

WESTERN AUSTRALIAN SEPTEMBER 2009 SUBMISSION

ROADS

Key Points

- Heavy vehicle use should be measured by ESA-km, rather than AGM-km.
- The impact of heavier vehicles in Western Australia and the Northern Territory should be taken into account by using ABS State-specific vehicle mass data.
- Western Australian data indicates that our per kilometre cost of maintaining unsealed roads, after adjusting for their lower traffic intensity, is about 55% of the cost for sealed roads.
 - The unsealed road length weight should reflect each State's data in proportion to their share of national unsealed road length.
- The proposed assessment has an internal inconsistency between the urban/rural split of expenditures and the road use disability factors.
 - This submission presents a simple method of removing this inconsistency.
- We support the Draft Report proposal to include pavement and bridge improvement expenditures in the recurrent Roads factors, and to apply the same factors to capital stocks.
- The 675 kilometre reduction in Western Australia's mapped rural road length since the 2009 Update should be examined.

HEAVY VEHICLE USE MEASURE

To measure road use by heavy vehicles, the Commission is proposing to use average gross mass kilometres (AGM-km), rather than equivalent standard axle kilometres (ESA-km).

The reason for this decision is that calculating AGM-km is simpler and gives results that are not materially different from those obtained from ESA-km.

However, ESAs were specifically designed to measure the impact of heavy vehicles on roads, and have generally been accepted as such by road authorities. In their submissions to this Review, States generally supported heavy vehicle use being measured by ESAs.

Also, ESAs can be calculated directly from AGMs by applying a simple formula. The only additional "data" required are the constants in this formula, which the Commission has obtained from the National Transport Commission (NTC).

Therefore, the Commission is proposing to adopt a less appropriate measure (AGM-km) for the sake of an insignificant increase in simplicity.

However, the materiality of using AGM-km instead of ESA-km depends on the method used to calculate AGM-km for each State.

Using the Commission's proposed approach for calculating AGM-km, the impact of using AGM-km instead of ESA-km is not material in 2007-08 (the largest impact is a cut to Western Australia's assessed expense of \$6.79 per capita), but it may be material in other years (including in the future, as trucks tend to increase in size).

The Commission has calculated AGM-km for each State by assuming that a vehicle of a given type¹ will have the same AGM in all States, based on NTC trend data. The ABS Survey of Motor Vehicles produces State-specific estimates of AGM, which indicate that Western Australia and the Northern Territory have, on average, relatively heavier vehicles within vehicle types.

The Commission has not used this ABS data because, when disaggregated by vehicle type, some of it has high standard errors. However, we note that the results would be aggregated across all vehicle types, reducing any statistical problems.

If the ABS State-specific data were used, then the impact of adopting ESA-km instead of AGM-km would be very material for the Northern Territory (we estimate an impact of about \$270 per capita).

UNSEALED ROAD LENGTH WEIGHT

The Draft Report proposes weighting rural unsealed roads by 50%, based on cost and use data from some States.

- Western Australian data was not used because Commission staff were not convinced about the comparability of this data.

The relevant information provided by Western Australia was:

- the cost of maintaining 2,157 kilometres of sealed roads in the Kimberley in 2007-08 was \$24.5 million; and
- the estimated cost per kilometre of maintaining unsealed roads in the Kimberley is \$4,450 per annum.²

¹ For example, "Articulated trucks: B-double: over 8 axle rig".

² Comprises \$45,000 periodic maintenance cost each 12 years, and \$700 regular maintenance cost annually.

By using Kimberly data in both cases, we abstract from the impact of location (all rural roads in the Kimberley would be Very Remote under the Commission's classification).

From this data, per kilometre maintenance costs for unsealed roads are 39% of sealed road maintenance costs.

However, unsealed roads have far lower traffic intensities than sealed roads.

In an earlier submission, we provided data showing that Western Australian unsealed State-managed roads have:

- 28% of the all vehicle traffic intensity of sealed roads; and
- 24% of the heavy vehicle traffic intensity of sealed roads.

After adjusting for this lower traffic intensity, our data would support an unsealed road length weight of around 55% (see Attachment).

