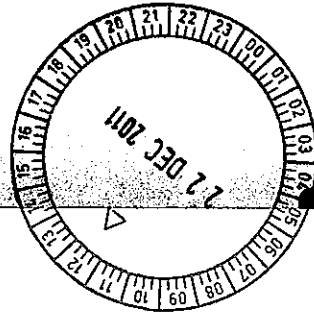


Submission

Hon Philip GARDINER MLC
Member for the Agricultural Region



Hon Brian Ellis
Chairman,
Standing Committee on Environment and Public Affairs,
Parliament House,
Perth WA 6000

Re: Petition No 145 - Closure of Tier 3 Narrow Gauge Rail Lines in the Wheatbelt.

Dear Brian,
Please find attached my submission in relation to Petition No 145 – Closure of Tier3 Narrow Gauge Rail Lines in the Wheatbelt and the review being undertaken by your Committee.
I am available for further information as you and your committee consider appropriate.

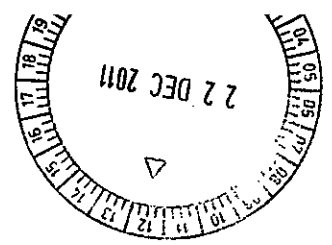
Yours sincerely,

A handwritten signature in black ink, appearing to read "Philip Gardiner".

Philip Gardiner MLC

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The Strategic Grain Network Report ("SGNR"):

The SGNR is a flawed document. Further, new information has made its findings an out dated document.

It is a flawed document for two reasons. Economic distortions are embedded in the strategic infrastructure investment in transport whereby the emphasis on reflective costing of road use is much less than that being prescribed by government for rail. The analysis undertaken by the SGNR neither addressed the full spectrum of economic issues, nor the risks of additional expenditure which has become clear to us on deeper examination.

It is essential that the level of investment in efficient transport take into account these distortions, else the agriculture industry in particular, or any other in general, will lead to wrong conclusions. For example, investment in road infrastructure which is used by heavy vehicles, and light vehicles, is funded from consolidated revenue with little regard to cost recovery, whereas for rail, there is a material private equity investment on which private equity returns need to be made to justify the private investment. Is this an economic distortion which can, and has, led to wrong conclusions?

Or, should the now material investment required in Tier3 rail, as a result of the failure of appropriate maintenance expenditure by government during the late 90s, and then the Wesfarmers/Genesee & Wyoming period of ownership where there was an *undertaking* without any contractual detail or obligation, be cast in the light of a new investment when this situation would not have been realised if appropriate and regular maintenance had been carried out by these parties across this time period? The absence of investment by government during their ownership of the rail means that Tier3 rail has financed other government investment.

The SGNR is further flawed in that while the costs of rail provided by WestNet Rail (now Brookfield Rail) in the report have been rigorously assessed, the cost of road expenditure for upgrades has been assessed by a "desktop" analysis where there was no road specific investigation undertaken. It is now being seen that the estimates of road maintenance expenditure applied in the SGNR may be seriously underestimated.

If the Tier 3 Rail network is closed and the effect of continued heavy vehicle traffic on roads is underestimated, causing major road maintenance and safety concerns as independent reports suggest, what alternative will the State and affected Shires then have?

The decision by the Government to close Tier3 network was based on Finding 12 of the SGNR which stated "Tier3 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- Yillmilling-Narrogin, Kulin-Yillmilling, Kondinin-Merredin, Trayning-Merredin and York-Quairading (total 599km). 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)"¹

¹ Strategic Grain Network Report Dec. 2009 P.9

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“Finding 13: There is a sound business case for the “Brookton Strategy” which aims to maximise the 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 Kellerberrin, 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 approximately \$16m over 7 years will be needed from State Government during a transition period targeted to reduce track access costs and thereby to equalise road and rail haulage prices.”²

The SGNR is an out dated document because at the time of writing, road costs to transporters of grain in the Tier3 zone were materially cheaper than rail. Part of the conclusion of the SGNR at the time was justified on this basis. However, since publication of the SGNR, new information has come to light refuting this conclusion. Following a tender process administered by CBH to find efficiencies in the above rail operation, Australian Railroad Group (“ARG”) was replaced as the above rail operator. Efficiencies foreshadowed as a result of the new partnership between CBH and Watco, resulting from the tender process has changed the cost relationship between road and rail to where rail is marginally cheaper than road using the same assumptions of road expenditure as contained in the SGNR, confirmed by the investment of \$175m which CBH/Watco has made in rolling stock to be used on the Tiers 1, 2 and 3 lines.

