

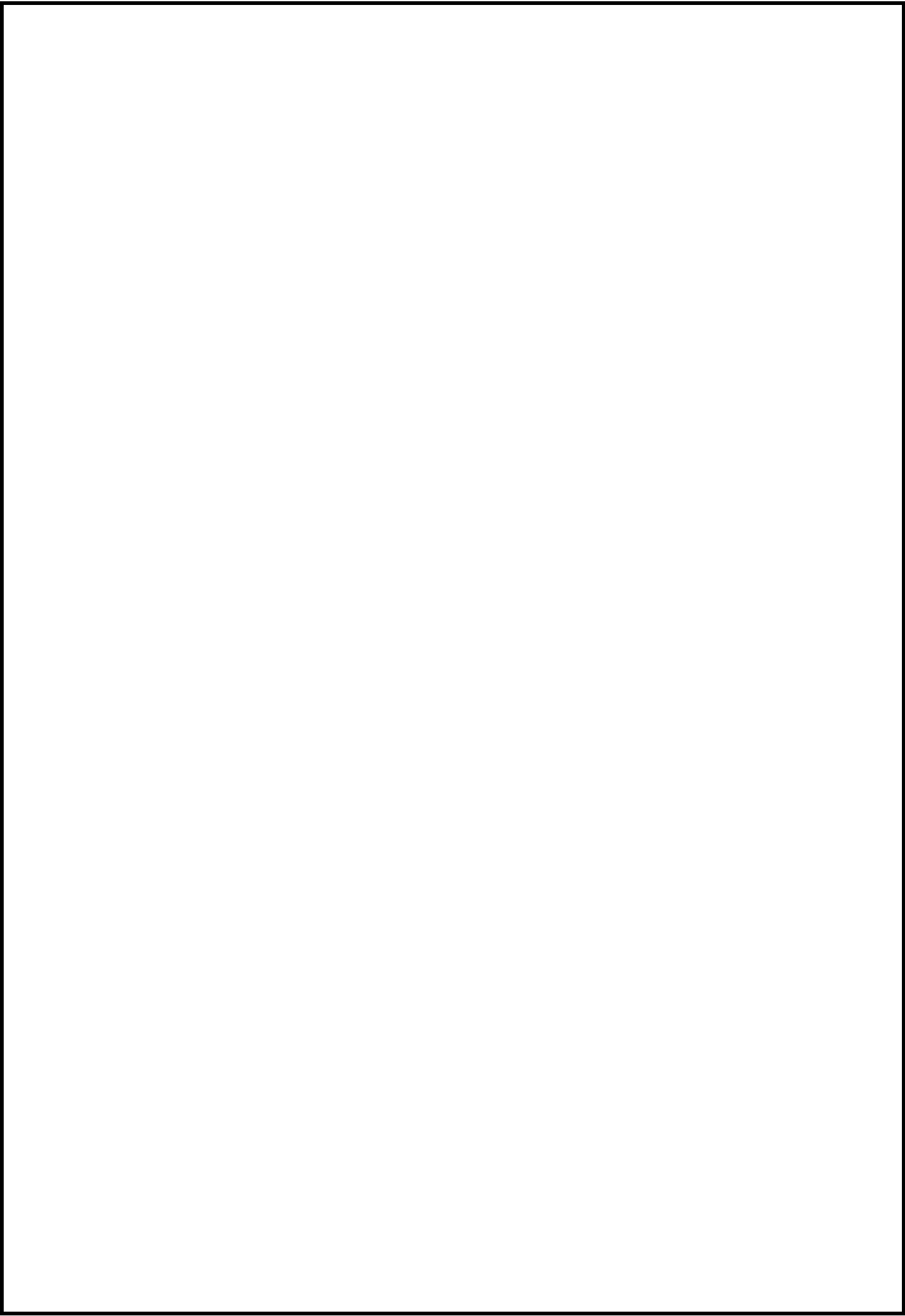
Draft 1 emailed to Council 25/9/2019 - Awaiting response

Draft 2 emailed to council 16/10/2019 - Amended the intervention levels and life cycles for the sealed road pavements

Moloney Asset Management Systems MAMS



Report Following the Survey of
Road Assets
for Southern Grampians Shire
Undertaken in Sep-19



Report produced by Moloney Asset Management Systems
exclusively for Southern Grampians Shire

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Peter Moloney MIEAust
Moloney Asset Management Systems

peter@moloneys.com.au

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1.0 Report Summary - Major Findings

This report provides a summary of the major findings coming out of the condition survey of Southern Grampians Shire's road assets undertaken by Moloney Asset Management Systems (MAMS) in Sep-2019

1.1 Major Findings

1. *The road assets within Southern Grampians Shire were found to be in good overall condition when benchmarked against all 69 councils assessed by Moloney Asset Management Systems (MAMS).*
2. *Your overall condition ranking lifts to "Very Good" when we apply the standardised intervention levels. This is because your adopted level of service is a little better than the standardised figures.*
3. *There was a very modest condition improvement found with the overall condition of the sealed road pavement assets and a strong improvement with both the extent of poor condition assets and isolated pavement failures since our last survey in 2017.*
4. *The sealed surface assets were found to be in poor overall condition, but there had been a strong condition improvement since 2017 as a result of relatively high levels of renewal expenditure.*
5. *The unsealed road pavements were found to be in excellent overall condition and had generally improved in condition since 2017.*
6. *The kerb and footpath assets were both found to be in only fair overall condition but they both had strong reductions in the extent of poor condition assets since the last survey in 2015.*
7. *The long term trend in condition movement over our seven surveys since 2004 indicate that sealed road pavements, sealed surfaces and kerbs have all tended to decline in overall condition while unsealed road pavements have improved massively and footpaths have tended to remain static.*
8. *The total present renewal shortfall or backlog of over intervention assets for the whole roads group is estimated at \$14,165,952 representing 3.31% of the total road asset valuation. This equates to 174% of one full year's annual liability for the renewal of the assets and as such is considered to be within the "Good" Condition range (see Appendix D - Figure D 1 for details).*
9. *Council is currently funding road network renewals at \$5,633,200 pa, while the consumption rate (Average annual liability) is estimated at \$8,140,383 pa. Hence, the assets are currently being consumed at around \$2,507,183 pa. This is in no way meant as a criticism, as the present condition of the assets dictates that renewal demand has not yet reached the estimated level of the full annual liability (annual consumption).*
10. *The current total renewal funding level of \$5,633,200 pa is considered to be at an appropriate present total level. Modelling suggests that this total level of renewal funding subject to CPI increases will be at an appropriate level for the next 10-years,*
11. *It is recommended that total renewal funding commence at it's planned level of \$5,633,000 pa next year and then be subject to a 0.00% compounding annual total increase for the next 10 years.*
12. *The recommended funding level should be considered as an average figure over the next 10 years. It may vary year to year depending on project size and council priorities.*
13. *The recommended funding strategy in 10 above is predicted to deliver a very slightly lower level of "over intervention assets" (see Appendix H for definition) after 10 years than presently exists.*
14. *The recommended funding strategy is just one available option. With all data now within the Moloney model, different funding scenarios can be examined quite easily. Council is encouraged to use the model to deliver a funding strategy that best meets their needs.*
15. *All financial reporting within this document is based in today's values with no allowance for any CPI movement. The Moloney software has the capacity to adjust all outputs for an adopted*

annual CPI increase at the touch of a button. But it is felt that reporting with CPI included can present some very difficult to interpret results.

- 16. Council has done an exceptionally good job in managing it's road assets particularly since our last survey.*

1.1.2 Other Important findings

- 1. Unique degradation curves have been produced based on actual condition change between seven surveys undertaken between 2004 and 2019. This has greatly enhanced the financial modelling results.*
- 2. Key performance indicators have been developed at a sub asset level that accurately benchmark asset condition change since the last survey*
- 3. The same key performance indicators have been used to benchmark Southern Grampians Shire against all 69 councils assessed by MAMS.*

2.0 Report Summary - Condition Findings

2.1 Overall condition at Sub Asset level

This section provides a summary of the condition findings at road sub asset level for each of the sub assets that were inspected.

