Bruce Highway.

The identified existing routes will be the basis of this resilience analysis.

Responding to calls by industry for an identified inland route, the Queensland Government has gone some way towards answering the preceding questions in the Heavy Vehicle Action Plan (draft).

21 New push for inland Highway, ABC Rural, 29 April 2014; Northern Australia Renewed push to seal inland north Queensland highway, ABC News, 19 August 2014

2.6 Heavy Vehicle Action Plan

The Heavy Vehicle Action Plan (HVAP)[22] , currently in draft, was prepared by the Department of Transport and Main Roads in consultation with industry. It intends to identify appropriate infrastructure investments that aid productivity for freight efficient vehicles.

The objective of the HVAP is to support Queensland's economic growth, particularly in the agriculture and resource sectors. This will be achieved by ensuring a fit-for-purpose road network that helps minimise transport costs and does not hinder productivity.

The HVAP identified that certain routes be designated as higher priority freight routes and considered for infrastructure investment to support high productivity vehicles (HPV). The HVAP has also identified potential benefits.

The HVAP has detailed infrastructure issues that impact road safety and the performance of HPV. These issues are proposed to be addressed through a future infrastructure development program. These infrastructure issues include:

- pavement vertical loading: ensuring that load applied to roads by axle groups conform to the limits that apply under General Mass Limits, Concessional Mass Limits or Higher Mass Limits
- pavement horizontal loading: ensuring that road wear caused by horizontal forces such as turning, acceleration and braking is minimised
- tyre contact pressure distribution: minimising road wear from excessive contact pressure by tyres and setting minimum tyre widths
- bridge loading: limiting the maximum effect on a bridge acceptable to the bridge owner.

The HVAP specifically examines routes that are required to support heavy vehicle movements for the agriculture and resource sectors, and identified the need for:

- an inland north-south HPV route
- a Toowoomba-Northern Territory HPV route
- a Central Queensland HPV and an OSOM route,
- investment on the Kennedy and Gregory Developmental Roads, Flinders Highway and Clermont to Alpha Road to support agricultural movements.

22 Heavy Vehicle Action Plan Stage 2 – Route Identification, Queensland Department of Transport and Main Roads, June 2013

The HVAP was developed in consultation with industry and suggests:

- increased access to Type 2 road trains and PBS Level 4 vehicles on the north-south routes (potentially leading to greater supply chain efficiency)
- increased access to Type 2 road trains and PBS Level 4 vehicles closer to Toowoomba from the current location west of Roma
- increased access on the Peak Downs Highway from B- Double to A-Double.

Benefits stated from these actions include:

- freight may move away from the Bruce Highway, which will relieve some of the safety, congestion and capacity issues
- improved supply chain cost base to compete for new markets in the Northern Territory currently serviced from South Australia and Western Australia
- productivity and efficiency gains such as:
  - a 5% shift of B-Double freight movements from the Bruce Highway (215,000 annual trips) to a north-south route would lead to a 49% reduction in movements if by a Type 2 road train QUAD, with a 5% reduction in pavement wear
  - using A-Doubles rather than B-Doubles on Peak Downs Highway would reduce movement through urban Mackay by 23%.

This report supports the recommendations of the HVAP, with the intention to add to the HVAP body of work. This report identifies further benefits of an inland priority freight route and a number of alternatives, and specifically addresses road safety, natural disaster resilience, increased capacity opportunities and access.

3 Scope and objectives

The QTLC has produced three reports focusing on Queensland supply chains. This document is the third, providing:

A focus on the Queensland Inland Highway - an examination of a resilient inland freight route connecting South East Queensland to Northern Australia and key nodal infrastructure.

3.1 Overall project objectives

In summary, the overall project - consisting of the three primary reports, 11 Supply Chain Perspectives[23] and an analysis of the related legislative and policy[24], has the objective of:

Better understanding supply chains in Queensland, the drivers of change, and the policy and infrastructure requirements to support future growth.

In detail, QTLC's objectives are to:

- develop a clear view on supply chains that underpin the Queensland economy and what will drive supply chain change into the future
- define the infrastructure required - current, proposed and not yet identified - to enable the efficient, productive and safe flow of goods; and establish how the resultant benefits will accrue, and in what form
- identify policy and governance settings that are required to allow for success in each supply chain category
- identify additional policy, governance and infrastructure requirements to ensure resilience in Queensland's supply chains in times of natural disasters and unplanned crisis
- influence infrastructure design and/or investment by providing broad initial consideration of the economic and productivity benefits that can be leveraged by better optimising existing or committed corridors.

23 The Supply Chain Perspectives are included in Report 1 of this Project, A focus on Future Freight in Queensland – QTLC
24 Freight Transport in Queensland, Legislative & Policy Background & Context - QTLC, July 2014

3.2 Project scope

While there is an unprecedented level of investigation and activity across a broad range of supply chains and related areas at the time of conducting this project, the QTLC has chosen to focus this project on:

- the Toowoomba Second Range Crossing
- a potential inland road transport route to improve resilience: the Queensland Inland Highway (QIH).

3.3 Specific objective - focus on QIH

The overall objective of this component of the project is to:

Identify potential flood resilient inland routes that provide Queensland supply chains with feasible and safe alternatives that connect points of origin with destinations, and nominate any policy and infrastructure gaps required to achieve a QIH.

Specific objectives are:

- identify potential inland route/s that are resilient and contribute to improved productivity
- examine the performance of these inland routes from a resilience, road safety and a capacity perspective
- identify what supply chains will benefit from a QIH and how will these benefits be realised
- identify what policy frameworks will be impacted and what infrastructure gaps must be filled to achieve a QIH.

4 Methodology

4.1 Overview

Key inputs used in this report include:

- Queensland Supply Chain Perspectives
- TMR road performance data during flood events from 2011 to 2013
- TMR road freight tonnage maps
- TMR road safety statistics
- De-coupling yard locations
- Queensland Government flood extent series dataset
- Queensland Government floodplain assessment overlay dataset.

In addition to analysis and anecdotal information provided through industry liaison, the following reference sources (Appendix 3) were also reviewed and included:

- related policy and governance frameworks, reflecting Commonwealth and Queensland Government strategies and objectives
- existing Commonwealth, Queensland Government and industry reports and information in the public domain
- contribution from industry content experts of information not in the public domain.

The initial inputs to the QIH investigation included information available in the 11 industry/sector specific 'Supply Chain Perspectives' (Perspectives)[25].

Perspectives provide detail of the movement patterns, freight volumes, vehicle configurations and nodal activity requirements for each industry/sector investigated. Further, this study provided an understanding of the structure and drivers of the major Queensland supply chains, including those that operate and/or have nodal/freight hub activity in the regions, and therefore are potential QIH users.

25 Future Freight in Queensland from a Global Supply Chain Perspective, Report 1 QTLC August 2014

4.2 Requirement for resilience in supply chains

Defining resilience and the supply chains that require a resilient road network response is important in identifying what route can provide the best economic and performance-based outcomes. As identified in Section 2, the initial focus must be on:

- road safety performance
- food to service the population
- links with ports to distribute imported food products
- animal fodder and grains to service feedlots
- fuel to support services such as temporary electricity generation and refrigeration of food
- continuation of economic activity in regions affected by natural disasters.

From this resilient supply chain requirement, existing routes can be examined to determine if they currently do, or potentially can, service these supply chains. They can also be examined to determine current levels of resilience and, if relevant, how they connect to routes normally used to provide the required level of access.

4.3 Appraisal methodology

This report will achieve the objectives stated in Section 3.3 by applying the following methodology:

- investigate relevant policy, growth strategies and infrastructure issues
- define potential inland route/s to support growth opportunities, predominately focusing on the agriculture and resource sector
- identify options for a QIH and examine travel time and distances involved from and to main locations of production to points of consumption and export, and list any preferred options
- investigate the road safety performance of the proposed options
- identify the benefits of a potential QIH in the following areas:
  - road system capacity
  - access and productivity
  - road safety
  - time and distance
  - resilience.

4.4 Report structure

The balance of this report provides:

- appraisal of current and proposed infrastructure (Section 5)
- economic assessment based on the conclusions (Section 6).

5 Appraisal - Queensland Inland Highway (QIH)

The following section provides an appraisal of the potential for a QIH, against the QTLC nominated objective, being:

Identify potential inland routes that are resilient during flooding that provide Queensland supply chains with feasible and safe alternatives that connect points of origin with domestic and export markets, and nominate any policy and infrastructure gaps required to achieve a QIH.

5.1 Policy and growth strategies

There is currently joint infrastructure investment on the Bruce Highway, Toowoomba Second Range Crossing (TSRC) and inland rail corridor from Melbourne to Brisbane connecting to the Port of Brisbane. However, it is unclear if this is sufficient to cater for future growth to support:

- agriculture as a pillar of the Queensland economy
- the Commonwealth Government's vision for Northern Australia
- Galilee and Bowen Basin mining developments.

As this report will demonstrate, future growth of the agriculture and resource sectors will benefit from a QIH.

Agriculture, worth $13.7 billion gross regional product to the Queensland economy and one of the Queensland Government's four pillars of sustainability, is the basis of a major growth strategy. The Queensland Government is proposing catalytic infrastructure aimed at doubling agricultural production by 2040. This is aligned to the Commonwealth Government's 2030 vision for developing Northern Australia. Both of these strategies are predicated on an expansion of primary production land supported by new and reliable water supply infrastructure.

From detailed analysis in Section 5.3 in this report, it is estimated that more than 860 road freight heavy vehicle movements currently occur daily throughout the inland regions of Queensland. Based on the aforementioned vision of increasing agricultural production, it is reasonable to assume that this number could increase to well in excess of 1000 daily road freight heavy vehicle movements throughout inland regions.

The National Land Freight Strategy (NLFS) has identified long term challenges influencing the land freight task, including the development of new infrastructure corridors that balance efficiency, amenity and investment.

NLFS also identifies future fiscal constraints that will impact on the nation's ability to meet transport infrastructure priorities. From this, the NLFS position would support an inland freight corridor that requires minimal investment.

The resource sector, worth $38 billion gross regional product to the Queensland economy, is proposing to invest $34 billion in resource infrastructure over the next three years. This investment will occur in mineral provinces in the north west, far north, central and south western regions of Queensland. This proposed expansion is forecast to generate daily freight movements during construction and operation[26] as shown in Table 1.

Table 1: Resource coal growth

Resource growth coal (Galilee and Bowen Basins)	**Daily movements**	
Commodities	Construction	Operation
Bulk fuel	105	65
Hazardous consumables	155	96
TEU	28	17
OSOM	50	21
Total	**338**	**199**

To ensure investment aligns with growth, consideration should be given to the above growth strategies as well as current Queensland infrastructure investment programs and strategies including:

- Queensland Transport and Roads Investment Program (QTRIP)
- Queensland Department of Transport and Main Roads (TMR) Heavy Vehicle Action Plan (HVAP)
- Commonwealth Governments Heavy Vehicle Safety and Productivity Program (HVS&PP)
- Central Queensland Transport Supply Chain Strategy (CQTSCS) and Inland Port
- Surat Basin Regional Transport Strategy.

