Asset Preservation Model

Manual

Version 2.0, February 2021

Contact:

Ian Duncan

Executive Manager Infrastructure

WALGA

ONE70, LV 1, 170 Railway Parade West Leederville

Phone: (08) 9213 2031

Fax: (08) 9213 2077

Mobile: 0439 947 716

Email: iduncan@walga.asn.au

Website: www.walga.asn.au

Sebastian Davies-Slate

Policy Officer Transport and Roads

Phone: (08) 9213 2050

Email: sdavies-slate@walga.asn.au

DOCUMENT HISTORY

Version	Date	Description of version
1.0	November 2020	
2.0	February 2021	

Table of Contents

1 Introduction 4
2 Principles and Funding 5
2.1 Purpose of the Asset Preservation Model 5
2.2 Principles for Distributing Funding 5
2.3 Cost Regions and Disability Factors 6
2.4 Introduction of the Minimum Standard 6
2.5 Funding Sources 7
2.6 Funding Determined Externally to the Model 7
2.6.1 Special Projects 7
2.6.2 Aerodromes 8
2.6.3 Transport Standard 8
3 Overview of the Asset Preservation Model 9
3.1 Calculating Annual Expenditure Need 9
3.2 Asset Classes 10
3.3 Asset Base and Minimum Standards 12
4 Unit Costs Calculations 14
4.1 How Unit Costs are Calculated 14
4.2 Cost Regions 14
4.3 Disability Factors 15
4.3.1 Distance Required to Cart Gravel 15
4.3.2 Soil Condition and Sealed Pavement Thickness 15
4.3.3 Terrain 16
4.3.4 Salt 16
4.4 Simplifications of the Asset Preservation Need Equation 16
5 Updating the Asset Preservation Model 18
6 APPENDIX: List of Cost Regions 20
7 APPENDIX: List of Minimum Standard Regions 21

1 Introduction

The Asset Preservation Model is used by the Western Australian Local Government Grants Commission to allocate State and Federal grant funding to Local Governments. It affects allocations under a number of grant funding schemes, either directly or indirectly. The Model estimates the Asset Preservation Need of each Local Government, and allocates available funds in proportion to each Local Government's need.

This document is a manual for the Asset Preservation Model, intended to assist stakeholders to better understand the model's objectives and operation, and for future operators to understand how to make use of it.

This manual draws on material from a guidance document prepared by the WA Grants Commission on the Asset Preservation Model[1], a history of roads funding in Western Australia prepared by an officer at Main Roads[2], and examination of the Asset Preservation Model spreadsheet, supplied to WALGA by the WA Local Government Grants Commission. The manual does not attempt to verify the values of any of the model's parameters, such as construction costs or the inventory of road assets.

[1] Western Australian Local Government Grants Commission (December 2013) Asset Preservation Model Documentation.
[2] Shepherd, F.C. (1985) History of road grants to local authorities in WA. Main Roads WA. [Copy in possession of author].

2 Principles and Funding

2.1 Purpose of the Asset Preservation Model

The Asset Preservation Model aims to distribute state and federal road grants funding among Local Governments in an efficient and equitable manner, taking account of local Asset Preservation Need and costs.

The model estimates the expenditure required by each Local Government to maintain its asset base, known as Asset Preservation Need. The total assessed Asset Preservation Need, as determined by the model, is substantially higher than total available grant funding. This implies that Local Governments are required to make up this asset preservation shortfall through own-source revenue.

The Asset Preservation Model was originally developed by Main Roads and Local Government in 1989-90, based on a theoretical model developed by the Australian Road Research Board, and was introduced the following year. The WA Local Government Grants Commission was given responsibility for its on-going administration.

The principles that inform the Model have been developed over time in response to changes of grant distribution formula. Originally, Local Governments in regional areas collected motor vehicle licensing fees directly, with metropolitan Local Governments sharing with Main Roads WA in half of the licensing revenue collected in the metropolitan region. Licensing fee collection was later centralised, with the concurrence of Local Government, in response to a change in Commonwealth grant funding conditions.[3]

2.2 Principles for Distributing Funding

The Asset Preservation Model allocates funding to Local Governments based on assessed need, including the cost of both ongoing maintenance and periodic road reconstruction. This addresses the allocation National Principle for allocating roads funding from the Commonwealth, as laid out in section 12 of the Commonwealth *Local Government (Financial Assistance) Act 1995*:

> The identified road component of the financial assistance grants should be allocated to local governing bodies as far as practicable on the basis of the relative needs of each local governing body for roads expenditure and to preserve its road assets. In assessing road needs, relevant considerations include length, type and usage of roads in each local governing area.

In addition, several other funding allocation principles were adopted in consultation with the National Office of Local Government,[4] namely:

1. Seven percent of the funds will be reserved for special projects: two-thirds for bridges and one-third for roads serving Aboriginal Communities.
2. The remaining 93 per cent of funds will be distributed according to Asset Preservation Needs as determined by the Western Australian Model.
3. The Asset Preservation Needs will be adjusted to provide for minimum standards as determined by the Western Australian model.

[3] Shepherd (1985) ibid.
[4] Western Australian Local Government Grants Commission (December 2013) ibid.

