

Report prepared for

Freight and Logistics Council of WA

on behalf of the

Strategic Grain Network Committee

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SDD consult

CONTACT

For further information, please contact:

Neil Matthews

Managing Director

+61 2 9868 2590

HEAD OFFICE

Strategic design + Development Pty Ltd

Suite 604, 51 Rawson Street

Epping NSW 2121

PO Box 1075

Epping NSW 1710

Australia

+61 2 9868 2590

www.strategicdesign.com.au

ABN 51 103 363 257

MELBOURNE

Level 8, Collins Street Business Centre

350 Collins Street

Melbourne VIC 3000

Australia

+61 3 8605 4831

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EXECUTIVE SUMMARY

SNAPSHOT

1. The grain sector produces an average 11 million tonnes per annum, with 90% of production destined for export markets. Rail transports around 60% by volume and 80% by net-tonne-kilometres, but its share is falling, as road transport is being increasingly used in some areas.
2. Deregulation of export grain marketing arrangements has allowed CBH to manage the entire export supply chain on behalf of traders using its facilities. CBH uses road and rail services to move grain to port at lowest possible cost. New entrants into logistics markets will be similarly motivated. Network based pricing has been abolished in favour of bin-pricing which will accelerate change.
3. Resleepering needs to be done every 10-15 years on all lines. Much of the rail network serving the grain industry is due for re-sleepering over the next three years and the WA Government will need to fund the capital works, at a potential cost of $258 million for all current lines.
4. However, in some areas, notably the Kwinana South zone, rail services are unsustainable as they are uncompetitive with road transport, and under all plausible scenarios this will continue. Therefore the low quality track on which they operate does not warrant resleepering investment. This would save costs for resleepering of $94 million. The SGNR has found that cessation of rail services is likely to occur on several lines in this area (Quairading, Kulin, Kondinin, Corrigin and Yealering). This will also create a need for targeted investments for road upgrading to handle many new truck movement.
5. To keep the Kwinana South zone grain on rail via loading at Brookton and other key sites, some public investment will be needed at these CBH sites to improve rail efficiency (for longer sidings and fast train loading - estimated cost $15m).
6. Some short term operating support (estimated $16m over 7 years) will be needed to ensure rail services are commercially competitive with road. The most appropriate vehicle for this support is to enable reduction in WestNet Rail access charges. Without this support, there will be no incentive for exporters to choose rail over trucking to Kwinana for up to 1 million tonnes per year. This operating support is offset by up to $4million per annum savings in real externality costs.
7. Rail transport operations are commercially viable in the Albany and Kwinana North zones, but a $164m contribution will be needed for resleepering . In the Geraldton zone, grain freight shares network costs with other freight (e.g. iron ore), and no public contribution will be needed. No other line closures are recommended at this stage.
8. Rail can be viable going forward if Government meets resleepering costs, and its competitiveness will increase as diesel fuel and carbon costs increase in future.
9. Investment in road corridor upgrades worth up to $320m would complement the long term rail network including roads not fit for purpose for use by heavy grain haulage trucks, most notably the Chester Pass Rd into Albany. Some of these roads will be impacted by cessation of uncompetitive rail services on lines which will consequently be redundant and should be formally closed.
10. The heavy vehicle permit system should be fully reassessed so that large combination vehicles hauling grain from bin to bin and bin to port are permitted on a limited number of routes, concentrated in areas not served by rail. This will have an immediate effect in reducing road maintenance costs. CBH and WALGA should be engaged as active partners in this process.

SUMMARY OF FINDINGS

Finding 1: There is a strong economic rationale – and wide grower support – for maintaining a strong rail network, wherever the sum of long-term 'whole-of-life' costs for rail infrastructure and operations and 'external' costs are less than for alternative road transport.

Finding 2: The present grain rail network may be segregated into three parts: Tier 1 'core network' lines, which are competitive with road transport and will be in future regardless of probable future cost increases (fuel and CPRS); Tier 2 'viable' lines where rail services are competitive with current rail access prices and above-rail costs; and Tier 3 'unviable' lines where volumes are low and rail is already uncompetitive with road transport. Most Tier 3 lines have light-weight non-welded and unballasted rail limited to carrying 16-tonne axle mass wagons at slow speeds.

Finding 3: There is a good business case for long-term retention of Tier 1 lines and for investment to renew key assets required for continued efficient operation, e.g. re-sleepering. The business case for investing in Tier 2 lines varies from case to case, and for some it will be more economic to upgrade nearby local road networks. There is no sound business case for upgrading Tier 3 lines, as transport of grain will be cheaper by road regardless of rail upgrading; these will soon cease to operate. The following table summarises warranted investment and investment avoided.

Rail Tier	CAPEX to be FUNDED on Tier 1 and 2 lines	CAPEX AVOIDED by Tier 3 line closure	Distance
	($M)	($M)	(kms)
1	121.2		979
2	43.3		420
3		93.5	736
TOTALS	**164.5**	**93.5**	2,135

Finding 4: Investment in rail infrastructure should aim to enhance economies of scale by increasing or preserving the size of trains (tonnes carried), increasing loading rates at sidings and outloading rates at ports, and reducing cycle times. Where these outcomes cannot be achieved at reasonable cost, there is no case for investment.

Finding 5: Deregulation of grain handling and marketing, has profoundly affected the economics and operation of the grain network. There is competition to transport grain from bins to ports. Due to this competition the traditional grain receiver, CBH, cannot offer a single network-wide price for grain transport, so there is a cost-based price for

Figure E1 - Rail network showing Tier 1, 2 and 3 lines

every bin, exposing some to road transport competition. Increased grain price volatility and on-farm storage have created strong grain transport peaks when rail and port terminals are unable to provide all requested capacity.

Finding 6: Because grain marketers/transporters cannot cross-subsidise between high and low-cost rail bins, grain from high-cost/high-price bins will transfer to road transport. On affected Tier 3 rail lines unviable trains will cease to operate and grain will be transferred immediately to vulnerable local and State roads. This unintended consequence can be prevented by temporary support for rail to keep prices at pre-deregulation levels until new more efficient rail arrangements and/or strengthened road infrastructure are put in place.

Finding 7: Where rail lines become uncompetitive and cease to operate, grain will be carried by road, either to other more efficient low-cost bins, or directly to port. Some local and State roads will be used by greatly increased numbers of heavy vehicles carrying grain; many affected roads are not of a standard (width and pavement strength) to carry this traffic, and will warrant investment and incur increased maintenance costs. A staged program of targeted road investments will be necessary.

Finding 8: Governments' long-term commitment to the rail transport network serving the grain belt should focus on investment in a core network of Tier 1 rail lines, and selected Tier 2 rail lines where the cost of road upgrades and economic disbenefits resulting from rail closure would be greater than the savings available from withdrawing them from service.

Finding 9: There is a sound business case for long-term retention of the Tier 1 Northam-Albany line, and for governments and industry to share the cost of investment in resleepering, at a total cost of $43.6m.

Finding 10: There is a sound business case for long-term retention of the Tier 1 Wagin-Lake Grace line and the Tier 1 Lake Grace-Hyden and Newdegate branchlines and for investment in resleepering at a cost of $41.1m.

Finding 11: The Tier 3 Katanning to Nyabing and Gnowangerup lines are not competitive with road and will become even less competitive with time. As a consequence, rail services no longer operate on these lines and they should be formally closed.

Finding 12: Tier 3 lines in the Kwinana South zone are not competitive with road transport and during 2010 rail services will cease to operate on them regardless of actions taken by governments. The lines affected are: Merredin-Bullaring-Yillimilling-Narrrogin, Kulin-Yillimilling, Kondinin-Merredin, Trayning-Merredin and York-Quairading (total 599 km). There is no sound business case for investing in these lines and they should be formally closed. These closures should be part of a broader staged 'Brookton Strategy' aimed at avoiding excessive transfer of grain from this zone onto vulnerable roads, including the Brookton Highway to Kwinana (see Finding 13).

Finding 13: There is a sound business case for the 'Brookton Strategy' which aims to maximize efficiency of rail loading at Brookton and Kellerberrin and thereby concentrate a high volume of grain from the Kwinana South zone onto the lines connecting these bins via Avon to Kwinana. The Brookton Strategy can be implemented by co-ordinated commitments from government and industry to invest in targeted road upgrades and in storage and siding upgrades at Brookton and Kellerberin, to create economies of scale and lower rail haulage costs which will keep a large proportion of grain from this area on rail. While these upgrades are being undertaken, temporary support totalling approxmately $16 million over 7 years will be needed from the State Government during a transition period targetted to reduce track access costs and thereby to equalise road and rail haulage prices.

Findng 14: There is a good business case for long-term retention of Tier 1 lines in the Kwinana North zone from Avon to Goomalling, Kalannie and Korda, and investment in resleepering over 4 years at a cost of $36.5m.

Finding 15: There is a good business case for long-term retention of the Tier 2 Beacon-Burakin line in the Kwinana North zone and investment in resleepering over 4 years at a cost of $11.0m.

Finding 16: There is a good business case for long-term retention of the Tier 2 Mukinbudin-Koorda line in the Kwinana North zone and investment in resleepering over 4 years at a cost of $11.5m.

Finding 17: There is a good business case for retention of the Tier 2 Miling and McLevie lines in the Kwinana North zone and investment in resleepering of McLevie-Goomalling be funded at a cost of $20.8m. A further review of the future of this line should occur in 2014 in conjunction with assessment of the success of the the Brookton Strategy.

Finding 18: The Tier 3 Perenjori-Maya line should be closed and no investment in resleepering should be undertaken on this line.

Finding 19: There is a good business case for investment to extend rail sidings (to improve rail loading efficiency) on Tier 1 lines in the Geraldton zone at Mullewa, Morowa and Perenjori to enhance train loading and efficient train pathing, at a cost estimated at approximately $6m.

Finding 20: The State Government could provide a stable policy climate to encourage private sector investment in grain supply chain assets and for local and State road

funding by committing to funding its share of recommended investments in the Tier 1 core rail network for at least the next 10 years.

Finding 21: A substantial progam of road works will be required to cover the cost of upgrading and increased maintenance of roads likely to experience significant freight traffic increases caused by rail closures and from new patterns of road usage caused by post-deregulation grain logistics practice. This would be facilitated by creating new roads funding arrangements for this purpose quarantined from present road funding schemes. It is estimated total costs will be approximately $320m for one-off investments and $1.1m per annum for increased maintenance.

Finding 22: Excessive costs are being incurred by local governments to maintain a very large number of roads on which grain trucks are currently allowed to operate under permits issued by Main Roads WA. Heavy vehicle permit policy should be revised by the government and MainRoads WA with input from WALGA and CBH to substantially reduce the network of routes used for **inter-bin and bin-to-port** movements, to reduce on local road maintenance costs and 'externality' costs.

Finding 23: There is an opportunity for government agencies to work with CBH to reduce and manage more effectively the network of road transport corridors used by CBH-contracted heavy vehicles for **inter-bin and bin-to-port** movements. This would make considerable road maintenance cost savings via voluntary CBH initiatives.

Finding 24: In the long-term, congestion on the existing rail corridor via Avon (Northam) to Kwinana, which is heavily used by other bulk export and import freight as well as grain will require substantial expansion of rail capacity in this strategic corridor. The Commonwealth and State Governments should undertake a joint pre-feasibility study of a new rail corridor from Kwinana via Brookton to Merredin, to determine strategic, economic and operating benefits and to identify potential corridor alignments and related technical requirements. The cost of this study would be between $300,000 and $500,000.

BACKGROUND

The rail network serving the WA Wheatbelt is vital to the State's grain industry, providing the means of moving around 40% Australia's grain export task to market quickly and at reasonable cost. It also protects the community and the regional road network from the impact of heavy trucking.

The grain rail network is a major national and state asset that should be utilized to its maximum potential, particularly since much of the regional road network is not in sufficiently good condition to handle this heqavy freight export task. To perform this role sustainably the rail network must be combined with commercially competitive train operations and efficient train loading and unloading facilities.

The rail network has traditionally handled about 60% of the export grain task (as measured in tonnes) and closer to 80% in tonne-kms. The reduction in rail's share began with the deregulation of grain and freight markets in the 1980s and 1990s and has accelerated in recent times. Elimination of statutory marketing arrangements for grain has provided impetus for further major changes to the operation of the grain supply chains in WA.

Where rail and road previously had control of predictable shares of the grain freight task on well defined and separate corridors, the picture is now much more flexible and varied . Grain logistics deregulation has led to more interchangeable use of road and rail transport in all corridors previously the preserve of the rail. CBH's ability to manage 'cargo assembly' for all traders under 'Grain Express' allows it to manage stocks, bin operations and export demand via the best mix of road and rail transport operations at its disposal. Other exporters in this deregulated market make use exclusive of trucking to all grain export ports.

The changes caused by deregulation have challenged governments' management of regional transport infrastructure in all Australian States. The provision, maintenance and usage of road and rail assets in WA's wheatbelt requires careful management and planning to:

- Provide the grain industry with safe and cost-effective access to export ports
- Maximise the use of the most economically efficient transport infrastructure
- Concentrate scarce funding into the most viable rail and road corridors, avoiding duplication of investments (ie between competing road and rail routes)
- Minimise the impact of grain movements on population centres and other users of transport corridors, and
- Minimise the impact of grain movements on road assets which currently do not generate related income streams to cover their maintenance.

Need for rail investment

The majority of the network used by grain trains is operated by WestNet Rail (WNR) under long term lease from the WA Government through the Public Transport Authority (PTA). Infrastructure company WNR emerged as lessee of below-rail assets when the original purchaser of the Westrail system sold below- and above-rail segments of the business to Babcock & Brown Infrastructure Pty Ltd.

WNR is obliged to provide above-rail access to the network under the terms of WA's Rail Access Regime administered by the Economic Regulation Authority (ERA). Under the lease agreement, WNR may return to government control any line sections that are demonstrably non-commercial.

The rail network and commercial arrangements managed by WNR have been the subject of recent audits by PTA to assure compliance under the PTA/WNR lease. The audit results confirmed that WNR is meeting its commercial and maintenance obligations.

Approach to this study

This study was commissioned by the State's Minister for Transport, Hon Simon O'Brien MLC, and was guided throughout its course by the Strategic Grain Network Committee (SGNC), also apointed by the Minister for this purpose. The membership and processes adopted by the SGNC are described below.

The approach to developing the recommendations to this review has been to:

- Consider the performance and future options for the network's four discrete zones, reflecting each zone's different operating conditions and geography
- Identify a system for classifying lines according to their economic viablity, including assessment of the long term competitiveness of every line
- Assess the costs for competing rail-based and road-based solutions
- Identify transitional arrangements to ensure outcomes for road and rail corridors can be robust and sustainable.

Rail network issues

The rail network comprises a system of line sections heavily used close to ports, and more sparsely used moving into the wheatbelt extremes. Parts of the rail network are already so thinly used as to be redundant. Other parts carry substantial enough volumes to consider them 'essential', although this designation requires verification by testing their economic performance and that of alternatives. In between are the sections for which a choice between road and rail investment can be made on financial and economic grounds, moderated by consideration of some social outcomes.

In this report, the grain line sections are divided into three 'Tiers':

- Tier 1 – the core line sections that form the basic structure of the network, mostly carrying heavy volumes and providing locations for the capture of grain to rail from the outer grain production areas.
- Tier 2 – branchlines where rail services are viable based on current access rates and above-rail costs, but where an investment choice is required – between periodic rail resleepering and the upgrade of road network.
- Tier 3 – branchlines mainly with light track, inefficient loading arrangements and low volumes, and/or rail services are already non-competitive with road transport and are not candidates for reinvestment. In the new deregulated export grain market environment, these lines will cease to be used.

Line sections carrying interstate freight and/or mineral traffic such as Kwinana-Merredin, Midland-Geraldton and Perenjori-Geraldton are not included in this classification, but can be considered to be Tier 1.

Lines in all categories are at or near the point in their investment cycles where periodic resleepering works are due – following pre-privatisation line upgrades in the 1990s. The estimated costs for this work are summarised below:

- **Tier 1** line investments are considered to be essential to the ongoing viability of the network as a whole. Without investment in these lines the sustainability of significant rail services into Kwinana and Albany would be severely compromised. Investment of $121.2m over the next 4 years will sustain these lines through another 10-15 year cycle.
- **Tier 3** lines do not warrant investment in upgrading when it becomes due, as most will cease being used. These lines can be formally closed, avoiding $93.5m of resleepering investment.
- **Tier 2** lines have required careful analysis and discussion. Four Tier 2 line sections in the Kwinana North zone are viable at current access rates and freight rates, and will continue for the foreseeable future to be used for carrying significant tonnages from bin to port. Up to $43.3 m could be invested to sustain these rail lines, but in some cases it will be more economic to invest in alternative road infrastructure and maintenance. The choice is between public investment for periodic rail upgrading, or upgrading local road corridors to deliver grain to rail loading sites on other nearby line sections (or to port). This choice can be made largely on financial criteria, where there is sufficient data, but the CBH growers exhibit a preference for rail.

The following table provides a summary of the initial capital expenditure on the basis that all lines are to remain open however a key finding of this study is that only Tier 1 and 2 lines should remain open and recieve iinvestment fo resleepering.

Table E1 – Summary of rail investment

Rail Tier	CAPEX to be FUNDED on Tier 1 and 2 lines	CAPEX AVOIDED by Tier 3 line closure	Distance
	($M)	($M)	(kms)
1	121.2		979
2	43.3		420
3		93.5	736
TOTALS	**164.5**	**93.5**	2,135

Alternative road investments for Tier 2 lines and for roadworks to make routes now served by Tier 3 rail lines fit for purpose are discussed in the body of this report.

In making decisions on Tier 2 lines, several factors have been assessed:

- ***Operational viability*** – The key to efficient rail operations are regular cycle times by trains carrying large quantities of grain to maximise economies of scale, supported by efficient rapid loading and unloading, to minimise delivery times to ports and maximise utilisation of above-rail assets. The best way to achieve these outcomes is to concentrate grain receivals in a smaller number of larger good quality loading sites on well-maintained track. Closure of poor quality light rail lines (which restrict tonnage and speeds) should be considered favourably if they result in heavier usage of nearby good quality loading sites served by good quality track. Maximum use of rapid-loading sites will improve average cycle times, overall system capacity and train utilisation.
- ***Road impacts*** – Closure of many Tier 2 lines could cause large volumes of grain to use local and state roads, some of which are not currently fit for this purpose. Short distance road hauls to nearby rail-based consolidation sites would be preferred rather than long hauls to port. These transfers could necessitate substantial one-off investments for road widening and pavement upgrading.
- ***Urban impacts*** – In some areas increased use of road corridors will cause impacts on country town amenity, as many wheatbelt towns do not have freight bypasses. This issue needs to be considered where large volumes are involved. Some areas of Perth will also be affected if rail closures lead to heavy trucking direct to Kwinana or other metropolitan sites. These impacts can be very expensive to address.

ALBANY ZONE – The "Albany Strategy"

The Albany zone services grain growers in a wide arc between the timber country in the south west and the open land in the Hyden area. The western and northern parts of the zone are served largely by rail (17 sites), while eastern and central areas are largely served by road. There are three main road corridors and one rail corridor linking the zone with its port. The grain transport task in the Albany zone averages two million tonnes per annum, with rail carrying around 50% of this task.

There is a sound business case for long-term retention of the Tier 1 Northam-Albany line, and for governments and industry to share the cost of investment in resleepering, at a total cost of $43.6m.

The line is of ongoing strategic significance to the region, the grain industry and future mineral export opportunities. The line also acts as a barrier protecting the coastal metropolitan areas from the impact of heavy truck movements.

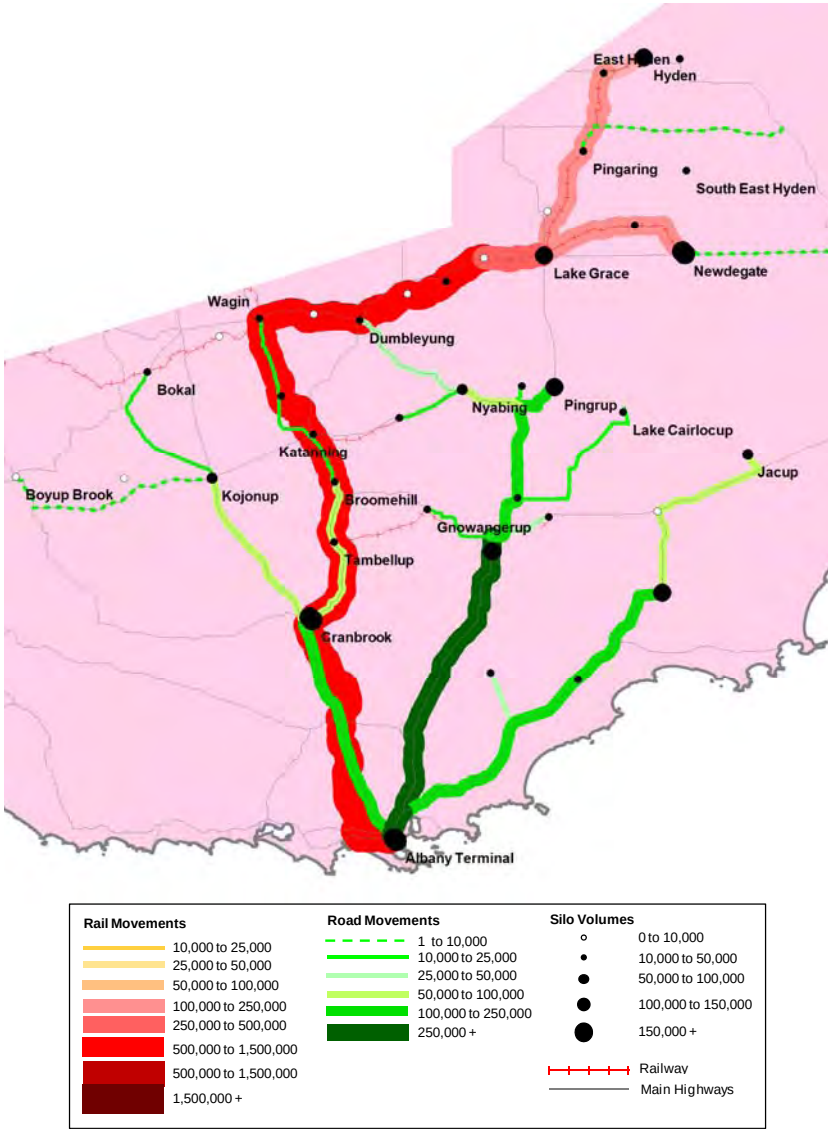
There is also a sound business case for long-term retention of the Tier 1 Wagin-Lake Grace line and the Tier 2 Lake Grace-Hyden and Newdegate branchlines and for investment in upgrading at a cost of $41.1m.

This is based on the following reasons:

- Most grain on the rail network is concentrated in 3 large and efficient sites in the Hyden-Lake Grace area
- The absence of the railway would have a very significant effect on the Chester Pass road corridor, adding a further $90m to the $129m cost already indicated for the upgrade of this route; that is, a total cost of $219m.

The Tier 3 Katanning to Nyabing and Gnowangerup lines are not competitive with road and will become even less competitive with time. As a consequence, rail services no longer operate on these lines and they should be formally closed.

Figure E2 – Rail and road flows in Albany zone



KWINANA SOUTH ZONE – "The Brookton Strategy"

This zone consists of several narrow gauge rail lines serving the area bounded by Northam, Narrogin, Kondinin and Merredin. The western part of the zone is close to the Perth metro area and the port of Kwinana (via the Brookton Highway) and consequently supplies considerable volumes of grain by road into Perth for domestic use and containerised export.

Rail lines in the area run very indirectly to the port, adding at least 100 km over the mosty direct route from most bin sites, by connecting to the main east-west (EGR) corridor and the north-south (GSR) corridor. The Corrigin and Kondinin lines also require trains to transship at Merredin to larger Standard Gauge trains. There are also few fast loading sites in the area.

Until grain export deregulation, grain freight pricing has been system-wide, to compete with road and retain rail services from these sites. With the change to 'site-based' pricing, the non-competitiveness of these sites has become very clear. Where rail cannot in future offer road-competitive prices, it is inevitable that a very large proportion of grain will transfer to the road network. In these circumstances, it will not be warranted to support the future provision of track, and a more appropriate strategy will be to concentrate attention on ensuring affected road routes are fit for puprpose.

To avoid grain from this area being trucked to Kwinana directly, a joint government/industry project should be aimed at maximizing the efficiency of the rail loading site at Brookton. This would involve investment in elevated bin capacity, extended siding lengths and some road works. The Brookton site would then become a viable transfer point for over 500,000 tonnes each year. Kellerberrin will also become a more significant loading site, and would benefit from its siding being lengthened and loading speed increased. Some financial operational funding support will also be necessary to 'bed in' the use and efficiency of a targeted Brookton rail strategy. At present, rail freight rate projections remain slightly higher than road freight charges in this region, and some assistance will be needed to ensure rail is used over the transitional period. This support would be aimed at reducing access charges.

Cessation of rail services – regardless of whether rail lines are formally closed – would immediately impact some roads in the area. Grain from bins without rail services would be trucked either north towards sites on the EGR, or west towards Brookton, some of it all the way to port. The risk is that up to 600,000 tonnes could be lost from the rail network and would reach port by road.

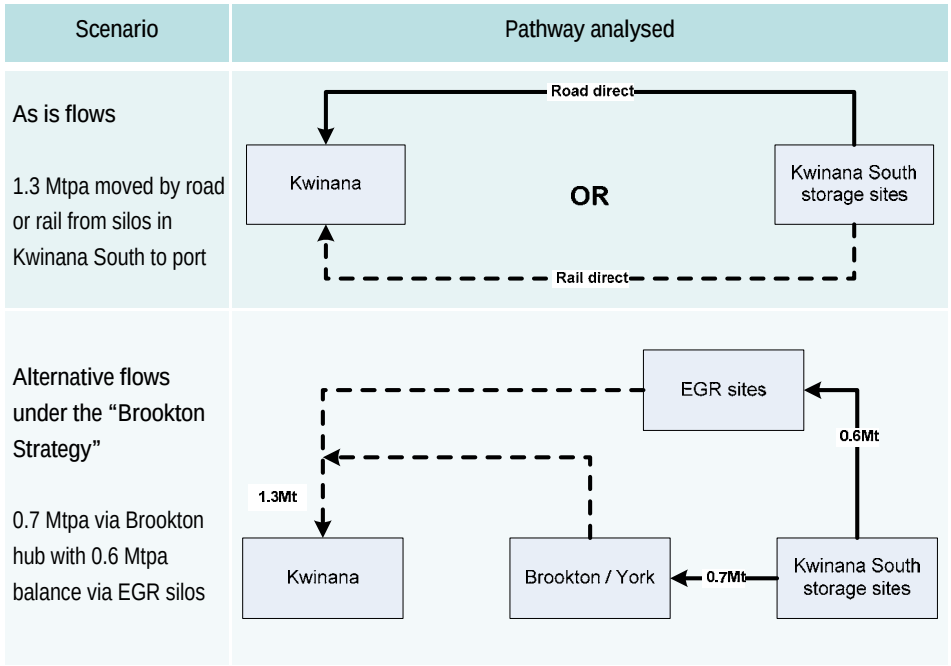
In order to avoid this outcome, a "Brookton Strategy" has been agreed in principle by the Committee, with the following components:

- Develop the Brookton bin site as an efficient road/rail transfer point for grain from the south-eastern part of the zone. Government to be sought for capital upgrading of selected sites.
- Commit to road upgrading works, at a cost of approximately $88.1m for the routes connecting bins no longer served by rail to the retained rail lines.
- Lock in rail pricing for the Brookton site, which is road-competitive for the trip to Kwinana, via long term contracts between ARG, CBH and government.
- Retain grain on rail during a transition period while rail efficiencies are bedded in and road upgrades are completed, by means of government transitional assistance to reduce rail access charges. Required assistance would be $6.9m for one year, $1.9m for a second year at $1.9m, and $1.4m pa to 2016.

The strategy also yields a significant reduction in externality costs – accidents, noise, visual disturbance and road damage outside the wheatbelt – by avoiding the movement of heavy trucks within the Perth metro area. NPV results show a substantial benefit from the 'Brookton Strategy' compared with the alternative outcomes (retention of rail lines or unrestricted use of roads to port).

The Brookton Strategy will demand a new level of co-ordinated involvement by industry and government agencies responsible for the rail and road systems, and requires some operational funding support – as mentioned above. This will avoid more expensive road upgrades in the outer metropolitan area. To facilitate the desired outcomes from the Brookton Strategy, which requires efficient train operations, supported by rapid loading and unloading of trains at Brookton and other sites on the EGR, State Government agencies will need to take a leadership role in establishing efficient supply chain management arrangements.

Figure E3 – Current and future grain movements under Brookton Strategy

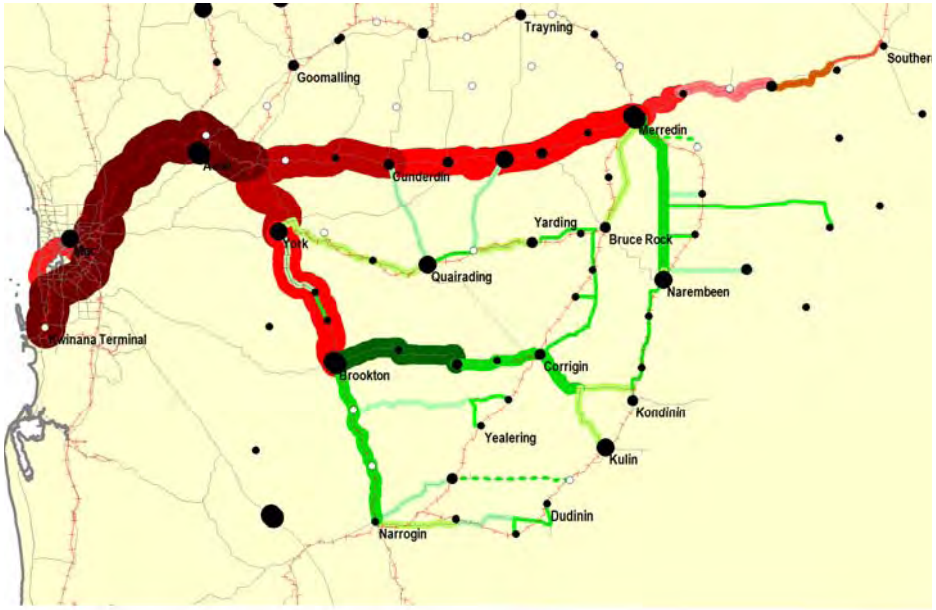


Brookton Strategy line closures

Tier 3 lines in the Kwinana South zone are not competitive with road transport and during 2010 rail services will cease to operate on them regardless of actions taken by governments. The lines affected are: Merredin-Bullaring-Yillimilling-Narrrogin, Kulin-Yillimilling, Kondinin-Merredin, Trayning-Merredin and York-Quairading (total 599 km). There is no sound business case for investing in these lines and they should be formally closed. These closures should be part of the broader staged 'Brookton Strategy' aimed at avoiding excessive transfer of grain from this zone onto vulnerable roads, including the Brookton Highway to Kwinana.