1. Background

- (a) Main Roads Western Australia is responsible for maintaining the freeways, highways, main roads and bridges on the state road network. This network provides the major transport links between and within the regional and metropolitan areas of WA. It is approximately 17,800 km in length and valued at \$35bn.

Between 1999 and 2002 Main Roads contracted out its road maintenance functions through eight contracts each lasting 10 years. The contracts aimed to achieve cost savings whilst maintaining the condition of the roads to agreed levels. This was a dramatic shift in the manner in which Main Roads went about its maintenance business. No other state or territory has embarked on this course of action.

The Auditor General’s Report June 2009 “Maintaining the State Road Network” stated “ The road maintenance contracts have not delivered adequate levels of planned maintenance and contract costs have increased. Addressing the overdue planned maintenance will be expensive and effectively targeting any restoration will be difficult for Main Roads due to a lack of key information about the condition of the road network. Such information is essential to deciding where, when and what type of maintenance is needed to ensure optimal cost effectiveness.”

² Ibid P.9

“Roads are at increased risk of structural failure because levels of planned maintenance have declined over the past 10 years - resurfacing by 30% and rebuilding by 80%. Delaying planned maintenance will have long term cost implications.”³

“Over 25% of roads have not been resurfaced on time and are at risk of needing expensive rebuilding maintenance.”⁴

“Nearly a third of the road network is simultaneously reaching the end of its design life and Main Roads does not know how much longer these roads will last.”⁵

“Based on road deterioration rates, Main Roads estimates the entire network should be resurfaced every 15 years and rebuilt every 40 years. At the current rate, it will take 25 years to resurface and 250 years to rebuild the network.”⁶

“The extent of deferred maintenance in the order of \$800m represents an ongoing risk to the state.”⁷

Main Roads has advised that the Government has now commenced contributing additional funds to address this maintenance backlog.

- (b) In 2000, the State Government sold Westrail to Wesfarmers and Genesee & Wyoming. The purchaser gave an *undertaking* (not an obligation) to spend \$400m on infrastructure and rolling stock over the next 5 years. There appears to be no clear criteria or protocols established by Government at the time as to how the \$400m was to be spent, or even if it was actually spent.

In 2006 the below rail lease was sold by Wesfarmers/Genesee & Wyoming to Babcock & Brown. SGNR states “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.”⁸ This statement leads to an obvious question. If WNR was meeting its commercial arrangements, what were they? Is this consistent with an investment requirement of \$93.5m for the Tier 3 network?

The SGNR was compiled in the context of a State road network whereby Main Roads, due to a change in its maintenance philosophy, was not fully conversant with the condition of roads and any required upgrade; and a rail network where no known criteria or protocols were established for Wesfarmers and Genesee & Wyoming on their *undertaking* to spend \$400m. This context presents a weak foundation upon which to make a strategic transport decision.

The analysis undertaken by Main Roads and WALGA in assessing the cost of upgrading the road network, both State and Local, for the SGNR was a desktop analysis. There was no road specific analysis undertaken. SGNR mentions on numerous occasions that the costing on road upgrades to implement the Brookton Strategy are approximations, and that further analysis is required.

³ Western Australian Auditor General’s Report: Maintaining the State Road Network. Report 6. P. 6

⁴ Ibid P.13

⁵ Ibid P.13

⁶ Ibid P.14

⁷ Ibid P. 8

⁸ SGNR P.11

The SGNR used a figure of increased road maintenance of \$870,000/year as result of the closure of Tier3 lines. There is no factual evidence to support this figure. On the evidence of the Auditor General's Report June 2009 alone, this appears a gross under estimation.⁹

The only accurate assessment of cost in relation to the rail/road mode analysis in the SGNR was provided by Westnet Rail re the resleepering of Tier3 of \$93.5m. This is confirmed by the estimated cost of resleepering the Tier3 Network in 2011/2012 as \$100m.