4. All roads that are the responsibility of local government will be used in assessing asset preservation needs."

Points 2 and 3 are addressed via the Asset Preservation Model, which includes an assessment of the Asset Preservation Need of each Local Government required to maintain minimum standard of road infrastructure.

The 7% of funding reserved for special projects (maintaining bridges and aboriginal access roads) is allocated outside of the Asset Preservation Model. Note that bridges and aboriginal access roads are also included in the calculation of Asset Preservation Need.

Asset Preservation Need is generally estimated based on road asset type (for example, sealed roads, gravel roads, formed roads), although distributor roads are recognised as a separate road type. The full list of asset types is listed in Section 3.2. In addition, some roads that are not formerly classified as distributor roads for the purposes of other government planning processes are classed as distributor roads in the model, if there is a heavy volume of traffic or a large number of heavy vehicles travelling on that road. This allows greater funding to be allocated to maintain heavily-used roads.

2.3 Cost Regions and Disability Factors

The Asset Preservation Model allocates all Local Governments into one of 21 road cost regions. This regional classification is intended to reflect differences in the cost of building and maintaining roads in different parts of the State, due to remoteness, geology and the local economy.

Roads costs for the different regions are adjusted according to a series of four disability factors, reflecting particular local conditions that affect costs or road life. These disability factors are:

- the distance that gravel has to be carted for reconstructing roads;
- soil conditions that affect the required thickness of sealed pavements;
- terrain; and
- salt.

One method by which a particular Local Government's asset preservation grants might be varied is by changing their region allocation.

The cost regions were developed by examining variations in the disability factors across the State.

2.4 Introduction of the Minimum Standard

A criticism of early versions of the model was that it directed greater funds to local governments that already had well-developed road asset bases, disadvantaging the less developed Local Government Areas. To correct this, a minimum standard asset base was added to the model. The minimum standard was introduced to compensate those Local Governments which did not have a well-developed road asset base.

The actual Asset Preservation Need and minimum standard Asset Preservation Need are calculated for all road types, and aggregated into the five major categories detailed in Section 3.2, below. For each of these five categories, the greater of the two values – actual need and minimum standard need – is used in determining each LG's total Asset Preservation Need.

Some asset types do not have a minimum standard applied, namely river crossings; cattle grids; gravel (residential roads); adjustment for CBD roads (residential roads); gravel (local distributor roads); adjustment for CBD roads (local distributor roads); widening of main roads in country towns; or any of the assets in the 'Miscellaneous' and 'Other transport assets' groups.

2.5 Funding Sources

The Asset Preservation Model is used to allocate funding from a number of sources, totalling approximately $370 million between State and Federal governments (2020 allocation).

Federal Government funding allocated in 2020 based on the Asset Preservation Model includes the following:

- Untied roads component of the Financial Assistance Grants ($112m p.a.)
- Roads to Recovery program ($77m p.a.)
- Local Roads and Community Infrastructure Program (Tranche 1) ($73m p.a.)

The model is also used to allocate the following State Government funding:

- Direct Grants ($26m p.a.)
- Road Project Grants (by Region) ($89m p.a.)

In addition to this, the model influences grant allocations for Federal General Purpose Grants. These grants are based on assessed revenue capacity and expenditure need of each Local Government, and road Asset Preservation Need is a component of the expenditure need. For some regional councils, with a large road network and sparse population density, it is a substantial part of their expenditure needs and thus a significant influence on their financial assistance grant outcome.

2.6 Funding Determined Externally to the Model

A number of funding streams appear in the Asset Preservation Model but are determined through separate processes. These funding streams include:

- Special project grants for bridges – allocated on the recommendation of the Local Government Grants Commission's Bridge Committee, with representation from the Commission, Main Roads and WALGA.
- Special project grants for Aboriginal roads – allocated on the recommendation of the Local Government Grants Commission's Aboriginal Roads Committee, with representation from the Commission, Main Roads, the Indigenous Affairs Group, Department of Prime Minister and Cabinet, Department of Local Government, Sport and Cultural Industries, Department of Planning, Lands and Heritage and WALGA.
- Aerodromes – allocated via a separate asset preservation model.

Further detail on these is provided below.

2.6.1 Special Projects

One third of the special project funds is allocated to roads serving remote Indigenous communities. In recommending allocations for roads serving remote Aboriginal communities, the Aboriginal Roads Committee has established funding criteria based on factors such as the

population served and the distance of the Community from a sealed road. The aim of the criteria is to better meet the needs of Aboriginal communities.

The Commonwealth special project funds for bridges and Aboriginal Access Roads are augmented by State funds. Main Roads WA contributes a third of the cost of all projects funded under the special projects program. This contribution of State funds is subject to the condition that local governments spend the special project funds on the project for which the funds were allocated.

2.6.2 Aerodromes

In addition to the Asset Preservation Need for roads, Local Governments that operate aerodromes are provided with an additional allowance. This allowance is reported in the Asset Preservation Model, but is determined through other Local Government Grants Commission processes.

There is a separate asset preservation model for aerodromes, and a list of all Local Governments with aerodromes to maintain. Commercial aerodromes (used by commercial airline services) that are owned by councils qualify for a capped allowance in recognition of the emergency services they provide.