The weight adopted by the Commission should be a national average, with each State's contribution to the average being in proportion to their share of national unsealed road length.

COMBINING LENGTH AND USE

The proposed assessment contains an internal inconsistency.

- Urban and rural expenditures are split into those that are length-related and those that are use-related.
- However, the use disability factors are not consistent with this split.

Table 1 below compares the urban/rural split of expenditures relevant to "arterial" roads (based on expenditure assumptions in the Draft Report) to an urban/rural split of road length and road use (based on data provided by Commission staff).

- The Commission's key assumption is that, for each NTC category of road expenditure,³ the urban/rural ratio for total expenditure in the category applies separately to the length-related component and (hence necessarily) use-related component of the category.
- A further assumption has also been made – that the urban/rural ratio for use-related expenditure in each category is the same for each component of use-related expenditure, namely "all vehicle" use-related expenditure and "heavy vehicle" use-related expenditure.
 - While this further assumption is neat, it has no effect on the Roads assessment, and no effect on the inconsistency we point out below.

³ The NTC compiles road expenditures in categories, such as "servicing and operating", "routine maintenance" and "periodic surface maintenance".

Table 1: National urban/rural expenditures, road length and road use

Expenditure (based on assumptions in the Draft Report)				
	Length-related (\$m)	All vehicle use-related (\$m)	Heavy vehicle use-related (\$m)	Total (\$m)
Urban	1,154	970	813	2,937
Rural	897	778	729	2,405
Total	2,052	1,749	1,542	5,342
Urban/Total	56%	55%	53%	55%

Length and Use			
	Length ^(a) (road-km)	All vehicle use (Mveh-km)	Heavy vehicle use (ktonne-km)
Urban	23,415	106,960	142,864
Rural	103,389	31,062	193,492
Total	126,804	138,021	336,356
Urban/Total	18%	77%	42%

(a) Unsealed road lengths weighted by 50%.

Sources: Expenditures – Draft Report (Table 16-A3)

Rural road length – Draft Report, (Table 16-6)

Urban road length - CGC2007/35-S (Table 3, State-provided lane-km divided by 2)

Road use – spreadsheets provided by Commission staff (2006-07 ABS data)

As summarised in Table 1, the Draft Report assumes that 56% of length-related expenditure is urban (this is an average across all the NTC road expenditure categories), even though only 18% of road length is urban.

The Draft Report assumes that 54% of use-related expenditure is urban (this can be obtained from Table 1 by adding the “all vehicle” and “heavy vehicle” urban and total expenditures respectively, and taking their ratio - as noted above, the specifics of the assumed split between “all vehicle” use and “heavy vehicle” use do not affect the Roads assessment).⁴

- However, the Commission has not split road use disability factors into urban and rural (as reliable annual data on urban and rural use by State are not available).
- Instead, the “all vehicle” and “heavy vehicle” factors have been applied to total “all vehicle” and “heavy vehicle” expenditures respectively.
- This is equivalent to assuming that the urban shares of “all vehicle” and “heavy vehicle” use-related expenditures are 77% and 42% respectively (see last row of Table 1 - these are the percentages of use that are urban).

⁴ The urban proportions of length-related expenditure (56%) and use-related expenditure (53-55%) in Table 1 differ from the 55% of total expenditure that is urban because each NTC category of expenditure is split differently between length- and use-related. If there were only a single NTC category, these urban expenditure proportions would all be identical.

- This in turn implies, using Table 1, that \$2,010 million of road use-related expenditure is urban (i.e. 77% of \$1,749 million plus 42% of \$1,542 million).⁵
- This allows us to calculate length-related urban expenditure as the difference between total urban expenditure and use-related urban expenditure – that is, \$927 million (i.e. \$2,937 million [see Table 1] less \$2,010 million).
- This is inconsistent with the length-related urban expenditure assumed by the Commission (i.e. \$1,154 million – see Table 1).
- **Hence the Commission’s methodology is internally inconsistent.**

In response to our previous Roads submission, the Draft Report defended the proposed assessment on two grounds. These grounds, together with our responses, are as follows.