The Corrigin, Kondinin, Yealering, Kulin and Quairading lines can be withdrawn from service as or before they fall due for upgrade, since rail services are already accepted as non-competitive on most of these. In the case of the Kulin and Kondinin lines, rail services should be retained for an interim period (up to 3 years) while necessary road upgrading works are scoped and implemented. This will involve some operational funding support to make up the difference between silo-based rail rates and available road freight rates.

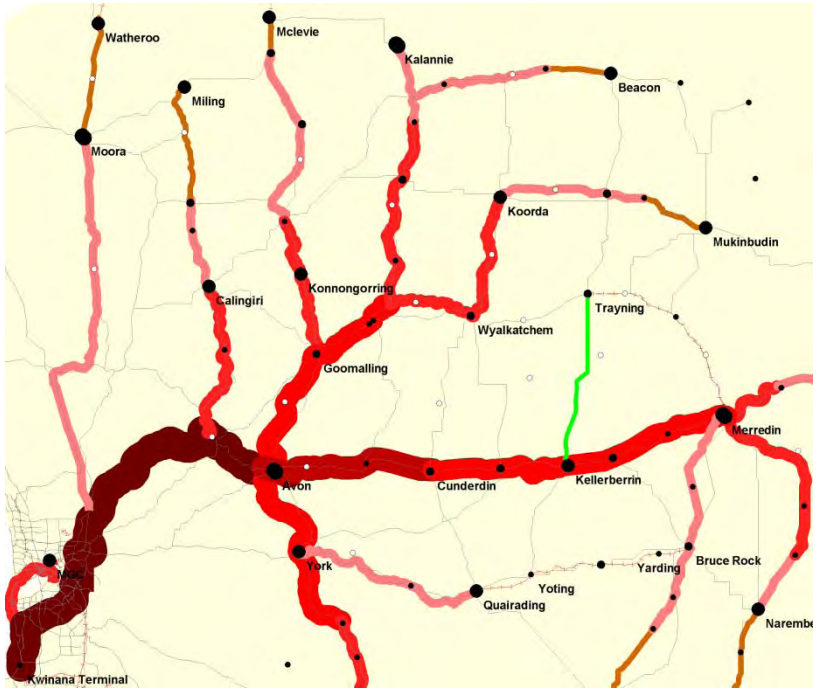
Figure E4 - Kwinana South grain flows after implementation of Brookton Strategy



KWINANA NORTH ZONE

The northern Kwinana zone extends from Moora through Dalwallinu, Beacon and the area north of Merredin. Rail is highly competitive with road transport throughout this zone. It is served by a network of 6 narrow gauge lines feeding into the main EGR corridor between Midland and Northam. Export volumes vary considerably from season to season, as the eastern areas are more susceptible to rainfall shortages than other zones. Rail lines are a mix of 16t and 19t axle load rated sections.

Figure E5 - Kwinana North grain flows based on retaining existing Tier 1 & 2 lines



The following short sections outline preferred soltuions for major branchlines in the Kwinana North zone.

Tier 1 lines

There is a good business case for long-term retention of Tier 1 lines in the Kwinana North zone from Avon to Goomalling, Kalannie and Korda, and investment in resleepering over 4 years at a cost of $36.5m.

Tier 2 Beacon-Burrakin line

There is also a good business case for long-term retention of the Tier 2 Beacon-Burakin line in the Kwinana North zone and investment in resleepering over 4 years at a cost of $11.0m. The Beacon-Burakin line is the least heavily used and suffers great seasonal variation, but most grain is loaded via the Beacon rapid-loading facility, at the end of the line. It will require upgrade at a cost of $11m in 2011. The alternative road upgrade cost estimates partially balance this amount, but freight cost increases and externalities make the NPV results for both cases similar.

Tier 2 Mukinbudin-Koorda line

There is a good business case for long-term retention of the Tier 2 Mukinbudin-Koorda line in the Kwinana North zone and investment in resleepering over 4 years at a cost of $11.5m. The Mukinbudin-Koorda line carries higher tonnage and also features rapid rail loading. The savings though rail closure would be less than the costs of the upgrade necessary for the road route to Merredin.

Tier 2 Miling and McLevie lines

There is a good business case for retention of the Tier 2 Miling and McLevie lines in the Kwinana North zone and investment in resleepering of McLevie-Goomalling be funded at a cost of $20.8m. A further review of the future of this line should occur in 2014 in conjunction with assessment of the success of the the 'Brookton Strategy'.

The Miling and McLevie lines both carry around 260,000 tonnes to port by rail on average, and are both around 135 km in length. One of these lines could be closed so that volume could be concentrated onto remaining lines for improved track utilization. The McLevie line has operational advantages over the Miling line, but road usage impacts are potentially greater if Miling line closes, as heavy freight traffic through Perth to Kwinana will result.

The Miling line does not require reinvestment until around 2016, whereas the McLevie line requires works at $20m from 2011.

The most attractive option is a hybrid solution involving the retention of the Miling line in total and the McLevie line as far north as Konnongorring (south of Wongan Hills). This site would be redeveloped to offer efficient loading for the southern McLevie line tonnages, while grain now using the northern sites would be transferred via Miling. Additional road freight costs would be relatively light and the proportion of grain handled from these lines via efficient rail sites would be increased.

It is unlikely, however, that grain industry acceptance of this outcome could be achieved before the McLevie line resleepering works are due in 2011. More likely is that the success of the 'Brookton Strategy' will need to be demonstrated before projects of similar scale could be attempted in the Kwinana North zone. This hybrid outcome may emerge in the medium term as the best option.

GERALDTON ZONE

Two rail lines serve the Geraldton grain chain. The rail lines carried around 850,000 tonnes to port in 2009, of which over 550,000 tonnes was hauled from the Midland Railway sites at Mingenew and Carnamah alone. A further 800,000 tonnes was delivered to port from road-only sites, mostly to the north and east of the port.

In 2009, grain was consolidated from sites on both lines into Mingenew and Carnamah by road, since these sites offer the best rail loading facilities and cycle time into port, thus maximizing rail capability when heavy export volume is required.

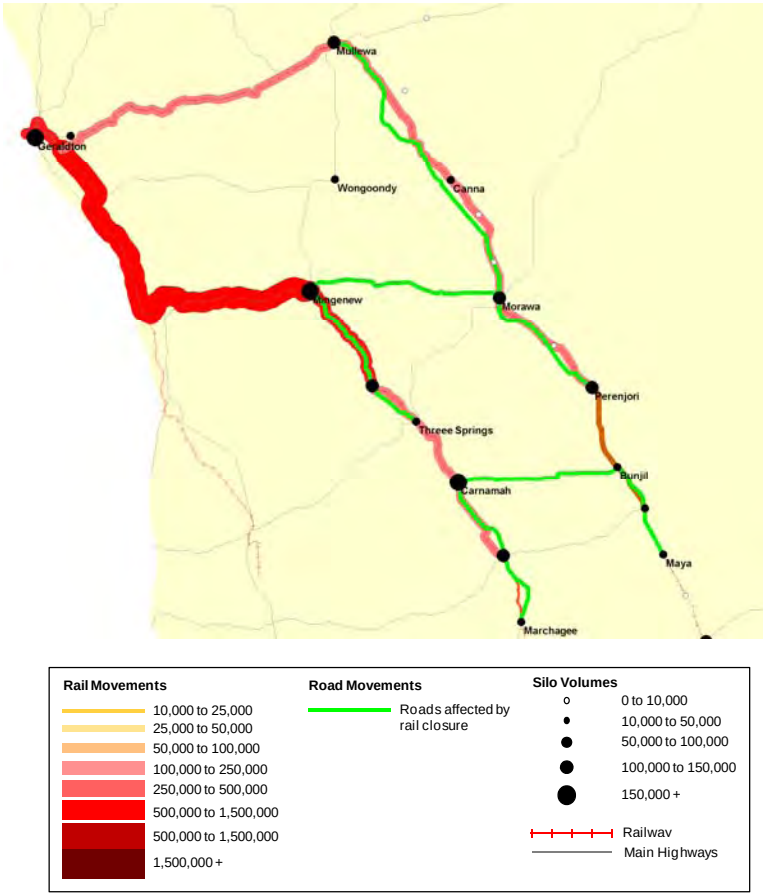
The line south of Perenjori carries only 70,000 tonnes on average and will be affected by poor path availability in future, due to other heavy rail usage. Grain is now being trucked into Perenjori from Maya. The Perenjori-Maya line be slated for closure ahead of its next scheduled resleepering investment in 2013.

Road condition is the major identified problem in the region, with state and local roads all in need of upgrade.

With consolidation of tonnage into the larger and more efficient sites of Mullewa, Morawa and Perenjori, train configurations have become larger and now exceed the capacity of the rail sidings at the grain silos. The consequence is that train shunting is substantially more complex and less efficient. The rail sidings at Mullewa, Morowa and Perenjori could be extended at a notional estimated cost of $6 million.

There is a good business case for Investment to extend rail sidings (to improve rail loading efficiency) on Tier 1 lines in the Geraldton zone at Mullewa, Morowa and Perenjori to enhance train loading and efficient train pathing, at a cost estimated at approximately $6m. The Tier 3 Perenjori-Maya line should be closed and no investment in resleepering should be undertaken on this line.

Figure E6 - Geraldton grain rail and road flows



ROAD INVESTMENT AND POLICY IMPLICATIONS

The main focus of this project has been to identify a sustainable rail network. However, the transport of grain has become multi-modal, even in areas long served mainly by rail. So maintaining a safe and effective road network is also important.

The use of wheatbelt roads for grain transport has increased since the end of orderly and comprehensive use of rail for export grain in about 1999. The deregulation which has created increased supply chain flexibility has also made use of the road network more attractive to users but less predictable. This trend will continue to increase the use on road networks and the resulting maintenance task.

This study did not cover the use of local roads for the harvest delivery task from *farmgate* to silo. It has focused on the roads affected by the *inter-silo* movements and those from *silo to port*, which use a mix of state and local roads.

Changes to the scope and use of the rail network will potentially create a need for capital improvements to many road routes. Many state and local roads are currently built to widths of less than 6 metres which is below the accepted standard for significant use by heavy vehicles. Road authorities consider a pavement width of 7.5 to 8.0 metres is necessary given the typical road vehicle configurations used for grain cartage in the wheatbelt. In assessing the need for road upgrades in this project, three road categories have been defined in relation to usage for grain freight transport:

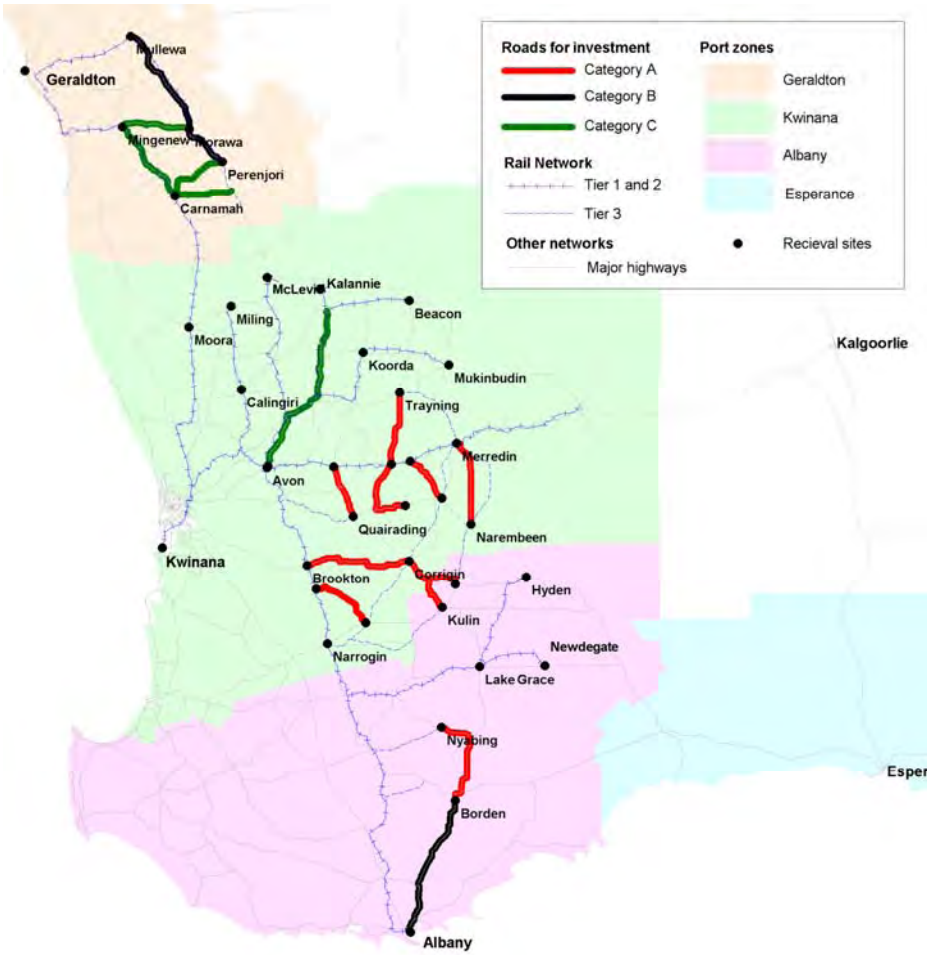
- *Category A* - Roads carrying increased grain tonnage attributable to cessation of rail operations on Tier 3 lines
- *Category B* - Important grain transport roads already less than fit for purpose
- *Category C* - Other roads carrying significant extra freight due to changing grain cargo assembly practices.

Table E2 summarises the investment and increased maintenance costs estimated for each category while Table E6 shows an annual breakdown of these road investments.

Table E2 - Estimated road expenditure and additional annual maintenance

Category	Capital upgrade works ($'000)	Additional maintenance ($'000 per year)
Category A	96,100	785
Category B	176,000	85
Category C	47,600	249
TOTAL	319,700	1,119

Figure E7 - Location of potential road investments in Categories A, B and C



A substantial progam of road works will be required to cover the cost of upgrading and increased maintenance of roads likely to experience significant freight traffic increases caused by rail closures and from new patterns of road usage caused by post-deregulation grain logistics practice. This would be facilitated by creating new roads funding arrangements for this purpose quarantined from present road funding schemes. It is estimated total costs will be approximately $320m for one-off investments and $1.1m per annum for increased maintenance.

Excessive costs are being incurred by local governments to maintain a very large number of roads on which grain trucks are currently allowed to operate under permits issued by Main Roads WA. Heavy vehicle permit policy should be revised by the government and MainRoads WA with input from WALGA and CBH to substantially reduce the network of routes used for **inter-bin and bin-to-port** movements, to reduce on local road maintanance costs and 'externality' costs.

Information provided by Main Roads and WALGA members to the Committee has enabled a schedule of routes affected by rail closures to be prepared, with some preliminary estimates of capital upgrade costs that would be required to upgrade these routes to appropriate standard for the volumes predicted; it should be emphacised that the scope of upgrading required has not been examined in detail. The routes identified (shown in Table E3) are those most likely to be affected by grain moving to ports or to key transfer sites on the EGR and GSR rail lines. (The list in Table E5 is distilled from the routes identified during the consultations with road authorities and is not intended to be a comprehensive table of all routes carrying extra traffic in 2009.)

There are many roads already heavily used for substantial grain movements to port and intermediate destinations, which State and local authorities have identified as overdue for upgrade or major maintenance. The most important of these is the Chester Pass Road, which carries over 350,000 tonnes of grain to Albany from road bins, including bins from the two short branchlines which have recently ceased to operate. The other routes are sections of the M39 state road in the Geraldton area parallel to the Mullewa-Perenjori line. There are many other routes which are starting to see heavier volumes as a result of a tendency for grain to be loaded to rail at good sites, rather than the smaller sites, even though rail remains in operation.

There is an opportunity for government agencies to work with CBH to reduce and manage more effecitively the network of road transport corridors used by CBH-contracted heavy vehicles for **inter-bin and bin-to-port** movements. This would make considerable road maintenance cost savings via voluntary CBH initiatives.

The new deregulated environment provides some challenges to State Governments regarding integration of road and rail transport policy for the rural sector. The use of road transport will be more wisdespread and market forces will not optimise the use of infrastructure in the overall public interest, due to absence of effective road-use charging arrangements.

The State Government could provide a stable policy climate to encourage private sector investment in grain supply chain assets and for local and State road funding by committing to funding its share of recommended investments in the Tier 1 core rail network for at least the next 10 years.

LONGER TERM PERSPECTIVES

The SGNR was also required to consider long term initiatives for the rail network. A number of key issues arise when a planning horizon of 30 years is considered, including the indirect rail pathways serving Kwinana South, the growth in east-west national rail corridor traffic and the potential in future for non-grain traffic on parts of the network. Cumulatively these factors may warrant investigation of an alternative rail corridor linking Kwinana via Brookton-Corrigin to the east-west rail line at Merredin.

The benefit of this new rail infrastructure would be to allow substantial freight movements to bypass the Kwinana-Fremantle-Kewdale-Forrestfield corridors, and provide a more efficient movement of grain and other commodities to port.

The Commonwealth and State Governments should undertake a joint pre-feasibility study of a new rail corridor from Kwinana via Brookton to Merredin, to determine strategic, economic and operating benefits and to identify potential corridor alignments and related technical requirements. The cost of this study would be between $300,000 and $500,000.

Figure E8 - Potential west-east rail corridor for Kwinana to Merredin

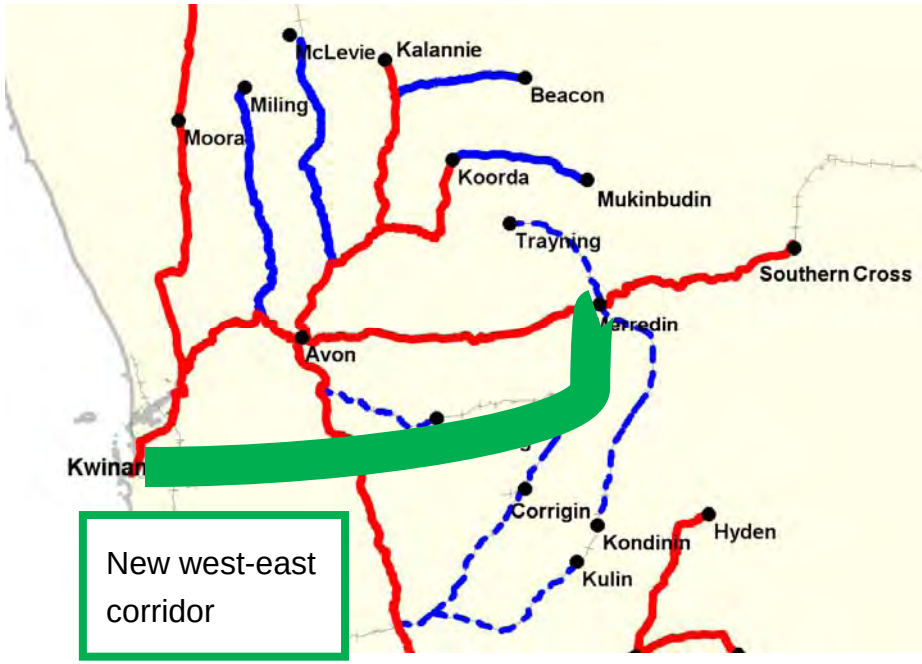


Table E3 - Summary of CAPEX, transitional costs and marginal recurrent costs

INVESTMENT CAPITAL ($M)		Albany	Kwinana South	Kwinana North	Geraldton	Total
Rail CAPEX	*Tier 1*	72.2	12.5	36.5	-	121.2
	Tier 2	-	-	43.3	-	43.3
	Subtotal	72.2	12.5	79.8	0.0	164.5
Road CAPEX	*State*	137.0	50.0	16.0	65.8	268.8
	Local	-	38.1	6.6	6.2	50.9
	Subtotal	137.0	88.1	22.6	72.0	319.7
Bin and siding upgrade CAPEX	***Subtotal***	0.0	15.0	0.0	6.0	21.0
Transitional arrangements	*2010*	-	6.9	-	-	6.9
	2011	-	1.9	-	-	1.9
	2012	-	1.4	-	-	1.4
	2013	-	1.4	-	-	1.4
	2014	-	1.4	-	-	1.4
	2015	-	1.4	-	-	1.4
	2016	-	1.4	-	-	1.4
	Subtotal	-	16.0	-	-	16.0
Total CAPEX	***Total***	209.2	131.6	102.4	78.0	521.2

RECURRENT MAINTENANCE ($M)		Albany	Kwinana South	Kwinana North	Geraldton	Total
Road Maintenance Annual Recurrent	State	-	0.4	0.1	0.1	0.6
	Local	-	0.3	0.1	0.1	0.5
Total RECURRENT	Subtotal	0.0	0.7	0.2	0.2	1.1

Table E4 - Summary of required rail investment for Tier 1 and 2 grain network lines

Zone	Rail Tier	Line section	Rail CAPEX					Distance	Volume
			FY10	FY11	FY12	FY13	Total	(kms)	(tonnes)
Albany	1	Narrogin - Wagin	-		-	-	-	50	0
	1	Wagin - Katanning	5.6	0.6	-	-	6.2	52	700,000
	1	Katanning - Tambellup	7.0	0.8	-	-	7.8	55	750,000
	1	Tambellup - Albany	17.1	-	-	-	17.1	106	900,000
	1	Lake Grace - Wagin	-	17.7	-	-	17.7	110	650,000
	1	Hyden - Lake Grace	-	11.6	2.4	-	14.0	94	200,000
	1	Lake Grace - Newdegate	-	9.4	-	-	9.4	72	150,000
	Subtotal		29.7	40.1	2.4		72.2	539	
Kwinana South	1	Avon (Northam) - York	3.1	-	-	-	3.1	41	650,000
	1	Narrogin - York	9.4	-	-	-	9.4	135	570,000
	Subtotal		12.5				12.5	176	
Kwinana North	1	Kalannie - Burakin	-	-	-	3.1	3.1	20	180,000
	1	Burakin - Amery	-	-	-	12.1	12.1	78	380,000
	1	Koorda - Wyalkatchem	-	-	6.8	-	6.8	45	350,000
	1	Wyalkatchem - Amery	-	-	4.9	-	4.9	32	460,000
	1	Amery - Goomalling	-	-	5.2	-	5.2	34	800,000
	1	Goomalling - Avon	-	-	4.4	-	4.4	55	1,000,000
	2	Mukinbudin - Koorda	-	-	11.5	-	11.5	76	230,000
	2	Beacon - Burakin	-	11.0	-	-	11.0	71	130,000
	2	McLevie - Goomalling	-	8.2	12.6	-	20.8	138	260,000
	2	Miling - Toodyay West	-	-	-	-	-	135	260,000
	Subtotal		-	19.2	45.4	15.2	79.8	684	
TOTAL			42.2	59.3	47.8	15.2	164.5	1,399	

Table E5 - Summary of road investment and maintenance expenditure

Category	Road link	Road name	Zone	Class	Distance	New grain freight volume	Capital upgrade works required ($'000)	Additional annual maintenance ($'000)
Category A New volumes as a direct consequence of rail closures	Corrigin- Brookton	H52 Brookton Hwy	Kwinana Sth	state	92	280,000	21,900	258
	Kulin-Corrigin	M17 Gorge Rock-Lake Grace	Kwinana Sth	state	55	90,000	10,700	50
	Kondinin-Corrigin	H52 Brookton Hwy	Kwinana Sth	state	50	60,000	13,400	30
	Trayning-Kellerberrin	Bencubbin Kellerberrin Rd	Kwinana Sth	local	61	90,000	3,700	55
	Wickepin-Pingelly		Kwinana Sth	local	76	120,000	5,300	91
	Narembeen-Merriden		Kwinana Sth	local	92	130,000	5,200	120
	Bruce Rock-Doodlakine		Kwinana Sth	local	42	60,000	5,700	25
	Shackleton-Kellerberrin		Kwinana Sth	local	41	50,000	6,000	21
	Quairading-Cunderdin		Kwinana Sth	local	46	90,000	3,700	41
	Yealering-Pingelly		Kwinana Sth	local	25	20,000	2,000	10
	Dudinin-Wickepin	M38	Kwinana Sth	state	45	25,000	4,000	20
	Normans Lake-Wickepin		Kwinana Sth	local	25	5,000	500	0
	Tincurrin-Narrogin		Kwinana Sth	local	50	40,000	5,000	30
	South Kumminin-Narembeen		Kwinana Sth	local	15	20,000	1,000	10
	Nyabing-Borden	M21 Kojonup-Pingrup	Albany	state	84	30,000	8,000	25
	Subtotal						$96,100	785
Category B Significant grain routes already in degraded or unsuitable condition for existing task	Borden-Albany	M1 Albany-Lake Grace (Chester Pass Rd)	Albany	state	121	30,000	129,000	36
	Morawa-Mullewa	M39 Wubin-Mullewa	Geraldton	state	97	50,000	31,000	49
	Perenjori-Morowa	M39 Wubin-Mullewa	Geraldton	state	39	20,000	16,000	0
	Sub-total						$176,000	85

Category	Road link	Road name	Zone	Class	Distance	New grain freight volume	Capital upgrade works required ($'000)	Additional annual maintenance ($'000)
Category C Sample of routes which will experience increased significant usage due to short inter-bin movements	Dowerin-Goomalling	M16 Goomalling-Merredin	Kwinana Nth	state	24	100,000	3,000	24
	Goomalling-Northam	M32 Northam-Pithara	Kwinana Nth	state	47	110,000	13,000	52
	Carnamah-Mingenew	M28 Midlands Road	Geraldton	state	76	30,000	8,000	23
	Morawa-Mingenew	M25 Minginew-Morowa	Geraldton	state	61	50,000	10,800	31
	Bunjil-Carnamah		Geraldton	local	50	60,000	3,300	30
	Perenjori-Carnamah		Geraldton	local	55	70,000	2,900	39
	Burakin-Dowerin	Dowerin-Kalanie Rd	Kwinana Nth	local	84	60,000	6,600	50
	Subtotal						$47,600	249
TOTALS							$319,700	1,119

Table E6 – Summary of required road capex schedule

Port zone	Road CAPEX				
	FY10	FY11	FY12	FY13	Total
Albany	34.3	34.3	34.3	34.3	137.0
Kwinana South	22.0	22.0	22.0	22.0	88.1
Kwinana North	5.7	5.7	5.7	5.7	22.6
Geraldton	18.0	18.0	18.0	18.0	72.0
Total	73.1	73.1	73.1	73.1	319.7

1. BACKGROUND

1.1 Overview

The Strategic Grain Network Review (SGNR) Committee was established in mid-2009by Western Austrlia's Minister for Transport, Hon Simon O'Brien MLC, to provide advice to the Minister on emerging transport infrastructure issues in the export grain supply chain. This document reports on the outcomes from analysis undertaken on behalf of the Committee and considered in detail at its meetings in 2009, and its findings represent the broad consensus achieved by the Committee.

The Committee brought together a wide range of government, industry and wheatbelt community representatives to address the management and investment needs of the road and rail infrastructure used to transport grain to ports and other destinations. The participation of all parties has been willing and co-operative, in recognition of the importance of the issue to the future of the state.

The Committee met regularly over a 4-month period from July to November 2009, and intensively reviewed grain logistics chains, infrastructure usage trends and findings with regard to future options. The Committee's independent chair, Dr. Fred Affleck, has been supported by Neil Matthews, principal of Strategic design + Development Pty Ltd (Sd+D). The SGNR committee members and delegates were:

Fred Affleck	Chairman
Neil Matthews	Strategic design+Development
Rick Wilson	Pastoralists and Graziers Association
Sheldon Mumby	Pastoralists and Graziers Association
Mike Norton	WA Farmers Federation
Chris Wyhoon	WA Farmers Federation
Colin Nicholls	WA Farmers Federation
Bill Mitchell	WA Local Government Association
Michelle Mackenzie	WA Local Government Association
Tim Collins	CBH Limited
Owen Davies	CBH Limited
Paul Larsen	WestNetRail
Allan Rose	WestNetRail
Ken Potts	Australian Railroad Group
Sue McCarrey	Public Transport Authority
Drew Gaynor	Department of Transport, WA
Mark Brownell	Department of Transport, WA
Peter Metcalfe	Department of Agriculture, WA – Grains Industries
Kym Foster	Dept of Infrastructure, Transport, Regional & Local Government, Commonwealth (DITRLG)
Jason Maher	DITRLG, Commonwealth
Dave Morrison	WA Treasury and Finance
Peter Shardlow	WA Treasury and Finance
John Erceg	Main Roads WA
Rob Proud	Grain Industry Association
Eacham Curry	Office for the Minister of Transport

Sd+D provided analytical advice to the committee and developed a series of workbooks throughout the process.

