SUBMISSION No 194

NELG

NEW ENGLAND LOCAL GOVERNMENT

Regional co-operation working to create sustainable communities

Contributing to the Best North South Rail Corridor

March 2007

Submission to the North – South Rail Corridor Study Report of Sept 2006

Commissioned by the Department of Transport and Regional Services

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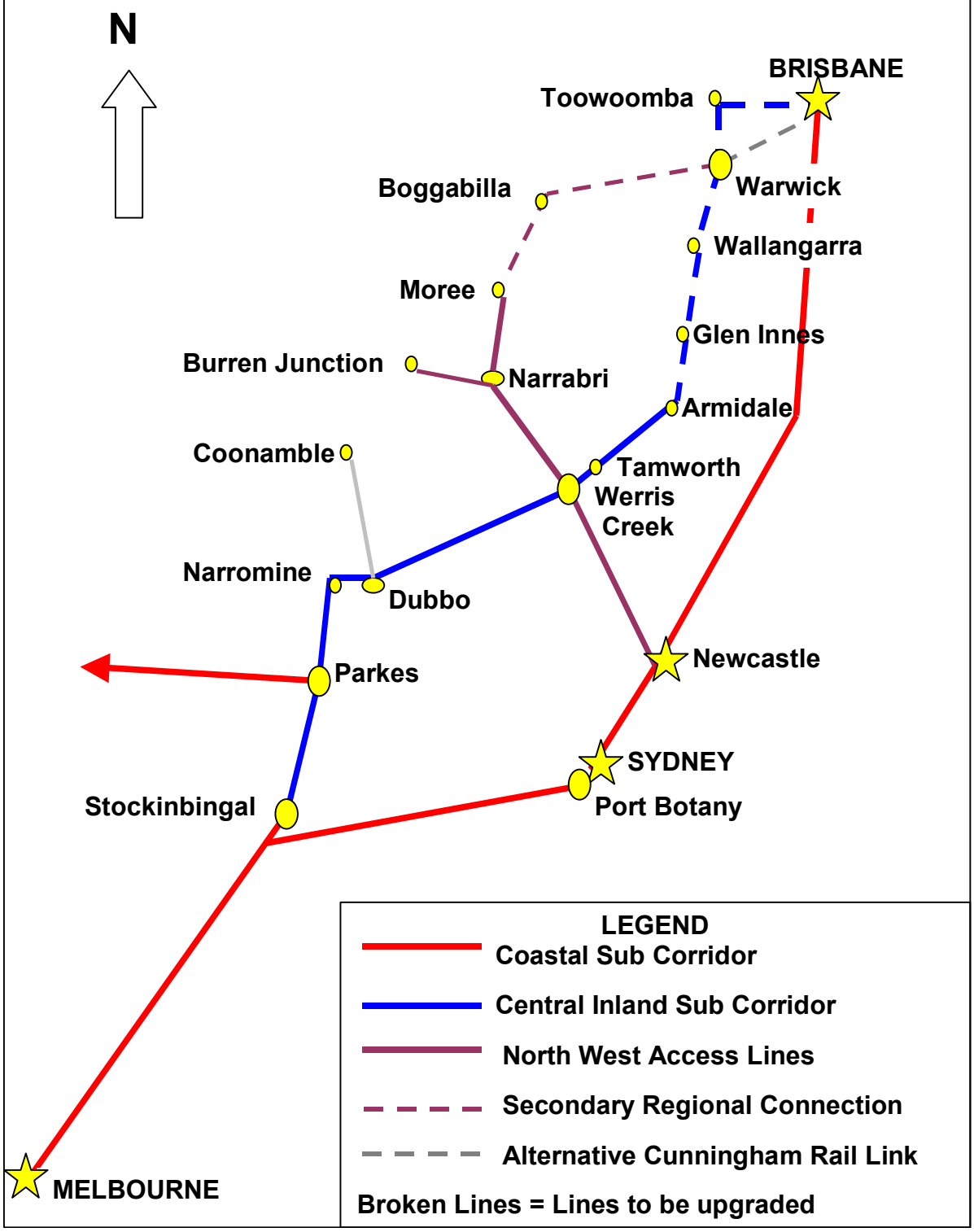
Executive Summary Map

Map NELG Proposal



Executive Summary

The creation of a North South Rail Sub Corridor through inland New South Wales has many benefits. It improves the regional and national movement of north south freight, improves overall rail capacity, avoids the Sydney metropolitan bottleneck, and has the potential to reduce road transport conflicts.

The Study provided a comprehensive overview of the economic, physical and environmental attributes of many route options that could contribute to the North South Rail Corridor linking Brisbane with Melbourne.

None of the Sub Corridor route options demonstrated a positive economic return, based on the work of the Study. It did however identify that the Coastal Sub Corridor will be capacity constrained by 2019, suggesting that some action will be needed.

Of the four Sub Corridors identified, the two inland options, being the Far Western and the Central Inland Sub Corridors were the most promising. These two Sub Corridors have 50% of their route in common. Options with the least capital cost demonstrated the most cost effective balance between cost and revenue, due to inelastic demand with increasing time saved.

This assessment looked at the Base Routes proposed for the two inland Sub Corridors and added the most cost effective route improvement options to develop a Modified Base Route for each sub corridor, under a least cost approach. The Base Routes represent the minimum improvement works to establish a standard gauge rail corridor, regardless of travel time. Additional expenditure on the route reduces travel time.

It is assumed that Government would want realistic limits on capital expenditure for this project. The project changes considerably if the capital budget was say $1.0 billion compared to $3.5 billion. This analysis assumes Government would be reluctant to commit to a project of much more than one billion dollars, given the economic case presented.

The Central Inland Sub Corridor could be established for $1.0 billion, and achieve a 28 hour travel time, under the Modified Base Route strategy.

By comparison, the Far Western Sub Corridor would

- Cost $1.4 billion for its straightened route alignment
- Duplicates the existing Dubbo – Werris Creek – Moree lines
- Bypasses the regional centres of Narrabri and Gunnedah
- Requires an estimated 430 km longer distance of line upgrade and new route construction, and
- Crosses significant flood prone and cultivation land

Despite traversing higher country, the Central Inland Sub Corridor does not exceed the maximum grade design criteria for the corridor. No part of the Sub Corridor exceeds a grade of 2.5%. It is also acknowledged that all routes have imperfections because of different aspects, and it is a case of optimising from the affordable choices.

The Central Inland Sub Corridor has unique advantages:

- Provides an efficient route for the Melbourne to Brisbane direct inland route
- Strategically placed to complement the Sydney - Newcastle - Brisbane Coastal Corridor
- Forms part of the loop line that allows for an inland bypass of Sydney, and
- Accesses the Werris Creek rail hub as an appropriate freight collection point for the Northwest Region.

This analysis found the significant differential presented in the Study between the Far Western Sub Corridor of $3.5 billion and the Central Inland Sub Corridor of $8 billion is unjustifiably inflated, relative to comparison costs for similar projects, and is therefore challenged.

Construction cost estimates provided in the Study are generally too high, and appear to be biased against the Central Inland Sub Corridor. Major discrepancies were also found in the cost estimates for the Toowoomba Ranges – Boggabilla section.

This submission strongly recommends that an inland standard gauge rail route be established between Cootamundra and Brisbane, and that the Central Inland Sub Corridor should be adopted, as it offers distinct advantages in terms of cost and strategic location.

The possibility of developing a secondary feeder line connecting North Star with Warwick to tap into Queensland markets and ports is also possible, and not precluded by adoption of the Central Inland Sub Corridor. The savings in not duplicating the rail section from Narromine to Moree could support this connection. Refer to the Executive Summary Map.

A more detailed and comprehensive study needs to be undertaken for each of these northern alternative routes, and to take account of the issues raised in this submission.

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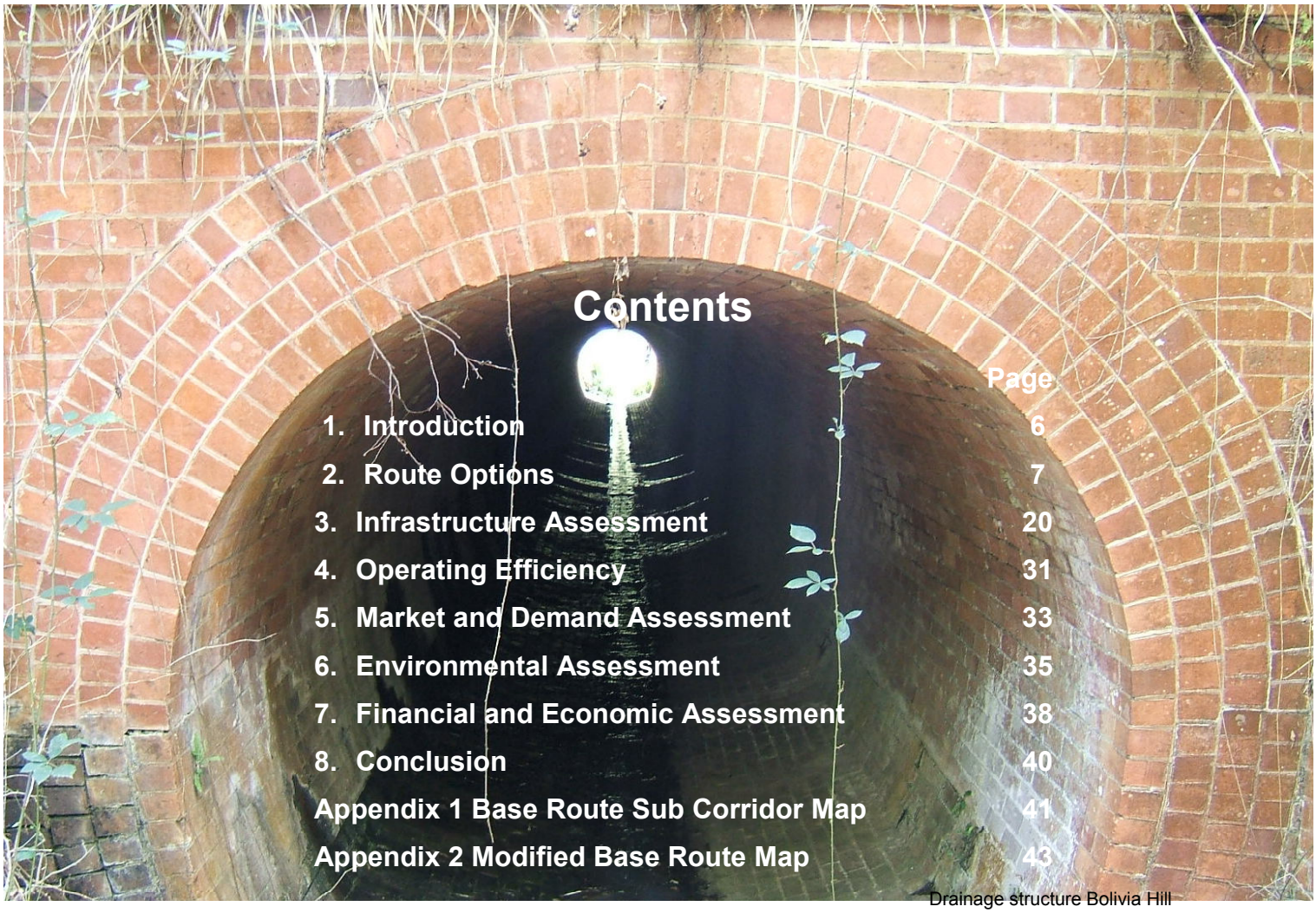
Submission to the North – South Rail Corridor Study Report of Sept 2006

Commissioned by the Department of Transport and Regional Services

New England Local Government (NELG)

March 2007



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Drainage structure Bolivia Hill

1. Introduction

The New England Local Government Group (NELG) represents the Local Government Areas of Armidale Dumaresq, Walcha, Guyra, Glen Innes Severn, Inverell, Tenterfield and the New England Weeds County Council.

