CentrePort Waingawa log hub

Cost savings from a transport mode shift

Hui-tanguru 2020

www.berl.co.nz

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 Reference No: #6011 Hui-tanguru 2020

Making sense of the numbers

Over the last three years CentrePort (CP) has co-operated with KiwiRail and log exporting interests in the Wairarapa to develop a log hub at Waingawa to transfer logs from road to rail for the haul to CP. This report generates estimates of the impacts of this transfer on transport costs, environment costs and other externalities.

The analysis finds that 250,000 tonnes of logs, with an average road haul of 135 kilometres (kms) from forest to CP, could **reduce transport costs by 38 percent** – from $7.4 million to $4.6 million – if transferred to a combined road and rail haul through Waingawa.

For forest owners this is a saving of over $11 per tonne of logs. With an export value of about $150 per tonne, this saving is equivalent to **more than seven percent of the export value**. This implies an increase in value of significantly more than seven percent increase, if estimated as a percentage of the forest stumpage returns.

In addition to reduced transport costs, there are externality impacts on others including environmental, accident, and congestion. There are also some road wear costs which are unmet by the Road User Charges (RUCs) levied on the transport operators.

We estimate these externality impacts as $0.93 per tonne transported by rail and road, compared with $4.54 per tonne when transported by road. Consequently, the externality cost of transporting 250,000 tonnes of logs is $0.2 million for rail and road, compared with $1.1 million when hauled by road. In other words, transferring the transport of 250,000 logs from road to combined road and rail through Waingawa results in **an 80 percent reduction in externality costs**.

Headline costs of hauling 250,000 tonnes of logs to CentrePort

	Transport mode			
	Road and rail combined	Road only	Savings from combined option	
	$m	$m	$m	%
Transport	4.6	7.4	2.8	38.2
Unmet road wear	0.0	0.3	0.3	85.5
Environmental externalities	0.1	0.2	0.1	71.8
Other externalities	0.1	0.6	0.5	78.8
Total costs	**4.8**	**8.5**	**3.7**	**43.7**

Of course, the findings are dependent on our estimated 'average' costs for road haulage. One industry comment is that the haul across the Remutaka Hill is tough on log rigs and accelerates their depreciation. If that were to be fully reflected in road haul charges, then our figures based on 'average' rates may well understate the savings in moving to a combined road and rail option.

Simlarly, the log loads on the Remutaka Hill could be expected to result in greater degradation of the pavement and road structure than would be the case on the relatively flatter terrain in the South Island. In that case our unmet road costs estimate is also likely to be understated.

Our overall conclusion is that the log transport mode shift from road to rail has improved the profitability of forest production in the Wairarapa, and significantly reduced externality costs.

These findings also have implications for planned future hubs in, for example in Woodville and Marton. In particular, it is in the interests of forest owners, the environment, and Wellington region and New Zealand people and communities for CentrePort and KiwiRail to co-operate to increase rail capacity and logs carried by rail in the southern North Island.

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1 Scope and purpose of impacts estimate

1.1 Introduction

This note estimates costs of transporting logs via road compared to a combined road and rail option. These estimates are specific to the transport of logs from forests in the Wairarapa to their ultimate destination at Wellington's CentrePort (CP). We estimate comparative costs for two options across the following categories:

- Road transport costs
- Rail transport costs
- Costs of greenhouse gas (GHG) emissions
- Costs of other emissions
- Other environmental costs (for example, noise, soil and water, biodiversity, nature and landscape, and additional urban/barrier effects)
- Road and rail accident costs
- Congestion costs
- Unmet road wear (maintenance) costs.

The first two of these costs are covered in section 2, with the remaining externality and other costs detailed in section 3.

1.2 Context

Over the last three years CentrePort (CP) has initiated and co-operated with KiwiRail and log exporting interests in the Wairarapa to develop a log hub at Waingawa to transfer logs from road to rail for the haul to CP. This report estimates the impacts of this transfer on log transport costs and on the environmental and other externality costs. The findings can be useful in assessing impacts of planned future hubs, for example Woodville and Marton.