1.2 Objective

The objective of the Committee has been to advise the Minister on the most appropriate road and rail transport network that should be provided for the WA grain industry based on a multimodal transport system fit for the 21st Century. The intention of the project is to guide road and rail capital investments so as to provide sustainable rail services, and complementary road infrastructure, for the post-deregulation supply chains now being used by the industry.

1.3 Scope and methodology

The prime focus of the study is the grain rail network, maintained by WestNet Rail, on which trains are operated by ARG, and the impact of any necessary rail section closures on the state and local road networks throughout the wheat belt. The project also considers the changing use of road and rail systems in the current market environment, and the grain storage and handling infrastructure that influences rail and road transport efficiency.

Figure 1 and Figure 2 over page, show the extent of the rail and storage networks considered in this study.

The broad methodology for the project was as follows:

- Document the extent and nature of existing networks
- Ensure a clear understanding by all parties of the post-deregulation commercial landscape
- Estimate the impacts of changing supply chain practice on the existing infrastructure
- Agree on rail line closure options for detailed analysis

- Conduct NPV analysis of options on resource cost basis
- Develop findings on regional network improvement strategies, including rail line investments and closures, road investments and related policy initiatives.

This report describes the recent history and geography of the WA grain chains, and then highlights the rail and road network extent and usage. The options for rail rationalization are then assessed on a zonal basis, using maps and excerpts from operational and financial models.

Commercial organisations have been highly cooperative in the provision of data, and this is presented in aggregated form wherever necessary to protect commercial confidentiality.

Figure 1 - WestNet Rail network

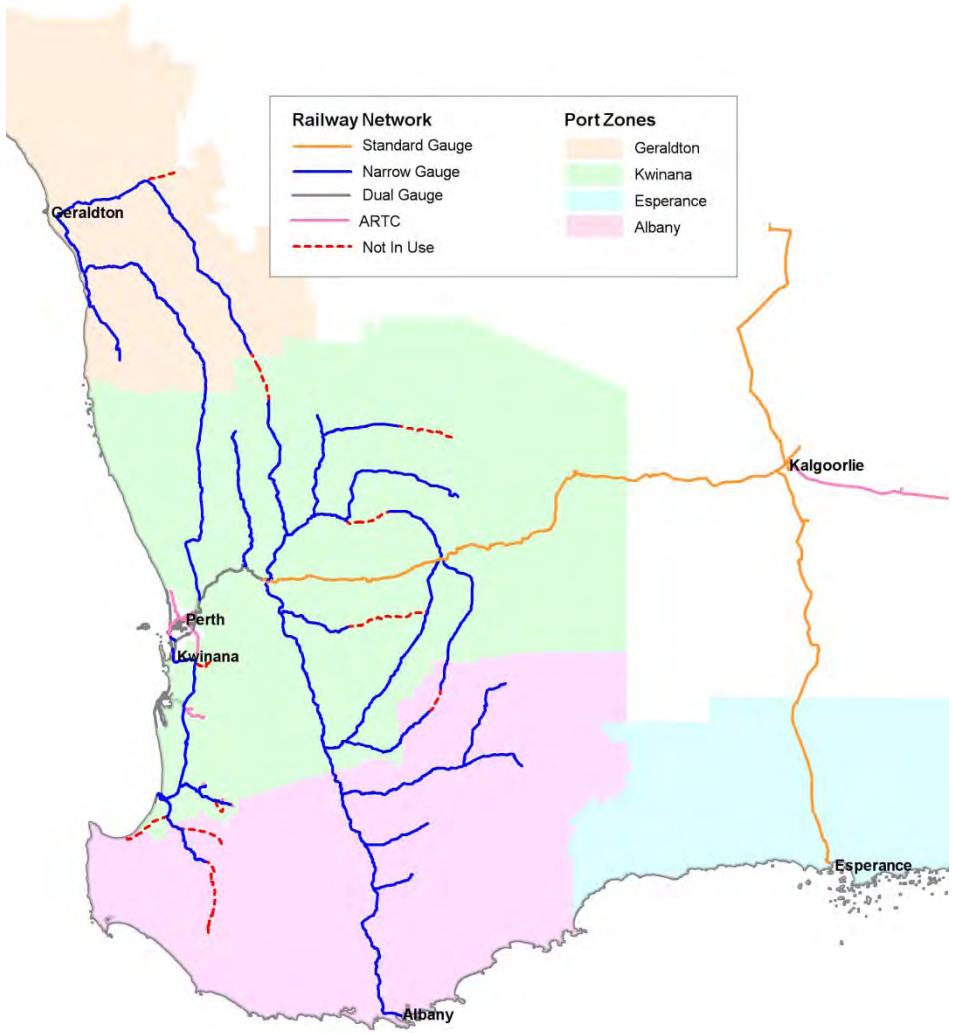
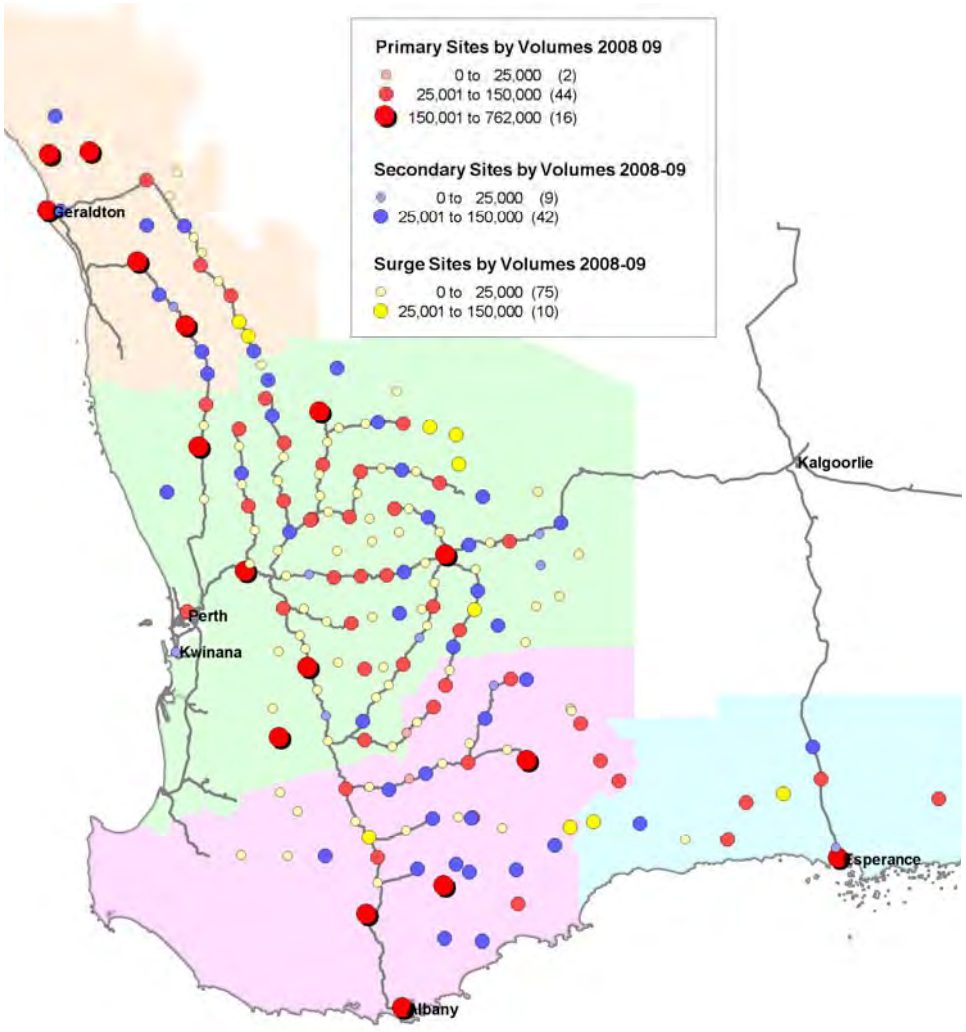


Figure 2 - Network of CBH storage locations



2. WA GRAIN LOGISTICS CONTEXT

2.1 Rail network

The majority of the network used by grain trains is operated by WestNet Rail (WNR) under long term lease from the WA Government through the Public Transport Authority (PTA). WNR is the infrastructure company which emerged when the original purchaser of the rail system split and sold the below- and above-rail sections of the business. WNR is a subsidiary of Babcock and Brown Infrastructure Pty Ltd.

WNR is obliged to provide access to the network under the terms of an access regime administered by the Economic Regulation Authority (ERA). Under the lease agreement, WNR may return to government control any line sections that are demonstrably non-commercial.

Much of the network benefitted from resleepering programs prior to the initial privatization sale in 1999. Consequently, most wheat belt sections have recently or will soon reach the point where a further round of sleeper replacement is required.

PTA and WNR have agreed that these expenses cannot be funded by WNR from achievable revenue returns at prices which are able to compete with road transport. A new agreement is being negotiated allowing for public funding of such works on lines deemed worthy of retention.

Table 1 on page 28 provides a summary specification of the current rail network serving the WA grain sector, outlining rail and axle capacity, ballast and sleeper type and nominal speed performance.

2.2 Rail services

Australian Railroad group (ARG) is presently the single operator which provide above rail services to the grain sector. It the past, ARG had rail agreements with grain marketers, notably AWB and Grain Pool WA (now part of CBH). These parties in turn had logistics agreements with CBH for the storage, out-turn and loading of grainstocks into ARG trains. Since deregulation, new contract arrangements now brings all export grain rail movements under the control of CBH and ARG working together, without the involvement of grain exporters in micro-logistics decisions.

2.3 Grain storage and handling

Co-operative Bulk Handling (CBH) is a grower co-operative which owns and operates the State's four grain export ports and almost 200 country receival bins. Its staff manage the loading and unloading of ARG trains and trucks used for domestic, export and local deliveries.

CBH is gradually rationalizing its storage network, categorizing its storages according to scale and frequency of use, while closing some smaller sites.

Since the deregulation of the grain export trade in 2008, CBH has implemented a program called Grain Express, under which it manages all aspects of cargo assembly for traders selling international consignments. Grain Express allows CBH to deliver grain 'at specification' to the sellers at the port for shipping, making all decisions as to the sourcing of stocks, and the management of bin stocks throughout the State irrespective of the location of purchase by the trade. Thus grain buyers acquire techncial ownership of grain stocks from growers at bins throughout the Wheatbelt, but are issued with different grain stocks (of equal value) at port to those which they purchased. This system offers great improvements in logistics flexibility and is leading to changes in the usage of road and rail assets from the more regulated patterns of the past.

2.4 Competitive environment

Despite the orderly approach to cargo assembly provided by Grain Express, competitive pressures remain throughout the chain. ARG rail services must be competitive with road transport prices in order to guarantee business, and the rail access regime remains in place for traders or handlers seeking to engage independent rail services. CBH has expressed an intention to tender to provide rail services next season.

CBH itself faces competition from the onsite storage sector as well as smaller grain handlers and packers. The rail system is an asset to CBH, since it has virtually sole access to the bulk transport capability offered by rail, although other handlers are free to develop sites on or near rail (though siding costs can be prohibitive). Competition for CBH primarily comes from the road-based off-farm sector.

There are as yet no competing grain export port or upcounty terminals but the threat of such development exists. CBH offers the lower export (FOB) prices for grain in Australia.

CBH has recently introduced a new system for auctioning export supply chain capacity to the trade to avoid over committing resources in peak early season export periods. This system if successful will help to spread the export period over a longer period of the year, smoothing out peak demands on storage and transport operators throughout the year.

2.5 Changing use of road and rail

The newly deregulated environment has changed the traditional usage of road and rail corridors. CBH now controls all export stock movements and can readily clear out stocks from smaller bins for repositioning at better rail-loading sites. The use of road transport for these movements inevitably adds volumes to roads usually not used after harvest for heavy freight. Large volumes of grain were also moved in 2009 by road to port from rail sites, causing stress on a number of roads unused to such volumes. CBH suggests that this type of movement will be less likely under the new capacity auction arrangements, but will no doubt occur from time to time when short term problems such as track damage, heat restrictions or train shortages arise.

Main Roads WA and local authorities are now starting to come to terms with the challenges of these types of atypical movements. A new form of dialogue between CBH and roads authorities will need to be instigated to meet this challenge.

2.5.1 Efficient rail operations

As a general philosophy, it is accepted that rail operations should become more streamlined and efficient as the network evolves. The key to efficient rail operations are regular cycle times minimising time to deliver grain to ports, supported by efficient loading and unloading times and trains carrying large quantities of grain to maximise economies of scale. The best way to achieve these outcomes is to reduce the scope of operations (i.e. the number of loading points and network coverage), allowing volumes to be consolidated in a smaller number of larger good quality loading sites on well-maintained track. Line closures should be considered favourably if they result in heavy usage of good quality, nearby loading sites. Maximum use of rapid-loading sites is also the best way to improve average cycle times, overall system capacity and train utilization.

2.5.2 Complementary road operations

There will be a greater role for the road network and road transport services as the volume on rail is reduced, due to track reduction and changed service practice. Road usage is currently largely unfettered and there has been little need in the past for specific regulatory efforts aimed at grain transport. Changes to the grain marketing environment, however, will arguably require some direction from government to stimulate the optimal use of the road and rail networks requiring government financial support.

It is important that road upgrade investments be made in such a way as to support rail investments, offering integrated road/rail corridors for use by concentrated freight volumes, so as to minimise the extent of road damage costs throughout the state and local roads networks.

These issues are outlined in more detail in Chapter 8 commencing on page 66.

2.5.3 Urban impacts

In some areas increased use of road corridors will involve impacts on country town amenity, as many wheat belt towns do not have freight bypasses. This issue needs to be considered where large volumes are involved. Some areas of Perth will also be affected if rail closures lead to heavy trucking direct to Kwinana or other metropolitan sites. These impacts can be very expensive to address.

Heavy freight volumes already are experienced into CBH's Metro Grain Centre (MGC) in Perth's industrial east. These volumes serve domestic processing and consumption needs as well as container packing. If new export volumes into Kwinana became the norm due to rail's lack of competitiveness with road, or reductions in the track network, the extra trucking would attract community attention in some areas in south-eastern metropolitan Perth. This outcome should be avoided if at all possible, since it will eventually lead to more expensive road works in the built up areas.

Table 1 - Current track specification

Line section	Section length	Nominal volume	Rail weight	Welded	Axle load		Ballast			Sleepers		Performance (loaded)				
	(Km)	('000s tonnes)	(Kg/m)	(Y / N)	19 tonne	16 tonne	Metal	Metal & gravel	Gravel	Timber	Steel & timber	70kph	60kph	50kph	40kph	30kph
Wagin to Albany	237	819	41	Y	☑		☑				☑		☑			
Wagin to Lake Grace	119	509	47	Y	☑		☑				☑	☑				
Katanning to Nyabing	61	71	30	N		☑		☑			☑					☑
Tambellup to Gnowangerup	38	45	30	N		☑			☑		☑					☑
Hyden to Lake Grace	94	204	47	Y	☑		☑				☑	☑				
Newdegate to Lake Grace	72	137	41	Y	☑			☑			☑			☑		
Bullaring to Merredin	134	139	30	N		☑		☑		☑						☑
Yilliminning to Bullaring	60	68	30	N		☑			☑	☑						☑
Narrogin to Yilliminning	23	228	30	Y		☑	☑			☑				☑		
Kulin to Yilliminning	95	147	30	Y		☑			☑		☑				☑	
Kondinin to Merredin	140	314	30	N		☑		☑			☑				☑	
York to Quairading	74	148	30	N		☑			☑		☑					☑
Narrogin to Avon	176	416	41	Y	☑		☑				☑		☑			
Trayning to Merredin	73	157	30	N		☑			☑		☑					☑
Amery to Mukinbudin	154	313	41	Y	☑			☑			☑		☑			
Amery to Kalannie	98	296	41	Y	☑		☑				☑	☑				
Burakin to Beacon	71	111	30	N		☑			☑		☑				☑	
Goomalling to McLevie	137	298	30	Y		☑		☑			☑			☑		
Maya to Perenjori	56	114	30	Y		☑			☑		☑				☑	
Toodyay to Miling	135	276	30	N		☑		☑			☑			☑		
Avon to Amery	89	1016	47	Y	☑		☑				☑	☑				

3. ANALYSIS OF HISTORICAL FREIGHT TASK

3.1 Historical production

Grain production in Western Australia has averaged around 11 mtpa over the last 12 years, with wheat production averaging almost 8 mtpa, being 70% of total production. Barley represents almost 20% of production.

Annual variability from the average can be as much as +/- 40% and even higher on a localised basis.

The area of grain production in WA extends in an arc from Geraldton-Mullewa in the north to Esperance in the south east. The areas with highest yields tend to be 200-300km inland as shown in Figure 5 and Figure 6 on page 31, with greater variability observed in the northern cropping areas.

3.2 The freight task

The dominant freight task is that created by deliveries into the CBH network of silos and storage facilities, before being transferred by road or rail to one of four export ports or to domestic processors in metropolitan Perth and Northam. This network handles around 90% of total production, with the balance remaining on farm and/or feed-lotting, or moved by independent means to the market.

With the advent of greater competition across marketing and bulk handling, the volume handled through the CBH network may decline over time.

3.2.1 Receivals, rail and road deliveries by port zone, intermediate moves

The grain network can be segmented into four largely independent zones, each with dsitinct characteristics; **Kwinana, Albany, Geraldton and Esperance**. The Kwinana zone represents around 50% of the logistics task as shown in the following diagram.

Table 2 over page provides supporting data to Figure 4.

Figure 3 - Annual grain production since 1998-99 (all types)

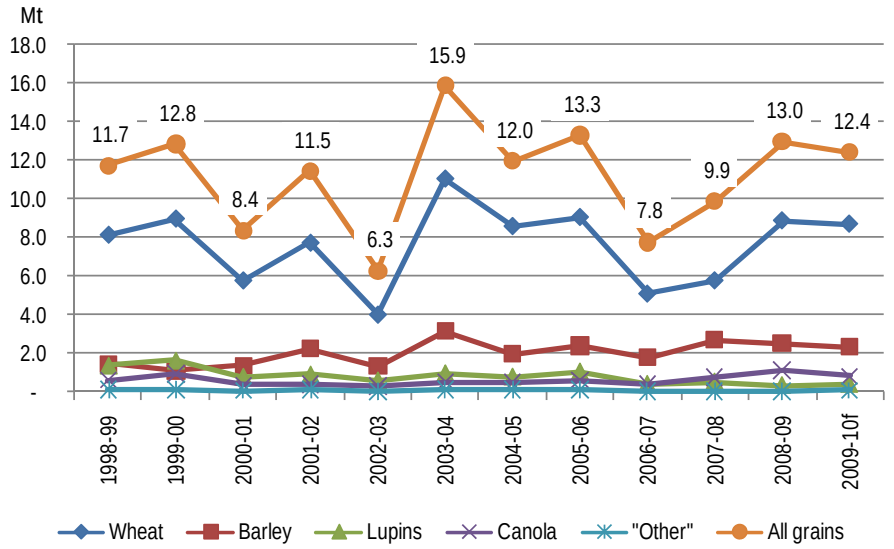


Figure 4 – Transport task (1994-2009)

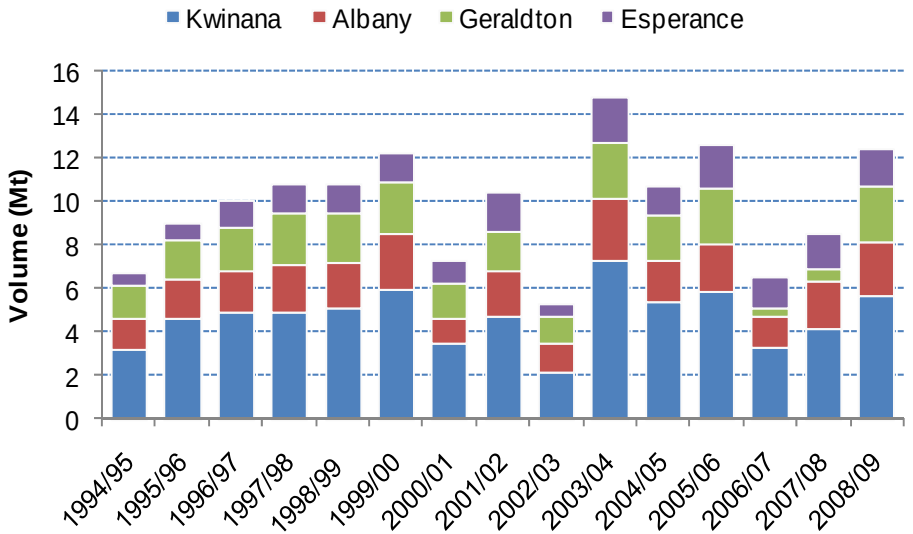
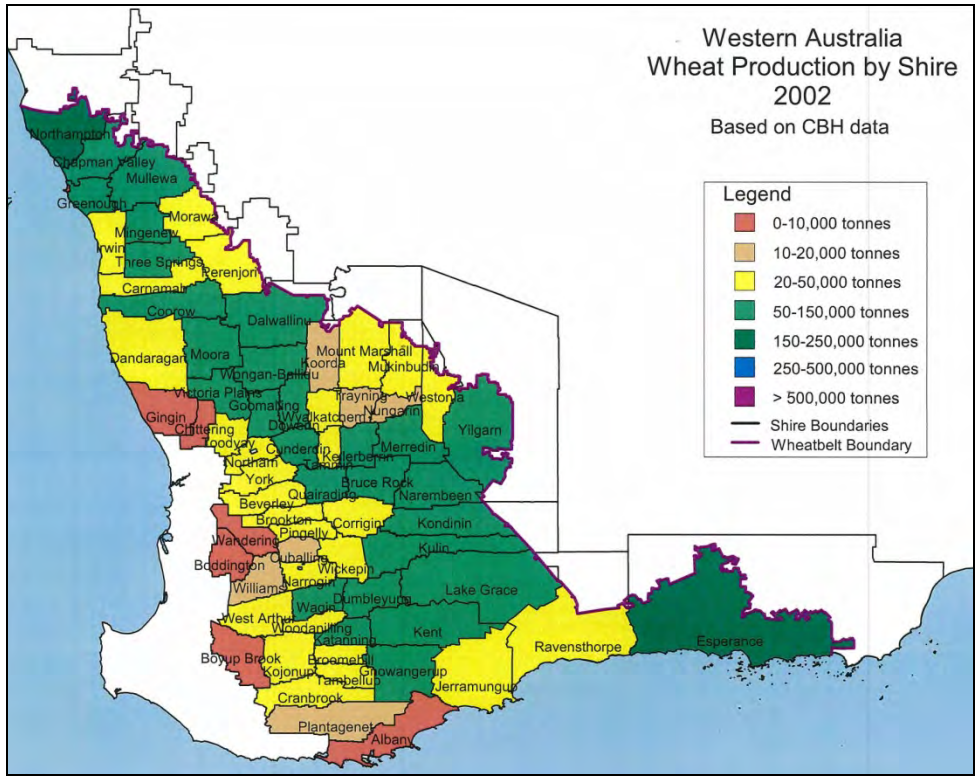


Table 2 - Annual tonnage by port zone (millions tonnes)

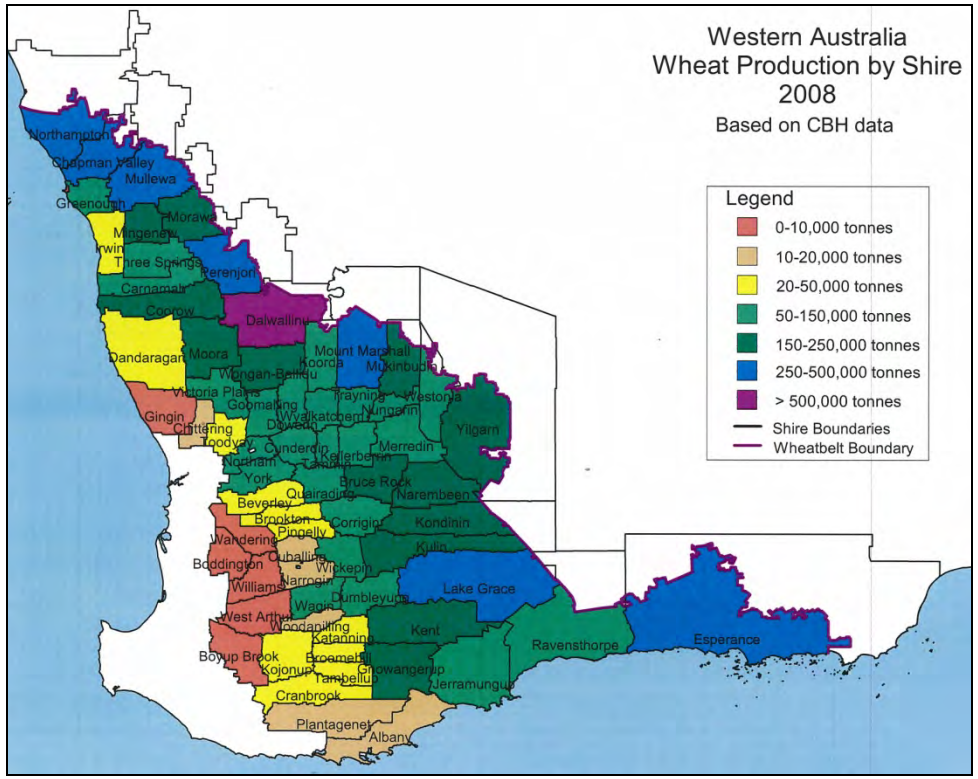
Port Zone	Tonnes per annum per port zone (millions)															
	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	10yrAVG
Albany	1.5	1.8	1.9	2.1	2.0	2.5	1.2	2.1	1.4	2.9	2.0	2.2	1.4	2.2	2.4	2.0
Esperance	0.5	0.8	1.2	1.3	1.3	1.4	1.1	1.8	0.6	2.0	1.4	2.0	1.4	1.7	1.7	1.5
Geraldton	1.5	1.7	2.0	2.4	2.3	2.3	1.6	1.7	1.2	2.6	2.0	2.6	0.4	0.5	2.6	1.7
Kwinana Terminal	3.1	4.6	4.8	4.9	5.1	5.9	3.4	4.7	2.0	7.2	5.3	5.7	3.2	4.0	5.6	4.7
Grand Total	6.6	8.9	9.9	10.7	10.7	12.2	7.2	10.3	5.2	14.7	10.6	12.5	6.4	8.5	12.3	10.0

Figure 5 - Wheat production by shire for 2002



Source: WA Department of Agriculture and Food

Figure 6 - Wheat production by shire for 2008



Source: WA Department of Agriculture and Food

3.2.2 Changing drivers in logistics demand

The deregulation of the export market in 2008 has seen greater variability evident in the logistics task, with the objective of marketers seeking to export greater volumes earlier in the annual cycle. In previous years, demand management was "centralised" with AWB and tended to be smoothed across the year. A number of the strategic changes are summarised in the following points:

- CBH's Grain Express initiative now provides a means of coordinating demand and rationing port capacity.
- Historically, rail transport moved around 60% of the grain tonnes and more than 80% on a net-tonne-kilometre basis. These shares have been declining in recent years with greater road haulage consolidating tonnage from smaller sites into larger facilities and direct to port. Rail in 2009 handled around 50% of the tonnage to port.
- The 2008-9 harvest and export program generated considerable variability from November through to July 2009, with March being the "peak" month moving more than 1.5 million tonnes.
- The transition from network-based pricing to silo-base pricing for road and rail transport is changing the mode shares on a local and sub-zonal basis.

Figure 7 and Figure 8 show the variability in monthly demand in terms of mode share distribution by port zone.

Figure 7 - Transport mode share (2008-09 YTD)

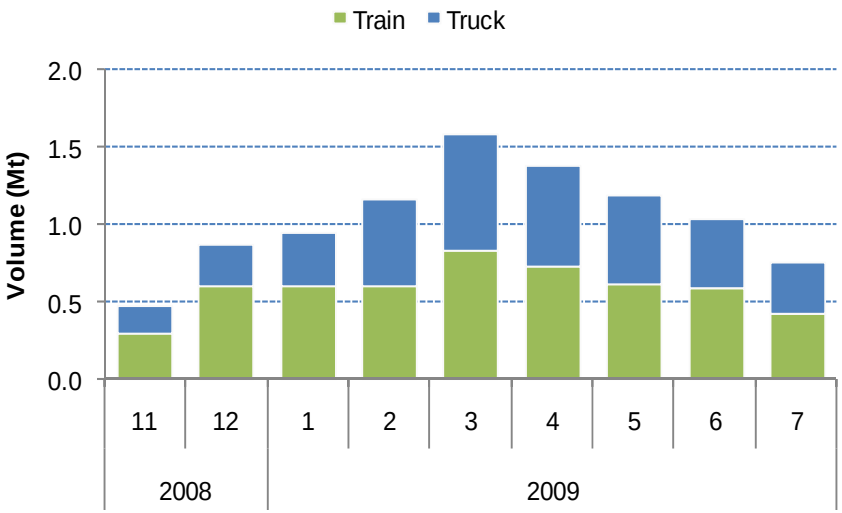
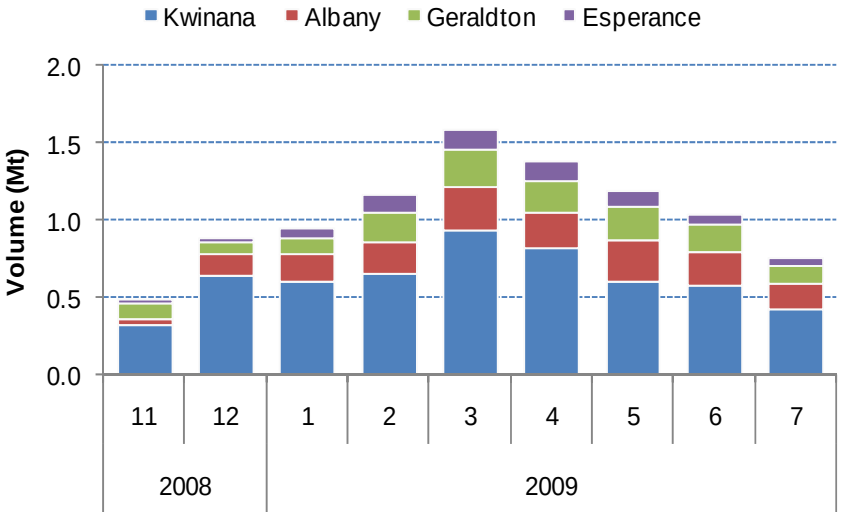


Figure 8- Exports by month (2008-09 YTD)



3.2.1 Supply chain structures

Figure 9 shown over page highlights the road and rail pathways to move export tonnage in March 2009. Figure 27 and Figure 28 on pages 79-80 in the Appendix show the pathways for November 2008 and January 2009 using the same formats.