NELG acknowledges the Department of Transport and Regional Services, and the various consulting organisations for the very comprehensive North South Rail Corridor Study. The Study covers methodology and assumptions; market, demand and infrastructure assessment; the route options; environmental and financial and economic assessment; data collection and community consultation.

The Study by its nature is an extensive exercise, dealing with the need and the various options to establish an inland North South Rail Corridor. At the same time, the Study tries to identify and assess relatively detailed route data to determine infrastructure requirements and costings. The extent of available detailed infrastructure proposals and cost estimates varies between geographic areas.

The Study comprehensively identifies the broad picture and indicates options within the constraints of the analysis tools, assumptions and data.

NELG believes it is in Australia's national interest to have a second rail route through the northern part of NSW connecting to Brisbane, as an alternative to the existing Sydney Brisbane rail route. An alternative rail corridor will have national advantages into the future, not currently foreseen.

In addition to the obvious commercial benefits from the project, are the less quantifiable benefits. These benefits are believed to be:

- National Security in creating an extra north south supply line
- Economic development benefits to the regions serviced by the new corridor, and particularly the opening up of connections into SE Queensland
- Facilitating the switch from road to rail, both on the Pacific Highway, and the Newell Highway. Both highways have become dominated by heavy road transport, and this situation will only get worse
- Reduction in fossil fuel consumption, and
- Reduction in green house gases

NELG strongly believes the final route decision should be justified on objective social and economic grounds, rather than political favour or commercial vested interest. NELG also needs to lobby for our own local region, as others have for theirs, so that all matters and local knowledge are fully assessed before the final decision.

The North South Rail Corridor Study Report will be referred to from here on in this submission as 'the Study'.

This submission was prepared Cr Steve Toms BSc (For). He is a member of the Glen Innes Severn Transport Committee, and a member of NELG.

NELG prepared an earlier submission to the North South Rail Corridor Study titled-

"Submission to the North – South Rail Corridor Study
New England Local Government Group NELG
New South Wales
6 March 2006"

2. Route Options

The Study identified four broad sub corridor options:

1. **Far Western**
2. **Central Inland**
3. **Coastal, and**
4. **Hybrid**

According to the Study, none of the Sub Corridor options displayed a positive economic result. The Study does however identify that the Coastal Sub Corridor will become capacity constrained by 2019. The Federal Minister for Transport has publicly promoted the Far Western Sub Corridor as the 'least non-economic' of all the route options.

The Study indicates the Central Inland Sub Corridor is second in order of economic benefits.

The Study identifies the Coastal and Hybrid Sub Corridor options as the least viable options for expenditure upgrades beyond the current Auslink program.

2.1 The Coastal Sub Corridor

The Coastal Sub Corridor is actually the existing rail route linking Melbourne, Sydney and Brisbane. It has significant Auslink funding committed to it, in the order of $2 billion. The Coastal Route is currently the principal route of the North South Rail Corridor.

The Coastal Sub Corridor has many limitations. These are slow and cluttered travel times through Sydney; significant environmental and residential restrictions; major river crossings, and vulnerability should a major river crossing fail. The line has many sections with relatively poor alignment, and it is essentially a single-track line. Capacity and travel times on this route will be improved by the significant Auslink funding being injected into it. The economics of spending unlimited amounts on this option appear poor, due to very significant diminishing returns for extra dollars spent. The route will become capacity constrained by 2019 however.

The development of an additional route has significant advantages in terms of increasing capacity, meeting contingencies and accessing different regions. The Coastal Sub Corridor will not be discussed further in this submission, on the basis that it is uneconomic to spend additional capital funds to that, which has already been committed.

2.2 The Hybrid Sub Corridor

The Hybrid Sub Corridor is actually the existing line linking Melbourne with Brisbane that by passes Sydney, and as such is currently trafficable. It follows the route Melbourne, Cootamundra, Dubbo to Werris Creek, and picks up the North Coast Line at Maitland.

It suffers from being excessively long, particularly from Werris Creek back to Maitland and up the coast. The alternative route of Werris Creek to Warwick to Brisbane, via the Main North Line (Central Inland Sub Corridor) would be much shorter.

The Hybrid Sub Corridor suffers all the disadvantages of the North Coast line from Maitland north, in common with the Coastal route.

The Hybrid Sub Corridor in bypassing Sydney does avoid the congestion in travelling from the southern side of Sydney to Newcastle, via Dubbo and Werris Creek. This route has been used in the past, particularly during the Olympics when the Sydney metropolitan area was effectively sealed off from through rail freight.

The Hybrid Sub Corridor will not be considered any further in this submission, and is assumed a non-viable option. It does however, highlight the importance of an alternative route that by passes Sydney, and that can pick up the east west connection at Parkes.

2.3 Albury versus Shepparton Sub Options

The Study identified two Sub Route Options at the Victorian end for each of the four Sub Corridor options. The route sub options are via Albury or Shepparton. Consideration of these alternatives has complicated the Study and its analysis by adding two route sub options to each of the four Sub Corridors, in addition to four Expenditure Sub Options.

Page 8 – 9 of the Study says "Much of the Shepparton alternative requires new construction, while the Albury alternative is already established and operable as a Class 1 freight rail line."

The economic outcomes of the Study, based on the criteria used, indicate that the Albury route will have the most financial benefit, faster travel times and more significantly, takes advantage of the significant existing and planned rail upgrades for this section. The Shepparton connection is partly on disused rail line, and would cost more to upgrade in the short term.

The decision between these two alternative sub routes does not directly affect consideration of the Sub Corridor options in the northern part of New South Wales and South Eastern Queensland. Indirectly, the Shepparton alternative will cost more, and would therefore compete with northern Sub Corridor options for upgrade priority expenditure.

The value of the Shepparton line could be considered at a regional level as a feeder line to the North South Rail Corridor.

This analysis assumes that the Albury Sub Route Option is the obvious preferred choice, and all cost analysis for the total corridor assumes the Albury route is adopted.

2.4 Orange Sub Option

The Study also includes a Sub Route Option that includes Orange, rather than Parkes. This sub option diverts at Cootamundra and Dubbo, via the line linking Blayney and Orange in the central west.

The Study does not adequately explain why this sub option has been listed, or its relative merits compared to going through Parkes. This sub option is common to both the Far Western and Central Inland Sub Corridors yet is only considered under the Central Inland Sub Corridor. The Central Inland maps and detailed route option improvement costs are cluttered with this alternative sub option. This detail is not included with the Far Western Sub Corridor, even though they are common to both.

The Improvement Costs for the Orange Sub Option are included in Table 2 of Appendix 10.7 of the Study under the Central Inland Sub Corridor. The extra costs for this alternative route burden the cost base of the Central Inland Sub Corridor. $4.1 billion of costs are included for this Orange sub option in the Study under 'Table 2 Improvement Options for the Central Inland Sub Corridor', even though they are not specifically part of the Central Inland Sub Corridor, via Parkes.

Our analysis indicates that this sub route variation via Orange, would add extra length to the North South Corridor, and an unnecessary cost burden, for either Sub Corridor option, and is assumed to be non viable.

2.5 North South Corridor Strategic Overview

The North South Rail Corridor currently has a major route in place, being the Melbourne – Sydney – Brisbane standard gauge rail connection. In addition, the North South Rail Corridor has links connecting it with Western Australia via Parkes, and an inland diversion of Sydney, via Werris Creek.

The broad conclusions of the Study are summarised in the route options section above. The case for an additional rail route as part of the North South Corridor needs to be decided, and if it is, where should it be located?

The Study found the economic case for an additional route is marginal at present, but will become necessary once the existing lines reach capacity. This submission identified other advantages to be gained in creating an alternative route.

The focus for an additional route appears to narrow down to the northern part of NSW and South East Queensland. The existing rail line south of Cootamundra traverses much easier country, and with improvements, is gradually becoming dual line to Melbourne, reducing some of the risks with a single line route.

Given the above, the focus is then on establishing the most effective and cost efficient inland route between Cootamundra and Brisbane. Hence, the Far Western and Central Inland Sub Corridors are the primary focus of this submission.

Appendix 1 is a map indicating the major rail lines of the North South Corridor. These lines consist of the rail lines mentioned above, plus the link Cootamundra - Parkes – Dubbo – Werris Creek; and the links from Newcastle to Werris Creek to Moree and to Armidale. The Newcastle to Werris Creek line is very significant because of the tonnage of bulk freight that it carries mainly to the port of Newcastle.

Analysis of these existing major rail lines reveals some significant considerations:-

- The Melbourne – Cootamundra – Sydney route is a very busy essential rail line and the route is subject to upgrade expenditure.
- The Sydney - Newcastle rail line is also essential for both passenger and freight services. There are problems in traversing the Sydney metropolitan suburban network, and physical limitations associated with the Hawkesbury.
- The Newcastle - Werris Creek route is a major bulk freight route and is continually being upgraded to deal with its significant freight task.
- The Cootamundra – Parkes – Dubbo route is an important route to connect with West Australian freight, and to deal with regional freight linkages.
- The Dubbo – Werris Creek rail line completes this loop, and has a role similar to the Cootamundra - Dubbo route.

The significant point to be made from the above is that in addition to the main North South Coastal Line, the above routes form a loop with Sydney at its southeastern corner as can be seen in map form at **Appendix 3**. This loop helps overcome the difficult geography that surrounds Sydney, with the sandstone wall that skirts its western side and the Hawkesbury River and associated steep timbered terrain to its north, the issues of which extend most of the way to Newcastle.

The rail lines listed above are all in place and are all needed in the NSW and national rail system. It is possible to bypass Sydney via Dubbo and Werris Creek, as has been described in the Hybrid Sub Corridor above.

The links with Werris Creek to Moree, and to Armidale are also currently maintained and needed.