The methodology and coefficients for this estimate are largely based on research into potential mode shifts in the South Island completed in June 2019 for the South Island Regional Transport Committees and Environment Canterbury (ECAN).[1] The research was done by Stantec and partners. That research aimed to develop a methodology and coefficients that are useful for a rail provider exploring business cases for the mode shift to rail and/or road infrastructure owners considering investment to address freight movement.

These coefficients have been developed in international research and in the Stantec case studies completed in the South Island. However, we expect that the relevant coefficients for similar activity in the Lower North Island will not be greatly different from these.

This study applies that methodology and the coefficients to the mode shift of logs from road to rail from Waingawa to CP to obtain estimates of the general order of magnitude of impacts.

We suspect that using road haul impacts from South Island State Highways may underestimate the costs and impacts of hauling logs across the Remutaka hill from Wairarapa to CP.

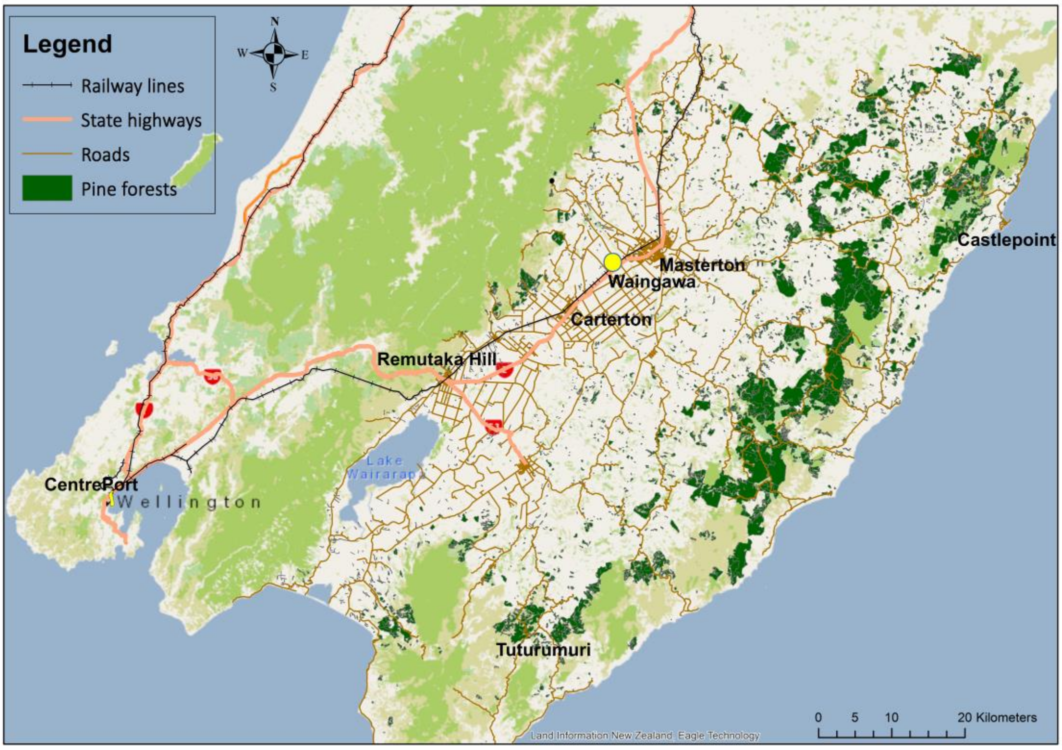
[1] Stantec. *South Island freight study: Identification of the opportunity for mode shift and preparation of a mode shift implementation plan*. South Island Regional Transport Committees and ECAN. Christchurch, June 2019

1.3 Limited objectives of these estimates

The initial objective for the current estimate of the impacts of hauling logs from the Wairarapa to CentrePort (CP) by rail and road, is to describe a framework of analysis of impacts. We then aim to apply this framework to a defined, average haulage of logs from Wairarapa to CP, by rail and local road, compared with road haulage for the journey. The data used for the scale of each impact is drawn from industry data and other case studies. The shape of the framework used in this estimate will hopefully assist in obtaining or deriving local data to improve the accuracy of the estimates.