2.6.3 Transport Standard

A Local Government's Transport Standard is comprised of the cost of maintaining its roads, footpaths, laneways, street lighting and aerodromes. It is a component of the Balanced Budget Calculations used to allocate the general purpose Financial Assistance Grants. The Transport Standard includes the results of the Asset Preservation Model, required expenditure on street lighting, footpaths, laneways, and aerodromes. The Transport Standard is reported in the Asset Preservation Model but determined externally.

The Transport Standard is calculated for each Local Government through the following formula:

Transport Standard
= Factored Back Needs + Aerodrome Allowance – Preservation Grants

Where Factored Back Needs are calculated as the Asset Preservation Need, scaled back to actual expenditure. This is done to provide for a 'balanced budget' for Financial Assistance grant purposes. For 2020-21, Factored Back Needs equal to 76% of Asset Preservation Need.

3 Overview of the Asset Preservation Model

3.1 Calculating Annual Expenditure Need

The model makes a detailed estimate of each local government's Asset Preservation Need. This Asset Preservation Need is calculated for most types of road asset using the model's basic equation:

Annual expenditure need
= (construction cost per km × frequency factor
+ annual maintenance cost per km) × road length

This annual expenditure need is calculated for each type of road, plus miscellaneous other assets, such as kerbing, river crossings or bridges.

Construction cost per kilometre and **annual maintenance cost per kilometre** vary between different types of asset. They also vary between Local Governments, to reflect differences in local construction costs. Local Governments are grouped into 21 cost regions. The unit cost includes a term for inflation, which is constant for all local government areas, and updated annually.

The **frequency factor** is the inverse of the design lifetime of the asset, in years. So if a particular type of asset must be rebuilt every 45 years, the frequency factor value would be 1/45. This frequency varies by type of road, and some cases by local government area.

Road length is measured in lane-kilometres for sealed roads and kilometres for unsealed roads. Data on the various road lengths is collected by Main Roads from Local Governments and provided to the Local Government Grants Commission on an annual basis.

The various types of roads and related asset are grouped into five categories:

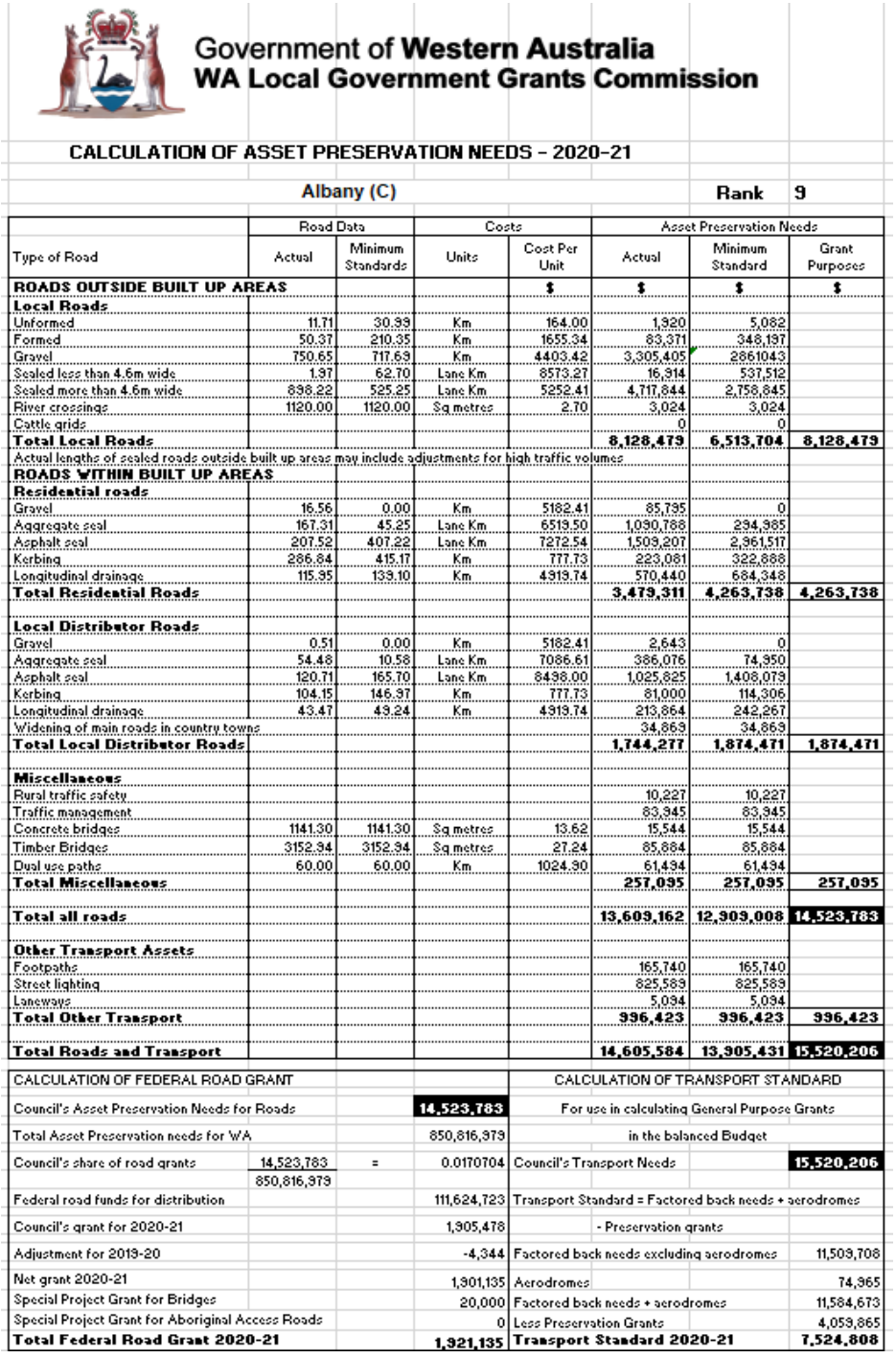
- Roads outside built up areas
- Roads inside built up areas – residential roads
- Roads inside built up areas – local distributor roads
- Roads inside built up areas – miscellaneous
- Other transport assets.