26 Draft Sea Freight Action Plan, Department of Transport and Main Roads, June 2014

Table 2 demonstrates the current transport and roads infrastructure investment[27]:

Table 2: QTRIP Investment Program 2014/15

Queensland Transport and Roads Investment Program (QTRIP) 2014/15	National network	State network	Local network
	$ million	$ million	$ million
Maintenance, preservation, operations and other minor enhancements	$ 175.9	$ 605.9	
Project planning, initiation and construction	$ 1,296.2	$1,207.9	
Natural Disaster Relief and Recovery Arrangements (NDRRA)	$ 157.0	$ 817.4	
Administered capital (Queensland Rail)		$ 452.6	
Local network special initiatives			$ 147.3
Black Spot			$ 10.8
Other transport grants			$ 44.3
Transport Infrastructure Development Scheme			$ 40.7
	$ 1,629.1	**$3,083.8**	**$ 243.1**

Note: Includes Commonwealth Heavy Vehicle Safety and Productivity Programme Funding

Queensland's road network is valued at $61.48 billion, with the total investment program in 2014/15 valued at $4.956 billion. Of this, 19.7% relates to restoring infrastructure damaged or destroyed by natural disasters ($0.98 billion). Other resilience projects are also included in the 51% attributed to project and construction investments. More than $1 billion is spent annually on road network resilience.

Despite this significant investment, it is unclear how well these investments align to provide the best overall outcome to support resilience and growth into the future, and how they might align with a future inland route.

27 Queensland Transport and Roads Investment Program (QTRIP) 2014-15 to 2017-18, Queensland Government

5.2 Current infrastructure issues

The 10-year Bruce Highway Action Plan (BHAP) was developed in response to identified capacity, congestion, delay and safety issues.

The TSRC, as identified in Report 2, has a significant role to play in ensuring the supply chains that travel west-east from regional Queensland to South East Queensland markets, and that link to export markets, are serviced to cater for future growth.

To allow for increased HPV access throughout the network, a number of infrastructure issues need to be addressed through measures, including:

- bridge strengthening and widening and pavement strengthening to allow for high mass limits (HML) and over-size over-mass (OSOM) movements
- upgrades to culverts to improve flood immunity, allow for higher mass limits and improved safety performance
- lane and shoulder widening, with changes to cross fall to allow for higher speeds, improved drainage and safety performance
- reducing grades and improving forward visibility allowing for increased speeds and safer passing with overtaking lanes
- intersection and interchange access for HML and OSOM, typically around strategic freight generation nodes and multimodal terminals
- town bypasses and/or the strategic location of decoupling yards that allow for access as close as possible to either the source or destination of the movement.

The Heavy Vehicle Safety and Productivity Program (HVS&PP), which is a Commonwealth Government program co-funded with state governments, has a specific focus on infrastructure investments to address heavy vehicle safety and productivity issues. With the support of the Queensland Government, the HVS&PP has provided funding over the last four years to construct heavy vehicle rest areas and livestock spelling yards, and to upgrade three bridges that are key assets in the heavy vehicle network: two on the Warrego Highway and one on Port Drive at the Port of Brisbane.

In addition, QTRIP has a program of recent and current works involving 15 major projects that include investment in heavy vehicle infrastructure assets to address the above issues.

Specifically, the Heavy Vehicle Action Plan (HVAP) nominates routes required to support heavy vehicle movements for the agriculture and resource sectors, and identified the need for:

- an inland north-south HPV route
- a Toowoomba–Northern Territory HPV route
- a Central Queensland HPV and OSOM route
- investment on the Kennedy and Gregory Developmental Roads, Flinders Highway and Clermont to Alpha Road, to support agricultural movements.

These current and proposed infrastructure works help identify a potential inland freight route.

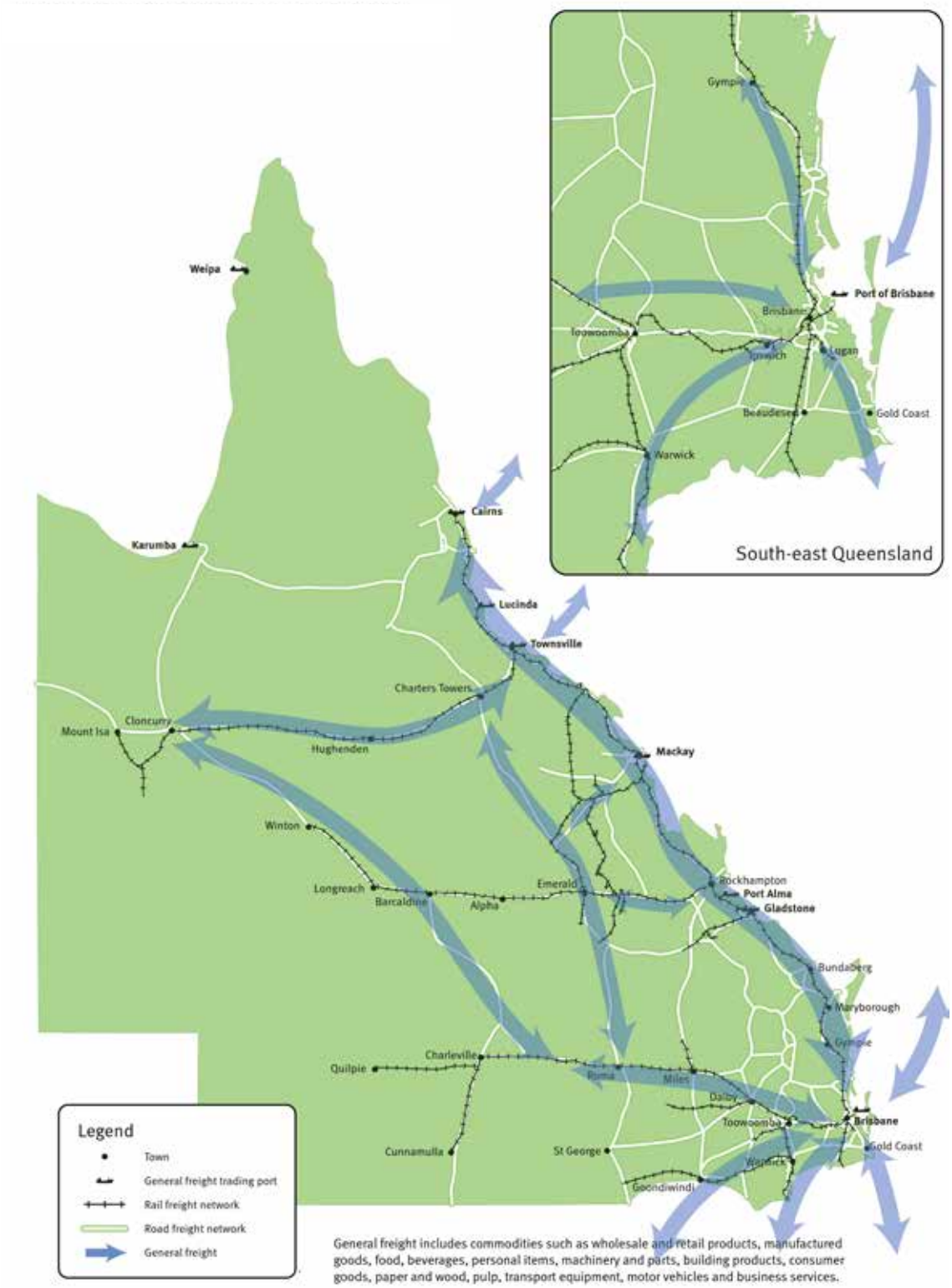
5.3 Inland supply chain flows

A number of supply chains are heavily reliant on inland routes to move between sources of production and value-adding nodes, and finally to domestic or export markets or points of consumption. The supply chains moving product north-south and west-east on inland routes include:

- livestock, moving from the Northern Territory and outback Queensland to pastoral leases, sale yards, feedlots and abattoirs, typically in a west-to-east flow, with movements across the New South Wales border in both directions
- grains, moving north to south from inland growing regions in central and southern Queensland and southern states to feedlots, and then west to east to reach domestic and export markets
- cotton from inland growing regions in central and southern Queensland and northern New South Wales, with seed moving north to south to feedlots; and lint and seed moving west to east to reach export markets
- fuel, moving west from ports and the Brisbane refinery to reach population centres, agricultural, mining, transport and industrial operations
- project, construction, OSOM and mine inputs, moving west from ports and industrial estates to reach project and mining sites in Queensland and the Northern Territory
- horticulture from production regions in the Lakeland Downs, Atherton Tablelands, Innisfail, Tully, Bowen, Bundaberg, Gympie, Caboolture, Gatton, Lockyer Valley, Darling Downs and the Granite Belt, moving in all directions to access domestic markets in all Australian states and export hubs at airports and ports
- general freight, moving east to west to service outback Queensland and the Northern Territory.

The movement of general freight throughout Queensland is depicted in Figure 3, with the daily movements of major flows detailed in Table 3.

Figure 3: General freight movements Queensland



As a product of the livestock supply chain, meat for export and domestic consumption is reliant on routes that service abattoirs and meat processing facilities. These labour-intensive facilities are located close to highly populated areas in the eastern regions of Queensland. They are less reliant on an inland route, with 72% of current processing capacity in South East Queensland, 20% in central Queensland and 8% in north Queensland[28].

Fast-moving consumer goods and general freight supply chains will always need to access population centres. These supply chains are critical in times of natural disaster to ensure sufficient food supplies and consumables are available to replenish stocks in flood-affected regions. It is also important for these supply chains to be able to use flood resilient routes to access non-flood-affected communities when normal routes are closed due to flooding.

