

# SERVICE LEVELS FOR LOCAL ROADS - SHIRE OF CAMPASPE

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## Abstract

Assets owned or operated by Councils are only required because they support a service provided to the community (not because they are needed in their own right).

In the case of roads the service provided is the means to allow the transportation of people and goods in vehicles. Different types of roads provide this service to varying levels.

For Councils to know if their roads meet the level of service required by the community firstly it is necessary to define the level of service provided by different type of roads and secondly it is necessary to speak with the community about the level of service they require and can afford.

The local government sector is moving towards defining levels of service using a 5 star rating, similar to hotels.

At Campaspe we have undertaken discussions with the community regarding what characteristics of a road define the level of service (and how they maybe combined into a star rating) and where roads with different levels of service should be located.

Further discussions with the community will define the cost implications of a range of options in applying different service levels to various parts of the road network. This will lead to an "agreement" with the community over what level of service (type/standard of road) will be provided in what location and at what annual cost of service (operational, maintenance and depreciation).

An over arching concern is providing funding for the renewal of assets at the end of their life and further that this must be continue to be financially sustainable.

This whole process involves extensive consultation with the community.

## Key Words: local roads, levels of service, star rating, cost of service

### Introduction

The Shire of Campaspe is located about 180 km north of Melbourne with a population of over 36,000. Agriculture is the main industry (predominantly dairying). Tourism is also very important with the main town Echuca being on the Murray River and being so close to Melbourne.

Generally the northern part of the Shire is flat and is irrigated, mainly used for dairying, with dry land farming to the south.

Much of the road network is rectangular and set out on 1.6 km grids with roads running north-south and east-west.

There is 1,140 km of sealed roads, 2,400 km of gravel roads and 500 km of earth roads controlled by the Shire.

The Shire's annual budget is \$55 million with about \$6 million spent on road renewal.

### Context

The Shire of Campaspe has about \$740 million of assets of which local roads forms about \$400 million.

There are 1,138 km of sealed roads (170 km urban access, 42 km urban collector, 421 km rural access, 505 km rural collector), 2,439

km of gravel roads (53 km urban, 2,386 km rural) and 546 km of earth roads controlled by the Shire and 560 km controlled by the state road authority.

In mid 2008 Council agreed to review the rural road network in response to community concerns about service levels (and Council's concern about its ability to fund roads in a sustainable manner).

In the 2009/10 budget Council has allocated \$6 million on roads, mostly for renewal.

As with many Councils in Australia, Campaspe has an annual renewal gap in funding replacement of its infrastructure at the end of its life. This gap is in the order of \$3 to \$ 4 million per year. A significant part of this is related to roads.

This issue means that the cost (operational, maintenance and depreciation/renewal), extent and standard of the road network needs to be carefully analysed and reviewed to ensure a financially sustainable future. It cannot be assumed that additional funding can be found to close this funding gap. More importantly the service provided by the road network needs to be understood and reviewed so that it meets the communities

needs at a cost that can be afforded into the future.

To understand the service currently provided by roads, propose alterations to this service and discuss the outcomes with the community we need a common language to describe the level of service.

A star rating (similar to hotels) is one method.

The objective of the project was to set up a system to define the level of service provided by various roads, determine where roads delivering various levels of service should be located and ensure that the road network is financially sustainable. All this needed to be undertaken through discussion with the community.

### **Level of Service Definition**

How is a level of service described? It should describe the quantity, quality, location, time and cost of a service.

For example with a road it might describe, what length of road provided, at what roughness, in what area, during what season of the year and at what cost.

### **Methodology**

The methodology consisted of a number of steps:

- Develop a star rating system to describe the service level provided by roads using factors identified through discussion with the community and industry standards.
- Determine drivers that describe where different star rated roads should be located through discussion with the community
- Determine costs for operations, maintenance and depreciation (cost of service) so that the total annual costs can be determined in
  - Changing a road from one star rating to another
  - Changing the location of various star rated roads
- Analyse various network scenarios (ie different star rated roads in various layouts) and their annual costs. Discuss this with the community to produce a preferred network
- Adopt a network that delivers an agreed level of service at a known cost of service in a financially sustainable manner

### **Initial Community Discussion**

The first community meeting was held in late 2008. The meeting was organised through one of Council's District Planning Groups.

(Council has 17 groups across the municipality. Their role is to determine what issues are important to the local community and develop a plan to achieve the agreed outcomes. Council's role is to support and build capacity in these groups so they can pursue their plans. Most actions do not require significant Council funding. Often funding is through government grants.)

The group consisted of a range of people from the local area plus specific invitees who had a particular interest in roads eg transport operators.