The full list of road types is listed in Figure 1 below.

The total annual Asset Preservation Need for roads and transport is the sum of the annual expenditure need for each type of road asset.

The model is capable of generating a high-level summary sheet for each Local Government, displaying the results of the above equation for the different road types, federal road grant based on these results, special project grants (bridges and aboriginal access roads), and the calculation of the Transport Standard, which is used in calculating general purpose grants. This summary sheet is supplied to each Local Government, to explain their grant allocation.

Figure 1: Asset Preservation Model summary sheet available to Local Governments



Government of **Western Australia**
WA Local Government Grants Commission

CALCULATION OF ASSET PRESERVATION NEEDS – 2020-21

Albany (C) **Rank 9**

Type of Road	Road Data Actual	Road Data Minimum Standards	Costs Units	Costs Cost Per Unit	Asset Preservation Needs Actual	Asset Preservation Needs Minimum Standard	Asset Preservation Needs Grant Purposes
ROADS OUTSIDE BUILT UP AREAS				$	$	$	$
Local Roads							
Unformed	11.71	30.99	Km	164.00	1,920	5,082	
Formed	50.37	210.35	Km	1655.34	83,371	348,197	
Gravel	750.65	717.63	Km	4403.42	3,305,405	2861043	
Sealed less than 4.6m wide	1.97	62.70	Lane Km	8573.27	16,314	537,512	
Sealed more than 4.6m wide	898.22	525.25	Lane Km	5252.41	4,717,844	2,758,845	
River crossings	1120.00	1120.00	Sq metres	2.70	3,024	3,024	
Cattle grids					0	0	
Total Local Roads					**8,128,479**	**6,513,704**	**8,128,479**
Actual lengths of sealed roads outside built up areas may include adjustments for high traffic volumes							
ROADS WITHIN BUILT UP AREAS							
Residential roads							
Gravel	16.56	0.00	Km	5182.41	85,795	0	
Aggregate seal	167.31	45.25	Lane Km	6519.50	1,090,788	294,985	
Asphalt seal	207.52	407.22	Lane Km	7272.54	1,509,207	2,961,517	
Kerbing	286.84	415.17	Km	777.73	223,081	322,888	
Longitudinal drainage	115.95	139.10	Km	4919.74	570,440	684,348	
Total Residential Roads					**3,479,311**	**4,263,738**	**4,263,738**
Local Distributor Roads							
Gravel	0.51	0.00	Km	5182.41	2,643	0	
Aggregate seal	54.48	10.58	Lane Km	7086.61	386,076	74,950	
Asphalt seal	120.71	165.70	Lane Km	8438.00	1,025,825	1,408,079	
Kerbing	104.15	146.97	Km	777.73	81,000	114,306	
Longitudinal drainage	43.47	43.24	Km	4919.74	213,864	242,267	
Widening of main roads in country towns					34,869	34,869	
Total Local Distributor Roads					**1,744,277**	**1,874,471**	**1,874,471**
Miscellaneous							
Rural traffic safety					10,227	10,227	
Traffic management					83,345	83,345	
Concrete bridges	1141.30	1141.30	Sq metres	13.62	15,544	15,544	
Timber Bridges	3152.94	3152.94	Sq metres	27.24	85,884	85,884	
Dual use paths	60.00	60.00	Km	1024.90	61,494	61,494	
Total Miscellaneous					**257,095**	**257,095**	**257,095**
Total all roads					**13,609,162**	**12,909,008**	**14,523,783**
Other Transport Assets							
Footpaths					165,740	165,740	
Street lighting					825,583	825,583	
Laneways					5,094	5,094	
Total Other Transport					**996,423**	**996,423**	**996,423**
Total Roads and Transport					**14,605,584**	**13,905,431**	**15,520,206**

CALCULATION OF FEDERAL ROAD GRANT				CALCULATION OF TRANSPORT STANDARD	
Council's Asset Preservation Needs for Roads			**14,523,783**	For use in calculating General Purpose Grants	
Total Asset Preservation needs for WA			850,816,379	in the balanced Budget	
Council's share of road grants	14,523,783	=	0.0170704	Council's Transport Needs	**15,520,206**
	850,816,379				
Federal road funds for distribution			111,624,723	Transport Standard = Factored back needs + aerodromes	
Council's grant for 2020-21			1,305,478	- Preservation grants	
Adjustment for 2019-20			-4,344	Factored back needs excluding aerodromes	11,503,708
Net grant 2020-21			1,301,135	Aerodromes	74,965
Special Project Grant for Bridges			20,000	Factored back needs + aerodromes	11,584,673
Special Project Grant for Aboriginal Access Roads			0	Less Preservation Grants	4,059,865
Total Federal Road Grant 2020-21			**1,321,135**	**Transport Standard 2020-21**	**7,524,808**