28 QTLC Supply Chain Perspective Livestock and Meat 2014

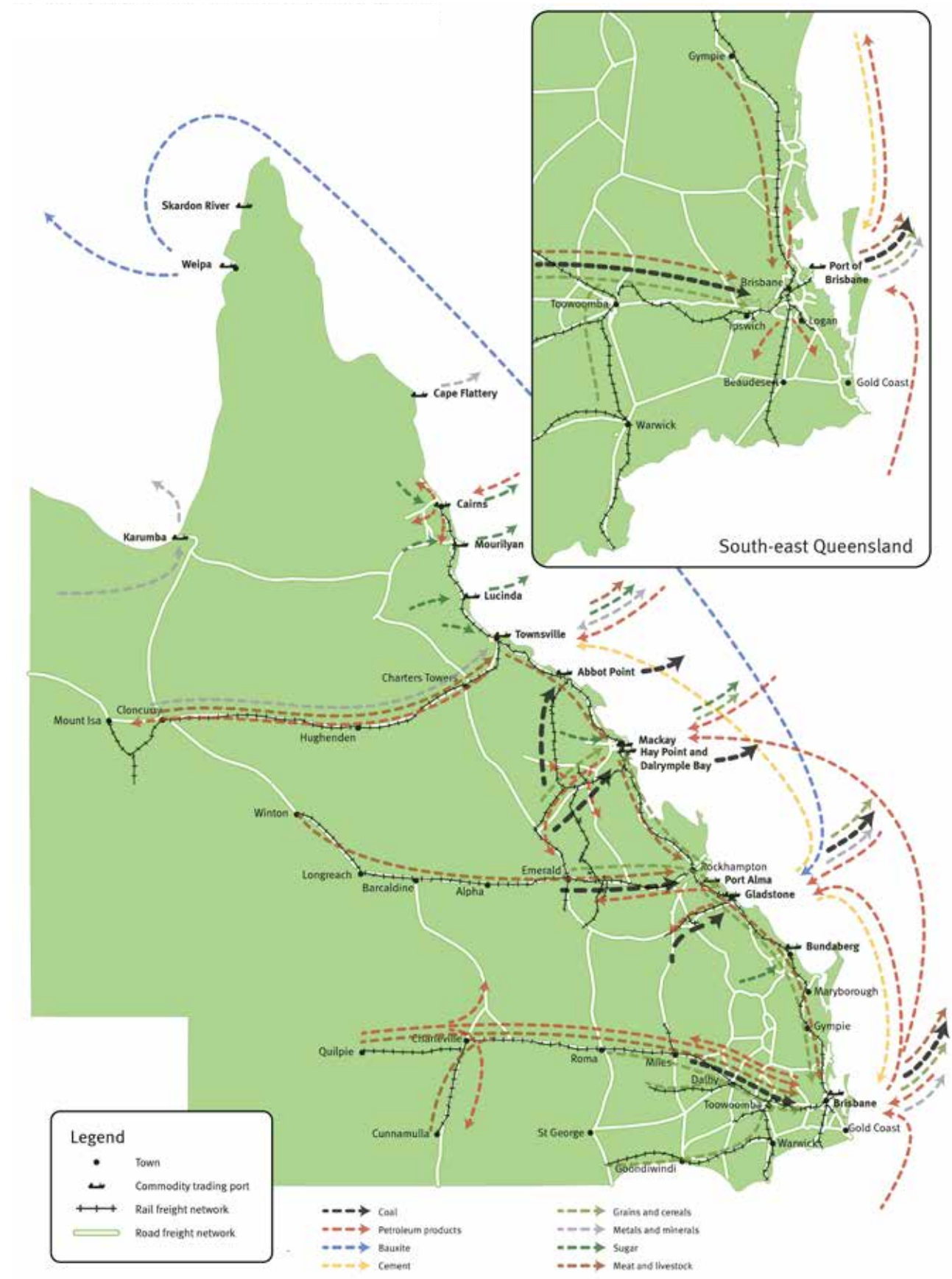
Table 3: Daily inland freight movements

Supply chain*	Daily inland movements
General freight	7,777
FMCG	671
Livestock and feed	
Cattle to abattoir – non South East Qld	32
Grain to feedlot	357
Station to sale yard	107
Saleyard to feedlot	32
Subtotal	**528**
Fuel	
Diesel - mining	258
Diesel - agriculture	79
Diesel - transport	59
Gasoline - inland	66
Subtotal	**463**
Cotton	
Cotton to gins	12
Cotton to warehouses	9
Subtotal	**21**
Horticulture - southern markets	208
OSOM	
Central Queensland internal movements	61
North Queensland internal movements	5
Darling Downs internal movements	6
Subtotal	**72**
Grain - farm to hub	106
Total return trips	9,846
Total trips - traffic census[2]	11,179

**Note: Excludes coastal and South East Queensland movement profiles*

These movements are shown in Figure 4.

Figure 4: Bulk commodity flows Queensland



Source: Department of Transport and Main Roads

Sugar is produced in high rainfall areas on Australia's eastern seaboard. The value-adding nodes of milling and refining are linked to the Bruce Highway and local roads, providing access to export and domestic markets. Sugar is unlikely to require access to inland routes, unless new areas of production and processing are introduced in line with the Queensland Government's agriculture strategy (under the four pillars) or the Commonwealth Government's Northern Australian Plan.

The majority of supply chains vital to the Queensland economy rely on inland routes. The need for an alternative to the Bruce Highway and recognition of a QIH is further supported by:

- the proposed doubling of agricultural production
- the continued increase in mining activity in the resource sector
- the vision for Northern Australia
- the need for resilience during natural disasters.

Figure 5: Heavy vehicle routes Queensland

Source: Department of Transport and Main Roads

5.4 Performance of existing Inland road infrastructure

Through industry consultation, a number of existing heavy vehicle routes have been identified as being strategically important. Figure 5 shows these key routes.

These routes, listed in Section 2.5 and depicted above, will be appraised using the evaluation structure laid out in Section 4.3.

From 2011 to 2013, Queensland experienced some of the most significant natural disasters in recent history, including three flood events and two tropical cyclones. The road and rail network was severely impacted in the 2011 event, with 9,170 km of road, 4,748 km of rail and 89 state-owned bridges and culverts suffering major damage[29]. Road infrastructure damaged during these events continues to be reinstated. This process will continue for some time as shown in QTRIP.

29 Resources for Reconstruction Discussion Paper No 1, Queensland Reconstruction Authority, September 2011

Flood impacts on the road network

Figures 6 and 7 below map historical flood performance for 2011, 2012 and 2013 against these freight routes. The three flood events are shown in blue, with the most affected areas being close to the coast. While there was inland flooding, it was concentrated around Emerald, Roma, Mitchell and near the Queensland and New South Wales border areas. The coastal areas around Rockhampton, Bundaberg and South East Queensland were also heavily impacted. The inland route of the Mitchell Highway was impacted at Charleville.

Figure 6: Queensland north: historical floods 2011, 2012, 2013

Source: https://data.qld.gov.au/dataset/flood-extent-series

Figure 7: Queensland south: historical floods 2011, 2012, 2013

Source: https://data.qld.gov.au/dataset/flood-extent-series

A statewide analysis of Department of Transport and Main Roads flood-related road closure data for January to April 2011 identifies the following impacts:

All highways, developmental roads and motorways impacts

- 91 sections of road were closed on the network.
- Closures ranged from 106 days to one day over a total of 1,922 outage days.
- An estimated 5.4 million tonnes of freight were delayed.

Bruce Highway impacts

- Eight sections of road were closed on the network.
- Closures ranged from 14 days to two days over a total of 56 outage days.
- An estimated1.8 million tonnes of freight were delayed.

A similar analysis was undertaken on all existing inland highways and developmental roads that could form part of a QIH:

- 66 sections of road were closed on the network.
- Closures ranged from 106 days to one day over a total of 1,406 outage days.
- An estimated 2.6 million tonnes of freight were delayed.

The specific routes as identified in the HVAP were impacted as follows:

Inland north-south HPV route impacts on the Castlereagh, Carnarvon, Dawson, Gregory and Flinders Highways

- 13 sections of road were closed on the network.
- Closures ranged from 43 days to one day over a total of 174 outage days.
- An estimated 522,713 tonnes of freight were delayed.

The largest impacts were experienced in the St George sections of the route.

Toowoomba – Northern Territory HPV route impacts on the Warrego, Landsborough and Barkly Highways

- Five sections of road closed on the network.
- Closures ranged from 10 days to one day over a total of 22 outage days.
- An estimated 462,424 tonnes of freight were delayed.

This demonstrates that sections of inland routes are resilient during floods compared to the overall road network - particularly the Bruce Highway.

Travel distance and driving times

Resilient road networks should reliably link supply chain nodal activity. The distances between locations and the time taken to move across those routes helps analysts understand potential for supply chain efficiency. National Heavy Vehicle Regulators (NHVR) Journey Planner[30] distance and travel times for inland routes were mapped as per the table below.

Table 4 demonstrates travel times and distances for a selection of eight key Queensland regional centres to the state capitals of Brisbane, Sydney and Melbourne via a combination of highways and developmental roads. In total, 90 combinations were examined. The Bruce Highway route has been mapped as the base line and compared to inland routes.

30 www.nhvr.gov.au/road-access/journey-planner

The combinations of sections of highways and developmental roads that form the 90 different routes analysed are contained in Appendix B.

For movements to Brisbane from these regional centres, the quickest route is via the Bruce Highway, except for Mount Isa which is via Toowoomba. By using either of the inland routes via Toowoomba or Roma, the time disadvantage for all north and far north locations is approximately one hour. For Mackay and Rockhampton, a route via Roma may not be feasible, whereas via Toowoomba may be considered an option with a two-hour disadvantage. The trade-off of the longer trip would have to be offset by freight productivity gains.

For movements to Sydney from these centres, the quickest route compared to the Bruce Highway for most locations is via St George. Mount Isa is 7.5 hours quicker, while other locations are one hour quicker than the Bruce Highway. For Mackay and Rockhampton, there is a marginally quicker route through Moonie or Moree rather than using the Bruce Highway.

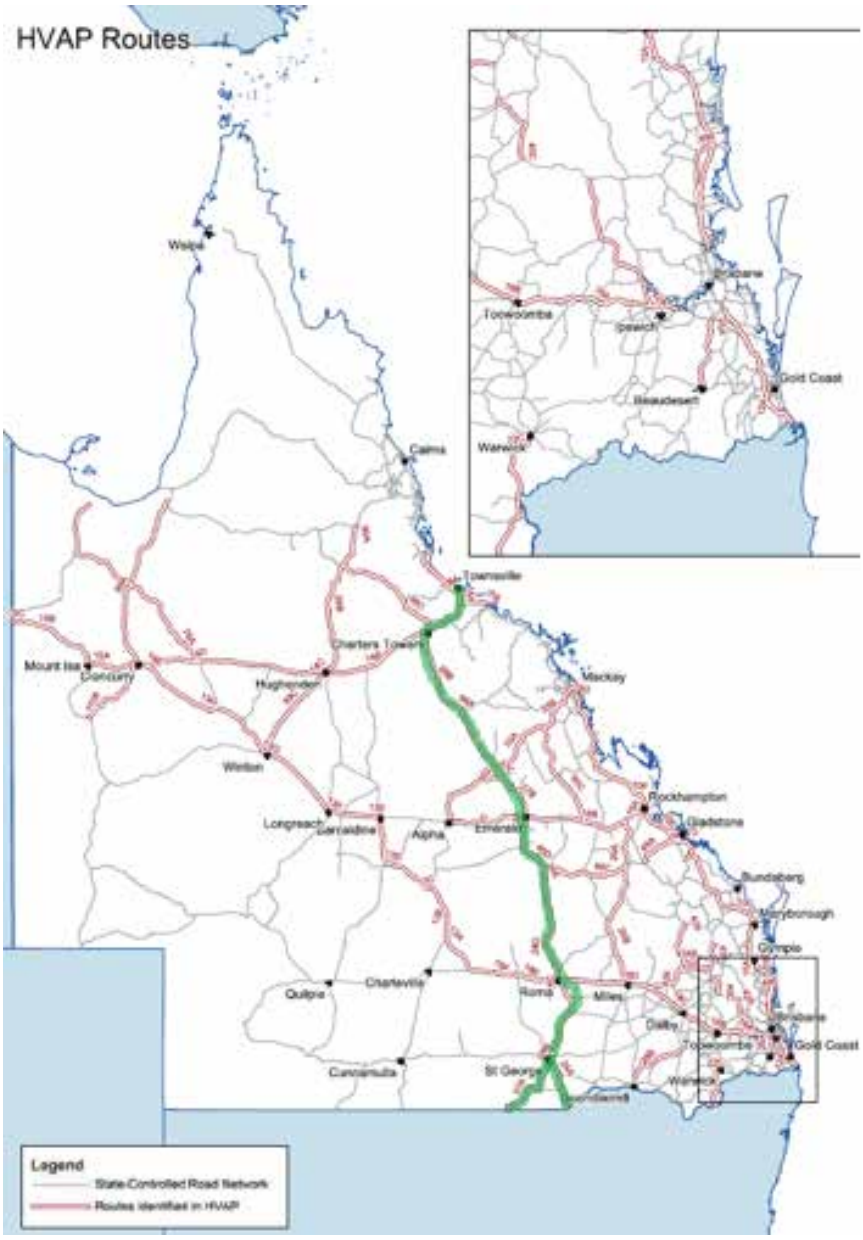
For movements to Melbourne from these centres, an inland route via St George is the shortest travel time in most cases. The advantage from Mount Isa via Cunnamulla to Melbourne is significant at just under 15 hours, due to Mount Isa's inland location. Typically, there is a four to five hour advantage from Lakeland via Townsville through St George. Mackay and Rockhampton are the anomalies, with lesser advantages of one to two hours. Rockhampton via Goondiwindi represents the quickest route relative to the Bruce Highway with 2.75 hours savings in travel time.