The Far Western Sub Corridor assumes that a direct, straight route will connect Narromine with Moree, in the shortest possible distance, estimated at 414 kms. This section involves crossing a considerable distance of cultivation farming land. This route is highlighted in map form at **Appendix 2.**

However, the existing rail lines connecting Narromine with Werris Creek, and Werris Creek with Moree, estimated total distance of 582 kms, will still be required, and will need to be maintained regardless. Both of these because of their regional connection status, and the latter to maintain the loop that can avoid Sydney.

The standard of maintenance of these regional lines is already under question. If a new rail line of some 414 kms is created between Narromine and Moree, this will compete further for maintenance dollars.

North of Moree, major upgrading to the border at Boggabilla will be required, estimated distance 131 kms; and in addition 188 kms of dual gauge major line upgrade will be needed to get to the anchor point of Warwick.

The Central Inland Sub Corridor would require major upgrade from Armidale to the border at Wallangarra, distance of 213 kms, and 92 kms of dual gauge major line upgrade to get to the anchor point of Warwick.

In total, the Far Western Sub Corridor would require major upgrade or new rail easement from Narromine to Warwick, a distance estimated at 733 kms. Of this, the 414 kms between Narromine and Moree would be duplicated with existing line.

The Central Inland Sub Corridor, by comparison, would require major upgrade from Armidale to Warwick, a distance of 305 kms, and this line would not duplicate any existing routes. **Appendix 3** highlights the proposed section of duplication in map form.

Whilst the route Narromine to Moree direct, creates a short cut, the distance Werris Creek to Moree to Warwick is estimated at 574 kms; compared to Werris Creek to Armidale to Warwick at 473 kms, some 101 kms shorter via the Central Inland Sub Corridor.

In summary, whilst the directness of a new rail line travelling from Narromine to Moree is appealing, the major disadvantage is that it will duplicate 414 kms of existing rail line infrastructure that is currently already struggling to be maintained. The shortest upgrade option, quite clearly is the Central Inland Sub Corridor.

The Far Western Sub Corridor will require 430 kms longer of significant upgrade to reach existing standard gauge rail heading south into New South Wales, compared to the Central Inland Sub Corridor.

2.6 Expenditure Sub Options

In addition to identifying four Sub Corridor Route Options, the Study examines the economics of four Expenditure Sub Options within each Sub Corridor. The Expenditure Sub Options are: -

- **Base Route**
- **$1.5 billion**
- **$3.0 billion, and**
- **Unlimited expenditure**

The Base Route represents the least cost to produce a standard gauge rail connection between Brisbane and Melbourne, regardless of travel time.

Each Expenditure Sub Option builds on the Base Route to which targeted improvements are made to bring the total expenditure for each Sub Corridor up to $1.5 billion, $3.0 billion and Unlimited Expenditure. These targeted route improvements aim to give the most cost effective reduction in travel time, for extra dollars spent. The Base Routes for the Far Western and Central Inland Sub Corridors are shown in map form at **Appendix 1**.

For each of the Expenditure Sub Options, the Study estimates the Net Present Value (NPV) as a basis for estimating the most economic options.

Neither NPV nor travel times are supplied in the Study for each of the Base Routes which underlie each Expenditure Sub Option. In the absence of this information, this submission estimated the Base Route travel times by deducting route improvement timesavings from the $1.5 billion option.

Page 6 – 33 of the Study indicates,
"Sub Corridor Analysis Results:
For the $1.5 billion and $3.0 billion capital spend options, the optimisation process selected the projects that minimised the transit time between Melbourne and Brisbane within the spend constraint. For the unconstrained unlimited expenditure case, the process effectively selected every project that gave a travel time saving, however small, *and irrespective of cost."*

The Central Inland Sub Corridor is disadvantaged in this process because it was allocated many upgrade options, relative to the Far Western, and as will be identified later, many of these improvement options are excessively high cost, with very marginal returns for the dollars spent. *The total unconstrained capital cost of $8.0 billion for the Central Inland Sub Corridor is unjustifiably inflated.*

The Study demonstrated that under all options, once a Base Route is established for each Sub Corridor, significant diminishing returns occur for additional expenditure on the route.

Diminishing returns occur because of the relatively inelastic increase in freight flows that are estimated to occur following improvements in travel times. Significant expenditure is also required to reduce travel times.

Another factor to be discussed later is that, the costs per kilometre for some of the upgrade works, particularly on the Central Inland Sub Corridor appear to be unrealistically high.

This analysis indicates that a least cost option approach should be further investigated for the two most favoured Sub Corridors, being the Far Western and the Central Inland Sub Corridors.

The costs to establish the Far Western and Central Inland Sub Corridors under least cost options are similar, and when environmental constraints and the duplication that will be created in building additional rail lines between Narromine and Moree are fully considered, the Central Inland Sub Corridor emerges as the most cost effective in the long term.

Based on the analysis in this submission, the significant differential presented between the Far Western Sub Corridor of $3.5 billion and the Central Inland Sub Corridor of $8 billion for the Unlimited Expenditure Option is challenged and does not stand up to scrutiny.

Our analysis indicates that a Central Inland Sub Corridor with acceptable travel times could be completed for $1.0 billion; and that by comparison, the Far Western Sub Corridor would cost $1.4 billion.

This submission will focus on the strategy for achieving the North South Rail Corridor under a least cost, acceptable travel time basis by examining the Far Western and the Central Inland Sub Corridors in more detail.

2.7 Anchor Points

Brisbane is a major population centre and port. Brisbane is the northern end of the North South Rail Corridor. Brisbane, like Sydney also has limitations due to urban congestion, in the development of an appropriate rail freight line to service Brisbane and its port. A new intermodal facility has been planned for Bromelton, south of Brisbane on the North Coast Line.

Toowoomba is a logical major regional freight centre for western and northwest Queensland. A business consortium has invested in land at Toowoomba (Gowrie) for a proposed major intermodal freight centre. An alternative Cunningham option into Brisbane has been proposed, and even if this was more cost effective, Toowoomba could still be linked to Brisbane via Warwick.

Toowoomba's elevation of 600 metres above sea level does not appear to have disadvantaged it from becoming a major intermodal centre based on rail.

Warwick (460m above sea level) is a major freight focal point for inland New South Wales en route to Brisbane. Warwick is also an obvious regional centre for an intermodal hub. The placement of a significant supermarket distribution centre at Warwick is an indication of its location on the New England and Cunningham Highways with direct links into Brisbane.

Warwick should be included in the route of the North South Rail Corridor. The Base Route, and the $1.5 billion Expenditure Options for the Far Western Sub

Corridor both include Warwick in its route; however, the $3 billion Expenditure Option excludes Warwick.

The Central Inland Sub Corridor includes Warwick in all of its options.

Warwick emerges from this analysis as a northern anchor point. The route from Warwick to Brisbane is common to both the Far Western and Central Inland Sub Corridors as shown in Appendices 1 and 2.

Werris Creek is located 40km south west of Tamworth, and is a significant rail intersection in the New South Wales rail system. Werris Creek is at the intersection of the following rail lines:

1. Newcastle / Sydney to the south east
2. Parkes / Melbourne to the south
3. Narrabri / Moree to the north west; and
4. Tamworth / Armidale to the northeast.

$57 million was allocated through the Auslink program to the upgrading of the rail line between Werris Creek and Binnaway as part of the rail line to Dubbo.

There is a proposal for the construction of a new tunnel and realignment of the rail crossing of the Liverpool Range near Murrurundi, located on the Werris Creek to Newcastle rail line. This line carries significant volumes of coal and grain, plus general freight. Improvements to this route are supported as the recent "Liverpool Range New Route Selection Study" makes a strong economic case for the construction of this upgrade. The Study identifies the heavy usage of the Werris Creek to Newcastle line. It also emphasises the importance of Werris Creek in any consideration of regional anchor points in the rail network.

A link to Brisbane via Werris Creek provides a significant alternative rail connection between Sydney South and Brisbane via the Central Inland Sub Corridor.

Dubbo is a major inland regional centre at the half way point of the Corridor, and is at the junction of the Newell, Mitchell and Golden Highways. Dubbo is a centrally placed regional city and should be included in the North South Rail Corridor. Dubbo is at the junction of rail lines heading north, east and south.

The Far Western Sub Corridor aims to deviate at Narromine bypassing Dubbo.

Parkes is a major intermodal centre being developed at the junction of the Newell Highway and the North South Rail Corridor. Parkes is common to both the Far Western and Central Inland Rail Sub Corridors.

Cootamundra is at the junction of the main Melbourne – Sydney rail line and the inland North South Sub Corridors. This locality is also a significant anchor point for rail freight that can be diverted from Port Botany, where the main intermodal port is located, via the inland route to Brisbane. This alternative route bypasses

the Sydney to Newcastle urban passenger rail bottleneck. It has been used during the Olympics, and where crises may occur in Sydney.

A route variation common to both the Far Western and Central Inland proposals, bypasses Cootamundra in favour of Stockinbingal.

Melbourne is a major population centre and port servicing the southeast corner of Australia. Melbourne is at the southern end of the North South Rail Corridor.

2.8 Access Routes into Brisbane

Understanding the transport links into Brisbane from the Great Dividing Range and westwards are relevant to any inland north south route. Toowoomba is a transport focal point for both road and rail, with western and central Queensland as its catchment. The Warrego and Burnett Highways, and the Quilpie – Toowoomba Rail Lines, feed into Toowoomba and then onto Brisbane.

Warwick, on the other hand, is the focal point for New South Wales and Victoria leading into Brisbane. Warwick is connected to the Newell and New England Highways, then the Cunningham Highway into Brisbane, and the Main North Rail Line from NSW, and the rail line from Dirranbandi. Both Toowoomba and Warwick have important roles in relation to any non-coastal access to Brisbane, and both need to be accessible to the North South Rail Corridor.

The Study concludes that the Toowoomba Range option is the only viable route into Brisbane for either the Far Western or Central Inland Sub Corridors. The Study does not adequately consider the alternative routes into Brisbane, and the case for Toowoomba relative to Warwick is not adequately developed in the Study.

The Cunningham Option, linking Warwick with Brisbane (Bromelton) has been promoted as a viable and more efficient link to Brisbane. This alternative option needs to be more fully considered at a strategic level. The Cunningham Route Option is shown at **Appendix 1**.

Recent announcements have been made that Toowoomba will be linked by an inland rail line crossing the Surat coal basin to Gladstone. The Toowoomba to Gladstone link is important in the consideration of a North South Rail Corridor, yet it has not been considered in the Study.

2.9 Far Western versus the Central Inland Sub Corridor

The northern end of the Far Western Sub Corridor skirts to the west of the existing northwest rail branch lines, in its aim to create the shortest north south distance. The established north west rail lines generally have east west linkages focused on Newcastle, with lower branch line standards, whilst the Far Western Sub Corridor route predominately heads north south.

The Far Western Sub Corridor could not be viable if it depended on following the existing rail track alignment, as the distance would be too long. To go by existing

track would take it via Werris Creek, at which point the Central Inland Sub Corridor would be 100kms shorter.

