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Central West Transport Needs Study

SUMMARY REPORT

- Final
- May 2009

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A Executive Summary

A1 Introduction

The Australian Government commissioned the Central West Transport Needs Study (CWTNS), to evaluate the appropriateness of existing land transport networks in meeting the short and long term needs of the Central West. The preliminary findings of the study were submitted to Infrastructure Australia (IA) in late 2008 for consideration as part of IA's national infrastructure audit.

The study area, covered by the Central West Regional Organisation of Councils (CENTROC), is shown in **Figure A1**.

The objectives of the Central West Transport Needs Study as defined by the brief were to:

- Identify passenger and freight land transport needs between the Central West and greater Sydney, Port Botany, Port of Newcastle and Port Kembla over the next 25 years;
- Review current performance of the land transport network, including tourism links, in the Central West and its connections to greater Sydney, Port Botany, Port of Newcastle and Port Kembla and identify current deficiencies and challenges that may be anticipated in the future;
- Consider, as part of the review above, the need to enhance rail services between Bathurst and other towns in the Central West and Sydney for passengers and freight;
- Consider the role of major centres with respect to the provision of future inter-modal terminals;
- Identify land transport strategies to meet passenger and freight needs over the next 25 years, in particular, the need to improve freight access between the Central West and greater Sydney, Port Botany, Port of Newcastle and Port Kembla;
- Identify a list of potential proposals to deliver these strategies and assess the relative benefits of each proposal based on strategic engineering, environmental, economic and cost assessment in meeting the identified long term transport needs of the study area; and
- Identify a priority list of proposals capable of being delivered in the short term (say within 5-years), as well as a series of strategic initiatives to meet transport needs over the longer term (say 6 to 25 years).

This report presents the major findings of the study and takes into consideration the views and submissions from key stakeholders including CENTROC. A more detailed Technical Report and Appendices are presented under a separate cover, which document submissions from the various stakeholders, including those from CENTROC.



A2 Method

What Was Studied

The study looked at the existing road and rail network and its use in terms of its size (capacity to transport people and goods effectively), safety and productivity (is the network serving industry's needs for efficient transport?).

The study then calculated the growth in the different economic sectors (agriculture, minerals, coal, manufacturing and tourism) over the next 25 years and forecast the resulting transport volumes for each sector that would use the road and rail network, as well as the growth of passengers (car and public transport). This allowed a comparison of the future transport demand (number of cars and number of tonnes of goods, number of trains and daily road trucks) that would use the future network, to determine whether or not the existing network would cope with the additional traffic in the future.

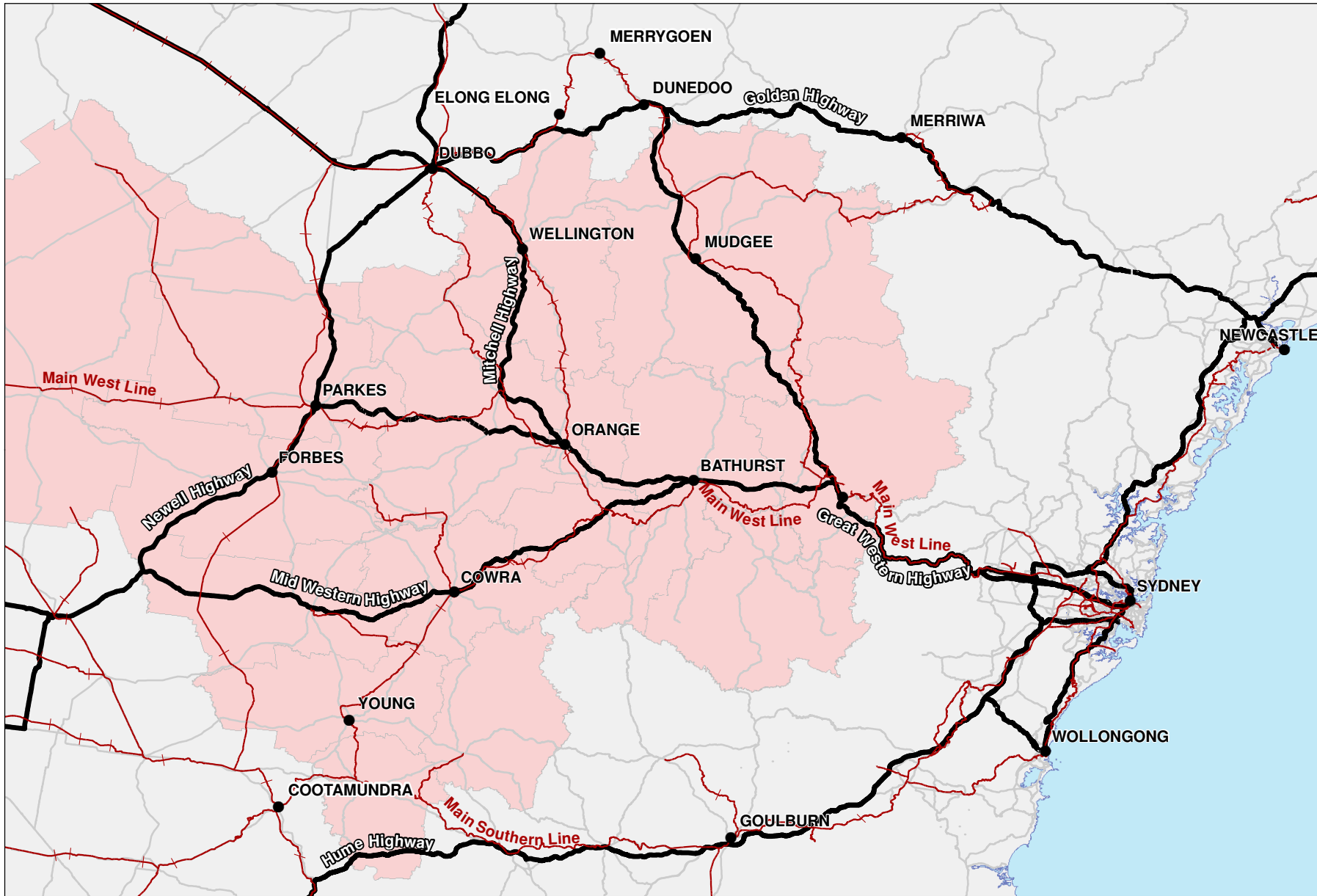
While the focus was on the Central West area, transport to and from the region was investigated, including access to Sydney, the Port of Newcastle, Port Botany and Port Kembla.

The study also reviewed a number of strategic studies related to the Central West issues including the Bells Line of Road.

Stakeholder Consultation

Meetings with key regional stakeholders were undertaken and submissions received to collect the views and concerns of stakeholders including Councils as input to the study.

Two stakeholder workshops were held in Orange to assist the study team identify problems and potential projects.



Legend

- NSW Main Highways
- + + NSW Railways
- National & State Roads
- Central West Study Boundary

Note the following non-operation rail lines/segments:
 Cowra – Eugowra
 Greenthorpe – Grenfell
 Galong – Boorowa
 Cowra – Blayney
 Gulgong – Kandos
 Tarana – Oberon

Data Sources

Streetworks

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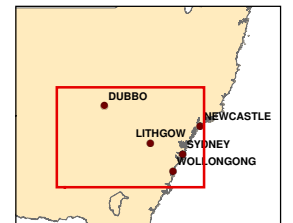


Figure A1: Existing Road and Rail Network within the Study Area
 CENTRAL WEST TRANSPORT NEEDS STUDY





Assessments Undertaken

The combination of the outputs from the community stakeholder meetings, submissions and workshops and the results of the technical analysis formed the basis of the study's findings.

A simple project assessment process was followed by the study team:

- identify problems and a long list of potential projects;
- apply a strategic assessment to this long list and test if each project would satisfy social, environmental and economic objectives;
- list those projects which satisfy more than one objective to gain a short list of potential projects;
- apply a preliminary benefit cost analysis to the short list projects (ie would the user benefits be greater than the costs of improvement?); and
- identify candidate projects for further investigation.

The costs of the short list potential projects were based on contract costs and unit rates (2008). The costs were compared with user benefits which included travel time savings (for drivers, passengers and goods moved), vehicle operating cost savings and accident savings. Productivity benefits included longer trains and heavier loads moved on the network (eg freight trains and B-Double truck operations).

A3 Current Situation

The Central West region of New South Wales lies to the west of the Blue Mountains and has a population of 208,000 (2006), which is 3.5% of the State's population. Its economy is diverse, based on agriculture and mining and represents about 2% of the State's economy.

Road Network

National and State Routes

The road network is dominated by two national routes, the Great Western Highway/Mitchell Highway (to Dubbo) and the Newell Highway. The Mid-Western, Mitchell, Castlereagh, and Olympic Highways as State roads contribute significant inter- and intra-regional connections, as do a number of major regional roads. The National and State routes within the study area are approved for B-double operation. Road network constraints affect freight traffic operation over the Blue Mountains (B-doubles over 19m are not permitted east of Lithgow), and overtaking opportunities are limited along most of the highways.



There are no capacity constraints of any significance on the major road network. The Great Western Highway, and to the west the Newell Highway, provide a high level of service with capacities well in excess of existing traffic flows.

Bells Line of Road (BLoR)

The Bells Line of Road provides an alternate route to the Great Western Highway for traffic crossing the Blue Mountains. The BLoR is 81 kilometres long from Lithgow to Richmond and takes light vehicles about 65 to 70 minutes end to end travel time (depending on travel direction). BLoR carries 3,000 to 4,000 vehicles per day (AADT) along its central length compared with 25,000 to 30,000 vehicles per day on the Great Western Highway between towns. The relatively poor horizontal and vertical alignment of BLoR limits access to cars, as well as light and medium commercial vehicles.

Crash rates (per 100 mvkt) along BLoR are higher than the State average and on the Great Western Highway. However, crash rates per kilometre on BLoR are lower than the Great Western Highway.

Rail Network

The rail network comprises three main elements: a portion of the Sydney – Perth East West Corridor from Lithgow to Condoblin (Sydney to Broken Hill); Main South line through Harden and Cootamundra (Sydney to Melbourne), and a connection from Newcastle to Dubbo via Ulan.

The interstate network is managed by Australian Rail Track Corporation (ARTC) on behalf of the NSW government with the section from Cootamundra to Parkes and Parkes to Condoblin (Broken Hill) being included in ARTC's lease of the interstate network. The country regional network is managed by Rail Infrastructure Corporation.

While rail capacity in the region is constrained by the limited load capacity of track, bridges, and passing opportunities, there are spare train paths within the region. However, rail operations from the region are severely impacted by constraints beyond the region. This is particularly the case for trains accessing the Sydney network and Port Botany, as a result of freight restrictions during commuter peaks and limited paths.

Rail freight movement in the region serves both domestic (Sydney) and export markets. Bulk coal and increasingly containerised minerals are moved to Sydney and then to Port Botany and Port Kembla by rail over the Blue Mountains and to Newcastle via the Ulan line.