A complete, definitive and defensible estimate of the range of impacts of the mode shift when a volume of logs from the Wairarapa, bound for CP are shifted from the road transport mode, to a combined local road and rail mode would be a complex analysis. We understand that some shippers ship logs from a number of forests, so the profile of log exports by shippers does not easily translate into logs originating in specific forests at a known location. Hence the haulage distances are complex. Also we understand that any given log transporter may haul some logs directly from the forest to CP, and others to Waingawa log hub by road for rail to CP, so that a definitive analysis would require this data from each transporter for logs from each forest.

The intention is that the analytical framework can be tested with the current average information, and revised as necessary. The revised model could then be applied to the potential future impacts from the Waingawa log hub, and the projected transport profile from the future log hubs including those proposed for Woodville and Marton.



1.4 Core analytical framework

The core of the analytical framework used here for the CP-initiated Waingawa log hub is based on the framework developed and used in the recent research into potential mode shifts in the South Island. The methodology used in the Stantec study is not all completely apparent, and nor is the basis for some of the coefficients used. However, in most cases we have been able to infer coefficients from the tables in the report. Our current report completes the analyses using these coefficients and parameters from the Stantec study. We also use coefficients from a Scion 2010 study which included log haulage costs across a range of distances[2]. We have updated these values to 2019. We also use data from other BERL studies such as the recent *Tūranga ki Wairoa Rail* (Gisborne to Wairoa Rail), *Feasibility study into reinstatement of rail line*.

1.5 Case study log haul assumptions

This case study uses industry and other data and information to estimate the range of impacts when a volume of logs from the Wairarapa, bound for CP are carried in two different hauls. The distances for each transport option are summarised in Table 1.1.

Table 1.1 Wairarapa area - transport distances and share of forest log yield

Wairarapa main forest areas shipping logs via CentrePort	Assessed average haul distances				Estimated approximate share of annual log yield
	Forest to Waingawa by road	Waingawa to CP by rail	Forest to CP by rail & road	Forest to CP by road	
Distance	*km*	*km*	*km*	*km*	*%*
Masterton - Castlepoint	65	100	165	165	65
Carterton ex western hills	20	100	120	85	18
South Wairarapa ex Tuturamuri	58	100	158	95	17
Case Study Assumed average	**50**	**100**	**150**	**135**	

1. **Road transport mode:** The logs are hauled from forest ride in the Wairarapa to join State Highway Two (SH2), then across the Remutaka hill road and to the log marshalling yard at CP in Wellington. For the purpose of this case study we have estimated an approximate weighted average haul distance, given the location of log offtakes in three main forest areas. Our estimate is that an average road haul would be 135 kilometres (km).

2. **Rail transport mode and local roads**: The logs are hauled from forest ride on local roads to Waingawa hub where they are transferred to rail for the haul to CP in Wellington. Again, we have estimated an approximate weighted average haul distance on the local roads, given the location of log offtakes in three main forest areas. Our estimate is that an average road haul would be 50 km. We understand that the rail haul from Waingawa log hub to CP is approximately 100 km. This implies a total haul distance from forest to CP using rail of 150 km.

While we present per tonne, and per tonne kilometre[3], estimates for costs, we also present overall estimates for shifting 250,000 tonnes of logs from the road option to the combined road and rail option. This is the equivalent of the quantity of logs shifted to the road and rail combined option over the latest year.

[2] Hall, Peter, Barbara Hock and Ian Nicholas, Scion *Volume and cost analysis of large scale woody biomass supply: Southland and Central North Island*. Parliamentary Commissioner for the Environment. Wellington, April 2010.

[3] A tonne kilometre refers to the movement of one tonne of logs over 1 kilometre. This is also the equivalent of moving 0.5 tonnes over two kilometres, or moving two tonnes over 0.5 kilometres.

2 Transport costs for the two modes

2.1 Transport unit costs by mode

Transport unit costs have been estimated as the dollar cost per tonne kilometre (tkm). The figures we have for cost by rail, from two different sources, and originating from KiwiRail, indicate a cost of $0.062 dollars per tkm. This is $6.2 cents per tkm, and is assumed to apply irrespective of distance.