2.1.2 Condition Findings for road sub assets

Sub Asset Description	Indicator 1 - Overall Condition		Ind. 2 - Ext of poor Cond Assets		Indicator 3 - Ext of Isolated Failures	
	Present Overall Condition Descriptor	Change since last survey	Extent of Poor Cond Assets	Change since last survey	Extent of Isolated Failures	Change since last survey
Sealed Rd Pavements	Good	Modest Improvement	Low	Very Strong Improvement	Low	Very Strong Improvement
Sealed Surfaces	Poor	Very Strong Improvement	High	Strong Improvement	Not Assessed	Not Assessed
Unsealed Rd Pavements	Excellent	Very Strong Improvement	Extremely Low	Very Strong Improvement	Extremely Low	Very Strong Improvement
Kerbs	Fair	Small Decline	Low	Strong Improvement	High	Modest increase
Footpaths	Fair	Relatively Static	Very Low	Strong Improvement	Not Assessed	Not Assessed

Figure 2.1 Summary of sub asset condition findings

Figure 2.1 provides a summary of the overall condition findings for each of the sub asset classes that were inspected. There are three indicators that are examined. Each has a descriptor in the first column that ranks you against all 69 councils assessed by MAMS. The second column for each indicator provides a description of how your condition has changed since our last survey.

1. **Overall Condition** - Derived by benchmarking your weighted average asset condition against that of all 69 councils inspected by MAMS.
2. **Extent of poor condition Assets** - This is the extent of the asset base, near or above the recommended industry intervention level and again measures your performance against all 69 councils assessed.
3. **Extent of Isolated Failures** - For all sub assets other than sealed surfaces we record the extent of any isolated asset failures. These can occur within otherwise good condition asset and your base ranking is delivered by comparing your results to those of the full 69 councils assessed.

All sub assets were found to be in fair to good overall condition with the unsealed pavements found to be in excellent condition.

2.2 Standardised Full Road Network Condition Findings

This section will look at the condition and performance of the whole road network. It can be difficult to report on the performance of the whole road network when dealing with sub assets that have quite different life cycles, unit renewal rates and intervention levels between different councils. We have developed a single reporting indicator that is independent of asset life, the adopted intervention level and unit renewal rates.

The total level of the Over Intervention Assets (OIA's) within a road network provides a very strong indicator of overall condition performance. The best measure of the level of OIA's is considered to be the OIA's expressed as the number of years value of the average annual liability (similar to annual depreciation in accounting terms). See Appendix D for a detailed explanation. But in brief the backlog of OIA's expressed in this way provides a really solid condition benchmark that is independent of asset service life and unit renewal rates.

There is one other variable that needs to be standardised and that is the intervention level. If Council "A" has a high level of service (low intervention level) and Council "B" has a low level of service (High intervention level). Then for the same absolute extent of poor condition assets, Council B will report a lower level of OIA's than Council A. To avoid these problems we have adopted a standardised set of

typical industry standard intervention levels that we apply to all councils when reporting within Figure 2.2 below.

Southern Grampians Shire has a relatively high level of service and so the standardised values within Figure 2.2 will be a little better than the ones appearing within Figure Agg 2 below. But these are the best values to use for comparison purposes.

Standardised Levels of Over Intervention Assets

Present extent of OIA's expressed in three ways			Your overall road asset condition based in the extent of OIA's	
Current % of OIA's expresses in years worth of average annual liability	Your present value of OIA's in \$	Your OIA's as a % of your total asset base valuation	Moloney standardised condition description	Additional comments on standardised condition descriptor
132%	\$9,979,782	2.33%	Very Good	low level of over intervention assets

Figure 2.2 Standardised levels of Over Intervention Assets

Figure 2.2 summarises the present level of OIA's for the full road network in terms of the number of year's worth of annual liability that it represents. The present figure of 132% of one full years annual liability, equates to a Moloney standardised condition description of "Very Good". See Appendix D, Figure D 1 for details of the standardised descriptors.

The standardised intervention levels have delivered a better overall outcome for Southern Grampians. This is because the adopted level of service (intervention levels) are at a better level than the average of all councils for the sealed road pavements and kerb assets. But this is what council is delivering and hence what the public expect.

2.2.3 Long term condition trend

MAMS has undertaken 7 condition surveys of Southern Grampians Shire's road assets since 2004. All surveys have been undertaken broadly upon the same basis, so we are now able to present the longer term condition trends for each sub asset set.

When reporting on the financial requirements within later sections of this report we tend to use the extent of "Over Intervention Assets" OIA's as the measure of asset condition performance. There are several indicators of overall condition performance, but it is felt that the extent of OIA's represents the best single indicator.

In broad terms the position is summarised as detailed below.

- *Sealed road Pavements* - *Condition decline from 2003 to 2010 but steady improvement after 2010*
- *Sealed surfaces* - *Continual decline from 2003 to 2016. Improvement since 2016*
- *Unsealed Pavements* - *Generally a strong condition improvement over the long term*
- *Kerbs* - *A little mixed with the extent of very poor condition assets having long term improvement, but there is a long term decline in overall condition*
- *Footpaths* - *Modest condition improvement over the long term*

You are referred to the sub asset sections of this report where a detailed set of graphs is available that tracks the long term condition performance across all 7 surveys.

3.0 Report Summary - Financial Findings

The Moloney financial modelling software was used to deliver the following three reports for each of the sub asset sets and to then combine the results into a whole of roads group single report.

1. Prediction of renewal demand to treat all over intervention assets - Column E within Figure 3.1 (and series 5 graphs in sub asset sections). Note that the figure in column E has been averaged over the first 5 years to better reflect how the model is structured.
2. Prediction of future asset condition based on the continuation of the planned renewal expenditure level (series 6 graphs in sub asset sections)
3. Delivery of a recommended funding profile - Column G (series 7 graphs in sub asset sections). Note that within Column G the recommended funding strategy can include in some cases a recommended annual compounding increase in funding (see column heading).

The individual modelling results for the above three reports can be found within each of the sub asset sections 5 - 9 below. Figure 3.1 provides an overall financial summary in a table rather than graphical form.

	A	B	C	D	E	F	G	H	I
Sub Asset Description	Present Annual Expenditure on Upgrades and New Assets	Average Planned renewal expenditure next 5 Years	Average Annual Liability (Based upon modelling lives and valuations)	Annual Depreciation based on Accounting valuations and lives	Average Capital Renewal Demand for next 5-years to eliminate all over intervention assets	Year of Condition Inspection	Recommended Commencing Year 1 funding level with a 0.0% annual compounding increase for 10	Planned renewal expenditure (Column B) as a % of the Annual Liability	Recommended Funding level (Column G) as a % of the Annual Liability Rate
Sealed Pavements	\$5,320,000	\$2,400,000	\$4,325,766	\$2,519,513	\$3,470,000	2019	\$2,750,000	55%	64%
Sealed Surfaces	\$80,000	\$2,990,000	\$2,446,173	\$1,621,454	\$3,475,000	2019	\$2,485,000	122%	102%
Unsealed Pavements	\$0	\$140,000	\$857,437	\$684,009	\$240,000	2019	\$122,000	16%	14%
Kerbs	\$0	\$78,200	\$308,045	\$403,464	\$446,000	2019	\$225,000	25%	73%
Footpaths	\$100,000	\$25,000	\$202,963	\$302,121	\$60,000	2019	\$51,000	12%	25%
Totals	\$5,500,000	\$5,633,200	\$8,140,383	\$5,530,561	\$7,631,000		\$5,633,000	69%	69%
C - B Estimated Annual Consumption Rate		\$2,507,183							

Figure 3.1 Recommended and other funding profiles

Figure 3.1 contains a lot of information but it is a very important table that summarises the financial position relating to the road assets in a number of different ways.