Intermodal Facilities

Intermodal terminals are privately operated at Parkes (two), Bathurst (one), Blayney (one) and Dubbo (two). Plans are being developed for additional terminals at Parkes, Bathurst, Blayney and Dubbo.



Passenger Transport

Public transport services into the region are dominated by services from the east to Lithgow, and diminishing further westwards as population concentrations reduce. Many rail services have been replaced by bus services between rail stations. CountryLink runs a daily return XPT to Dubbo (through Bathurst) with coach connections to many other centres. The rail service pattern accommodates a return trip to the Central West from Sydney but not from the Central West to Sydney. CountryLink also runs a daily return coach service to Sydney connecting with inter-urban trains at Lithgow from most major centres including Nyngan, Dubbo, Parkes, Cowra, Mudgee, Orange and Bathurst. Same day return from the Central West to Sydney by bus can be undertaken, with an interchange at Lithgow for City Rail services.

The public transport services in the region outside the main towns serve about 670 (rail and coach) passengers per day (both directions). This is a relatively small proportion of the total trips made in the region (about 1%). This low patronage for public transport may be a result of the relatively low provision of services and the sometimes significantly longer transit times for rail and bus when compared with private transport travel times.

A4 Major Findings

Capacity Needs Within the Region

The study found that when the future traffic volumes were applied to the existing network within the region, no capacity problems were identified. That is, the existing size of the network (road lanes and the number of train paths required to move traffic on the network) would be adequate for future needs for at least 25 years.

The main reason for this finding is that the existing network generally has considerable spare capacity and that the expected growth in population (0.47% pa over 25 years), employment and forecast economic activity can be accommodated. Since undertaking these forecasts, the NSW Department of Planning has released revised demographic forecasts indicating a lower population growth of the Central West region of 0.09% per annum.

Network Enhancements

There are however, safety and network enhancements which would improve transport efficiency on the Central West transport network. Preliminary analysis indicates that further investigation of road safety and network improvements on the Great Western Highway, the Main West rail line and inter-modal facilities at Parkes may be warranted.

The total capital investment of all the candidate safety and productivity improvements within the region is estimated to be \$100 million in the short term – over the next seven years (2009 – 2015).



Road Needs

The road network investigation indicates a need to continue with the current policy of maintaining the network and investing in safety and overtaking lane improvement programs.

The short term (2009 – 2015) candidate projects from the assessments are:

- Road Safety Program (up to 23 locations), (*\$8 million*);
- Overtaking Lane Program (*\$67 million*)
- Great Western Highway Improvement – Mount Victoria to Lithgow Upgrade (this project is the subject of a separate investigation)

In the longer term (2015 – 2033), candidate projects from the assessments, and subject to current and separate investigation, are:

- Parkes Bypass and Improved Access to Inter-Modal Facilities;
- Continued Road Safety Program (up to 29 locations); and
- Continued Overtaking Lane Program on the Great Western Highway, Newell Highway and Mid-Western Highway.

The recommended candidate projects are shown on **Figure A2**.

Bells Line of Road

Based on the current expected growth in demand, an improved Bells Line of Road (to 4 lanes and 80 to 100 km/hr design speed) would not be needed and would be justified only after 2033.

The 2004 BLoR investigation developed a preferred 4-lane, 80 to 100 km/hr design speed alternative suitable for the safe operation of long commercial B-Double vehicles. The capital cost of this option was estimated at \$3 billion (2004 prices), which, as with all strategic level costings, included 50% contingencies. It included a bypass of Richmond.

The economic return on this investment, assuming a trend regional population growth (average of 1% pa between 2004 and 2031) and regional GDP growth (2% per annum to 2021 then 1.5% per annum up to 2033), was assessed at a BCR of 0.3 and a Net present value of -\$1.7 billion. It was concluded that the upgrade option was not economically viable.

It was also concluded that a road corridor should be preserved for future needs beyond 2033, subject to detailed environmental planning.

Since 2004, population and employment growth in the region has fallen below the trend assumed in 2004. Furthermore, the NSW Department of Planning has forecast (at October 2008) regional population growth to fall further (to 0.09% pa) over the next 10 years.



However, traffic growth and peak congestion in the Blue Mountains towns along the Great Western Highway would need to be managed over this period. This will require further investment in safety improvements to BLoR beyond the current RTA safety programme. The current policy of capacity improvements along the Great Western Highway, as the main route over the Blue Mountains, would appear justified.

Rail Needs

A key issue to be resolved through further investigation is whether the existing maintenance regime and investment policy of priority to the Southern line via Cootamundra for inter-state traffic, would adversely affect operations on the Main West line.

The short term (2009-2015) candidate projects from the assessments are:

- Newcastle to Dubbo line (crossing loop at Elong Elong and Merrygoen triangle junction) (\$25 million); and
- Main West line (Mount Victoria to Parkes) long term demand and Investment Program.

In the longer term (2015-2033) rail investment would depend on the outcome of the full investigation of the Main West line.

Passenger Needs

Public transport in the Central West should be improved in stages, in line with passenger demand as assessed by the NSW Government. Additional or improved bus services are likely to be the least costly alternative to improved rail passenger transport services. An additional rail service from Bathurst (to Sydney and back within a day) would offer travel time savings as well as avoiding the need to interchange. This option would also minimise transfers between modes and the associated wait times, disabled access and toilet facilities, and comfort and ride quality associated with rail travel.

The costs of improving the Bathurst-Sydney rail service and the regional rail services are likely to outweigh the user benefits given the low demand to use rail.

The NSW Government would need to undertake a detailed investigation, involving community consultation. Revealed and stated preference surveys, would be required to estimate potential patronage levels and feasibility of an additional daily Orange to Sydney service (to Sydney and back within a day).

It is recommended that more detailed investigation be undertaken in parallel to assess the level of economic investment in the Main West line required to achieve productivity benefits and its economic justification; and to assess the staged improvements of additional bus and rail services



and regionally-based rail passenger improvement options identified in this report, in line with passenger demand, on the basis of affordability.

It should be noted that there is a general shortage of rolling stock in NSW particularly due to the current Endeavour and Explorer refurbishment program. It could therefore take up to 24 months to secure new rolling stock to cater for any additional services.

Access and Connectivity to Sea Ports

The viability of the Central West economy is dependent on access to ports. An assessment of the connectivity of the region to east coast sea ports for the expected future freight movement has found that:

- Access and capacity to Port Botany (up to 2021) can be maintained by extending train lengths (short term) and from the proposed Sydney rail network improvements (long term);
- Beyond 2021, at a time when Port Botany may be at capacity, growth in freight traffic (rail and road) could be partially diverted to Newcastle;
- Access to Port Kembla for coal traffic can be maintained in the short term and subject to export coal production, out of region capacity upgrades in the longer term; and
- Freight access from the region to non NSW ports (Brisbane, Melbourne, Fremantle) would be facilitated by the proposed North South Inland rail facilities and potential connection at Parkes (subject to independent investigation).

Further Investigations

The study recognised the need for further investigation of the longer term needs, including:

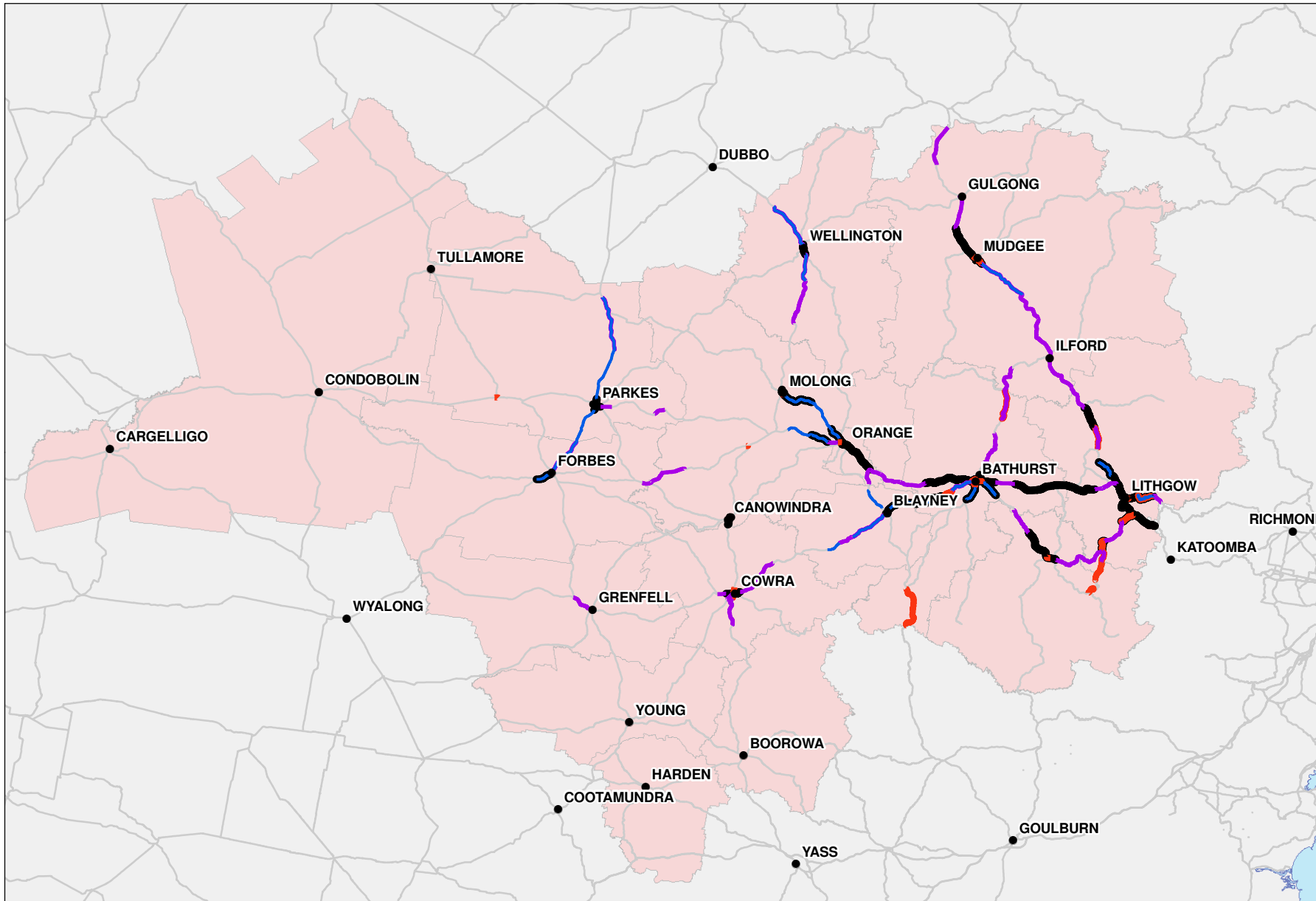
- A full review of the long term (beyond 2033) need for additional transport capacity across the Blue Mountains. This would include:
 - a) further investment in the Main West rail line; and
 - b) consideration of the need for additional road capacity generally along the Bells Line of Road, including investigation of the need to reserve a corridor.
- Consideration be given to a trial of a new Bathurst-Sydney rail passenger service;
- Continuation of the Great Western Highway Improvement Program west of Mount Victoria, and the upgrade of the Great Western Highway west of Lithgow which would include a review of rural road capacity warrants;
- Continuation of the RTA's safety upgrade program on the BLoR, with an investigation of further safety and capacity enhancements for the medium term;
- Investigation into regional Road Overtaking and Safety Priority Programs; and
- Investigation into operations and productivity at Parkes Inter-modal and need for future investment (subject to North South Inland rail study) findings.



