



Australian Government


Commonwealth Grants Commission

2020 REVIEW

ROADS

**STAFF DRAFT ASSESSMENT PAPER
CGC 2018-01/17-S**

APRIL 2018

Paper issued	20 April 2018
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Submissions sought by	31 August 2018. Submissions should be emailed in Word format to secretary@cgc.gov.au . Submissions of more than 10 pages in length should include a summary section.
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ROADS

- 1 This paper provides the Commission staff proposals for the assessments of roads expenses and investment for the 2020 Review. Expenses are assessed in the Roads category. Roads investment is a component of the Investment category.

2015 REVIEW APPROACH

Services included in this category

- 2 The Roads category comprises expenses on:
 - the maintenance and rehabilitation of roads, bridges and tunnels
 - road safety, traffic management and other transport activities (such as driver licensing, motor vehicle registration, heavy vehicle regulation and road transport planning administration).
- 3 Road construction (investment) and depreciation expenses are assessed in the Investment and Depreciation categories.

Category and component expenses

- 4 The Roads category is assessed in five components:
 - rural roads
 - urban roads
 - local roads
 - bridges
 - other services.
- 5 Table 1 shows that the dominant expenses are the provision of rural and urban roads, representing 38% and 32% respectively of the total category expense.

Table 1 Roads category expenses by component, 2016-17

	Amount	Proportion of total expenses
	\$m	%
Rural roads	2 618	38
Urban roads	2 177	32
Local roads	370	5
Bridges	314	5
Other services	1 377	20
Total	6 856	100

Source: Commission estimates based on State-provided data, 2018 Update.

6 Table 2 shows roads investment. Urban roads investment represents 76% of total roads investment.

Table 2 Roads investment, 2016-17

	Amount	Proportion of total expenses
	\$m	%
Rural roads	790	24
Urban roads	2 471	76
Total	3 261	100

Source: Commission estimates based on State-provided data, 2018 Update.

The roads task

- 7 All three levels of government fund the roads network, and State and local governments manage the network. The main roads are usually managed by the State governments. Roads of lesser significance in both urban and rural areas are typically the responsibility of local governments. The allocation of road management responsibilities between State and local governments is not based on an agreed standard but is generally due to historical policy decisions. As a result, the allocation varies from State to State.
- 8 In providing rural and urban roads, States are faced with differential spending needs due to differences in the following factors.
- **The length of the road network.** Every kilometre of road regardless of its use needs some maintenance work due to climatic and other factors. Hence, States with more road length due to, say, large rural areas need to spend more on maintenance and repairs than other States. For example, the ACT is a compact jurisdiction where the road network comprises mostly roads within the Canberra urban area. By contrast, Queensland has a large road network. It has a large network of urban roads because of its many urban population centres. Furthermore, since those centres are scattered across a large land area, it also has a large network of rural roads connecting them.

- **Traffic volume.** Roads in densely populated urban areas carry large volumes of traffic. Such roads require more maintenance to overcome the wear and tear caused by that traffic, notwithstanding that the original specifications for their construction would have taken some account of the expected traffic levels. Hence, the cost of maintaining urban roads is likely to differ from that of maintaining rural roads — the latter may span large distances but carry smaller traffic volumes. Furthermore, the high traffic volumes in urban areas require States to install and maintain extra traffic control and safety measures (such as signage and traffic lights).
 - **Heavy vehicle use.** Heavy vehicles cause greater pavement wear and tear than other vehicles, which requires additional maintenance to restore the pavement to acceptable service standards. States with greater heavy vehicle use incur higher maintenance costs.
- 9 In some areas (usually sparsely populated ones), States manage roads that would normally be classified as local roads or they contribute extra funds to help maintain them. This is typically because a local government does not exist or because it does not have the financial capacity to support those roads.
- 10 States are also required to fund and maintain particular structures as part of their road network, most notably bridges. Bridge structures may be required due to geographical features such as waterways or for roads passing over the path of railways and other roads.
- 11 Other road related expenses, such as those associated with corporate services, driver licensing and vehicle registration, may be affected by other influences including population composition and relative wage levels.

Data sources and assessment methods

Rural and urban roads

- 12 **Road length.** The Commission developed different methods for the assessment of needs associated with rural and urban road length because it considered their maintenance costs per kilometre were materially different.
- For rural road length, the Commission developed a mapping algorithm in the 2010 Review, which calculates the length of roads connecting neighbouring localities larger than 400 persons by the fastest route. It did so to ensure the measured lengths were policy neutral and not affected by differences in State policies on the allocation of responsibility for roads between State and local governments or policies on when and where roads were built.
- The locality size threshold of 400 was chosen because geospatial data at the time were not sufficiently reliable for localities with a lower population.

The Commission treated minor rural roads identified by the mapping algorithm as unsealed roads. All other mapped roads, such as freeways, highways or main roads, were treated as sealed roads. The maintenance cost of unsealed roads was set at half that of a sealed road.

- For urban roads, a suitable policy neutral measure of State managed roads could not be developed. The Commission, therefore, used urban population as a proxy measure. Urban centres were defined as those with population over 40 000. The 40 000 threshold was chosen because it aligned with the ABS definition of urban centres in the *Survey of Motor Vehicle Use (SMVU)*.

13 **Traffic volume.** The traffic volume disability was assessed separately for urban and rural roads. The assessments used data on traffic volumes (measured in terms of total vehicle kilometres travelled (VKT)) in urban and rural areas obtained from the Bureau of Infrastructure, Transport and Regional Economics (BITRE).

14 The BITRE traffic volume data are themselves based on the ABS' SMVU.¹ However, BITRE adjust the SMVU data² and smooth it using averages from several survey years. BITRE also make adjustments to remove data relating to travel on local roads and to split the data between travel on urban and rural roads (allowing for their separate assessment).

15 **Heavy vehicle traffic volume.** The data on total vehicle kilometres travelled measure the total distance travelled by all vehicles. In doing so, they treat a kilometre travelled by a car the same as a kilometre travelled by a heavy truck. Since heavy vehicles create a greater need for maintenance than cars, an extra assessment was necessary to allow for interstate differences in heavy vehicle use. This factor was assessed separately for urban and rural roads and was assessed in two steps.

- Australian average gross mass (called 'trend AGM') details were calculated for each vehicle group by dividing Australian total average gross tonne-kilometres travelled (AGM-km) by total VKT. Table 3 shows the trend AGM for each group of vehicles. Sub-dividing the data by vehicle type facilitated more accurate assessments because maintenance requirements tend to increase with vehicle size and weight.
- The trend AGM for each group of vehicles was then multiplied by the VKT in each State to obtain State specific AGM-km.

16 As with the traffic volume measure, the heavy vehicle travel data were adjusted to remove travel on local roads and to split the data between urban and rural roads.

¹ It uses the SMVU (ABS Cat. No. 9208.0) dataset 'Total distance travelled by area of operation'. This ensures the traffic data reflect all travel in a State, not just travel by vehicles registered in that State.