SGNR states "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."¹⁰ It is the road foundation which will determine how much damage is caused by heavy haulage vehicles. The funds being committed to road under the Government's Brookton Strategy will have minimal impact on improving the foundation to make it relevant for the use envisaged. The cost of road rebuilding varies between \$500,000 and \$1m / kilometre.

The SGNR does not take into account the cost to the State on increased heavy vehicle movements with the closure of Tier3 rail on Road Safety. The death rate on Western Australian country roads in 2008 was 22/100,000 population. The Wheatbelt has the highest death rate in regional Western Australia. The death rate is higher than Thailand, Greece, Poland, Korea, Spain and the Czech Republic. The Office of Road Safety ("ORS") assessed in 2010 the cost of fatal road crashes on non-metropolitan roads at being \$6.7m. The cost to the State of those seriously injured can be exponential due to the rehabilitation costs.

A decision taken by Government based on SGNR would be a flawed decision.

2. New Roads Information since SGNR

It is now understood that the SGNR assumptions for road exclusively used the highest axle loads and most efficient (in terms of gross combination mass) haulage vehicles – known as Restricted Access Vehicles ("RAV"). RAV 7 vehicles are the heaviest axle weight vehicles. These vehicles carry between 75-90t net or 120t gross combination mass, but more importantly, their damage to roads occurs as a result of their "Equivalent Standard Axles". Whilst these RAV 7 vehicles give the most economically optimistic weight assumptions for grain freight by road, they also cause the heaviest damage to the roads. The Government's decision in favour of road and the Brookton Strategy embrace not only the most optimistic economic assumptions but is also unrealistic as not only will many of the roads be unsuitable for trucks of this axle configuration and weight – the truck configurations are unlikely to be available.

The Cardno Eppell Olsen Report ("Cardno") entitled "Local Government Grain Freight Network Heavy Vehicle Strategic Pathway Mapping and Access Policy" prepared for, and tabled to the Western Australian Local Government Association in June, 2011 discusses the impact on roads by heavy haulage RAV vehicles.

Factors by which Cardno considered the suitability of roads for use by RAV combinations are:

⁹ SGNR P. 17

¹⁰ Ibid P. 17

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- Road pavement is impacted by heavy vehicle transport with damage increasing with additional axle loads and the passage of closely spaced axle groupings. This means the fully laden RAV 4 or RAV 6 and RAV 7 combinations tend to cause more damage to the sub base than RAV 3 and RAV 5 combinations.
- Damage to pavement follows a rough 4- power rule. If axle weight doubles damage increases 16 times. Equivalent Standard Axle ('ESA') gives the equivalent impact of a truck combination on a straight level road.
- Type and condition of pavement, formation and seal width. Local Government should consider the impact on the pavement of the use of road by RAVs and whether suitable alternative routes exist.
- RAV 5, RAV 6 and RAV 7 combinations suffer from additional rear trailer sway when compared to RAV 3 and RAV 4 combinations, particularly when travelling around bends at high speeds. This represents a safety issue with oncoming vehicles and also places considerable wear and tear on the seal edges. In the case of Local Government roads, the local government should consider restricting speed limits for these vehicles on routes with these characteristics. In situations with higher traffic volumes or where significant safety concerns exist, local government should consider not issuing permits for these vehicles, bearing in mind that the Minister for Transport can, and does over-rule such local government determinations.
- Steep grades reduce the speed of heavy vehicles, increase the risk of break away, and magnify conflicts with fast moving lighter vehicles. Local government should consider whether use of a road with steep grades by RAVs will significantly increase conflicts with other traffic and/or encourage dangerous overtaking manoeuvres before issuing permits.

The reports of both the Auditor General and Cardno should raise alarm bells about the under estimation of costs of building and maintaining regional roads, especially when carrying the additional burden of RAV 7 heavy haulage vehicles totalling a gross mass combination around 120t, assessed by Cardno to cause the greatest damage to roads. More graphically, Cardno states that as far as road damage is concerned "a single RAV 3 truck at its legal weight (84t) ...is equivalent to over 25,000 cars ". Damage which heavy haulage trucks can cause is readily witnessed on completed new road works just south of Bindoon on the Great Northern Highway. Much worse damage can be expected on regional and other state roads on which RAV 7 trucks will travel under the Brookton Strategy adopted by the Minister. Government sources are uncertain about how much this will cost local government.