Projects Outside the Region Being Investigated

There are projects outside the region which are the subject of other independent investigations and which may improve the effectiveness and efficiency of transport to and from the region, including:

- M4 Extension Investigation, as part of access to Sydney from the west;
- M5 East capacity study (road access to Port Botany);
- North South Inland Rail Study (access to national ports to / from Parkes);
- Sydney network rail improvements – including rail access to Port Botany, metropolitan rail capacity upgrades, more train passing lengths over the Blue Mountains;
- Northern Sydney Freight Line Investigation; and
- Maldon Dombarton Study (rail access to Port Kembla for coal exports to / from the region).



- Legend**
- High Accident Locations (Existing)
 - Locations where Crash Rate exceeds NSW State Average (100 MVKT)
 - High Accident Locations (Future)
 - Auxiliary Lanes
 - NSW Main Highways
 - Central West Study Boundary

Data Sources

Streetworks

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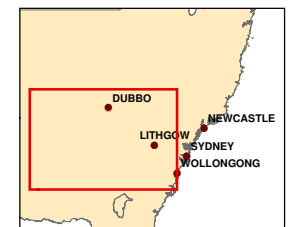


Figure A2 - Central West Potential Short and Long Term Road Projects

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B The Overall Approach to the Study

B1 The Strategic Context

The Central West of New South Wales has an existing freight and rural road and rail network that serves both population and industries focused on agriculture, mining, food processing, manufacturing, tourism and retail. Its economy has been valued at a Gross Regional Product of \$7.9B (2006), representing about 2% of the NSW economy¹.

The study area includes the local government areas of Bathurst Regional, Blayney, Boorowa, Cabonne, Cowra, Forbes, Harden, Lachlan, Lithgow, Mid-Western Regional, Oberon, Orange, Parkes, Weddin, Wellington and Young. The study also considered links across the Great Dividing Range to greater Sydney, Port Botany, Port of Newcastle and Port Kembla.

B2 Overall Approach to the Investigation

The approach to the assessment of the region's transport needs and appropriate infrastructure initiatives was established to match the emergent appraisal framework adopted by Infrastructure Australia². This framework corresponds with that appropriate to the development of a regional strategy and is outlined in **Figure B1**.

B3 Government Policy Goals

Government policy goals provide the framework for Government investment. For this study, policy goals were adopted to ensure that an appropriate range of transport projects would be assessed. The policy goals nominated for initial screening of projects were:

- economic (Australian Government policy goals from AusLink enabling legislation)³;
- social and environmental goals (from the NSW State Plan); and
- transport goals (from AusLink administrative framework)³.

The adopted policy goals are shown in **Table B1**. Potential projects were assessed against these policy goals as part of the Strategic Merit Test (see **Section F2**).

¹ Bathurst Regional Profile Autumn/Winter 2007, Bathurst Regional Council.

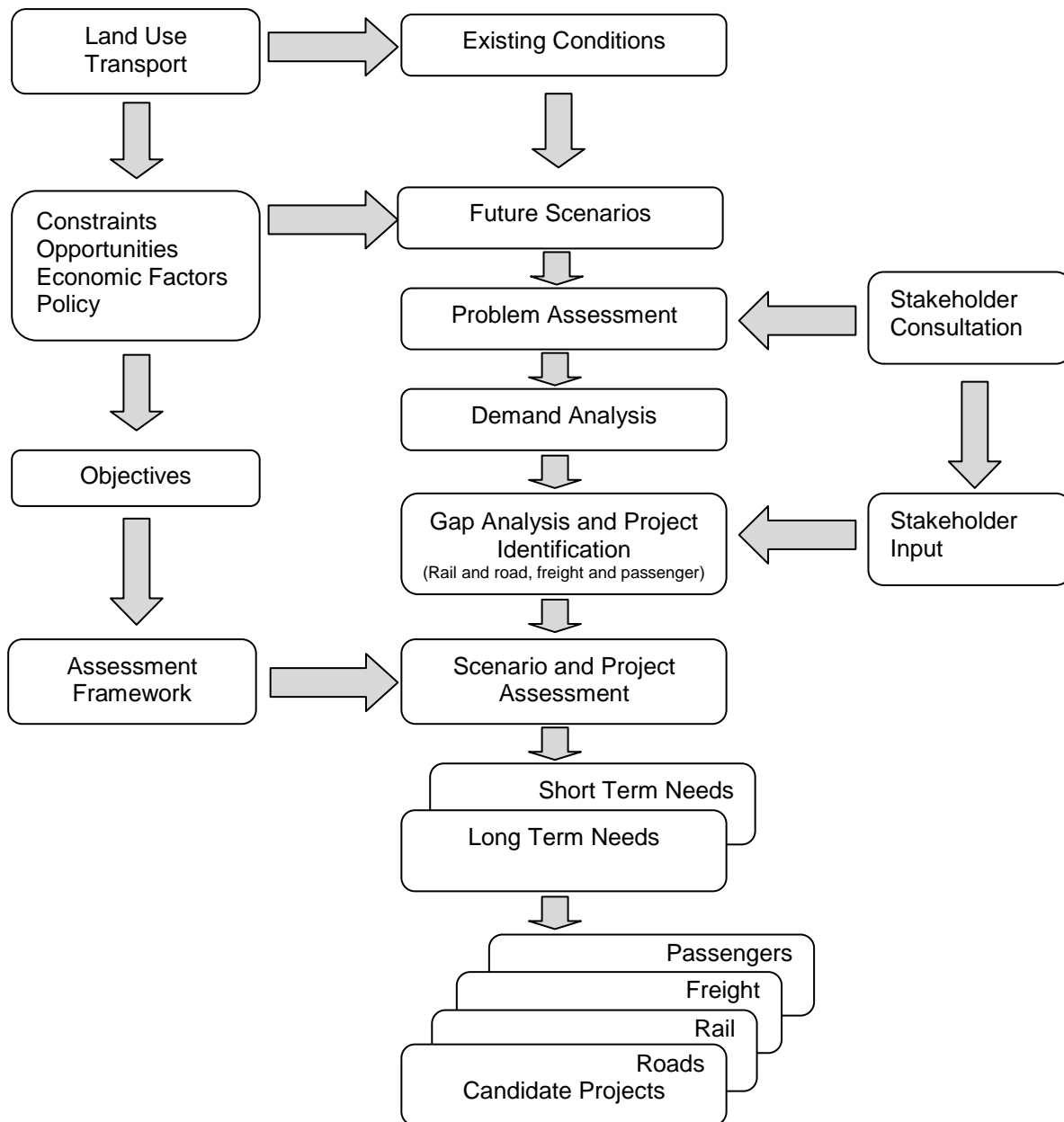
² The study framework was initiated prior to release Infrastructure Australia's framework, but adopted a similar framework

³ AusLink (National Land Transport) Act of 2005,

<http://www.comlaw.gov.au/comlaw/Legislation/Act1.nsf/0/8A37CB9B1B6C353ACA25703800186E20?OpenDocument>



■ **Figure B1 Overall Methodology**





■ **Table B1 Policy Goals Adopted for this Investigation**

Policy Theme	Policy Goal	Criteria
Economic	Assist national and regional economic development (National)	Accessibility to markets beyond and within the region Reliability of inter-regional access
Social	Building Harmonious Communities (NSW) Building Healthy Communities (NSW)	Improved accessibility to services Improved safety
Environment	Environment for Living (NSW)	Better environmental outcomes
Transport	Single integrated network of strategic and national importance (AusLink)	New or improved connection with national road or rail network including inter-modal facilities

B4 Problem Assessment

This phase addressed the issues and problems in the region that inhibit achieving the identified policy goals. This approach ensures that initiatives address real issues. Problem articulation was qualitative in this study, consistent with the strategic nature of the assessment. Candidate projects were identified through consideration of the current situation and a gap analysis workshop conducted with key stakeholders. The workshop was designed to inform the study process, rather than provide a comprehensive list of all the stakeholders' perceived transport issues and possible projects. The study team considered all potential projects through the appraisal framework in order to determine the candidate projects.

B5 Forecast Possible Economic Futures

Following the identification of the current level of transport activity and transport network operation, changes in regional transport demand were forecast for the short-term (5 years) and the long-term (2033), based on two economic scenarios. These scenarios were framed prior to the severe economic downturn of late 2008/early 2009. The Base Growth scenario was framed to consider the continuation of recent trends for the short-term, followed by a return to long term trends related to population growth, reduced agriculture from climate change, and recognition of the impact of a carbon economy. The High Growth forecasts reflected a more buoyant future of the continuation of recent growth, continuation of current commodity trends, and stronger population and employment growth. Wherever data was available, growth was identified for each sub-region in the study area. Growth was identified independent of the region's transport infrastructure.

A regional traffic model was developed for the road network, which provided a tool to assess road network capacity under the increased future demand. By their very nature, rail operations are more distinct, and a more pragmatic assessment was made of future train-path capacity under differing demand scenarios.



B6 External Influences and Treatment of Uncertainty

The economic futures were subjected to challenges that reflected influences beyond the region's economy, such as the effects of a congested Port Botany, restrictions on freight access over the Blue Mountains, the price effects of 'peak oil' and consequential cross-modal shifts; and development of an inland rail network.

A range of future scenarios (population, employment, external infrastructure influences) were tested (refer to **Table D4**) in order to assess likely future changes to the economy, the resulting transport activity, and to determine future transport capacity constraints and needs over the next 25 years.

B7 Review of Candidate Infrastructure Projects

While potential candidate projects were initially assessed as stand-alone projects, they were also considered in conjunction with other initiatives in the form of a connected network. This included multi-modal aspects, such as possible inter-modal centres in conjunction with enhanced road and rail access and associated town bypass options (Orange, Bathurst and Parkes).

Out-of-region candidate projects were also considered in the context of the support they would provide for freight movements from within the study area, such as improved out-of-region rail corridor initiatives that released more direct rail paths that assisted movement to and from the study area. Additionally, candidate projects were considered in the context of being of merit under more than one scenario, thus providing a measure of surety against a range of possible futures.

The strategic nature of the study precluded the development of detailed business cases and detailed operational assessment of the candidate projects.



C The Current Situation

C1 Population and Economy

The Central West's economy is primarily based on coal and minerals mining, agriculture and tourism. There is also a strong educational sector especially in Bathurst. The region employs 88,000 workers out of a population of 208,000 (which is about 3.5% of the NSW population in 2006). Population and employment growth over the last 10 years has been at an average of between 0.16% pa and 0.74% pa respectively, which is significantly lower than the State average. The towns of Bathurst and Orange have the most significant concentration of population and employment in the study area.