3.2 Asset Classes

Asset Preservation Need is estimated based on 28 classes of transport-related asset, mostly different types of roads. These are separated into five categories:

- Roads outside built up areas;
- Roads within built up area – residential roads;
- Roads within built up area – local distributor roads;
- Miscellaneous; and
- Other transport assets.

The full list of transport assets is listed below.

Roads outside built up areas

Local roads:

1. Unformed
2. Formed
3. Gravel
4. Sealed less than 4.6m wide
5. Sealed more than 4.6m wide
6. River crossings
7. Cattle grids

Roads within built up areas

Residential roads:

8. Gravel
9. Aggregate seal
10. Asphalt seal
11. Kerbing
12. Longitudinal drainage
13. Adjustment for CBD roads

Local Distributor Roads:

14. Gravel
15. Aggregate seal
16. Asphalt seal
17. Kerbing
18. Longitudinal drainage
19. [Adjustment for] Widening of main roads in country towns
20. Adjustment for CBD roads

Miscellaneous

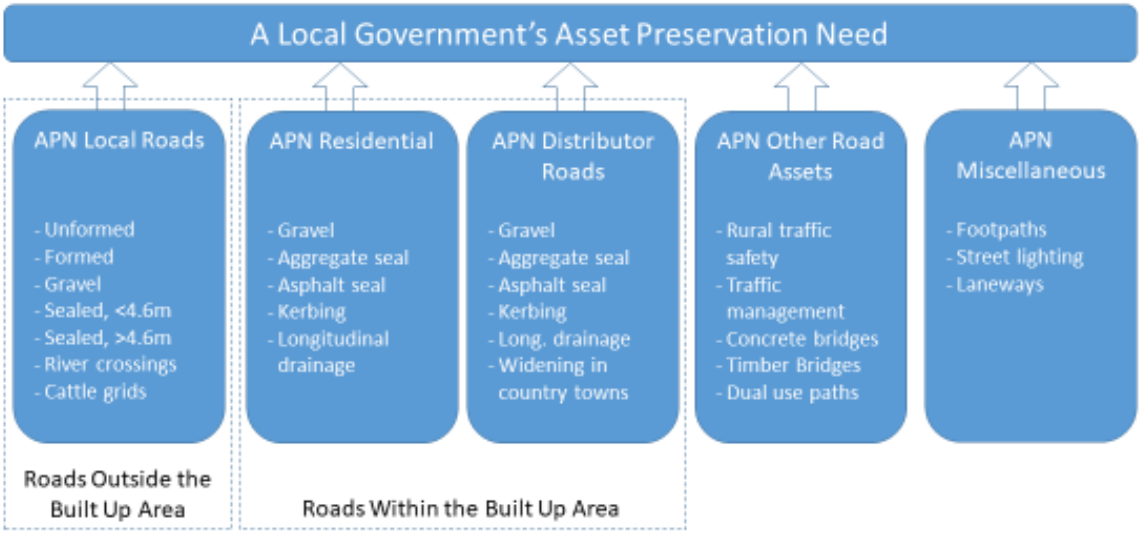
21. Rural traffic safety
22. Traffic management
23. Concrete bridges
24. Timber Bridges
25. Dual use paths

Other Transport Assets

26. Footpaths
27. Street lighting
28. Laneways

This is shown conceptually in Figure 2, below.

Figure 2: Conceptual diagram of calculation of Asset Preservation Need



3.3 Asset Base and Minimum Standards

The different road types listed in the model (formed, gravel, sealed less than 4.6m wide, etc.) can be considered different levels of quality of road. The minimum standards retain the total length of roads in each local government area, and assumes a fixed proportion of each road type, regardless of the actual asset base. Local Governments are grouped into minimum standard regions (separate from the cost regions), and the proportions of the different types of road are fixed for all Local Governments within that region for the purposes of the minimum standard.

The actual Asset Preservation Need and minimum standard Asset Preservation Need are calculated for all road types, and aggregated into the five major categories listed above. For each of these five categories, the greater of the two values – actual need and minimum standard need – is used in determining each Local Government's total Asset Preservation Need. This concept is shown through the following formula:

Annual expenditure need
= [(construction cost per km × frequency factor)
+ annual maintenance cost per km]
× Max (actual road length, minimum standard road length)

Some asset types do not have a minimum standard applied, namely river crossings; cattle grids; gravel (residential roads); adjustment for CBD roads (residential roads); gravel (local distributor roads); adjustment for CBD roads (local distributor roads); widening of main roads in country towns; or any of the assets in the 'Miscellaneous' and 'Other transport assets' groups. Various methods are used to calculate the Asset Preservation Need of these assets.

Each Local Government is assigned to a minimum standard region, with the regions determined according to Grants Commission judgment. These minimum standard regions are listed in the appendices.