Table 4: Travel times and distances on inland routes and Bruce Highway

FROM	Mt Isa		Lakeland Downs		Cairns		Innisfail		Tully		Townsville		Mackay		Rockhampton		Route via
TO	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	
Brisbane	2,177	27:47	1,920	26:26	1,709	23:09	1,621	21:50	1,570	21:09	1,361	18:18	976	12:58	642	8:35	Bruce HWY
Brisbane	1,845	22:25	2,048	27:24	1,836	24:07	1,748	22:49	1,697	22:07	1,489	19:15	1,101	14:55	766	10:32	Toowoomba
Brisbane	1,853	22:36	2,050	27:26	1,838	24:09	1,750	22:51	1,699	22:09	1,491	19:17	1,272	17:02	1,154	15:20	Roma
Brisbane	2,050	26:08	2,132	28:53	1,921	25:36	1,833	24:17	1,782	23:35	1,573	20:43	1,041	14:14	754	10:29	Esk
FROM	Mt Isa		Lakeland Downs		Cairns		Innisfail		Tully		Townsville		Mackay		Rockhampton		Route
TO	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	
Sydney	3,093	39:07	2,836	37:46	2,625	34:29	2,537	33:10	2,486	32:29	2,277	29:37	1,892	24:18	1,558	19:55	Bruce HWY
Sydney	2,634	33:27	2,833	38:20	2,622	35:03	2,534	33:45	2,483	33:03	2,275	30:11	1,886	25:51	1,552	21:28	Warwick
Sydney	2,389	31:42	2,694	36:44	2,482	33:27	2,394	32:08	2,343	31:26	2,135	28:34	1,916	26:19	1,675	22:55	St George
Sydney													1,797	24:11	1,463	19:48	Moonie/ Moree
FROM	Mt Isa		Lakeland Downs		Cairns		Innisfail		Tully		Townsville		Mackay		Rockhampton		Route
TO	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	km	hr:m	
Melbourne	3,974	48:26	3,717	47:05	3,506	43:48	3,418	42:30	3,367	41:48	3,158	38:56	2,773	33:37	2,439	29:15	Bruce HWY
Melbourne	2,803	33:33	3,122	41:29	3,001	39:27	2,913	38:09	2,862	37:27	2,654	34:35	2,533	32:56	2,409	31:04	Cunnamulla
Melbourne	2,918	36:24	3,223	41:47	3,011	38:30	2,923	37:12	2,872	36:30	2,664	33:38	2,445	31:23	2,204	27:59	St George
Melbourne	3,213	39:35	3,321	43:05	3,109	39:48	3,022	38:30	2,971	37:48	2,762	34:56	2,543	32:41	2,073	26:34	Goondiwindi

This analysis closely aligns to the HVAP, which identified that a route via the New South Wales border from Hebel or Mungindi to St George and on through Roma, Emerald, Charters Towers and Townsville would be suited for a north-south HPV route to Sydney and Melbourne. This route is shown in Figure 8.

Figure 8: Preferred inland freight route



Current access on this route is for Type 1 road trains and B-Triples from the New South Wales border through to Clermont. From Clermont to Townsville, Type 2 road trains and B-Triples are allowed.

The routes identified in the HVAP as forming the inland north-south HPV route from Townsville to the New South Wales border align with the above time and distance analysis, resulting in the best overall travel times. The HVAP development path should also consider access to the QIH by those supply chains that will benefit from this route.

It should be noted that this route was affected during the last three flood events around Goondiwindi and St George.

Hann Highway

There has been mention in both the general media and in the Pivot North Commonwealth parliamentary enquiry[31] into the benefit of sealing a section of road known as the Hann Highway. The Hann Highway is proposed as being able to reduce the road transit time for heavy vehicles between Far North Queensland and Melbourne of between two days and 15 hours. Based on this, the Hann Highway was considered as potentially forming a section of the QIH and was examined from a travel time and distance perspective using the NHVR Journey Planner.

The Hann Highway route was analysed against three routes, using Innisfail as the origin and Melbourne as the destination. Figures below depict the route, the distance and driving time.

31 Pivot North Inquiry into the Development of Northern Australia: Final Report, Joint Select Committee on Northern Australia, The Parliament of the Commonwealth of Australia, September 2014

Figure 9: Innisfail - Hann Highway - St George - Melbourne

Figure 10: Innisfail - Bruce Highway - Sydney - Melbourne

Figure 11: Innisfail - Cunnamulla - Melbourne

This analysis identifies that the Hann Highway would not provide any additional benefit, with the quickest route via Cunnamulla.

Traffic volumes and freight flows

The traffic volumes and freight flows for these routes were mapped from the 2010 and 2012 Traffic Census data available from the Queensland Government website[32]. The tables and figures below demonstrate these traffic volumes and freight flows for 2010.

32 https://data.qld.gov.au/dataset/traffic-census-for-the-queensland-state-declared-road-network

Figure 12: Daily freight tonnage on road network by region

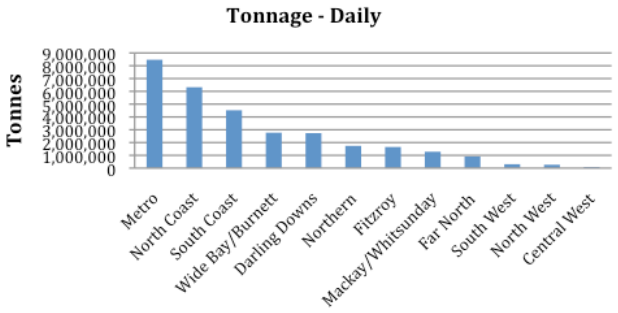


Figure 13: Daily movements by region

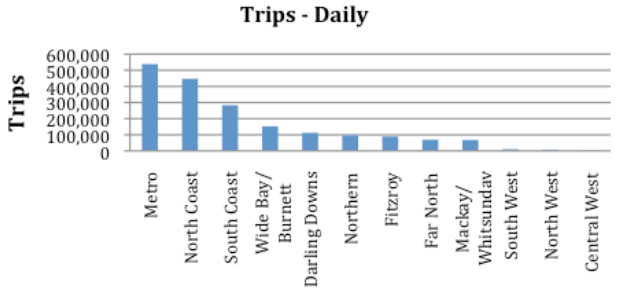
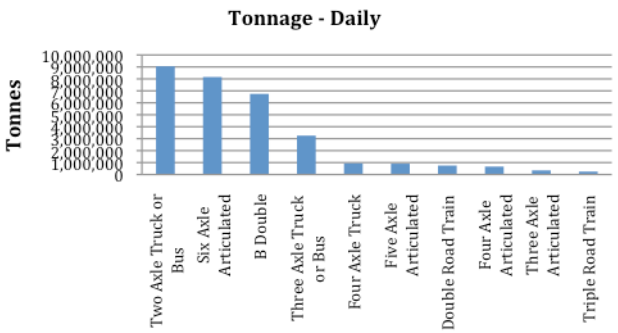


Figure 14: Daily tonnage by vehicle type



This movement data relates to all freight movements for vehicles over eight tonne and clearly demonstrates that the inland regional areas road freight task is significantly less than what occurs in South East Queensland.

The payload capacity of the vehicle used to move freight influences the total number of movements. Figure 14 demonstrates that the articulated and B-Double configurations move 54% of all freight in Queensland, with HPV moving 3.2% of the freight task.

The extent of productivity gain from a mass perspective is demonstrated in Table 5, which reflects actual average movement mass data for 2010. Type 1 and 2 road trains, and the equivalent, offer a gain of more than 25% and possibly as high as 49%.

Table 5: Vehicle mass profile - tonnes

Vehicle mass profile-tonnes	
Vehicle type	**Movement mass**
Triple road train	84.2
Double road train	52.8
B-Double	42.5
Six-axle articulated	29.6
Five-axle articulated	24.1
Four-axle truck	19.4
Three-axle truck or bus	15.3
Four-axle articulated	14.9
Three-axle articulated	10.8
Two-axle truck or bus	8.6

The HVAP nominates specific routes (identified by section) that have a low current freight load compared to the Bruce Highway, which experiences more than 10,000 daily heavy vehicle movements in some sections. These routes also have a low current freight load compared to the proposed Toowoomba Second Range Crossing (TSRC), which is projected to have more than 3,500 daily heavy vehicle movements.

Table 6: Inland north-south HPV route

INLAND NORTH-SOUTH HPV ROUTE	Daily movement	
	Min	Max
CASTLEREAGH HWY (NOONDOO - HEBEL)	79	158
CARNARVON HWY (INJUNE - ROLLESTON)	137	155
CARNARVON HWY (MUNGINDI - ST GEORGE)	92	278
CARNARVON HWY (ROMA - INJUNE)	310	707
CARNARVON HWY (ST. GEORGE - SURAT)	80	364
CARNARVON HWY (SURAT - ROMA)	124	137
DAWSON HWY (ROLLESTON - SPRINGSURE)	127	324
GREGORY DEV RD (BELYANDO CROSSING - CHARTERS TWRS)	118	176
GREGORY DEV RD (CHARTERS TWRS - THE LYND)	63	306
GREGORY DEV RD (CLERMONT - BELYANDO CROSSING)	124	130
GREGORY HWY (CLERMONT - BELYANDO CROSSING)	433	451
GREGORY HWY (EMERALD - CLERMONT)	314	1899
GREGORY HWY (SPRINGSURE - EMERALD)	258	880
FLINDERS HWY (CHARTERS TOWERS - HUGHENDEN)	131	606
FLINDERS HWY (TOWNSVILLE - CHARTERS TOWERS)	415	1202

On the proposed inland north-south route, the largest daily freight movements occur between Emerald and Clermont (1,899). The Toowoomba to Northern Territory route has the largest daily freight movements (5,446) between Ipswich and Toowoomba and west of the range between Toowoomba and Dalby. The proposed OSOM route on the Peak Downs Highway between Mackay and Mount Nebo is highest at 1,861 daily movements.

Table 7: Toowoomba Northern Territory HPV route

TOOWOOMBA NORTHERN TERRITORY HPV ROUTE	Daily movement	
	Min	Max
WARREGO HWY (DALBY - MILES)	820	1584
WARREGO HWY (IPSWICH - TOOWOOMBA)	2569	5446
WARREGO HWY (MILES - ROMA)	518	1224
WARREGO HWY (MITCHELL - MORVEN)	245	282
WARREGO HWY(ROMA - MITCHELL)	240	1069
WARREGO HWY (TOOWOOMBA - DALBY)	909	3297
LANDSBOROUGH HWY (KYNUNA - CLONCURRY)	142	173
LANDSBOROUGH HWY (LONGREACH - WINTON)	174	174
LANDSBOROUGH HWY (MORVEN - AUGATHELLA)	107	255
LANDSBOROUGH HWY (TAMBO - BLACKALL)	196	196
LANDSBOROUGH HWY (WINTON - KYNUNA)	97	129
LANDSBOROUGH HWY (AUGATHELLA - TAMBO)	142	159
LANDSBOROUGH HWY (BARCALDINE - LONGREACH)	198	384
BARKLY HWY (CAMOOWEAL - BORDER)	103	103
BARKLY HWY (CLONCURRY - MT ISA)	292	452
BARKLY HWY (MT ISA - CAMOOWEAL)	112	532

Table 8: Central Queensland HPV OSOM route

CENTRAL QUEENSLAND HVP-OSOM ROUTE	Daily movement	
	Min	Max
PEAK DOWNS HWY (CLERMONT - NEBO)	204	692
PEAK DOWNS HWY (NEBO - MACKAY)	837	1861

The figures quoted in this report are maximums. The lower range is often 50% less.

It should be noted that adequate vehicle maintenance support on these inland routes would be required, and could be an issue in remote locations. The price of fuel in these areas is typically higher than in populated areas. This is a major consideration in route selection for operators as fuel is a large component of operating costs, and adequate vehicle maintenance support aids equipment and service reliability.