However, the unit costs per tkm for log haulage by road transport are expected to decline as the haul distance increases and the overhead costs of the trip are spread over a longer distance. This was reflected in the Scion analysis in 2010 across a range from 10 km to 200 km on which the cost per tkm declined from 25 cents per tkm to 17 cents per tkm respectively. This progression is reflected in our analysis which updated the numbers to 2019 dollars and found that for a 50 km haul the cost is 24.2 cents per tkm, and for a 135 km haul the cost is 21.9 cents per tkm.

The unit cost per tkm using the coefficients for local road and rail for a haul of 150 kms from the forest to Waingawa and to CP by local road and rail averages 12.2 cents per tkm. The cost for a 135 km road haul from forest ride to CP cost 21.9 cents per tkm.

Table 2.1 Transport unit costs by modes forests to Waingawa to CentrePort

Case study mode transport costs	Unit	Log transport hauls			
		Forest to Waingawa by Road	Waingawa to CP by rail	Forest to CP by rail and road	Forest to CP by road
Assumed distance	*km*	50	100	150	135
Cost per tonne km	*$/tkm*	0.242	0.062	0.122	0.219

2.2 Transport costs for 250,000 tonnes of logs from forest to CentrePort

This case study aims to assess the impacts of shifting from road to rail the approximate volume of logs railed from Waingawa hub in the 2018 fiscal year. This volume we understand to be an amount above 250,000 tonnes. For ease of application to other assessments we have rounded the assumed volume to 250,000 tonnes.

Using the average unit costs provided above we are able to estimate the total costs of hauling 250,000 tonnes from the forest, the 50km average to Waingawa, and then the 100km from Waingawa to CP by rail. These estimates are that the local road haul would cost $12.09 per tonne, and the rail haul cost $6.16 per tonne, giving a total haul cost of $18.25 per tonne. This unit cost to haul the 250,000 tonnes of logs transferred from road to rail in 2018 financial year from the forest to CP via the Waingawa hub, would cost a total of $4.6 million.

For comparison, if the same 250,000 tonnes of logs had been hauled by road from forest to CP, the cost per tonne for the 135 km haul would have been $29.52 per tonne. This cost applied to the 250,000 tonnes of logs transferred from road to rail would have cost a total of $7.4 million.

Table 2.2 Transport costs by mode for hauling 250,000 tonnes logs to CentrePort

Case study mode transport costs	Unit	Log transport hauls: Forest to Waingawa by road	Waingawa to CP by rail	Forest to CP by rail & road	Comparison Forest to CP by road
Assumed distance	*km*	50	100	150	135
Cost per tonne km	*$/tkm*	0.24	0.06	*0.12*	0.22
Transport cost per tonne	*$/tnne*	**12.09**	**6.16**	**18.25**	**29.52**
Tons of logs 2018FY	*'000tnne*	250	250	250	250
Total Log transport cost	*$ million*	**3.02**	**1.54**	**4.56**	**7.38**
Mode shift cost saving	*$ million*			**2.82**	
Transport cost saving	*%*			**38**	

2.3 Potential commercial impact on forestry returns

This analysis indicates that transferring 250,000 tonnes of logs from a road haul to a combined local road and rail haul through the Waingawa log hub could reduce transport costs from $7.4 million to $4.6 million. This is a reduction by $2.8 million, or by 38 percent of the road haul cost.

From the forest owners' viewpoint this is over $11 per tonne of logs. At an export value of about $150 per tonne, this is equivalent to over seven percent of the export value, which implies that it is significantly more than seven percent increase in value if estimated as a percentage of the forest stumpage returns.

3 Externality costs by modes

The previous section estimated the transport cost savings for the case study modes shift of logs from road to rail through the Waingawa log hub. This section describes the externality costs using the methodology as described in the Stantec South Island study and provides the coefficients derived by BERL from that study.

We then consider whether or not these coefficients could or should be modified to make them more rational to be applied to the log haulage from Wairarapa forests through the Waingawa log hub to CP.

3.1 Environmental unit costs by modes

The overall externality unit costs we have derived from the Stantec South Island study include environmental costs, and other externality costs. The other externality costs are those of accidents and of impacts on other road users. The latter are mainly congestion costs. These two added to environmental cost are the main externality costs.