The region's economic activity is strongly related to a central east-west transport corridor of Lithgow, Bathurst, Orange and Parkes along the Great Western Highway and the Main West rail line running westwards from Sydney. The higher levels of transport services in this corridor have contributed to most of the recent population and economic activity taking place within the towns in this east-west corridor.

C2 Road Network

The road network is dominated by two national routes, the Great Western Highway/Mitchell Highway (to Dubbo) and the Newell Highway. The Mid-Western, Mitchell, Castlereagh, and Olympic Highways as State roads contribute significant inter- and intra-regional connections, as do a number of major regional roads. The National and State routes within the study area are approved for B-double operation (except for a small portion of the Great Western Highway in the Lithgow LGA). Road network constraints affect freight traffic operation over the Blue Mountains (B-doubles over 19m are not permitted east of Lithgow), and overtaking opportunities are limited along most of the highways.

The average general traffic growth (all vehicles) on the regional network has been averaging 1.8% pa (last 10 years). It is evident that the growth in total traffic is due to both through-traffic growth and increased local activity. The growth is not constant over the whole network with a decline in traffic on some regional roads. There are however no capacity constraints of any significance on the major road network. The Great Western Highway and to the west, the Newell Highway, provide a high level of service with capacities well in excess of existing traffic flows.

C3 Rail Network

The rail network comprises three main elements: a portion of the Sydney – Perth East West Corridor from Lithgow to Condoblin (Sydney to Broken Hill); Main South line through Harden and Cootamundra (Sydney to Melbourne), and a connection from Newcastle to Dubbo via Ulan. There



are eight critically important cross-linkages including lines running through Parkes, Dubbo and through Bathurst to Sydney. Lithgow to Condobolin is however not the most commonly used route for Sydney to Perth traffic due to restrictions over the Blue Mountains and most of the non-time sensitive freight travels via Cootamundra.

The interstate network is managed by Australian Rail Track Corporation (ARTC) on behalf of the NSW government with the section from Cootamundra to Parkes and Parkes to Condobolin (Broken Hill) being included in ARTC's lease of the interstate network. The country regional network is managed by Rail Infrastructure Corporation. The freight terminal facilities in the region are all privately owned. The exclusion of the Lithgow to Parkes section in the ARTC lease reflects the low level of interstate freight activity on the line and relatively high cost of upgrade for low return due to high "above rail" operating costs.

The Emu Plains to Bowenfels rail operations are constrained largely by the terrain of the Blue Mountains. The associated gradients and curvature place limits on the speed and length of trains on this corridor segment. The length and weight of freight trains are limited by the braking performance of rolling stock. The height of trains is limited by the presence of overhead wiring and the numerous bridges and tunnels along the segment. The interface between passenger rail services and freight rail services is not considered a significant constraint, due to spare capacity on the railway line and limited growth in demand for passenger transport.

While rail capacity in the region is constrained by the limited load capacity of track, bridges, and passing opportunities, there are spare train paths within the region. However, rail operations from the region are severely impacted by constraints beyond the region. This is particularly the case for trains accessing the Sydney network and Port Botany, as a result of freight restrictions during commuter peaks and limited paths.

C4 Intermodal Facilities

Intermodal terminals are privately operated at Parkes (two), Bathurst (one), Blayney (one) and Dubbo (two). Plans are being developed for additional terminals at Parkes, Bathurst, Blayney and Dubbo.

The region also contains many grain terminals, reflecting the significant role of grain in the transport of bulk materials, with forty five GrainCorp sites, a further six AWB sites, and a further seven non-grain bulk terminals. However, the grain industry is undergoing re-structure, in part due to de-regulation of wheat marketing, and changes to existing rail haulage agreements.



C5 Freight Movement

Freight movement in the region serves both domestic (Sydney) and export markets. Bulk coal and increasingly containerised minerals are moved to Sydney and then to Port Botany and Port Kembla by rail over the Blue Mountains and to Newcastle via the Ulan line.

Export containers from the region are currently loaded at Manildra, Blayney, Bathurst and Dubbo and railed to Port Botany. The Sydney-Dubbo corridor handles about half of the freight task between central NSW and Sydney and the east coast. Seventy five per cent of this task is the transport of bulk commodities, mainly coal, grain and minerals, for which connecting roads and rail links are available both north and south of this corridor. For example, minerals from Cobar and Elura traverse the corridor via the Narromine– Dubbo section and then travel via Werris Creek, Muswellbrook and Singleton to get to Newcastle; export grain north of Dubbo also uses this route to Newcastle, while export grain south of Dubbo is transported to Port Kembla via Cootamundra and the Southern Line. The majority of interstate freight (NSW–SA/WA) travels on the Southern Line via Cootamundra.

Outside the region, the topographical (steep grades) and environmental constraints (National Park and World Heritage status) of the Blue Mountains limits easy access to and from Sydney. B-double vehicles over 19 metres in length are not permitted east of Lithgow, and Down trains length is limited due to braking capacity coming down the Blue Mountains⁴.

The major existing rail movement constraints are the single rail track and low average speeds west of Lithgow and the lack of refuge loops for overtaking (for Down services) over the Blue Mountains and the congested Sydney metropolitan network.

C6 Public Transport

The provision of public transport services in the Central West is a NSW Government responsibility.

Public transport services into the region are dominated by services from the east to Lithgow, and diminishing further westwards as population concentrations reduce. Many rail services have been replaced by bus services between rail stations. CountryLink runs a daily return XPT to Dubbo (through Bathurst) with coach connections to many other centres. CountryLink also run a daily return coach service to Sydney connecting with inter-urban trains at Lithgow from most major centres including Nyngan, Dubbo, Parkes, Cowra, Mudgee, Orange and Bathurst.

⁴ The longest train is the Inter-State train (5 days a week) which is 1200 metres long but is restricted in its operation to outside passenger train operating hours.



The Dubbo XPT service departs Sydney at 07:10 and arrives at Bathurst and Orange at 10:40 and 11:56 respectively. The departure times for the same day return from Orange and Bathurst are 15:55 and 17:14 respectively with a Sydney arrival time of 20:48. A better service is provided for those starting their journey in Sydney (west-bound) compared with those starting in the region (east-bound). The service patterns cannot be simply reversed without significant investment in stabling and/or maintenance facilities, rolling stock and changes to staff rosters and timetables. Same day return from the Central West to Sydney by bus can be undertaken, with an interchange at Lithgow for City Rail services.

The once-a-day Countrylink service from Dubbo to Sydney takes three and a half hours journey time from Bathurst to Sydney which can be compared to the journey by private motor vehicle which takes about three hours.

Most areas in the Central West have local bus services which include regular passenger town services and school services. New arrangements for the delivery of bus services in rural and regional NSW were approved by the NSW Government in April 2008. The progressive implementation of new contracts across NSW, including the Central West area, commenced in July 2008 and is expected to be completed by June 2009. A significant number of bus operators have already accepted the new arrangements and executed contracts with the Ministry of Transport. These new contracts will ensure sustainable services and certainty for communities and operators, with clear requirements for performance, community consultation and working cooperatively with neighbouring operators. These new arrangements take into account the diverse range of transport needs in regional centres, country towns, villages and rural communities.

The public transport services in the region outside the main towns serve about 670 (rail and coach) passengers per day (both directions). This is a relatively small proportion of the total trips made in the region (about 1%). This low patronage for public transport may be a result of the relatively low provision of services and the sometimes significantly longer transit times for rail and bus when compared with private transport travel times.

C7 Bells Line of Road

The existing Bells Line of Road (BLoR) provides an alternate route to the Great Western Highway for traffic crossing the Blue Mountains. The existing BLoR is 81 kilometres long from Lithgow to Richmond and takes light vehicles about 65 to 70 minutes end to end travel time (depending on travel direction). BLoR carries 3,000 to 4,000 (AADT) vehicles along its central length compared with 25,000 to 30,000 (AADT) vehicles per day on Great Western Highway between towns. The relatively poor horizontal and vertical alignment of BLoR limits access to cars, light and medium commercial vehicles.



Crash rates (per 100 mvkt) along BLoR are higher than the State average and on the Great Western Highway. However, crash rates per kilometre on BLoR are substantially lower than the Great Western Highway. The RTA will continue to monitor safety on BLoR.

The 2004 BLoR investigation developed a preferred 4 lane, 80 to 100 km/h design speed alternative suitable for the safe operation of long commercial B Double vehicles. The capital cost of this option was estimated at \$3 billion (2004 prices), which, as with all strategic level costings, included 50% contingencies. It included a bypass of Richmond.

The economic return on this investment, assuming a trend regional population growth (average of 1% pa between 2004 and 2031) and regional GDP growth (2% pa to 2021 then 1.5% pa up to 2033), was assessed at a BCR of 0.3 and a Net present value of –\$1.7 billion. It was concluded that the upgrade option was not economically viable.

It was also concluded that a road corridor should be preserved for future needs beyond 2033, subject to detailed environmental planning.

Since 2004, population and employment growth in the region has fallen below the trend assumed in 2004. Furthermore, the NSW Department of Planning has forecast (at October 2008) the regional population growth to fall further (to 0.09% pa) over the next 10 years.

It is therefore likely, based on the current expected growth in demand, that an improved BLoR (to 4 lanes and 80 to 100 km/h design speed) would not be needed and would be justified only after 2033.

However, traffic growth and peak congestion in the Blue Mountains towns along the Great Western Highway would need to be managed over this period. This will require further investment in safety improvements to BLoR beyond the current RTA safety programme. The current policy of capacity improvements along the Great Western Highway, as the main route over the Blue Mountains, would appear justified.



D How We See the Future

The region's economy is dominated by agriculture, both in terms of value to the gross regional product, and employment. While retail trade and health services are the next biggest employment sector, tourism and mining rank next in terms of contribution to the economy. The continued viability of the Central West economy depends on accessibility to:

- economic markets (Dubbo, Sydney, Brisbane, Melbourne or beyond);
- sea ports as the region is a net exporter (Botany, Newcastle, Kembla or Brisbane); and
- the communities that will provide the flow of tourists.

D1 Economic Scenarios

Two economic futures were forecast: a Base Growth scenario that reflected continuation of existing trends in the short-term, with a return to the longer-term average reflecting expected changes due to environmental and economic effects; a High Growth scenario that again reflected the short-term trends, and continued these trends or related them to a more buoyant long term commodity growth.

For all forecasts, and wherever possible regional data was used reflecting the mixed nature of the whole region in terms of dominant industries, and degree of urbanisation. Department of Planning forecast population growth of 0.47% per year to 236,500 in 2033⁵. The demographic profile of the region was also recognised as an important element of the future economy. The region's population profile will age more noticeably than more urbanised areas with implications for health services, with the over 65 year cohort increasing from 15% to 27% of the population by 2033.

If employment were to grow at the same rate as the population, it would reach 100,200 by 2033. However, workforce participation has been increasing since 2002, and this trend is expected to continue.