Through a brain storming session the group produced a list of factors which describe the level of service provided by a road. They also identified factors which were of higher importance. These included

- Safety
- Width of road
- Quality surface (long life seal e.g. asphalt; camber of road; absence of loose material; corrugations; wheel ruts; potholes
- Offset intersections; vision at intersections; visible intersections.
- Appropriately located signage – directional, warning and regulatory
- Drainage

A range of other less important factors were also identified as follows:

- Delineations; road markings; cats eyes; flashing lights at intersections; guide posts and reflectors
- Width and surface of road shoulders
- Level of maintenance to keep rating standard
- Offset railway crossings; lights at railway crossings on sealed roads
- Capacity to manage overhanging branches; low risk of falling branches
- Bridge surface; culverts and bridges sized for traffic type using road i.e. weight, width and age
- Capacity of road
- Consistency of surface, width, speed limit zones
- Stock crossings

- Appropriate plantings on verge – integrate with roadside vegetation strategy
  - Clear signage, located well ahead; appropriately positioned; advanced direction signage
  - Number and location of property entrances
  - Hills and curves
  - Truck route and road design to meet turning requirements of trucks
  - Width of road reserve
  - No conflicts in traffic movements; one way traffic; divided roads; traffic lights
  - Flood ways
  - Low risk of stock grazing on the roads
- These factors were later grouped into like categories.

Further the group was asked to identify the top drivers that describe where higher (or lower) service level rated roads should be located.

They were:

- Traffic volumes i.e. the higher the volume the higher the level of service to be provided
- Type of traffic using the road (commercial, large vehicles)
- Connecting roads:
  - Directly connecting towns
  - Directly connecting industrial areas
  - Connecting residences and schools e.g. school bus routes
  - Connecting residences and shops
- Roads servicing business areas
- Roads servicing growth areas (residential, industrial, etc)

Other drivers were also identified as follows:

- Roads entering the Shire
- Visitor and tourist roads
- Population impacts
- Numbers of industries and factories
- Number of residences
- Roads requiring a minimal level of service
- Access roads to large scale farms
- Access roads to towns
- Access requirements for emergency vehicles
- Straight roads
- Designated roads in flood areas

- Land use
- Degree of variability in use
- Access to properties

### Star Rating Model

The factors identified in the community discussion group which describe the level of service provided by a road were grouped into categories. A scoring system of 1 to 5 was then developed so that each factor could be rated depending on the degree to which it was provided. Given that not all factors had equal importance a weighting system was developed. This is shown in the Appendix 1.

Roads could then be scored. A range of scores is possible depending on the level of service provided. This range was split into five segments to match a star rating 1 to 5 by technical staff based on their technical and local knowledge. (This could be tested with a focus group but in a practical sense there may not be anything to gain as the adopted weighted scoring fits well with the existing road types as will be seen below.) The star rating against the weighted scoring is shown Table 1 below:

Star	Weighted score
1	less than 70
2	70-119
3	120-169
4	170-200
5	200 plus

**Table 1 Star rating versus weighted score**

To understand what this means in practice the type of road that align with the mid range of the weighted score for each star rating is shown in Table 2 below:

Star	Description
1	Freeway
2	Dual carriageway
3	Two lane sealed
4	Single lane all weather
5	Single lane dry weather

### Table 2 Star rating versus description

It should be noted that it is the mid range score that matches the typical road type. Therefore it is possible, for example, that a well serviced single lane all weather road could be 3 star rated or a poorly serviced two lane sealed road is 2 star rated.

### Cost of Service

The cost of service is the total annual expenditure to provide the service at the current level. It includes operational costs, maintenance and depreciation (or the amortised cost of renewal).

These costs are shown in the Appendix 2. Renewal is excluded as depreciation is already included.

Also if a road were to be upgraded the capital cost needs to be known.

It is now possible to determine the cost to provide various levels of service (star ratings). Also the cost to move from one level of service (star rating) to another can be calculated.

### Costing Scenarios

The next phase in the project was to undertake costing various scenarios on the network ie using the drivers identified by the community that determine where different star rated roads should be located. A number of scenarios were tested and estimates of costs produced.

Scenarios, with costs, included:

- All dwellings to be located on at least a 2 star road

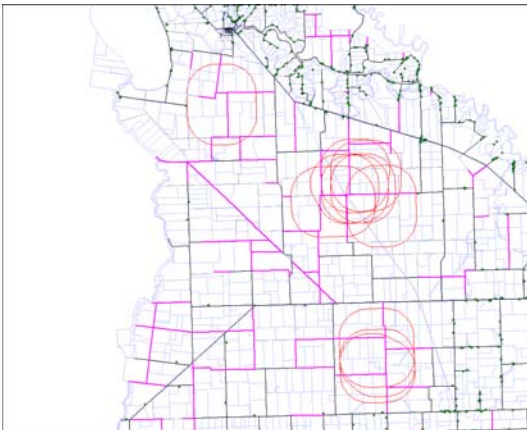
- This resulted in an upgrade cost of \$20,000, increased maintenance costs of \$500
- All properties (dwelling or not) within 2 km of a 2 star road
  - This resulted in an upgrade cost of \$205,000, increased maintenance costs of \$5,000
- All properties within 5 km of a 2 star road
  - No property outside 5 km, no cost
- All roads with a traffic count of 150 vpd min 3 star
  - No roads with 150 vpd under 3 star, no cost
- All roads with a traffic count of 200 vpd min 3 star
  - No roads with 200 vpd under 3 star, no cost
- All roads with a commercial count of 20 vpd min 3 star
  - This resulted in an upgrade cost of \$5.2 million, increased maintenance costs of \$15,000
- All roads with a commercial count of 30 vpd min 3 star
  - This resulted in an upgrade cost of \$2.2 million, increased maintenance costs of \$7,000
- All roads with a commercial count of 50 vpd min 3 star
  - There are currently no gravel roads with more than 50 vpd
- Provide a collector road network on a 10 km by 10 km grid of minimum 2 star
  - This resulted in an upgrade cost of \$129,000
- School bus routes to greater than 2 stars
  - All bus routes are currently 2 star, no cost
- All tourist roads greater than 2 star
  - All tourist roads are currently 2 star, no cost
- All collector roads greater than 2 star
  - All collector roads are currently 2 star, no cost
- Roads with 50 vpd to be no greater than 2 star
  - There is currently 132 km of road in this category which are above 2 star and if, at the end of their useful lives they were down graded to 2 star, there would be a saving of \$226,000 per annum in depreciation (from a practical

perspective they should not be down graded until the end of their useful lives as it is a similar cost to keep a 3 star road as a 2 star road once it is in place)

- Roads not servicing dwellings or industry to be 1 star
  - There is currently 249 km of road in this category which are above 1 star and if, they were down graded to 1 star, there would be a saving of \$246,000 per annum in depreciation

It can be seen that these scenarios include the drivers that the community identified as being important ie traffic volumes, traffic types, and connections. It is the degree to which these have been accommodated that is varied in each of the scenarios.

The Council's geographic information system was useful in testing scenarios. For example it has been possible to identify areas where dwellings are more than a specified distance to a 2 star road as shown in Figure 1 below:



**Figure 1 Use of GIS to test scenarios**

As indicated above a range of scenarios have been costed by building a complete road network against each scenario. The total annual cost of service can therefore be determined for each scenario and the financial sustainability of each scenario can be assessed against Council's long term financial plan. It can be seen that some scenarios give a total increase in cost and some a reduction.

All these various scenarios can then be compared to the cost of the current network, the level of service provided by the current network and the implications of any change between the current network and various scenarios to be investigated.

### **Where to from here?**

The next phase in the process is to have Council consider the the cost of the current network, the level of service provided by the current network and the implications of any change from the service provided by the current network to another network with another level of service. The new network needs to offer a reduced level of cost to assist in closing the asset renewal gap. This is likely to come from down grading 2 star roads to 1 star roads and agreeing that when a number of 3 star roads reach the end of their useful lives that they will be down graded to 2 star roads. This needs careful consideration as maintain a current sealed road (including renewing the seal) is a similar cost to maintaining a gravel road. It is only at the end of its life that the 2 star road would down graded.

Council then needs to adopt a preferred network so that the community can be engaged.

As this is likely to be a sensitive issue a community consultation strategy will be developed. This process will involve, amongst other things, engaging the Community Planning Groups across the shire.

Following this Council will need to adopt a revised road network.

### **Conclusion**

The process of Council agreeing to review the road network has been based on a culmination of policy decisions from the last 6 or 7 years. These include Council adopting asset management plans in 2004, an asset renewal funding strategy adopted in mid 2008 (which aimed to progressively increase funding each year for 20 years to close the renewal gap) and a recent restructure within the Assets and Planning division to focus on assets.

Without this background it would seem unlikely that any Council would be willing to review its road network, particularly if it could result in a variation to the current arrangement.

Developing a star rating has not proved to be an overly difficult task although weightings in the scoring methodology is more subjective. Analysing the annual cost of various network scenarios has also proved tedious due to the

manner in which the data is held in GIS and how it can be manipulated.

Community engagement over the network layout and possible changes to the service level will prove to be more difficult, based on information to date.

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### **Bibliography**

Jon Aujard is the Assets and Planning Executive Manager at the Shire of Campaspe based in Echuca Victoria on the Murray River.

Jon commenced his career working in an engineering consultancy before moving into local government in 1979. He worked for a number of councils in metropolitan Melbourne before moving to the City of Greater Bendigo in 1994.