5.5 Road safety performance

Road safety performance must be considered when proposing a QIH. TMR data[33] has been analysed over a five-year period to capture road safety performance on all highways, developmental roads and motorways in Queensland, relating to statistical area level 2. This data is captured in the following figures.

The data provided counts of serious incident and the resulting causalities.

The darker shades of red indicate regions with the highest frequency of incidents and casualties, while the lighter shades depicts areas of less frequency.

33 www.tmr.qld.gov.au/Safety/Transport-and-road-statistics/Road-safety-statistics.aspx

Figure 15: Queensland road safety statistics - serious incidents 2007-11

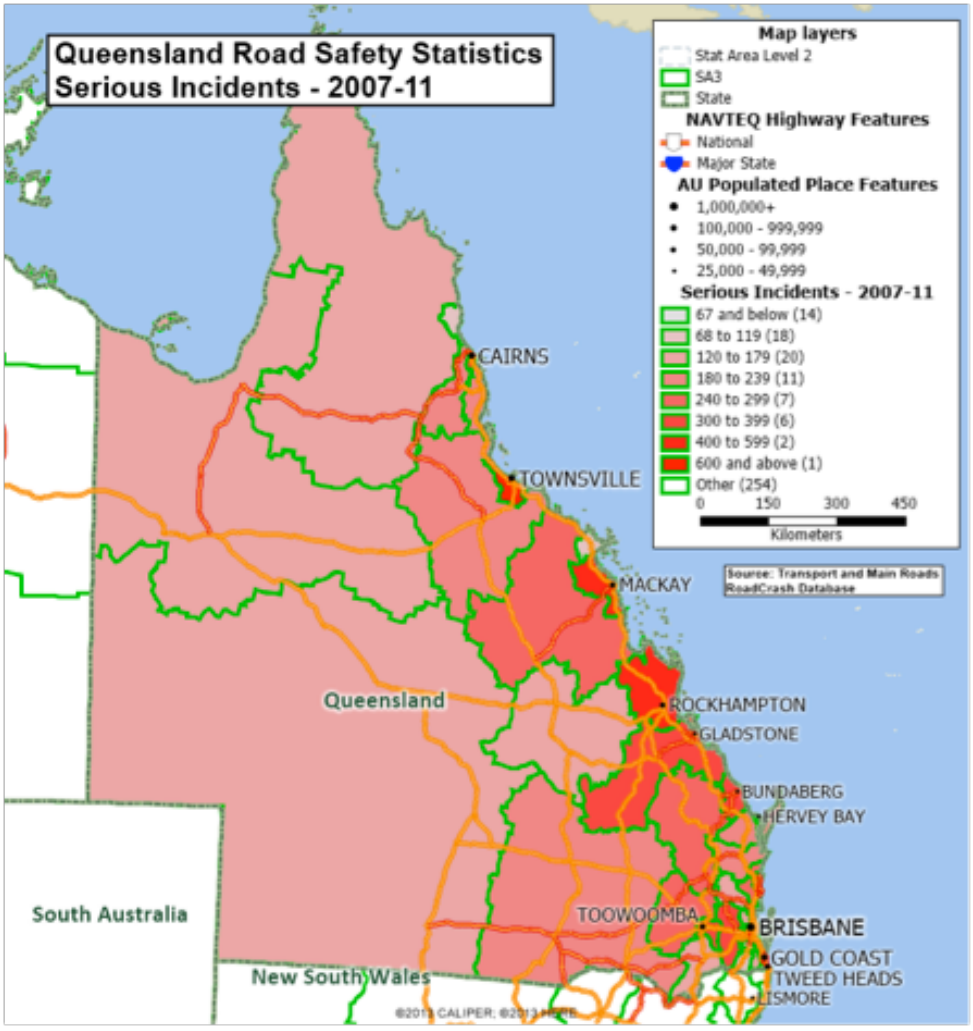
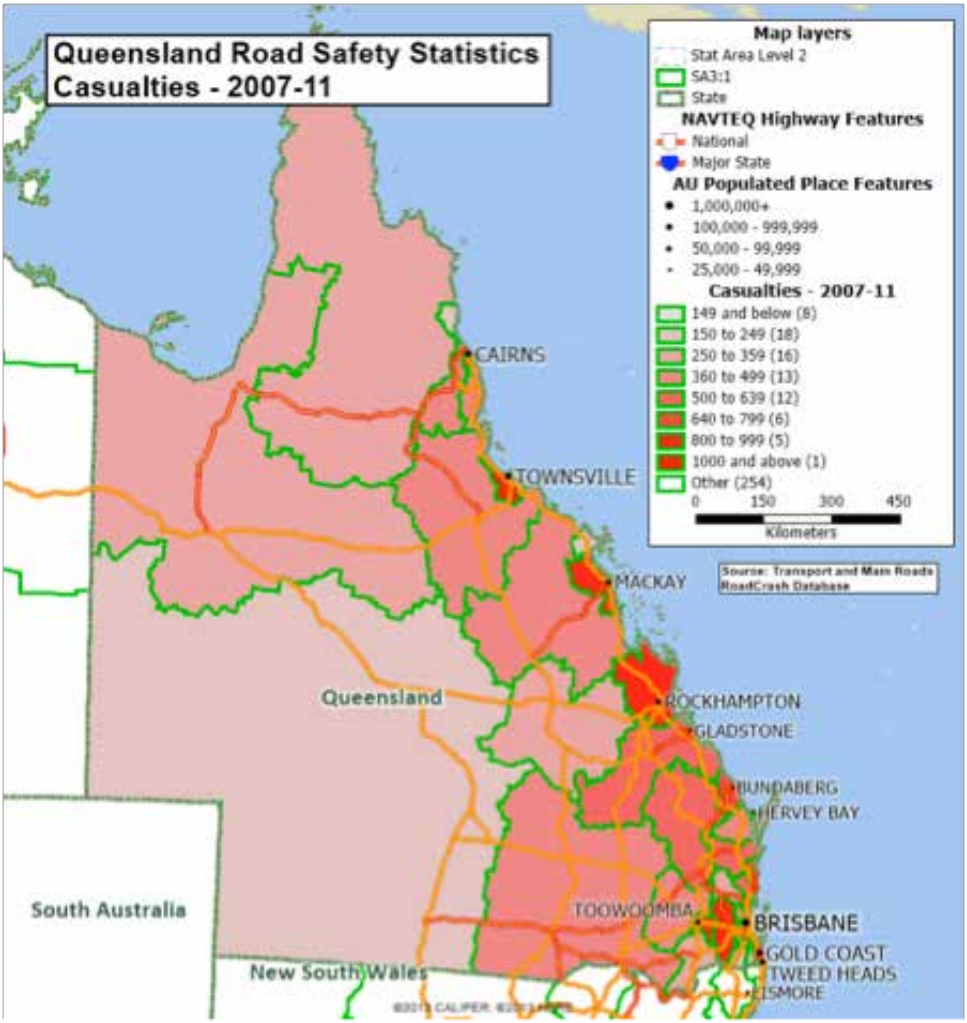


Figure 16: Queensland road safety statistics - casualties 2007-2011



The least safe areas are aligned to sections of the Bruce Highway, The Peak Downs and Flinders Highways near the coast, and between Brisbane and Toowoomba. This result can, in part, be attributed to the higher volumes of vehicles travelling these routes.

Infrastructure investments have been announced and, in some case, work has started to improve this level of road safety performance. Key projects include the BHAP, the TSRC and the Warrego Highway Upgrade Strategy (WHUS).

In regional Queensland, the road safety incident rate is less, with the best performance being on the routes that would form a QIH (although again, this can likely be attributed to lower vehicle volumes). However, road safety maintenance would be critical along these routes if a high productivity QIH is established and heavy vehicle volumes increased.

5.6 QIH options analysis

The QIH offers an advantage for movements to Melbourne from nominated Queensland locations - mainly St George - when taking into account current freight flows, level of access for heavy vehicles, road safety performance, flood resilience and time and travel distance from key regional areas in Queensland. With a QIH, it could take half an hour less to travel from Rockhampton to Melbourne via Goondiwindi. The trip from Mount Isa to Melbourne would be significantly quicker via Cunnamulla, however the St George route might be preferable when considering flood and safety issues.

The inland route makes the trip to Sydney quicker by around an hour from most locations in regional Queensland. Rockhampton and Mackay are up to an hour and forty mintues quicker via Moonie and Moree. This demonstrates there are a least three main alternatives to and from Sydney from regional Queensland:

- via the Bruce Highway
- the inland routes via Warwick, St George and Moonie
- via Moree (from Rockhampton and Mackay).

An inland route to Brisbane is also viable, given only a small amount of time is lost by going via Toowoomba rather than the Bruce Highway. Travelling to Brisbane via Roma is also an option from most regional centres.

Following the appraisal process, the routes proposed for the QIH to Melbourne include (refer Figure 8):

- Castlereagh Highway
- Carnarvon Highway
- Dawson Highway
- Gregory Highway
- Gregory Developmental Road
- Flinders Highway.

The routes proposed for the main QIH to Sydney include (refer Figure 8):

- Carnarvon Highway
- Dawson Highway
- Gregory Highway
- Gregory Developmental Road
- Flinders Highway.

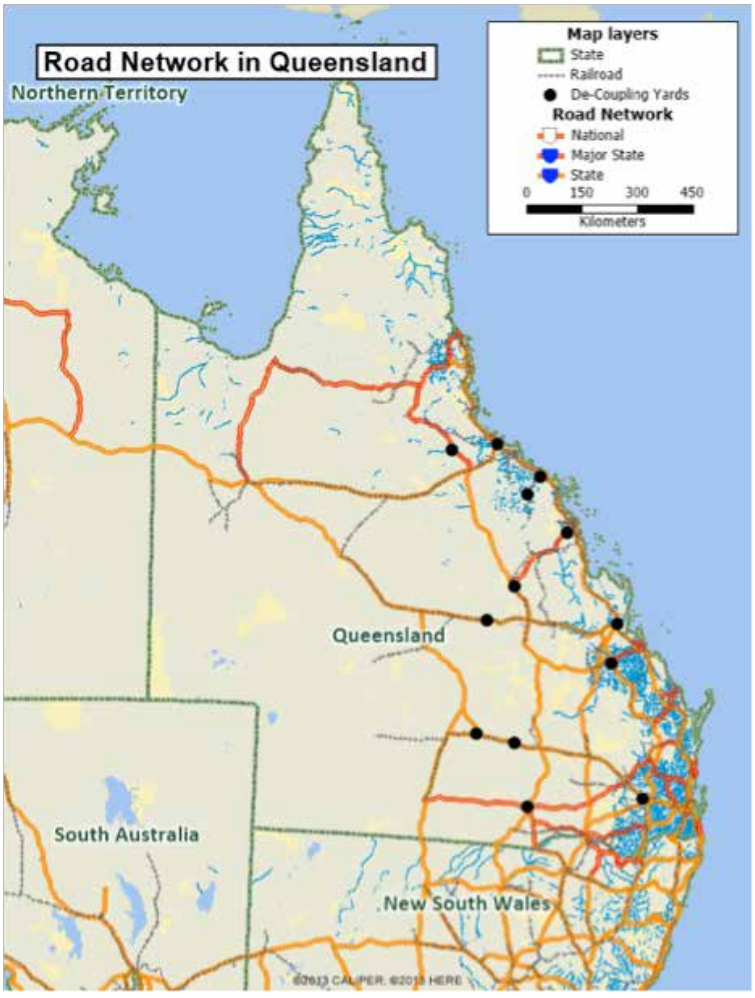
The same routes as above could be used for an inland route to Brisbane, along with a route via Toowoomba.