Agricultural forecasts were based on growth in the dominant agricultural sectors, with livestock accounting for 70% of the region's agricultural land use. The base forecast assumes growth of 1.38%pa, with a high-growth forecast of 1.41%pa. This narrow band reflects long-term trends, and environmental issues that face the region.

Mining was forecast to grow at between 2.7%pa and 6.3%pa reflecting known short-term contracts, identified prospects, along with contraction of the mining sector reflecting diversification of world-

⁵ NSW Department of Planning 2005. Subsequent to this analysis, the Department of Planning issued updated forecasts reflecting lower growth forecasts (see page 12).



wide mineral sources for the Base Growth scenario, as opposed to continued high long term growth.

Tourism was forecast using divergent themes: following the recent real decline in tourism numbers in the region, as opposed to growth continuing the increase in tourism expenditure.

Manufacturing and construction were forecast to follow historical trends, while education and health services were forecast to grow with the younger and older segments of the population. Other sectors of the economy were forecast to grow with the overall population.

The overall effect for the Base Growth scenario, was that economic growth was forecast to grow at 1.09%pa, while the High Growth scenario has forecast growth at 1.84%pa.

To support these economic futures, the Base Growth scenario has forecast employment to grow to 116,500, an annual increase of 1.04%pa, with an employment participation rate of 49%, growing from the present 42%. For the High Growth scenario, employment growth was forecast to reach 143,000 (1.8%pa), supported by a net population growth of 0.85%pa, and workforce participation increasing to 55%.

Since undertaking these forecasts, the NSW Department of Planning⁶ has released revised population and demographic forecasts. These indicated a population growth for the Central West statistical district of 0.09%pa. As this district represents the economically strongest portion of the Central West study area, the revised forecasts suggest a less optimistic growth for the region than indicated in the economy-based forecasts adopted in this study. The findings of this study therefore rely on a slightly higher set of population forecasts than those updated (October 2008) by the Department of Planning.

D2 Transport Activity

Economic activity drives population and employment growth and thence transport demand. Other measures of transport growth that need to be recognised include the role of inter-regional traffic operating through the region such as road traffic on the Newell and Olympic Highways, as well as Sydney-Perth rail activity.

The forecast for growth in inter-regional road freight was based on BTRE forecasts which correspond with the generally accepted growth in Australian Gross Domestic Product + 1%. Inter-regional light vehicle activity was based on NSW Gross State Product.

⁶ <http://www.planning.nsw.gov.au/programservices/population.asp>, 20 Oct 2008.



General road traffic activity was identified from historical traffic data for the region as growing at an average of 1.4%pa.

Rail growth was forecast on known contracts and developments, allowing some mode shift reflecting changes in logistics practices such as increased containerisation of freight and development of intermodal interchanges.

D3 Freight Forecasts

Recognising both short and medium term contracts, known mining activity and documented prospects, and broad economic forecasts, the region's freight forecasts are summarised in **Table D1**.

The relatively high future volumes reflect the commodity growth assumptions used. The estimate tonnes moved by road include volumes on both public and private roads.

The average Base Growth in rail freight (tonnes moved) was estimated at 3.5% over 25 years, consistent with the growth in road heavy vehicle volumes (**Table D2**).



■ **Table D1 Freight Forecasts (tonnes) for Road and Rail**

	2008		2013		2033	
	Road* (t)	Rail (t)	Road (t)	Rail (t)	Road (t)	Rail (t)
Within the region						
Agriculture	2,200,000		2,810,000		3,000,000	
Cement	10,000		12,642		29,910	
Petroleum	80,000		80,000		80,000	
Total intra region movements	2,290,000		2,902,642		3,109,910	
Growth (%pa)			2008-2013		2013-2033	
			4.9%pa		1.4%pa	
Originating in or destined to the region						
Agriculture		2,200,000		2,810,000		3,000,000
Cement		450,000		568,878		1,345,950
Fertiliser		80,000		71,674		28,752
Forestry	1,300,000	100,000	1,070,000	230,000	875,000	425,000
General freight	275,000	740,000	347,647	804,000	822,525	1,902,243
Meat products	205,000		259,155		321,413	
Mining (Minerals+Coal)	14,618,803	13,800,000	26,990,898	26,950,000	41,264,856	64,972,470
(Minerals)	5,118,803	400,000	8,340,898	700,000	13,920,184	1,168,235
(Coal)	9,500,000	13,400,000	18,650,000	26,250,000	27,344,672	63,804,235
Petroleum		80,000		88,326		88,326
Total modal movements	16,398,803	17,450,000	28,667,700	31,522,878	43,283,794	71,762,741
Total region movements	33,848,803		60,190,580		115,046,535	
Growth (%pa)			2008-2013		2013-2033	
			12.2%		3.3%	
Through movements						
East-West						
General freight	230,000	1,300,000	320,000	1,800,000	757,112	4,258,753
Steel		1,000,000		1,000,000		1,000,000
North-South				4,157,000		7,216,000
Total modal movements	230,000	2,300,000	320,000	6,957,000	757,110	12,474,755
Total through movements	2,530,000		7,277,000		13,231,865	
Growth (%pa)			2008-2013		2013-2033	
			23.5%pa		3.0%pa	
SUMMARY						
Total modal freight task	18,918,803	19,750,000	31,890,342	38,479,878	47,150,816	84,237,494
Total Freight task	38,668,803		70,370,220		131,388,310	
Growth (%pa)			2008-2013		2013-2033	
			12.7%pa		3.2%pa	

* Includes tonnages on private roads and conveyors for coal, minerals and mining. Total task based on government sources, annual reports and known data from discussion with operators and owners of transport related business in each sector.

D4 Road Traffic Forecast

Road traffic forecasts were developed based on a Saturn road network traffic model, which was calibrated against known traffic counts, estimates of heavy vehicle activity, and sub-regional



growth indicators based on the Base and High Growth forecasts for the 25 year study period. The next step was to analyse the capability of the current road network to accommodate future traffic growth. Demand and capacity of the existing network was analysed and assessed in terms of its economic viability. Candidate road projects were then included in the network to identify benefits to be derived from their implementation.

The average traffic growth for the Base Growth and High Growth was 0.9% and 1.47% compound growth per annum respectively. However the growth rates varied for each local area due to area specific economic forecasts and traffic growth rates. The identified policy scenarios were also modelled to estimate the effect on network operations. **Table D2** summarises these forecasts.

■ **Table D2 Forecast Road Traffic (Vehicles per day) on the Strategic Regional Network**

Mode	2008	2033 Base Growth		2033 High Growth	
Light Vehicles	64,611	73,055	13.1%	85,890	32.9%
Commercial Vehicles	13,757	25,430	84.8%	26,905	95.6%
Total	78,368	98,480	25.7%	112,790	43.9%

D5 Public Transport

Public transport was estimated from existing rail and rail/bus passenger figures, in conjunction with regional population growth and assuming up to a 20% mode shift from private transport (High Growth).

The estimated patronage forecasts for public transport is unlikely to warrant a high level of service in the future, even with high levels of mode shift from private vehicle to public transport. **Table D3** summarises the public transport forecasts.

■ **Table D3 Public Transport Growth Forecast (Passengers per day) on the Regional Network**

Mode	2008	2033 Base Growth		2033 High Growth	
		Existing mode share (mode shift) ⁽¹⁾	Total	Existing mode share (mode shift) ⁽¹⁾	Total
Bus	400	475 (850)	1325	570 (1185)	1755
Rail	280	355 (1455)	1,810	375 (1690)	2065
Total	680	830 (2305)	3135	945 (2880)	3825

(1) Includes mode shift from car

D6 Rail

Rail traffic by sector was assessed from estimates of overall freight demands. These were identified by reference to existing known reserves and contracts, as well as assessment of future



activity. Rail futures and tonnages moved were predicted (**Table D1**) based on these expected outcomes.

D7 External Influences on Transport Demand

There are a number of key external influences which reflect government, social and environmental policy futures. These would have varying effects on the regional economy and hence regional transport needs. These were identified as:

Port capacity: The NSW Ports Growth Plan (2003) provides for Newcastle to be the next major container port when Port Botany reaches capacity (3.2M TEU). Port Botany capacity could be reached by 2021 and the port would predominantly be focussed on servicing Sydney's metropolitan trade, with the Central West competing for access. This may lead to greater reliance by the Central West on the Port of Newcastle, with implications for preferred routes from the region across the Blue Mountains, such as B-double routing from Bathurst north towards the Golden Highway.

Inland Rail: A North South Inland rail is currently being investigated by ARTC. The development of an inland rail network would create a changed orientation for rail and road freight from within the region, opening up new markets of Brisbane and Melbourne, as well as providing increased competition for port access including the Ports of Brisbane and Melbourne. Economic growth of the Parkes area could also be expected to grow faster than its recent manufacturing growth of 5.7%pa.

Peak Oil: This scenario reflects increasing costs of fuel for transport, reducing transport demand, with some measure of modal shift to rail reflecting greater fuel efficiencies and changed business paradigms departing the current just-in-time philosophy. This influence is however only likely to reduce transport demand on road, and the test for transport needs is a qualitative one as to whether rail would be able to service its increased mode share.

Environmental Change: Climate change would have substantial effects on the agricultural economy of the Central West. Increased atmospheric carbon dioxide may lead to increased crop yields, but reduced and more erratic rainfall would reduce overall production. The ability to secure future water needs remains a key issue for the region.

Carbon Trading: Recognising the environmental impact of our carbon use would result in changes to the costs of petroleum-based transport, as well as changes to the market for the region's coal production. In respect of transport costs, these would be consistent with the peak oil scenario. In respect of coal production, the region's coal is high-quality thermal coal, which is anticipated to remain in demand over the study period.



Blue Mountains Road Freight: The Blue Mountains is often regarded as a sandstone curtain, dividing the Central West from the coastal economy. However, road freight crossing the mountains impacts on the communities of the mountains. Due to operational requirements, B-doubles over 19m are restricted from travelling over the mountains. A sensitivity test which would prohibit all freight vehicles over the Blue Mountains was undertaken to estimate the upper demand limit on alternative routes and rail. This test increased reliance on Newcastle as the port of preference to / from the Central West.

Freight Containerisation: In 2006/07 of the 800,000 TEU's exported from Port Botany 54% were empty. This provides an opportunity for increased containerisation of export freight, with consequential opportunity for increased rail share. Inherent in this scenario is increased development of inter-modal container terminals. Effective operation of these inter-modal centres is a private sector issue, but ensuring reliable road and rail access is certainly a wider infrastructure issue. Road access to the terminals, integrated with town bypasses, should complement appropriate rail track improvements.

The scenarios tested are shown in **Table D4**.