A - This is the planned upgrade or new asset expenditure. You may or may not have this data, but it is often very important to consider and perhaps re-allocate some of this expenditure to the renewal program if you are under funding the renewals in Column B

B - The planned average renewal expenditure over the next 5 years. Note also that Column H provides your planned expenditure expressed as a percentage of the annual liability rate in Column C.

C - "Average annual liability" is the average annual renewal expenditure needed over the long term in order to maintain your asset base. The figure is similar to the accounting term "Annual Depreciation", but is calculated in a different way by directly linking it to the unit renewal rates and life cycles as used within the financial model. It can differ quite markedly from "Annual depreciation" because of the requirement for annual depreciation to comply with Australian and international accounting standards, which promote the delivery a tax deductible figure for "Annual depreciation", often with little regard to what your actual future annual liability is.

D - "Annual Depreciation" - This is similar to C above, but is designed to deliver a figure that a business can claim as a tax deduction rather than providing an estimate of your ongoing liability to maintain the capital value of your assets.

E - "Average capital renewal demand over the first 5 years". This figure comes from the Moloney "Predicted Capital Requirement" model. It is the estimated renewal expenditure necessary to eliminate all over intervention assets within five years. The average figure over the first 5 years is used because in some cases where early renew demand is high the model eases in the demand over a 5 year period. In all cases if this average figure was allocated then the model predicts that all over intervention assets would be eliminated after 5 years.

F - This is a record of the year that the condition data was collected. It may vary between the asset sets if not all inspected at the same time.

G - The year one recommended commencing funding level. This comes from the Moloney funding scenario finder and mostly aims at a total commencing expenditure that is the same or close to your current expenditure in column B. Note that within the title row there may be an annual compounding future percentage increase that is used to bring down the year one expenditure to more closely match your current total expenditure.

If the current renewal funding level is very low there may be a recommendation to lift the year one spend to a level above the planned total spend in column B. This would be done to avoid excessively high annual compounding percentage increases.

For Southern Grampians it was found that the present total renewal expenditure of \$5,633,200 pa was found to be at an appropriate total level for the next 10 years subject to CPI increases.

H + I - Two useful comparisons figures relating to the percentage of the annual liability rate being met by the planned renewal expenditure in Column B and the recommended in column G.

The recommended funding strategy is to continue with the total planned renewal expenditure of \$5,633,200 pa for the next 10 years combined with CPI increases. Note that the recommended future funding strategy has also optimised the funding split between the road sub asset sets to achieve the best overall condition outcome for the whole roads group.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2.	Criteria 3
	Desired extent of Over intervention assets as a % of one Years Annual Liability	Desired Over Intervention Assets as a % of total asset base	Years to achieve Desired Condition outcome	Annual % of Compounding funding increase (if required)
Sealed Rd Pavements	132%	1.93%	10	0.00%
Sealed Surfaces	132%	6.56%	10	0.00%
Unsealed Rd Pavements	132%	4.59%	10	0.00%
Kerbs	132%	1.04%	10	0.00%
Footpaths	132%	1.38%	10	0.00%
All Assets	132%	2.51%	10	0.00%

Figure 3.2 Funding scenario finder modelling criteria for road sub assets

Figure 3.2 contains the details of the three input criteria for the Moloney funding scenario finder which was used to deliver the recommended funding strategy as reported within column G of Figure 3.1 above.

The extent of over intervention assets (OIA's) was set at 132% of the level of one year's annual liability after 10 years for all assets. Your current level being 174% so we have asked for a very modest condition improvement.

Scenario Finder Results

Desired extent of OIA's expressed in 3 ways			Commencing year one renewal expenditure requirement (from scenario finder)	Moloney Descriptor for the - Desired Condition outcome of the road network	
As a % of one years average annual liability	As its replacement value in \$	As a % of the total asset base valuation		Standardised Moloney condition description	Additional Comments on condition descriptor
132.00%	\$1,074,530,525	275.15%	\$5,633,000	Very Good	low level of over intervention assets

Figure 3.3 Projected condition outcome from recommended funding strategy

Figure 3.3 provides a summary of the Moloney funding scenario finder results for the whole roads group. The individual sub asset inputs are as detailed within Figure 3.2 while Figure 3.3 shows the overall results for the whole roads group.

The overall desired condition outcome for the whole roads group as set within the scenario finder is to deliver 132.00% of one years level of annual liability as the extent of over intervention assets after 10 years (See Appendix D Figure D 1 for details of the Moloney standardised descriptors as well as further details relating to the scenario finder operation).

3.1 Summary of recommended future funding strategy

The Moloney financial modelling "Funding Scenario finder" was used to deliver the following results:

- *All assets will be delivered within "Very Good" Overall condition after 10 years*
- *The commencing annual renewal expenditure requirement is \$5,633,000 pa (same as present total level of renewal funding) for the next 10 years with CPI adjustments.*
- *All figures are in today's values but can be adjusted for CPI within the model if required.*

Section 4: Sealed Road Pavement Sub Assets

This section deals with the Sealed Road Pavement Sub assets. It will look at both internal and external benchmarking of asset condition as well as providing financial forecasting of future renewal demand and projected asset condition.

4.1 Condition and Performance of Sealed Road Pavements - Internal Benchmarking

MAMS have developed a series of eight key condition indicators that can be applied to all road sub asset sets. They are used to measure condition movement between the two most recent field surveys as well as providing external benchmarking against other council districts assessed by MAMS on the same basis.

The same key condition indicators are used for all road sub asset sets. However for some assets certain indicators are not applicable and as such are omitted. Detailed below is a brief explanation of the eight key condition indicators. The explanation here is also applicable to their use with other road sub asset sets beyond the sealed road pavements.

4.1.1 Weighted Average Asset Condition - "WAAC"

The weighted average asset condition is a single condition indicator that represents the condition of the whole asset set in one single figure. It is derived by weighting the raw asset condition scale 0 - 10 for the extent of the assets within each condition rating and so provides a basic single figure summary of the overall condition of the asset set. It is a very useful figure as a condition movement indicator.

4.1.2 Percentage of Urgent Failures

The percentage of urgent failures is a measure of the isolated failures identified during the survey as needing immediate repair. The figure is expressed as a percentage of the total asset group quantity.

4.1.3 Percentage of Other Failures

The percentage of other failures represents those isolated failures which, while present on the ground, do not require urgent attention. The figure is expressed as a percentage of the total asset group quantity.

4.1.4 Average Roughness

Average roughness only relates to pavement assets. For sealed road pavements, it is a key capital condition indicator of longitudinal pavement shape, while for unsealed pavements it is a key maintenance indicator. It is based on a 0 – 10 scale with 0 being perfect and 10 un-driveable.

4.1.5 Average Profile

Average pavement profile is similar to the roughness rating and can be seen as the pavement cross sectional shape indicator. Profile is all about the efficient shedding of water from the road pavement. Profile 0 would have enough slope to shed water easily, while profile 10 would retain vast amounts of water within the road pavement.

4.1.6 Extent of Poor Condition Assets above a given Condition

The percentage of the asset base at and above a given condition rating is an excellent way of expressing the extent of poor condition assets present. This figure is expressed as a percentage of the total asset base and is reported at several different condition levels from condition 5 to 8 depending upon the asset set in question. For example sealed road pavements at and above condition 7 would represent the extent of the asset base that would be likely to require rehabilitation over the next 1 – 10 years.

Note that it is not the extent of the asset base within a given condition rating, but rather the extent at and above that condition rating.