The level of access on these routes is suitable for Type 1 road trains and B-Triples from the New South Wales border through to Clermont. Increased access for Type 2 road train and HPV PBS 4 would be required, along with de-coupling yards, so that these combinations can be reconfigured to general access combinations. It would then be possible to access the road network where general access combinations are allowed. Type 2 road trains currently have access from Clermont through to the Port of Townsville. The routes in New South Wales linking to the QIH are currently Type 1 road trains.

De-coupling yards allow the freight operator to safely de-couple, store and re-couple trailers of multi-combination vehicles. De-coupling yards are provided by government and private operators and encourage the use of higher productivity vehicles.

Figure 17 demonstrates where TMR-recognised de-coupling yards are located.

Figure 17: Queensland road network public de-coupling yards



5.7 Advantages of a QIH

The advantages identified from this appraisal of a QIH include:

- lower current freight volumes than the Bruce Highway, with lower traffic volumes
- existing levels of access for high productivity vehicles, with opportunities to increase current access levels
- higher levels of road safety performance
- superior flood resilience across the majority of the inland road network
- time and distance advantages on a number of routes to Melbourne.

While it is difficult to forecast how these potential benefits might translate into economic benefits for individual supply chains or the wider Queensland economy, the following observations can be made.

A number of supply chains currently operating throughout inland Queensland would benefit from the productivity gain offered by an inland freight route. These include those supply chains captured in Table 9.

Table 9: Daily inland freight movements summary

Supply chain	Daily inland movements
General freight	7,777
Fast-moving consumer goods	671
Livestock and feed	528
Fuel	463
Cotton	21
Horticulture - southern markets	208
OSOM	72
Grain - farm to hub	106
Total return trips	**9,846**
Total trips - traffic census	**11,179**

The scenarios modelled for this analysis indicate it would take 10% to 15% less time to travel from regional Queensland to Melbourne on a return trip. This would likely lead to an increased use of those routes and infrastructure, with a corresponding reduction in fuel consumption and operating costs for each trip.

This should also lead to a reduction in road safety incidents and associated costs of around $3.2 million per fatality and $0.317 million per serious injury[34] which would attract broad community support.

34 Cost of Road Crashes, NRMA March 2012

Another advantage is the ability to deal with forecast future agricultural and resource activity in inland regional Queensland:

- The proposed coal mining expansion in the Galilee Basin is forecast to generate freight activity of 338 vehicle movements a day during construction, and 200 a day during operation.
- Given the Queensland Government's vision to increase agricultural production in the state, it is reasonable to assume that the number of daily road freight movements could increase to well in excess of 1,000, up from the current 860.

An inland route is the less costly option to support future economic growth, given the infrastructure already exists. All that would be required is investment as proposed in the HVAP to improve flood resilience in the southern sections and to cater for HPV the entire length.

The freight load on other networks such as the Bruce Highway would be reduced, leading to increased productivity when using PBS Level 3 and 4 vehicles. Analysis indicates potential productivity gains of 23%, and a reduction in movements as high as 49%. There is also expected to be a 5% reduction in pavement wear.

Regional towns along the QIH could benefit from the increased freight movements. The road transport operators will require fuel, maintenance support, rest stops, food and, potentially, accommodation.

As established in the Perspectives and examined in the TSRC Report 2, supply chains are a combination of nodal and modal activity. This Report 3 examines the QIH, which is a modal route for long haul freight movements north-south. As freight is generated at nodal points of production or value-adding operations, policy settings and incentives may be required for industry to align to the vision of a QIH and develop their nodal activity in alignment with a QIH strategy.

Development of production and value-adding operations alongside the QIH network and the west-east feeder routes should be encouraged, especially those focused on the interstate markets of Victoria, South Australia, Western Australia and the Northern Territory.

Export supply chains would also require access to nodes for air freight and sea freight, thus ensuring higher levels of vehicle productivity throughout the entire journey. Ports able to accommodate this level of access include Townsville, and potentially Brisbane, as identified in the TSRC report 2. Other Queensland regional multi-cargo ports are location constrained, as all are situated alongside major regional cities and not connected to potential HPV routes. Infrastructure investments would be required at these ports to improve access for HPV. As airports are also located alongside cities and towns, they will also have access issues.

Attracting production and value-adding activities close to a QIH, must be a foundation principle to underpin the growth strategies for agriculture and resource sector.

➲ Case study:

A Clermont-based engineering and fabrication business opened a new facility 12 km from the entry to the Clermont Coal Mine. Refurbishments of large mining equipment such as haul truck bodies are conducted at this facility.

These truck bodies would normally be transported to Mackay for refurbishment, generating an OSOM transport task with escort costs for this movement. Transport costs have been reduced, as the movement is now a 24 km round trip compared to a 580 km return trip to Mackay.

5.8 Conclusions

There is clear evidence the Commonwealth Government and Queensland Government are driving increased economic performance in agriculture developments and the resource sector. The forecast growth for these sectors will increase freight activity as follows:

- The proposed coal mining expansion is forecast to generate freight activity of 338 vehicle movements a day during construction, and 200 a day during operation.
- Given the Queensland Government's vision to increase agricultural production in the state, it is reasonable to assume that the number of daily road freight movements could increase to well in excess of 1,000, up from the current 860.

This will be in addition to the existing heavy road freight activity, which is more than 11,000 daily movements throughout inland Queensland.

The Queensland Government has a strong focus on helping industry develop integrated end-to-end supply chains.

Planning to support these supply chains must go beyond traditional geographic and/or agency boundaries. Further evidence for this need can be found in a number of recent reports on Queensland supply chains – in particular, those relating to Queensland's export and agricultural chains[35] [36] [37].

The Queensland Government has identified this as a constraint and this report on the potential for a QIH is another sound case study in this regard.

To provide industry with the highest level of access to existing and new markets, domestic and export supply chains must be seamless, ensuring high levels of efficiency in servicing these markets. In this context, the role of government then is to ensure that appropriate infrastructure is in place for these supply chains to access markets, and that policy frameworks are aligned to ensure the best possible return from this infrastructure.

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35 Strengthening Queensland Supply Chains 2013-2015, Queensland Transport and Logistics Council

36 Queensland Ports Strategy, Department of State Development, Infrastructure and Planning 2014

37 Report No. 54 Rail freight use by the agriculture and livestock industries, Transport, Housing and Local Government Committee June 2014

Advantages

The advantages of a QIH for growth in the agriculture and resource sectors, and for current supply chains, include:

- The road safety performance of inland HPV routes is better than the Bruce Highway.
- Current inland HPV routes could form a QIH with time advantages over the Bruce Highway from Far North Queensland to Sydney and Melbourne of around 10% to 25%.
- Current inland HPV routes could form a QIH with a small time disadvantage over the Bruce Highway from Far North Queensland to Brisbane, which could be offset by increasing HPV access.
- Inland HPV routes are more resilient in natural disasters, providing options to access additional routes.
- Inland HPV routes experience lower freight volumes and traffic flows than the Bruce Highway. A transfer of freight to a QIH would reduce network impacts on the Bruce Highway and reduce loss of productivity associated with congestion delays.
- Transferring HPV vehicles to the QIH could lead to productivity gains of around 23% for PBS Level 3 and 49% for PBS Level 4.

These advantages could lead to other economic benefits including:

- It would enable forecast growth in the agriculture and resource sector through increased productivity in supply chains that effectively link production to markets.
- Regional towns along the QIH could benefit from the increase in traffic. Transport operators would require support from services industries and amenities including fuel, maintenance support, rest stops, food and, potentially, accommodation.
- Origin production, value-adding and logistics hub nodal activity for the growth sectors should be encouraged to be located adjacent to the QIH to reduce local road network access issues and investments, and to accelerate benefits.
- Destinations such as ports, airports and domestic processing and logistics hubs will benefit from more efficient export supply chains but will require access for HPV to eliminate un-productive multi-combination re-configurations.

Policy drivers

The QIH would clearly deliver supply chain advantages. To deliver economic benefit in alignment with the agriculture and resource growth plans, and be regarded as catalytic infrastructure, a number of policy settings may need to be aligned. These include:

- The infrastructure investment program as outlined in the HVAP needs to be aligned to a QIH development plan. The next stages of the HVAP and resulting infrastructure investments must be timed and sequenced in alignment with the growth plans for agriculture and resource sectors. These plans must also consider the local road network for access by the HPV. Failure to do so will further decrease performance on existing routes already under stress, and not necessarily encourage maximum use of the QIH.
- Communication plans to support a QIH should be developed in conjunction with industry, to explain the benefits and encourage early adoption. Industry should be given the opportunity to provide input to infrastructure planning for local road network access, particularly in relation to locations of de-coupling yards.
- Processing and value-adding facilities and logistics hubs are encouraged to develop next to the QIH to minimise local road network access issues.
- Destination access for HPV is required at or in proximity to ports, airports and processing facilities and should be planned to meet supply chain requirements.

Infrastructure gaps

In addition to what has been proposed in the HVAP, this appraisal has identified a number of potential infrastructure gaps, including:

- local network access at origin and destinations where the QIH is the major line haul modal infrastructure, either by direct access or via a de-coupling yard
- either direct access into and out of freight precincts around South East Queensland or via a de-coupling yard, as identified in the TSRC report.

The location of these de-coupling yards must be based on a logistics centroid analysis that enables local road network access where a direct access route is not possible.

6 Economic benefits

6.1 Introduction

The appraisal of an inland road route from central and northern Queensland to South East Queensland and interstate identified a range of potential benefits for the transport sector and for inland Queensland regions. Road freight sector benefits – which are the focus of this analysis – are the more readily quantified and include:

- time savings for drivers and goods in transit
- other vehicle operating cost savings (e.g. fuel, tyres, repairs and maintenance, vehicle depreciation)
- reduced delays during periods when the Bruce Highway is flooded.

Other economic implications, including regional development, are addressed towards the end of this section.

Previous sections of this report have identified a number of potential inland routes that could complement the Bruce Highway/Pacific Highway corridor. Relative to the Bruce Highway/Pacific Highway/Hume Highway corridor to Melbourne, an inland route offers savings ranging between two hours and 30 km on trips from Rockhampton, and 1,200 km and 15 hours on trips from Mt Isa, depending on the inland route chosen in Queensland and interstate (see Table 11).

Given the shape of the Australian landmass, and the potential heavy vehicle volumes that could benefit, the greatest potential for savings on an inland route appears to lie in trips to and from Melbourne. To illustrate the potential of an inland route, the analysis focuses on a route from Townsville to Melbourne that includes the Flinders, Gregory, Carnarvon and Castlereagh Highways in Queensland, the Castlereagh and Newell Highways in New South Wales, and the Goulburn Valley Highway in Victoria (Table 10). From origins north of Mackay, this route offers savings of approximately 500 km and 4.5 to 5 hours in travel time on a one-way trip to Melbourne.