The analysis of flows led to the development of a network-based generalised supply chain structure, which shows the origins, destinations and intermediate staging nodes of the supply chain.

Grain sector supply chain activity is more complex than that observed under a regulated marketing environment, given the tendency for cargo consolidation via a more volatile mix of road and rail usage..

Figure 10 on page 34 shows the generalised chain model and the monthly volumes being moved through each leg/stage of the chain.

Figure 9 - March 2009 rail and road flows

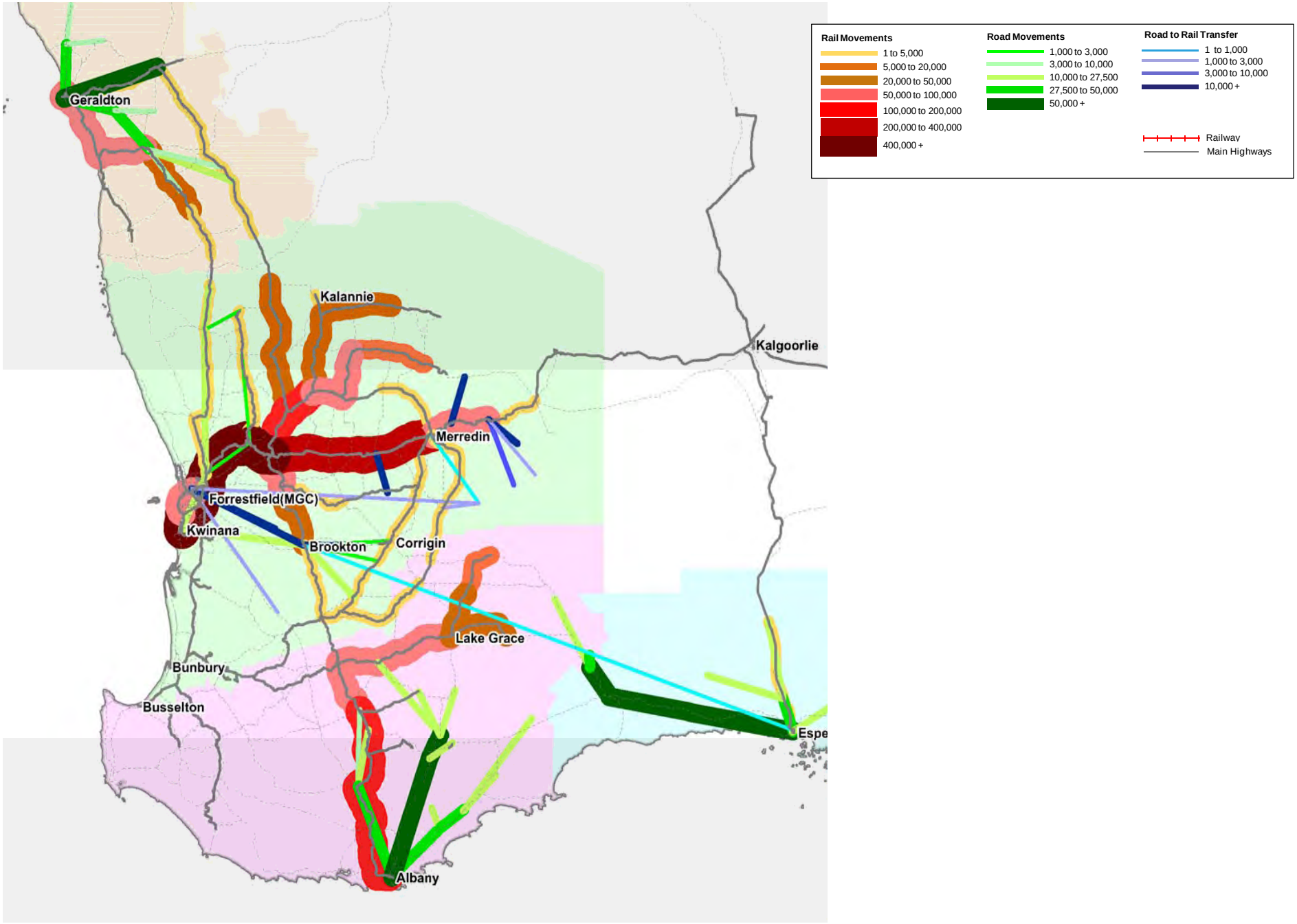
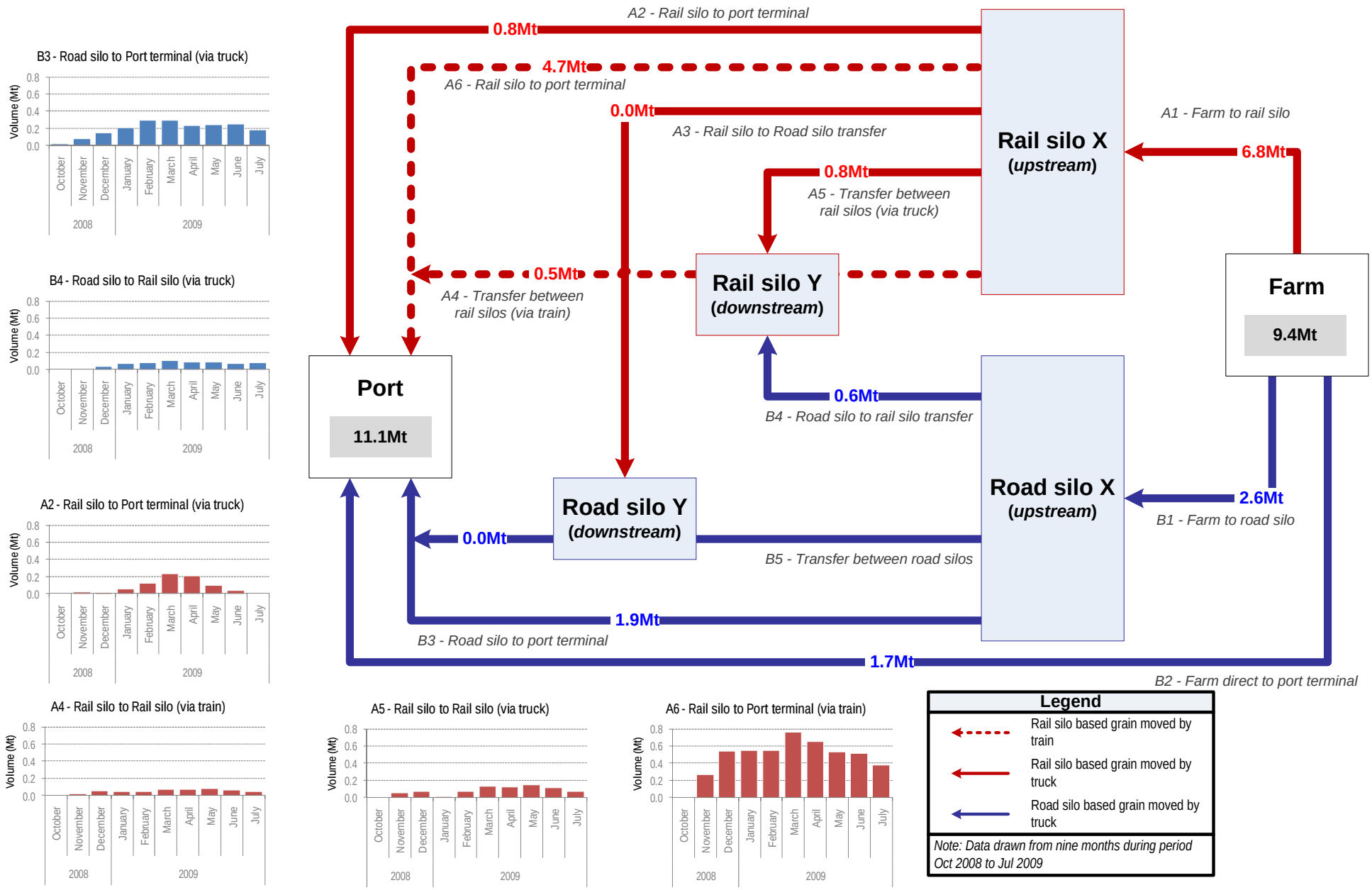


Figure 10 - Overall chain structure for WA grain showing monthly variation by movement



Note that some imbalances will exist due to movement of carryover stock

4. ROAD AND RAIL PRICE RELATIVITIES

4.1 Context

The purpose of this section is to assess the current and future price relativities for road and rail transport under various operating conditions and over time. Notwithstanding expected changes to technology, a key determinant of operating cost is to assess a range of input costs such as changes in operating costs due to rising fuel (i.e. peak oil) and/or new charges associated with the introduction of a carbon pollution reduction scheme (CPRS).

Typically for road operators, a larger proportion (30-35%) of their total operating costs can be attributed from fuel consumption whereas for rail operators, this proportion is much lower and around 12-16% of operating costs. The new input costs associated with a CPRS are considered to have a lesser impact than the fuel cost impacts under "peak oil" scenarios.

4.2 Approach and analysis

With the introduction of silo-based pricing for road and rail services, it is possible to assess the cost-price relativity of each transport mode on a geographical basis (given the relaxation of any network cross-subsidisation).

A scenario-based approach was adopted to test changes in input costs. An "as is" case with two future scenarios based on fuel costs under "peak oil" conditions (e.g. $1.70 and $2.40) and CPRS costs ($20 and $40 per tonne CO_2e). That is:

- Scenario 1 – As Is, fuel price at $1.20 with no carbon charge
- Scenario 2 – Fuel price at $1.70 with carbon charge at $20/tonne
- Scenario 3 – Fuel price at $2.40 with carbon charge at $40/tonne

The cost-price relativities were then assessed in three bands and plotted onto the rail network to assess areas where:

- Rail had a competitive advantage over rail now and into the future, or
- Road had an advantage over rail, or
- The prices where relatively similar (i.e. within +/- 5%)

4.3 Results

Overall, rail advantage share rises as the price of oil and carbon charge increases as shown in Table 3 below. Note that scenario 2 represents a midpoint between the "as is" case and future scenario 3 and further detail is provided in the Appendix Table 26 and Table 27.

Sites which only receive road transport services are excluded from the analysis.

Table 3 - Summary of price relativity analysis for the 'as is' and future scenario

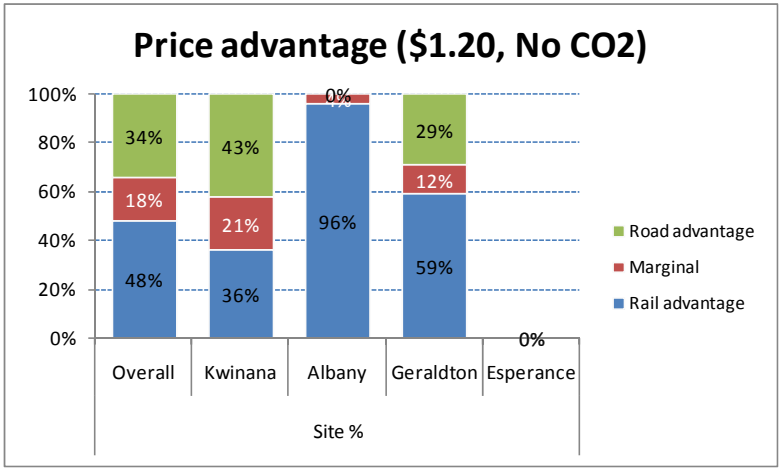
Scenario		Price relativity	Sites		Volume	
			No.	%	Mt	%
Scenario 1	As Is, $1.20, No CO_2 costs	Rail advantage	71	48%	3.5	55%
		Marginal (±5%)	26	18%	0.9	15%
		Road advantage	51	34%	1.9	30%
Scenario 3	$2.40/L, $40 CO_2 costs	Rail advantage	100	68%	4.5	71%
		Marginal (±5%)	21	14%	0.6	10%
		Road advantage	27	18%	1.2	19%

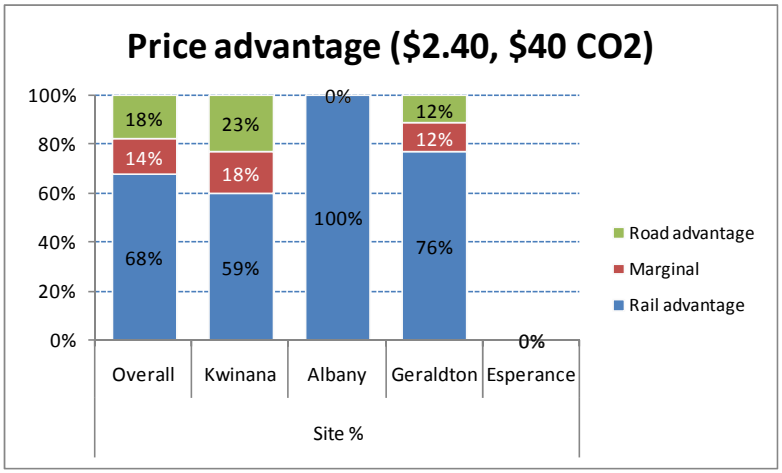
Other key results observed from this analysis:

- In scenario 1 ("as is"), marginal price differential between road and rail account for 18% (by site numbers) and 14% (by tonnes)
- In scenario 1, rail is more advantageous than road at 48% and 34% respectively (by site) and likewise when compared by volume (55% and 30% for rail and road advantage respectively)
- For scenario 3, the rail advantage share over road increases to 68% and 18% respectively (by site) and similarly by volume

The following diagrams show the proportion of sites under current and future input cost scenarios.

Figure 11 - Price relativity effects for current and future cost impacts





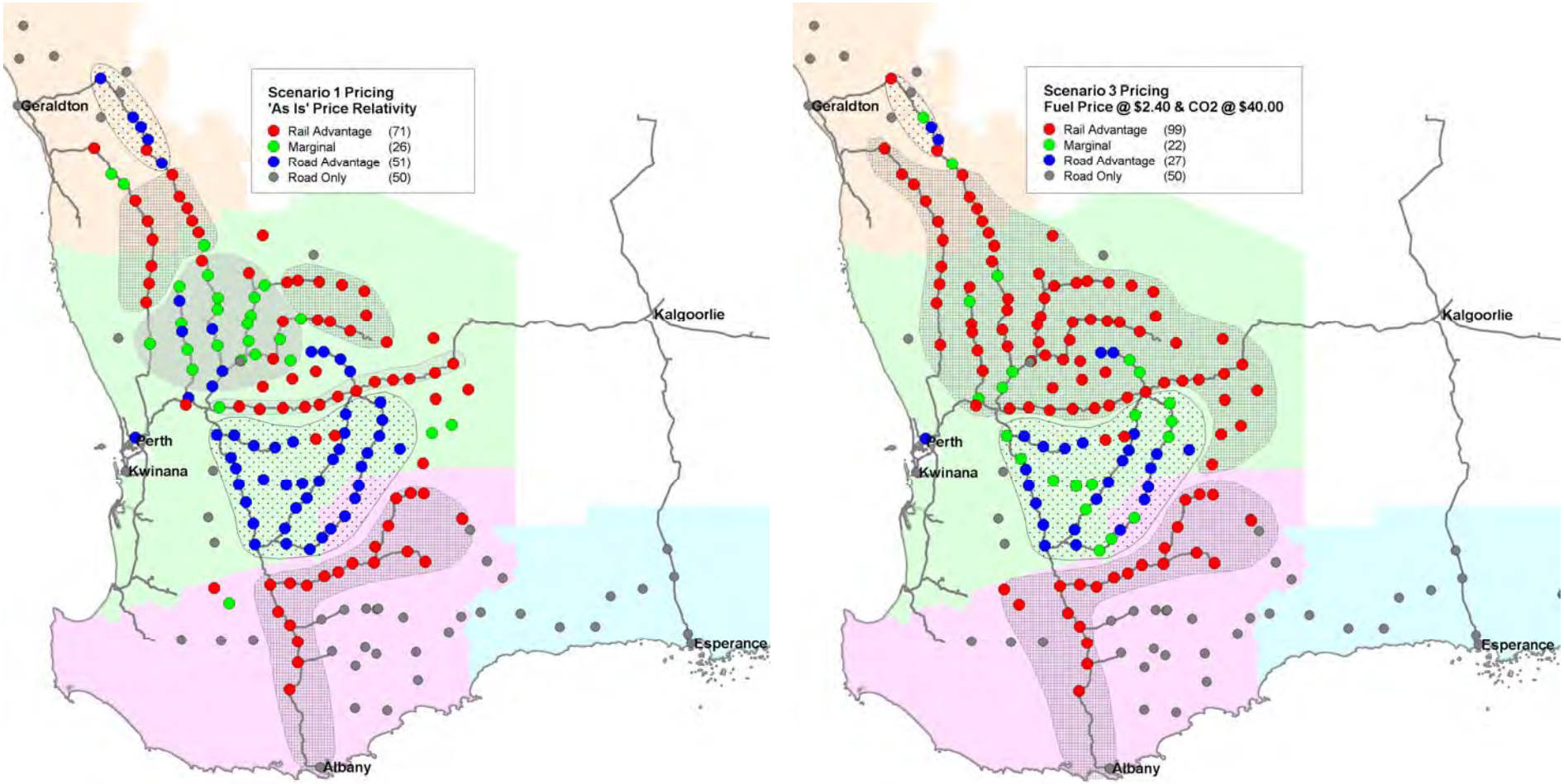
Over page, Figure 12 shows the geographic distribution of sites where (a) rail has an advantage, (b) road transport has an advantage, or (c) there is little difference.

The locations marked in “red” denote sites where rail has an advantage and includes most of the Albany rail sites and EGR sites as well as the more distant sites in the Kwinana North zone around Beacon, Mukinbudin, and Geraldton lines. The sites marked in “blue” denote a road advantage, whereas those in “green” denote a similar price outcome.

However, with future peak oil and higher carbon cost considerations taken into account, a greater proportion of the rail network becomes more competitive relative to road with the distinct exception of the sites south of the EGR in the Kwinana South zone, which remains inherently road-oriented. From the diagram, the map for scenario 3 shows changing patterns in price relativity.

This issue of rail usage in Kwinana South will be dealt with in more detail in following sections.

Figure 12 - Price relativity for current and future scenarios



5. RAIL NETWORK CLASSIFICATION

WestNet Rail operates and maintains approximately 5,100 route-km of rail infrastructure throughout the southern half of Western Australia. The proportion of the rail network servicing the grain sector is around 2,135 route-kms, whereas the Eastern Goldfields Railway, Midland line and Geraldton line service grain and other markets.

5.1 A 3-Tier rail network classification

To aid decision making analysis, the grain rail network has been divided into 3 Tiers, reflecting the level of importance and viability of each line section to the overall network and grain supply chain.

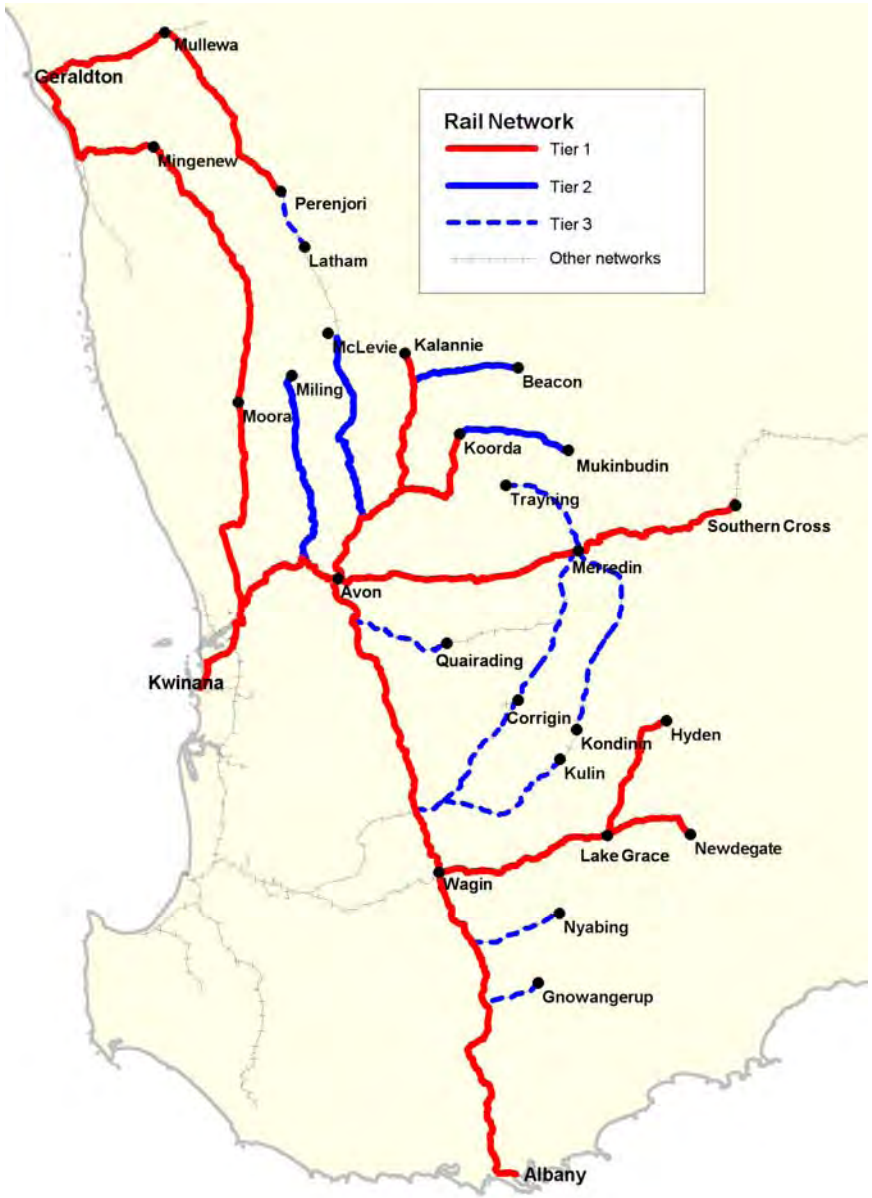
- **Tier 1** – the core line sections that form the basic structure of the network, mostly carrying heavy volumes and providing locations for the capture of grain to rail from the outer grain production areas.
- **Tier 2** – branch lines where rail services are viable based on current access rates and above-rail costs, but where an investment choice is required – between periodic rail resleepering and the upgrade of road network.
- **Tier 3** – branch lines where volumes are low and/or rail services are already non-competitive with road transport and are not candidates for reinvestment.

Tier 1 lines do not include line sections shared with other traffics, which have an assured future, such as:

- Kwinana-Merredin (Eastern Goldfields Railway)
- Midland-Marchagee-Geraldton
- Perenjori-Geraldton

The adjacent diagram shows the classification of Tier 1, 2 and 3 lines used in this study.

Figure 13 - Rail network showing Tier 1, 2 and 3 lines



5.2 Potential capital investment in Tier 1 and 2 lines

Based on WNR's advice, an investment of $121.2m is required from Government in the years 2010-2013 for track resleepering to maintain the Tier 1 core network line sections, with a further $43.3m if Tier 2 lines are to be kept in operation.

Table 4 shows the capital expenditure needs for Tier 1, 2 and 3 lines, as advised by WNR. A more detailed explanation is shown in on the following pages, at:

- Table 5 - Summary of rail investment for Tier 1 and 2 grain network lines, and
- Table 6 - Summary of rail investment avoided with closure of Tier 3 lines

5.3 Investment avoided with Tier 3 closures

By closing the Tier 3 line sections, capital expenditure of $93.5m is avoided.

The volumes hauled on these sections are relatively low, but cessation of services on these lines will have some impact on replacement road corridors, to be reflected in both capital upgrade and recurrent maintenance costs. Service cessation is likely to occur regardless of whether lines are formally closed.

Table 4 - Summary of required and avoided capital expenditure for grain network by rail tier

Rail Tier	CAPEX to be FUNDED on Tier 1 and 2 lines	CAPEX AVOIDED by Tier 3 line closure	Distance
	($M)	($M)	(kms)
1	121.2		979
2	43.3		420
3		93.5	736
TOTALS	**164.5**	**93.5**	2,135

Table 5 - Summary of rail investment for Tier 1 and 2 grain network lines

Zone	Rail Tier	Line section	Rail CAPEX					Distance	Volume
			FY10	FY11	FY12	FY13	Total	(kms)	(tonnes)
Albany	1	Narrogin - Wagin	-		-	-	-	50	0
	1	Wagin - Katanning	5.6	0.6	-	-	6.2	52	700,000
	1	Katanning - Tambellup	7.0	0.8	-	-	7.8	55	750,000
	1	Tambellup - Albany	17.1	-	-	-	17.1	106	900,000
	1	Lake Grace - Wagin	-	17.7	-	-	17.7	110	650,000
	1	Hyden - Lake Grace	-	11.6	2.4	-	14.0	94	200,000
	1	Lake Grace - Newdegate	-	9.4	-	-	9.4	72	150,000
	Subtotal		29.7	40.1	2.4		72.2	539	
Kwinana South	1	Avon (Northam) - York	3.1	-	-	-	3.1	41	650,000
	1	Narrogin - York	9.4	-	-	-	9.4	135	570,000
	Subtotal		12.5				12.5	176	
Kwinana North	1	Kalannie - Burakin	-	-	-	3.1	3.1	20	180,000
	1	Burakin - Amery	-	-	-	12.1	12.1	78	380,000
	1	Koorda - Wyalkatchem	-	-	6.8	-	6.8	45	350,000
	1	Wyalkatchem - Amery	-	-	4.9	-	4.9	32	460,000
	1	Amery - Goomalling	-	-	5.2	-	5.2	34	800,000
	1	Goomalling - Avon	-	-	4.4	-	4.4	55	1,000,000
	2	Mukinbudin - Koorda	-	-	11.5	-	11.5	76	230,000
	2	Beacon - Burakin	-	11.0	-	-	11.0	71	130,000
	2	Mclevie - Goomalling	-	8.2	12.6	-	20.8	138	260,000
	2	Miling - Toodyay West	-	-	-	-	-	135	260,000
	Subtotal		-	19.2	45.4	15.2	79.8	684	
TOTAL			42.2	59.3	47.8	15.2	164.5	1,399	

Table 6 - Summary of rail investment avoided with closure of Tier 3 lines

Zone	Rail Tier	Line section	Rail CAPEX					Distance	Volume
			FY10	FY11	FY12	FY13	Total	(kms)	(tonnes)
Albany	3	Gnowangerup - Tambellup	-	-	-	-	-	38	30,000
	3	Nyabing - Katanning	-	-	-	-	-	61	50,000
Kwinana South	3	Bullaring - West Merredin	-	7.1	-	9.3	16.4	129	280,000
	3	West Merredin - Narembeen	-	-	-	21.8	21.8	129	320,000
	3	Bullaring - Yilliminning	-	-	-	6.8	6.8	61	70,000
	3	Narrogin - Yilliminning	-	-	3.5	-	3.5	23	250,000
	3	Kulin - Yilliminning	-	-	14.4	-	14.4	95	180,000
	3	Quairading - York	-	11.0	-	-	11.0	74	100,000
	3	Trayning - West Merredin	-	5.4	5.5	-	10.9	70	140,000
Geraldton	3	Perenjori - Maya	-	-	-	8.7	8.7	56	90,000
TOTAL	Total		-	23.5	23.4	46.6	93.5	736	

6. ANALYSIS AND STRATEGIES BY ZONE

6.1 The Albany zone and Great Southern Railway

6.1.1 Regional geography and volume flows

The Albany zone services grain growers in a wide arc between the timber country in the south west and the open land in the Hyden area. The western and northern parts of the zone are served largely by rail (17 sites), while eastern and central areas are largely served by road. There are three main road corridors and one rail corridor linking the zone with its port. The transport task in the Albany zone averages two million per annum, with rail carrying around 50% of this task.

The rail corridor comprises the Great Southern Railway (GSR) which extends from Northam to Albany, passing through the Albany and Kwinana South zones[1]. There are several other branchlines, being the Wagin to Lake Grace, Hyden and Newdegate lines, and the now disused Nyabing and Gnowangerup lines.

In most years, rail and road handle roughly equal volumes in this zone, aside from the tonnage delivered by local growers at harvest time directly to the port. In ntk terms, however, rail handles around 70% of the post-harvest freight task, carrying freight over an average 316km, compared to the average road site haul of 163km in the zone.

The rail system in this zone has 17 storage sites between Cranbrook and Hyden, excluding the 3 sites on the Nyabing and Gnowangerup lines which have previously been agreed for closure.

The rail service exists mostly to service the volumes grown and delivered to the CBH sites in the Lake Grace-Hyden area, which account for 53% of line tonnage received and 71% of net tonne-kms in a typical year.

These bins are 350-450km from Albany by rail, though only 250-350km by road. The line includes a long section from Wagin to Newdegate running virtually west-east. Despite this, rail freight rates throughout the zone are road-competitive and expected to remain so. Production volumes in this zone are fairly reliable and will be less affected by future reduced rainfall than other zones.

The Great Southern Railway (GSR) from Wagin-Albany makes up the first 237km of track in the zone, accounting for about 35% of total line volumes. This section is also part of the Avon-Albany line which is of strategic significance, linking the port of Albany to Perth and the national network. This section also allows ARG to service its trains hauling over 1mtpa of woodchips a short distance to port, and will also be essential for future minerals export tasks expected to arise in the region in the near future.

The section from Wagin to Lake Grace handles only 12% of line volume, but is essential in linking the most productive areas in the region to the port.