The final distance of the Far Western Sub Corridor is dependent on which new rail route options are ultimately established, and the capital cost varies accordingly. It is difficult to compare the costs of the various Sub Corridor options, particularly for the Far Western Sub Corridor because the route changes with each expenditure sub option.

The final route for the Far Western Sub Corridor is therefore dependent on the final budget allocated to it. The route requires shortening in a number of key sections to produce a competitive distance, and dollars would be wasted if all linking sections were not established at the outset.

By comparison, the Central Inland Sub Corridor substantially follows the route of the existing rail line; hence, any upgrade of the existing line would not be wasted.

The Far Western Sub Corridor, in its shortest distance option, bypasses the Regional Centres of Narrabri and Gunnedah, as it skirts further west via Coonamble, Burren Junction and Moree. Narrabri is currently an important regional intermodal centre, but would not be directly on the route.

The existing rail line between Moree and Werris Creek is currently an important connection, and already accesses the regional intermodal centre of Narrabri. This line needs to be maintained regardless, as discussed earlier, and any new Far Western line would compete with this line for maintenance and capital expenditure.

NELG concludes that the two Sub Corridors, the Far Western and the Central Inland are much closer in cost than the Study indicates, and that a more detailed assessment is needed, before any final decisions are made, focusing in on these two northern options. The connection into Brisbane also justifies further study.

The value of the Shepparton line could be considered at a regional level as a feeder line to the North South Rail Corridor.

2.10 Sub Corridor Base Routes

Page 6 - 28 of the Study refers
"Sub Corridor Selection Procedure:
The procedure started with a 'base – route' for each Sub Corridor. This was a set of infrastructure works deemed necessary to establish a complete rail connection between Melbourne and Brisbane ***in accordance with the defined engineering and operational standards.***"

Estimated Base Route Distances for the Far Western and Central Inland Corridors are presented below in Table 1, and in Map form at **Appendix 1**.

Table 1 Sub Corridor Base Route Distances

Far Western Sub Corridor	**Total Km**	**Construct Dual Gauge**	**Upgrade Distance**	**New Route Dist**
Brisbane (Yeerongpilly) to Toowoomba	142	142		
Toowoomba to Warwick	84	84		
Warwick to Boggabilla	188	188		
Boggabilla to Moree	131		131	
Moree to Narrabri Junction	101		101	
Narrabri Junction to Burren Junction	83		83	
Burren Junction to Coonamble	120			120
Coonamble to Dubbo	154			
Dubbo to Narromine	36			
Narromine to Parkes	109			
Parkes to Cootamundra	197			
Cootamundra to Albury	216			
Albury to Melbourne	320			
Total	**1,881**	**414**	**435**	**120**
Central Inland Sub Corridor				
Brisbane (Yeerongpilly) to Toowoomba	142	142		
Toowoomba to Warwick	84	84		
Warwick to Stanthorpe	55	55		
Stanthorpe to Wallangarra	37	37		
Wallangarra to Armidale	213		213	
Armidale to Werris Creek	168			
Werris Creek to Binnaway	149			
Binnaway to Merrygoen	41			
Merrygoen to Dubbo	101			
Dubbo to Narromine	36			
Narromine to Parkes	109			
Parkes to Cootamundra	197			
Cootamundra to Albury	216			
Albury to Melbourne	320			
Total	**1,868**	**318**	**213**	**0**

Route information derived from the Study

The Table indicates that *comparing each Base Route, that the Central Inland route between Melbourne and Brisbane would be 13 kms shorter at 1,868 kms; would require no new rail easements; and would require 96kms less of dual gauge line construction.*

The alignment is in place for the Central Inland Sub Corridor, and a basic corridor can be established by upgrading existing unused track, and dual gauging narrow gauge sections within Queensland.

For the Far Western Sub Corridor by comparison, significant new rail easements need to be developed between Narromine and Moree, a distance of some 350 kms, much of it traversing low lying flood prone land, with significant river crossings, and also intensively cultivated land holdings. These connections need to be established to produce a route of competitive distance.

2.11 Sub Corridor Base Route Costs

Table 2 below indicates the costs derived from 'the Study' for each Base Route.

Table 2 Sub Corridor Base Costs

Base Route Construction Projects	Far Western $ 000	Central Inland $ 000
Signal Upgrade	7	6
Basic Track Upgrade	90	35
Crossing Loops	62	123
Coonamble - Burren Junction New Route	174	
North Star - Goondiwindi Connection	36	
Yeerongpilly – Inglewood Dual Gauging (Brisbane to Border via Warwick 414 kms) $1.2 mill per km	505	
Yeerongpilly - Wallangarra Dual Gauging (Brisbane to Border via Warwick 318 kms) $1.4 mill per km		437
Armidale to Wallangarra Rebuild		265
Total Base Route Costs	**$874**	**$866**
Total Distance Kms	**1,881**	**1,868**
Travel Times (estimated) hrs	**29.1**	**30.2**
Average Speed from travel time	**65**	**62**

Source "The Study" Table 9 Page 6 - 37

The Basic Track Upgrade costs as presented in the Study for the Far Western Sub Corridor of $90 million are questioned. It is estimated that 469 kms of track between Dubbo and Boggabilla would need upgrade. At $90 mil, this represents a cost of only $0.19 million per kilometre to replace track and rebuild the formation. An analysis of cost estimates is presented further on in this response.

The travel time for the Central Inland Sub Corridor estimated at 30 hrs for the Base Route appears too high and is further discussed at section **4.1 Transit Time**.

2.12 Proposed Modified Base Route

After reviewing the Study, a slightly different option for the Far Western and Central Inland Sub Corridors is proposed. This option, called the Modified Base Option is presented in Map form at **Appendix 2**. This option utilises the Base Option and adds some of the most cost for time effective route upgrade options to it to ensure an acceptable maximum travel time. These route upgrade options are presented in Table 3 below.

The Far Western Sub Corridor modified base option includes constructing some of the new connections necessary to create a reasonably direct route, and includes the link between Boggabilla to Warwick. This is the minimum alignment standard to make the Far Western Sub Corridor worth considering.

Table 3 Modified Base Route Costs

Far Western Sub Corridor

Improvement Projects	Cost $ 000,000	Run Time Hours
Total Base Route Costs	874	29.1
plus Junee to Stockinbingal	120	-0.9
plus Narromine to Coonamble	137	-0.7
plus Burren Junction to Moree	230	-1.0
Total	**1,361**	**26.50**

Central Inland Sub Corridor

Improvement Projects	Cost $ 000,000	Run Time Hours
Total Base Route Costs	866	30.2
plus Junee to Stockinbingal	120	-0.9
plus Binnaway Connection / Deviation	8	-0.5
plus Dubbo Bypass	44	-0.6
plus Merrygoen Bypass	15	-0.2
Total	**1,053**	**28.00**

The proposed Modified Base Option (based on information from the Study) would cost ***$1,053 million for the Central Inland Sub Corridor***, with a ***total run time of 28 hours.*** This run time is within acceptable limits for the North South Corridor as discussed further on.

3. Infrastructure Assessment

3.1 Infrastructure Design Criteria

Page 2 – 24 of the Study lists the Infrastructure Design Criteria for any new works on the proposed corridor.

The design criteria appear reasonable as a benchmark for any upgrade of the rail corridor to ensure its future maximum operational efficiency.

3.2 Minimum Vertical Clearance

The aim is to have the minimum vertical clearance above top of rail at 7.1 metres to accommodate double stacked freight trains. This outcome will not be achieved until the entire corridor is able to achieve the minimum clearance of 7.1 metres. It makes sense to aim for this requirement at the beginning, even though it may take some years to establish an entire line at 7.1 metres working height.

The economic analysis in the Study however, is based on single stacked trains.

3.3 Sleepers

The criteria specify concrete sleepers for any new work, and this is entirely logical.

3.4 Rail Track Weight

The aim is to include a 60 kilogram per metre track weight to ensure the track in the future can sustain maximum axle loads of 30 tonnes at high speed.

The existing Great Northern Line (New England Rail Section) was originally constructed to main line standards and currently has a lot of track at about 40 kg/m. The Study acknowledges that the existing rail on the Central Inland Sub Corridor is 40, 47 or 53 kg/m.

The Base Route for each Sub Corridor includes the cost of upgrading the upper earthworks formation, laying new ballast, laying new sleepers (concrete) and laying new 60 kg / m rail line.

Costs for reinstating the line could be reduced by utilising older 53kg/m rail line. It is significantly cheaper than new 60kg line, estimated to be in the order of $120,000 per km cheaper.

3.5 Vertical Alignment (Grade)

The Study adopted a maximum desirable gradient for freight trains of 1.25%, or 1 vertical in 80 horizontal; and a maximum allowable gradient of 2.5%, or 1 vertical in 40 horizontal.

No grade on the Central Inland Sub Corridor rail line exceeds the maximum allowable grade of 2.5%. This rail sub corridor therefore satisfies the Infrastructure Design Criteria for grade.

The Study also refers to a preferred maximum allowable gradient of 1.5% or 1 vertical in 67 horizontal.

The Curve and Gradient Diagrams (Rail Access Corporation 1999) for the section of the Central Inland Sub Corridor rail line between Narromine and Wallangarra indicate the varying grades along the route.

For the section **Narromine to Werris Creek** the length of track with gradients between 1.5% and 2.5% is:

Uphill heading north	Nil
Downhill heading north	3 kms

For the section **Werris Creek to Wallangarra** the length of track with gradients between 1.5% and 2.5% is:

Uphill heading north	88 kms
Downhill heading north	59 kms

The significant uphill sections greater than 2 kms in any one section are:

Limbri Valley Drive to Walcha Road 23 kms
Dumaresq – Booralong 11 kms
Bluff Rock 8 kms
Sunnyside - Wallangarra 4 kms

The significant downhill sections greater than 2 kms in any one section are:

Ben Lomond 9 kms
South of Dundee 4 kms
Bolivia 6 kms; and
north of Tenterfield 3 kms

The remaining sections with grades in the range 1.5% to 2.5% are all short, separated sections less than 2kms each.

Critics of the Central Inland Sub Corridor claim that grade and elevation are significant issues, as part of the route is located on the Great Dividing Range.

The above analysis identifies the various grades on various sections. The section between Narromine and Werris Creek, despite travelling some areas of higher elevation, maintains grades well within the preferred maximum allowable grade.

The section from Werris Creek to Wallangarra climbs up to a plateau of around 1,000 metres above sea level between the Moonbi Range and Wallangarra. This section does not exceed the maximum permissible grades as identified above.

There would be an added cost for energy to negotiate these grades, but this will be offset by lower maintenance costs of the line due to more stable geology, and the advantage that altitude gives of being flood free and cooler.

The Study also identified that the new generation of locomotive, is well equipped to handle the grades on this sub corridor, refer to Section 3.10 Locomotives and Rolling Stock.