Additionally, if the Road User Charges do not cover the full costs of maintaining the roads in a useable condition the cost is carried by rate payers and other road users. These are estimated as unmet road wear costs and are the final externality costs added in the Stantec analysis.

This section concentrates on the environmental unit costs by the modes of heavy commercial vehicl*es* (HCVs) and rail.

The Stantec study provided a range of sources of externality costs. Then based on 2014 Austroads research, the report derived values in New Zealand dollars, updated to 2017 for environmental components of the externality costs. This research gave specific estimates of costs for light commercial vehicles (LCVs), HCVs and for rail. The costs were shown separately for rural areas and urban areas. The Stantec categories relevant to the current case study are air pollution, greenhouse, noise, soil and water, biodiversity, nature and landscape, and additional urban/barrier effects. The costs in 2017 New Zealand dollars for HCVs and rail in rural and urban areas are shown in Table 3.1.

Table 3.1 Environmental unit costs for HCVs and rail in $NZ 2017 prices

Environmental costs ex Austroads / Stantec	Rural		Urban	
	HCV	Rail	HCV	Rail
	$/1000 tkm	***$/1000 tkm***	***$/1000 tkm***	***$/1000 tkm***
Air pollution	1.40	0.02	13.99	2.78
Greenhouse	3.24	0.60	3.24	0.60
Noise	0.30	0.02	2.97	2.23
Soil and water	0.15	0.01	1.46	0.74
Biodiversity	0.10	0.00	0.98	0.00
Nature and landscape	1.15	0.10	0.11	0.01
Additional urban/barrier effects	0.00	0.00	0.95	0.29
Total environmental costs	**6.34**	**0.75**	**23.70**	**6.65**
Upstream	3.41	8.15	3.41	8.15

In their methodology for estimating the environmental impacts in the South Island, the Stantec report has accumulated these seven categories into just three categories which are *GHG emissions*, *Other emissions*, and *Other environmental costs*.

As well as the environmental categories, the Austroads information supplied estimates of the upstream environmental impacts which relate mainly to environmental costs of fuel and electricity production resulting in emissions. The Stamtec report says it is not clear if these are appropriate to New Zealand conditions and so are excluded from the analysis.

In terms of valuing the Greenhouse gases (GHG), the Austroads analysis considered a carbon cost of €25 per tonne appropriate. This is equivalent to about $60 per tonne which is above the spot price, but slightly below the value of $65 per tonne in the most recent version of New Zealand Transport Agency's Economic Evaluation Manual (EEM).

These comparisons of the overall environmental unit costs per 1,000 tonne kilometres shown in the table indicate that the use of HCVs in urban areas results in environmental costs per tkm which are three to four times the costs of HCVs in rural areas, or of rail in urban areas.

The environmental costs of rail in rural areas is very low, not to say negligible at just $0.75 per 1,000 tkm. This means that in a rural setting 10 tonnes of logs could be hauled by rail for 133 kms to incur an environmental cost of just $1.

3.2 Costs of accidents, congestion and unmet road wear

The **road accident costs** for HCVs estimated in the Stantec study were derived from the New Zealand Transport Agency (NZTA) database for the South Island State Highway network. The average costs for each crash were estimated using the EEM figures updated to 2017 values as $4.89 million for a fatal injury crash and $0.52 million for a serious injury crash. This gave an average cost per vehicle kilometre travelled (vkt) of $0.22, which was then applied to road haul distances.

The **rail accident costs** are small. Based on information from other reports, Stantec found that accident costs per tonne kilometre are one-eighth of those for road vehicles.

These analyses resulted in accident costs per 1,000 tonne kms of $14.90 for HCVs, and $2.40 for rail transport.

Congestion costs are more complex, being dependent on peak and off-peak traffic in urban areas where in the South Island costs range from $15 per 1,000 tkm to $39 per 1,000 tkm. Given that the environmental costs above totalled $23.70 per 1,000 tkm the congestion costs are significant in urban areas, especially at peak times.

In rural areas, congestion costs are estimated at just $2.50 per 1,000 tkm or a little over one-third of the total of the environmental costs.