■ **Table D4: Transport Scenarios Tested**

Scenario	Traffic Demand	Infrastructure Capacity				Environmental Regulation		Transport Costs	
		No Inland Rail	Inland Rail ⁽¹⁾	No congestion at Port Botany ⁽²⁾	Port Botany reaches capacity ⁽²⁾	Articulated trucks transit over Blue Mountains via Great Western Highway	Articulated trucks over Blue Mountains via Golden and Hume Highways	Current trends	Mode shift from increase in VOC ⁽³⁾
A	BASE	✓		✓		✓		✓	✓
B	BASE	✓			✓	✓		✓	
C	BASE		✓	✓			✓	✓	
D	HIGH	✓		✓		✓		✓	✓
E	HIGH		✓		✓		✓	✓	
F	HIGH		✓	✓			✓	✓	
G	HIGH	✓			✓	✓		✓	

(1) After 2021

(2) From 2021, all trade movement to Newcastle Port

(3) A 10% and 20% mode shift to PT and Rail (for freight) was assumed from higher vehicle operating costs (VOC), only in corridors where alternative modes are available. Demand and assignment of these effects were undertaken outside of the road model.



E Gap Analysis, Problems Assessment and Project Identification

E1 Problem Assessment Process

The technical assessment and stakeholder consultation process that identified problems, assessed gaps and offered potential projects was undertaken in parallel. Thus each activity was informed by, and influenced the outcome of the others.

All potential candidate projects, including those identified through the technical process, and those projects put forward by various stakeholders or submissions received during the study process were considered in this part of the assessment. A full presentation of the process listing all problems and projects identified is described in the Technical Report and Appendices under a separate cover.

E2 The Importance of the Great Western Highway and the Main West Line

The Great Western Highway and the Main West Line are the key transport spines providing access and mobility to the study area. They also provide the most direct route to Sydney over the Blue Mountains.

The Great Western Highway will continue to be the most heavily trafficked route in the study area. The continuation of the existing upgrade program is supported and would result in continuing effective investment⁷. The 25 year daily traffic volume forecast is within the capacity of the Great Western Highway west of the Blue Mountain's main population centres. However, when taking into account local traffic generated within the Blue Mountains, the highway outside the study area is approaching capacity during peak periods as it descends towards Sydney. This has implications for both local and through traffic, which would potentially be affected by delays associated with congestion on the highway through the towns. In the longer term (beyond 25 years) additional transport capacity may be required over the Blue Mountains.

The major constraint for increased freight traffic from the Central West is the significant growth in passenger trains within the Sydney metropolitan network which reduces the availability of freight paths from the region.

The key issues on the Main West line within the region (west of Mount Victoria) are the existing low productivity operating standards (single track, low train speeds and restricted axle loads) due to the poor condition of bridges, track and tunnels and outdated signalling. In the longer term and

⁷ The RTA is currently investigating the section of the Highway from Mount Victoria to Lithgow as a continuation of the current upgrade program.



outside the region, operations would be constrained by short passing and crossing loops; insufficient passing and crossing loops and constraints on the movement of freight trains between St Marys and Emu Plains.

The construction of the Southern Sydney Freight Line would allow freight trains to and from the region to access south Sydney and Port Botany via Cootamundra and the Southern Line, unhindered by passenger trains within the Sydney metropolitan network. Most freight operators would benefit from running trains via this alternative route.

An emerging issue is whether the existing maintenance regime and the investment policy of priority to the Southern line via Cootamundra for inter-state traffic, would impact on the effectiveness of the Main West line infrastructure.

E3 Capacity and Safety

The growth in rail and road traffic over the next 25 years for both freight and passengers, will be driven by growth in population and economic activity. Future rail freight demand within the region, inter-regional and through the region, can be accommodated by the existing rail network capacity, under all future scenarios tested (**Table D4**). However some services may become uneconomical given current constraints on axle loads and speeds.

The existing capacity of the regional road network was also assessed to be sufficient to manage forecast traffic volumes under all future scenarios (**Table D4**) and acceptable levels of service. Some sections of the road network will require more overtaking lanes and improved safety. From a technical standpoint, the problems were found to be more related to productivity and safety, than to capacity on both the road and rail network.

Road crashes in the study area generally occur at a rate less than the State average. The highest number of total vehicle crashes and heavy vehicle crashes occur between Lithgow and Orange, but specifically in Bathurst, Orange and to a lesser extent Lithgow. Warrants⁸ for overtaking lanes are often closely associated with safety improvements. Selected overtaking lanes are warranted on the Great Western Highway between Lithgow and Bathurst, the Mitchell Highway between Bathurst and Wellington, the Mid Western Highway between Bathurst and Cowra, and on parts of the Newell Highway within the study area. Town bypasses would improve travel speeds and increase safety but may be difficult to justify on economic grounds.

⁸ RTA Road Design Guide



E4 Road Access to Newcastle and Port Kembla and Intra-regional Access

The eastern part of the study area is not readily accessible to the Hume Highway and Port Kembla without travelling south-west to Cowra and then onto Yass before heading east. Similarly the route for B-doubles between Bathurst and the Golden Highway and then to Newcastle, is via Mudgee, but this requires travel first to Wallerawang before heading north. A direct route via Sofala and Bylong would be 120km shorter than the current route but would be prohibitively costly given the forecast demand. Compared to existing and future demand on the Great Western Highway, demand for capacity for these two port routes is relatively low.

E5 Freight Rail and Intermodal Productivity and Port Access

Line speeds and track geometry through the study area are insufficient to achieve competitive journey times for freight and passenger trains, and limit the ability of rail to increase its market share. Existing yard facilities consist of short sidings in poor asset condition, and are poorly located for road transfer. Road improvements to inter-modal facilities, and improved rail axle loading and speed, would offer significant runtime reductions to allow freight and passenger services to be more competitive with road.

Future congestion on the Sydney metropolitan rail freight network, together with capacity restriction at Port Botany will be an increasing problem for the movement of rail freight from the Central West region to Port Kembla and Port Botany beyond 2021. Improved rail access to the Hunter line and the Port of Newcastle for regional products (including coal), could be justified in the longer term.

E6 Public Transport

Notwithstanding the provision of bus and rail services, public transport mode share is limited to less than 1% of total daily trips. This level of mode share is not likely to change in the future and current services are likely to accommodate the Base Growth. Under higher levels of mode share as a result of increasing road transport prices, passenger demand is likely to require an increase in the frequency of services than are currently provided under existing contracts.

Passenger transport in the Central West should be improved in stages in line with increased passenger demand. Additional or improved bus services should be considered to be the first stage to improve passenger transport services as they are the least costly alternative to improved rail passenger services.

With further increases in passenger demand, a second stage involving an additional rail service from Bathurst (to Sydney and back within a day), could be considered. A detailed investigation, involving community consultation, and revealed and stated preference survey, would be required to



estimate potential patronage levels and feasibility of an additional daily Orange to Sydney service (to Sydney and back within a day). This could involve consideration of a trial of an additional daily Bathurst to Sydney service, to test public support and uptake for the service, reveal passenger demand, and assess the feasibility of an expanded (Orange to Sydney service) and/or discontinuation of the service.

It should be noted that there is a general shortage of rolling stock in NSW particularly due to the current Endeavour and Explorer refurbishment program. It could therefore take up to 24 months to secure new rolling stock to cater for any additional services.

The costs of improving the Bathurst-Sydney rail service are likely to far outweigh the user benefits given the low demand to use rail. The economic justification to invest in rail passenger improvements is likely to be low.



F Project Assessment

F1 Assessment Process

A project appraisal framework was developed based on a combination of Australian Transport Council transport project assessment criteria⁹, appraisal principles adopted in major transport infrastructure assessment studies in the UK¹⁰ (and more recently in Melbourne (Eddington)¹¹) and preliminary indications of the appraisal framework being adopted by Infrastructure Australia. Potential projects were assessed against the criteria of a strategic merit test which was framed around government policy objectives (**Table B-1**) and a Rapid Benefit Cost analysis (CBA).

The steps taken to identify candidate projects from the long list of potential projects was as follows:

- Step 1: Identify long list of potential projects (from stakeholder workshop and analysis)
- Step 2: Apply strategic merit test to long list to identify short list potential candidate projects.
- Step 3: Apply Rapid Benefit Cost analysis to short list of potential projects.
- Step 4: List candidate projects based on economic results.

F2 Results of the Strategic Merit Test

As part of the Strategic Merit Test, potential projects were assessed against the economic, social, environmental and transport criteria (see **Table B1**). For the purposes of this study, if a potential project met at least three of the four criteria, it was considered to pass the Strategic Merit Test. Those potential projects which passed the strategic merit test are listed in **Table F1**.

F3 Results of the Rapid Benefit Cost Analysis

A rapid Benefit Cost Assessment was undertaken on the short list of potential projects incorporating the use of upgrade warrants. While project costs were strategic, benefits were restricted to standard economic parameters. The wider economic benefits that underpin the UK/Eddington approval were not reflected in the analysis.

The rail assessment results are shown in **Table F2** and the road assessment results in **Table F3**. The rail analysis was based on a Base Case of expected future traffic benefits and project costs based on the costs of recent rail contracts. The road analysis used a range of traffic forecasts (see **Table F3**) and project costs based on average unit rates for the different work types.

⁹ <http://www.atcouncil.gov.au/documents/NGTSAM.aspx>

¹⁰ <http://www.dft.gov.uk/about/strategy/transportstrategy/eddintonstudy>

¹¹ www.doi.vic.gov.au/eastwest



■ **Table F1: Strategic Merit Test of Short List Potential Projects Warranting Further Investigation**

Strategic Merit Test		Economic	Social	Environment	Transport
Reference Number	Short List Potential Projects	Market accessibility; Reliability of inter-regional access	Services accessibility; Improved Safety	Better environmental outcomes	Connection + national road or rail network; Inter-modal facilities
	Rail Network Improvements ⁽¹⁾				
1	Parkes double track, signals and removal of level crossings	✓	✓	✓	✓
2	Bathurst double track, signals and removal of level crossings	✓		✓	✓
3	Blayney double track, signals and removal of level crossings	✓	✓	✓	✓
4	Passenger service investigation, new rolling-stock, maintenance facility at Orange, crossing facility at Stuart Town & passenger facilities improvements	✓	✓	✓	✓
5	Main Line upgrade (Mt Victoria to Lithgow & Lithgow refuge)	✓	✓	✓	✓
6	Main Line upgrade (Lithgow to Orange)	✓	✓	✓	✓
7	Main Line upgrade (Orange to Parkes)	✓	✓	✓	✓
8	Main Line upgrade (upgrade Wallerawang – Kandos, reopen Kandos – Gulgong & Mudgee - Ulan connection)	✓		✓	✓
9	Improve Newcastle to Dubbo Line (crossing loop at Elong Elong & Merrygoen junction triangle)	✓		✓	✓
10	“Collector” corridor upgrade (Bogan Gate to Tottenham)	✓		✓	✓
11	“Collector” corridor upgrade (Koorawatha to Greenthorpe)	✓		✓	✓
12	“Collector” corridor upgrade (Ungarie to Lake Cargelligo)	✓		✓	✓
	Road Network Improvements				
9	Great Western Highway (Lithgow to Bathurst) – four lanes divided	✓	✓		✓
13	Bells Line of Road Expressway – Route selection investigation & corridor acquisition	✓	✓		✓
14	Newell Highway (Marsden to Peak Hill) – Dual carriageway	✓	✓		✓
15	Parkes bypass & improved intermodal access	✓	✓		✓
16	Bathurst outer bypass & improved intermodal access	✓	✓		✓
17	Orange bypass upgrade		✓		✓
18	Great Western Highway (Lithgow to Bathurst) – selected overtaking lanes/safety enhancements	✓	✓		✓
19	Mitchell Highway (Bathurst to Orange) – selected overtaking lanes/safety enhancements	✓	✓		✓
20	Mitchell Highway (Orange to Dubbo) – selected overtaking lanes/safety improvements	✓	✓		✓
21	Other Main Road blackspot/links	✓	✓		✓
22	Other Main Road overtaking/auxiliary lanes	✓	✓		✓
23	Great Western Highway – Mount Victoria to Lithgow upgrade to B-double route standard	✓	✓		✓

(1) Those projects warranting further investigation on the basis of productivity increases, given that the demand analysis found no need to increase the existing rail capacity within the region.