3.6 Horizontal Alignment (Curves)

The Design Criteria set out a range of maximum train speeds for various radius curves. Quite clearly, horizontal curve radius and the degree of rail banking or super elevation, will directly affect safe train speeds. To sustain the desirable maximum speed of 115 km per hour for a freight train, a minimum radius curve of 1,200 metres is required. For 80 kph, a minimum radius of 500 metres is required.

Recent research has shown that for a given curve, that speed can be increased with appropriate track banking.

The Dubbo to Brisbane route has a number of sections that have smaller radius curves to the above. Some of these sections will be improved in the base route upgrade costing, whilst the remainder will be reflected in the travel time for the Sub Corridor. In some sections, tighter radius curves will be the payoff to reduce steeper grades, in other sections tighter radius curves may be to do with terrain. Some sections may already have reduced speed because of the grade, so may also be able to contain tighter curves with no additional decrease in speed.

Sections with poor alignment on the Central Inland Sub Corridor are relatively short. The most significant sections are east of Toowoomba en route to Brisbane; a couple of sections on the Dubbo to Werris Creek Section; and three on the New England section.

It should be noted that the alignment of the New England section overall is relatively good, and better than the general perception. There is a lot of relatively straight track between Armidale and Tenterfield.

The Rail Access Corp Curve and Gradient Diagrams 1999, indicate running speeds for freight trains along the route.

The line between Narromine and Werris Creek has 212 kms with speeds of 100 kph or greater. The line between Werris Creek and Glen Innes has 103 kms with speeds of 100 kph or greater, and 124 kms in the speed range 70 to 99 kph. It is suspected that this will be higher once reasonable maintenance standards are reintroduced.

The Toowoomba Ranges rail section is reported in the Study to have curves down to 100 m radius, and yet is considered physically navigable by the trains assumed in the Study, albeit at a slow speed.

The Study reports at page 5 – 49, "Any of the inland route options being considered require a connection to Brisbane through the Toowoomba area. The existing narrow gauge track through the Toowoomba Ranges is slow and difficult to negotiate for larger trains. There are numerous curves with radii as low as 100 metres which, combined with steep grades averaging 2 %, make the existing link difficult to negotiate, particularly for larger trains with heavy trailing loads. However, the operations modelling undertaken for the Study has indicated that *the design train can negotiate the route*, though the route would need to be standard gauge (or dual gauge subject to QR and QT approval) and the travel speed would be around 10 km/h."

By comparison to the Toowoomba Ranges, the Bolivia Range north of Glen Innes has larger radius curves in the range 220 to 400 m over a distance of about 9 kms, including 3 kms of straight track.

Bolivia Range has been identified in the Study as an upgrade section, at a cost of $527 million over a distance of 13kms. The need for this major reconstruction is questioned, as well as the total cost. The unit cost for these works is $39 million per km, which by other comparisons in this analysis is extremely excessive. The grades in this section do not exceed 2.5%, and occur over a distance of about 6 kms and satisfy the maximum grade design requirements.

3.6 Drainage

The design criteria requires new and upgraded track to clear 1:100 year floods, and for the track to drain freely under 1:100 year rainfall events.

The 1:100 year flood requirement is an issue that distinguishes the Far Western from the Central Inland Sub Corridor. *The Far Western Sub Corridor traverses considerable zones of low-level flood plain geography that is very vulnerable to flooding.* To compensate for this, any track will need to have a significant formation height, either by major fill embankments using imported material connected by major drainage structures, or significant distances of elevated track built on piers or trestles.

The Central Inland Sub Corridor by comparison, is generally located high on the landscape, resulting in relatively small drainage catchments and shorter watercourse crossings.

3.7 Significant Sections Requiring Upgrade

The Far Western and Central Inland Sub Corridors have 50% of their proposed routes in common. The section from Melbourne to Narromine is common, as is the section from Warwick to Brisbane, except for the Far Western Sub Corridor $3.0 billion Expenditure Option, in which Toowoomba is the northern meeting point.

A number of major upgrade options are therefore common to both Sub Corridors. Those common upgrade options with significant timesavings as identified in the Study are:

- **Junee to Stockinbingal** - saving estimated to be 52 minutes (0.9 hours), for a cost of $122 million (equates to **$2.3 million** per saved minute of travel time)

- **Toowoomba Ranges Crossing** (Cambooya to Grandchester) estimated saving to be 136 minutes (2.2 hours), for a cost of $1,904 million (equates to **$14 million** per saved minute of travel time) Page 10.7 – 19 of the Study.

3.8 Toowoomba Ranges Crossing

The Toowoomba Ranges Crossing is one of the most significant improvement sections to establish the route. Alternatives here are either:

1. Adopt the least cost base-route approach with dual gauging of the existing route. The cost of this option is not transparent from the Study, but appears to be about $250 million for 142 kms, based on Base Route cost from Brisbane to Wallangarra of $437 million; or

2. Construct a fully engineered higher speed route involving realignment and tunnels quoted in the Study at "an indicative cost of around $1,600 million" for Gowrie to Grandchester. There are discrepancies with costs for the reconstructed route as identified in Table 4 below.

The Study indicates (Page 1 – 14) "The high cost of obtaining an acceptable route through the Toowoomba ranges is a major inhibitor to the Sub Corridor. Modelling suggests *that it is possible to achieve a transit time of less than 27 hours without the Toowoomba range rail deviation,* albeit with a line subject to significant speed restrictions in key sections that will adversely influence its operational viability and competitiveness."

The economic advantage of the lower cost dual gauging option, compared to the reconstruction and rerouting option needs to be further evaluated whichever sub corridor is chosen.

The Study further indicates at page 5 – 49, "QR and QT have jointly developed an option that involves a new rail connection between Gowrie and Grandchester that includes a long tunnel under the Toowoomba Ranges, and substantial reconstruction and realignment of existing infrastructure to connect back to the existing network. The option has been identified by QR and QT as the preferred solution to the challenge of the Toowoomba Ranges crossing and has been adopted as the basis of the route option developed for the Study."

"QR has provided information on the Gowrie to Grandchester proposal to guide the development of a route option for the Study. It should be noted that the project is included in the Queensland Government SEQIPP and is identified for construction during 2015-16 to 2025-26." The question arises whether the Queensland Government will fund this upgrade regardless of external funding, or the final route of the corridor? If this is going to happen anyway, the northern end of the inland

Sub Corridor would be locked in, regardless of whether the Far Western or Central Inland Sub Corridor is adopted.

Given the total potential cost of the North South Rail project, it is likely that unless the Toowoomba Range upgrade were targeted by say the State Government, it is unlikely to be funded under the overall project, particularly if the overall budget was less than $3.0 billion.

Based on information from the Study, there appears to be some major cost and time discrepancies in the Toowoomba Ranges area, and in the Inglewood to Toowoomba sections. This issue becomes significant when comparing the $3.0 billion and above expenditure sub options. Table 4 highlights these.

The construction cost for the Toowoomba to Brisbane (Cambooya to Grandchester) realignment and construction option is $1,904 million, as costed against the Central Inland Sub Corridor. However, the realignment and construction cost of the much longer Inglewood to Calvert section, as costed under the Far Western Option, is listed at $2,059 million, an additional $155 million.

The Study infers for the Far Western Sub Corridor that, for an extra $155 million expenditure, an extra 228 km is reconstructed, with a claimed saving of 3 hours in travel time. The cost per kilometre appears too low at $680 million per km, and the time saving much greater than any comparable route upgrade option. This equates to a cost of $0.9 million for every minute saved, which appears unrealistically low.

This unrealistic 3-hour saving heavily biases the result in favour of the Far Western Sub Corridor under the Unlimited Expenditure Sub Option, where travel time is an important criterion.

Table 4 Toowoomba Range Upgrade Costs – Unlimited Expenditure Sub Option

Far Western Sub Corridor	Cost $ 000	Length kms	Transit Time Saving
Inglewood to Calvert: Major Realignment and Construction (Boggabilla to Brisbane actually 370kms)	**$2,059**	**214**	**5.2 hrs**
Plus Inglewood - Yeerongpilly Dual Gauging (should be Boggabilla to Brisbane. Balance of Base Route upgrade cost reduced from $505,000 due to overlap with the above project)	**$83**		
TOTAL	**$2,142**	**214**	**5.2 hrs**
Cost of $6.9 million per minute; $10.0 million per km			
Central Inland Sub Corridor			
Cambooya to Grandchester: Major Realignment and Construction (This option is a subset of the Inglewood to Calvert Option above, is only 46% of the distance, yet accounts for 92% of the total cost. Toowoomba to Brisbane is actually 142kms. Indicates that only 2.2 hours saved between Brisbane and Toowoomba; and 3 hrs between Boggabilla and Toowoomba)	**$1,904**	**100**	**2.2 hrs**
Stanthorpe - Yeerongpilly (Border to Brisbane) Base Option (This amount should be significantly reduced, as it was for the $505mill above, as it is largely superseded by Cambooya to Grandchester construction costs)	**$437**		
TOTAL	**$2,341**	**100**	**2.2 hrs**
Cost of $17.7 million per minute; $23.4 million per km			

Information sourced from the Study, Table 13 Total Capital Spend Unconstrained Page 6 – 52

According to the Study, the Cambooya to Grandchester Option (distance of 100 km) is a subset of the Inglewood to Calvert Major Realignment and Construction Option (distance of 214 kms). Yet the latter accounts for 92% of the cost, is only 46% of the distance, and only creates a 2.2 hour saving for the massive

expenditure of $1.9 billion. *This issue needs to be re-examined, as it appears to be artificially disadvantaging the Central Inland Option.*

Unconstrained Capital Cost Sub Option

It is noted that in Table 13 page 6 – 52 of the Study, that the Dual Gauging costs for the Stanthorpe – Yeerongpilly Section of $437 million under the Central Inland Sub Corridor are not reduced due to the inclusion of the Cambooya bypass – Calvert major upgrade, that is also included in this section. The Cambooya to Calvert major upgrade would duplicate and negate much of the $437 million already provided for under the Base Route.

Acceptance of this issue would save in the order of $300 million for the Central Inland Sub Corridor under this option.

3.9 Upgrade Cost Estimates

Costing Database

The Study does not detail the rail construction unit costs used in the analysis 'page 5 – 54 Section 8.2.1 Costing database' of the Study refers. The Study does indicate that the cost estimates have a geographical basis, but the details of this are not documented either.

In the absence of these unit costs, this analysis will examine relevant comparison cost estimates to compare upgrade costs listed in the Study. Due to the size of the Study area, it is assumed that the basis of cost estimating will have relied on very extensive assumptions for many areas where detailed costed proposals would not have been available. By its very nature, cost estimating at this level of project size, will have errors attached to it, and can only give broad comparisons. More refined and detailed cost estimates will be needed to refine the targeted options.