The Brookton Strategy, complementary to the Tier 3 rail line closures will cause on average, an extra 650,000 tons of grain to be transferred by road in an average season, much more in a good season. For the average season, this will be more than 7,000 RAV 7 trucks/year carting 90t each on regional roads. When a high yielding season similar to that of 2011 occurs, and should Tier 3 lines be closed, three times the number of trucks will be required. Road infrastructure will be at grave risk of collapsing. Even grain haulage contractors do not know from where the road trains will come to cart the grain. On the other hand, rail could readily handle this crop. Under these circumstances, what will happen to road haulage prices to growers? Of course, they will rise, creating an even more expensive gap between road and the lower priced rail as detailed in the business case put to government at each Tier 3 site.

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3. Road Safety

The issue of Road Safety has been mentioned previously in this submission. The state Government has officially endorsed the "Towards Zero – Road Safety Strategy March 2009" By endorsing this Strategy the Government has clearly acknowledged the importance it places on road safety.

Towards Zero states in its "Evidence on safe roads and roadsides":

"Western Australia's road network has been built over many years, driven (in the early years) by state development needs. This resulted in unsealed roads and low-cost narrow, single sealed roads being built (some narrow sealed roads have since been widened to allow vehicles to pass safely). Thus we have roads that may be narrower than is required to undertake affordable safe system transformations over the long lengths of road in the state."¹¹

"Safe roads and roadsides: Improving road infrastructure by designing and maintaining roads and roadsides to reduce the risk of crashes occurring and the severity of injury if a crash does occur."¹²

"A forgiving road system: We need to design a road system that is "inherently safe" so when crashes do happen, deaths and serious injuries can be avoided".¹³

Western Australian country road death rate per 100,000hd population is amongst the highest in the world – in 2008 there were 22 deaths/100,000hd (Australian Bureau of Statistics). The rate of deaths in the Wheatbelt is the highest in country Western Australia being 27 per 100,000hd population. The rate of serious injuries is 25 per 100,000hd population.¹⁴

The Government is cognisant of the importance of road safety. Its decision to close Tier 3 rail without a fully detailed, road specific costing and upgrade timetable on the affected road network is contrary to its aims of "Towards Zero – Road Strategy "

4. Environment

The certainty of a price on carbon over the next 3 years, with the passage of the Federal Government's carbon tax legislation, has now been confirmed. It is agreed that road uses 4 times the quantity of fuel as rail to travel the same distance. With the anticipated shortage occurring in supplies of fossil fuel to make diesel, the pricing of carbon will exacerbate this freight price difference between road and rail, plus give rise to greater CO2 emissions. Each of these factors is driven by different forces, but both have the higher risk in increased prices for road transport over rail.

5. Partnership between CBH and Watco.

(a) Direct Cost changes showing road no longer being cheaper than rail:

Due to the reservations CBH had that the rail operator ARG was operating at too high a cost for the transport of grower's grain to port, CBH sought tenders around the world for contracting the above ground rail task. ARG, along with many others tendered for the above rail transport business. The

¹¹ Towards Zero – Road Safety Strategy P. 33

¹² Ibid P.22

¹³ Ibid P.23

¹⁴ Data from ABS, 2008.Regional Data from: Fatal and Serious Injuries on WA Roads. 2010 summary.

tender was awarded to Watco, a USA rail operator. Watco had demonstrated its rail efficiencies in Kansas and Oklahoma.

As a consequence, CBH and Watco formed a partnership, investing \$175m in rolling stock. The wagons are lighter than the aging ARG fleet, and have higher axle loadings. This has combined to give efficiencies to the CBH /Watco partnership as expressed in the total grain freight costs in the Tier3 zone as illustrated below:

SGNR REPORT (May 2009)

- Rail Direct (ARG) = \$30.9m
- Road Direct = \$23.7m
- Road cheaper by = \$ 7.2m

CURRENT REVIEW (ARG)

- Rail Direct (ARG) = \$31.5m
- Road Direct = \$23.62m
- Road cheaper by = \$ 7.88m

CURRENT REVIEW (CBH/Watco)

- Rail Direct (WC) = \$23.28m
- Road Direct = \$23.62m
- Rail Cheaper by = \$ 340k

The CBH/Watco pricing structure depends on the following conditions:

- (a) Funding is reallocated for re-sleepering on Tier 3 lines.
- (b) State Government reallocates Brookton Transfer facility and TAP monies to Merredin Transfer Facility upgrade.
- (c) Westnet offers track access charge discount.
- (d) CBH-Watco can run their new trains on 16T lines.
- (e) Perenjori – Maya line is retained.