■ **Table F2: Summary of Rail Rapid BCR Results⁽¹⁾**

Project Reference Number	Project Description	Benefit Cost Ratio (BCR)
1	Parkes double track, signals and removal of level crossings	0.33
2	Bathurst double track, signals and removal of level crossings	0.48
3	Blayney double track, signals and removal of level crossings	0.52
4	Rail passenger service investigation, new rolling stock, maintenance facilities at orange, crossing facility at Stuart Town & passenger facilities improvements	NA
5	Main Line upgrade (Mt Victoria to Lithgow & Lithgow refuge)	0.85
6	Main line upgrade (Lithgow to Orange)	0.42
7	Main line upgrade (Orange to Parkes)	0.31
8	Main line upgrade (upgrade Wallerawang - Kandos, reopen Kandos - Gulong & Mudgee - Ulan connection)	0.35
9	Improve Newcastle to Dubbo Line (crossing loop at Elong Elong & Merrygoen triangle junction)	1.63
10	Collector corridor upgrade (Bogan Gate to Tottenham)	0.34
11	Collector corridor upgrade (Koorawatha to Greenthorpe)	0.97
12	Collector corridor upgrade (Ungarie to Lake Cargelligo)	0.30

(1) No allowance made for savings in Major Periodic Maintenance (MPM) costs.

The strategic nature of the rail analysis does not take into full account the replacement cost savings that would result from the higher capital investment. The rail projects BCR's are based on the provision of higher productivity rolling stock and increased axle loads as compared with the NSW government policy of "fit-for-purpose" investment. However, few stand alone projects would be economically viable except improvements to the crossing loop at Elong Elong and the Merrygoen triangle junction on the Dubbo to Newcastle line (BCR of 1.63) and the section of the Main West line from Mount Victoria to Lithgow (BCR of 0.85).

Investment in the intermodal rail facilities (Projects 1, 2 and 3 in **Table F2**) would be required by the private sector operators if these projects were implemented. The full benefits of the integrated improvements would need further investigation, including a detailed assessment of total benefits. Similarly investments in collector line upgrades (Projects 8, 10, 11 and 12 in **Table F3**) would require a business case to be developed and private sector funding to be secured.



■ **Table F3: Summary of Road Rapid BCR Results⁽¹⁾**

Project Reference Number	Scheme Description	Low Growth			High Growth		
		BCR		FYRR	BCR		FYRR
		Min BCR	Max BCR		Min BCR	Max BCR	
1	Orange to Parkes Upgrade	0.14	0.14	0.2%	0.20	0.20	0.9%
2	Seal Condobolin to Narromine route (around Tullamore)	0.12	0.19	1.0%	0.12	0.46	1.3%
3	Upgrade Parkes to Wellington to B-Double status	0.05	0.06	0.3%	0.04	0.07	0.2%
4	Upgrade Wellington - Gilgong - Ulan to Golden Hwy	0.04	0.04	0.3%	0.05	0.05	0.3%
5	Upgrade Parkes to Boorowa	0.08	0.08	0.5%	0.08	0.08	0.5%
6	Upgrade Boorowa to Hume Hwy	0.07	0.07	0.5%	0.07	0.07	0.5%
7	New road Orange to Mudgee	0.02	0.03	0.1%	0.03	0.04	0.1%
8	Upgrade Orange/Bathurst to Hume Hwy - Crookwell route	0.01	0.01	0.1%	0.01	0.01	0.1%
9	Great Western Hwy Bathurst to Lithgow	0.16	0.22	1.0%	0.22	0.22	1.0%
10	Upgrade Bathurst to Golden Highway - Bathurst to Ilford	0.01	0.01	0.0%	0.01	0.01	0.0%
11	Upgrade Bathurst to Golden Highway - Ilford to Denman	0.04	0.14	0.3%	0.07	0.21	0.3%
12	Upgrade Ulan to Bylong Road	0.13	0.13	1.0%	0.13	0.13	0.9%
13	Bells Line of Road - Expressway	0.01	0.01	0.0%	0.01	0.01	0.0%
14	Upgrade Newell Highway to Dual Carriageway	0.01	0.03	0.0%	0.01	0.02	0.1%
15	New Newell Highway Link (bypass town centre)	0.11	0.12	0.7%	0.15	0.19	0.8%
16	Bathurst Southern Ring Road (bypass town)	0.11	0.12	0.7%	0.15	0.19	0.8%
17	Upgrade the orange northern beaches bypass (B-doubles)	0.17	0.18	0.8%	0.19	0.23	0.8%
18	Great Western Highway (Lithgow to Bathurst) – selected overtaking lanes/safety enhancements	}					
19	Mitchell Highway (Bathurst to Orange) – selected overtaking lanes/safety enhancements						
20	Mitchell Highway (Orange to Dubbo) – selected overtaking lanes/safety improvements						
21	Other Main Road blackspot/links						
22	Other Main Road overtaking/auxiliary lanes						
23	Great Western Highway – Mount Victoria to Lithgow upgrade to B-double route standard	Under investigation by RTA.					

Notes:

- (1) Benefits excluded local traffic benefits, therefore a full analysis would yield higher BCR values.
- (2) Projects 18 – 22 based on RTA warrants.
- (3) Project 23 under RTA investigation.
- (4) Projects 2 – 8 did not pass Strategic Merit Test.
- (5) Project / Program 22 includes overtaking lanes on Newell Highway (from Marsden to Peak Hill).

The results of the road BCR (**Table F3**) show that none of the capacity improvement projects to be economically viable. The exception being the safety and overtaking lane programs (Project



reference 18 through to 22 in **Table F3**) which are based on RTA warrants. Crash data for the study area was obtained from the RTA for the 5 year period 2003-2007. The criteria to identify blackspots was based on road lengths that have “an average of 0.2 casualty crashes per kilometre per annum over the length in question measured over five years” and that the links were “three kilometres or more”. These criteria are consistent with the Auslink Black Spot program.¹²

These criteria have been applied to identify lengths of road for where some intervention may be appropriate to improve road user safety. Some 23 locations in the short term and 29 locations in the long term were identified for further investigation.

Figure F1 shows those road projects that are worthy of more detailed investigation.

F4 Investment in the Main West Line

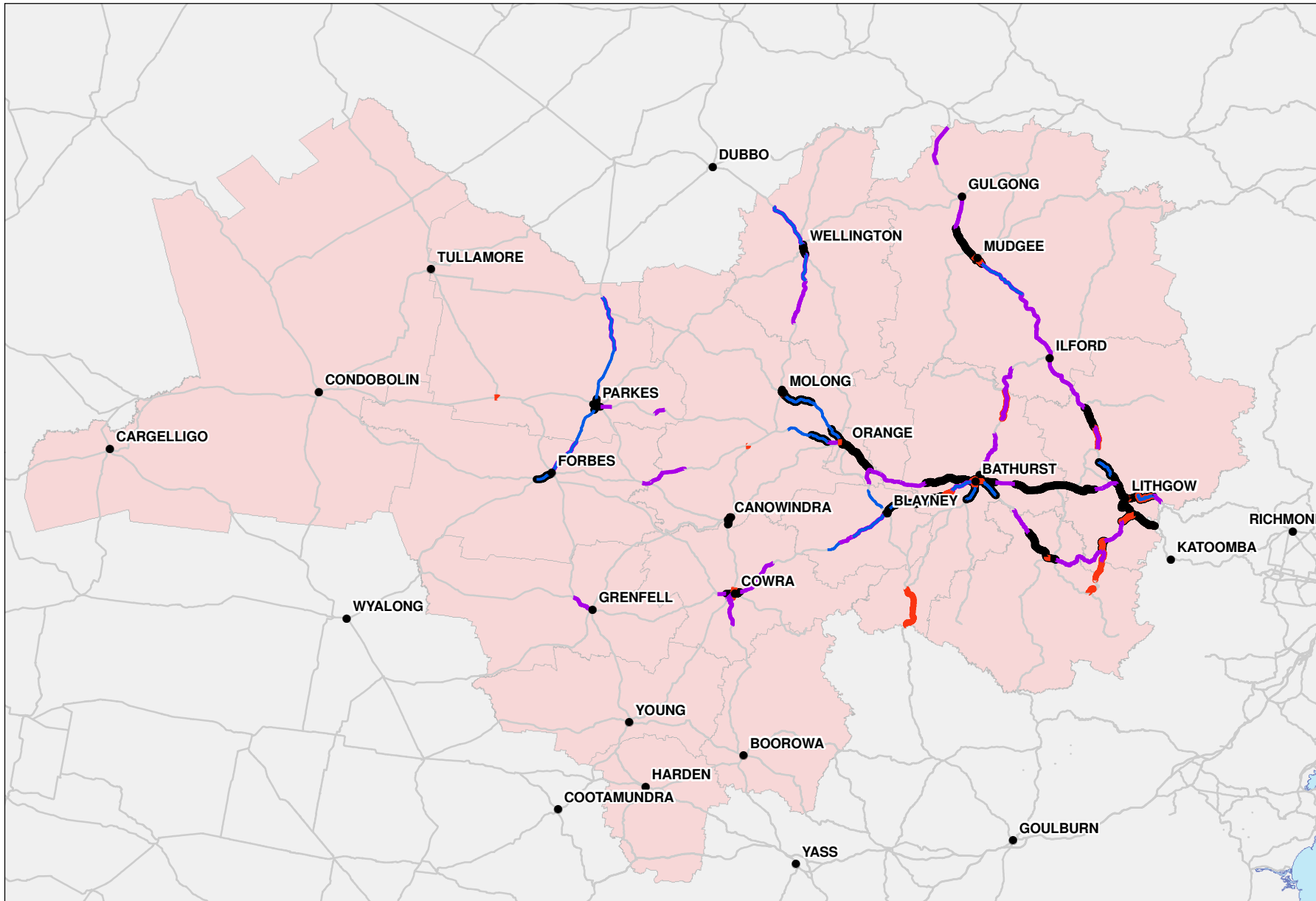
The analysis of the Main West line (**Table F2**) suggests a range of BCRs between 0.31 and 0.85 without taking into account replacement costs, that is assuming only routine maintenance as the alternative investment policy. A further comparative assessment of the incremental investment options for the Main West line west of Lithgow was undertaken, taking into account track and bridge replacement costs over 25 years. The options investigated were:

- Maintain current “fit-for-purpose” service standards; and
- Invest for higher productivity.