² BITRE adjusts the SMVU data using data such as fuel sales, off-road use, fleet fuel use and traffic on monitored networks in cities.

Table 3 Trend average gross mass by vehicle group

Vehicle group	Trend AGM
Passenger vehicles	0.0
Light commercial vehicles	1.9
Rigid and other trucks	8.7
Buses	9.9
Articulated trucks	42.7

Note: Passenger vehicles trend AGM is set to zero because they are not considered heavy vehicles.

Source: Commission calculation based on trend data from the National Transport Commission. The data were last updated in the 2016 Update.

Local roads

- 17 The local roads assessment allows for interstate differences in the length of roads in sparsely populated remote and very remote areas. Those areas are considered most likely to be unincorporated or to be managed by a local government with insufficient population to support road maintenance.
- 18 A sparsely settled area was defined as one in a remote or very remote region with a population density of not more than one person per hundred square kilometres. The length of local roads in these areas was then identified.

Bridges

- 19 The Commission was unable to reliably identify or measure an indicator of the underlying factors affecting the maintenance of bridges. As a result, the bridges component was assessed equal per capita (EPC). This assessment also includes spending on tunnels.

Other services

- 20 As with the bridges component, the Commission was unable to identify a reliable measure of needs relating to the provision of other services. Therefore, the other services component was also assessed EPC.

Location factors

- 21 The impact of differences in wage costs was recognised in all components. A regional cost disability was applied to the rural road length sub-component, to recognise that the costs of maintaining rural roads increase with increasing remoteness.

Investment and depreciation assessments

- 22 In the 2015 Review, roads investment was assessed in the Investment category. Separate assessments were made for urban roads and rural roads.
- 23 These allow for the assessment of the impact that the following interstate differences have on investment in road infrastructure:
- the quantity of road infrastructure (capital stock) required through an assessment of road length, traffic volume and heavy vehicle use, and bridges
 - population growth
 - the cost of road infrastructure, through a capital cost factor that reflects the relative construction, wage and regional costs.
- 24 Local roads and other services had no effect on roads investment.
- 25 Depreciation of roads assets was assessed in the Depreciation category. The assessment was based on the roads capital stock factor used in the Investment assessment.

Component weights (recurrent and capital)

- 26 Data on State expenses as reported to the National Transport Commission (NTC) were used to derive the component weights of the Roads category and for the urban and rural roads investment assessments. Table 4 shows the NTC categories and the Australia-wide total reported expenditure for each category in 2016-17.

Table 4 NTC expenditure data, 2016-17

	2016-17
	\$m
A: Servicing and operating	785
B: Road pavement and shoulder construction	
B1: Routine maintenance	690
B2: Periodic surface maintenance	584
C: Bridge maintenance/rehab	284
D: Road rehabilitation	911
E: Low-cost safety/traffic	1 197
F: Asset extension/improvements	
F1: Pavement improvements	2 006
F2: Bridge improvements	1 029
F3: Land acquisition, earthworks, other extensions/improvement expenditure	4 093
G: Other miscellaneous activities	
G1: Corporate services	709
G2: Enforcement of heavy vehicle regulatory costs	169
G3: Vehicle registration	339
G4: Driver licensing	197
G5: Loan servicing	42
H: Other road-related payments	
H1: Financial assistance to councils for work on council managed arterials (a)	447
H2: Payments to councils for contract work on State managed roads (a)	474
H3: Spending on local access roads in unincorporated areas	15
H4: Direct spending on council managed local access roads	218
H5: Any other direct State spending on local access roads	102

Note: Loan servicing spending (G5) does not contribute to the component weight calculations.

(a) While the NTC reports these categories separately, the expenses are also included in the expenses for categories A to G. Hence, these expenses are double-counted in this presentation.

Source: State expenses reported to National Transport Commission (NTC) for 2016-17, NTC 2017.

27 The urban and rural roads components include expenses for:

- A: Servicing and operating
- B: Road pavement and shoulder construction
- D: Road rehabilitation
- E: Low-cost safety/traffic
- G2: Enforcement of heavy vehicle regulatory costs.

28 The local roads component includes:

- H3: Spending on local access roads in unincorporated areas
- H4: Direct spending on council managed local access roads

- H5: Any other direct State spending on local access roads.
- 29 The bridges component includes spending on:
- C: Bridge maintenance/rehabilitation.
- 30 The other services component includes spending relating to:
- G1: Corporate services
 - G3: Vehicle registration
 - G4: Driver licensing
 - G5: Loan servicing.
- 31 The roads investment assessment includes:
- F: Asset extension/improvements.

GST redistribution

- 32 Table 5 shows the redistribution of GST implied by each component of the Roads assessment in the 2018 Update. The category redistributed \$537 million.

Table 5 **Redistribution of GST from the recurrent Roads assessment, 2018 Update**

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Rural roads	-110	-179	53	123	83	5	-45	69	334
Urban roads	-21	18	35	11	-33	-8	5	-7	68
Local roads	-89	-95	45	96	23	-8	-6	35	199
Bridges	0	-1	0	1	0	0	0	0	2
Other services	1	-3	-2	6	-2	-2	1	1	9
Total	-219	-260	130	237	71	-12	-46	99	537
	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc
Rural roads	-14	-28	10	47	48	10	-108	282	13
Urban roads	-3	3	7	4	-19	-15	11	-27	3
Local roads	-11	-15	9	36	13	-15	-15	142	8
Bridges	0	0	0	0	0	-1	0	0	0
Other services	0	-1	0	2	-1	-3	2	3	0
Total	-27	-40	26	90	41	-24	-110	400	21

Note: Columns do not add to total due to interactions.

Source: Commission calculation.

ISSUES AND ANALYSIS

- 33 The main issues to be considered are:
- the measurement of rural road length

- the measurement of urban road length
- the expenses included in the local roads component
- the assessment of bridges expenses
- the assessment of other services expenses
- the assessment of physical environment.

Rural road length

34 In the 2010 Review, the Commission developed a synthetic rural road network to measure rural road length. The Commission did not use actual road length because the definition of State roads varied across the States. As shown in Table 6, there are substantial differences between the actual length of State managed rural roads reported by the States and the Commission’s assessed road length. The differences are particularly evident for New South Wales, South Australia and the Northern Territory.

Table 6 Actual and assessed rural road length

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	km	km	km	km	km	km	km	km	km
Synthetic network	25 685	15 020	26 391	19 085	10 673	2 659	6	9 141	108 660
State actual	37 535	21 456	32 710	18 091	22 039	3 883	662	23 187	159 563
Difference	11 850	6 436	6 319	-994	11 366	1 224	656	14 046	50 903

Note: The State actual rural road length data are not comparable between States and should be treated with caution. They are preliminary estimates by staff. No adjustments have been made to remove State policy influences.

These measures capture dual carriageways but do not capture lane-kilometres.

The actual road length includes local type roads in unincorporated areas. This is particularly relevant to South Australia.

Source: Actual figures are staff calculations using State roads spatial data obtained through a special data request or openly available data. Assessed figures are based on the Pitney Bowes consultancy report for the 2010 Review.

