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Sent via email: LWoodland@armidale.nsw.gov.au

Dear Lindsay,

RE: FEASIBILITY OF RAIL LINE BETWEEN ARMIDALE AND TENTERFIELD: DISCUSSION PAPER – FINAL

PROJECT BACKGROUND

A proposal has been made to transform the disused Tenterfield to Armidale rail corridor into a rail trail, opening up the corridor to cyclists, walkers, runners and horse riders. The rail line has not been in operation since the mid 1970's.

Analysis is required to provide a starting evidence base and direction regarding the likely feasibility of the existing line to be reopened for commercial rail uses (passenger and/ or freight). This letter provides preliminary and *prima facie* analysis and discussion regarding the potential feasibility of reopening the rail line for commercial uses¹. Financial analysis has been undertaken using a discounted cashflow analysis, examining anticipated financial costs and benefits (i.e. revenues) of reopening the Armidale to Tenterfield rail line.

ANTICIPATED COSTS & BENEFITS OF REOPENING THE RAIL LINE

COSTS

Reopening the Armidale to Tenterfield rail line is anticipated to present three key financial costs:

- Capital costs for upgrading the infrastructure
- Annual maintenance costs
- Annual operating costs.

Capital costs and annual maintenance costs are examined below. Annual operating costs, however, have not been examined in this section. For the purposes of this assessment the ongoing operational costs have been examined in the benefits side below, with operational costs netted off projected revenues.

¹ This discussion paper provides a *prima facie* analysis of the feasibility of reopening the rail line between Armidale and Tenterfield, based on desktop research and examples from other jurisdictions. The paper is designed to provide a high level, order of magnitude assessment of the potential viability of reopening the rail line. Detailed and appropriate due diligence including engineering, project costings and demand analysis would be required prior to any decision to reopen the line.

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Construction Costs for Upgrading the Armidale-Tenterfield Railway

The northern railway tracks from Armidale to Tenterfield and beyond have been decommissioned since mid-1970's. In order to resume commercial rail uses along the Armidale-Tenterfield rail line, the rail infrastructure will likely require significant investment for fixing and upgrading the disused line to current operational standards. Key areas for upgrade include upgrading the condition of several timber structures, substitution of steel sleepers, installation of grade crossing signals and barriers at rail crossings, clearance of debris for container and carriage traffic and level crossing sight lines.

An estimate of the potential capital cost in upgrading and reviving rail infrastructure was developed based on the average railway infrastructure upgrade costs per kilometre for a number of benchmark projects of a similar nature (see Table 1). Based on a review of these projects, a cost per kilometre for rail infrastructure was assumed to be \$2.5 million.

Table 1. Case Studies of Rail Infrastructure Upgrades

Name	Type	Capital (\$M)	Distance (km)	Price per km (\$M)
Inland Rail Alignment	Construction and Upgrades	\$8,200.0	1,649	\$4.97
North East Rail	Upgrades	\$500.0	200	\$2.50
Murray Basin	Upgrades	\$440.0	275	\$1.60
Cowra Rail Line Revival	Construction and Upgrades	\$42.5	21	\$2.02

Source: IRAS (2010), PTV (2017), ROPD (2009), TVIC (2018).

The assumed cost for rail infrastructure upgrades is in line with those for the 'North East Rail' and 'Cowra Rail Line Revival' benchmarks. These projects were chosen as the closest match to this project as they included rail track upgrades to incorporate higher volumes of freight movements, revival of physical structures and parts; such as the replacement of wooden sleepers with steel sleepers and construction of new railway lines to accommodate existing obstacles and distances. Additionally, these case studies are rural based, and therefore do not include high cost overheads to account for metro disturbances.

With approximately 195km of rail line between Armidale and Tenterfield, the assumed capital cost for upgrading the rail line is estimated to be \$487.5 million. This likely represents a minimum estimate given the case studies examined were for upgrading infrastructure that is currently in use.

For the purposes of this assessment, construction works are assumed to be undertaken during the 2018/19 financial year and completed by 2020.

Costs for Ongoing Maintenance of the Armidale to Tenterfield Rail Line

For the purposes of this assessment it has been assumed that 1% of the capital cost for rail infrastructure is required each year for ongoing maintenance, at approximately \$4.88 million per annum. The required sum would be dedicated towards track maintenance and rail inspections, which would maintain the functioning stability of the railway between Armidale and Tenterfield. Of the aforementioned key areas for upgrading the rail line, physical structures and sleepers represent the major components for ongoing maintenance costs.