Table 10: Inland route in the economic analysis (via St George)

National route number	State	Route name	Locations
A6	QLD	Flinders Highway	Townsville to Charters Towers
A7	QLD	Gregory Highway	Charters Towers to Emerald. Springsure, Rolleston
A7	QLD	Carnarvon Highway	Rolleston to Roma, St George,
A7	QLD	Castlereagh Highway	St George to Dirranbandi, Hebel
A55	NSW	Castlereagh Highway	Hebel to Coonamble, Gilgandra
A39	NSW	Newell Highway	Gilgandra to Dubbo, West Wyalong, Tocumwal
A39	VIC	Goulburn Valley Highway	Tocumwal to Shepparton, Melbourne

Table 11: Trip savings via inland routes

Origin	Mt Isa		Lakeland Downs		Cairns		Innisfail		Tully		Townsville		Mackay		Rockhampton		Route
Destination	Trip length	Trip time		Trip time		Trip time		Trip time		Trip time		Trip time		Trip time		Trip time	
	km	min	km	min	km	min	km	min	km	min	km	min	km	min	km	min	
Brisbane	332	5.37	-127	-0.97	-127	-0.97	-127	-0.98	-127	-0.97	-127	-0.95	-124	-1.95	-124	-1.95	via Toowoomba
Brisbane	324	5.18	-130	-1.00	-130	-0.90	-130	-1.02	-130	-1.00	-130	-0.98	-296	-4.07	-512	-6.75	via Roma
Brisbane	127	1.65	-212	-2.45	-212	-2.45	-212	-2.45	-212	-2.43	-212	-2.42	-65	-1.27	-112	-1.90	via Inland
Sydney	458	5.67	3	-1.00	3	-0.57	3	-0.58	3	-0.57	3	-10.57	6	-1.55	6	-1.55	via Warwick
Sydney	704	7.42	143	1.03	143	1.03	143	1.03	143	1.05	143	1.05	-24	-2.02	-117	-3.00	via St George
Sydney													90	0.12	90	0.12	via Moonie/ Moree
Melbourne	1170	14.88	596	5.60	505	4.35	505	4.45	505	4.35	505	4.35	240	0.68	30	-1.82	via Cunnamulla
Melbourne	1056	12.03	494	5.30	494	5.30	494	5.30	494	5.30	494	5.30	328	2.23	235	1.27	via St George
Melbourne	761	8.85	396	4.00	396	4.00	396	4.00	396	4.00	396	4.00	230	0.93	366	2.68	via Goondiwindi

Note: Negative values signify that the inland route would be longer/slower than the Bruce Highway/Pacific Highway/Hume Highway route
Source: Calculated from Table 4

6.2 Approach to the economic analysis

Spatial attribution of benefits

The benefits of an inland highway accrue over the total trip length and not solely over the trip portion located on the Queensland road network. Realisation of the potential of an inland highway could necessitate road upgrade works in each of the three mainland eastern states and, for that reason, not all of the benefits of an inland highway could be considered as accruing in Queensland. The analysis here adopts a simple apportionment of benefits according to route length. In reality, however, a wide range of national and state policy and budgetary considerations would influence an inland highway investment program.

Estimating demand for an inland highway

Because of a lack of comprehensive origin-destination data for long distance road freight, a scenario or 'what if'-based approach is adopted here to estimate benefits. Considering the heavy vehicle volumes currently travelling on the rural sections of the Bruce Highway and those that are using the Queensland sections of the inland route, the analysis estimates benefits by assuming 100 B-doubles a day switch to using the inland highway. That volume transfer is small enough to be accommodated within the infrastructure envelope of the route but not so large that the necessary upgrade costs would be prohibitive. It is also consistent with the reality that only a proportion of the heavy vehicle traffic on routes between central/north Queensland and Melbourne will be travelling the full distance between those points.

By way of comparison, heavy vehicle volumes on the rural sections of the Bruce Highway range from a low of around 500 vehicles a day up to 1,800 vehicles a day. On the Newell Highway between the Queensland and Victorian borders, heavy vehicle volumes range between 500 and 1,500 vehicles a day[38]. In volume terms, 20% of freight (by volume) on the Newell Highway is moving end-to-end, which suggests through (end-to-end) vehicle numbers of 200 to 300 vehicles per day.

38 See Transport for NSW (2014) Newell Highway Corridor Strategy, p 66, April

Conversion of benefits to present values

Inland highway benefits are presented in present value (PV) terms over a 30 year period. A 4% discount rate, which is the rate used for Commonwealth assessments, is used here in the calculation of PV benefits. Expressing benefits in PV terms allows them to be considered relative to potential levels of capital investment in an inland route. For example, were the present value of benefits to be $100 million, approximately $70 million of capital investment could be justified at a benefit cost ratio of say 1.5.

Other benefit assumptions

The analysis assumes that underlying heavy vehicle trip demand is growing at 2% a year.

Benefits are calculated in 2014 terms.

To simplify the analysis, it is assumed fleet composition will not change as a consequence of a volume shift towards an inland highway. Hence the analysis makes no allowance for increased take-up of high productivity vehicles (HPV). While potentially unrealistic, this assumption allows the analysis to operate broadly within the confines of the existing infrastructure envelope.

6.3 Benefits during normal road network operations

Time and vehicle operating cost savings

The analysis estimates the benefits of a switch to the inland route by taking account of the total trip distance and time between Queensland destinations and Melbourne. Benefits are calculated using Economic Associates rural road evaluation model, which has a similar structure to the Department of Transport and Main Roads CBA6 cost benefit analysis model.

Key inputs into the estimation of benefits, including traffic volumes and composition and road characteristics such as seal width and roughness, are specified at a coarse level of detail consistent with what is essentially a strategic analysis. The benefit estimation exercise calculates the time and cost saving associated with the shorter, quicker inland route with a built-in adjustment for the effects of lower road standards on that route. For example, parts of the Bruce Highway/Pacific Highway/Hume Highway corridor benefit from wide seals or divided carriageways, whereas long lengths of the inland corridor, particularly in Queensland, are built to a lower standard.

Time and vehicle operating cost savings are quantified in monetary terms using Austroads values.

Travel times are net times and do not include allowance for rest breaks mandated by driving hours regulations.

Environmental benefits

Fewer kilometres travelled to deliver the same freight tasks means fewer emissions and fewer resources required to construct, operate and dispose of heavy vehicles over their lifecycle. The benefits of this reduced environmental footprint are included in the analysis.

Safety benefits

As with environmental benefits, a more efficiently delivered freight task reduces crash risk. Offsetting that is the higher inherent (infrastructure related) crash risk on the lower standard inland route. In addition, there will be a set of urban risk factors that will be complex because the routes pass through a wide variety of urban settings. Hence the estimation of crash benefits is quite coarse.

6.4 Total estimated normal operations benefits

The potential productivity benefits (travel time and vehicle operating cost savings) in a shift of heavy vehicle traffic to an inland highway would be approximately $642 million over 30 years. Adding in safety and environmental benefits, the total benefits over the 30 year period would be $689 million.

Not all of those benefits would accrue in Queensland because just under half of the length of the route is located in New South Wales and Victoria. If route length was the basis of benefit attribution, the Queensland benefits over a 30 year period would be $355 million.

Most of the benefits (67%) represent savings in the costs of vehicle operation (fuel, repairs and maintenance, depreciation etc.). Driver and freight time savings are also important at approximately 27% of benefits. The quantum of potential safety benefits is very small and should be viewed with caution in light of the very strategic nature of the economic analysis. At the same time, this result could suggest that enhanced safety would not be a key driver for an inland route.

Table 12: Productivity benefits (4% discount rate)

	PV** benefits over 30 years	% of benefits
Travel time savings	$183m	26.6%
Vehicle operating cost savings	$459m	66.6%
Crash cost savings *	$1m	<1%
Environmental cost savings	$46m	6.7%
Total	$689m	100.0
% of inland highway in Qld	51.46%	
Benefits attributable to Qld	$355m	

** This result should be viewed with caution given the strategic nature of the analysis*
*** PV: Present value*

6.5 Economically justifiable upgrades

The economic analysis has estimated the productivity benefits of shifting traffic from one existing route to another. The analysis then raises the question: If upgrades are needed to encourage or accommodation a route shift, which road upgrade programs can be justified, in light of the benefits?

At a break-even benefit cost ratio (BCR) of 1 (i.e. benefits equal to upgrade costs), Table 4 shows that a program of $355 million could be supported in Queensland, equal to expenditure of approximately $0.259 million per route kilometre. At a more robust BCR, of say 1.5, a $237 million program would be economically justified, equal to approximately $0.173 million per route kilometre.

Table 13: Economically justified upgrades in Queensland

	Benefits	Benefits/km
PV benefits attributable to Queensland	$355m	$0.259m
Benefits attributable to Queensland at a target BCR of:		
1	$355m	$0.259m
1.25	$284m	$0.207m
1.5	$237m	$0.173m

6.6 Flood related benefits

During a flood event in central/north Queensland, a larger proportion of coastal traffic might be expected to use the inland route than would normally be the case. Depending on the duration of expected delays either side of a flood site or group of flood sites, trips focused on South East Queensland that normally would not gain much advantage from an inland route might reduce their flood delay costs by diverting inland.

A wide range of factors will influence diversion behaviour, not the least of which will be the possibility that the inland highway is flooded by the same event that inundates the Bruce Highway. Other factors include the location of the flood site, whether other sites on the Bruce Highway are also flooded at the same time, the warning time available to drivers, and each driver's judgement about how long the road will be flooded.

Whereas productivity benefits will arise every year, the flood mitigation benefits of an inland highway will only arise in the years in which the Bruce Highway is flooded. In wet periods that may mean every year, but in dry periods flooding incidents might be infrequent. Consequently, the average annual benefits may well be less than the benefits in a flood year.

Analysis of all of those factors is beyond the scope of this particular exercise but, for illustrative purposes, the economic analysis estimates the costs of the 2011 Bruce Highway flood incidents by drawing on the assumptions on page 28 earlier. For simplicity, it is assumed that the highway was closed in its entirety for seven days and that 300 vehicles divert to the inland route on each of those days. It is further assumed that of those 300 vehicles, 150 are bound for Brisbane and 150 for Melbourne. For Brisbane trips, the benefits of avoiding the flood delay will be offset partially by the effects of the 130 km distance penalty on the inland route. This will not be the case for Melbourne trips because the inland route offers time and distance advantages in the normal course of events.

With these assumptions, the delay costs for vehicles assumed to be potential inland highway users would be approximately $9.5 million for a seven-day event. Delay costs to all heavy vehicles on the Bruce Highway would be much larger but not all drivers will be able to or want to divert. The benefits of using the inland route nominated here rather than waiting at a flood site are slightly less, at $9.4 million for a seven-day event, because of the distance penalty on the inland route for Brisbane-bound trips.

Were that seven-day event to occur annually, the present value benefit over 30 years of having heavy vehicles divert inland to avoid flooding would be $196 million. Present value benefits for a 1-in-10 year occurrence would be around $20 million and approximately $10 million for a 1-in-20 occurrence.

These productivity benefits do not include losses of trade in areas affected by transport outages during floods. The economic efficiency component of those losses is very difficult to measure because at least part of the business turnover losses in flood affected areas will be made up elsewhere in Queensland or nationally as turnover gains.

The economic efficiency performance of flood mitigation projects is sometimes poor because flooding on a scale seen early in this decade is relatively infrequent and may be followed in parts of the state, as is the case now, by periods of intense drought. However, for reasons unrelated to economic efficiency, governments may elect to make flood proofing investments to strengthen community resilience and protect regional economies.

6.7 Assessment – productivity benefits of an inland highway

The potential productivity benefits of an inland highway in normal weather conditions, representing savings in time and vehicle operating costs, appear to be much greater than those associated with providing a more flood-resilient alternative to the Bruce Highway.

The analysis has focused on one inland route – Townsville to Melbourne via St George – to illustrate the potential of the concept. Achievement of a modest diversion of heavy vehicle traffic to that route could yield benefits that would be sufficient to justify an upgrade program in Queensland of between $237 million and $355 million. Investment in Queensland might not be fully beneficial unless connecting routes interstate are also upgraded. Hence, a similar investment might also be needed in New South Wales and Victoria on the Castlereagh, Newell and Goulburn Valley Highways, depending on their condition and capacity. More investigation, supported in particular by origin-destination and freight flow data, would be needed to establish whether an inland highway strategy should be targeted at one route or perhaps several in a number of north-south and east-west corridors.