35 Some of these differences may be due to policy decisions. For example, the definition of what is a State road may differ between States.³ However, a significant proportion of the differences may reflect a gap between the actual task faced by States and the Commission’s definition and measure of the policy neutral State road network. By emphasising policy neutrality, through an approach that considers that all State roads reflect policy positions rather than underlying drivers of need, the Commission’s definition could be considered to understate what States do in the following ways.

³ Western Australia’s actual network length is shorter than the length of their synthetic network as the synthetic network incorporates a number of roads that the State road authority classifies as local rather than State roads (see Table 6).

- It omits State-managed roads which connect localities with a population smaller than 400.
- It assumes only one road between two urban centres (either directly or through connecting roads) whereas in many cases State networks provide more than one such road and all of them must be maintained.
- Its focus on population centres means it may not capture State managed roads connecting to 'significant' regions (such as economic, tourist and production regions).
- It does not capture lane-kilometres. It assumes that all roads have only one lane.

36 Staff consider that, for the 2020 Review, it is now possible to more comparably identify State roads and that an alternative approach may be to adopt a measure of State road length more closely resembling the actual length of roads States manage. Such an approach would reflect the reality that the vast bulk of State road networks were established many years ago and States must maintain the existing networks. It would not be constrained to covering only one road between centres if States, due to their settlement patterns, frequently have multiple roads between centres. The approach assumes that different governments in the same circumstances would have followed broadly similar approaches to developing the road network. Under this approach, a policy neutral measure of roads becomes a classification issue, that is comparable roads in different States are treated in the same way.

- 37 If such an approach is adopted, staff believe that there are two options that could produce satisfactory measures of road length.
- Start with the actual State road networks as reported and make adjustments to ensure that only roads commonly classified as State roads are included to reflect average policy. We call this approach the 'adjusted road network'.
 - Retain the synthetic road network approach but change the definition of State roads and the algorithm to better capture the roads for which States are currently responsible.

Adjusted road network

38 Staff have examined several sources of State road data that could be used to measure rural road length. A summary of the data options considered is in Attachment A. Staff consider the best option is to use the geospatial datasets all States maintain on their road networks. States also maintain road asset datasets which include details of road attributes such as 'number of lanes' and 'surface type' and which are either part of the main geospatial datasets or can be linked to them. These datasets constitute the best information available on what States do.

39 Staff are currently collecting and reviewing the spatial data for all States.

- 40 Our proposal for developing comparable rural road lengths across States would be to:
- start with the actual State managed road networks
 - identify the roads commonly classified as State roads to reflect average policy
 - adjust individual State road networks to match that average policy. By doing so, like connections between population centres and areas of significance would be treated consistently.
- 41 Examples of where these adjustments may be required are provided below.
- States manage roads to and within national parks. However, roads within the parks are not included in State road networks if they are managed by the national parks agency, rather than the roads authority. Similar issues may arise for roads managed by ports and transport authorities. Staff aim to adjust the road networks to ensure consistent treatment of these roads.⁴
 - While State road networks usually link to the rest of the network in both directions, some roads (including those which provide access to remote localities and areas of significance) reach a 'dead end'. For example, Queensland provides a road to the small farming community of Dalbeg, which unlike the nearby route through Collinsville, does not continue through the town. Staff will evaluate whether provision of these 'dead end' roads is average policy, and if not, will adjust the network accordingly.
 - Some roads are included in State managed road networks because they are in an area not governed by a local government (unincorporated areas). For example, much of South Australia and parts of New South Wales and the Northern Territory are unincorporated. Staff aim to adjust the State actual road network in these areas to remove local type roads.
 - Staff will seek to ensure the data apply comparable definitions of State and locally managed roads.
- 42 These adjustments would be applied across the complete State road networks and as such the adjusted actual road network will incorporate both rural and urban roads. In assessing the rural and urban road length subcomponents, staff will differentiate between rural and urban roads on the finalised adjusted actual road network according to the urban roads definition discussed in the urban road length section.
- 43 In the synthetic road network, only one connection was included between two towns. Staff propose to include all existing connections as we consider this better reflects the networks States actually manage.

⁴ NTC data includes only spending by the State road authorities, whereas GFS data includes roads spending by all State agencies. Staff consider it appropriate that the road network be consistent with the total expenses included in the assessment even if this may cause slight discrepancies with the component weights derived from NTC expense data.

- 44 If additions to the network are required (for example, to include roads managed by Parks Departments or roads that staff consider are State managed roads under average policy), staff would incorporate these using either further information from States or information from another source such as the Public Sector Mapping Authority's (PSMA) Transport and Topography national dataset. In this case we would assume one lane in each direction.
- 45 **Austroads.** Austroads is currently developing the *Austroads Data Standard for Road Management and Investment Project* (Austroads Standard),⁵ which is a harmonised roads dataset intended for use by local and State governments (and other stakeholders). At this stage, Austroads is working towards an agreement on a subset list of priority data items. The draft priority harmonisation subset is provided in Attachment B. The priority subset would include items such as:
- functional classification (such as State, arterial, collector and local roads)
 - ownership of the asset (State and local government)
 - lane-kilometre length (derived from road length and number of lanes)
 - surface material type, allowing for differentiation of sealed and unsealed roads.
- 46 However, staff understand this Standard dataset is unlikely to be available in time for use in the 2020 Review.⁶ That said, staff are considering sending a data request to States by, say, early 2019 to seek road length data based on the Austroads Standard.⁷ While early 2019 is late in the 2020 Review process, it may give sufficient time for Austroads to get agreement from States on a harmonised dataset. We will monitor progress in the development of the Austroads Standard.
- 47 If agreements are reached on the Standard dataset and we can collect the data, we would use States' actual lane-kilometres and proportion of sealed and unsealed roads in the assessments for the road length components.

Synthetic network

- 48 While the synthetic network methodology used since the 2010 Review is policy neutral and has broad acceptance, it has the shortcomings mentioned earlier. It also assumes all roads have only one lane in each direction. An assessment of road length

⁵ [Austroads website](http://www.austroads.com.au/road-operations/asset-management/road-data-harmonisation-project), (<http://www.austroads.com.au/road-operations/asset-management/road-data-harmonisation-project>).

⁶ We note that there is also substantially more data that falls under the scope of the Austroads Standard dataset than has been discussed in relation to road length. These data may complement or replace other measures in future updates and reviews. However, we do not consider sufficient data will be available for a broader uptake in the 2020 Review.

⁷ Before formally requesting the data, staff would ask States whether they can be provided.

that used lane-kilometres rather than road-kilometres would be preferable.⁸ This issue was raised by the ACT in its response to the *Roads – What States Do* paper.

49 The mapping algorithm used in the 2015 Review could be retained with adjustments to overcome the issues with the current data and methodology. These adjustments are outlined below.

- Continue to run the algorithm over a national road network that includes both State and local roads, such as PSMA’s national dataset.
- Include roads connecting all ABS Urban centres / localities (UCLs).⁹
- Include connections to national parks and any other areas of significance that can be reliably identified as connecting to the State road networks under average policy.
- Include all connecting roads between urban centres instead of just one.
- Data on lane-kilometres is not readily available. These would need to be estimated, perhaps with the help of the State Road Authorities.