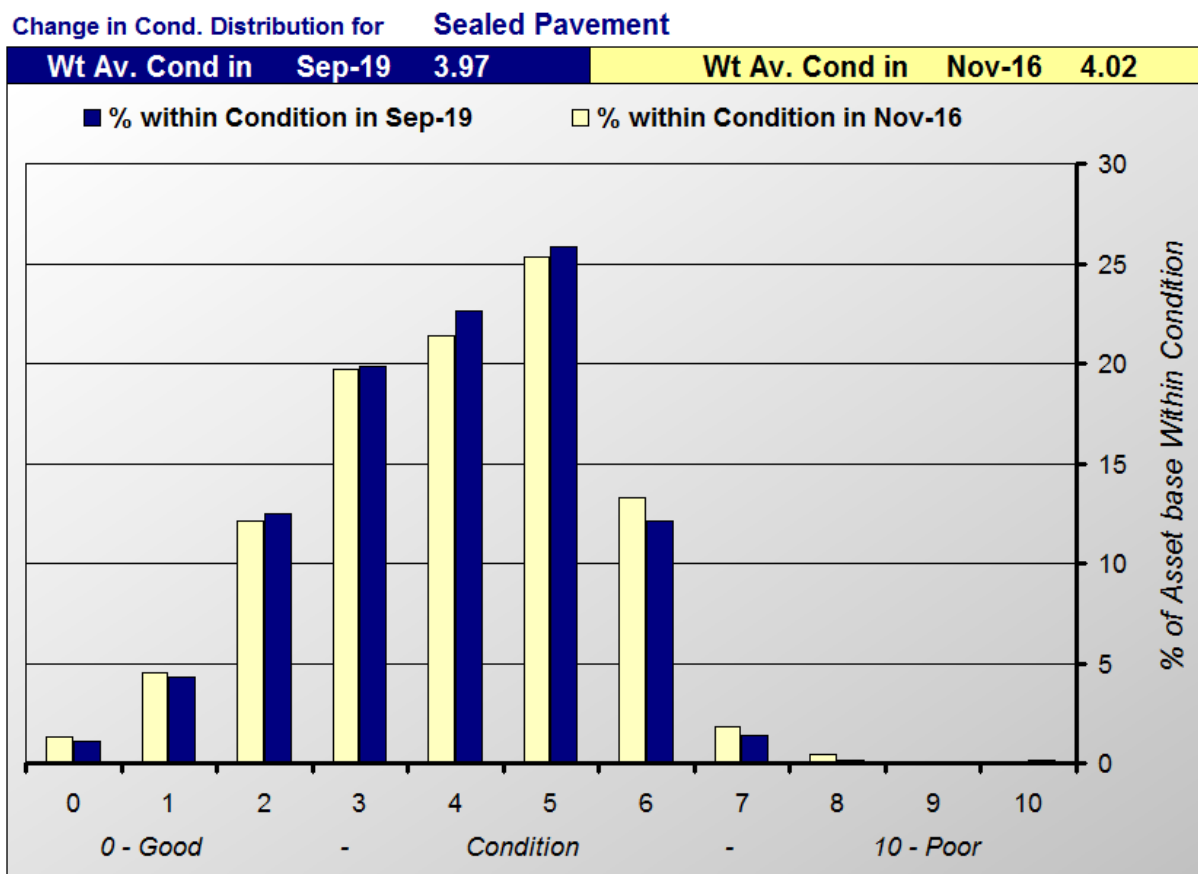


Figure P1 Condition Distribution Comparison Graph – Between Surveys

Key Cond. Indic. No.	Sealed Pavement Condition Indicator	Figures from Last Survey in Nov-16	Figures from Current Survey in Sep-19	Change between Surveys New Minus Old	% Change Between Surveys	Better or Worse Since last Survey
1	Weighted Average Asset Condition	4.02	3.97	0.05	0.57%	Better
2	% of Urgent Failures	0.24	0.15	0.09	37.4%	Better
3	% of Other Failures	1.99	1.43	0.56	28.2%	Better
4	Average Pavement Roughness	3.56	3.50	0.06	1.6%	Better
5	Average Pavement Profile	3.17	3.06	0.11	3.6%	Better
6	% of Asset Base above Condition 6	15.65	13.76	1.89	12.1%	Better
7	% of Asset Base above Condition 7	2.38	1.65	0.73	30.6%	Better
8	% of Asset Base above Condition 8	0.57	0.30	0.27	47.4%	Better
Renewal Demand Being Met For:		% of Annual Liability expenditure Planned in Future years		% of Annual Liability expenditure Since the time of the last survey		
Sealed Rd Pavement Asset Group		55%		55%		

Figure P2 Table of Key Condition Indicator Change since the last Survey

The above 2 figures provide internal benchmarking that details how asset condition has changed since the last survey. Figure P1 provides the condition distribution for each survey along with the first of the key condition indicators, the weighted average asset condition.

Figure P2 contains the eight key condition indicators and also shows how they have changed since the previous survey. At the bottom of the table are two very important figures. These indicate the percentage of the annual liability rate that has been met since the last survey, along with the percentage planned for future years.

Figures P1 and P2 demonstrate that asset condition has improved across all eight of the key performance indicators. The most dramatic improvements being within the extent of poor condition assets and the extent of isolated pavement failures.

4.1.7 Long term Internal Benchmarking

MAMS has undertaken 7 condition assessments of the sealed road pavement assets since 2003 all on exactly the same basis and mostly with the same staff. This has enabled us to plot some long term condition trends. It is felt that the most important indicators are the extent of poor condition assets at and above conditions 6 - 8 and the weighted average asset condition "WAAC".

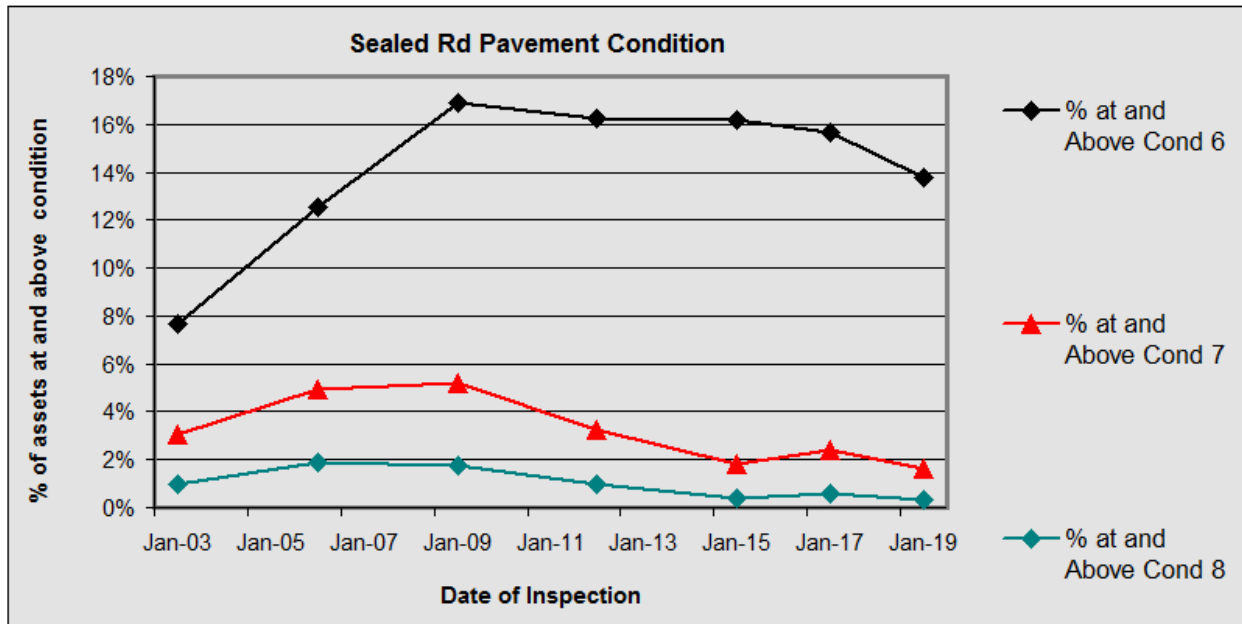


Figure P2-A Long term extent of poor condition assets.

Figure P2 - A shows a rise in the extent of poor condition assets between 2003 and 2009. But from 2009 on the indicators have all trended down.