Unmet road wear costs as estimated by Stantec were based on different configurations of 50Max vehicles[4] and road damage unit costs per Equivalent Standard Axle (ESA). These were modelled using the Ministry of Transport's Cost Allocation Model (CAM). The modelled road asset costs were then compared with the estimated Road User Charges (RUC) revenue for the configurations and thus the difference is the unmet road wear costs.

[4] 50MAX are trucks that are slightly longer than standard 44 tonne vehicles and have an additional axle (9 in total) in order to operate at 50 tonnes maximum total weight, hence 50MAX. The modified design means that these trucks can carry more, but they perform on the road in the same way as a standard 44 tonne truck.

It is probable that the road asset unit costs on the structural layers of the pavement over the Remutaka hill road may be significantly higher than those estimated for the South Island State Highway network.

3.3 Deriving costs per tonne for the Waingawa case study

The various externality cost components discussed above were combined into six cost categories. The unit costs per tonne are shown in the Stantec report *Table C-3. Externality Costs for Movements between Milburn and Bluff or Port Chalmers by Road and Rail ($'000 per 50,000 tonnes).* This is a figure therefore of dollars per 50 tonnes.

From this table we find two apparent approaches to estimating each of the six categories[5]:

- The distance from Milburn to Bluff is approximately three times the distance from Milburn to Port Chalmers. Similarly, the figures of dollars per 50 tonnes from Milburn to Bluff for greenhouse gases (*GHG*), *accidents*, and *unmet road wear costs* are approximately three times the costs from Milburn to Port Chalmers. This indicates that these three externality costs have been estimated on a per tkm basis.
- The figures for three of the externality categories appear similar in dollars per 50 tonnes hauled irrespective of the distance hauled. These categories are *Other emissions, Other environmental costs* and *Impacts on other road users.*

In our estimates we have accepted the relationships implied in these case studies for the Milburn log hub, and also the rail component of the Stillwater to Lyttelton log haul.

The figures given per tkm for *GHG*, *accidents* and *unmet road wear costs* are relatively self-explanatory. However, the Stantec costs could understate the costs for the log road haul across the Remutaka hill, with the road wear aspect and the impact on the commuting traffic into Wellington City, especially from Melling to CP. This could increase the *accident costs*, and the *impact on other road users*, which is mainly the cost of congestion.[6]

The apparent figures for the externality costs applied in the Stantec analyses are shown in Table 3.2 Externality unit costs by modes from forests to Waingawa to C These costs can be applied for the log haul distances from Wairarapa forests to CP.

[5] Another aspect on the table in the report is that it contains an arithmetic error in creating the sub-total for *Total externality costs* from Milburn to Port Chalmers. The table shows a figure of $120 per 50 tonnes, whereas the sub-total should read $97 per 50 tonnes. This in turn causes an error in the *Total Cost/tonne* overall which shows as $3.0 per tonne for that haul, when it should show $2.54 per tonne.

[6] The author experiences this increased congestion, caused not only by logging trucks. The trend in average speeds in peak time traffic travelling from Dowse interchange in Lower Hutt to the Wellington CBD recorded in my vehicle's computer has declined from 36 kph in 2012 to 31 kph in 2018. This also results in increased fuel consumption per km, and increased emissions. Presumably this effect is also measured by Ministry of Transport / NZTA traffic flow data.

Table 3.2 Externality unit costs by modes from forests to Waingawa to CentrePort

	Wairarapa to CP Log transport externality costs by modes	Rail + local road	Road	Cost saving
	Distance (km)	150	135	
		$ per tonne	***$ per tonne***	***Percent***
1	GHG emissions	0.14	0.30	52
2	Other emissions	0.03	0.27	89
3	Other environmental costs	0.05	0.21	76
	Total environmental costs	**0.22**	**0.78**	71
4	Accidents	0.48	2.00	76
5	Impacts on other road users	0.04	0.45	91
	Total externality costs	**0.74**	**3.24**	77
6	Unmet road wear costs	0.19	1.31	86
	Total including road wear	**0.93**	**4.54**	80

3.4 Externality costs for 250,000 tonnes of logs forest to CentrePort

The externality costs per tonne can now be applied to a haul of 150 km by road and rail compared with a haul of 135 km by road from the Wairarapa forests to CP. These respective costs are $0.93 per tonne by road and rail, compared with $4.54 by road alone.