(1) *The NTC has advised the Commission that there is no basis for different splits of urban and rural expenditures between cost–drivers.*

However, while the NTC effectively advised that the same urban/rural splits could be used for length-related and use-related expenditure, **this is not what the Commission has done.** As shown above, it has used a 56/44 urban/rural split for length-related expenditures, a 77/23 split for “all vehicle” related expenditure and a 42/58 split for “heavy vehicle” related expenditure.

Moreover, the NTC also qualified their advice, by saying “*it is quite possible that different proportions could be appropriate for urban compared to rural road expenses, taking into account the fact that roads in urban areas (compared to rural areas) may have different traffic volumes, weather conditions and so on.*”

The Draft Report also supports the logic that the proportion of expenditure related to length will be greater in regions with greater road lengths - see paragraph 83 and footnote 140.

(2) *Commission staff produced an indicative urban and rural road use disability factors, and got results supporting the proposed assessment.*

We agree that the results of this indicative assessment were substantially closer to the results of the proposed assessment, than to an assessment with no urban/rural split of road length (which we had proposed).⁶

⁵ These numbers are based on unrounded data. These calculations are also presented in Table 2 below.

⁶ The Commission does not propose adopting this indicative assessment, as it does not consider the required data to be sufficiently reliable.

However, the indicative assessment is still based on the assumption that, for each NTC category of expenditure, the urban/rural ratio for total expenditure in the category applies separately to the length-related and use-related components. The NTC has provided only qualified support for this assumption, and the case in our February 2009 submission (that this assumption is highly implausible) still stands.

Even so, the indicative assessment does give materially different results from the proposed assessment.

At a minimum, the Commission needs to address the internal inconsistency in its proposed method.

We have a “minimalist” proposal for fixing the inconsistency, which will also simplify the assessment.

- The road use disability factors imply that the urban and rural use-related expenditures are in proportion to urban and rural road-use. For consistency, the urban/rural length-related expenditures should be equal to urban/rural total expenditures minus the corresponding use-related expenditures.

This is illustrated in Table 2.

Table 2: Disability factor consistent national urban/rural expenditures

Urban/Total	Length and Use			Length ^(a) (road-km)
	All vehicle use (Mveh-km)	Heavy vehicle use (ktonne-km)		
	77%	42%		18%
Urban/Total	Expenditure			
	All vehicle use-related (\$m) (A)	Heavy vehicle use-related (\$m) (B)	Total (\$m) (C)	Length- related (\$m) =C-(A+B)
Urban	1,355	655	2,937	927
Rural	394	887	2,405	1,124
Total	1,749	1,542	5,342	2,052
Urban/Total	77%	42%	55%	45%

(a) Unsealed road lengths weighted by 50%.

The revised length-related costs in Table 2 still give a very high weight to urban length compared to rural length, but the change is in the right direction (i.e. the disproportionately high weight for urban length has been somewhat reduced) and the revisions would make the assessment internally consistent.

Some additional data are required (compared to the proposed assessment), in order to determine the proportion of all vehicle and heavy vehicle use that is urban. However, only **national** data are required.

The assessment would be simplified, as the urban/rural split of expenditure would only be cross-classified against the cost-drivers at the aggregate level, not by each NTC category of expenditure.

CAPITAL ASSESSMENT OF ROADS

The Draft Report proposes including pavement and bridge improvement expenditures⁷ in the calculation of the recurrent Roads factors, and to apply these factors to capital stocks.

As discussed in our Capital submission, we support this proposal.

MEASUREMENT OF RURAL ROAD LENGTHS

The Draft Report proposes assessing rural road lengths by the mapping approach introduced in the 2008 Update.

The latest mapped lengths for Western Australia are 675 kilometres lower than in the Position Paper (CGC2008/25).

We understand that some urban boundaries have been broadened (to include nearby urban centres).

However, the magnitude of this decline is substantial.

We suggest that the Commission provide maps of the assessed rural roads, so that States can review the results.

Western Australian Department of Treasury and Finance

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⁷ NTC categories F1 and F2.