Another way of looking at the whole picture is to track the "WAAC" with time. This figure can be converted to a percentage of the asset base that has been consumed. Figure P2-B below tracks the estimated percentage of the asset base that has been consumed. The percentage runs to zero at condition 7.0 for sealed road pavements as indicated at the top of the graph.

Figure P2-A looks at the movement in the extent of very poor condition assets while P2-B is a single figure representing the estimated remaining value within the whole sub asset set.

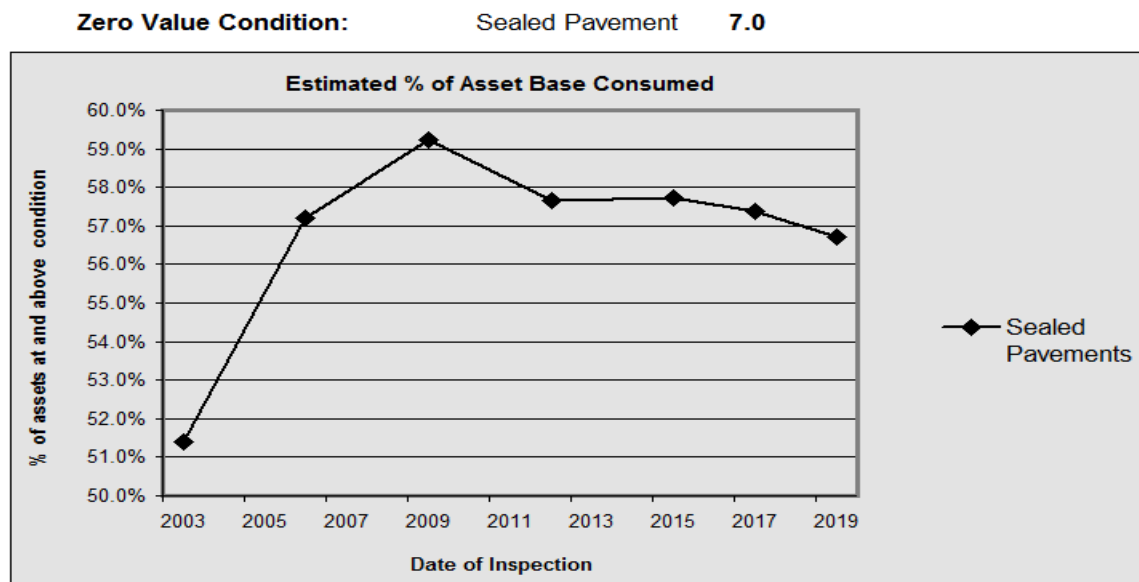


Figure P2-B Long term percentage of asset consumption

4.1.8 Summary - Internal Benchmarking

Southern Grampians experienced a general condition decline from 2003 to 2009. But since 2009 there has been a slow but steady condition improvement. This is considered to be a strong achievement.

4.1.9 External condition Benchmarking

Figure P3 provides external benchmarking based on the same key performance indicators as used internally in figure P2. The total number of councils assessed by MAMS on exactly the same basis is 69 for this sub asset class. The graph then displays the number of councils ranked better and worse than Southern Grampians Shire for each of the eight performance indicators. The dark green bars represent the number of councils that Southern Grampians Shire is ranked better than, while the light green is the number that Southern Grampians is ranked worse than.

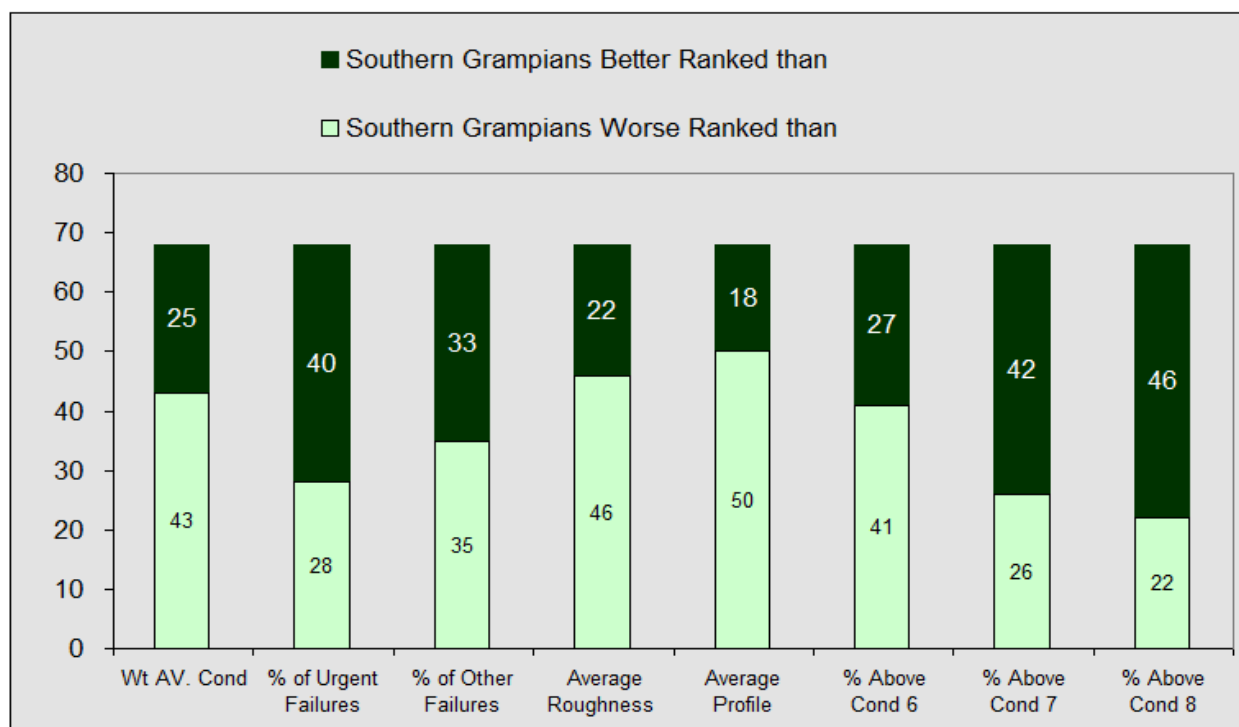


Figure P3 Key Condition Indicators as Compared with other Councils surveyed

The comparison with all 69 councils in Figure P3 indicates a set of fair to good condition assets that have a high age profile. The weighted average asset condition and the pavement shape indicators tend to be outside of the best 70% of councils assessed. But the extent of poor condition assets and isolated pavement failures are far better and are generally sitting within the best 40% of the councils assessed.

In summary the external benchmarking indicates that the sealed road pavements have a high age profile, but are holding up well and are being very well managed in terms of isolated pavement failures and the extent of poor condition assets present.

4.2 Sealed Road Pavement Financial Modelling Analysis

The Sealed road pavement assets will be modelled in like performing data sets with the results aggregated into one presentation for the whole sub asset group

4.2.1 Sealed Road Pavement – Selection of Retreatment Intervention Level

The point at which you choose to intervene to renew or replace an asset will have a big impact on the predicted future renewal demand. The intervention level can be seen as the level of service associated with the asset set. High intervention level equates to a low level of service while low intervention level relates to a high level of service.

Detailed below are a series of photographs illustrating various sealed road pavement condition ratings. They do not cover the complete condition range but hopefully will provide some guidance to the selection of an acceptable retreatment intervention level.

Condition 0 – 1 No Failures no shape loss	Condition 6 Moderate failures and shape loss
Condition 7 Ext shape loss and failures	Condition 8 – 9 Bad shape loss and ext failures

It is very difficult to cover pavement condition in such a limited range of photographs but hopefully they will provide some idea of asset condition in the 6 – 9 condition range where most interventions will take place. Pavements can be within this condition range for a number of different reasons and the photos will

cover only a limited range of these situations. They should be seen as one possible condition situation and not the only situation for that condition rating.