Staff propose to recommend the Commission:

- consider whether it should adopt a new approach to measuring State road length in a way that more closely reflects the actual length of roads that States manage and, if so, to:
 - use State actual road networks adjusted to ensure the inclusion of roads commonly classified as State roads and the exclusion of roads commonly classified as local roads to reflect average policy
 - as a fall-back, retain the mapping algorithm approach with changes to incorporate all connections between urban centres, connections to smaller population centres and connections to certain areas of significance
- provide a draft data request to States by early 2019 to see whether States can provide road length information based on the definitions and formats set out in the Austroads Standard.

Urban road length

50 In the last two reviews, the Commission used population in UCLs of 40 000 or more as a proxy measure for road length because it could not find a reliable policy neutral measure of urban road length.

⁸ This paper uses ‘road length’ to encompass our measure of the extent of the network, while ‘road-kilometres’ and ‘lane-kilometres’ are used to differentiate between the different measurement options.

⁹ The ABS uses three criteria to identify areas of ‘an urban character’, one of which is that they have a population density greater or equal to 200 persons per square kilometre.

- 51 For this review, the options for measuring urban road length are similar to those for rural road length:
- adjusting State actual urban road network according to the approach outlined in the rural road length section
 - if available, using State actual lane-kilometres from the Austroads Standard
 - retaining the current population proxy measure as a fall-back position.
- 52 In the 2015 Review Roads assessment, urban areas were defined as UCLs with a population over 40 000 because the same definition is used in the ABS's SMVU and by the NTC to collect expense data for urban and rural areas. Staff propose to continue to use this definition.

Staff propose to recommend the Commission:

- retain the definition of urban areas as UCLs of more than 40 000 people
- use State actual road networks adjusted, to the extent possible, to ensure the inclusion of roads commonly classified as State roads and the exclusion of roads commonly classified as local roads to reflect average policy
- as a fall-back, continue to use urban population as a proxy measure of urban road length needs.

Local road length

- 53 The local roads assessment measures State needs to maintain local roads in areas of States where there is no local government (unincorporated areas) or where there is insufficient population for the local government to support road maintenance.
- 54 Staff are concerned that the expenses currently included in the local roads component may be overstated.
- 55 The local roads component expenses are derived using NTC expense data for the categories shown in Table 7. In the last two reviews, the Commission considered that spending under the H3, H4 and H5 categories were mostly for areas of States where there is no local government (unincorporated areas) or where there is insufficient population for local governments to support road maintenance.

Table 7 NTC local roads expenditure under the H3, H4 and H5 categories, average 2014-15 to 2016-17

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
H3	4	0	0	1	0	0	0	2	8
H4	38	15	0	137	14	5	0	1	210
H5	0	1	72	3	0	0	0	22	98
Total	42	16	72	141	14	5	0	26	316
	%	%	%	%	%	%	%	%	%
H3	54	0	0	18	0	0	0	28	100
H4	18	7	0	65	7	2	0	1	100
H5	0	1	74	3	0	0	0	23	100
Total	13	5	23	45	4	2	0	8	100

Source: National Transport Commission expenditure data, 2014-15, 2015-16 and 2016-17.

56 The definition of NTC’s H3 category (spending on local access roads in unincorporated areas) fits the component’s definition. However, the average spending shown in Table 7 seems low given our understanding that some States, such as South Australia, have significant amounts of local access roads in unincorporated areas. One possibility is that the spending may be recorded in other NTC categories.

57 In the case of the H4 category (direct spending on council managed local access roads), Table 7 shows that 65% of the spending is in Western Australia and another 18% in New South Wales. This suggests a State policy influence and/or a classification issue. It is possible that Western Australia and New South Wales spend on council managed local access roads for reasons other than the absence or the financial constraints of local governments.

58 For Western Australia, this seems confirmed by Main Roads Western Australia, which suggested to Commission staff that ‘the general driver for this spend (H4) relates to its role to provide a whole of network solution and some expenditure directly on local roads is required so there is good integration with the State network’.¹⁰ Another possible explanation is that Western Australia may be classifying some roads as local roads that other States would classify as State roads.

59 In the case of the H5 category (any other direct State spending on local access roads), 97% of total spending is in Queensland (74%) and the Northern Territory (23%). In its definition of H5, the NTC says the item:

should show the value of any other direct State or Territory spending on local access roads that are not council managed and not in unincorporated areas, which is direct spending on local access roads (spending not counted in H3 or H4). For example, in Queensland, it should include State spending on those district roads that are classified as local access roads.

¹⁰ Email exchange between Commission and Main Roads WA officers, May 2017.

The figure should not include any grants or assistance paid to councils to fund work on local access roads for which councils are the managing authority.¹¹

- 60 If spending under the H5 category excludes spending on roads that are not council managed and not in unincorporated areas, it should not be part of the local roads component. It should be reassigned to the rural road component.
- 61 At this stage, staff have little information on the reasons for spending classified to the H4 category in New South Wales and the H5 category in the Northern Territory.
- 62 Staff intend to review the expenses included in this component to ensure that they include only those relating to the maintenance of local roads in unincorporated areas or for local governments where there is insufficient population for local governments to support road maintenance. If some of the expenses in Western Australia and Queensland were reallocated to other components, this would markedly reduce the size of the local roads component and the assessment may become immaterial.
- 63 Staff also propose to update the estimates of local road length developed in the 2010 Review using the same method, that is, actual road length in sparsely populated areas, excluding that already counted in the rural road network. We propose to retain the 2015 Review definition of sparsely populated areas.

Staff propose to recommend the Commission:

- ensure that the local roads component includes only expenses relating to maintenance of local roads in areas of States where there is no local government (unincorporated areas) or where there is insufficient population for the local government to support road maintenance
- update the estimates of local road length using actual road length in unincorporated areas and sparsely populated areas.

Road use – traffic volume and heavy vehicle use

- 64 Staff propose to retain the current measures of traffic volume and heavy vehicle use with two minor adjustments as outlined below.
- 65 Table 8 shows the trend average gross mass (AGM) by vehicle class used to assess the heavy vehicle use disability.

¹¹ 2017 NTC Expenditure Template Reporting Guidelines, July 2017.

Table 8 Average gross mass by BITRE vehicle class

	Gross tonne kilometres travelled	Vehicle kilometres travelled	Trend AGM
	'000	'000 kms	Tonnes
Passenger vehicles	-	173 368 615	0.0
Light commercial vehicles	85 104 540	45 540 671	1.9
Articulated trucks	353 762 855	8 288 049	42.7
Rigid and other trucks	75 859 347	8 719 481	8.7
Buses	15 705 721	1 594 233	9.9

Note: This table includes both rural and urban kilometres travelled.

Source: Special data request to BITRE based on National Transport Commission data.