It has been confirmed that condition (c) has been met Brookfield have reduced the access fee by 50%.

The rail efficiencies introduced by the CBH/Watco partnership together with the cooperative structure of CBH totally negates the cost advantage to users by road as entertained in the SGNR.

(b) Discounted cash flows over 25 year investment period showing Rail investment cheaper for Government:

1. Investment analysis of the Tier3 road and rail alternative has been made by addressing the business case proposal presented to the Minister for Transport from CBH and those outlined in the

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consultant's report to the SGNR committee, from which details were taken for inclusion in the SGNR. Common use of assumptions by CBH with those used by SGNR renders comparison relevant with the CBH business case when efficiencies are applied to the rail alternative resulting from the CBH partnership with Watco, entered some months following tabling of the SGNR. The cost comparison between SGNR and CBH's business case is expressed in terms of Net Present Value Costs (which include capital requirement, maintenance, government subsidies and externalities) and takes into account the time value of when the expenditures are made under the proposal. The discount rate of 6.5% pa used approximates the Government's cost of capital.

2. The key differences of the investment analysis between the SGNR and the recent CBH Business case on Tier3 are:

In SGNR, the relevant net Present Value Costs ("NPVC") are:

- Operating tier 3 lines (rail) = **\$222.8million**
- Brookton strategy (road) = **\$144.8m**

In CBH's business case, the NPVCs have been revised to

- Operating Tier 3 lines (rail) = **\$138.4m** (Main difference is \$7m less annual maintenance; includes \$16m MTF payout)
- Brookton Strategy (road) = **\$156.2m** (Main difference estimation of Brookton Transfer fee and road maintenance on newly constructed roads)

These revised costs essentially mean that:

- On an annual basis, spending on the rail option will be less over the 30 year review period and the present value cost takes into account the timing difference between rail and road capex.
- Shifting from ARG to Watco is estimated to generate a cumulative NPV cost saving equivalent to **\$84m** of today's value (a reflection of the difference between \$222.8m and \$138.4)
- When the net cumulative impact of these cost differentials are brought back to **today's money value**, it will cost the Government roughly **\$18m** more to adopt the Brookton Strategy, the Government's current road preference. This is without taking into account the difference in cost blow out risk which is more likely for the road mode.
- The road cost projections used by CBH in their business case are consistent with those used by the Department of Transport.
- The downside for rail can only be justified if the likelihood of adverse climate change impacting to lower grain production in the Tier3 zone is assumed. The transport economic outcome in the Tier3 zone will be a race between the rate of adverse climate change and development of increasingly drought resistant varieties which can be grown in the Tier3 zone environment.

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6. Conclusion

The Government's decision to close the Tier3 Network is flawed and based on out-dated information. Since publication of the SGNR in late 2009, basic premises on which its conclusions were made have changed in some instances, and are flawed in others.

Significantly, the direct cost of transporting grain by rail as a result of the CBH/Watco partnership taking over the above rail operations from ARG is now breakeven with that of road, based on applying the same road cost assumptions as in the SGNR.

Even more telling is that the risk of road costs blowing out well beyond those included in the SGNR is extremely high compared to any blowout of equivalent rail costs. Verification of such road cost blowouts, even when not speculating on the possible rises in road fuel costs, is essential prior to concluding a decision on the most economic, safe and efficient transport mode for movement of grain in the Tier3 zone.

A new independent update of the SGNR is required to take account of the flaws in the original report and the new information which materially affects the SGNR conclusions. This should begin with a revised Tier3 road specific cost analysis, similar to the format as attached in Appendix 1.