Applying these costs per tonne to 250,000 tonnes per year shifted from road haul to rail and road implies and externality cost of $0.2 million per year for rail and road, compared with $1.1 million externality cost when hauled by road.

The externality costs saved when shifting mode to rail and road is 80 percent of the externality costs of road hauling.

Table 3.3 Externality costs by mode for hauling 250,000 tonnes logs to CentrePort

Case study mode externality costs	Unit	Forest to CP by road & rail	Comparison Forest to CP by road
Assumed distance	*km*	150	135
Mode shift tonnes of logs 2018FY	*'000 tnne*	250	*250*
Externalities cost per tonne	*$/tnne*	0.93	4.54
Log externalities costs	*$ million*	0.23	1.14
Mode shift externalities costs saving	*$ million*	0.90	
Externalities costs saving	%	80	

Although the externality costs are significantly lower than the commercial transport costs, the share of the externality costs which are saved by shifting from road to rail for the haul from Waingawa to CP is 80 percent of the road externality costs. In other words the environmental and other externality costs of hauling logs from Wairarapa to CP become relatively insignificant when the logs are hauled by rail from the Waingawa log hub.

4 Summary impacts of Waingawa log hub

The estimation of the commercial transport costs and the externality costs of haul logs from Wairarapa by road and by rail detailed in sections two and three can now be shown in the same table for comparison.

Table 4.1 Summary transport and externality costs of hauling 250,000 tonnes logs to CentrePort

Case study mode transport and externality costs	Unit	Forest to CP by road & rail	Comparison Forest to CP by road
Assumed distance	*km*	150	135
Mode shift tonnes of logs 2018FY	*'000 tnne*	250	250
Transport cost per tonne	*$/tnne*	18.25	29.52
Log transport costs	*$ million*	4.56	7.38
Mode shift Transport costs saving	*$ million*	2.82	
Transport cost saving	*%*	38	
Externalities cost per tonne	*$/tnne*	0.93	4.54
Log externalities costs	*$ million*	0.23	1.14
Mode shift Externalities costs saving	*$ million*	0.90	
Externalities costs saving	*%*	80	
Total Log transport all costs	*$ million*	4.80	8.52
Mode shift all costs saving	*$ million*	3.72	
Transport all costs saving	*%*	44	

4.1 High level findings

- The estimated commercial transport cost per tonne of logs is $18.25 by rail and road, compared with $29.52 per tonne by road. This saving of $11.27 per tonne, may be over seven percent of the export value, and would be a greater percentage of the stumpage value. This would increase net harvest revenues per hectare.
- The commercial impact findings are very dependent upon the assumed transport costs per tonne-km and per tonne for the main hauls, namely:
    - By road forest to Waingawa log hub 50 kms at $0.242 per tkm, namely 24.2 cents/tkm
    - By rail Waignawa log hub to CP 100 kms at $0.062 or 6.2 cents per tkm
    - By road forest to CP 135 kms at $0.219 or 21.9 cents per tkm.

One industry comment is that the haul across the Remutaka hill is tough on log rigs, and accelerates their depreciation. If that is reflected in charges, the tkm charge in 1. could be lower than that in 3.

- A related matter is that the log loads on the Remutaka hill road could be expected to result in greater degradation of the pavement and road structure than would be the case on the relatively flatter-terrain costed in the South Island. The unmet road costs of $1.31 per tkm are about one-third of the estimated total externality costs of the road haul. Any revision to the case study assumptions which increased these costs for logging rigs on the Remutaka hill road would be significant.

- An overall conclusion is that the log transport mode shift from road to rail has made an impact to improve the profitability of forest production in the Wairarapa.
- It is in the interest of forest owners, the environment and people in the Wellington Region and New Zealand for CentrePort and KiwiRail to co-operate further and with log exporting interests to increase train capacity and the share of logs carried by rail in the southern North Island.