Heavy vehicle definition

- 66 Staff propose to exclude light commercial vehicles from the definition of heavy vehicles. This means our definition of heavy vehicles would be consistent with that set out in the Australian Heavy Vehicle National Law (that is, vehicles over 4.5 tonnes of vehicle mass) and that used by the NTC in its heavy vehicle charges determination.
- 67 The heavy vehicle assessment is based on the evidence that heavy vehicles cause damage to roads because of their weight. The heavier the vehicle the greater the damage. In contrast, the weight of a car has no or little impact on roads, other than that caused by the passage of tyres, which is captured in the traffic volume assessment.
- 68 The NTC data suggest the average weight of vehicles classified as light commercial vehicles is 1.9 tonnes, which is similar to many vehicles classified as passenger vehicles (such as large cars, 4WDs and passenger vans). In addition, these vehicles are below the 4.5 tonne threshold for heavy vehicles.

Reducing the number of heavy vehicle classes

- 69 Staff also propose to simplify the assessment by reducing the number of heavy vehicle classes by combining rigid and other trucks, and buses.
- 70 Table 9 shows the proposed new classes of vehicles and trend AGM.

Table 9 Trend average gross mass by aggregated BITRE vehicle class

	Gross tonne kilometres travelled	Vehicle kilometres travelled	Trend AGM
	'000	'000 kms	Tonnes
Light vehicles	-	218 909 286	0.0
Articulated trucks	353 762 855	8 288 049	42.7
Other heavy vehicles	91 565 068	10 313 715	8.9

Source: National Transport Commission data.

71 Table 10 shows that the combined effect of the proposed adjustments on the GST distribution is not material, using the \$10 per capita threshold for data adjustments.

Table 10 Impact of simplifying trend AGM categories, 2018 Update

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Redist
Dollars million	18	-2	1	-2	-11	-2	0	-1	19
Dollars per capita	2	0	0	-1	-7	-3	-1	-5	1

Source: Commission calculation.

Urban population density

72 The ACT's comments on the *Roads – What States Do* paper said the information summarised in Table 11 indicated States with higher urban area per capita generally appear to spend more per capita in those areas and the reasons should be investigated by the Commission.

73 Staff do not think the correlation is strong. Western Australia and Tasmania have above average urban area per capita and below average per capita spending. South Australia has below average urban area per capita and above average spending. This means three out of eight States do not follow the pattern the ACT noted.

74 Staff do not intend to investigate this issue further. However, the ACT is welcome to make a case that States with above average urban area per capita need to spend more than average.

Table 11 Urban population density and urban spending per capita, 2016-17

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	km ²	km ²	km ²	km ²	km ²	km ²	km ²	km ²	km ²
Urban area per '000 urban pop.	0.58	0.62	1.04	0.83	0.71	1.41	1.09	1.71	0.75
Urban area per '000 total pop.	0.44	0.49	0.77	0.65	0.50	0.70	1.09	0.88	0.57
Urban spending (\$ per capita)	238.6	183.2	289.6	226.1	367.9	51.1	251.2	253.6	238.8

Note: Shaded cells are above average.

Source: ABS ERP 2016-17; State expenses reported to National Transport Commission for 2016-17, NTC 2017. Includes capital expenses and excludes miscellaneous expenses not allocated by area.

Staff propose to recommend the Commission:

- retain the current methodology for calculating urban and rural traffic volume
- treat light commercial vehicles as passenger vehicles because they do not fit the definition of heavy vehicles
- combine rigid and other trucks, and buses into an other heavy vehicles class
- not pursue the issue raised by the ACT.

Bridges and tunnels

- 75 In the 2015 Review, investment in bridges and tunnels and maintenance expenses for them were assessed EPC because no reliable measure of needs could be found.
- 76 Staff note bridges and tunnels cost more to build and maintain than roads. They are required because of topological features such as waterways and, in some cases, changes in elevation. States also respond to safety issues and the complexity of their road and rail networks by building bridges and tunnels over or under other sections of the networks to avoid intersections.
- 77 Other influences on bridge and tunnel expenses and investment would be:
- the size of a State's road network, which increases the likelihood of bridges and tunnels across the networks; this would especially be the case for over/under passes; although there is probably no intrinsic relationship between road length and the number of bridges
 - traffic volume, including heavy vehicle use, which would influence the type and size of bridges built, and the maintenance costs.
- 78 Staff have collected spatial data that include the following attributes for urban and rural areas:
- number of bridges, culverts and tunnels
 - the length of bridges, culverts and tunnels in kilometres
 - the feature they are crossing.
- In addition, we should be able to calculate lane-kilometres.
- 79 While staff have not done any calculations yet, we intend to examine a number of possible indicators of needs, including the number and length of bridges and tunnels and the total lane-kilometres of bridges and tunnels. At this point, lane-kilometres appears a conceptually better approach as it would go some way towards capturing the impact of traffic volume.
- 80 Staff would also test whether it is necessary to calculate separate factors for bridges and tunnels over/under waterways and other topographical features and for bridges and tunnels over/under other roads or rail tracks.
- 81 However, none of these possible measures account for differences in bridge and tunnel size and complexity due to the need to retrofit roads into existing heavily developed urban areas or the width of the crossing and the height/depth at which the bridge or tunnel crosses. While some States have previously argued such influences are important, it is not clear how they could be measured.
- 82 In previous reviews, issues have been raised about the treatment of culverts. Those issues include: should culverts be included; and, if so, should they be given the same

weight as bridges? There is also a question whether tunnels should be given the same weight as bridges.

- 83 If staff are unable to develop a simple, reliable and policy neutral measure of needs for bridges and tunnels, we propose to reallocate bridge and tunnel expenses and investment to the urban and rural road components and apply the disabilities for those components. This would at least recognise the impact of road use on bridge and tunnel expenses.

Staff propose to recommend the Commission:

- agree to staff considering options for a bridge and tunnel factor based on State spatial data
- if no satisfactory options are found, reallocate bridge and tunnel expenses and investment to the relevant urban and rural road components and apply the disabilities for those components.

Other services

- 84 Other roads services cover expenses on corporate services, enforcement of heavy vehicle regulatory costs, vehicle registration, driver licensing and loan servicing (NTC category G expenses). These expenses were assessed EPC in the 2015 Review because a simple and material assessment could not be identified.
- 85 In all other expense categories, corporate services expenses (excluding administrative scale affected expenses) are treated as part of the service delivery expenses and the disabilities that affect service delivery expenses are applied to them. This is consistent with the approach adopted by most States in those parts of departmental annual financial statements which seek to show the expenses incurred in delivering each output of the department.
- 86 For consistency with that practice, staff propose to reallocate roads corporate services and loan servicing expenses to all roads components on a proportional basis. In 2016-17, corporate services expenses were \$709 million and loan servicing expenses were \$42 million (see Table 4).
- 87 Staff have tested the materiality of separate assessments for:
- enforcement of heavy vehicle regulatory costs using heavy vehicle registrations as the measure of needs
 - vehicle registration costs using total vehicle registrations to measure needs
 - driver licensing using population aged 17 to 85 to measure needs.
- 88 Table 12 shows that such assessments would not be material, individually or in total.