This concept is illustrated below in Figure 3, using the example of the Residential Roads category of roads.

Figure 3: Conceptual diagram of calculation of minimum standard

4 Unit Costs Calculations

4.1 How Unit Costs are Calculated

Unit costs are the most complicated part of the model, and calculating unit costs can involve a large number of parameters.

As mentioned in Section 3.1, road Asset Preservation Need is generally estimated through the basic equation, repeated here:

Annual expenditure need
= (construction cost per km × frequency factor
+ annual maintenance cost per km) × road length

This equation allows for both annual maintenance costs and periodic reconstruction.

The model includes separate parameters for the frequency of reconstruction of different types of road. The reconstruction frequency parameters are mostly uniform between Local Government Areas, although there are different reconstruction frequencies for sealed residential roads between Local Governments located within the metropolitan area (55 years) and outside the metropolitan area (45 years). The assumption for the frequency of re-gravelling gravel roads is 12 years for the majority of Local Governments. Model documentation states that the model uses an allowance of 100mm pavement thickness when determining the cost of gravelling, although this is assumption not explicitly contained within the model spreadsheet. The assumption for the frequency of re-gravelling gravel roads is 12 years for the majority of Local Governments. Model documentation states that the model uses an allowance of 100mm pavement thickness when determining the cost of gravelling, although this is assumption not explicitly contained within the model. There is also a handful of Local Governments with more frequent re-gravelling of gravel roads coded into the model. Within the model, frequency factor is worked into the unit cost per kilometre, rather than being a separate item.

In addition to the cost regions, some cost parameters have individual values for each Local Government.

“Disability Factors” are applied to the base asset preservation need estimate for some Local Governments. These disability factors inflate assessed costs in excess of what is prescribed by the cost regions, to reflect difficult conditions in terms of road durability and construction costs. This concept of the model is discussed further in Section 4.3

4.2 Cost Regions

The twenty-one cost regions appear in the model as a combination of the various unit cost parameters for different types of roads. For example, the model includes nine cost values for the cost per kilometre of resealing for aggregate seal residential roads, and seven cost values for the annual maintenance cost per lane-kilometre of sealed residential roads in the built up area. There are a large number of such parameters in the Asset Preservation Model, and the cost regions are combinations of these cost parameters.

Each of the cost regions are a combination of values on these parameters, being a distinct combination of a large number of unit cost groupings within the model. For example, there are nine distinct values for the cost per square metre of footbridges parameter, seven distinct

values for the Residential Roads – Aggregate Seal Costs parameter and eight distinct values for the cost per kilometre of kerb reconstruction parameter. None of the model's parameters has exactly 21 values, so every region shares some of its cost parameters with other regions. Comparing two regions might see the same costs on some parameters but different costs on other parameters.

The cost regions are detailed in the appendices.

4.3 Disability Factors

The disability factors adjust each Local Government's assessed Asset Preservation Need, to reflect differences in road maintenance costs due to environmental conditions such as landform, climate, location and soils.

As mentioned above, the disability factors are:

- the distance gravel has to be carted for reconstructing roads;
- soil conditions that affect the thickness of sealed pavements;
- terrain (i.e. hilliness); and
- salt.

4.3.1 Distance Required to Cart Gravel

The distance required to cart gravel greatly affects paved roads construction costs. Cartage distances in Western Australia vary between five and fifty kilometres.

A separate model was developed to estimate the cost of pavement materials, and this is hard-coded into the Asset Preservation Model. Values are individual to each Local Government, rather than there being cost regions. This disability is explicitly applied to the unit cost of rebuilding roads outside the built up area (there are separate parameters for roads less than a 4.6 metre seal and for roads with greater than a 4.6 metre seal). It is also included in the cost calculation for re-sheeting gravel roads.

The modelling was last reviewed in 2012.

4.3.2 Soil Condition and Sealed Pavement Thickness

Another disability factor applied to paved road costs is the effects of soil conditions on required pavement thickness.

The source data for this disability is a publication by the then Federal Department of Home Affairs and Environment titled Biophysical Attributes of Local Government Areas[5]. This report was published in 1983. Presumably soil conditions have not changed materially since its publication, although it is uncertain to what degree measurement techniques might have improved since then, potentially dating the results.

The soil types were related to agricultural uses, rather than road engineering considerations, and Main Roads estimated the design Californian Bearing Ratios for each of these agricultural classifications. The Californian Bearing Ratio is a measure of the bearing capacity of a particular soil. Equivalent standard axles were then calculated by Main Roads, and this then used to estimated the required pavement thickness.

[5] 'Biophysical Attributes of Local Government Areas', Department of Home Affairs and Environment, 1983, AGPS, Canberra.

This disability is only applied to the unit cost of rebuilding the two categories of sealed roads outside the built up area (roads with less than a 4.6 metre seal and roads with greater than a 4.6 metre seal). The model combines these two disability factors into a single joint variable, labelled NBPVREC in the model.

4.3.3 Terrain

The terrain disability accounts for the hilliness of the ground in each Local Government. Information on terrain, obtained from a report 'Physical Attributes of Local Government Areas', gave the percentage of each local government area in each of four terrain categories – plains, undulating, rolling and hilly.