4.2.2 Sealed Road Pavement Financial Modeling

Modelling Parameter	Urban Link and Collector Rds	Urban Non Link and Collector Rds	Rural Link and Collector Rds	Rural Non Link and Collector Rds	Sealed Shoulders Narrow <= 5.2 m	Sealed Shoulders Wide Seals > 5.2 m	Totals
Asset Quantity in sqm	175,715	1,453,446	1,436,771	5,852,669	2,995,200	571,200	11,913,801
Unit Renewal Rate	\$22.00	\$22.24	\$30.50	\$30.50	\$10.50	\$10.50	
Total Asset Group Renewal Cost	\$3,865,730	\$32,327,000	\$43,821,509	\$178,501,349	\$31,449,600	\$5,997,600	\$289,965,189
Annual Renewal Exp.	\$10,000	\$70,000	\$400,000	\$1,850,000	\$60,000	\$10,000	\$2,390,000
Retreat. Intervention Condition	7.0	7.0	7.0	7.0	7.0	7.0	
Life to Condition 10 in Years	120.0	120.0	90.0	90.0	55.0	55.0	
Life in years to Intervention	105.3	105.3	70.5	70.5	45.2	45.2	

Figure P4 – Summary of Modelling Input Parameters for sealed road pavement assets

Sealed road pavement modelling has been undertaken within six groups as detailed in P4 above.

Retreatment intervention levels have been set at what are considered to be lower levels than the general industry standard (high level of service). But they do reflect what council is currently achieving.

Life cycles have been raised since our last report. However, the degradation curve analysis undertaken within appendix B suggest that these lives remain below the total life that could be expected. This is further reinforced by the condition improvement as shown within figure P2 and P2-A while the renewal expenditure is at only 55% of the total level of annual liability.

It is recommended that Council review the accounting lives as they do not accord at all with our degradation curves and broader experience. Council has allocated 115 years to the rural pavements and only 60 to the urban. We believe the lives should be closer to 115 for the urban and 65 for the rural. We have also included an allowance for the periodic renewal of the rural road shoulders.

The total sub asset group has been broken down into several individual data sets in order to refine the modelling result based on the most appropriate intervention levels and life cycles for each.

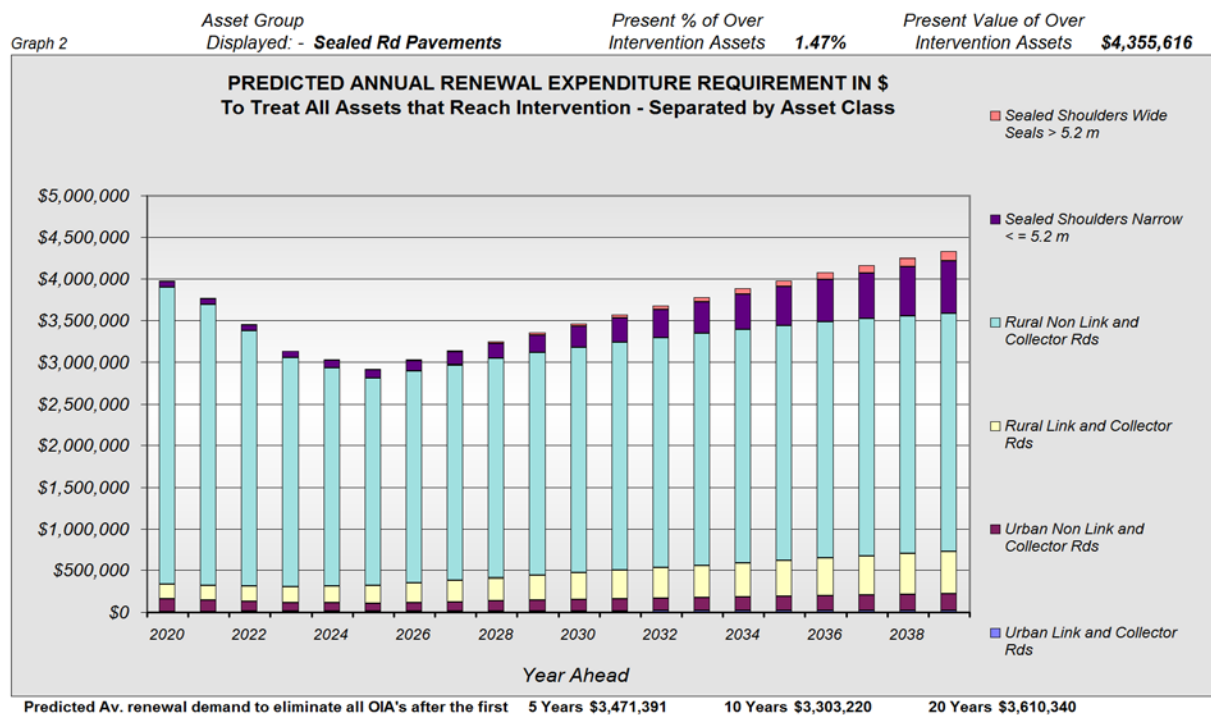


Figure P5 Predicted Renewal Demand to treat all assets that reach the Intervention level in future years

Figure P5 plots the annual funding profile required to eliminate all over intervention assets. If there is a large backlog of over intervention assets such that the raw year one demand is 30% or greater than the year two demand then the Moloney model eases the difference in over the first five years (this will show up as a reducing demand over the first five years). For this reason we prefer to quote the present renewal demand as the average figure for the first 5 years. In this case the first 5 year average renewal demand is estimated at \$3,470,000 pa. If this expenditure is maintained all OIA's will be eliminated within 5 years.

Figure P5 indicates that the capital renewal demand pattern to treat all assets that are predicted to reach the retreatment intervention level has an average demand figure of \$3,470,000 pa over the first 5-years. The peak demand over the next 20 years being \$4,325,000 pa by the year 2039.

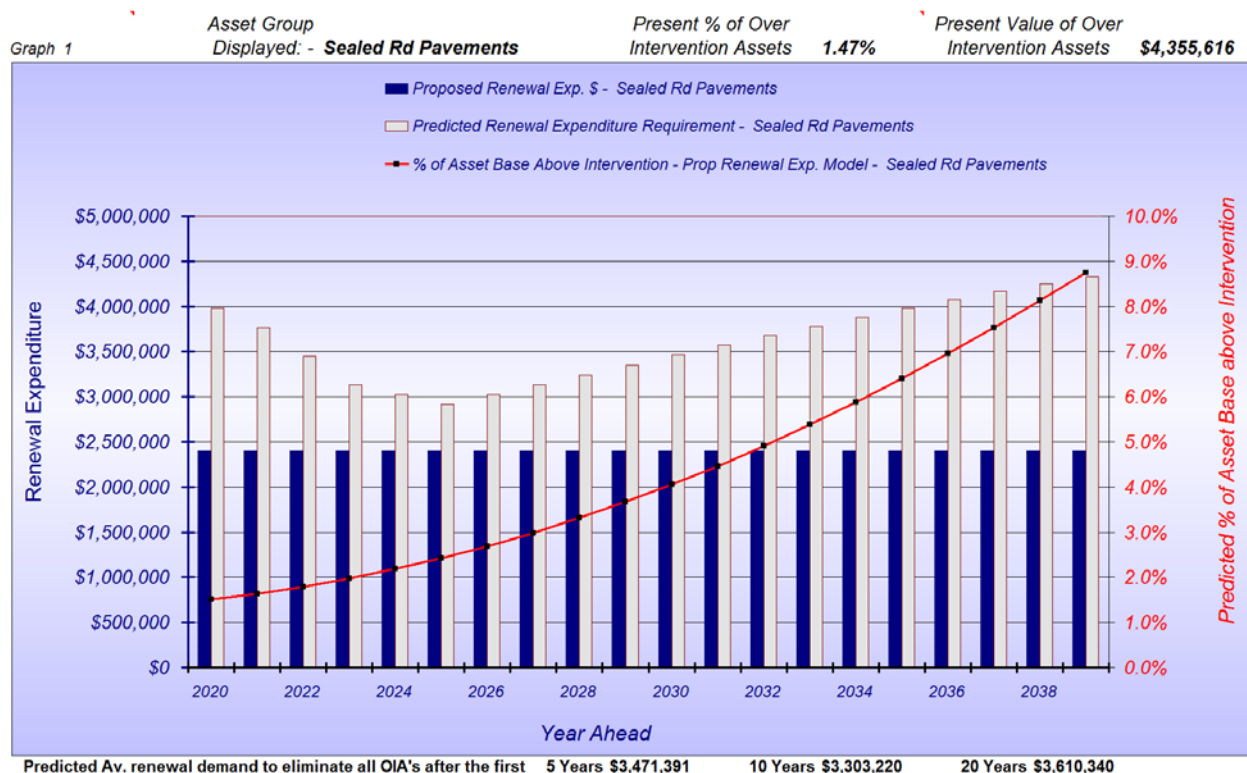


Figure P6 Future Predicted Condition Based on adoption of planned expenditure profile