[1] For the purpose of analysis, the capital investment for the GSR line from Northam to Albany will be treated solely within the Albany zone, and separate to analysis associated with the Brookton Strategy in the Kwinana South zone (see next chapter).

Table 7 - Rail line distances

Line section and length	CBH site	Rail distance to Albany (km)	Est. 2009 export volume (tonnes)	Ntks ('000)	Tonnes %	Ntks%
Hyden line (94km)	Hyden	450	153,000	68,850	21%	30%
	Karlgarin	427	12,000	5,124		
	Pingaring	399	46,000	18,354		
Newdegate line (72km)	Newdegate	428	166,000	71,048	18%	25%
	Buniche	403	11,000	4,433		
Wagin-Lake Grace line (119km)	Lake Grace	356	140,000	49,840	14%	16%
	Tarin Rock	336	6,000	2,016	12%	12%
	Kukerin	316	41,000	12,956		
	Moulyinning	297	9,000	2,673		
	Dumbleyung	277	57,000	15,789		
	Ballaying	257	8,000	2,056		
Great Southern Railway (237km)	Wagin	237	56,000	13,272	35%	17%
	Woodanilling	205	13,000	2,665		
	Katanning	185	33,000	6,105		
	Broomehill	165	52,000	8,580		
	Tambellup	130	18,000	2,340		
	Cranbrook	110	176,000	19,360		
Total			997,000	305,461	100%	100%

6.1.2 Recent logistics trends

ARG typically uses two train sets to service this region, but achieves only around 8 deliveries per week (24,000 tonnes) to port. The lines are rated for 19 tonne axle load, but are subject to heat restrictions in the hotter months. Since the heaviest volumes originate at the most distant sites, average train transit time is well over 24 hours. The largest sites offer reasonably fast loading, but some shunting is required.

The Albany facility has been substantially upgraded in recent years, bringing on line fast train tipping facilities that allow a train to arrive, deliver and depart within two hours. The benefit of this investment, however, is not captured in faster cycle times, because it is not routinely used. Trains are programmed to operate on the assumption of slower tip times, which reduces the risk of train crew rostering problems leading to service cancellations.

The limitations of this region were highlighted in the 2008/09 season just completed. CBH moved around 120,000 tonnes from rail sites in this region to Albany or other rail sites by road, mostly in the months of March and April. This coincided with the months of peak export shipping demand, when rail system capacity was insufficient to meet demand, and road transport was used to make up the shortfall.

From 2009/10 onwards, CBH will use its new capacity auction system to allocate estimated monthly supply chain capacity to the export traders, and thus tend to spread the usage of rail services more evenly through each year. Under these arrangements, it is expected that use of road transport from rail sites will be much diminished in future years, so long as freight pricing remains competitive. Rail will continue to be used for the 0.5m+ tonnes originating each year in the Hyden-Lake Grace area.

There will, however, be some shorter haul consolidation road movements between smaller sites (with poor rail loading conditions, and nearby primary sites with better rail loading. Usage of roads linking these sites along the rail line will therefore increase in future peak demand periods.

6.1.3 Road and rail infrastructure issues

Investment in rail resleepering for the Northam-Albany rail line at a cost of $43.6m is considered essential given the strategic and operational importance of the Great Southern Railway.

External funding will be required for the periodic resleepering works needed on the Wagin to Lake Grace, Hyden and Newdegate lines over the next 3 years, and every 15 years or so thereafter. WestNet Rail estimates the cost of these works at $41.1m.

The alternative proposition, to close the Wagin-Hyden-Newdegate rail lines, would transfer over 600,000 tonnes per year onto the region's roads over an average distance of around 300km. This tonnage would be concentrated onto the Chester Pass Rd, and associated routes linking Hyden and Newdegate to Albany via Borden and Pingrup. This route traditionally handles up to 350,000 tonnes (south of Borden), from road haul sites throughout the eastern part of the Albany Zone. In the past two years, since the Nyabing and Gnowangerup lines were effectively abandoned by the rail operator, up to 50,000 additional tonnes have been moved to port via Chester Pass Rd and some local government controlled routes, fuelling concern over the growing use of the road and its poor condition. This has led to the development of the current proposal to extensively rebuild this road, in part due to concerns over its current safety for mixed use, and partly in expectation of future grain volumes.

The transfer of an average 600,000 tonnes of long haul grain freight to this route would virtually triple the current level of grain freight movements 'overnight' and strengthen the identified need for major road widening over 250km from Lake Grace to Albany.

The cost of such an effort has been estimated at $129m for the section south of Borden, already heavily used by grain trucks, and a further $90m for the Lake Grace-Borden corridor, which is currently rarely used for ex-bin road movements. The closure of such a significant rail section would need to be balanced by a significant road upgrade spend. The retention of the rail service would assist in arresting the perceived move towards more road transport for grain in the region. This might also serve to limit the scope of works perceived as needed on the Borden-Albany section of Chester Pass Rd so as to address percieved safety and efficiency concerns.

6.1.4 Findings

On the available evidence, a decision to retain the Wagin to Lake Grace, Hyden and Newdegate lines would minimize the capital upgrade required on the Borden-Albany and Lake Grace-Borden sections of the main road network.

It is also very likely that the absence of a rail service would greatly reduce the ability to move grain from this region to port in heavy years, given the limited availability of road transport assets, particularly as the mining boom gathers momentum once again.

- Investment in rail resleepering should occur on the Northam-Albany rail line at a cost of $43.6m, complemented by investment in Chester Pass Road to accommodate with the inbound road transport estimated to cost $129m (Borden – Albany)
- The retention of the existing rail sections from Wagin to Hyden and Newdegate for the period to around 2028 at a cost of about $41.1m is recommended over the alternative road upgrades very likely to be deemed necessary if the rail lines were to be closed.

6.1.5 Outcomes

There is a sound business case for long-term retention of the Tier 1 Northam-Albany line, and for governments and industry to share the cost of investment in resleepering, at a total cost of $43.6m;.

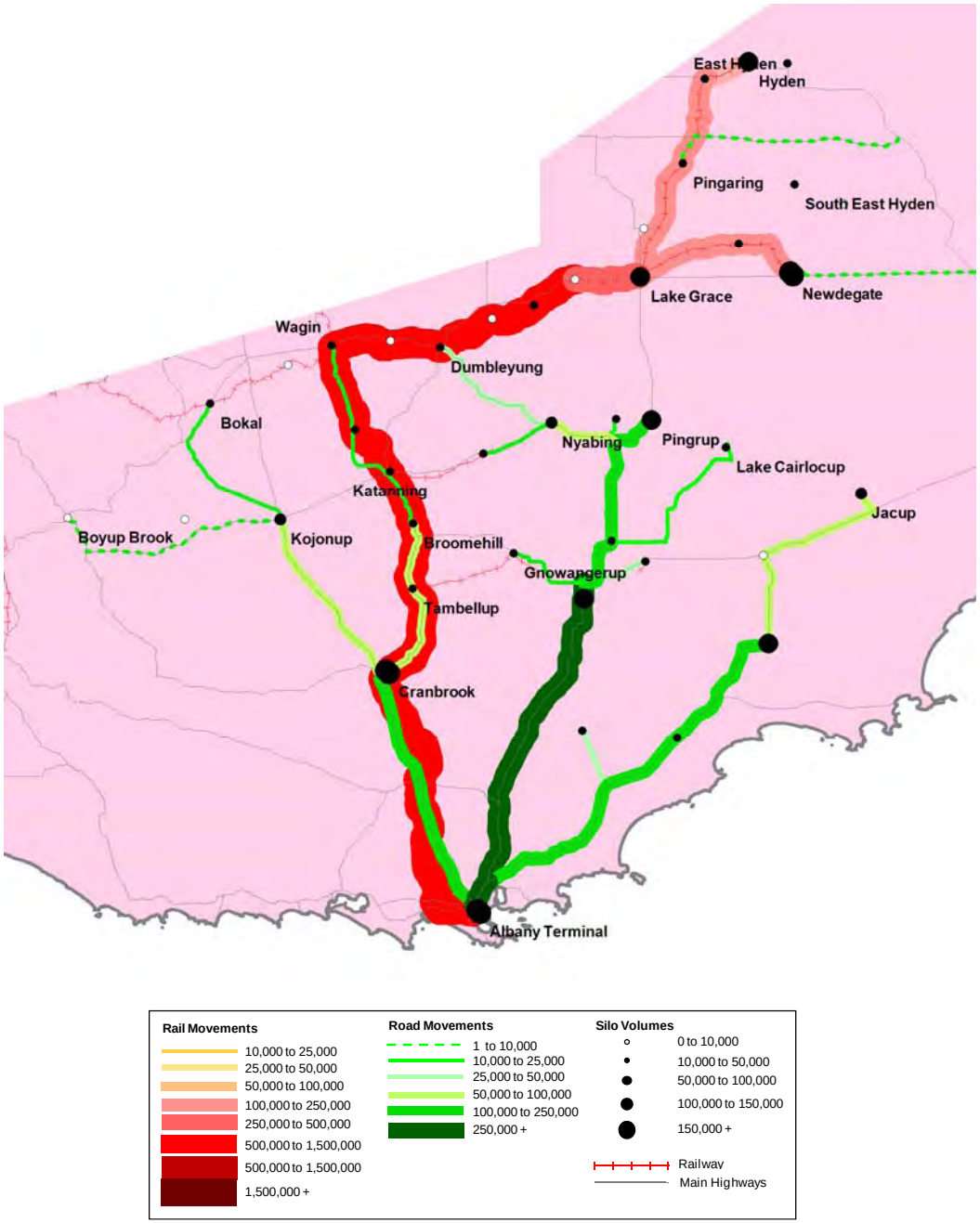
There is a sound business case for long-term retention of the Tier 1 Wagin-Lake Grace line and the Tier 2 Lake Grace-Hyden and Newdegate branchlines and for investment in resleepering at a cost of $41.1m.

The Tier 3 Katanning to Nyabing and Gnowangerup lines are not competitive with road and will become even less competitive with time. As a consequence, rail services no longer operate on these lines and they should be formally closed.

Table 8 - Table of option summaries: Albany zone

Scenario	Rail volume	Road volume	Total volume	Rail CAPEX to 2013	Road CAPEX	Annual road maintenance	Site CAPEX	∆Road /rail cost vs. rail	∆$ per tonne gap	Total externality	Externality difference	NPV (to 2039)
	(Mt)			($M)					($/tonne)	($M)		
Option 1: Full investment in rail, including GSR, and Lake Grace, Hyden and Newdegate lines	0.75	0.00	0.75	72.2	171.3	0.0	-	3.69	4.9	0.24	-	236.1
Option 2: Hyden, Newdegate and Lake Grace lines closed	0.30	0.45	0.75	29.7	262.9	1.3	-	2.84	3.8	1.80	-	322.2

Figure 14 - Albany zone features



6.2 Kwinana South zone – "The Brookton Strategy"

6.2.1 Regional geography and volume flows

This zone consists of several narrow gauge rail lines serving the area bounded by Northam, Narrogin, Kondinin and Merredin. The western part of the zone is close to the Perth metro area and the port of Kwinana, and consequently supplies considerable volumes of grain by road into this area for domestic use and containerization for export.

The Trayning line is also a narrow gauge feeder line into Merredin and is generally considered as part of the Kwiana North zone. However, in this study it is included in Kwinana South for analytical purposes.

This area is the major source of commercial competition in storage and handling between CBH and other businesses. The eastern area is more export oriented. About 1.2m tonnes is usually delivered by rail from this area to the port and domestic consumers.

Rail lines in the area do not run in the direction to the port but serve to bring volume to the main east-west (EGR) corridor and the north-south (GSR) corridor, adding at least 100km to the most direct route from most bin sites. The Corrigin, Kondinin and Trayning lines also require trains to transship at Merredin to larger Standard Gauge trains. There are few fast loading sites in the area.

The section from Quairading to Bruce Rock has been closed for many years, and trucking is used to transfer grain from bins in that area to EGR sites. The Quairading line suffers from poor gradients and rail quality, and can only handle half length trains. All lines other than the GSR are only rated for 16t axle load.

6.2.2 Recent logistics trends

Until recently, freight pricing has followed a road-competitive model, in order to keep these lines serviced by rail. With the move to site-based pricing, the non-competitiveness of these sites has become very clear. CBH has already flagged that most bins on the inner lines of this zone will be slated for road movement either to MGC for domestic use or to Kwinana for export on the basis of current freight rates.

In 2009, over 550,000 tonnes of grain was moved from bin to MGC, of which 420,000 tonnes was by road. Of this amount 270,000 tonnes was moved from rail sites in the Kwinana South and Kwinana North zones. This reflects both the need to concentrate grain for export rapidly, and the need to utilize the least cost path to port.

The inescapable deficiencies of the network are illustrated in Table 9, showing the extra distances and costs associated with rail service over road.

Where rail cannot offer road-competitive prices, it will drive a large percentage of the freight task to the road network.

Table 9 - Kwinana South road/rail freight price comparison

Line sections and bins		Distances (km)			Estimated freight difference ($/t)
		Road	Rail	Difference	
Corrigin-Merredin	Bullaring	258	452	194	15.45
	Corrigin	253	428	175	14.36
	Ainsworth	261	406	145	11.86
	Ardath	288	387	99	11.32
	Bruce Rock	277	368	91	7.32
	Korbelka	308	347	39	3.57

Table 9 continued ...

Line sections and bins		Distances (km)			Estimated freight difference ($/t)
		Road	Rail	Difference	
Kondinin-Merredin	Kondinin	287	447	160	14.89
	Bendering	293	435	142	13.66
	South Kumminin	316	412	96	9.41
	Narembeen	315	396	81	8.66
	Wogarl	336	374	38	4.51
	Muntadgin	324	357	33	4.19
	Koonadgin	326	337	11	2.93
Kulin-Narrogin	Kulin	312	444	132	2.28
	Jitarning	274	423	149	5.46
	Dudinin	286	408	122	3.73
	Tincurrin	273	389	116	3.99
	Nomans Lake	245	363	118	4.04
	Narrogin	189	326	137	8.43
Yealering-Narrogin	Yealering	277	394	117	4.07
	Wickepin	243	369	126	4.96
Quairading-York	Quairading	198	265	67	4.16
	Mawson	174	237	63	5.46
	Greenhills	156	213	57	5.36
Narrogin-York	Yornaning	195	302	107	4.41
	Pingelly	167	275	108	5.84
	Brookton	148	255	107	4.32
	Mount Kokeby	168	237	69	2.79
	Beverley	165	224	59	2.23
	York	132	191	59	1.87

6.2.3 Road and rail infrastructure outcomes

In these circumstances, it is not feasible to support the future provision of track, and is more appropriate to concentrate attention on the road routes increasingly being used.

Closure of rail lines places an immediate impact on a number of roads on the area. It is expected that grain from bins without future rail services would be trucked either north towards sites on the EGR, or west towards Brookton en route to port.

Roads affected by the extra traffic would be the Brookton Highway linking Kondinin, Kulin and Corrigin with Brookton, along with several north-south routes. Upgrading works may be necessary on some of these routes to safely support the additional volume.

The risk associated with the closure of these lines is that up to 600,000 tonnes would be lost to the rail network, and would reach port by road. This would not be an optimal outcome for the State, as it would result in extra road provision costs and externality costs, as well as reduce the utility of the remaining network, particularly the Avon-Albany line.

The prospect of this volume heading towards Kwinana could cause community concern in the affected outer metropolitan areas when added to current freight traffic into MGC via Welshpool Rd. Large volumes of freight destined for Kwinana could lend weight to a case for the development of a freight corridor bypassing some key populated areas where current roads may not be suitable for heavy freight vehicles.

The Brookton Strategy

In order to avoid this, a "Brookton Strategy" has been agreed in principle by the Committee, with the following components:

- Develop the Brookton bin site as an efficient road/rail transfer point for grain from the south-eastern part of the zone at a cost of $10m. This could involve increasing the elevated rail loading bin capacity, lengthening the siding, and associated road works
- Lock in rail pricing for the site, which is road-competitive for the trip to Kwinana, via long term contracts between ARG, CBH and Government
- Seek Government assistance in the form of capital for the site improvements, and a underpinning of rail access prices for certain sites for one year (estimated. $6.9m pa) while some road upgrades are completed, a second year at $1.9m, and for a further period to 2016 (at $1.4m pa) while rail efficiencies are bedded in.
- Improve the Kellerberrin site at a cost of $5m to accommodate extra volume from both north and south of the EGR
- Commit to road upgrading works up to a possible $88.1m for the routes connecting these bins to the remaining rail lines
- The need for financial assistance during the transitional preiod arises from the difference between forecast rail freight rates from Brookton and road freight costs. Until the line closures are fuilly implemented, and the new Brookton site upgraded, the rail operator cannot reduce prices to the road-competitive level. This necessitates the transitional support arrangements, since grain exporters have the right to access to the cheapest available cost pathway to port.
- The most appropriate and simple means for this support would be via rail access price support under the PTA/WNR agreement.

Phasing implementation

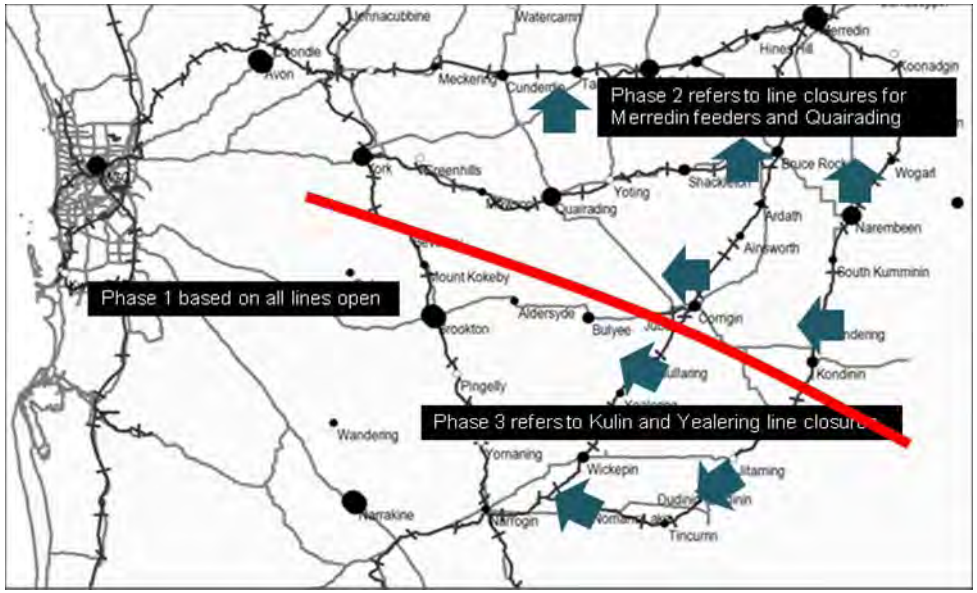
The Brookton strategy would be implemented over three years as follows:

- 2010 (phase 1) – retain line availability while essential road works are scoped and commenced
- 2011 (phase 2) – formerly close Kondinin, Corrigin, Trayning and Quairading lines
- 2012 (phase 3) – close Kulin and Yealering lines

The pace of the phasing will depend on the progression and completion of road works.

Figure 15 below shows the scope of phases while Table 29 (in Appendix) summarises the modelling for each phase against the 10year average and the 2008-09 harvest year.

Figure 15 - Brookton Strategy phasing



Cost modelling shows that a rail service dedicated to handling Kwinana South export volumes via the EGR sites and Brookton would be achievable at considerably lower cost than is currently incurred by ARG. Trains servicing a single location (Brookton) on a sustained basis would move grain far more reliably than when serving current sites on 16t axle load track with poor loading capabilities. The terrain would allow greater locomotive efficiency, crewing patterns and cycle times well within 24 hours.

Options for analysis

Table 10 over page summarises the analysis of the options considered for the Brookton Strategy, as:

- Close all Tier 1 lines in Kwinana South zone and allow all tonnage to move by road transport to Kwinana port
- Undertake resleepering investment at a cost of $97.3m
- Implement the Brookton Strategy

The analysis uses a net present cost (NPV) comparison and demonstrates a substantial benefit of the Brookton solution over the other scenarios. A more detailed account is provided in Table 30 on page 85 in the Appendix.

Options which yield the lowest NPV present the lowest overall cost and therefore preferred, all other things being equal.

The Brookton Strategy demands a new level of co-ordinated involvement by government agencies responsible for the rail and road systems, and calls for some operational funding support in order to avoid more expensive road upgrades in the outer metropolitan area. Inevitably, the state government will need to become more operationally involved in the supply chain in order to manage these arrangements.

Government will also need to accept the concept of providing funding towards assets held by private parties (CBH and WNR) in improving the ability of Brookton and other sites to efficiently transfer large volumes from truck to train.

Table 10 - Option summaries: Kwinana South zone

Scenario	Rail volume	Road volume	Total volume	Rail CAPEX to 2013	Road CAPEX	Annual road maintenance	Site CAPEX	∆Road /rail cost vs. rail	∆$ per tonne gap	Total externality	Externality difference	NPV (to 2039)
	(Mt)			($M)			($/tonne)			($M)		
Option 1: Close rail lines	0.00	1.26	1.26	12.5	238.2	1.5	0.0	-7.68	-6.08	5.95	0.00	296.9
Option 2: Invest in rail lines	1.26	0.00	1.26	97.3	0.0	0.0	0.0	-6.94	-5.49	0.73	5.22	222.8
Option 3a: Brookton strategy	0.39	0.87	1.26	12.5	88.1	0.7	10.0	-1.42	-1.13	1.61	4.34	144.8
Option 3b: Brookton strategy (max road CAPEX for equivalent outcome to Option 2)	0.39	0.87	1.26	12.5	183.0	0.7	10.0	-1.42	-1.13	1.61	4.34	225.0

Figure 16 - Brookton Strategy Phase 2 rail closures with Kulin/Yealering open

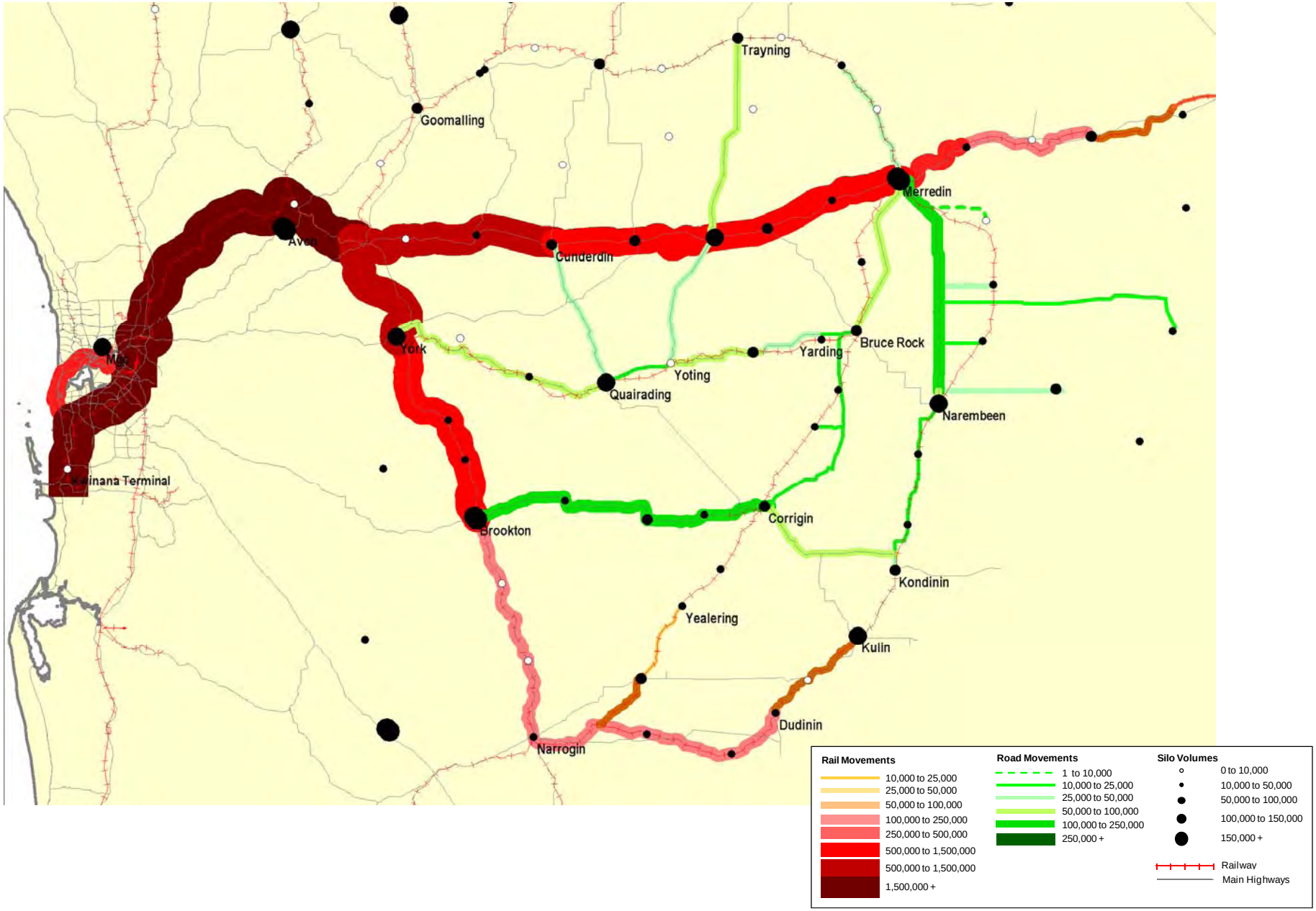


Figure 17 - Brookton Strategy Phase 3 with all Tier 3 lines closed

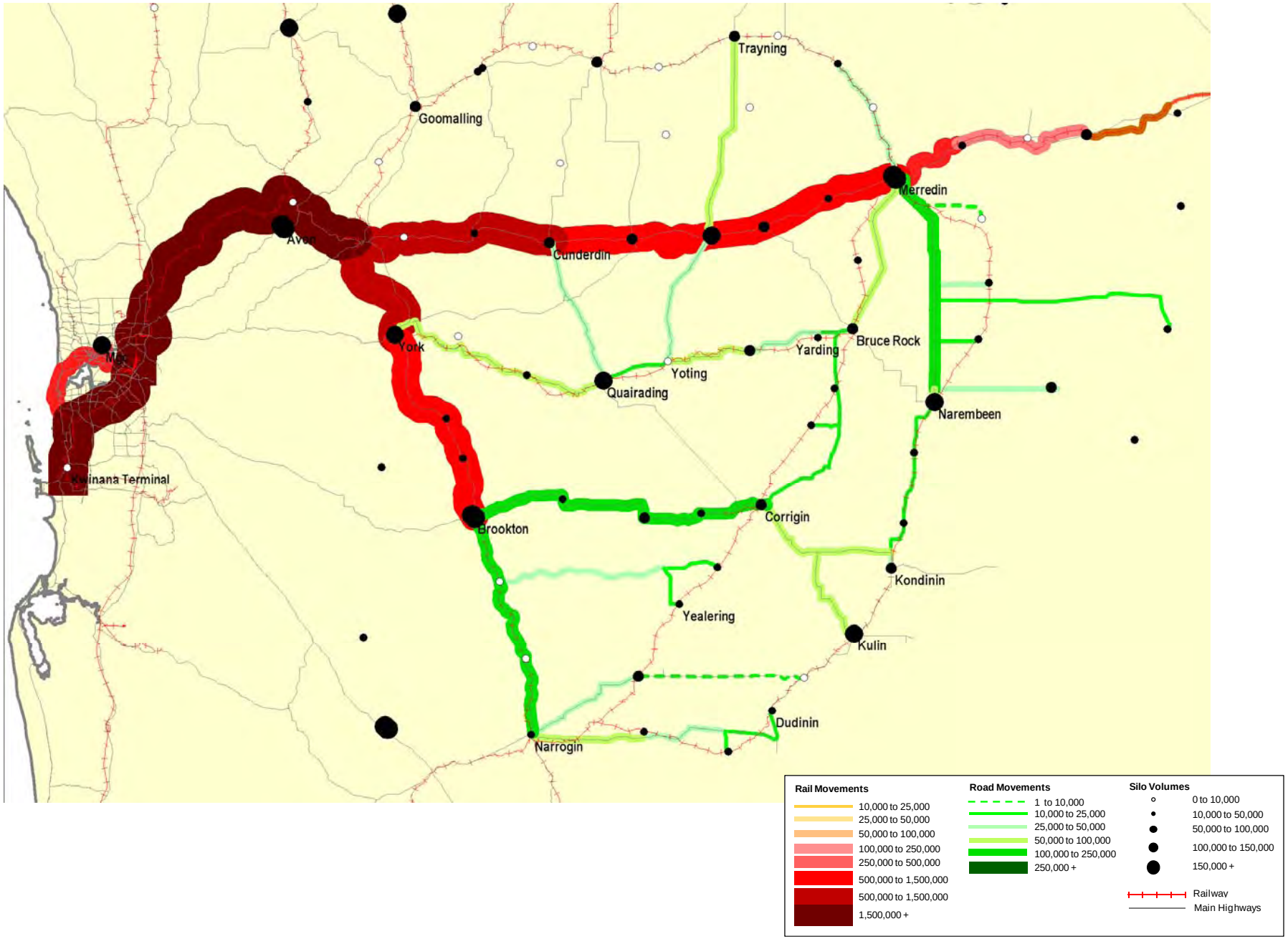


Table 11 - Volume distribution of Kwinana South phases

Export volume (tonnes) By line sections	Road/Rail nodes						
	Brookton	York	Remaining Narrogin lines	Kulin & Yealering lines	Merredin feeder lines	EGR	Total
Phase 2							
Corrigin-Merredin	91,987	15,980	-	-	-	86,253	94,219
Kondinin-Merredin	70,663	-	-	-	-	216,460	287,123
Kulin-Narrogin-Pingelly	-	-	32,966	152,358	-	-	185,324
Yealering-Narrogin	-	-	-	41,420	-		41,420
Shackleton area	-	-	-	-	-	72,334	72,334
Quairading line	72,169	67,284	-	-	-	44,507	183,960
Brookton-York	90,349	61,651	32,932	-	-	-	184,932
Trayning line	-	-	-	-	-	113,900	113,900
Total volume	325,168	144,914	65,898	193,778	-	533,453	1,263,212
Phase 3							
Corrigin-Merredin	91,987	15,980	-	-	-	86,253	194,219
Kondinin-Merredin	70,663	-	-	-	-	216,460	287,123
Kulin-Narrogin-Pingelly	152,358	-	32,966	-	-	-	185,324
Yealering-Narrogin	41,420	-	-	-	-	-	41,420
Shackleton area	-	-	-	-	-	72,334	72,334
Quairading line	72,169	67,284	-	-	-	44,507	183,960
Brookton-York	90,349	61,651	32,932	-	-	-	184,932
Trayning line	-	-	-	-	-	113,900	113,900
Total volume	518,947	144,914	65,898	-	-	533,453	1,263,212

6.2.4 Brookton Strategy – assessment of externality costs

Externality costs are the exogenous costs and benefits of transport, outside the purely 'internalised' commercial costs. Specifically, they include negative impacts such as pollution, climate change, congestion, degraded respiratory health, crashes, noise and severance - or the cost to mitigate these impacts – as a result of a development in transport operations or infrastructure. Both road and rail freight have external impacts in this regard, though the impact of rail is usually considerably less than road, particularly in urban environments.