Alice Springs to Darwin Cost

A benchmark for recent new rail corridor creation and construction is the Alice Springs to Darwin rail line. According to information available, it was completed in 2003 for a total cost of $1,300 million over a distance of 1,420 kilometres. The unit cost for this rail line is therefore $916,000 per kilometre. This equates to about $1.0 million per kilometre in 2007 dollars.

The Alice Springs to Darwin route is relatively straight, over relatively flat, stable country. The route does include some heavy earthworks mainly at the Alice Springs end, and some significant drainage structures along the route, with the formation mainly won from borrow pits along the route.

Cost estimates provided in the North South Rail Study vary considerably on an average cost per kilometre basis. In general terms, the minimum reinstatement cost of refurbishing an existing rail line is quoted in the Study at about $1.2 to $1.4 million per km. Upgrade option costs within the Study vary from $1.4 to $39.0

million per km. By comparison, to the Alice Springs Darwin line, cost estimates provided for in the Study appear on the generous side, and even excessive.

The currently quoted cost of laying new ballast, concrete sleepers, 60 kg/m rail line and some associated minor drainage works is around $1.0 million per km. This figure is consistent with the Alice to Darwin costs. The estimates provided in the Study appear too high by comparison.

Liverpool Range New Route Cost Estimates

The "Liverpool Range New Route Selection Study – Project Conclusions 2007 Report" provides some very relevant insight into costs associated with new rail line heavy constructions costs. The above Study, commissioned by the ARTC was undertaken to examine options for improving the Ardglen Tunnel route through the Liverpool Range. The Project Conclusions have recently been released.

The Liverpool Range Study reflects more detailed, intensive and therefore more realistic cost estimates than would have been possible for the North South Rail Corridor study. The Liverpool Range Study provides some useful benchmark costs for heavy construction of rail through mountainous steep terrain, including tunnelling.

The Project Conclusions give cost estimates for seven route options, involving the construction of single-track rail over distances varying between 24 to 35 kms.

For the three surface alignment options including up to 0.82 km of rail tunnel, the average cost per kilometre is given in the range $4.7 to $7.0 million per km.

For three 4.16 km tunnel alignment options, the average cost was in the range $10 to $12 million per km.

For the 8.76 km tunnel option, the average cost was $19.4 million per km.

The above figures provide some interesting benchmarking costs for heavy construction, including full rock tunnelling, and construction in mountainous country. These figures are considerably less than the range of unit costs used for the North South Rail Corridor, particularly those quoted for the Central Inland Sub Corridor of up to $39.0 million per km.

Other Cost Estimates

The author has made some rough cost estimates for tunnelling. 'Rawlinsons Australian Construction Handbook 2004 Edition 22' is the source for unit costs. It provided estimates of up to $100 per cubic metre for excavation in rock. At a cross sectional area of 56 m2 (7m wide x 8m high), by 1000 m by $100 for excavation in rock, indicates a figure of up to $5.6 million per km, plus the laying of ballast, sleepers and track. Whilst this is a very basic cost estimate, it is consistent with the range of figures provided in the Liverpool Range estimates.

The range of improvement option costs for the Western Sub Corridor is from $1.4 to $9.6 million per kilometre, and by comparison, $3.8 to $39.0 million for the Central Inland Sub Corridor. Whilst it will be said the Central Inland Sub Corridor has more mountainous terrain, any comparison indicates that the unit costs relative to other projects are very high, and it is argued are biased against the Central Inland Sub Corridor.

It can also be argued that the difference in geography between the two Sub Corridors is negated by the need to build 'up' in the west on low flat land, and to build 'in' on the higher country of the central route.

Based on these comparisons, the construction cost estimates used for in the Study are questioned.

Central Inland $1.5 billion versus $3.0 billion Sub Option Cost Base

The Study indicates that the $1.5 billion expenditure sub option achieves a line haul transit time of 28 hours for the Central Inland Sub Corridor.

The $3.0 billion expenditure sub option, according to the Study only reduces travel time by an extra 0.8 hrs, for an increased expenditure of $1.5 billion. This represents a cost of $31 million per each minute saved in travel time. Clearly, this would be an uneconomic proposition.

The cost of $31 million per minute saved highlights some concerns with the cost estimation in the Study.

Firstly, the cost per kilometre for some of the Central Inland Sub Corridor route upgrades carry extremely high cost estimates per kilometre; and

Secondly, the choice of sections for route upgrades within each expenditure sub option does not appear to target the most cost effective sections to upgrade. Appendix 10.7 of the Study is the reference for this information.

The $3.0 billion Expenditure Sub Option includes a Kootingal upgrade with a spend of $1,063 million for a saving of only 15 minutes, equating to a cost of $70 million per minute saved! If this cost estimate is correct, then on an economic basis, this improvement option should not be included as a viable option.

More likely, it reflects overestimation of costs, and underestimation of time saved.

Maintenance Costs

The cost of maintaining rail track on black soil plains is estimated to be roughly double that of more stable country. The reason is that the ballast tends to settle into the cracks as the black soil shrinks and expands, and eventually the ballast has to be re-laid. Maintenance costs in this country could be in the order of $10,000 per km. The maintenance cost on black soil could be reduced at construction, by providing geo grid type products to separate the ballast from the

formation. The initial cost of using this material would add significantly to construction costs.

In addition to maintaining the rail line, is the need to maintain access roads to service the rail line. In black soil country, such roads have to be heavily engineered at a high cost to ensure they remain passable in wet conditions, or accept that there will be critical times when these access roads are not available.

In recent years, roads in the Moree area have received significant funds to repair flood damage affects, and to a much greater scale than has been required on the higher New England country.

Challenges faced on flat, black soil, hot western environments.

3.10 Locomotives and Rolling Stock

Page 5 – 44 of the Study indicates, “The reference train (for the Study) adopts GT46C-AC model locomotives and a mixed wagon fleet comprising wagons suitable for domestic, automotive and shipping containers, steel plate and slab wagons, general merchandise vans and grain hoppers.”

“The GT46C-AC model locomotives will be more fuel efficient, incorporate semi steer bogies, microprocessor control and electronic brakes, making them ideal for travel on steep gradients along the route options considered in the Study.” … “This new generation of locomotives has been ordered from EDI Rail by SCT for

its east – west services. At 3,200kw (4,300hp), these GT46C-AC model locomotives will be marginally more powerful with a similar axle load."

The planned locomotives to be used on the corridor will clearly have the capacity to deal with the steeper terrain of the Central Inland Sub Corridor.

There seems to be differing opinion regarding actual net loads of the design freight trains using the North South Corridor. Page 3 – 43 of the Study indicates that linehaul rail has a typical capacity of 1,500 tonnes. Some people have argued that the capacity of a 1,500 metre long general freight train should be greater than 1,500 tonnes.

Daily train movements based on the one way freight volumes between Melbourne and Brisbane and 1,500 tonne net loads, would equate to 3.8 trains per day one way by 2009, and 8.5 trains per day by 2029. Obviously if payloads were larger, the number of train movements would be comparably less.

Route Ownership

It is assumed that all of the rail easements within New South Wales are vested in the NSW State Government. The Melbourne to Sydney to Brisbane main rail lines; the line west of Parkes, and the line linking Cootamundra to Dubbo to Werris Creek and on to Newcastle are all leased by the Australian Rail and Track Corporation ARTC. The other existing lines under consideration in the northern inland are called Country Rail Network CRN Operational Open or Closed lines. These are maintained under agreement by the ARTC.

The line between Armidale and Wallangarra is CRN Operational Closed Corridor. On some rail maps, this line is no longer shown. The loss of corporate memory for this line as a result of major restructuring of the NSW State Rail Authority is of concern, as opportunities for this line could be lost, simply because it has been forgotten.

It is strongly recommended that the State Government negotiate this Main North Line with the ARTC to have it included in the ARTC Leased Corridor network.

4. Operating Efficiency

The Coastal Sub Corridor between Sydney and Brisbane will reach capacity, even after the budgeted improvements, by 2019. This will be one of the driving forces to encourage the establishment of the inland Sub Corridor.

4.1 Transit Time

Table 14 on page 4 – 57 of the Study indicates the results of industry surveys on expectations of future reliability, availability and transit time from various corridors. The expectation from these surveys for the Melbourne to Brisbane Inland Sub

Corridor was 27 hours, comparable to the expected (some say optimistic) transit time for the upgraded Melbourne - Sydney - Brisbane Coastal Sub Corridor.

27 hours is targeted in the Study as the ideal minimum to be achieved. However, ARTC has committed to a future travel time of 28 hours for the Coastal Sub Corridor via Sydney.

The current Brisbane – Sydney – Melbourne travel time is believed to be about 35 to 36 hours.

Page 5 – 40 of the Study discusses target transit times. It considers transit time options of 33, 30, 28 and 24 hours.

A number of points are made in the Study relevant to transit times:

30 Hours - "After allowing six hours for unloading, reloading and servicing at each end, *30 hours is considered the maximum transit time* allowable to meet the ARTC objective of a 72 hour (three day) equipment cycle time."

28 Hours - "ARTC has committed to a 28 hour transit time in its NSW Lease Agreement, a 20% improvement over current practice."

24 Hours or less - "After allowing six hours for loading and unloading at terminals, a two day turnaround of wagons would require a transit time of 18 hours. However it is important to note that freight users have indicated that the *increased gains from lower transit times are smaller once an objective of around 27 hours is reached*."

Discussion on Transit Times

The above information indicates that whilst 27 hours is the ideal transit time, 28 hours, and possibly 30 hours could be acceptable. The Base Route for the Central Inland Sub Corridor with an expenditure of $870 million is estimated to achieve a transit time of around 30 hours. The Modified Base Route reduces this to 28 hours based on the Study.

Dropping travel times to the next step of 18 hours would require a significant injection of funding with minimal returns in terms of increased freight carried. An 18 hour travel time would require trains to be travelling non-stop between Brisbane and Melbourne at an average speed of 100 kph or greater.

The travel times for the northern section of the Central Inland Sub Corridor used in the Study can only be estimates, as parts of the route are not used. It is suspected that some of the indicative travel speeds shown on Rail Access Corporation records reflect a history of low maintenance on sections of the Corridor, rather than inherent design speed.

The accuracy of the time estimates need to be fully tested as part of further analysis for this route. An hour either way would make a big difference in the

efficiency of this Sub Corridor. Improvements to route alignment in the future, will of course improve transit times.

It is noteworthy that the current runtime between Sydney and Brisbane indicates an average speed of only 55 kph. By 2009, it is estimated that this will increase to 64 kph (page 5 – 53 of the Study). These relatively slow average speeds highlight the deficiencies in the current Sydney to Brisbane Coastal Route.

The northern end of the proposed Central Inland Sub Corridor, after Base Route upgrades would be faster than the Sydney to Brisbane Coastal Route speeds.

The section Narromine to Werris Creek for example, has an indicative run time of 4.0 hours, and associated average speed of 82 kph for a non stop journey, based on the waited average of the recommended speeds for this section of line.