Annual maintenance costs are assumed to accrue in full once operational activities commence (assumed to commence in 2020).

BENEFITS

Once operational, the Armidale to Tenterfield rail line is anticipated to deliver two potential streams for financial benefits:

- Passenger revenues.
- Freight revenues.

In estimating the benefit of passenger and freight revenues, anticipated operating costs for delivering these services (excluding maintenance) have been netted from the revenue estimates, to provide a net operational revenue/ benefit.

Passenger Revenues

An average ticket fare for the Amridale to Tenterfield line was assumed to be \$30.38 (one way). This is based on comparison prices for using the existing coach service between Armidale and Tenterfield, as well as the cost for taking rail between Armidale and Willow Tree to the south.

Table 2. Passenger Ticket Prices for Similar Trips

From	To	Type	Distance (km)	Time	Ticket Price
Armidale	Tenterfield	Coach	203km	3:00 Hours	\$30.38
Armidale	Willow Tree	Train	195km	2:30 Hours	\$30.38

Source: TNSW (2018).

In estimating the potential passenger revenue generated by the Armidale to Tenterfield rail line, the above average fare was applied to:

- People using the rail line to get to/ from work. This was developed using 2016 Census of Population and Housing journey to work data (ABS, 2017a) to identify the proportion of residents that use rail to get to/ from work along the Hunter to Armidale rail line, which was then applied to current population of the Armidale to Tenterfield region (ABS, 2017f). It was assumed that every passenger using the rail line to get to work would also use it to return home, and that for every local within the Armidale to Tenterfield region using the rail line there would be someone from outside the region using the rail line to get to the region. Based on this approach, it is estimated there would be approximately 200 daily uses for work reasons initially, over approximately 250 work days each year, providing 50,000 trips a year. The number of trips per annum was grown using projected population growth for the Armidale to Tenterfield region (ABS, 2017b), which provides a starting number of trips per annum of around 51,100 in 2019/20, growing to around 56,000 by 2047/48.
- People using the rail line for leisure/ visitation purposes. This was developed using visitor data from Tourism Research Australia (TRA, 2017) to identify the proportion of visitors the Hunter to Amridale region that use rail, which was applied to the number of current visitors to the Armidale to Tenterfield region (TRA, 2017) (ABS, 2017a). As with work passengers, it is assumed each person both arrives and leaves using rail, and for every visitor to the Armidale to Tenterfield region using the rail line there would be a local using the rail line to visit areas outside the region. Based on this approach, it is estimated there would be approximately 550 daily uses for leisure/ visitation initially, over 365 days each year, providing around 200,000 trips a year. The number of trips per annum was grown using projections of visitation to the Armidale to Tenterfield region (TRA,2017), which provides a starting number of trips per annum of 211,000 in 2019/20, growing to 302,400 by 2047/48.

At 262,000 passenger trips in 2019/20 and an average fare of \$30.38, it is estimated the Armidale to Tenterfield rail line could generate passenger revenue of \$7.96 million initially. This is projected to grow to \$10.9 million by 2047/48.

To account for anticipated operating costs, the net revenue was estimated using standard Input-Output production functions for the rail transport industry, which indicates every \$1 million in revenue incurs approximately \$0.851 million in operating costs (i.e. net revenue of \$0.149 million). This provides a net revenue of \$1.19 million initially, increasing to \$1.62 million by 2047/48.

Freight Revenues

In understanding the potential for freight movements along the Armidale-Tenterfield rail line, an estimate of the current road freight task along the corridor was developed. This was developed using:

- 2018 NSW Roads and Maritime Services data (RMS, 2018) to identify the total number of trucks travelling along the New England Highway using the average daily traffic count of heavy vehicles. Based on this data, there are approximately 172,000 heavy vehicle movements per annum along the corridor.
- An average tonnage per truck of 24.1 tonnes, based on data from BITRE (2010). With 172,000 heavy vehicle movements per annum, this equates to approximately 4.1 million tonnes of freight transported along the corridor each year.
- The total tonnes of freight transported along the corridor was multiplied by the distance of road between Armidale and Tenterfield (203 km) to provide an estimated 838.6 million tonne kilometres travelled for freight along the corridor in 2017/18. This may overestimate the actual freight task as not every freight movement will travel the full distance of the corridor. The number of tonne kilometres per annum was then grown based on historic average annual growth in the regional NSW road freight task in the past decade (BITRE, 2017), which would provide a total of 872.4 million tonne kilometres by 2019/20, which for the purposes of this assessment has been assumed as the first year of operation of the rail line if upgraded.