It is my view that the temporary reprieve of 12 months granted by the Government for the 2011/2012 harvest be expanded to the full re- instatement of the Tier3 network, but be done in two stages. The first stage is to fund minimalist repair to the Tier3 lines so that the CBH/Watco partnership can demonstrate its competitive efficiencies during the period 2013 and 2014, taking into account the minimalist condition of the rail during this period. The second stage would be government making the investment into raising the condition of the Tier3 lines to a level to allow the full efficiencies to be realised under agreed conditions of the line being the same track and same ballast beneath the sleepers in the same light as if it was investment from consolidated revenue in road.

In reaching a decision between road and rail modes, the economic distortion applying to criteria used for the allocation of government resources into rail and road must be removed.

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References

Strategic Grain Network Report : December 2009.

Western Australian Auditor General's Report. Maintaining the State Road Network. Report 6 – June 2009.

Cardno Eppell Olsen Report: Local Government Grain Freight Network Heavy Vehicle Strategic Pathway Mapping and Access Policy.

Towards Zero – Road Safety Strategy.

Fatal and Serious Injuries on WA Roads : 2010 Summary.

CBH Business Plan :2011.

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APPENDIX 1

REVISED WA GRAIN FREIGHT NETWORK TIER 3 COST ANALYSIS

A current budget estimate for required road improvements to the grain freight network arising from the potential closure of Tier 3 Rail

This affected network is defined to consist of 609 km of Local Government roads as determined by WALGA Local Government Grain Network Heavy Vehicle strategic Pathway Mapping and Access Policy report (LGGFN), and 583 km State Government Roads described in the Strategic Grain Network report as Category A and B Roads

It is envisaged that a Project Steering Group would be established consisting of WALGA, Main Roads, WA Wheatbelt Development Commission, Department of Transport and other key stakeholders.

Methodology

Task 1: Create Comprehensive Asset Register

A relevant asset register for the defined Grain Freight Network would be prepared. This information can be then used to establish the extent of improvement works required to upgrade the existing road network to a suitable standard to cater for the expected additional heavy haulage traffic resulting from the closure of Tier 3 rail. The proposed network includes both Local roads and State roads as discussed above. It is acknowledged that the Tier 3 affected State road network as defined by the SGNR is not comprehensive and that additional roads may need to be added external to the scope of works.

It is proposed to conduct an asset review for all identified Local Government roads including capture of all inventory and base course information in the field. The data capture would be undertaken by a data capture team in the field through the definition, verification and quantification of all required inventory data. This process will involve the use of DRIVE vehicle which will provide GPS location data for all critical infrastructure, in addition to video capture of the road environment for future interrogation, as required.

The following data will be required for further assessment of costs to upgrade, and will be obtained through a variety of sources.

- Specific location – GPS local of Local road centrelines determined through the asset field review, GIS data for the State Road network will be added and compared to the field data captured;
- Logical location of critical Local Road infrastructure along the subject road in terms of displacement from the nominated start of the road (true distance) Or SLK (straight line kilometre) for the State roads, to be defined by the Asset team in consultation with Main Roads WA.

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- Local road widths (formation, pavement, seal) obtained through field capture.
- Local road seal type obtained through field capture;
- Local road base course thickness captured via the use of a Ground Penetrating Radar (GPR) to establish indicative base course thickness at suitable intervals, tentatively 5kms or where there is evidence of road rehabilitation, road resealing or where the data of construction differs. The objective will be to establish a base course thickness that will be used as a sufficiently accurate indication of the load bearing capacity of pavement surface;
- Base material (ground type) determined through literature review of area- wide geotechnical research;
- Drainage (culverts, table drains, open drains) along Local roads obtained through field capture;
- Bridge locations along local roads will be confirmed through field capture. Pertinent information for all bridges in the affected zone (eg. Length, construction type, load capacity and width) will be sourced from Main Roads documentation;
- Local road signage (regulatory and advisory) through field capture;
- Miscellaneous infrastructure within the Local road reserve through field capture;
- Details of Local road intersection locations (type, sight issues etc) through interrogation of the video field capture;
- Traffic volumes for all roads to be sourced from Main Roads WA and Local Government.
- Indicative grain bin transfer volumes to be obtained from CBH;
- Bend locations and radii for all roads will be determined through desktop assessment of graphical mapping and GIS data;

The required inventory data for all State roads in the affected zone, inclusive of base course thickness will be sourced from Main Roads WA through their corporate data IRIS.