Table 12 Other services assessments, GST redistribution

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Redist
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Heavy vehicle regulatory costs	-9	-3	3	9	0	1	-2	1	14
Vehicle registration	-14	0	4	7	2	2	0	-1	15
Driver licensing	0	-1	0	0	1	0	0	0	1
	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc
Heavy vehicle regulatory costs	-1	0	1	4	0	1	-5	6	1
Vehicle registration	-2	0	1	3	1	3	-1	-3	1
Driver licensing	0	0	0	0	0	1	0	0	0

Source: Commission staff calculation.

89 For the 2020 Review, EPC assessment of the expenses on enforcement of heavy vehicle regulatory costs, vehicle registration and driver licensing could be retained. However, because regulation type expenses (such as professional registration agencies in education and health services) are normally included as part of service delivery expenses in other categories and they are partly related to road use, staff propose to reallocate them to all components on a proportional basis, similar to the proposal for corporate services.

Staff propose to recommend the Commission:

- remove the other services component from the roads category and reallocate other services expenses to the other components of the Roads category on a proportional basis and apply to them the component disabilities.

National network roads

90 In the 2010 Review, the Commission was concerned that the roads disabilities may not capture all non-policy influences on State expenditure on the construction of National Network Roads (NNR). The Commission considered part of the Commonwealth support for these roads and the consequent investment was influenced by Commonwealth considerations that were not captured in the State based disability measures, for example, the need to develop an efficient national transport network to facilitate national economic growth, long term productivity gains and national economic stimulus benefits. For this reason, it decided to treat half of the Commonwealth payments for this investment as having no impact on the GST distribution. This treatment was continued in the 2015 Review and broadened to Commonwealth support for national rail projects.

91 However, this approach has been contentious. Some States have argued it was inappropriate to treat half the Commonwealth funding as having no impact on the GST because the Commission's assessments, especially the road use disabilities,

adequately captured all the main drivers of investment on national network roads. It was also suggested that States had some influence on Commonwealth decisions on which roads were on the national network and which projects received Commonwealth funding. The Grattan Institute has also highlighted this issue by querying the justification for the NNR status of the Geelong–Coolac road as it did not consider it a project of national significance.¹² Table 13 shows the payments made under the Infrastructure investment program – National network roads for 2013-14 to 2016-17. On average during those years, New South Wales and Queensland received above average shares of the payments.

Table 13 **Infrastructure investment program - National network roads, 2013-14 to 2016-17**

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
2013-14	1 628	1 663	621	254	39	8	0	48	4 261
2014-15	1 168	204	646	495	81	29	1	28	2 652
2015-16	1 350	162	840	196	145	69	1	17	2 781
2016-17	1 859	-69	1 070	222	364	76	1	18	3 541
Average	1502	490	794	292	157	46	1	28	3309
	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc	\$pc
2013-14	218	285	132	101	23	16	1	197	183
2014-15	154	34	136	195	48	56	1	117	112
2015-16	176	27	175	77	85	134	1	71	116
2016-17	238	-11	219	86	212	147	1	73	145
Average	197	84	165	115	92	88	1	114	139

Note: These figures include impact and no impact payments for on-network roads.

Source: Commonwealth Budget Papers, Final Budget Outcome, various years.

92 Recent discussions between staff of the Commission and the Department of Infrastructure and Regional Development revealed the following.

- The concept of a ‘National Network’ is fading as an influence on investment funding allocation. Investment funding for new projects is more focused on achieving objectives, such as improving productivity/access, freight transport, connectivity (to ports etc), improving commuter times, reducing congestion, improving safety etc, rather than building a national network. That is, similar objectives apply to both NNR and non-NNR project funding.
- Roads on the NNR are generally better maintained than those not on the NNR, but this is because they are the most trafficked roads, carry more freight, connect commuters, support industry, connect to ports etc.

¹² Terrill, M. 2016. *Roads to Riches: better transport spending*. Grattan Institute.

- 93 This discussion is also relevant to the treatment of Commonwealth payments for investment on the National Network Rail projects.
- 94 Commission staff, therefore, seek States' views on whether 50%, or some other proportion, of the Commonwealth payments for investment on national network road and rail projects should be treated as having no impact on the GST distribution in the 2020 Review.

Staff propose to recommend the Commission:

- defer a decision on the treatment of Commonwealth payments for investment on national network road and rail projects until State comments on the issue have been received and examined.

Investment

- 95 Roads investment is further discussed in the 2018-01/21-S Draft assessment paper – Physical and financial assets. However, it is noted that any changes made to the recurrent assessment will flow through to that assessment.

OTHER ISSUES CONSIDERED AND SETTLED

Physical environment

- 96 Evidence shows that the physical environment does have an impact on the cost of roads maintenance. However, the impact has proven difficult to measure. For example, a consultant employed by the Commission during the 2015 Review was unable to develop a measure of needs that would capture all the relevant physical environment influences.¹³ However, the inclusion of the Rawlinson's index in the investment assessment provides some recognition of environmental effects.
- 97 For the 2020 Review, staff consider that further attempts at measuring the impact of physical environment are not likely to deliver an improved outcome. As a result, staff propose not to pursue this issue in the 2020 Review.

¹³ Pottinger Co Pty Ltd and AECOM, 2013. *Optimising GST allocations – Final Report*.

Staff propose to recommend the Commission:

- not pursue the development of a physical environment assessment for road maintenance expenses.

Location factor

98 Wage costs and regional costs disabilities are applied to recognise the differences in wage costs between States and the higher costs of providing services with increasing remoteness respectively.

99 Staff propose to continue to apply the wage costs factor to all components of the Roads category and the regional costs factor to the rural road length component. These disabilities are discussed further in the Wage costs and Geography based measures assessment papers.

Staff propose to recommend the Commission:

- continue to apply the wage costs factor to all components of the Roads category
- continue to apply the regional costs factor to the rural roads component.

User charges

100 States raise roads user charges from various sources such as road tolls and driver's licence fees. The capacity to raise these user charges is not the same as the disabilities used to assess road expenses. In addition, given the degree of policy variation between States in the use of toll roads and in driver's licence fees (including differing fees for various license classifications), staff consider netting off user charges against roads expenses is not appropriate.

101 Staff, therefore, propose to assess roads user charges on an equal per capita basis in the Other revenue category, as was done in the 2015 Review.

102 Driver's licence fees have been assessed EPC since the 2010 Review because a needs assessment was found to be immaterial.

Staff propose to recommend the Commission:

- continue to assess roads user charges on an EPC basis in the Other revenue category.

CONCLUSION AND WAY FORWARD

103 The major issue for this review is the estimation of urban and rural road length. Staff are proposing a number of options for investigation. We have engaged with State

roads authorities to obtain spatial roads data. While we cannot say at this stage when the planned work will be finished, we will keep States informed of the results.