The assumed effect on road cost for the four categories are as follows:

- Flat: 1.0
- Undulating: 1.2
- Rolling: 1.4
- Hilly: 1.6

These numbers are cost multiples. Different Local Governments' terrain disabilities are determined by multiplying the percentage of land area in each category by the road cost multiplier, and the adding the four results to arrive at a final cost multiplier. The report only provides coarse estimates of the breakdown between these different terrain types, and there are only 12 distinct values for the terrain disability, between 1 and 1.48 (i.e. a 48% cost loading).

This disability is labelled "TERRAIN" in the model. As with the pavement thickness disability, the terrain disability is only applied to the reconstruction costs of the two categories of sealed roads outside the built up area.

4.3.4 Salt

Roads built over salty ground require more maintenance and deteriorate more rapidly than roads built where salt is not present.

While this reduction in road life is widely recognised, there is not definitive data available for it to be quantified. The Asset Preservation Model applies a one-third reduction in road life for roads built over salt, which was determined by the Grants Commission after discussions with Main Roads and Local Government engineers. The extent of salt-affected land was determined for each Local Government using satellite imagery, and this is used to determine a disability factor for each Local Government.

The salt disability factor can add up to 5.28% to Asset Preservation Need, and is applied to all gravel and sealed roads, both within and outside the built up area. This disability factor is also applied to the cost of kerbing and longitudinal drainage, and the adjustment for CBD roads.

This disability is labelled "SALTDF" in the model.

4.4 Simplifications of the Asset Preservation Need Equation

For some asset types, asset preservation cost is calculated more simply than through the basic equation detailed in Section 3.1.

The model does not take account of the actual or minimum standard asset base of the following asset types when calculating Asset Preservation Need:

- Cattle grids
- Adjustment for CBD roads (residential roads)
- Widening of main roads in country towns
- Adjustment for CBD roads (local distributor roads)
- Rural traffic safety
- Traffic management
- Footpaths
- Street lighting
- Laneways

Various methods are used to calculate the preservation needs of these asset types.

Further to this, for a number of asset types, the Asset Preservation Model does not include a minimum standard asset base. These are:

- River crossings
- Gravel roads (residential roads)
- Gravel roads (local distributor roads)
- Concrete bridges
- Timber Bridges
- Dual use paths

As discussed above, the minimum standards were introduced to address the less extensive development of the road network in some Local Government Areas. The minimum standard adjusts the composition of the different classes of roads. It is therefore not applicable to those assets which are not a type of road. It is also not applicable for gravel roads in the built-up area (BUA), as these are the lowest class of roads in BUAs, and so the minimum standard is intended to increase the proportion of other classes of roads.

5 Updating the Asset Preservation Model

The Asset Preservation Model is administered by the WA Local Government Grants Commission, and a substantial review or major structural change of the model would require Grants Commission approval.

There are various elements of the Asset Preservation Model that are regularly updated, including road length and other data, disability factors, and unit costs.

Road Length Data

Road length data is updated annually, with Main Roads WA providing a snapshot of current local government road inventories from IRIS. These inventories capture the roads within a local government area that a local government maintains and for which it has accepted responsibility. Local Governments are responsible to update their IRIS inventory on a regular basis ranging from 1 to 3 years depending on their classification.

The updated data is provided to the Local Government Grants Commission in March each year, in the form of road length and area by type of surface (seal, gravel, formed, unformed), by type of road (roads outside built-up areas, and residential and local distributor roads). Data is also provided for Aboriginal access roads and for bridges.

This data is checked and sorted and compared with the previous year data before being imported into the model.

Other Data

Other data is collected from an information return sent by the Local Government Grants Commission to Local Governments (most years, but not every year). Supplementary information is sought from Local Governments regarding expenditure and information on ancillary transport infrastructure such as footpaths, street lighting, river crossings, aerodromes and drainage.

Unit Costs

Unit costs are reviewed periodically, rather than on an annual or ongoing basis. A review of unit rates for road replacement and road preservation was performed in 2019. The costs previously used were last updated with local government input in 2011. Ideally these costs should be updated with local government input approximately every five years or so. In the intervening years, an inflation factor is applied to update the unit costs, which is used in the annual calculations of Asset Preservation Need.

The inflation factor is a calculation based on data sourced from the ABS road cost index (6427.0 - Producer Price Indexes, Australia; Index Number 3101 Road and bridge construction Western Australia).

Disability Factors

Of the four disability factors in the Asset Preservation Model:

- The terrain factor is not subject to update, but could be if a valid data source were to become available.

- The salinity factor has not been updated for many years. An update of data via the Land Monitor project is expected to be available for input prior to the 2021 calculations of the model.
- The disability factor for pavement thickness for sealed roads is based on Californian Bearing Ratios for soil types in WA sourced from a report prepared by Main Roads. This data is not required to be updated unless a more accurate data source was to become available.
- The disability factor for cost of pavement materials for sealed roads is updated periodically, when unit rate data is updated via a data collection from Local Government.

An allowance for traffic is also made in the Asset Preservation Model. Local Governments are invited each year to supply traffic count data for roads carrying higher than expected volumes of traffic. These submissions are evaluated each year and adjustments made to the allowances in the model where justified. Essentially this means that gravel roads carrying high traffic volumes are treated as if they were sealed roads in the Asset Preservation Model.