In 2004 Jon took up the position at Campaspe with a wide range of responsibilities including management of engineering design, statutory planning, asset management, road service management, road maintenance and parks and garden maintenance.

Jon has qualifications in civil engineering, municipal engineering and business management.

## Appendix 1

		SCORE						
Factor	Technical Level of Service	1	2	3	4	5	Weighting	Maximum Score
<b>Accessibility</b>								
Travel in all weather conditions	Surface type, depth of pavement	Natural	Sand or naturally occurring gravel	Gravel	Seal	Asphalt	3	15
Road subject to flooding	Depth of flooding, location of floodways	Floodway with depth of water exceeding 350mm in 1 in 10 year event	Floodway with depth of water less than 350mm in 1 in 20 year event	Floodway with depth of water less than 350mm in 1 in 50 year event	Floodway with depth of water less than 350mm in 1 in 100 year event	No floodway	3	15
Traffic congestion	Traffic volumes, lane widths, % commercial vehicles	Forced flow - capacity exceeded	Unstable flow - nearing capacity	Restricted stable flow	Stable flow	Free Flow	3	15
Connectivity	Hierarchy, truck routes, B Double access, Bus Routes	Access	B Double Route	Collector or Bus Route	Arterial	Freeway	3	15
Access to businesses and growth areas		Other				Access to industry and growth areas	3	15
<b>Affordability</b>								
Maintenance response	Road Management Plan response times	Slowest response times		Medium response times		Quickest response times	2	10

		SCORE						
Factor	Technical Level of Service	1	2	3	4	5	Weighting	Maximum Score
Value for money	Level of sustainability for class of road	Less than 40 % sustainability for road class	41% -59% sustainability for road class	60% - 79% sustainability for road class	80% - 99% sustainability for road class	100% sustainability for road class	3	15
<b>Serviceability</b>								
Smoothness	Roughness	141 plus	121 -140	81-120	51-80	<50	3	15
Noise	Surface type, size of aggregate, roughness	Gravel	14mm seal natural surface	10mm seal,	less than 10mm seal	Asphalt	1	5
Signage other than regulatory	Advanced warning signs and direction (route) signage, road name signage	No direction signage provided	Road names only	Direction signage at intersection		Advanced warning and direction signage provided	1	5
Ability to travel at speed limit	Safe travel speed.	0-20% of speed limit	21-40% of speed limit	41-70% of speed limit	71-99% of speed limit	100% of speed limit	3	15
<b>Customer Service</b>								
Customer Satisfaction	OLG Customer Service score for particular class of road	Less than 40% satisfaction	40- 49% satisfaction	50- 59% satisfaction	60- 69% satisfaction	Greater than 70% satisfaction	1	5
<b>Safety</b>								

		SCORE						
Factor	Technical Level of Service	1	2	3	4	5	Weighting	Maximum Score
Delineation of road edges and centreline	Type and extent of linemarking, guide posts, RRPM's	None		Centreline		Lane markings or centreline and edge lines	1	5
Safety margin	Lane width	<2.7m	2.7m -3.0m	3.0m -3.3m	3.3m to 3.7m	>3.7m	3	15
Obstructions on sides of road	Horizontal clear zone, LATM	Obstructions within clear zone		Obstructions within clear zone are properly protected		No obstructions within clear zone	1	5
Obstructions above the road	Vertical clear zone, bridge clearance heights	Less than 3m		3-5m		>5m	2	10
Intersection safety	Sight distance	Stop or no signage	Give way signage	Splitter islands with signage	Staggered T intersection	No intersection	3	15
Ability to safely overtake	Horizontal and vertical sight distance	Less than design stopping sight distance achieved		Midway between design stopping distance and design overtaking sight distance		100% of design overtaking sight distance achieved	2	10
Ability to safely pull over in an emergency	Shoulder width and shoulder type	No shoulder	Gravel shoulder 1.5m	Gravel shoulder 2.1m	Sealed shoulder <2.1m	Sealed shoulder >2.1m with edge marking	2	10

		SCORE						
Factor	Technical Level of Service	1	2	3	4	5	Weighting	Maximum Score
Regulatory signage	Type, condition and location of regulatory signs	No signage		Signage in moderate condition		Signage in good condition	3	15
							<b>Max Score</b>	<b>230</b>

**Appendix 2**

<b>Star Rating</b>	<b>Road Component</b>	<b>Operational Cost \$/km/yr</b>	<b>Maintenance Cost \$/km/yr</b>	<b>Annual Depreciation \$/km/yr</b>
5	All components	VicRoads	VicRoads	VicRoads
4	All components	\$1,000	\$2,500	\$11,400
3	Pavement	\$0	\$1,400	\$4,000
3	Seal	\$100	\$40	\$1,900
2	Pavement	\$0	\$400	\$1,100
1	Formation	\$0	\$150	\$0