- 104 The proposed work on the appropriate classification of local roads expenses could result in significant amounts of expenses being moved out of the local roads component to the urban and rural roads components. This would lead to a material change in GST distribution. As part of the work, staff will seek clarifications from States on the expenses currently included in the local roads component.
- 105 We have options for developing a bridge and tunnel factor for the bridges component. Staff will keep States informed of the results.
- 106 Staff propose that expenses currently included in the other services component no longer be separated from the roads and bridge maintenance expenses.
- 107 Staff seek State views on the treatment of Commonwealth funding to support investment on National Network Road and rail projects.
- 108 Any assessment features included in the 2015 Review assessments that is not discussed in the paper are intended to be retained by staff. Where possible, we will update the data used in the assessments.

Proposed assessment structure

- 109 Staff propose the following assessment structures in the 2020 Review. Roads investment is further discussed in the 2018-01/21-S Draft assessment paper – Physical and financial assets.

Table 14 Proposed Roads category structure

Component	Disability	Influence measured by disability
Rural roads	Length and use	Recognises that the length of the rural road network, traffic volume and heavy vehicle use influence the cost of providing road maintenance services in rural areas.
	Location	Recognises the differences in wage costs between States and in the cost of providing services to different areas within a State (applied to road length only).
Urban roads	Length and use	Recognises that the length of the urban road network, traffic volume and heavy vehicle use influence the cost of providing road maintenance services in urban areas.
	Location	Recognises the differences in wage costs between States.
Local roads	Length	Recognises the differences between States in the cost of maintaining local roads managed by State governments in sparsely populated areas.
	Location	Recognises the differences in wage costs between States.
Bridges and tunnels	To be determined	Recognises the differences between States in the cost of maintaining bridges and tunnels managed by State governments.
	Location	Recognises the differences in wage costs between States.

Table 15 Proposed roads investment component category structure

Component	Disability	Influence measured by disability
Rural roads	Capital stock	Recognises the impact of the recurrent disability factors on the need for rural road infrastructure.
	Capital cost	Recognises the impact of differences between States in the cost of rural road infrastructure.
Urban roads	Capital stock	Recognises the impact of the recurrent disability factors on the need for urban road infrastructure.
	Population growth	Recognises the impact of differences in population growth on the need for urban road infrastructure.
	Capital cost	Recognises the impact of differences between States in the cost of urban road infrastructure.

Data / information sought from States

110 Staff intend to provide States with a draft Roads data request for comment in early 2019. This data request will reflect the data item definitions agreed upon for the Austroads Standard, as discussed in the rural road length section of this paper. This will include data items intended to feed into the rural roads, urban roads and bridges components.

- 111 Staff intend to contact States to collect further information regarding local roads spending, in particular spending that has been allocated to NTC categories H3, H4 and H5 (that is, spending on local access roads in unincorporated areas, direct spending on council managed local access roads, and any other direct State spending on local access roads respectively).

ATTACHMENT A: ROAD LENGTH DATA SOURCE RESEARCH

- 1 Staff have investigated road length data sources from third parties with the following findings.
 - The Public Sector Mapping Authority (PSMA) Transport and Topography dataset specifies data items that would be useful to our work. However, the data are sourced primarily from State land agencies and PSMA has advised that several key data items are not currently reliable:
 - ‘authority code’, which identifies the responsible authority for a road, is only reliably present for two States
 - ‘number of lanes’ is only provided for three States and so would not support a calculation of lane-kilometres
 - ‘route_class_code’, which identifies the type of road (national, state, tourist, auslink, motorway etc) is not populated for all route classes.
 - Geoscience Australia’s existing datasets are out of date and do not have the level of granularity needed for our purpose. Geoscience has advised that a new dataset combining commercial data, PSMA data and Geoscience data has not yet been implemented, but is expected within two years.
 - Austroads is continuing to develop a Data Standard for Road Management and Investment, which will harmonise road asset data across all jurisdictions and contains relevant data items for our purposes. However, it is still the subject of consultation and has not yet been agreed by the Austroads board. Once agreed, State road authorities will need to implement the Standard within their own data holdings; there is no compulsion for them to do so.
 - Commercial roads data providers such as Google, Tom Tom and OpenStreetMap do not have all the data items needed to support a policy neutral road measurement (such as responsible authority, needed to distinguish between State and local government roads).
- 2 Staff have identified several alternatives for a rural road length measure, sourced from States’ data.
 - **Routes.** Austroads has defined a national route numbering system with an implicit policy neutral road hierarchy which would support simple assumptions about the number of lanes for each route class.¹⁴ We believe all State road authorities (SRAs) have data that support the measurement of lane length by route class. However, to use those data we would need to allocate a weight to

¹⁴ Austroads, 2003, AP-R224 *Towards a Nationally Consistent Approach to Route Identity*
<https://www.onlinepublications.austroads.com.au/items/AP-R224-03>

the different route classes to derive a weighted rural road length. Furthermore, State Roads Tasmania has advised that its use of the route numbering system does not reflect a functional classification (that is, the route classes are more for tourist interest than reflective of the different route classes). We would need to confirm with States whether they consider the data to be appropriate for our purpose and then determine appropriate weights for the four route classes.

- **SRA geospatial data.** SRAs have advised that they all maintain geospatial road datasets of their State controlled road networks. They also maintain road asset datasets which are either part of the main geospatial datasets or can be linked to them, which include road attributes such as ‘number of lanes’ and ‘surface type’. We have reviewed the data of States and compared their networks with the synthetic network used in the 2015 Review, with the following findings.
 - There are no obvious common criteria applied to include roads or localities within the State road network, suggesting that policy remains an influence.
 - States commonly include roads connecting localities with a population lower than the current synthetic network’s threshold of 400.
 - There are localities of more than 400 people not connected in the State networks, which are connected in the synthetic network.¹⁵ In several cases, this appears to occur where the localities are in remote or very remote locations.
 - The synthetic network frequently uses roads managed by local governments rather than State-controlled roads to make connections between localities. These roads are generally substitutes for the State roads, rather than additional connections.
 - We conclude that it is theoretically possible to apply the current rural road measurement algorithm to States’ geospatial data to derive lane length (that is, in lane-kilometres) by surface type (that is, sealed/unsealed). This would create a policy neutral rural road length measure that accounts for road width (number of lanes) and surface type, that could replace the current measure based on Mapinfo data. Since States appear to connect localities with fewer than 400 people and the ABS defines localities as being of population 200 or more, it may be appropriate to use this threshold for including localities in the spatial road measurement.
- **State reported lane length measure.** If the Commission was convinced that policy was not a significant influence on the length of State controlled road

¹⁵ These include: Bamaga on Cape York and Hideaway Bay in Queensland, Balgo in Western Australia, and Pukatja and Amata in South Australia.

networks, then State reported lane lengths could be used in the assessment – in lane-kilometres by sealed/unsealed.