The potential rail freight task was then estimated assuming the same split between rail and road in regional NSW is achieved along the Armidale to Tenterfield corridor, of 40% rail and 60% road (BITRE, 2017). It is anticipated this 40% figure for rail freight task will overestimate the share of freight the rail line between Armidale and Tenterfield could feasibly capture, as the majority of rail freight in NSW is for bulk commodities such as coal and iron ore, which will not be transported along the corridor. Assuming a 40% share, this equates to an estimate of 348.96 million tonne kilometres initially (2019/20), increasing to 607.06 million tonne kilometres by 2047/48.

The financial benefit of rail freight was estimated based on an average cost for large consignment short haul rail freight between Sydney and Brisbane, which is estimated to be between 8 and 12 cents per net tonne kilometre (c/ntk) in 2012 (average of 10 c/ntk used) (BITRE, 2013). However, as outlined by BITRE, smaller consignment freight can incur significantly higher rates.

"The freight rates presented here are designed to show the rates that would typically be paid by a substantial shipper of goods, spending around AUD \$60,000 - \$120,000 per month through transport contracts. Achieved freight rates are very sensitive to bargaining power, and small shippers often pay multiples of the rates paid by the largest consignors. Similarly, large shippers generally have more ability to arrange their affairs to minimise costs through more efficient load consolidation, greater potential for two way loadings and generally better understanding the costs in freighting, and acting to minimise those costs. "

BITRE (2013)

For the purposes of this assessment an average cost of 20 c/ntk has been used, indexed by CPI to provide an estimated present day cost of 22.04 c/ntk.

At 348.96 million tonne kilometers of rail freight initially and an average cost of 22.04 c/ntk, it is estimated that the Armidale and Tenterfield rail line could generate \$76.9 million in freight revenue initially (2019/20). This is projected to grow to \$133.8 million by 2047/48.

To account for anticipated operating costs, the net revenue was estimated using standard Input-Output production functions for rail and road transport industries, which indicates every \$1 million in revenue incurs approximately \$0.851 million in operating costs for rail (i.e. net revenue of \$0.149 million). This provides a net revenue of \$11.5 million initially (2019/20), increasing to \$20.0 million by 2047/48.

FEASIBILITY ASSESSMENT

A discounted cashflow analysis was undertaken over a 30 year period to assess the feasibility of reopening the Armidale the Tenterfield rail line, across real discount rates of 4%, 7% and 10%.

The table below outlines the present value (PV) of the identified costs and benefits associated with the project, between the financial year ended June 2018 and the financial year ended June 2047, at discount rates of 4%, 7% and 10%.

The modelling for the project shows that the proposal is not feasible. A discount rate of 7% (real) produces the following results:

- A Net Present Value (NPV) of -\$335.4 million over the 30-year assessment period with aggregated present value (PV) benefits of approximately \$176.1 million compared to an aggregated PV costs of approximately \$511.5 million.
- A BCR of 0.34, highlighting that the project is not economically feasible under the modelling assumptions, returning \$0.34 for every dollar spent.

The analysis identifies that the project is not viable at any of the discounted rates, with the costs highly outweighing the benefits. This highly negative return can be seen across all three discounted rates, with the BCR ranging between 0.47 (4% discount rate) and 0.26 (10% discount rate).

Table 3. Summary of Costs and Benefits, Total and Discounted Values, 2018 to 2047 (Financial Year Ended June)

Impact	Total Value (\$M)	PV (\$M) - 4% Discount Rate	PV (\$M) - 7% Discount Rate	PV (\$M) - 10% Discount Rate
Costs				
Capital Costs	\$487.5	\$468.8	\$455.6	\$443.2
Maintenance Costs	\$141.4	\$79.6	\$55.9	\$41.5
Total Costs	\$628.9	\$548.4	\$511.5	\$484.7
Benefits				
Passenger Revenue	\$40.4	\$22.1	\$15.2	\$11.1
Freight Revenue	\$444.8	\$237.4	\$160.8	\$115.7
Total Benefits	\$485.2	\$259.5	\$176.1	\$126.8
Summary				
Net Present Value (NPV)	-	-\$288.9	-\$335.5	-\$357.9
Benefit Cost Ratio (BCR)	-	0.47	0.34	0.26

Source: AEC.

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