There is no established process for adding or removing disability factors from the model.

Other elements of the Asset Preservation Model

There are a number of other elements of the Asset Preservation Model which do not require adjustments. These are either constants (such as frequency of seal) or formulas which are automatically calculated based on updates of other data.

6 APPENDIX: List of Cost Regions

Cost region	Local Governments
1	Bassendean; Bayswater; Belmont; Cambridge; Canning; Claremont; Cockburn; Cottesloe; East Fremantle; Fremantle; Gosnells; Joondalup; Melville; Mosman Park; Nedlands; Peppermint Grove; Perth; South Perth; Stirling; Subiaco; Victoria Park; Vincent
2	Armadale; Kalamunda; Kwinana; Mandurah; Mundaring; Rockingham; Swan; Wanneroo
3	Bunbury; Busselton; Harvey; Murray; Serpentine-Jarrahdale; Waroona
4	Boyup-Brook; Bridgetown Greenbushes; Capel; Collie; Donnybrook-Balingup; Dardanup
5	Augusta-Margaret River; Manjimup; Nannup
6	Albany; Cranbrook; Denmark; Kojonup; Plantagenet; West Arthur; Williams
7	Beverley; Boddington; Brookton; Moora; Victoria Plains; Wandering
8	Chittering; Gingin; Northam; Toodyay; York
9	Carnamah; Coorow; Dandaragan; Greater Geraldton; Irwin; Mingenew; Morawa; Perenjori; Three Springs
10	Bruce Rock; Cunderdin; Dalwallinu; Dowerin; Goomalling; Kellerberrin; Koorda; Merredin; Nungarin; Quairading; Tammin; Trayning; Wongan-Ballidu; Wyalkatchem
11	Kondinin; Kulin; Mount Marshall; Mukinbudin; Narembeen; Westonia; Yilgarn
12	Corrigin; Cuballing; Katanning; Narrogin; Pingelly; Wagin; Wickepin; Woodanilling
13	Broomehill-Tambellup; Dumbleyung; Esperance; Gnowangerup; Jerramungup; Kent; Lake Grace; Ravensthorpe
14	Chapman Valley; Northampton
15	Coolgardie; Dundas; Kalgoorlie-Boulder
16	Cue; Laverton; Leonora; Meekatharra; Menzies; Mount Magnet; Murchison; Ngaanyatjarraku; Sandstone; Upper Gascoyne; Wiluna; Yalgoo
17	Carnarvon; Shark Bay
18	Exmouth; Karratha; Port Hedland
19	Ashburton; East Pilbara
20	Broome
21	Derby-West Kimberley; Halls Creek; Wyndham-East Kimberley

7 APPENDIX: List of Minimum Standard Regions

Minimum standard region	Local Governments
MSR 1	Bassendean; Bayswater; Belmont; Cambridge; Canning; Claremont; Cockburn; Cottesloe; East Fremantle; Fremantle; Gosnells; Joondalup; Melville; Mosman Park; Nedlands; Peppermint Grove; Perth; South Perth; Stirling; Subiaco; Victoria Park; Vincent
MSR 2	Armadale; Kalamunda; Kwinana; Mandurah; Mundaring; Rockingham; Swan; Wanneroo
MSR 3	Augusta Margaret River; Bridgetown Greenbushes; Bunbury; Busselton; Capel; Collie; Dardanup; Donnybrook-Balingup; Harvey; Manjimup; Nannup; Waroona
MSR 4	Chittering; Gingin; Murray; Northam; Serpentine-Jarrahdale; Toodyay; York
MSR 5	Albany; Beverley; Boddington; Boyup Brook; Brookton; Broomehill-Tambellup; Bruce Rock; Carnamah; Chapman Valley; Coorow; Corrigin; Cranbrook; Cuballing; Cunderdin; Dalwallinu; Dandaragan; Denmark; Dowerin; Dumbleyung; Esperance; Greater-Geraldton; Gnowangerup; Goomalling; Irwin; Katanning; Kellerberrin; Kojonup; Koorda; Merredin; Mingenew; Moora; Morawa; Mukinbudin; Narembeen; Narrogin; Northampton; Nungarin; Pingelly; Plantagenet; Quairading; Tammin; Three Springs; Trayning; Victoria Plains; Wagin; Wandering; West Arthur; Westonia; Wickepin; Williams; Wongan-Ballidu; Woodanilling; Wyalkatchem
MSR 6	Jerramungup; Kent; Kondinin; Kulin; Lake Grace; Ravensthorpe
MSR 7	Mount Marshall; Perenjori; Yilgarn
MSR 8	Ashburton; Coolgardie; Cue; Dundas; East Pilbara; Halls Creek; Kalgoorlie-Boulder; Laverton; Leonora; Meekatharra; Menzies; Mount Magnet; Murchison; Ngaanyatjarraku; Sandstone; Upper Gascoyne; Wiluna; Yalgoo
MSR 9	Carnarvon; Exmouth; Port Hedland; Karratha; Shark Bay
MSR 10	Broome; Derby-West Kimberley; Wyndham-East Kimberley