The section Werris Creek to Glen Innes has an indicative run time of 3.5 hours, and associated average speed of 78 kph for a non stop journey, based on the waited average of the recommended speeds for this section of line.

These estimated average speeds for Narromine to Glen Innes at around 80 kph, are all well above that which is needed to ensure a maximum run time of 27 to 28 hours for the Central Inland Sub Corridor. By comparison, for a distance of 1868 km (Melbourne to Brisbane), the non stop running average speed for the Central Inland Sub Corridor would need to be 69 kph to complete the journey in 27 hours.

The Rail Access Corporation records for the section Glen Innes to Wallangarra show the train speed as 40 kph for this entire section. This speed limit reflects the low standard of maintenance of the line at the time, not the inherent design speed of this section.

Investigation is needed as to whether this low 40 kph speed was used in the Study to determine travel times along the route, or whether appropriate design speeds reflecting the upgraded base route were used.

Overall, the Central Inland Sub Corridor is capable of meeting acceptable transit times in the order of 27 to 28 hrs with capital cost of around $1.0 billion.

5. Market and Demand Assessment

The northwest region is currently connected to Newcastle by rail, and is an important link for products coming from and to this region. A Central Inland route would provide alternative access to Queensland markets and ports via Werris Creek. This would reinforce Werris Creek as a collection point for products coming from the NSW West and North West regions.
Coal represents a significant component of the bulk freight market on the eastern seaboard of Australia. In 2004, coal represented 120 out of 220 million tonne of freight. It is also significant that much of the coal freight travels eastwards to the port of Newcastle from northern NSW. Bulk grain movement from northern NSW is small by comparison to coal, but at 2.6 million tonnes is also significant.

The high bulk tonnages travelling west – east result in high use rail lines feeding into Newcastle from northern NSW, particularly the northwest. This bulk rail traffic could potentially compete for line capacity with north south rail movements on the North South Rail Corridor. The route, Dubbo to Werris Creek to Warwick is the least busy and would allow the North South Rail Corridor trains to cross the busy east west rail route to Newcastle, rather than competing with it.

The Melbourne - Brisbane rail freight task of around 4.5 million tonnes (2004) mainly comprises manufactured goods. Whilst this volume is small by comparison to bulk coal, it is significant because of the tonne kilometres involved. The long distance of 1,868 kms is less profitable for road transport.

The Central Inland Sub Corridor is strategically placed to access the coal reserves waiting to be developed at Ashford, north west of Glen Innes, and other possible nearby reserves.

The Study highlights that demand will steadily increase, and the Coastal Sub Corridor will reach capacity, based on planned upgrades by 2019. The Study does indicate that *by creating an inland route, a significant component of the Sydney Brisbane freight, which is actually Melbourne Brisbane freight, could shift to the inland route. The opportunity here is that, the Sydney - Brisbane rail line would be freed up allowing more Sydney - Brisbane road freight to divert from the Pacific Highway onto the coastal rail route.* "There would be some economic benefits if this occurred." Page 5 – 45 of the Study.

Page 6 -17 of the Study indicates, "As the Central Inland Sub Corridor provides an alternative to the existing Coastal Sub Corridor, it is better suited to addressing future capacity constraints, avoiding rail congestion in the Sydney Metropolitan area."

5.1 Rail Service Characteristics

Page 44 of the Study indicates that for long haul routes, rail relative to road has the following attributes:

- **Price** is cheaper, up to 30 %
- **Reliablity** is poor, 35 – 45%
- **Availability** is less, 40 – 45%
- **Transit time** currently longer, about 36 hours (road 21 – 27 hours)

Rail would have the opportunity to improve reliability, availability and transit time on a dedicated North South Sub Corridor that avoided metropolitan areas.

Price is already an advantage; reliability on a route that was not restricted by traversing the Sydney metropolitan areas would greatly improve, whilst availability would also be expected to improve with greater investment into rail. Transit time will improve on a dedicated line following increased investment.

A transit time of around 27 - 28 hours could be expected from a least cost investment for the North South Rail Corridor via either the Central Inland or the Far Western Sub Corridors.

A major advantage that the line via the Central Inland (New England) Sub Corridor would have is minimal competition for the rail line, and a freight feeder point at Werris Creek, that allowed single point entry to the North South Corridor from the Northwest. This route option crosses, rather than traverses these busier west east routes. The Far Western Sub Corridor is likely to have more competition with grain and coal trains, and not be as well placed to centrally pick up northwest freight. In time, a regional feeder line could be developed from Moree to Warwick to tap into Queensland markets and ports, as an alternative to Newcastle. This would be developed as a lower cost regional, rather Class 1 line.

Rail is disadvantaged compared to road, where door-to-door service is required at each end of the rail line. This disadvantage for rail is reduced where it is able to access a port directly, whether for import or export freight. It is assumed that a significant part of the freight load will be port to city, thus reducing taxiing at one end.

5.2 Demand Scenarios

The Study examined a number of demand scenarios in relation to the affects of market forces between the various forms of transport, and route options. The adopted scenario was Demand Case A, which is detailed in the Study. The assumed price of fuel should be commented on for Demand Case A.

Demand Case A, at page 6 of the Study indicates that fuel is valued at $70 a barrel in 2006, and only $50 a barrel in 2029. Given that fuel is becoming a scarcer commodity, and that carbon taxes are on the horizon, it should be apparent that this assumption is not valid, and that fuel prices will be significantly greater by 2029 than that foreshadowed in Demand Case A.

It is assumed that as fuel costs rise, there will be a corresponding advantage for rail, due to greater efficiency of tonnes moved per unit cost of fuel used.

Governments continue to increase mass load limits for road freight, due to the very powerful road transport lobby, and this continues to bias against rail freight and increase the damage cost for roads. The cost of improving and maintaining roads has not been addressed in the Study.

6. Environmental Assessment

6.1 Protected Areas and Heritage

The Study considered a corridor of interest of many kilometres wide when it considered issues relating to protected areas. As a result, the Study identifies

many protected areas along each Sub Corridor. The reality is that the Central Inland Sub Corridor is an established rail route, and only small realignment deviations would be needed. In general, it is difficult to see where the clash with protected areas would occur on this route.

The Bolivia and Girraween areas are the main areas where conflict with protected areas could occur. Given the existing alignment, it is unlikely this will be significant.

Sections of proposed new rail corridor would be significant on the Far Western Sub Corridor with respect to protected areas. The proposed Coonamble - Narrabri route sub option would have to cross significant sections of the Pilliga. Given these issues, it is likely that this route option would not be viable, or be subjected to many environmental challenges.

Other heritage issues are most likely to be related to rail heritage. Many of our rail lines were established in the late 1800s, and hence do have heritage considerations. The Great North Line has for example some rail line stamped 1884. Such issues can be dealt with in a variety of ways, through appropriate recording, sampling and preserving on or off site. These issues should not be significant to the final route choice.

6.2 Flora and Fauna

Flora and fauna issues are not identified as being more significant in the choice for either sub corridor. Vegetation clearing requirements for any new route or route realignments will need to be assessed on a local basis to determine impacts and ameliorative measures.

Consideration of new route options such as through the Pilliga is likely to be significant in this regard.

Fauna issues are likely to be related to impacts on vegetation habitat, and on barriers to free movement caused by rail corridors.

6.3 Water

Page 1 – 15 of the Study indicates “Furthermore complex river networks would require high numbers of crossings” on the Central Inland Sub-Corridor.

Page 7 – 5 of the Study further indicates, “The Central Inland Sub Corridor would require the largest number of major river crossings, whereas the Coastal Sub Corridor would require the largest number of minor river crossings.”

These appear to be extraordinary statements, and are not considered valid. The Central Inland Sub Corridor traverses higher country, and as a result tends to be at the head of catchment areas, not down stream in flood prone land.

River crossings are not a major obstacle for the Central Inland Sub Corridor. The Coastal Sub Corridor does have major coastal rivers to cross, and the Far Western

Sub Corridor does have many low-level flood plains and major rivers. Page 7 – 5 of the Study, "The largest area of flood liable land is found within the Far Western Sub Corridor".

The impact from flooding has recently been demonstrated on the Alice Springs to Darwin line where flood damage forced the closure of the line at the beginning of March 07. Flooding has both damaged, and delayed the reparation of the line.

The map provided on Page 7 - 13 of the Study indicates only a small area of flood plain near Narromine. This map underestimates the significance of this type of country for the Far Western Sub Corridor.

6.4 Drainage

The design criteria for the project, requires new and upgraded track to clear 1:100 year floods, and for the track to drain freely under 1:100 year rainfall events.

The 1:100 year flood requirement is one of the issues that distinguish the Far Western from the Central Inland Sub Corridor. The Far Western Sub Corridor traverses a lot of low-level flood plain geography, and will be very vulnerable to flooding. To compensate, significant engineering works will be required. The formation height of the track will need to be raised. This would be achieved either by major fill embankments using imported material incorporating major relief drainage structures, or significant lengths of track elevated on pylons.

Whilst these issues, including unstable black soils can be overcome, they will come at a cost that may not have been fully considered.

The Central Inland Sub Corridor by comparison, is generally located high on the landscape, on more stable geology, resulting in smaller drainage catchments with shorter watercourse crossings. This rail line has been successfully tested over its 120 plus year history in relation to flooding and drainage.

6.5 Air Quality

An advantage in the carrying of freight by rail compared to road is a reduction in green house gases. The reduction is attributed to the more efficient use of fossil fuel (diesel) where freight is transported by rail.

6.6 Noise

The main consideration with noise will occur in relation to residential areas. Both Sub Corridor options are relatively sparsely settled, with the exception of the towns that are located on the various routes. Noise will need to be considered at a local level, particularly from fast moving trains travelling at night. Overall, it is considered a localised impact, rather than a significant impact and does not distinguish one sub corridor from the other.

6.7 Soils and Contamination

Soils will be significant, particularly on black soil country, where they are characterised by movement and major cracking and expansion in response to moisture conditions. This is considered a disadvantage for the Far Western Sub Corridor and leads to higher construction and maintenance costs.

Contamination assessments will be required for the Far Western Sub Corridor. Page 7 – 5 of the Study indicates, "The highest proportion of known contaminated sites is the Far Western Sub Corridor". The extent of this contamination is unclear from the Study.

6.8 Land Use

Land use is a consideration for the Sub Corridors. The consideration is highest for new route easements, where a 50 metre wide corridor will need to be negotiated across farming country. The issues here are likely to relate to the splitting of holdings by the rail corridor. The impacts will be highest on cultivation farmland country where individual cropping land will be split. Other land will be affected including the splitting of grazing paddocks, interruption to irrigation practices; impacts near residential areas; and the isolating of protected areas.

The Far Western Sub Corridor will cross intensive cropping land, which will be problematic in choosing a new route. Significant cropping areas are likely to be between Narromine and Armatree, and Coonamble through to Moree.