Origin-destination data would be of particular value in assessing whether there is a strong role for an inland highway corridor or corridors to complement the Bruce Highway during severe weather events. The illustrative analysis carried out here suggests that the gains might not be as great as those that would come from developing an inland highway for use during normal weather conditions. Factors that would influence the potential role of an inland highway during adverse weather events include the expected frequency and duration of those events and the trip ends of heavy vehicle traffic on the Bruce Highway. Longer distance trips will gain the greatest benefit from a more flood resilient inland route and shorter trips the least benefit.

6.8 Other economic issues

Recent developments in the resource sector in southern and central Queensland have emphasised the importance of north-south and east-west transport links to support the development and long term operation of mines, well heads and pipe networks. The road network needs to support resource industry projects in moving materials to construction sites, moving inputs during the operating phase, and moving workforces in and out during construction and operating phases.

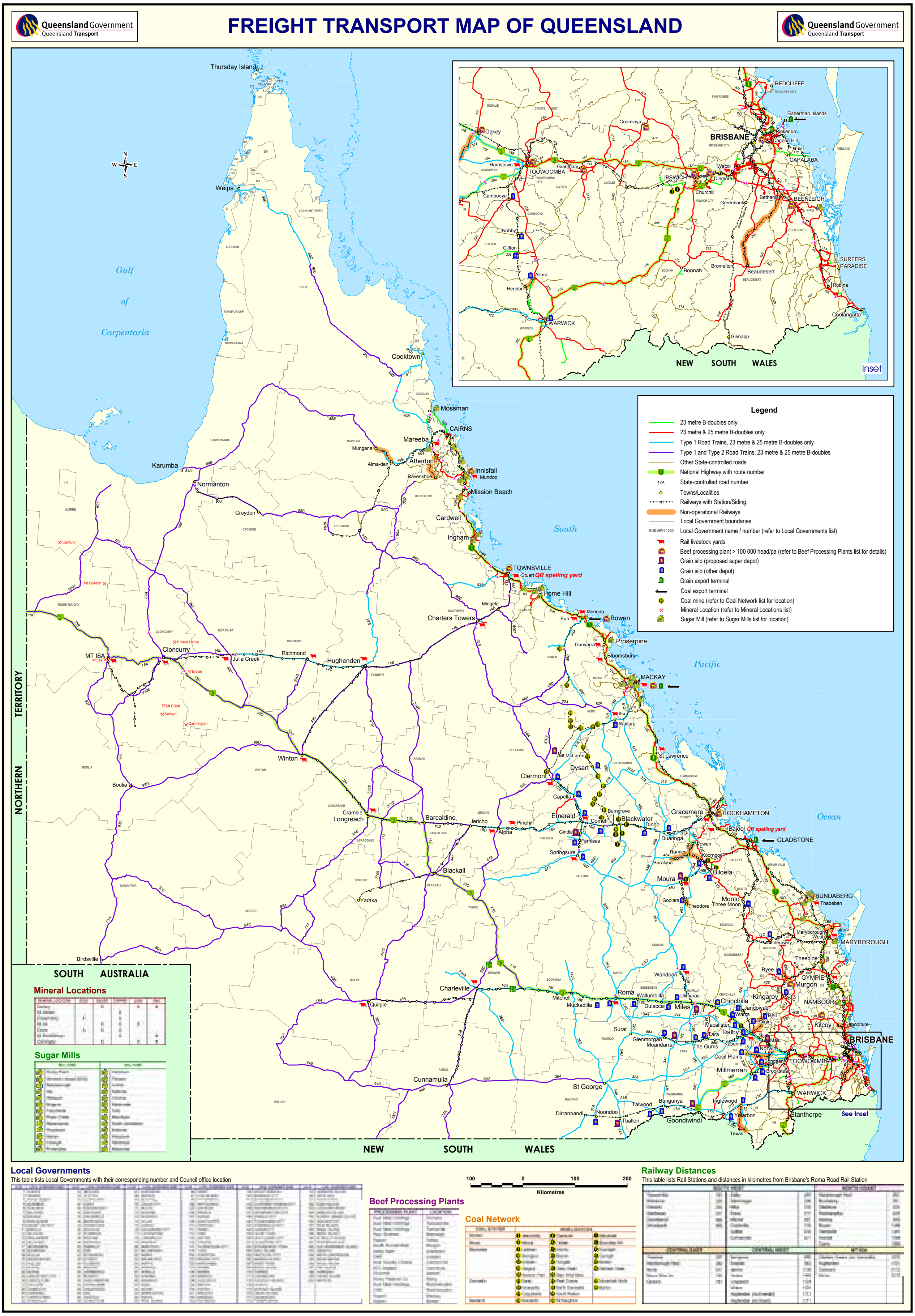
That potential is not included in the preceding estimation of productivity benefits because it tends to be project specific and somewhat cyclical, with relatively short and intensive bursts of high demand construction activity followed by longer periods of more subdued operating phase demand. Nevertheless, the inland route examined earlier skirts the eastern edge of the emerging Galilee Basin and could have an important role to play in the Galilee's development. Transport demands would include movement of inputs in the construction phase from southern manufacturing and port centres as well as from Gladstone and other Queensland centres. During the operating phase, that route could be important for moving bulk inputs, particularly fuel, but also in moving equipment to and from fabrication and repair centres such as Gladstone, Mackay, Townsville and Rockhampton, and perhaps to southern markets.

Reliable, efficient transport links are important for the provincial centres in Queensland in being able to tap into the resource sector demand. Reliability and efficiency in the transport task are important if the resource sector is to remain competitive on world markets; indirectly however, a reliable and efficient network increases the range of suppliers available to miners and maintains downward pressure on input costs, further helping them to remain competitive.

In Queensland's decentralised economy, an inland highway may be a means of supporting rural communities that have relatively narrow economic bases by improving their links with markets and services, facilitating road-based tourism and, in larger centres, by strengthening transport nodes, including activities related to truck servicing and repair. In this sense, an inland highway would have more of a social support and community development focus than an efficiency focus.

The role of transport in supporting isolated communities is an important one, reflecting the decentralisation policies of successive Queensland Governments over many years. A relevant issue is the balance to be struck between transport efficiency and the broader role of transport in the state's development. Too wide a distribution of funding in support of social objectives could detract from the ability of rural road investment to achieve an inland corridor that is sufficiently attractive to the road freight industry.

Appendix A



Source: Queensland Department of Transport and Main Roads

Appendix B

➲ Brisbane via Esk

Cairns to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Innisfail to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Lakeland to Brisbane – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Mackay to Brisbane – Bruce Highway, Isis Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Mt Isa to Brisbane – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Rockhampton to Brisbane – Bruce Highway, Burnett Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Townsville to Brisbane – Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Tully to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Dawson Highway, Burnett Highway, Wide Bay Highway, Burnett Highway, D'Aguilar Highway, Brisbane Valley Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

➲ Brisbane via Roma

Cairns to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Innisfail to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Lakeland to Brisbane – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Mackay to Brisbane – Peak Downs Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Mt Isa to Brisbane – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Capricorn Highway, Landsborough Highway, Warrego Highway, Carnarvon, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Rockhampton to Brisbane – Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Townsville to Brisbane – Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Tully to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Brisbane via Toowoomba

Cairns to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Innisfail to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Lakeland to Brisbane – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Mackay to Brisbane – Bruce Highway, Burnett Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Mt Isa to Brisbane – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Capricorn Highway, Landsborough Highway, Warrego Highway, Carnarvon, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Rockhampton to Brisbane – Bruce Highway, Burnett Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Tully to Brisbane – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Warrego Highway, Ipswich Motorway, Centenary Highway

Brisbane via Bruce Highway

Cairns to Brisbane – Bruce Highway

Innisfail to Brisbane – Bruce Highway

Lakeland to Brisbane – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway

Mackay to Brisbane – Bruce Highway

Mt Isa to Brisbane – A2 Highway, Barkly Highway, Flinders Highway, Kennedy Developmental Road, Flinders Highway, Gregory Highway, Capricorn Highway, Bruce Highway

Rockhampton to Brisbane – Bruce Highway

Townsville to Brisbane – Bruce Highway

Tully to Brisbane – Bruce Highway

Melbourne via Bruce Highway

Cairns to Melbourne – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Innisfail to Melbourne – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Lakeland to Melbourne – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Mackay to Melbourne – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Mt Isa to Melbourne – A2 Highway, Barkly Highway, Flinders Highway, Kennedy Developmental Road, Flinders Highway, Gregory Developmental Road, Gregory Highway, Capricorn Highway, Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Rockhampton to Melbourne – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Townsville to Melbourne – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Tully to Melbourne – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

➲ Melbourne via Cunnamulla

Cairns to Melbourne – Bruce Highway, Flinders Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Innisfail to Melbourne – Bruce Highway, Flinders Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Lakeland to Melbourne – Mulligan Highway, Kennedy Highway, Flinders Highway, Landsborough Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Mackay to Melbourne – Peak Downs Highway, Gregory Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Mt Isa to Melbourne – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Rockhampton to Melbourne – Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Townsville to Melbourne – Bruce Highway, Flinders Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Tully to Melbourne – Bruce Highway, Flinders Highway, Capricorn Highway, Landsborough Highway, Mitchell Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

➲ Melbourne via Goondiwindi

Cairns to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Innisfail to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Lakeland to Melbourne – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Mackay to Melbourne – Peak Downs Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Mt Isa to Melbourne – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Warrego Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Rockhampton to Melbourne – Burnett Highway, Dawson Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Townsville to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Tully to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Warrego Highway, Leichhardt Highway, Cunningham Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Melbourne via St George

Cairns to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Innisfail to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Lakeland to Melbourne – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Cumberland Highway, Hume Highway

Mackay to Melbourne – Peak Downs Highway, Gregory Highway, Capricorn Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Mt Isa to Melbourne –– A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Warrego Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Rockhampton to Melbourne – Burnett Highway, Leichhardt Highway, Moonie Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Townsville to Melbourne – Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Tully to Melbourne – Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Castlereagh Highway, Newell Highway, Mid Western Highway, Newell Highway, Goulburn Valley Highway

Sydney via Bruce Highway

Cairns to Sydney – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Innisfail to Sydney – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Lakeland to Sydney – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Mackay to Sydney – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Mt Isa to Sydney – A2 Highway, Barkly Highway, Flinders Highway, Gregory Highway, Capricorn Highway, Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Rockhampton to Sydney – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Townsville to Sydney – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Tully to Sydney – Bruce Highway, Pacific Motorway, Pacific Highway, New England Highway, Pacific Highway

Sydney via St George

Cairns to Sydney – Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Innisfail to Sydney – Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Lakeland to Sydney – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Mackay to Sydney –– Peak Downs Highway, Gregory Highway, Capricorn Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Mt Isa to Sydney – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Warrego Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Rockhampton to Sydney – Burnett Highway, Leichhardt Highway, Moonie Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Townsville to Sydney – Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

Tully to Sydney – Bruce Highway, Flinders Highway, Gregory Highway, Dawson Highway, Carnarvon Highway, Balonne Highway, Carnarvon Highway, Kamilaroi Highway, New England Highway, Pacific Highway

➲ Sydney via Warwick

Cairns to Sydney – Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

Innisfail to Sydney –– Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

Lakeland to Sydney – Mulligan Highway, Kennedy Highway, Palmerston Highway, Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

Mackay to Sydney –– Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

Mt Isa to Sydney – A2 Highway, Barkly Highway, Flinders Highway, Landsborough Highway, Warrego Highway, New England Highway, Cunningham Highway, New England Highway, Pacific Highway

Rockhampton to Sydney –– Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

Townsville to Sydney –– Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

Tully to Sydney –– Bruce Highway, Centenary Highway, Cunningham Highway, New England Highway, Pacific Highway

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