UNSEALED ROAD LENGTH WEIGHT BASED ON WESTERN AUSTRALIAN DATA

This attachment explains why we believe that Western Australian data supports a 55% weight for unsealed road lengths in the Commission's proposed Roads assessment.⁸

Western Australian data indicates that per kilometre maintenance costs for unsealed roads are 39% of sealed road maintenance costs. To a large extent, this is due to the lower traffic intensities on unsealed roads. Western Australian unsealed State-managed roads have:

- 28% of the all vehicle traffic intensity of sealed roads; and
- 25% of the heavy vehicle traffic intensity of sealed roads.

It is possible to derive the weight for unsealed road lengths through algebra, but it is easier to assume the 55% length weight and demonstrate that this would result in the observed unsealed road cost of 39% of the sealed road costs.

The process is as follows.

Step 1: Determine national per unit costs for rural "arterial" roads

The national weighted rural "arterial" road length, based on a 55% weight for unsealed roads, is 104,127 km.

The last line of Table 16-A3 of the Draft Report gives national expenditures by cost driver. The relevant expenditures for rural "arterial" roads can be turned into per unit costs as follows:

Rural sealed length	\$897.5m	/	104,127 road-km	=	\$8,619/road-km
Rural unsealed length			x 55%	=	\$4,740/road-km
All vehicle use	\$1,748.5m	/	138,032 Mveh-km	=	\$12,668/Mveh-km
Heavy vehicle use	\$1,541.9m	/	379,094 Mtonne-km	=	\$4,067/Mtonne-km

(For use related costs, the proposed assessment method assumes the same cost per unit for urban and rural roads.)

Step 2: Estimate use for Western Australian rural "arterial" roads

The Draft Report gives assessed road lengths for Western Australian rural sealed and unsealed roads. However, the Draft Report does not give urban/rural and sealed/unsealed splits of road use.

Commission staff have provided States with spreadsheets containing urban/rural road use data for 2006-07. Based on this data, 23.8% of all vehicle use and 64.8% of heavy vehicle use is rural, in Western Australia.

⁸ We will also provide a spreadsheet with the calculations underlying this Attachment.

Applying these percentages to Western Australian total road use data from the Draft Report gives Western Australian rural road use of 3,742 million vehicle-km and 32,988 million tonne-km. These estimates can be attributed to sealed/unsealed roads, as follows:

	Road length (km)		Traffic intensity relative to sealed roads					Estimated rural road use
All vehicle use								
Sealed	16,985	x	100.0%	=	16,985	or	94.4%	3,533 Mveh-km
Unsealed	3,578	x	28.2%	=	1,009	or	5.6%	210 Mveh-km
					17,994		100.0%	3,742 Mveh-km
Heavy vehicle use								
Sealed	16,985	x	100.0%	=	16,985	or	95.0%	31,344 Mtonne-km
Unsealed	3,578	x	24.9%	=	891	or	5.0%	1,644 Mtonne-km
					17,876		100.0%	32,988 Mtonne-km

Step 3: Apply per unit costs to Western Australian use estimates

Multiplying the national per unit costs from Step 1 to the Western Australian use estimates from Step 2 will give an estimate of use-related costs for Western Australian rural “arterial” sealed and unsealed roads. These costs can be divided by road length to give per kilometre use-related costs, and then added to the length-related per kilometre costs from Step 1.

The calculation is as follows:

All vehicle use									
Sealed	\$12,668/Mveh-km	x	3,533 Mveh-km	=	\$44.7m	/	16,985 km	=	\$2,635/km
Unsealed	\$12,668/Mveh-km	x	210 Mveh-km	=	\$2.7m	/	3,578 km	=	\$743/km
Heavy vehicle use									
Sealed	\$4,067/Mt-km	x	31,344 Mt-km	=	\$127.5m	/	16,985 km	=	\$7,506/km
Unsealed	\$4,067/Mt-km	x	1,644 Mt-km	=	\$6.7m	/	3,578 km	=	\$1,869/km
Length									
Sealed									\$8,619/km
Unsealed									\$4,740/km
Total									
Sealed									\$18,760/km
Unsealed									\$7,352/km

The result is that the unsealed road cost of \$7,352 per kilometre is 39% of the sealed road cost of \$18,760 per kilometre, as observed.