6.9 Traffic and Safety

Of particular consideration for any rail corridor is the question of road / rail intersections. This issue was not dealt with in detail in the Study, although costing is provided for in the Base Routes. It is unlikely that this issue is a major point of difference between the inland Sub Corridors. It is assumed that any road / rail safety issues would be addressed in the design and construction stage and be covered by existing standards for safety at intersections.

7. Financial and Economic Assessment

Construction cost estimates were discussed previously in Section 3, Infrastructure Assessment.

A substantial investment is required to enhance, create and maintain the North South Rail Corridor. There appears to be a very strong practical case to support development of an additional northern inland Sub Corridor. The range of cost estimates to actually establish the sub corridor vary widely, partly depended on the time efficiency to be achieved by the line, and partly to do with the quality and knowledge of construction cost and market revenues. The range of expenditure required to create the sub corridor has been quoted in the range of $800 to $8,000 million, quite widely varying figures.

It is unlikely that government, or industry, would fund a project that exceeded much over $1,000 million, at least in the establishment stage.

Given that the cost benefit analysis indicates that the new corridor would not be capable of paying for itself solely on a commercial basis, and that the demand is inelastic relative to increasing expenditure, the lowest, most cost effective proposal appears to have the best chance of being adopted.

To this end, the Modified Base Route Option as proposed in this submission for the Central Inland Sub Corridor, is promoted as a viable option at a cost of around $1,000 million. It is predicted that the final cost is likely to be less, and / or estimated travel time further reduced, once cost estimates are more carefully refined.

8. Conclusion

The creation of a North South Rail Sub Corridor through inland New South Wales has many benefits. It relieves some of the pressure off Sydney as a bottleneck for north south freight haulage, it allows for regional development that is not solely Sydney focussed and it will improve regional, interstate and national movement of freight. It also has the potential to reduce truck traffic from the Pacific Highway.

The Coastal Sub Corridor will in time become capacity constrained also, and the inland route will offset that.

The Main North Rail line was originally established through the New England in 1888 to link Sydney with the New England and on to Queensland. It was originally built to mainline standards and had as its vision, a connection with Brisbane. The Brisbane to Wallangarra line was completed one year earlier, and due to the difference in rail gauges, required the transfer of passengers and freight at the State Border. This rail gauge issue has restricted the line's development to date. The prospect of dual gauged lines within Queensland will overcome this past impediment.

This analysis finds that the route from Melbourne to Narromine is obvious, and that there are two main inland sub corridor options for the northern part of the route.

These being via:

- Moree as part of the Far Western Sub Corridor; or
- Dubbo, Tamworth, Armidale as part of the Central Inland Sub Corridor.

The conclusion from our analysis is that a lower cost option has more chance to be adopted; that the Far Western Sub Corridor would require a much longer distance of rail line to be established, or upgraded; and would duplicate the existing rail from Dubbo to Werris Creek and Werris Creek to Moree.

NELG concludes that the case for the Central Inland Route is a lot stronger than the Study has identified, and finds that the Central Inland Sub Corridor should be adopted as the inland route for the North South Corridor as shown in the Executive Summary Map.

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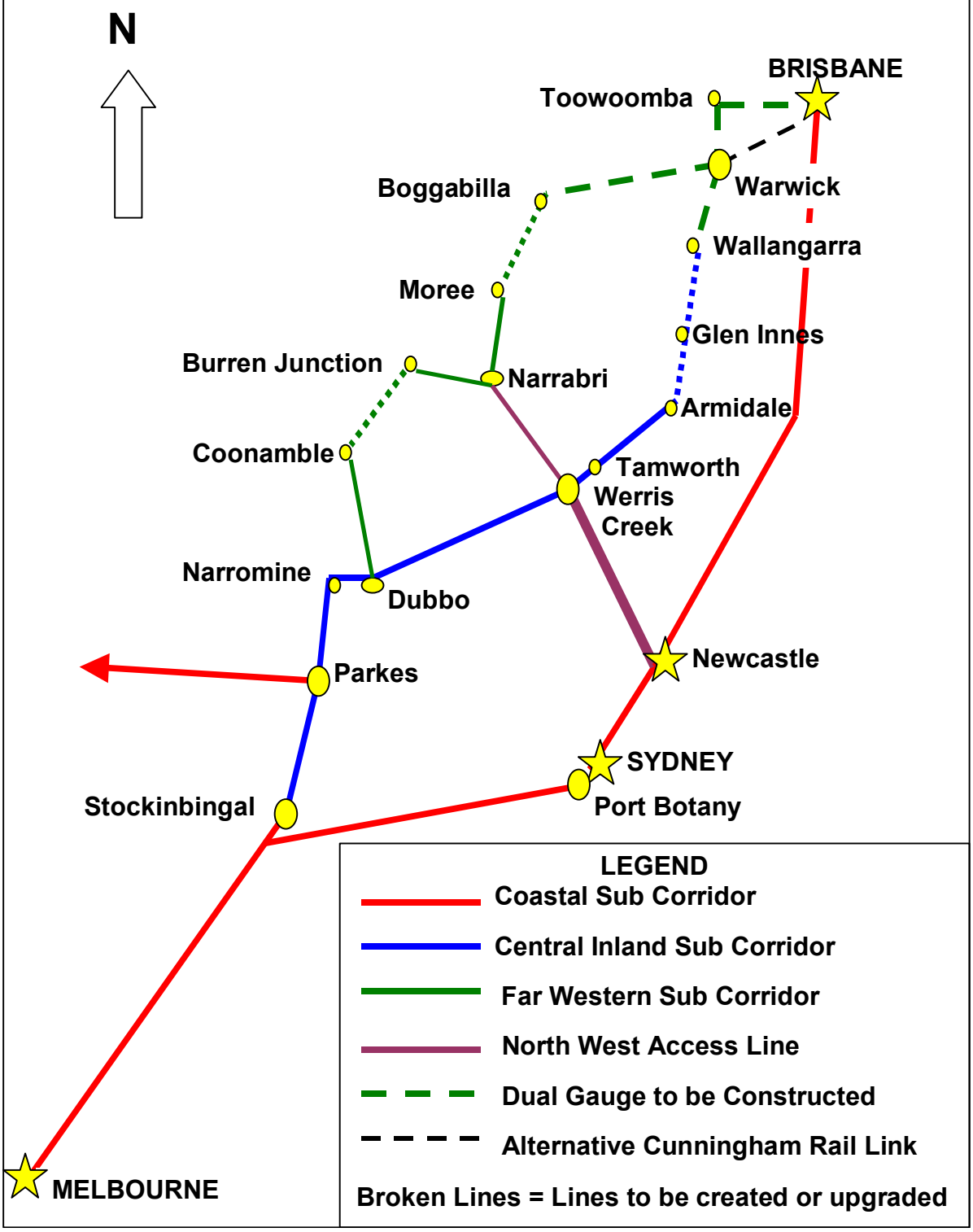
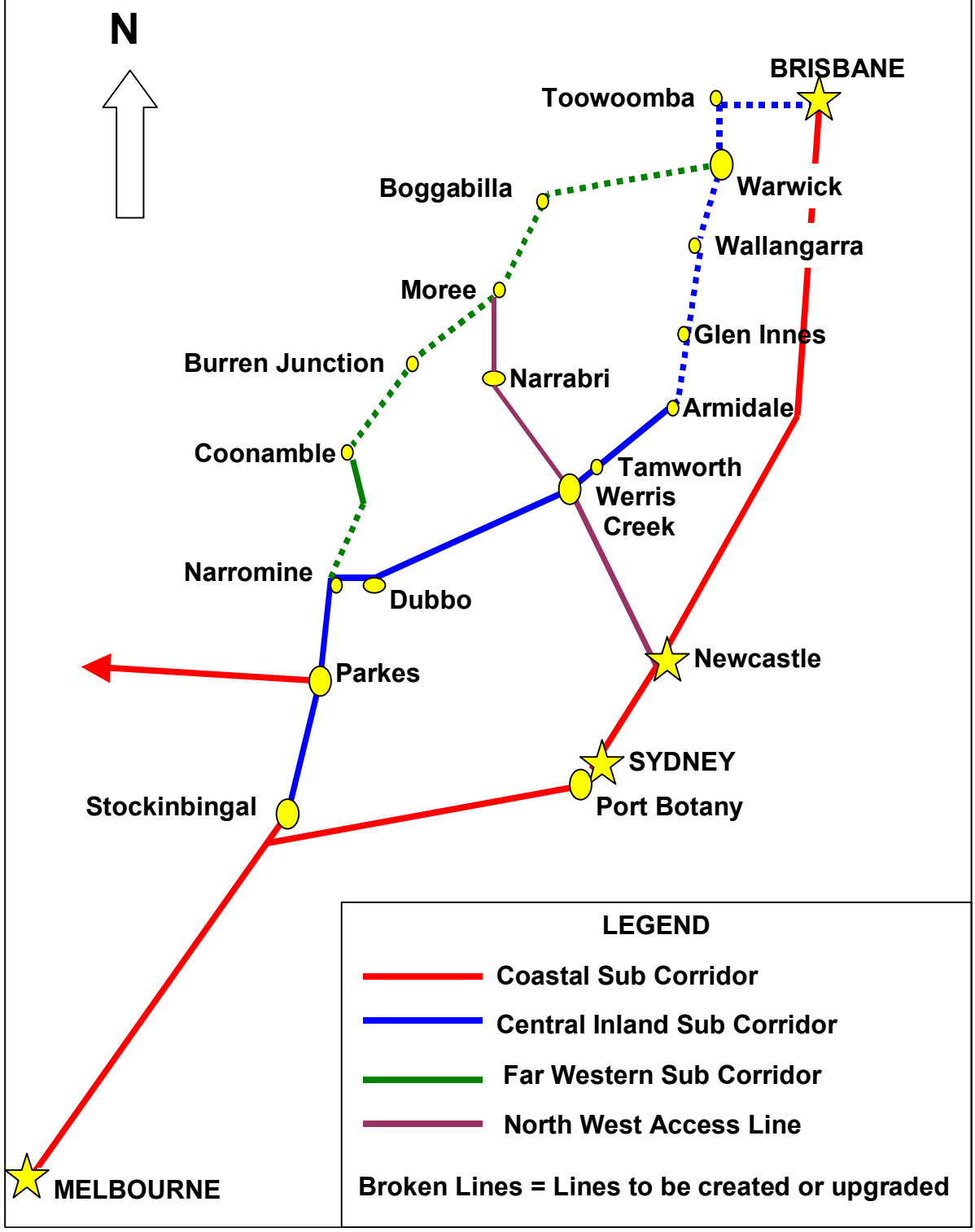
APPENDIX 1
Base Route of the Far Western and Central Inland Sub Corridors



APPENDIX 2
Major Rail Lines of the North South Corridor
Modified Base Route Options Shown



APPENDIX 3

Strategic Issues of the North South Corridor