ATTACHMENT B: AUSTRROADS ROAD ASSET DATA STANDARD – DRAFT PRIORITY HARMONISATION SUBSET

Group	Reference	Name
Identification	8.13.2	Restriction type
	8.13.3	Restriction reason
	8.13.4	User group restriction applies to
	8.13.5	Restriction unit
Functional Classification	8.2.1	Functional Classification
Subjective Condition	8.4.2	Subjective condition survey date-time
Visually Assessed Condition	8.4.4	Visual assessed condition
	8.4.9	Visual cracking area
	8.4.10	Visual measured rutting
Pavement - Cracking	8.4.12	All cracking extent
	8.4.20	Cracking survey date-time
Pavement - Deflection	8.4.22	Deflection testing vehicle
	8.4.23	Pavement deflection d0
	8.4.31	Deflection survey date-time
Pavement - Roughness	8.4.33	Lane roughness quarter car
	8.4.34	Inner wheel path roughness
	8.4.35	Outer wheel path roughness
	8.4.36	Roughness survey date-time
Pavement - Rutting	8.4.39	Rut depth inner
	8.4.50	Rut depth outer
	8.4.61	Rutting survey date-time
Pavement Surface - Texture	8.4.74	MPD Pavement texture inner wheel path
	8.4.75	MPD Pavement texture outer wheel path
	8.4.76	MPD Pavement texture between wheel path
	8.4.77	Texture survey date-time
Bridge	8.4.79	Bridge condition state 1
	8.4.80	Bridge condition state 2
	8.4.81	Bridge condition state 3
	8.4.82	Bridge condition state 4
	8.4.83	Bridge condition state overall
	8.4.84	Bridge survey date-time
Traffic Growth	8.5.8	Annual growth (% / year) of all vehicle classes
	8.5.11	Annual growth (% / year) of all heavy vehicles
All - A General	8.3.0.1	Unique asset identifier
	8.3.0.2	Asset class
	8.3.0.14	Design life
	8.3.0.4	Owner of the asset
All - B Valuation	8.3.0.15	Construction date
	8.3.0.16	Construction cost
	8.3.0.17	Operation status
	8.3.0.19	Valuation type
	8.3.0.20	Assessed cost in Australian/New Zealand Dollars
	8.3.0.22	Valuation year

Group	Reference	Name	
	8.3.0.21	Unit cost	
Bridge Major Culvert	8.3.3.6	Deck material	
	8.3.3.21	Feature structure type	
	8.3.3.23	Length	
	8.3.3.24	Width	
	8.3.3.26	Vehicular load limit	
	Pavement All	8.3.14.3	Chainage at start of street segment
8.3.14.4		Chainage at end of street segment	
Pavement Surfacing All	8.3.15.5	Road surface status	
	8.3.15.6	Year of current surface installation	
Pavement Surfacing	8.3.15.13	Surfacing material type	
Tunnels	8.3.31.1	Left tunnel width	
	8.3.31.2	Right tunnel width	
	8.3.31.3	Tunnel length	
	8.3.31.4	Tunnel services	
	8.3.31.6	Maximum trafficable height	
	Point	7.1.1.2	Location distance
7.1.1.7		X coordinate	
7.1.1.8		Y coordinate	
7.1.1.9		Z coordinate	
Polyline	7.1.2.11	Vertical datum	
	7.1.2.12	X coordinate start	
	7.1.2.13	Y coordinate start	
	7.1.2.14	Y coordinate end	
	7.1.2.15	X coordinate end	
	7.1.2.16	Z coordinate start	
	7.1.2.17	Z coordinate end	
Polygon	7.1.3.11	Vertical datum	
Network	8.1.1	Network name	
Node	8.1.2	Node ID	
	8.1.3	X coordinate start node	
	8.1.4	Y coordinate start node	
	8.1.5	Z coordinate start node	
	8.1.6	X coordinate end node	
	8.1.7	Y coordinate end node	
	8.1.8	Z coordinate end node	
	Road	8.1.12	Road ID
8.1.13		Road name	
8.1.14		Road Length	
8.1.15		Lane kilometre length	
8.1.17		Number of bridge structures	
8.1.18		Number of major culvert structures	
Link Section		8.1.19	Link section ID
		8.1.20	Link section start displacement
	8.1.21	Link section end displacement	
	8.1.22	Link section length	
	8.1.23	Link section average width	
	8.1.27	Number of lanes left of centreline	
Link Section	8.1.28	Number of lanes right of centreline	
	8.1.29	Average lane width left of centreline	
	8.1.30	Average lane width right of centreline	

Group	Reference	Name
	8.1.31	Separate link sections for traffic flow direction
	8.1.32	Traffic flow direction
	8.1.33	Traffic setting
	8.1.34	Type of pavement construction
	8.1.35	Ownership organisation
Asset Life	8.10.8	Design life
	8.10.15	Asset age
	8.10.9	Useful life assessed
	8.10.16	Remaining life assessed
Output	8.10.19	Resurfacing coverage across total network
	8.10.20	Resheeting coverage across unsealed network
	8.10.21	Resurfacing coverage across sealed network
	8.10.22	Spray seal resurfacing coverage across sealed network
	8.10.23	Asphalt resurfacing coverage across sealed network
	8.10.24	Pavement rehabilitation network coverage
	8.10.25	Major structures replaced
	8.10.26	Bridges replaced
	8.10.27	Major culverts replaced
Investment	8.11.11	Total capital spend
	8.11.12	Capital spend – Upgrade and expansion
	8.11.13	Capital spend – Renewals
	8.11.14	Total recurrent spend
	8.11.15	Recurrent spend – Maintenance
	8.11.16	Recurrent spend – Operations
Traffic volumes	8.6.12	Average annual daily traffic
	8.6.26	Percentage of aadt classified as heavy vehicles
FWP	8.14.1	Forward works program category
	8.14.2	Forward works program treatment reason
	8.14.3	Planned forward work treatment start year
	8.14.4	Forward works program treatment location start
	8.14.5	Forward works program treatment location end
	8.14.7	Forward work program intervention threshold
	8.14.8	Forward works treatment estimated cost
	8.14.9	Planned forward treatment end year
Maintenance	8.14.11	Defect description
	8.14.12	Status of work
	8.14.14	Work quantity
	8.14.16	Maintenance paid amount
	8.14.28	Activity group
	8.14.29	Work activity
Population	8.5.3	Population
Road Use	8.5.6	Equivalent standard axles kilometres
	8.5.5	Gross vehicle mass kilometres
	8.5.7	Passenger car unit equivalent kilometres
	8.5.4	Vehicle kilometers travelled
Bridge Major Culvert	8.3.3.17	Cell type for major culvert
	8.3.3.20	Number of spans or cells
		Structure unique identifier
Pavement Layers	8.3.14.13	Layer material
	8.3.14.18	Layer width
Pavement General	8.3.14.5	Centreline segment length

Group	Reference	Name
Pavement Surfacing - General	8.3.15.3	Length of seal
	8.3.15.7	Design life
		Number of lanes
	8.3.15.4	Width of Seal
Traffic Volumes	8.6.28	Average annual daily traffic per class
FWP	8.14.31	Forward work treatment actual completed cost
Output	8.14.37	Actual work treatment end date
	8.14.34	Benefit cost ratio
Asset Life	8.10.14	Life achieved