Estimation of the value of externalities is a complex task and is the subject of ongoing research. Broadly speaking, theaccepted value of externalities for road freight is up to $43.80 per thousand ntk (net tonne kilometres) in urban environments and up to $10.70 per ntk for rural. For rail freight, the costs are $6.90 and $0.80 respectively, derived from the working documents[2] used to support the AusLink (2006) transport funding programs.

These estimates differ primarily due to different air pollution assumptions, emissions reduction targets sought and diverse congestion patterns. In general, ATC road freight data is considered 'conservative' in its assumptions and is approximately half of the AustRoads estimate.

The economic analyses in this report apply the higher bound of Austroads externality values for road and ATC for rail as a base case approach. Sensitivity analysis using the urban/rural valuations is also provided assuming radii of 60km for Perth and 20km for Albany.

Externality costs were allocated across all tonne-kms travelled by road and rail under each network and volume distribution options as summarised in Table 12.

The main parameters factored to calculate the total externality costs involve (i) volume on rail by load point, (ii) distances between silo, port and load point, (iii) urban catchment boundaries and (iv) unit rates for urban and rural settings as derived from sources outlined above.

Table 12 - Externality costs assessed for the Brookton strategy

Parameters	Option 1 (All on rail)	Option 2 (All on road)	Option 3 (Brookton strategy)
Volume on rail by load point (Mt)	1.26	1.26 (-)	1.26
- Brookton and York	0.29	0.29 (-)	0.68(⇧)
- EGR	0.10	0.10 (-)	0.52 (⇧)
- Remaining Narrogin	0.07	0.07 (-)	0.07 (-)
- Other (Merredin feeders, Kulin and Yealering lines)	0.80	0.80 (-)	0.0 (⇩)
Distance (Km)			
- Silo to port	Varies by site	Varies by site	Varies by site
- Silo to load point	-	-	Varies by load point
- Load point to port	-	-	Varies by load point
Urban catchment boundaries (Km)	60	60	60
Externality unit rates ($/'000ntks)			
- Urban road	-	$43.8	$43.8
- Rural road	-	$10.7	$10.7
- Urban rail	$6.9	-	$6.9
- Rural rail	$0.8	-	$0.8
Total externality costs ($M)	$0.73	$5.95	$1.66
- Difference Option 1 and 2	$5.23		-
- Difference Option 2 and 3	-	$4.29	

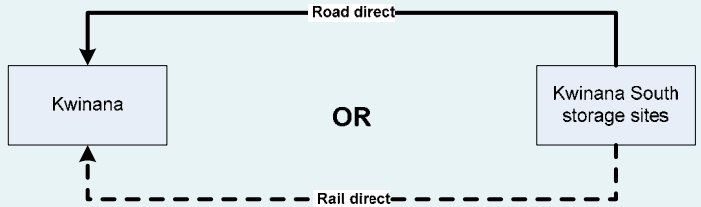
In summary, the externality costs associated with 1.26 Mtpa moving to road is around $5.23m pa more than rail, in an average harvest year. The estimated externality cost associated with the "Brookton hub strategy" (Option 3) is around $1.66m, which is $4.29m lower than the cost of a "road only" solution.

The externality cost savings which accrue to the government and community can be seen as an offset to any support for track access costs but further analyisis is required in the feasibilty study to integrate externalities into a commercial arrangement.

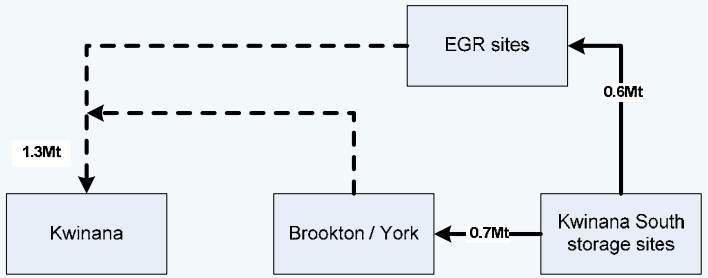
[2] The most widely used Australian externality cost estimates are originally sourced from European data (Infras/IWW). The interpreted results however, vary widely, based on the selection of European countries with which to compare Australia and other conversion factors. The two major data sources in this regard are the 'National Guidelines for Transport System Management' (ATC 2006) and AustRoads report 'Valuing emissions and other externalities', which was authored in 2000 and updated in 2005.

Figure 18 - Externality benefits within Kwinana South zone

<table>
<tr><th>Scenario</th><th>Pathway analysed</th><th>Analysis of externality costs</th><th>Comments</th></tr>
<tr>
<td>As is flows

1.26Mtpa moved by road or rail from silos in Kwinana South to port</td>
<td> 
</td>
<td>
<table>
<tr><th rowspan="2">As Is Scenario ($M pa)</th><th>Brookton</th><th>York</th><th>Other</th><th>All</th></tr>
<tr><th>0.16Mt</th><th>0.13Mt</th><th>0.97Mt</th><th>1.26Mt</th></tr>
<tr><td>Road direct</td><td>0.63</td><td>0.48</td><td>4.85</td><td>5.96</td></tr>
<tr><td>Rail direct</td><td>0.08</td><td>0.06</td><td>0.58</td><td>0.73</td></tr>
<tr><td>Modal difference</td><td>0.55</td><td>0.41</td><td>4.27</td><td>5.23</td></tr>
</table>
</td>
<td>The analysis provides a direct comparison of road versus rail externality costs for movements from the Kwinana South zone to port, and offsets the difference in market prices for road and rail services

Rail provides a $5.2M externality cost benefit over road</td>
</tr>
<tr>
<td>Alternative flows

0.7Mtpa via Brookton hub with 0.6Mtpa balance via EGR silos</td>
<td> 
</td>
<td> 
</td>
<td>The full Brookton strategy provides $4.3M externality benefit over road direct operation</td>
</tr>
</table>

6.2.5 Summary

The following table summarises the key elements of the Brookton Strategy, including justification and transitional arrangements.

Table 13 - Summary of Brookton Strategy

PHASE AND TIMING	DRIVERS	ROAD NETWORKS Actions	RAIL NETWORKS Actions	SUPPORT Actions	BENEFITS Offsets
Phase 1 : 2009-10 Maintain "as is" rail network for 2010-11 harvest year and commence transitional arrangements	Market demands for silo-based pricing and lowest cost pathways to port will force 1.26Mtpa onto road corridors Σ $ road costs around $6.9m lower than Σ $ rail costs based on current pricing for 10yr average, or $7.5m for 2008-09	Need for defined heavy road corridors to service the grain sector across MRWA and key local roads; establish industry code of conduct Commence investment in road corridor upgrades, particularly focussed in EGR catchment	Maintain all lines for use Review required silo and siding enhancements to support Brookton/Kellerberrin hubs and increased receivals to EGR	Financial support up to to $6.9m for year 1 via per tonne access subsidy to WNR, to be passed on thru freight pricing Need to link to commitments from operators, including progress towards 3 year strategy including hubs and other initiatives	Maintaining rail services for current season avoids increased externality costs associated with transfer of volume to road Difference estimated to be $5.2m for an average year over rail
Phase 2 : 2010-11	With some road improvements completed, rail lines will be progressively closed, along with establishment of Brookton and Kellerberrin Hubs	Ongoing upgrade of roads with investment particularly focussed on Brookton Highway and related feeder roads Establishment of "ring road" from Merredin, Kondinin, Corrigin and Brookton	Commence closure of Corrigin, Quairading and Kondinin lines, however Kulin and Yealering lines continues to operate Commence Brookton rail shuttle operations underpinned by defined capacity and performance undertakings	Support reduces to around $1.9m commensurate with progress towards implementing Brookton Strategy	Avoidance in externality costs of around $ 4.6m
Phase 3 : 2011-12	Fully implement Brookton strategy linked to improve road network quality and declining subsidy support	Complete road upgrades in Kwinana South zone	Close Kulin and Yealering lines and operate Brookton and York hubs to full capacity	Financial support of $1.4m for further 5 years as hub efficiencies are bedded in. Need to develop policies and initiatives to avoid ongoing support in perpetuity	Reduction in externality costs over "road only" solution of $4.3m pa

6.2.6 Brookton Strategy outcomes

In summary,

- The 581km of Tier 3 track in the Kwinana South zone be closed progressively over the period 2010-2013, foregoing resleepering investment costs of around $85m (including Trayning line).
- A one-off investment in upgrades to the Brookton Highway and some north-south routes (both local and state roads) be made at a cost of $88.1m, to ensure these routes are capable of safely handling the extra traffic generated.
- The Brookton Strategy needs to be implemented – involving upgrades to Brookton and Kellerberrin sites at a potential cost to government in the order of $15m
- Transitional funding arrangements up to a total estrimated $16m over 7 years will be required, in the form of underpinning rail access charges, to ensure that grain exporters have the incenitve to use the rail system via the Brookton Strategy while efficiency gains are still being achieved.

6.3 Kwinana North zone

6.3.1 Regional geography and volume flows

The northern Kwinana zone extends from Moora through Dalwallinu, Beacon and the area north of Merredin. It is served by a network of 6 narrow gauge lines feeding into the main EGR corridor between Midland and Northam. Rail is highly competitive with road transport throughout this zone. Export volumes vary considerably from season to season, as the eastern areas are more susceptible to rainfall shortages than other zones.

Rail lines are a mix of 16t and 19t axle load rated sections.

6.3.2 Recent logistics trends

The region has a strong rail orientation, but considerable volumes are also moved from bins by road from western areas into both Northam and MGC for domestic consumers and containerization. These movements were augmented in the last season by road haulage of bulk export tonnes into Kwinana due to the extreme export demand experienced from January to April 2009, and the inability of rail services to increase loadings.

Road movements also occurred in 2009 between inefficient rail loading sites and larger sites, particularly Avon, to assist rail by reducing cycle time. This trend is expected to continue in busy seasons, as grain will be consolidated in sites where rail cycle times allow for more deliveries per day. The successful introduction of Grain Express has allowed CBH much greater freedom to manage cargo assembly in this way, and short road hauls between bins can be expected to increase. In some cases, this trend will reduce the significance of the branch lines, and sharpen the focus on the need for road capital expense in place of rail.

6.3.3 Road and rail infrastructure outcomes

There are four Tier 2 lines in this region – the Beacon and Mukinbudin lines in the east, and the McLevie and Miling lines in the west. The Kalannie line that separates them is considered to be part of the Tier 1 network, as it features a single site with rapid loading facilities that consolidate over 150,000 tonnes to rail each year. The Kalannie line extends only 20 km from the junction with the Beacon line at Burakin.

Three of the 4 lines require resleepering from 2011-2013, at a total cost of around $43m, with the Miling line also due in about 2016. The lines are relatively close together and a case can be made for closure of some so that tonnage can be consolidated onto the remaining network via suitable transfer sites. Some scenarios of this type have been tested by the Committee.

In all, there are seven options considered for the Kwinana North zone, as follows:

- Option 1: All the eastern KN lines remain open
- Option 2: Beacon line closes
- Option 3: Both the Beacon and Mukinbudin close
- Option 4: Both Western KN lines remain open
- Option 5: The Miling to Toodyay closes
- Option 6: The McLevie to Goomalling line closes
- Option 7: The McLevie to Konnongoring closes

Figure 19 to Figure 23 on pages 62 and 63 show the scope of options 2-3 and 5-7 described above.

Eastern zone (Kwinana North)

In the eastern zone, the Beacon and Mukinbudin lines have been assessed for closure.

A range of options are assessed by comparing NPV as shown in Table 15 page 61 and in the Table 31 of the Appendix. Options which yield the lowest NPV present the lowest overall cost and therefore preferred, all other things being equal.

The Beacon-Burakin line handles on average about 130,000 tonnes over its 71 km length, most originating at the Beacon end-point via rapid loading rail facilities. This tonnage can vary greatly (Beacon loaded 45,000 tonnes to rail in 2008, and 160,000 in 2009). Closure of this line would establish Koorda on the nearby Mukinbudin line as a consolidation point for all of this line tonnage. Road cost impacts, however, on the local routes serving the area have been estimated at $6m, which virtually matches the rail investment savings ($11m) combined with the potential increase in freight charges that would occur in the Beacon area.

The calculated NPVs indicate similar results from the two options, and the Committee indicated its preference for the retention of rail service to Beacon.

The Mukinbudin line carries heavier volumes and consolidates tonnages from Bonnie Rock and Wilgoyne at the endpoint of the line. The line to Koorda (76km) carries around 230,000 tonnes on average, which increases beyond Koorda to around 350,000 tonnes. In the absence of the line, roads to Koorda and Merredin would see considerable extra tonnage, and the route from Mukinbudin south through Nungarin to Merredin is considered to be in urgent need of capital upgrade should this occur. The NPV results for this line are clearly in favour of retention at this point.

Western zone (Kwinana North)

In the western area, both the Miling and McLevie lines have been considered as alternative options for closure. Each has a strong argument fot its retention of each. These are summarized in Table 14.

The Miling line has been the preferred candidate of the two for closure in previous considerations by ARG and CBH. The McLevie site handles larger volumes and is considered superior to the Miling site, which requires shunting. Total rail volumes from each line, however, are very similar (averaged from 2002-2009 CBH data). There are some operational advantages to each line over the other. Freight density over each line is poor relative to the cost of investment, with only 266,000 tonnes hauled over the 135km length of each line.

The main difference between them is the estimated impact on road usage arising from closure of each. The rail volumes from the McLevie line would be trucked either west to Miling or south to Avon, where transfer to rail would be feasible on current rates. If the Miling line were to close, most export volume would be likely to be trucked directly to Kwinana, a distance of up to 250km. This would have a more significant impact in terms of road maintenance and community amenity costs. Conversely, the first cut road upgrade estimates derived for this study show that greater capital costs would be necessitated by the closure of the McLevie line, due to the use of poorer standard routes to the south.

Road capital costs used in this analysis are preliminary only and will need to be re-examined by government.for consistency during consideration of this report.

A range of options for Kwinana North western zone were assessed by comparing NPV as shown in Table 15 page 61 and in Table 32 of the Appendix. Options which yield the lowest NPV present the lowest overall cost and therefore preferred, all other things being equal. The NPV results indicate that a hybrid option, involving the closure of McLevie line as far as Konnongorring would be the superior to the outright closure of either line. This option would involve the improvement of the existing Konnongorring as a transfer point for grain from Ballidu and Wongan Hills. Wubin, McLevie and Piawaning volumes would be consolidated into Miling, via the Great Northern Hwy.

The Committee, however, is reluctant to endorse this strategy at this point in view of the strength of the rail service throughout the entire region and its obvious advantages over road transport.

In view of the major changes endorsed for the Kwinana South zone, the Committee's preferred position is for the next investment cycle of the McLevie line (2011-12) to be approved, with a decision on the Miling line (due around 2016) to be made after the Brookton Strategy has been fully implemented, including transfer site upgrades and the provision of a standalone mechanism for the funding of road upgrades arising from rail closures.

Table 14 - McLevie and Miling comparison

	McLevie Line	Miling Line
Key sites	McLevie, Ballidu, Konnongorring	Miling, Piawaning, Calingiri
Length	138km	135km
Average freighted volumes		
• By road	64,000 tonnes	45,000 tonnes
• By rail	266,000 tonnes	267,000 tonnes
Rail capex required	$20m (2011-12)	$11m+ (2016)
Road transfer point if closed	Miling, Northam	Moora, Kwinana
Road capex required	$32m	$17m
Road usage after closure	45M gtks	47M gtks
Rail operations		
• Locos required	2	1
• Crew change location	Avon	Avon (by call car)
• Trip Servicing	Avon	Kwinana
• Cycle time (end point loading)	26 hours	28 hours

6.3.4 Outcomes

In summary, there is currently a sound business case for all Tier 2 lines in the Kwinana North zone to be retained and funded through the upcoming resleepering cycle (2011-13). However, the Trayning line should be formally closed.

Other actions associated with the Trayning line closure are outlined earlier in the analysis relating to Kwinana South and the Brookton Strategy.

There is a good business case for long-term retention of Tier 1 lines in the Kwinana North zone from Avon to Goomalling, Kalannie and Korda, and investment in resleepering over 4 years at a cost of $36.5m.

There is a good business case for long-term retention of the Tier 2 Beacon-Burakin line in the Kwinana North zone and investment in resleepering over 4 years at a cost of $11.0m.

There is a good business case for long-term retention of the Tier 2 Mukinbudin-Koorda line in the Kwinana North zone and investment in resleepering over 4 years at a cost of $11.5m.

There is a good business case for retention of the Tier 2 Miling and McLevie lines in the Kwinana North zone and investment in resleepering of McLevie-Goomalling be funded at a cost of $20.8m. A further review of the future of this line should occur in 2014 in conjunction with assessment of the success of the the Brookton Strategy.

Table 15 - Table of option summaries: Kwinana North zone

Scenario	Via Koorda	Via Mukinbudin	Via Merredin	Via Miling	Via Moora	Via Konnon-gorring	Via Avon	Total volume affected	Total volume	Rail CAPEX to 2013	Road CAPEX	Annual road maintenance	Site CAPEX	∆Road /rail cost vs. rail	∆$ per tonne gap	Total externality	Externality difference	NPV (to 2039)
	(Mt)									($M)					($/ tonne)	($M)		
Option 1: All Eastern KN lines open	-	-	-	-	-	-	-	-	1.30	54.6	-	-	-	-	-	0.77	-	62.5
Option 2: Beacon close	0.11	0.03	-	-	-	-	-	0.13	1.30	43.6	6.1	0.2	-	0.44	3.28	0.18	0.09	63.2
Option 3: Beacon + Mukinbudin close	0.16	-	0.18	-	-	-	-	0.34	1.30	32.1	25.3	0.3	-	0.67	1.95	0.50	0.05	71.3
Option 4: Both Western KN lines open	-	-	-	-	-	-	-	-	1.30	25.2	-	-	-	-	-	0.77	-	35.9
Option 5: Miling – Toodyay close	-	-	-	-	0.08	-	0.21	0.29	1.30	25.2	15.7	0.2	-	0.94	3.20	0.40	0.18	59.6
Option 6: McLevie – Goomalling	-	-	-	0.19	-	-	0.14	0.32	1.30	4.4	32.5	0.3	-	0.37	1.14	0.42	0.11	49.1
Option 7: McLevie – Konnongorring	-	-	-	0.15	-	0.10	-	0.25	1.30	8.0	18.5	0.1	10.0	-0.02	-0.08	0.30	0.03	42.7

Figure 19 - Option 2: Beacon closed

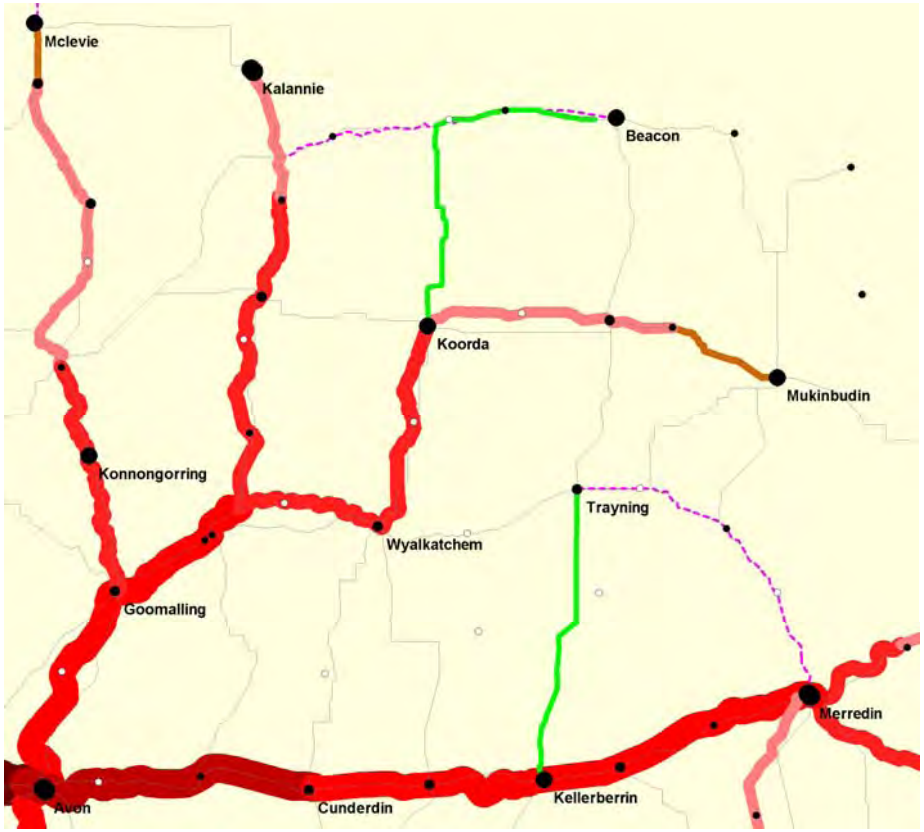


Figure 20 - Option 3: Beacon and Muckinbudin closed

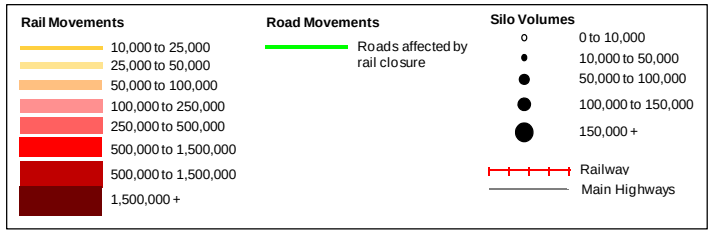


Figure 21 - Option 5: Miling closed

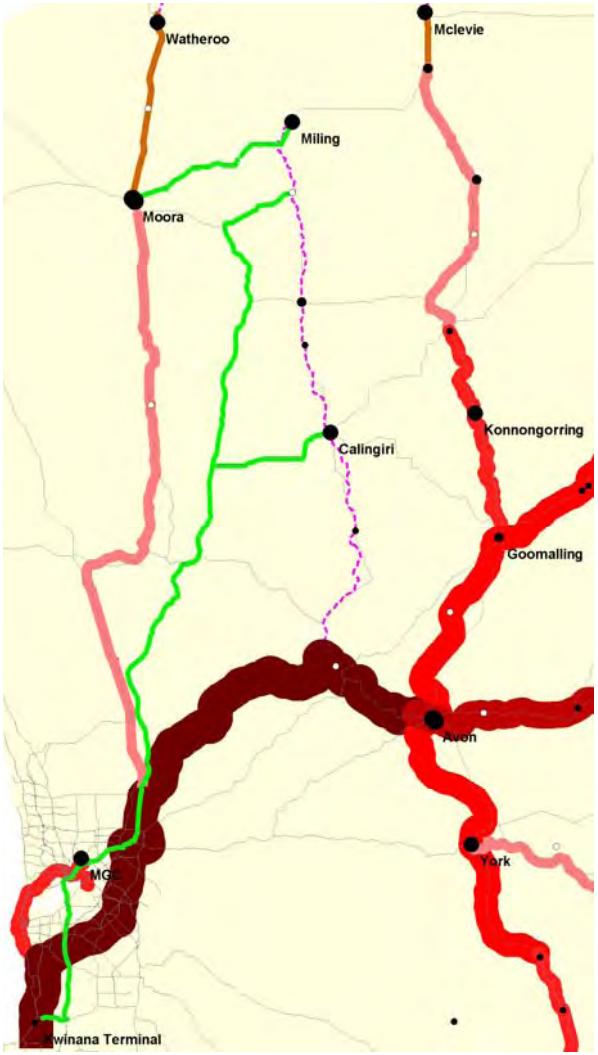


Figure 22 - Option 6: McLevie - Goomalling closed

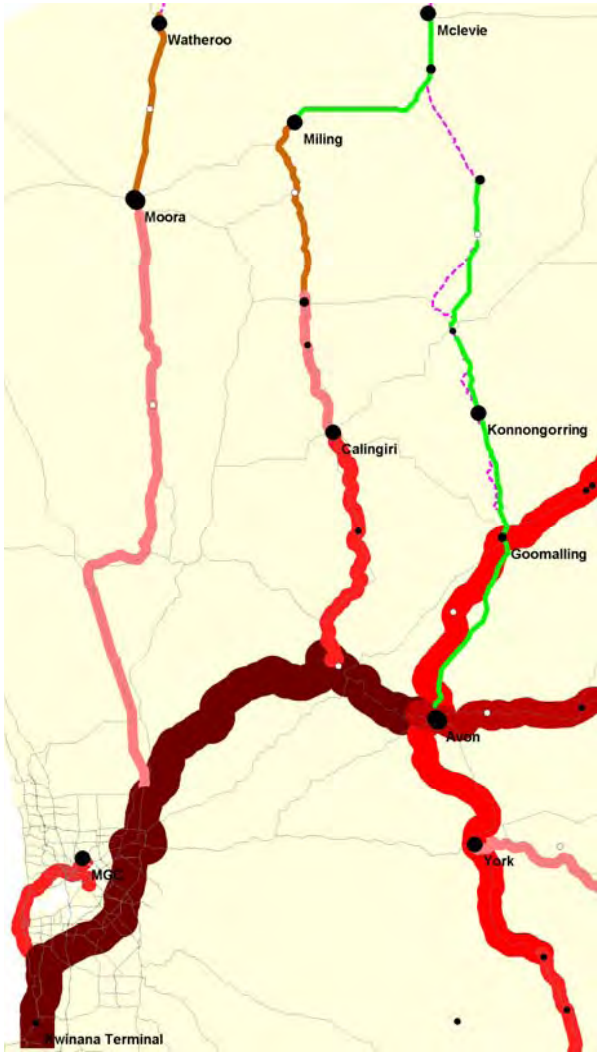
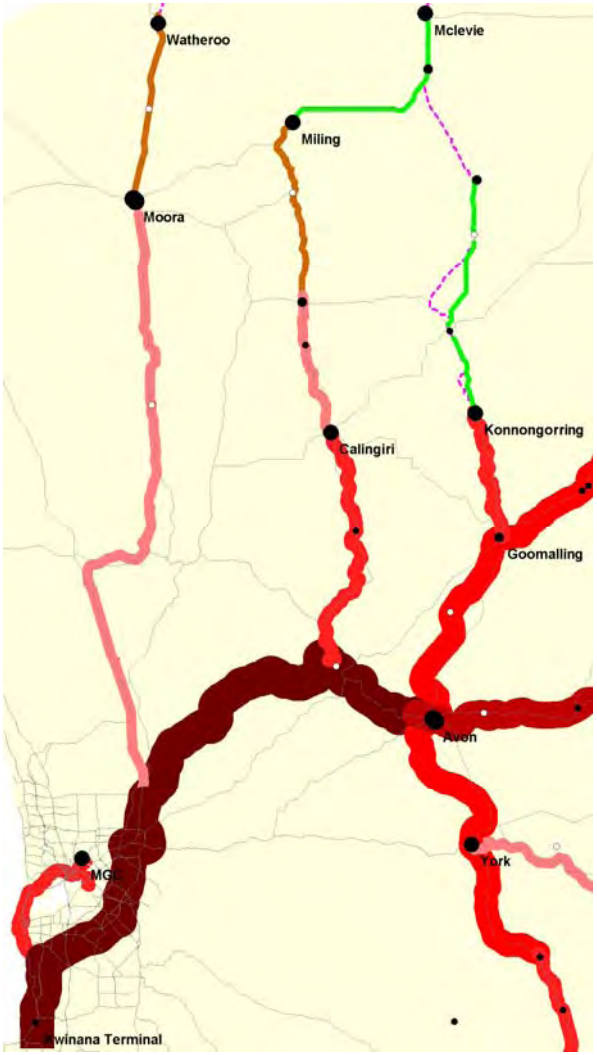
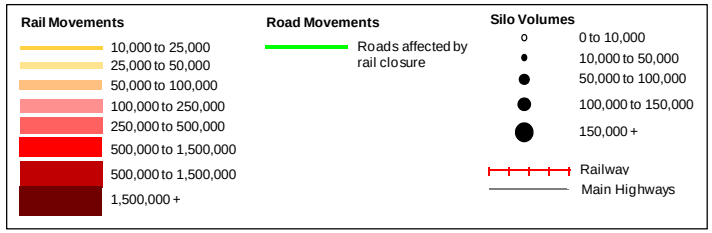


Figure 23 - Option 7: McLevie - Konnongoming closed





7. GERALDTON ZONE

7.1 Regional geography and volume flows

Two rail lines service the Geraldton grain chain, both of which are not considered part of the grain network for the purposes of this study. The Midland Railway links Perth with Geraldton and carries grain traffic in each direction, as well as other minerals product. The Perenjori line carries iron ore export traffic which is expected to increase markedly from various points such as Morawa and Perenjori in coming years.