Figure P6 plots the extent of the asset base that is predicted to rise above the intervention level (red line) based upon the continuation of the planned level of renewal expenditure (in blue bars). It also plots the predicted renewal demand to treat all over intervention assets within the grey bars (Same aggregate figures as within Figure P5 but not split into the individual modelling sets).

Figure P6 indicates that the planned renewal expenditure of \$2,400,000 pa is a little below the longer term demand and hence the extent of OIA's is predicted to rise with time. However, we have included the renewal of the rural road shoulders which does add to the total renewal demand of this sub asset class.

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model can also be used to allocate funding between the sub asset classes on a needs basis, to deliver the best overall condition outcome for the whole road network.

Please refer to Appendix D which explains why and how we set the desired extent of over intervention assets in terms of the number of year's worth of annual liability that it represents. Appendix D4 also provides an explanation of the Moloney funding scenario finder along with its three basic input criteria requirements. The three input criteria adopted for the sealed road pavement assets are as detailed within figure P7 below with the results of the funding scenario finder operation contained within figure P8.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2. Years to achieve Desired Condition outcome	Criteria 3 Annual % of Compounding funding increase (if required)
	Expressed as the % of One Years Annual Liability	Expressed as a % of The Total Asset Set Replacement Valuation		
Sealed Rd Pavements	132%	1.93%	10	0.00%

Figure P7 Modelling scenario finder inputs - Sealed Pavement Assets

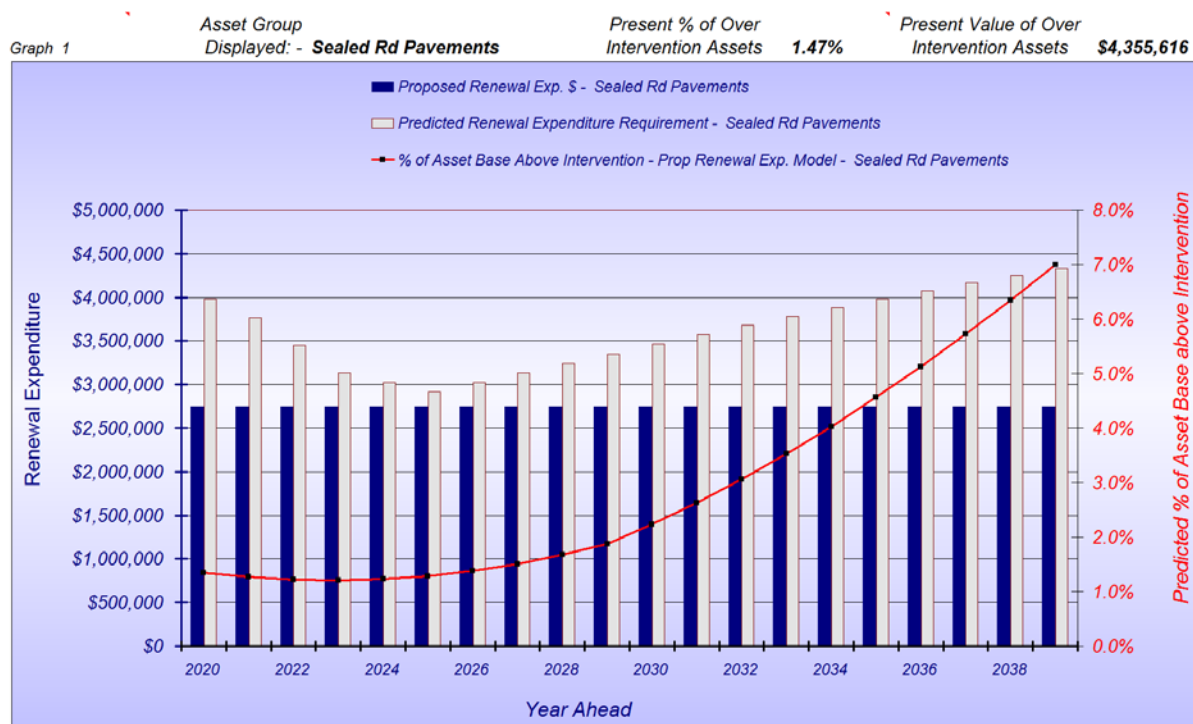


Figure P8 Recommended Renewal funding Strategy

For the Sealed Road Pavements we have set the level of over intervention assets at 132% of one year's annual liability after 10 years. This equates to 1.93% of the network, the current level being 1.47%. We have set the desired extent of over intervention assets around the middle of the "Very Good" Range (See Appendix D Figure D 1 for details relating to this classification range).

The recommended renewal expenditure level over the next 5 years is a flat \$2,750,000 pa subject to CPI increases. This is predicted to deliver the desired condition outcome as detailed within Figure P7 which will have the level of OIA's slightly above their present level but still within the "Very Good" Range. The recommended annual funding strategy should be seen as an average figure over the longer term. It may vary year to year depending upon council priorities.

4.3 Sealed Road Pavement Summary

The sealed road pavement assets were found to be in good overall condition with low levels of both poor condition assets and isolated pavement failures. There had also been a strong condition improvement across all of the performance indicators since our last survey in 2016 as well as a continual condition improvement in the longer term since 2009.

The recommended renewal expenditure level over the next 5 years is a flat \$2,750,000 pa subject to CPI increases. The funding situation should be reviewed again following the next condition survey.

Section 5: Sealed Surface Sub Assets

This section will deal with the Sealed Surface Sub assets. It will look at both internal and external benchmarking of asset condition as well as providing financial forecasting of future renewal demand and projected asset condition.

5.1 Condition and Performance of Sealed Surfaces

The same eight common key performance indicators are used for all road sub assets. An explanation for each is available within sections 4.1 to 4.1.6 above rather than duplicating those details here. Five of the eight condition indicators that were appropriate to the sealed surface assets are detailed here.

5.1.1 Internal Benchmarking of asset condition

This section will deal with your internal condition performance firstly in a detailed way since the last condition survey in 2016 and then over the longer term covering all MAMS inspections of the assets.