This assessment indicates that the costs of replacing bridge and track assets under a ‘maintain existing standards’ (Major Periodic Maintenance) would be about 70% (\$380 million) of the estimated upgrade costs to achieve higher productivity (\$540 million)(from Lithgow to Parkes). The incremental benefit cost ratio (BCR) of the additional investment would be greater than 1.00 when replacement costs exceed \$300 million over 25 years, which indicates that a Main West upgrade program could be justified if funds were available, and that further investigation would appear warranted.

Investment in the intermodal rail facilities would be required by the private sector operators if these projects were implemented. The full benefits of the integrated improvements would need further investigation, including a detailed assessment of total benefits..

¹² http://www.auslink.gov.au/funding/blackspots/eligibility_of_sites.aspx



- Legend**
- High Accident Locations (Existing)
 - Locations where Crash Rate exceeds NSW State Average (100 MVKT)
 - High Accident Locations (Future)
 - Auxiliary Lanes
 - NSW Main Highways
 - Central West Study Boundary

Data Sources

Streetworks

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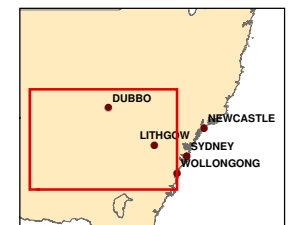


Figure F1 - Central West Potential Short and Long Term Road Projects

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G The Central West Transport Candidate Projects, 2008-2033

G1 Needs Within the Region

The result of a broad assessment of the population and employment, travel patterns and economic growth of the Central West region indicate that there are **no major transport infrastructure capacity constraints within the region for at least the next 25 years.**

There are however, potential safety and productivity gains on the regional network which would involve significant investment.

The assessment indicates further investigation of safety and productivity improvements to the Great Western Highway and the Main West rail line, and productivity enhancements to inter-modal facilities at Parkes is likely to be warranted, based on preliminary economic findings.

The total capital investment of all the candidate safety and productivity projects within the region would amount to \$100 million in the short term – over the next seven years (2009-2015).

G2 Projects Outside the Region Being Investigated

There are projects outside the region which are the subject of independent investigation and which would improve the effectiveness and efficiency of transport to and from the region, including:

- M4 extension investigation;
- M5 East capacity expansion study (road access to Port Botany);
- North South Inland Rail study (access to national ports);
- Sydney network rail improvements – including rail access to Port Botany (to achieve 40% mode share to rail), metropolitan rail capacity upgrade, operational efficiency of rail traffic over the Blue Mountains;
- Northern Sydney freight line investigation; and
- Maldon Dombarton study (rail access to Port Kembla for coal exports).

G3 Access and Connectivity to Ports to/from the Region

An assessment of the connectivity of the region to east coast sea ports for the expected freight movement has found that:



- Access and capacity to Port Botany (up to 2021) can be maintained by extending train lengths (to 1200m short term) and from the proposed Sydney rail network improvements (long term – see above);
- Beyond 2021, at a time Port Botany is likely to be at capacity, growth in freight traffic (rail and road) could be partially diverted to Newcastle (see the following Rail and Road Needs Candidate Projects);
- Access to Port Kembla for coal traffic can be maintained in the short term and subject to export coal production and out of region capacity upgrades (see above) in the longer term; and
- Freight access from the region to non NSW ports (Brisbane, Melbourne, Fremantle) would be facilitated by the N-S Inland rail facilities and connections at Parkes (subject to independent investigation).

G4 Road Network Needs, 2008-2033

The study confirmed that the current program of upgrading the Great Western Highway, funded by the Australian and NSW governments, will provide increased freight and transport capacity and improve safety. The candidate road projects therefore build on the current Great Western Highway program.

The road investigation was based upon:

- Priority being given to the Interstate road network;
- Improvements be consistent with existing RTA programs;
- Improvements be based on RTA warrants; and
- Improvements need to be practical and affordable.

Candidate road projects recommended to government agencies warranting further investigation are shown in **Table G1**, and summarised as follows.

Short Term (2008 – 2015)

- Road Safety Program (23 locations), (*\$8 million*)

Links subject to further investigation include:

- Newell Highway (SH17)(10 kms)
- Great Western Highway (SH5)(69 kms)
- MR54 (23 kms)
- Mid Western Highway (SH6)(29 kms)
- Castlereagh Highway (SH18)(40 kms)
- Mitchell Highway (SH7)(60 kms)
- MR61 (10 kms)



- MR310 (4 kms)
- MR253 (12 kms)
- MR253 (23 kms)
- MR516 (13 kms)
- Overtaking Program (53 kms) (*\$67 million*)
Based on RTA Road Design Guide, warrants subject to further investigation include:
 - Great Western Highway (SH5)(14 kms)
 - Newell Highway (SH17)(13 kms)
 - Mitchell Highway (SH7)(23 kms)
 - MR516(3 kms)
- Great Western Highway Improvement – Mount Victoria to Lithgow Upgrade (this project is the subject of a separate investigation)
- Investigations
 - Upgrade of Great Western Highway west of Lithgow and review of rural capacity warrants.

Long Term (2015 – 2033) (Subject to further investigation)

- Road Safety Program (29 locations),
 - Newell Highway (SH17)(37 kms)
 - Great Western Highway (SH5)(5 kms)
 - MR78 at Cowra
 - MR54 (42 kms)
 - Mid Western Highway (SH6)(58 kms)
 - Castlereagh Highway (SH18)(118 kms)
 - Mitchell Highway (SH7)(72 kms)
 - MR61 (12 kms)
 - MR56 (12 kms)
 - MR377 (17 kms)
 - MR559 (7 kms)
 - MR558 (35 kms)
 - MR253 (16 kms)
 - MR516 (4 kms)
- Overtaking Program (26 kms)
 - MR54 (3 kms)
 - Mid Western Highway (SH6)(10 kms)
 - Castlereagh Highway (SH18)(5 kms)
 - The Escort Way (MR61)(4 kms)
 - MR245 (2 kms)
 - MR253 (2 kms)



- Investigations
 - Long term (beyond 2033) need for additional road and rail transport capacity across the Blue Mountains, including consideration of preserving a corridor generally along the Bells Line of Road.

G5 Rail Network Needs, 2008-2033

A key issue to be resolved through further investigation is the cost effectiveness of replacing the Main West line to higher productivity standards, compared with on-going and replacement maintenance cost to current standards. This investigation indicates that the higher investment to gain higher productivity standards is warranted from which the following rail network needs are based.

The rail investigation was based on:

- The Main West line should meet Defined Interstate Rail Network (DIRN) standards;
- Improved standards, i.e. train length and higher speeds, needed for higher productivity;
- Maximised use of existing infrastructure before new infrastructure;
- Investments (by Australian Rail Track Corporation (ARTC) and RailCorp) to provide increased freight throughout without increase in train paths outside region; and
- Improvements need to be practical and affordable.

Candidate short term (2005-2015) rail projects recommended to government agencies warranting further investigation are shown in **Table G1**, and summarised as follows:

- Newcastle to Dubbo line (crossing loop at Elong Elong and Merrygoen triangle junction) (*\$25 million*);and
- Investigations of Main West line long term demand and Investment Program (Mount Victoria to Parkes).

In the longer term (2015-2033) rail investment would depend on the outcome of the full investigation on the Main West Line (above).



G6 Passenger Needs

Public transport in the Central West should be improved in stages, in line with passenger demand as assessed by the NSW Government. Additional or improved bus services are likely to be the least costly alternative to improved rail passenger transport services. An additional rail service from Bathurst (to Sydney and back within a day) would offer travel time savings as well as avoiding the need to interchange. This option would also minimise transfers between modes and the associated wait times, disabled access and toilet facilities, and comfort and ride quality associated with rail travel.

The costs of improving the Bathurst-Sydney rail service and the regional rail services are likely to outweigh the user benefits given the low demand to use rail.

The NSW Government would need to undertake a detailed investigation, involving community consultation. Revealed and stated preference surveys, would be required to estimate potential patronage levels and feasibility of an additional daily Orange to Sydney service (to Sydney and back within a day).

It is recommended that more detailed investigation be undertaken in parallel to assess the level of economic investment in the Main West line required to achieve productivity benefits and its economic justification, and to assess the staged improvements of additional bus and rail services and regionally-based rail passenger improvement options identified in this report, in line with passenger demand, on the basis of affordability.

It should be noted that there is a general shortage of rolling stock in NSW particularly due to the current Endeavour and Explorer refurbishment program. It could therefore take up to 24 months to secure new rolling stock to cater for any additional services.

G7 Inter-modal Terminals

The proposed facility at Parkes is considered to be of merit subject to a decision on the North South Inland Rail (currently being investigated by ARTC).

G8 Further Investigations

The study recognised the need for further investigation of the longer term needs, including:

- A full review of the long term (beyond 2033) need for additional transport capacity across the Blue Mountains. This would include:
 - further investment in the Main West rail line; and
 - consideration of the need for additional road capacity generally along the Bells Line of Road, including investigation of the need to reserve a corridor.



- Consideration be given to a trial of a new Bathurst-Sydney rail passenger service;
- Continuation of the Great Western Highway Improvement Program west of Mount Victoria, and the upgrade of the Great Western Highway west of Lithgow which would include a review of rural road capacity warrants;
- Continuation of the RTA's safety upgrade program on the BLoR, with an investigation of further safety and capacity enhancements for the medium term;
- Investigation into regional Road Overtaking and Safety Priority Programs; and
- Investigation into operations and productivity at Parkes Inter-modal and need for future investment (subject to North South Inland rail study) findings.

Table G1: Central West Transport Needs Study – Short Term Candidate Projects (and Indicative Costs) Warranting Further Investigation, 2008-2015

Candidate Project		Short Term 2008-2015 \$million (2008)
1	Rail	
1.1	Newcastle to Dubbo line (Crossing loop at Elong Elong & Merrygoen triangle junction)	\$25
	Sub total	\$25 million
2	Road	
2.1	Road Safety Program	\$8
2.2	Overtaking Program	\$67
2.3	Great Western Highway Improvement – Mount Victoria to Lithgow Upgrade (this project is the subject of a separate investigation)	Under investigation
	Sub total	\$75 million
3	Investigations	
3.1	Continuation of the investigation of extending the Great Western Highway Improvement Program west of Mount Victoria including upgrade of Great Western Highway west of Lithgow	\$5 million
3.2	Main West Rail line long term demand & Investment Program (Mount Victoria to Parkes)	
3.3	Consideration of a trial of an additional Bathurst-Sydney rail passenger service	
3.4	Long term (beyond 2033) transport capacity needs across the Blue Mountains including further investment in the Main West rail line and consideration of the need for new road capacity generally along Bells Line of road, including land preservation requirements	
3.5	Regional Road Overtaking and Safety Priority Program Investigation	
3.6	Investigate inter-modals' operations and productivity and need for future investment	
	TOTAL	\$105 million