The rail lines carried around 850,000 tonnes to port in 2009, of which over 550,000 tonnes were hauled from the Midland Railway sites at Mingenew and Carnamah alone. Both lines offer 19t axle loads along most of their length. A further 800,000 tonnes was delivered to port from road-only sites, mostly to the north and east of the port.

7.2 Recent logistics trends

The 2009 rail loading results illustrate the future patterns that will emerge in this area. Grain was consolidated from sites on both lines into Mingenew and Carnamah by road, since these sites offer the best rail loading facilities and cycle time into port, thus maximizing rail capability when heavy export volume is required.

While the road and rail operations in the Geraldton region are yet to mature in a post-deregulated environment, it is evident that CBH, ARG and WNR will need to conduct a more comprehensive study of the grain road routes being undertaken in the Geraldton area in view of the new volumes now moving between sites in east-west and north-south directions.

This is also an example of how a road-rail transfer operation might evolve in other regions as line closures take place (for instance as described herein for Brookton).

Separately, concerns over the future availability of flexible train pathing on the Perenjori line due to iron ore traffic levels have also driven the move by CBH towards the inner line.

7.3 Current road and rail condition issues

The line south of Perenjori carries only 70,000 tonnes on average and will be affected by poor path availability in future. Grain is now being trucked into Perenjori from suboptimal rail loading sites south to Maya. This line is considered non-viable and is a candidate for closure rather than the reinvestment which is due by 2013.

Road condition is the major identified problem in the region, with state and local roads all in need of upgrade. These routes include those roads running parallel to the Perenjori line along its length, as well as the east west routes linking the two lines.

The condition of these roads will worsen as grain continues to be consolidated at good loading points on both lines. The east-west routes to Carnamah and Mingenew are the obvious candidates for examination in view of the large volumes now moving on them due to the freedom to consolidate offered by Grain Express.

7.4 Need to improve silo rail siding capacity

The Midwest region has a growing iron ore export task focussed on Geraldton Port and in future on the proposed Oakajee Port. The line from Perenjori to Mullewa and Geraldon is already experiencing an increase in iron ore movements by rail.

Historically, the line served the grain sector solely. With consolidation of tonnage into the larger and more efficient sites of Mullewa, Morawa and Perenjori, train configurations have become larger and now exceed the capacity of the rail sidings at the grain silos. The consequence is that train shunting is substantially more complex and less efficient.

More significant however is that trains can often extend from the siding onto the main lines and impede the efficient and safe movement of other trains.

It has been assessed that investment needs to be undertaken to expand the sidings at Mullewa, Morowa and Perenjori, at a cost of $2 million each.

7.5 Outcomes

In summary, the Perenjori-Maya line could be slated for closure ahead of its next scheduled resleepering investment in 2013, and the rail sidings at Mullewa, Morowa and Perenjori be expanded at a total cost of $6 million.

Figure 24 – Geraldton grain network

8. INTEGRATED ROAD FREIGHT SERVICES

8.1 Increased use of road freight

While the main focus of this project has been on the definition of a sustainable rail network, the maintenance of a safe and effective road network is also critical to the industry and community. The Committee has been told there is evidence that roads in the wheatbelt have suffered from under-investment in recent years. A study commissioned by WALGA in 2008 estimated that $355m would be needed to bring local roads up to standard required to match the existing grain task. According to WALGA, this finding was supported by the Auditor-General's report 'Maintaining the State Road Network' which identified an $800m maintenance debt on State roads.

A large proportion of the rural freight task is accounted for by grain transport, and the use of wheatbelt roads has increased since the end of the orderly and comprehensive use of rail for export grain since 1999. The deregulatory moves which have offered increased supply chain flexibility have also made the use of the road network more common and less predictable. This trend can only increase the pressure on road networks and exacerabate the identified maintenance shortfall.

8.1.1 Road usage patterns

Roads are used in different ways at different stages of the harvest year:

a) At harvest time, from end October to January, the local road network is used extensively for concentrated short haul movements of grain from farms to bins. Roads at the farm gate are often narrow and unsealed, yet trucks of various types, laden to concessional (increased) mass limits operate intensively for the short local harvest period. From some areas close to ports, longer journeys are taken from the farm direct to port terminals, or MGC at Forrestfield.

b) After the harvest period, there is typically a peak export period to the middle of the year. During this time, road deliveries from farm, private (non-CBH) storage and CBH bins continue to arrive at ports and domestic consumers (mills etc) and container packers. These movements typically use State road corridors for the most part. At the same time, CBH increasingly uses trucks to consolidate stocks into key rail loading sites.

c) From June onwards, export volumes tend to fall off and rail transport can meet demand. Trucks continue to consolidate stocks, particularly to prepare carryover storage so as to have bins cleaned and maintained and to minimise disruptions to the next harvest.

This Report does not cover the use of local roads for the harvest delivery task. It is focused on the roads affected by the inter-bin movements and bin to port, which are a mix of State and local roads.

The movements from farm to bin are vitally important to growers, as any delays in delivery can have major adverse effects, for instance due to rainfall. The costs of transport are minimised by the abilty to maximise loading on every trip, reducing the impact of tipping delays and allowing more daily cycles. Road damage costs arising on local roads at harvest time are generally accepted as a responsibility of local government, in return for the benefit to the local grower community.

8.1.2 Increased usage

In addition to the long term maintenance shortfall, changes to the use of rail network will potentially create a need for capital improvements in roads. Many State and local roads are currently built to widths of less than 6 metres. While this width may be considered acceptable for infrequent trucking and limited car usage, more substantial freight movements would significantly increase the need for widening works on the grounds of safety for all road users, as well as operational (truck maintenance) costs.

The Committee was informed that freight operators and road authorities universally believe that a pavement width of 7.5 to 8.0 metres is necessary given the typical road vehicle configurations utilised in moving grain by road.

In 2009, there was considerable extra truck activity due to several factors:

- Large harvest and unexpectedly high early season shipping demand
- Lack of rail operational capacity to handle the peak demand
- Consolidation activity from small sites to larger sites to facilitate fast rail loading
- Urgent trucking to port, using roads not normally used by campaign ex-bin trucking
- Facilitation of inter-bin moves via Grain Express
- New rail freight rate structure and scale
- Non-competitive rail rates for moves into MGC.

In future years, it is likely there will be more balanced export activity throughout the year, which will reduce the need for road services augmenting rail capacity. However, there will be occasional periods of heavy road use for port deliveries, and there will be frequent use of road to consolidate stocks into good rail loading sites. There is potential for these movements to be better predicted and less damaging in future, but the extra trucking will inevitably add to total annual road maintenance costs.

In the following sections, the costs of road upgrades needed to handle the predicted future road freight task are addressed.

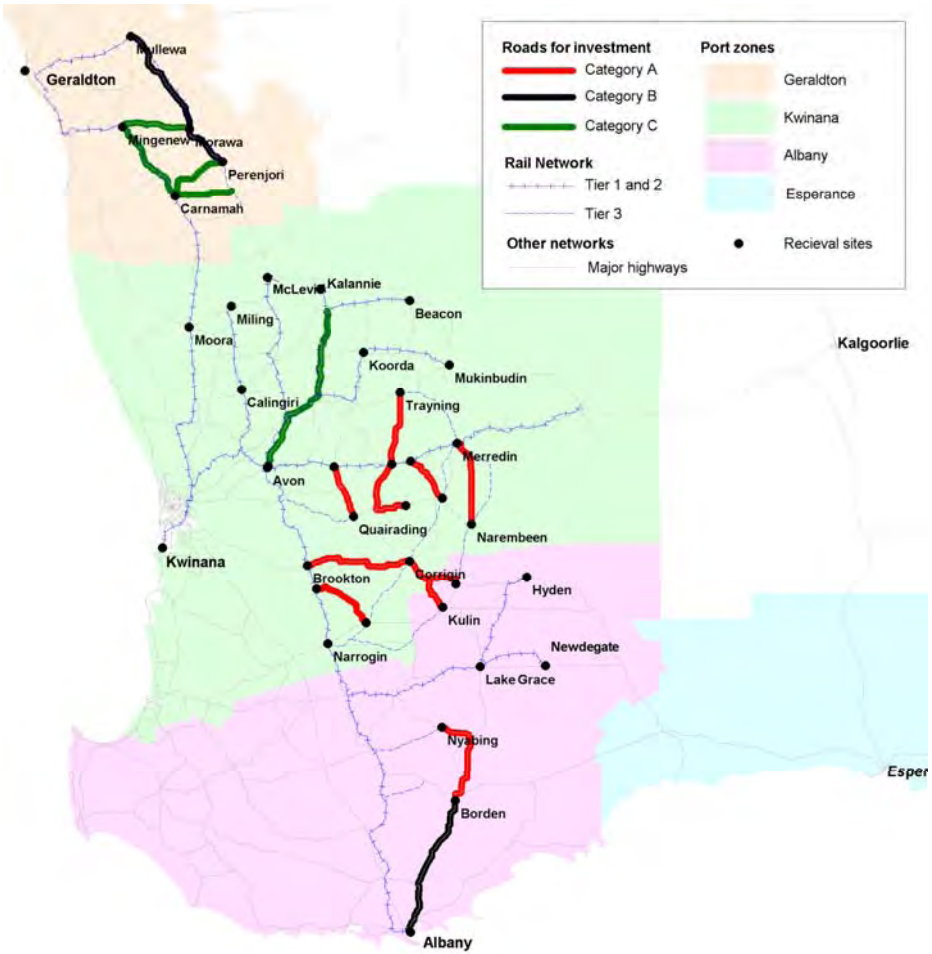
8.2 Road infrastructure cost estimates

Three categories of road usage were considered to assess the need and scope of road investment, as:

- Category A - Roads carrying increased grain tonnage which can be attributed to closures of Tier 3 lines
- Category B - Important grain haul roads which are already in a degraded condition
- Category C - Other roads experiencing significant extra freight activity

Each of these road categories are analysed in the following sections. In addition, the study identified a number of other roads which would be impacted by further rail closures (see Figure 25).

Figure 25 - Location of road investments under Category A, B and C



8.2.1 Road usage affected by rail closures

Road transport volumes will be increased by any reduction in usage of the rail network. Cessation of rail services on outlying rail branches – confirmed by subsequent formal closures – will lead to the transfer of rail volumes onto local and State roads leading either to port or to nearby rail-loading sites. While these movements will be predictable, they will result in the need for increased maintenance, and in some cases, capital upgrades.

Rail line closures proposed in this report are concentrated in the Kwinana South zone. Some roads in this region will experience increases in usage when rail services on these lines cease.

Information provided to the Committee by Main Roads WA and WALGA representatives has enabled a schedule of routes affected by rail closures to be prepared, with some preliminary estimates of capital upgrade costs that would be required to upgrade these routes to appropriate standard for the volumes predicted; the scoping of upgrades has however, been very approximate, and as a result the costs indicated here require confirmation by Main Roads WA. The routes identified are those which would most likely be affected by traffic moving towards the port, or to key transfer sites on the EGR and GSR rail lines. These assumptions have been made on the basis of current rail freight rates, and their competitiveness at various points with modeled road transport costs. Any substantial changes from year to year in rail freight rate structures could lead to changed freight flows in some areas.

Table 16 - Road investments arising directly from rail closures

Category	Road link	Road name	Zone	Class	Distance	New grain freight volume	Capital upgrade works required ($'000)	Additional annual maintenance ($'000)
Category A New volumes as a direct consequence of rail closures	Corrigin- Brookton	H52 Brookton Hwy	Kwinana Sth	state	92	280,000	21,900	258
	Kulin-Corrigin	M17 Gorge Rock-Lake Grace	Kwinana Sth	state	55	90,000	10,700	50
	Kondinin-Corrigin	H52 Brookton Hwy	Kwinana Sth	state	50	60,000	13,400	30
	Trayning-Kellerberrin	Bencubbin Kellerberrin Rd	Kwinana Sth	local	61	90,000	3,700	55
	Wickepin-Pingelly		Kwinana Sth	local	76	120,000	5,300	91
	Narembeen-Merriden		Kwinana Sth	local	92	130,000	5,200	120
	Bruce Rock-Doodlakine		Kwinana Sth	local	42	60,000	5,700	25
	Shackleton-Kellerberrin		Kwinana Sth	local	41	50,000	6,000	21
	Quairading-Cunderdin		Kwinana Sth	local	46	90,000	3,700	41
	Yealering-Pingelly		Kwinana Sth	local	25	20,000	2,000	10
	Dudinin-Wickepin	M38	Kwinana Sth	state	45	25,000	4,000	20
	Normans Lake-Wickepin		Kwinana Sth	local	25	5,000	500	0
	Tincurrin-Narrogin		Kwinana Sth	local	50	40,000	5,000	30
	South Kumminin-Narembeen		Kwinana Sth	local	15	20,000	1,000	10
	Nyabing-Borden	M21 Kojonup-Pingrup	Albany	state	84	30,000	8,000	25
	Subtotal						$96,100	785

8.2.2 Important grain haul roads already in degraded condition

WALGA representatives on the Committee provided information that there are many roads already heavily used for substantial grain movements to port and intermediate destinations, which are overdue for upgrade or major maintenance efforts. These routes will not necessarily be immediately affected by rail closures, but already service large truck volumes and are considered not fit for purpose for these volumes.

The most important of these routes is the Chester Pass Road, which carries over 350,000 tonnes of grain from road bins, including bins from the two short branch lines effectively closed over the last 3 years.

The other routes are sections of the M39 state road in the Geraldton area running parallel to the Mullewa- Perenjori line section.

Table 17 - Road investments associated with degraded heavy grain haul roads

Category	Road link	Road name	Zone	Class	Distance	New grain freight volume	Capital upgrade works required ($'000)	Additional annual maintenance ($'000)
Category B Significant grain routes already in degraded or unsuitable condition for existing task	Borden-Albany	M1 Albany-Lake Grace (Chester Pass Rd)	Albany	state	121	30,000	129,000	36
	Morawa-Mullewa	M39 Wubin-Mullewa	Geraldton	state	97	50,000	31,000	49
	Perenjori-Morowa	M39 Wubin-Mullewa	Geraldton	state	39	20,000	16,000	0
	Total						$176,000	85

8.2.3 Other roads experiencing significant extra freight activity

There are many other routes which are starting to see heavier volumes as a result of a tendency for grain to be loaded to rail at efficient sites, rather than at closer but smaller sites, even where rail remains in operation. As CBH uses its cargo assembly freedom under Grain Express to maximise the use of good rail loading bins and sidings, the smaller sites will increasingly become road-rail sites. Many of these roads are in the Kwinana North zone, where Avon has become a major consolidation point due to its fast train loading ability and fast train corridor to port. All roads leading towards Avon from the north-eastern area will experience some degree of extra freight, particularly at busy export periods.

The Category C list in Table 18 is distilled from the routes identified during the consultations with road authorities and is not intended to be a comprehensive table of all routes experiencing extra traffic in 2009.

Table 18 - Road investments associated with other grain freight traffic increases

Category	Road link	Road name	Zone	Class	Distance	New grain freight volume	Capital upgrade works required ($'000)	Additional annual maintenance ($'000)
Category C Sample of routes which will experience increased significant usage due to short inter-bin movements	Dowerin-Goomalling	M16 Goomalling-Merredin	Kwinana Nth	state	24	100,000	3,000	24
	Goomalling-Northam	M32 Northam-Pithara	Geraldton	state	47	110,000	13,000	52
	Carnamah-Mingenew	M28 Midlands Road	Geraldton	state	76	30,000	8,000	23
	Morawa-Mingenew	M25 Minginew-Morowa	Geraldton	state	61	50,000	10,800	31
	Bunjil-Carnamah		Geraldton	local	50	60,000	3,300	30
	Perenjori-Carnamah		Geraldton	local	55	70,000	2,900	39
	Burakin-Dowerin	Dowerin-Kalanie Rd	Kwinana Nth	local	84	60,000	6,600	50
	Total						$47,600	249

8.2.4 A consolidated view of road expenditure

Table 16 to Table 18 shown above indicates approximate total expenditure required to address the three categories outlined above and is summarised as follows. Once again it should be noted that the scoping of required new works on these roads is approximate and requires confirmation.

Table 19 below provides a summary of the road investments by Category, based on the preliminary estimates provided by Main Roads and WALGA, whereas Table 20 summarises the same road investments across each of the four port zones and by year, with an equal distribution of the expenditure out to 2013.

Table 19 - Summary of road expenditure and additional annual maintenance

Category	Capital upgrade works required ($'000)	Additional annual maintenance ($'000)
Category A New volumes as a direct consequence of rail closures	96,100	785
Category B Significant grain routes already in degraded or unsuitable condition for existing task	176,000	85
Category C Sample of routes which will experience increased significant usage due to short inter-bin movements	47,600	249
TOTAL	319,700	1,119

Table 20 – Summary of road investment schedule

Port zone	Road CAPEX				
	FY10	FY11	FY12	FY13	Total
Albany	34.3	34.3	34.3	34.3	137.0
Kwinana South	22.0	22.0	22.0	22.0	88.1
Kwinana North	5.7	5.7	5.7	5.7	22.6
Geraldton	18.0	18.0	18.0	18.0	72.0
Total	73.1	73.1	73.1	73.1	319.7

8.2.1 Other identified routes which would be affected by further rail closures

Cessation of rail services on lines as mentioned in this report will affect the road routes in Table 16 above. If, however, more substantial cessation of rail services were to occur, many more road corridors would be affected.

Table 21 over page identifies those routes and the preliminary costs of necessary upgrades.

Subject to future grain flows, it may also be the case that a number of these routes could qualify for capital investment under Category B or Category C outlined herein.

Table 21 - Potential road expenditure should future cessation of rail services eventuate

Region	Road section	Road name	Class	Distance (km)	Current annual volumes (grain/other)	Average annual grain volume added (by rail closures)	Rail closure scenario	Total capital upgrade works required to accommodate additional volume ($'000)	Additional annual maintenance ($'000)
Kwinana South	Brookton-Kwinana	H52 Brookton Hwy	state	140		600,000	Rail closure as per full Brookton strategy but no Brookton Strategy implemented (thus all freight on road to Kwinana)	150,000	840
Albany	Hyden-Lake Grace	Nth Lake Grace-Karlgarin Rd, Pederah Rd	local	99		180,000	Wagin - Hyden section closed	16,000	178
	Lake Grace-Pingrup	M1 Albany-Lake Grace	state	51		230,000	Wagin - Hyden section closed	15,300	117
	Newdegate-Pingrup	Newdegate-Pingrup	local	103		160,000	Wagin - Hyden section closed	30,900	165
	Pingrup-Borden	M1 Albany-Lake Grace	state	76		420,000	Wagin - Hyden section closed	34,100	319
	Borden-Albany	M1 Albany-Lake Grace	state	121	350,000	420,000	Wagin - Hyden section closed	129,000	508
Kwinana North	Nungarin-Merredin	M16 Goomalling-Merredin	state	40		40,000	Trayning - Merredin line closed	4,500	16
	Beacon-Mollerin	Burakin Wialki Rd	local	40		90,000	Beacon - Burakin line closed	2,100	36
	Mollerin-Koorda	Koorda Mollerin Rd, Burakin Wialki Rd	local	48		90,000	Beacon - Burakin line closed	4,000	43
	Mukinbudin-Nungarin	Nungarin North Rd	local	39		200,000	Mukinbudin - Koorda closed	4,600	78
	Nungarin-Merredin	M16 Goomalling-Merredin	state	40		240,000	Mukinbudin - Koorda closed	12,000	96
	Bencubbin-Koorda	Koorda Bullfinch Rd	local	40		40,000	Mukinbudin - Koorda closed	2,600	16
	Mollerin-Burakin	Burakin Wialki Rd	local	40		20,000	road consolidation from smaller sites into Avon, though line remains open	3,700	8
	McLevie-Miling	H6 GNH 184-233	state	49		160,000	McLevie - Konnongorring closed	6,000	78
	Ballidu-Konnongorring	M32 Northam-Pithara 74-129	state	50		110,000	McLevie - Konnongorring closed	12,500	55
	Konnongorring-Northam	M32 Northam-Pithara 00-74	state	81		180,000	McLevie - Goomalling closed	14,000	146
	Miling-Moora	Moora Miling Rd, H6 GNH	state	42		90,000	Miling - Calingiri closed	2,900	38
	Bindi Bindi-Calingiri	Toodyay Bindi Bindi Rd (Moora, Vic Plains)	state	55		90,000	Miling - Calingiri closed	3,800	50
	Calingiri, Great Northern Hwy to Kwinana	Calingiri Rd	state	244		220,000	Miling - Toodyay closed	9,000	66
Total				1,298				457,000	2,853

8.3 Grain Transport System Management for the 21st Century

The new deregulated environment for grain marketing provides challenges to the grain industry and government agencies to improve integration of road and rail transport for the rural sector. The export grain freight task is no longer split between separate road and rail networks and corridors as under the 'orderly' grain marketing arrangements of the past. The use of road transport will be more widespread and market forces will not optimise the use of infrastructure in the overall public interest without deliberate management of the overall system and some guidance from government.

More integated transport system management for the grain belt would encompass the following:

- Defintion of a long term sustainable rail network, supported from time to time by by public investment where sound business cases exist
- Complementary investment in road and rail corridors to avoid duplication
- Revision of the heavy vehicle combination permit system to reduce the widespread use of roads unfit for heavy haulage
- Improved bi-lateral co-ordination of CBH cargo assembly and mode choices with rail system development and operation.

These issues are expanded on below:

8.3.1 Definition of sustainable rail network for the 21st Century

It is in the interest of all players in the grain supply chain and of government to agree a core Tier 1 railway network which will continue to be supported where warranted by government so that private sector players can invest with confidence in complementary private assets and services.

Decisions taken now about the extent of the rail network required into the future should involve a commitment to the indicated program of public funding extending where warranted to a minimum of 10 years. The Agreement now under negotiation betwen WNR and PTA is the most appropriate vehicle in which to capture this understanding.

8.3.2 Complementary road corridor investments

Many road routes need urgent upgrading as a result of cessation of rail services as a result of long term changes to rail loading policy by CBH. These road routes should be clearly identified and earmarked for staged upgrading. The aim should be to funnel grain from outlying areas to high quality rail loading sites on core Tier 1 rail lines, which will help maintain overall rail volumes and viability, while limiting the volumes using the busier road routes through populated areas to ports and other destinations. This will generate safety, environmental and community amenity benefits.

An integrated approach where road project funding is targeted to support funding of Tier 1 and 2 rail sections yields lower commercial and economic cost outcomes for future governments and growers in the longer term.

These investments should be made via a standalone funding mechanism separate to normal road maintenance and capital works budget sources.

8.3.3 Revision of heavy vehicle mass limits policy

Current practice in issuing of permits for the use of local roads by heavy vehicles lacks a strategic context, and is probably contributing to the maintenance shortfall by permitting heavy vehicle use on many roads which were and will be unfit for this purpose. In short, there are too many roads for which permits are available, particularly post-harvest. As part of the road and rail system management arrangements refered to above, Main Roads WA (with government policy support) , WALGA and CBH should identify a more limited network hierarchy of routes on which permits will be granted under certain conditions.

While this would no doubt increase marginally road freight costs in some situations, the benefits in reduced maintenance costs will be much greater. Local authorities would be able to focus scarce funds on a limited number of strategically important routes, and apply their resouces for compliance and enforcement for more effective asset protection.

8.3.4 Improved bi-lateral relationship with CBH

Control of the export supply chain by CBH through Grain Express creates the opportunity for improved road use outcomes through greater co-operation between grain supply chain participants. CBH has the ability to control the use of the road network to a large degree and has recognised its enhanced responsibility for supply chain management in the deregulated era. CBH faces competitive pressures which means it legitimately searches for the least cost option for its road and rail movements. However, it has many storage assets which will benefit from proposed rail investments and it is fair for Government to seek maximum co-operation from CBH to maximise the benefits from rail and road funding strategies.

CBH has indicated it will initiate improved consultation with local authorities regarding the use of local roads for inter-bin movements. It can also ensure that certain routes are not used by its contractors when more cost-effective routes have been identified. CBH can use its contractual relationships with its road carriers to monitor their route usage, in order to support these initiatives.

An improved, more focused relationship between CBH, Main Roads WA and local governments in the wheatbelt, focusing on managed road use, would pay off immediately.

9. LONGER TERM PERSPECTIVES

The SGNR process was also required to consider long term initiatives for the rail network. A number of key issues arise when a planning horizon of 30 years is considered:

- A significant outcome arising from the study was the inherent inability of rail transport in the Kwinana South zone to compete with road transport direct to Kwinana Port, mainly due to the indirect pathway for rail movements, via Avon to port. Findings in this report suggest closure of present 16-tonne lines in the Kwinana South zone and instigation of the "Brookton Strategy" of integrated road and rail services hubbing through the Brookton storage site. This strategy seeks to minimise the movement of grain by road, but the rail pathway via Avon remains suboptimal over the long term.
- It is anticipated that inter- and intra-state freight demand on the main east-west rail corridor will increase markedly over the next 30 year, driven by the growth in consumer demand for products supplied from the east coast, and growth in international cargoes through the port of Fremantle.
- Moreover, rail traffic through the Kwinana area is already nearing the capacity of the rail network connecting to the Kwinana grain terminal, and future growth of EGR freight will further exacerbate rail system congestion in the Kwinana area. These issues are presently the subject of other freight and port studies being undertaken.
- A number of potential "non-grain" freight tasks including export hay from the York-Brookton area and mining operations near Kulin would also benefit from a competitive rail service from the Brookton area.

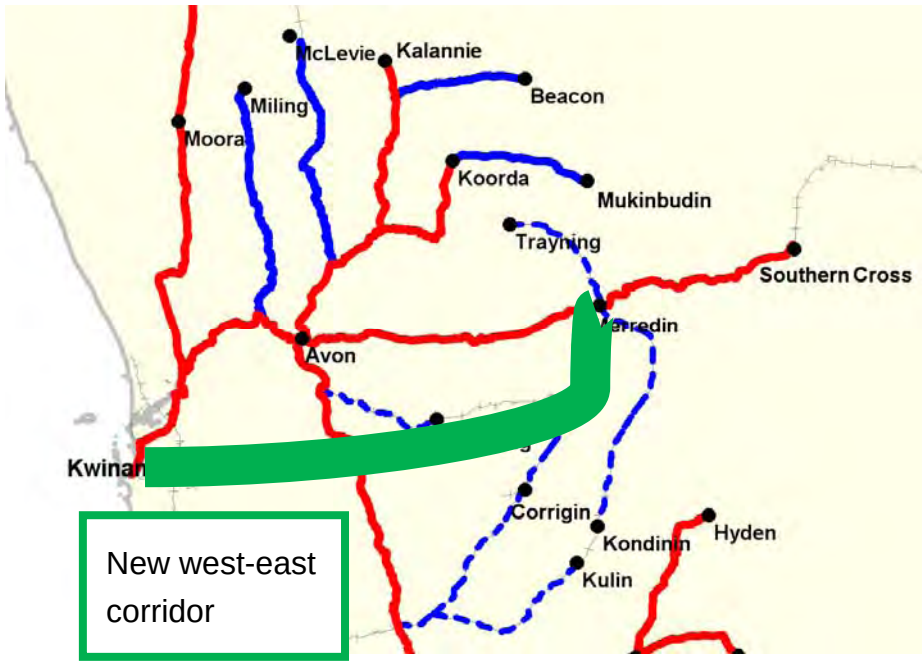
These drivers (i.e. the indirect rail pathways serving Kwinana South, the growth in east-west national rail corridor traffic and the potential for future non-grain traffic) when considered cumulatively warrant further investigation of a possible alternative rail corridor linking Kwinana via the Brookton-Corrigin area to the EGR at Merredin.

The benefit to this rail infrastructure would be to allow substantial freight movements to bypass the congested Kwinana-Fremantle-Kewdale-Forrestfield 'bottleneck' and provide more efficient movement of grain and other commodities to port.

The SGNR Committee agreed that there was merit in undertaking a pre-feasibility study to assess the potential for a project to be undertaken in coming decades. The cost of the study is estimated to be in the order of $300,000 to $500,000.

The study would review other strategic studies to verify potential demand-side opportunities and to assess the relative capacity and efficiency benefits in alleviating burgeoning congestion at key points in the existing and future rail network. The study would also consider (at a high level) potential infrastructure scope and corridor routes and any geographical and topographical constraints. A high-level project cost would be also developed.

Figure 26 - Potential west-east rail corridor for Kwinana to Merredin



10. SUMMARY OF INVESTMENT AND RECURRENT EXPENDITURE

The following table summarises the required road and rail capital expenditure identified through this report, together with estimated increased recurrent road maintenance costs and transitional costs associated with implementing the Brookton Strategy.

