WSFN
WHEATBELT SECONDARY FREIGHT NETWORK

MULTI-CRITERIA ANALYSIS METHODOLOGY

In order to demonstrate best outcomes and value for money it is necessary to develop a transparent process to identify which routes have the highest priority for the limited available funding. A preliminary prioritisation of the Wheatbelt Secondary Freight Network routes was performed to provide an initial example of the future process and assist in identifying high-value routes. A simple multi-criteria analysis (MCA) was developed to score each route on the available data. This was undertaken as part of the Business Case development and funding submission process.

The objective of the MCA is therefore to accurately reflect the relative need for upgrade works for each route across the network. To achieve this, the MCA must be based on clear and justifiable scoring system that uses good-quality and verifiable data.

Following the Preliminary MCA development the WSFN team have been able to obtain additional more detailed data from the Revitalising Agricultural Region Freight (RARF) strategy being coordinated by the WA State Government. This data will be distributed to the WSFN Steering Committee via Main Roads WA. The additional data will be incorporated as part of the development of a Revised MCA.

This document summarises the Revised MCA methodology of prioritising the 80 Secondary Freight Routes of the WSFN program.

The criteria upon which each route will be assessed in the MCA includes:

- Average Daily Traffic
  - as submitted by LGAs
  - which would actually be "peak season" traffic
- Equivalent Standard Axles / per day
  - as submitted by LGAs
  - which would actually be "peak season" traffic
- Seal Width
  - Linearly relates to percentage of road below minimum 7M requirement for seal width.
- Road Safety
  - ROSMA as per RARF data
  - KSI
- Road Condition Data
  - as submitted by LGAs
  - Simple Condition Grading Model - IPWEA, 2015, IIMM, Sec 2.5.4

Input Data

Data will be collated from a range of sources as summarised below. These data sources fall under two general categories, relating either to the condition or utilisation of each route (see further explanation below):

Category	Data Set	Description
Condition	ROSMA KSI Rate	ROSMA data will be supplied by Main Roads WA. It captures the rate of 'Killed or Serious Injury' (KSI) incidents on a route.
Condition	Seal Width	The seal width of the road described as a percentage of the route length, allowing an average seal width will be applied across the route. Seal width will be compared to a minimum seal width of 7m as per a Type 5 road.
Condition	Road Condition	Shire's have assessed road condition on a one to five scale, which has been applied as a direct metric. Five indicating very poor condition
Utilisation	ADT Counts	Average Daily Traffic counts provide data on the average number of total vehicles traveling on a road per day over the measurement period, capturing both heavy and light vehicle use.
Utilisation	ESA Counts	An Equivalent Standard Axle is defined as a dual tyred single axle transmitting 8.2 tonne to the pavement. ESA counts are therefore reflective of the total number and load of heavy vehicles that impact a road.

MCA Process

The MCA will use a three-step process to incorporate all routes into a final ranking system:

1. Each set of data is scored on a consistent scale (e.g. 1 to 5) based the range of results in the data set. For example, if average daily traffic counts (ADT) range from a minimum of 100 to a maximum of 600 then the following scores could be applied (**example only**):

ADT Range	ESA Range	Seal Width (m)	ROSMA (KSI)	Road Condition	Score
100 – 199	0 - 25	> 8	0	Excellent: only planned maintenance required	1
200 – 299	25 – 50	7 - 8	0.2	Good: minor maintenance required plus planned maintenance	2
300 – 399	50 - 75	6 - 7	1	Fair: significant maintenance required	3
400 – 499	75 – 100	5 - 6	1.5	Poor: significant renewal/rehabilitation required	4
500 - 600	> 100	< 5	2	Very Poor: physically unsound and/or beyond rehabilitation	5

2. The scores for each set of data are then combined using weightings (%) to reflect the importance of each set of results in establishing the need for works (example below). This system will be supported by a descriptive justification for the weighting applied to each set of data:

Data Set	Example Score	Weighting	Final Score
A	2	10%	0.2
B	3	20%	0.6
C	4	30%	1.2
D	1	40%	0.4
Total		**100%**	**2.4 out of 5**

3.   The final score for all routes are then compared to rank the routes according to a simple priority system e.g. high, medium and low.

Application of Weightings

The weightings applied to each set of data must be reflective of the actual need for upgrade/repair works. At a high level, the need for the works stems from:

1.   The current condition of the route and how far this is from an ideal standard
2.   How much the route will be utilised, primarily by heavy vehicles

Anecdotal feedback to-date has been that heavy vehicles generally choose routes based on travel time, irrespective of road condition. The result being that particular routes will quickly deteriorate if they are not maintained to a high standard – at significant cost to the affected Local Government. As an initial base it is therefore proposed that Condition and Utilisation categories collectively each receive equal weightings of 50%. This initial system is illustrated below:

Category	Suggested Category Weighting	Data Sets	Individual Weighting
Condition	50%	KSI Rate Seal Width Road Condition	To be developed (sum to 50%)
Utilisation	50%	ADT ESA	To be developed (sum to 50%)

It is noted that a higher weighting has been applied to ESA counts as this is reflective of the number of freight vehicles. Freight vehicles account for the majority of road costs and potential benefits through reduced VOC and repairs/reconstruction costs, these costs are generally proportional to total ESA numbers.

Under this system a highly utilised route in moderate condition may be prioritised over a route that is in poor condition but is seldom used. In refining and finalising the MCA weightings, agreement will need to be reached on what weightings approach will achieve the best value-for-money considering the root causes of costs and the expected future utilisation of each route.

The criteria will be weighted according to relevance to the overall investment decision and these totals to produce the upgrade priorities for each route. The route prioritisation will be produced and presented using a high-level four stage project implementation schedule.

Project Funding

Funding will be considered for the highest priority projects and will proceed provided the relevant Local Governments commit to providing the necessary match funding (one third of the States 20%).

Some routes will have more challenges than others (environmental, land, heritage, utilities etc.) but this does not change the prioritisation. It may, however, impact on the year of delivery as more time may be required to get to delivery stage. In this case appropriate development funding will be provided to these high priority projects.

Once a route is funded a route specific project plan will be developed in accordance with the project management plan and each Local Government involved in development and delivery will sign up to a detailed scope of what is to be delivered and an associated agreed fixed budget will be allocated.

Additional Pavement Condition Data

It is proposed that TSD or FWD data is used to determine pavement condition. These data sets can be obtained through undertaking tests on all 80 of the identified routes. This data provides an indication of the nature and status of the existing road pavement including an indication of the relative residual life of the pavement in terms of equivalent standard axles (ESAs). The life of a pavement is always measured in ESAs and it is possible to determine the relative residual life of a pavement in terms of ESAs. When combined with ADT predictions a residual pavement life in terms of years can be ascertained. These surveys can be commissioned by the project through existing Main Roads contracts and data provided to Shires for all 80 routes.

Condition	TSD Pavement Condition	The collection of Traffic Speed Deflectometer data provides information on the pavement condition and remaining residual life of a road and is therefore reflective of future maintenance and/or reconstruction costs.

Undertaking the TSD investigation and analysing the data is likely to take between 6-9 months and would unlikely be available until after April 2020.

This will be used to:

- To refine and update Prioritisation List for Priority 2-5 projects and subsequent Staging Plans.
- Provide further clarity on Priority 1 projects if require.