It is understood that Local Government maintains their asset register through the ROMAN database. This database is sporadically maintained and may have a variable quality across the affected zone. A comprehensive audit of the network has been proposed to ensure a consistent quality of data.

Outcome

The outcome of the asset review will constitute a Comprehensive Asset Register of existing roadway and infrastructure data, located specifically within GIS dataset.

Task 2: Sustainable Freight Network Technical Review

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It is proposed to undertake a technical review of best- practise with respect to the requirement for intense freight movements, as we would anticipate as a result of Tier 3 closure. This would involve review of operational characteristics, accepted best-practise and research material to determine the geometric, pavement, intersection and maintenance characteristics required for a safe and sustainable freight network to a RAV3, RAV4, or RAV7 standard.

Geometric Design Review

Geometric requirements for heavy vehicle depend on their individual characteristics (loaded and unloaded) and may be different for each of the three potential RAV combinations (RAV3, RAV4, and RAV7). In particular, the following requirements will be investigated;

- Pavement width;
- Bend radius;
- Gradient;
- Shoulder width;
- Sightlines and visibility;
- Safety barriers and delineation;
- Bridge and culvert construction, and
- Any othe geometric design requirements necessary to ensure safety or maintain the design life.

For each of the design parameters, an indicative cost to upgrade will be established. These cost estimates will form the unit costing for further budget analysis.

Pavement Design Review

Pavement requirement will also be considered for each common grain freight RAV combination. This review will focus on standard best- practise methodology defining the necessary characteristics to provide sustainable road infrastructure as well as the improvements to pavement design required to heavier combinations. Aspects of pavement design such as sub-base thickness and material, asphalt thickness and material, and the underlying base material will be recommended.

Indicative base rates for pavement construction will be refined through consultation with Main Roads, Local government and construction contractors to form the basis for unit costing.

Maintenance Requirements

The impact of each grain freight RAV combination will be reviewed with respect to their maintenance burden, identifying and quantifying the acceleration of damage resulting from heavier vehicles. The impact of different maintenance regimes will be investigated

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through literature review, and through consultation with Main Roads WA and Local Government.

From this review, indicative infrastructure maintenance costs will be determined, including consideration for whole-of-life costs and periodic maintenance works.

Intersection Requirements

The general requirements for intersection improvements will be quantified, with representative examples created which define best-practise geometry. This will include consideration for intersection width, turn radii and sightlines. Indicative local pavement improvement will also be considered, necessary where heavy vehicles are likely to be required to stop, or accelerate from a standing point.

Information Sources

Information will be sourced from research material, technical materials and internal sources, as well as from leading industry bodies in the road construction/maintenance and freight transport fields. As such, it is proposed to interface directly with Main Roads and CBH through 'secondment' within these organisations. A period of one (1) day per week over a six (6) week timeframe is proposed to allow discussion of the project aims and outcomes, obtain critical information and establish effective lines of communication.

Outcome

The outcome of this stage will be a report which quantifies the design and infrastructure requirements resulting from grain freight movements including an assessment of contributing factors and indicative costs to upgrade.

Task 3; Tier 3 Road Upgrade Design Requirements and Budget Cost Estimate Report

The information contained in the Sustainable Freight Network Technical Review will be applied to the Tier 3 affected road network as defined by the Comprehensive Asset Register. This will create a comprehensive infrastructure upgrade list which will be costed according to the determined rates on an individual road basis, taking into account the existing road environment and the future access level (RAV3, RAV4 or RAV7)

Once fully compiled, the infrastructure database, research guidelines, upgrade requirements and budget cost estimates will be collated into a draft report to review the Project Steering Group. This report will include the outcomes, assumptions and limitations of the study process and will provide an indication of the likely accuracy of the overall budget cost. This will enable the results to be reasonable compared to those

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provided for rail upgrade and maintenance. Once comments are received and changes made, a Final Draft will be released for comment.

Outcome

The outcomes of this assessment will be a comprehensive report containing the outcomes of the study, including a comprehensive list of required works and associated budget costing.

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