Table 22 - Summary of investment, recurrent and transitional costs

INVESTMENT CAPITAL ($M)		Albany	Kwinana South	Kwinana North	Geraldton	Total
Rail CAPEX	*Tier 1*	72.2	12.5	36.5	-	121.2
	Tier 2	-	-	43.3	-	43.3
	Subtotal	72.2	12.5	79.8	0.0	164.5
Road CAPEX	*State*	137.0	50.0	16.0	65.8	268.8
	Local	-	38.1	6.6	6.2	50.9
	Subtotal	137.0	88.1	22.6	72.0	319.7
Bin and siding upgrade CAPEX	*Subtotal*	0.0	15.0	0.0	6.0	21.0
Transitional arrangements	*2010*	-	6.9	-	-	6.9
	2011	-	1.9	-	-	1.9
	2012	-	1.4	-	-	1.4
	2013	-	1.4	-	-	1.4
	2014	-	1.4	-	-	1.4
	2015	-	1.4	-	-	1.4
	2016	-	1.4	-	-	1.4
	Subtotal	-	16.0	-	-	16.0
Total CAPEX	*Total*	209.2	131.6	102.4	78.0	527.2

RECURRENT MAINTENANCE ($M)		Albany	Kwinana South	Kwinana North	Geraldton	Total
Road Maintenance Annual Recurrent	State	-	0.4	0.1	0.1	0.6
	Local	-	0.3	0.1	0.1	0.5
Total RECURRENT	Subtotal	0.0	0.7	0.2	0.2	1.1

11. APPENDIX

Table 23 - Summary of WA grain production by type

Grain type	Metric	Unit	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10f
Wheat	Area	*'000 ha*	4,515	4,556	4,460	4,350	4,458	4,917	5,118	4,753	4,037	4,258	4,900	4,980
	Yield	*t/ha*	1.8	2.0	1.3	1.8	0.9	2.3	1.7	1.9	1.3	1.4	1.8	1.8
	Production	*kt*	8,170	9,004	5,814	7,760	4,047	11,070	8,619	9,088	5,134	5,820	8,915	8,743
Barley	Area	*'000 ha*	811	550	983	1,088	1,140	1,278	1,313	1,129	1,083	1,381	1,250	1,230
	Yield	*t/ha*	1.8	2.0	1.4	2.1	1.2	2.5	1.5	2.1	1.7	2.0	2.0	1.9
	Production	*kt*	1,469	1,117	1,358	2,263	1,349	3,170	1,979	2,400	1,808	2,719	2,527	2,372
Lupins	Area	*'000 ha*	1,180	1,133	987	920	795	667	677	672	530	546	267	326
	Yield	*t/ha*	1.2	1.4	0.8	1.0	0.7	1.5	1.2	1.6	0.8	1.0	1.3	1.2
	Production	*kt*	1,372	1,637	783	904	587	969	792	1,064	409	533	341	401
Canola	Area	*'000 ha*	536	879	517	394	349	358	428	437	411	595	620	626
	Yield	*t/ha*	1.1	1.1	0.7	1.1	0.9	1.5	1.1	1.4	1.0	1.3	1.8	1.3
	Production	*kt*	615	963	353	419	299	527	488	617	392	752	1,138	825
"Other"	Area	*'000 ha*	122	124	168	105	88	83	114	102	83	56	60	67
	Yield	*t/ha*	0.9	0.9	0.4	1.0	0.3	1.5	0.8	1.2	0.7	1.2	0.9	1.2
	Production	*kt*	109	116	75	106	29	122	86	127	57	66	53	81
Totals	Area	*'000 ha*	7,164	7,242	7,115	6,856	6,830	7,303	7,650	7,093	6,144	6,836	7,097	7,229
	Yield	*t/ha*	1.6	1.8	1.2	1.7	0.9	2.2	1.6	1.9	1.3	1.4	1.8	1.7
	Production	*kt*	11,735	12,837	8,382	11,452	6,311	15,858	11,964	13,296	7,800	9,890	12,973	12,423

Table 24 - Forecast rail capital expenditure to 2013 initially proposed by WNR

Zone	Line section	Rail CAPEX				
		FY10	FY11	FY12	FY13	Total
Albany	Narrogin - Wagin	-		-	-	-
	Wagin - Katanning	5.6	0.6	-	-	6.2
	Katanning - Tambellup	7.0	0.8	-	-	7.8
	Tambellup - Albany	17.1	-	-	-	17.1
	Lake Grace - Wagin	-	17.7	-	-	17.7
	Hyden - Lake Grace	-	11.6	2.4	-	14.0
	Lake Grace - Newdegate	-	9.4	-	-	9.4
	Gnowangerup - Tambellup	-	-	-	-	-
	Nyabing - Katanning	-	-	-	-	-
	Total	29.7	40.1	2.4	-	72.2
Kwinana South	Avon (Northam) - York	3.1	-	-	-	3.1
	Narrogin - York	9.4	-	-	-	9.4
	Bullaring - West Merredin	-	7.1	-	9.3	16.4
	West Merredin - Narembeen	-	-	-	21.8	21.8
	Bullaring - Yilliminning	-	-	-	6.8	6.8
	Narrogin - Yilliminning	-	-	3.5	-	3.5
	Kulin - Yilliminning	-	-	14.4	-	14.4
	Quairading - York	-	11.0	-	-	11.0
	Total	12.5	18.1	17.9	37.9	86.4
Kwinana North	Kalannie - Burakin	-	-	-	3.1	3.1
	Burakin - Amery	-	-	-	12.1	12.1
	Koorda - Wyalkatchem	-	-	6.8	-	6.8
	Wyalkatchem - Amery	-	-	4.9	-	4.9
	Amery - Goomalling	-	-	5.2	-	5.2
	Goomalling - Avon	-	-	4.4	-	4.4
	Mukinbudin - Koorda	-	-	11.5	-	11.5
	Beacon - Burakin	-	11.0	-	-	11.0

	Mclevie - Goomalling	-	8.2	12.6	-	20.8
	Miling - Toodyay West	-	-	-	-	-
	Trayning - West Merredin	-	5.4	5.5	-	10.9
	Total	-	24.6	50.9	12.1	87.6
Geraldton	Perenjori - Maya	-	-	-	8.7	8.7
	Total	-	-	-	8.7	8.7
ALL TOTALS		42.2	71.8	71.2	72.8	258.0

11.1 Monthly rail and road flows and volumes

Figure 27 - November 2008 rail and road flows

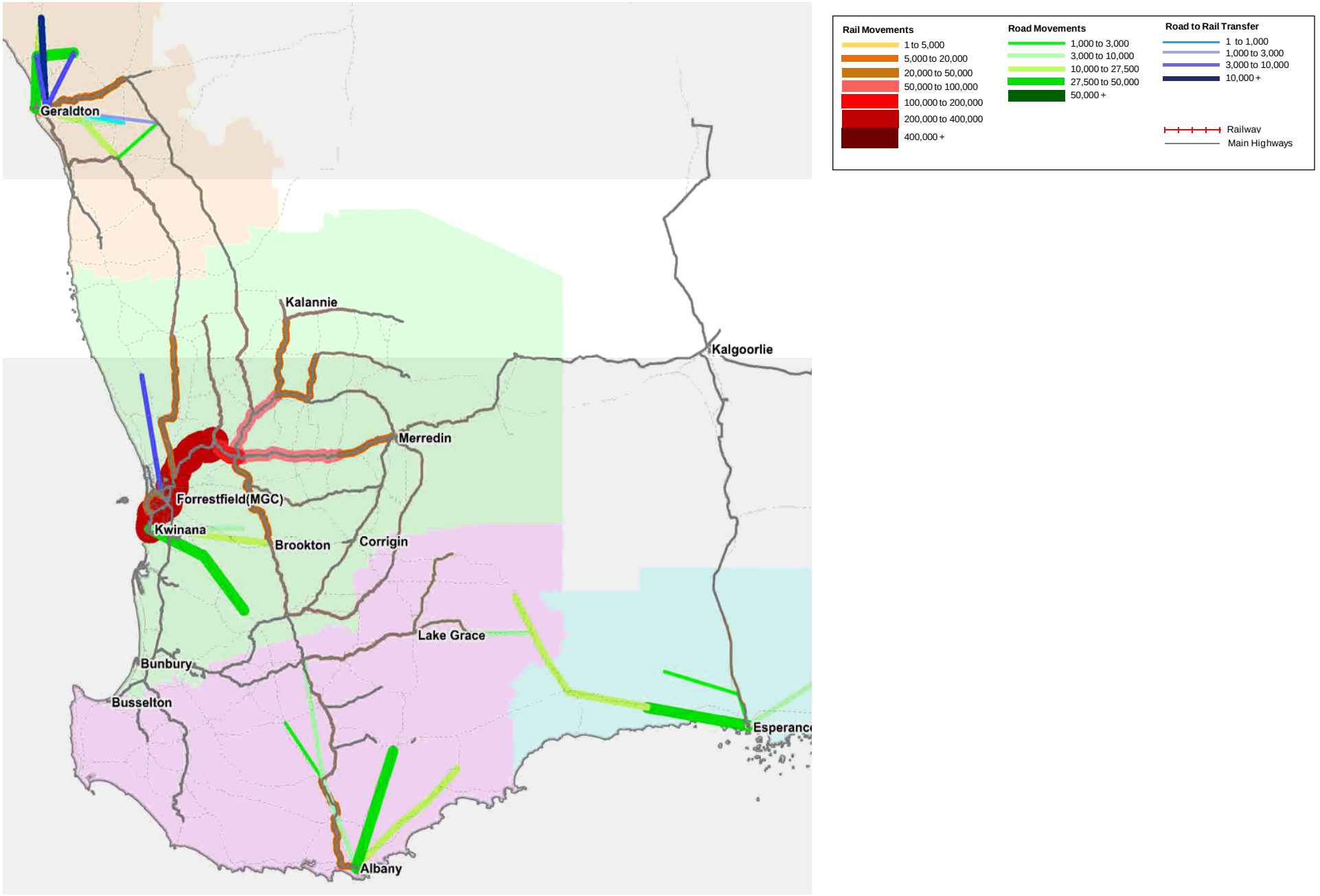


Figure 28 - January 2009 rail and road flows

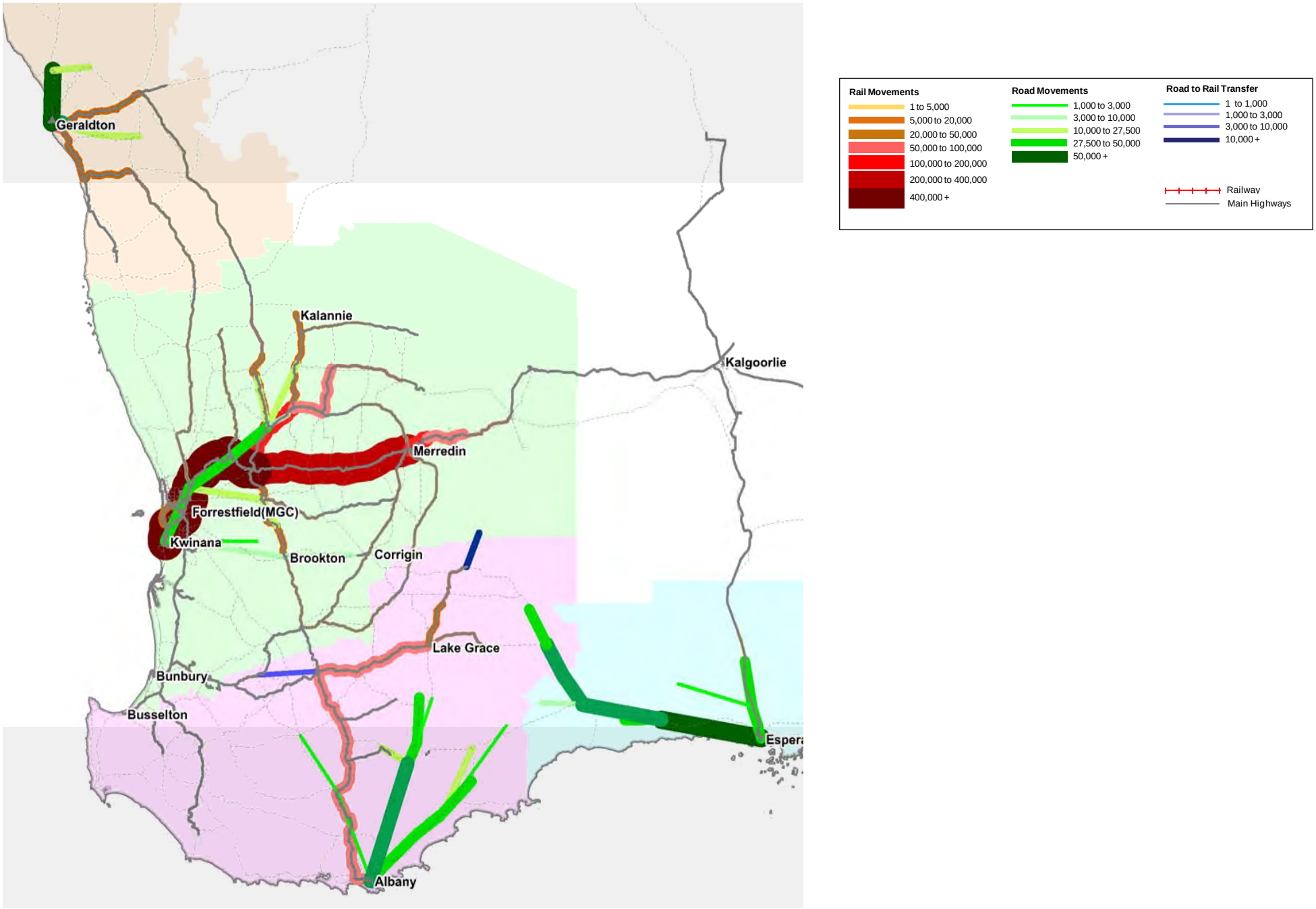


Table 25 - Road expenditure estimates from MRWA with WALGA (workshop outcomes)

Region	Road section	Class	Distance	Current annual volumes (grain + other)	AVG annual grain volume added (by rail closures)	Rail closure scenario	Total capital upgrade works required to accommodate additional volume ($'000)	Additional annual maintenance ($'000)	Comments
Kwinana South Zone	Corrigin- Brookton	state	92		280,000	A	21,900	258	
	Kulin-Corrigin	state	55		90,000	A	10,750	50	
	Wickepin-Pingelly	local	76		120,000	A	5,300	91	
	Kondinin-Corrigin	state	50		60,000	A	13,400	30	
	Brookton-Kwinana	state	140		600,000	B	150,000	840	Provisional metro capital estimate
	Narembeen-Merriden	local	92		130,000	A	5,200	120	
	Bruce Rock-Doodlakine	local	42		60,000	A	5,700	25	
	Shackleton-Kellerberrin	local	41		50,000	A	6,000	21	
	Quairading-Cunderdin	local	46		90,000	A	3,700	41	
	Yealering-Pingelly	local	25		20,000	-	2,000	10	
	Dudinin-Wickepin	state	45		25,000	-	4,000	20	
	Normans Lake-Wickepin	local	25		5,000	-	500	0	
	Tincurrin-Narrogin	local	50		40,000	-	5,000	30	
	South Kumminin-Narembeen	local	15		20,000	-	1,000	10	
Albany zone	Borden-Albany	state	121	350,000	30,000	C	129,000	36	Passing lanes & bridge widenings
	Nyabing-Borden (via Pingrup Rd)	state	84		30,000	C	8,000	25	Int'n upgrade (other works incl in M1 cost)
	Hyden-Lake Grace	local	99		180,000	D	16,000	178	
	Lake Grace-Pingrup	state	51		230,000	D	15,300	117	
	Newdegate-Pingrup	local	103		160,000	D	30,900	165	
	Pingrup-Borden	state	76		420,000	D	34,100	319	
	Borden-Albany	state	121	350,000	420,000	D	129,000	508	Passing lanes & bridge widenings
Kwinana North Zone	Trayning-Kellerberrin	local	61		90,000	E	3,700	55	
	Nungarin-Merredin	state	40		40,000	E	4,500	16	
	Beacon-Mollerin	local	40		90,000	F	2,100	36	
	Mollerin-Koorda	local	48		90,000	F	4,000	43	
	Mukinbudin-Nungarin	local	39		200,000	G	4,600	78	($3.2M est provided by LGA CEO)
	Nungarin-Merredin	state	40		240,000	G	12,000	96	
	Bencubbin-Koorda	local	40		40,000	G	2,600	16	
	Mollerin-Burakin	local	40		20,000	H	3,700	8	
	Burakin-Dowerin	local	84		60,000	H	6,600	50	
	Dowerin-Goomalling	state	24		100,000	I	3,000	24	
	Goomalling-Northam	state	47		110,000	I	13,000	52	
	McLevie-Miling	state	49		160,000	J	6,000	78	Passing lanes & int'n improvements
	Ballidu-Konnongoring	state	50		110,000	J	12,500	55	
	Konnongoring-Northam	state	81		180,000	K	14,000	146	
	Miling-Moora	state	42		90,000	L	2,900	38	
	Bindi Bindi-Calingiri	state	55		90,000	L	3,800	50	
	Calingiri-Great Northern Hwy	state	29		220,000	M	9,000	66	
	(then to Kwinana)	state	115		220,000	M	0	0	
Geraldton zone	Perenjori-Carnamah	local	55		70,000	N	2,900	39	
	Morawa-Mingenew	state	61		50,000	N	10,800	31	
	Bunjil-Carnamah	local	50		60,000	N	3,300	30	
	Morawa-Mullewa	state	97		50,000	N	31,000	49	
	Carnamah-Mingenew	state	76				8,000	0	
	Perenjori-Morowa	state	39				16,000	0	

Rail closure scenarios	
A	Staged closure of Quairading, Kulin, Bullaring, Kondinin, Yealering lines, with successful Brookton strategy
B	As per Scenario A, but no Brookton Strategy implemented (thus all freight on road to Kwinana)
C	Rail line maintained Hyden and Newdegate, Nyabing and Gnowangerup lines closed
D	Wagin-Hyden section closed
E	Trayning-Merredin line closed
F	Beacon-Burakin line closed
G	Mukinbudin-Koorda closed
H	road consolidation from smaller sites into Avon, though line remains open
I	new Dowerin area site volumes, plus Scenario H
J	McLevie-Konnongoring closed
K	McLevie - Goomalling closed
L	Miling-Calingiri closed
M	Miling-Toodyay closed
N	Perenjori-South closed or inaccessible for grain traffic

Table 26 - Road/rail price differentials by number of sites and volume (Mt)

Scenarios	Price metrics		Site #					Volume Mt				
			Overall	Kwinana	Albany	Geraldton	Esperance	Overall	Kwinana	Albany	Geraldton	Esperance
$1.20,No CO2	Rail advantage	>5%	71	39	22	10	0	3.5	1.9	1.0	0.6	0.0
	Marginal	+/- 5%	26	23	1	2	0	0.9	0.8	0.0	0.1	0.0
	Road advantage	>5%	51	46	0	5	0	1.9	1.8	0.0	0.1	0.0
	Sum		148	108	23	17	0	6.4	4.5	1.0	0.8	0.0
$1.70, $20 CO2	Rail advantage	>5%	92	57	23	12	0	4.1	2.4	1.0	0.7	0.0
	Marginal	+/- 5%	14	12	0	2	0	0.6	0.5	0.0	0.1	0.0
	Road advantage	>5%	42	39	0	3	0	1.7	1.6	0.0	0.0	0.0
	Sum		148	108	23	17	0	6.4	4.5	1.0	0.8	0.0
$2.40, $40 CO2	Rail advantage	>5%	100	64	23	13	0	4.5	2.8	1.0	0.8	0.0
	Marginal	+/- 5%	21	19	0	2	0	0.6	0.6	0.0	0.0	0.0
	Road advantage	>5%	27	25	0	2	0	1.2	1.2	0.0	0.0	0.0
	Sum		148	108	23	17	0	6.4	4.5	1.0	0.8	0.0

Table 27 - Road/rail price differentials by number of sites (%) and by volume (%)

Scenarios	Price metrics		Site %					Volume %				
			Overall	Kwinana	Albany	Geraldton	Esperance	Overall	Kwinana	Albany	Geraldton	Esperance
$1.20,No CO2	Rail advantage	>5%	48%	36%	96%	59%	0%	55%	42%	99%	74%	0%
	Marginal	+/- 5%	18%	21%	4%	12%	0%	15%	18%	1%	12%	0%
	Road advantage	>5%	34%	43%	0%	29%	0%	30%	40%	0%	14%	0%
	Sum		100%	100%	100%	100%	0%	100%	100%	100%	100%	0%
$1.70, $20 CO2	Rail advantage	>5%	62%	53%	100%	71%	0%	65%	53%	100%	86%	0%
	Marginal	+/- 5%	9%	11%	0%	12%	0%	9%	11%	0%	8%	0%
	Road advantage	>5%	28%	36%	0%	18%	0%	26%	36%	0%	6%	0%
	Sum		100%	100%	100%	100%	0%	100%	100%	100%	100%	0%
$2.40, $40 CO2	Rail advantage	>5%	68%	59%	100%	76%	0%	71%	61%	100%	93%	0%
	Marginal	+/- 5%	14%	18%	0%	12%	0%	10%	13%	0%	4%	0%
	Road advantage	>5%	18%	23%	0%	12%	0%	19%	26%	0%	2%	0%
	Sum		100%	100%	100%	100%	0%	100%	100%	100%	100%	0%

11.2 Albany analysis

Table 28 - Net present values: Options relating to Albany zone

($m)	Item	Value	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	Hurdle rate	6.5%																														
Option 1:	Invest in rail																															
	Rail capex	72.2	29.7	40.1	2.4	-	-	-	-	-	-	-	-	-	-	-	-	29.7	40.1	2.4	-	-	-	-	-	-	-	-	-	-	-	-
	Road capex	137.0	34.3	34.3	34.3	34.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Op. cost difference		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Externalities		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Total		64.2	74.6	36.9	34.5	34.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	30.0	40.4	2.7	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	NPV	$236.4																														
Option 2:	Close Wagin-Hyden																															
	Rail capex	29.7	29.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road capex	225.3	37.6	37.6	37.6	37.6	37.6	37.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Op. cost difference		3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	Externalities		2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	Total		74.0	44.3	44.3	44.3	44.3	44.3	44.3	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	36.5	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
	NPV	$333.1																														

11.1 Kwinana South analysis

The following table summarises the modelling for each phase against the 10yr average and the 2008-09 harvest year.

Main focus should be given to the subtotals (excluding the EGR)

Table 29 - Kwinana South modelling summary

	Catchment Summary	*10 Yr Average tonnes*						*2008/09 Yr tonnes*					
		Vol. (Mt)	As Is Case ($Mil)			Brookton strategy ($Mil)		Vol. (Mt)	As Is Case ($Mil)			Brookton strategy ($Mil)	
			Rail	Road	Delta	Integrated	Delta		Rail	Road	Delta	Integrated	Delta
As Is	Brookton	0.16			-0.65	2.79	-0.27	0.23			-0.95	3.85	-0.40
	York	0.13			-0.42	2.07	-0.26	0.17			-0.48	2.59	-0.35
	Narrogin remainder	0.07			-0.29	1.30	-0.29	0.04			-0.21	0.88	-0.21
	Kulin & Yealing lines	0.19			-0.66	5.40	-0.66	0.21			-0.68	5.87	-0.68
	Merreden feeders	0.60			-5.38	20.60	-5.38	0.62			-5.80	21.60	-5.80
	Subtotal (excl. EGR)	*1.15*			*-7.41*	*32.16*	*-6.86*	*1.27*			*-8.12*	*34.79*	*-7.44*
	EGR	0.12			-0.19	2.29	0.00	0.12			-0.18	2.44	0.02
	Total (incl. EGR)	*1.26*			*-7.60*	*34.45*	*-6.86*	*1.39*			*-8.30*	*37.24*	*-7.42*
Phase 2	Brookton	0.33			-2.93	6.80	-0.49	0.41			-3.47	8.22	-0.63
	York	0.14			-0.61	2.44	-0.26	0.18			-0.64	2.92	-0.35
	Narrogin remainder	0.07			-0.29	1.30	-0.29	0.04			-0.21	0.88	-0.21
	Kulin & Yealing lines	0.19			-0.66	5.40	-0.66	0.21			-0.68	5.87	-0.68
	Merreden feeders	0.00			0.00	0.00	0.00	0.00			0.00	0.00	0.00
	Subtotal (excl. EGR)	*0.73*			*-4.49*	*15.94*	*-1.70*	*0.84*			*-5.00*	*17.89*	*-1.88*
	EGR	0.53			-3.11	12.69	0.66	0.55			-3.29	13.24	0.56
	Total (incl. EGR)	*1.26*			*-7.60*	*28.64*	*-1.04*	*1.39*			*-8.30*	*31.14*	*-1.32*
Phase 3	Brookton	0.52			-3.59	11.78	-0.73	0.62			-4.15	13.67	-0.89
	York	0.14			-0.61	2.44	-0.26	0.18			-0.64	2.92	-0.35
	Narrogin remainder	0.07			-0.29	1.30	-0.29	0.04			-0.21	0.88	-0.21
	Kulin & Yealing lines	0.00			0.00	0.00	0.00	0.00			0.00	0.00	0.00
	Merreden feeders	0.00			0.00	0.00	0.00	0.00			0.00	0.00	0.00
	Subtotal (excl. EGR)	*0.73*			*-4.49*	*15.52*	*-1.28*	*0.84*			*-5.00*	*17.47*	*-1.45*
	EGR	0.53			-3.11	12.69	0.66	0.55			-3.29	13.24	0.56
	Total (incl. EGR)	*1.26*			*-7.60*	*28.22*	*-0.63*	*1.39*			*-8.30*	*30.71*	*-0.90*

Table 30 - Net present values: Options relating to Kwinana South zone

($m)	Item	Value	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	Hurdle rate	6.5%																														
Option 1:	Close rail lines																															
	Rail capex	12.5	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road capex	238.2	39.7	39.7	39.7	39.7	39.7	39.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Above rail subsidy		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Externalities		5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
	Total		59.0	46.5	46.5	46.5	46.5	46.5	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	19.3	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
	NPV	$296.9																														
Option 2:	Invest in rail lines																															
	Rail capex	97.3	12.5	23.5	23.4	37.9	-	-	-	-	-	-	-	-	-	-	-	12.5	23.5	23.4	37.9	-	-	-	-	-	-	-	-	-	-	-
	Road capex	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Above rail subsidy		7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
	Externalities		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Total		20.9	31.9	31.8	46.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	20.9	31.9	31.8	46.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
	NPV	$222.8																														
Option 3a:	Brookton strategy																															
	Rail capex	12.5	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road capex	88.1	22.0	22.0	22.0	22.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Site capex (i.e. Brookton, etc)		10.0																													
	Above rail subsidy		6.9	1.9	1.4	1.4	1.4	1.4	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Externalities		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	Total		53.8	26.3	25.8	25.8	3.7	3.7	3.7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	14.8	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	NPV	$144.8																														
Option 3b:	Brookton strategy (max road CAPEX for equivalent outcome to Option 2)																															
	Rail capex	12.5	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road capex	183.0	30.5	30.5	30.5	30.5	30.5	30.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Site capex (i.e. Brookton, etc)		10.0																													
	Above rail subsidy		6.9	6.9	1.9	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Externalities		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	Total		62.3	39.8	34.7	34.2	34.2	34.2	3.7	3.7	3.7	3.7	3.7	2.3	2.3	2.3	2.3	14.8	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	NPV	$225.0																														

11.2 Kwinana North analysis

Table 31 - Net present values: Options relating to Kwinana North East zone

($m)	Item		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	Hurdle rate	6.5%																														
Option 1:	All eastern KN lines open																															
	Rail capex to 2013	$54.6	-	11.0	28.4	15.2	-	-	-	-	-	-	-	-	-	-	-	-	11.0	28.4	15.2	-	-	-	-	-	-	-	-	-	-	-
	Road capex	$0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Freight cost difference		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Net externalities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total		-	11.0	28.4	15.2	-	-	-	-	-	-	-	-	-	-	-	-	11.0	28.4	15.2	-	-	-	-	-	-	-	-	-	-	-
	NPV (to 2039)	$62.5																														
Option 2:	Beacon closes																															
	Rail capex to 2013	$43.6	-	-	28.4	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	28.4	15.2	-	-	-	-	-	-	-	-	-	-	-
	Road capex	$6.1	1.5	1.5	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Freight cost difference		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Net externalities		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Total		2.2	2.2	30.6	17.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	29.1	15.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	NPV (to 2039)	$63.2																														
Option 3:	Beacon & Mukinbudin closes																															
	Rail capex to 2013	$32.1	-	-	16.9	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	16.9	15.2	-	-	-	-	-	-	-	-	-	-	-
	Road capex	$25.3	6.3	6.3	6.3	6.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Freight cost difference		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Net externalities		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		7.4	7.4	24.3	22.6	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	18.0	16.3	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
	NPV (to 2039)	$71.3																														

Table 32 - Net present values: Options relating to Kwinana North West zone

($m)	Item	Value	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	Hurdle rate	6.5%																														
Option 4:	Both western KN lines open																															
	Rail capex to 2013	$25.2	-	8.2	17.0	-	-	-	-	-	-	-	-	-	-	11.0	-	-	8.2	17.0	-	-	-	-	-	-	-	-	-	11.0	-
	Road capex	$0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Freight cost difference		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Net externalities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total		-	8.2	17.0	-	-	-	-	-	-	-	-	-	-	11.0	-	-	8.2	17.0	-	-	-	-	-	-	-	-	-	11.0	-
	NPV (to 2039)	$35.9																														
Option 5:	Miling - Toodyay closes																															
	Rail capex 2013	$25.2	-	8.2	17.0	-	-	-	-	-	-	-	-	-	-	-	-	-	8.2	17.0	-	-	-	-	-	-	-	-	-	-	-	-
	Road capex	$15.7	3.9	3.9	3.9	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Freight cost difference		0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	Net externalities		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Total		5.2	13.4	22.2	5.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	9.5	18.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	NPV (to 2039)	$59.6																														
Option 6:	McLevie - Goomalling closes																															
	Rail capex 2013	$4.4	-	-	4.4	-	-	-	-	-	-	-	-	-	-	11.0	-	-	-	4.4	-	-	-	-	-	-	-	-	-	-	11.0	-
	Road capex	$32.5	8.1	8.1	8.1	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Freight cost difference		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Net externalities		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Total		8.9	8.9	13.3	8.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	11.8	0.8	0.8	0.8	5.2	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	11.8	0.8
	NPV (to 2039)	$49.1																														
Option 7:	McLevie - Konnongorring closes																															
	Rail capex 2013	$8.0	-	1.4	6.6	-	-	-	-	-	-	-	-	-	-	11.0	-	-	1.4	6.6	-	-	-	-	-	-	-	-	-	11.0	-
	Road capex	$18.5	4.6	4.6	4.6	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Road maintenance	$0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Site upgrade (Konnongorring)		10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Freight cost difference		-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
	Net externalities		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		14.8	6.2	11.3	4.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	11.1	0.1	0.1	1.5	6.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	11.1	0.1
	NPV (to 2039)	$42.7																														