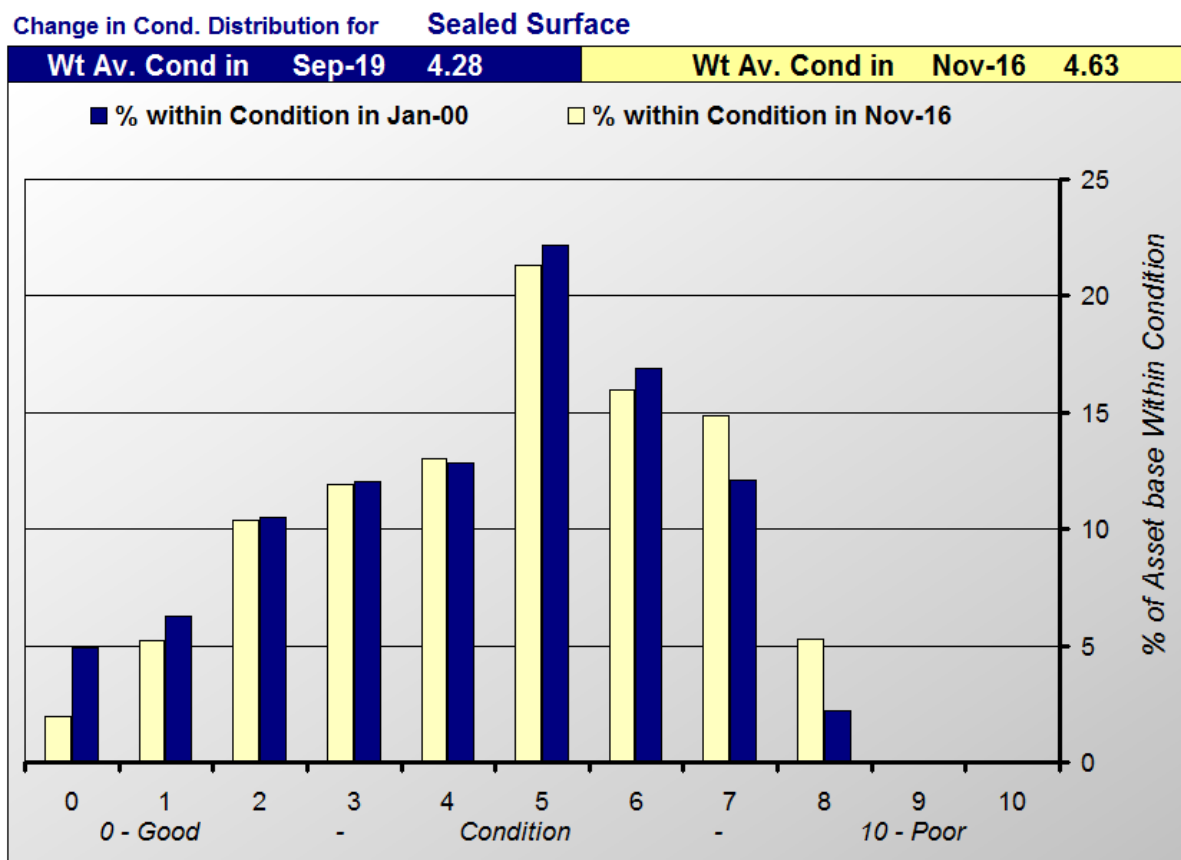


Figure S1 Condition Distribution Comparison Graph – Between Surveys all Sealed Surfaces

Key Cond. Indic. No.	Sealed Surface Condition Indicator	Figures from Last Survey in Nov-16	Figures from Current Survey in Jan-00	Change between Surveys New Minus Old	% Change Between Surveys	Better or Worse Since last Survey
1	Weighted Average Asset Condition	4.630	4.278	0.351	5.0%	Better
2	% of Asset Base above Condition 5	57.451	53.444	4.006	7.0%	Better
3	% of Asset Base above Condition 6	36.142	31.254	4.889	13.5%	Better
4	% of Asset Base above Condition 7	20.160	14.344	5.816	28.8%	Better
5	% of Asset Base above Condition 8	5.292	2.220	3.072	58.0%	Better
Renewal Demand Being Met For:		% of Annual Liability expenditure Planned in Future years		% of Annual Liability expenditure Since the time of the last survey		
Sealed Surface Asset Group		122%		122%		

Figure S2 Condition Change since last survey & Renewal demand being met

The above 2 figures provide internal benchmarking that details how asset condition has changed since the last survey. Figure S1 provides the condition distribution for each survey along with the first of the key condition indicators, the weighted average asset condition.

Figure S2 contains five of the eight possible key performance indicators that relate to this asset class. See section 4.2 above for a detailed explanation of each indicator. Figure S2 also shows how the indicators have changed since the previous survey. At the bottom of the table are two very important figures. These indicate the percentage of the annual liability rate that has been met since the last survey, along with the percentage planned for future years.

Figure S2 indicates that overall condition (weighted average asset condition) has improved by 5.0% since 2016. The extent of poor condition assets at and above condition 8 has improved by 58.0% , along with those at and above condition 7 experiencing an improvement of 28.8%. This is considered to be an outstanding achievement on the back of renewal expenditure levels since 2016 at 122% of the estimated consumption rate.

5.1.2 Long term Internal Benchmarking

MAMS has undertaken 7 condition assessments of the sealed surface assets since 2003 all on exactly the same basis and mostly with the same staff. This has enabled us to plot some long term condition trends. It is felt that the most important indicators are the extent of poor condition assets at and above conditions 6 - 8 and the weighted average asset condition "WAAC".

Figure S2 - A shows a rise in the extent of poor condition assets between 2003 and 2017. But this has been turned around in the 2017 - 2019 time frame.

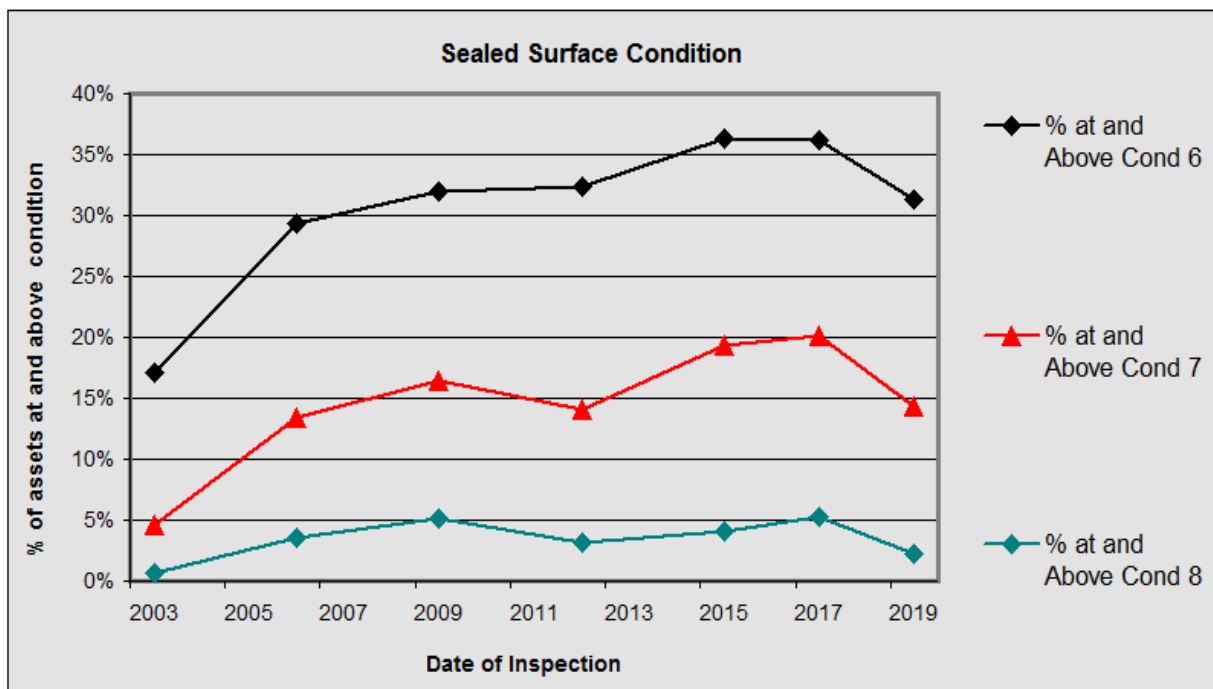


Figure S2-A Long term extent of poor condition assets

Another way of looking at the whole picture is to track the "WAAC" with time. This figure can be converted to a percentage of the asset base that has been consumed. Figure S2-B below tracks the estimated percentage of the asset base that has been consumed. The percentage runs to zero at condition 7.0 for sealed surface assets as indicated at the top of the graph.

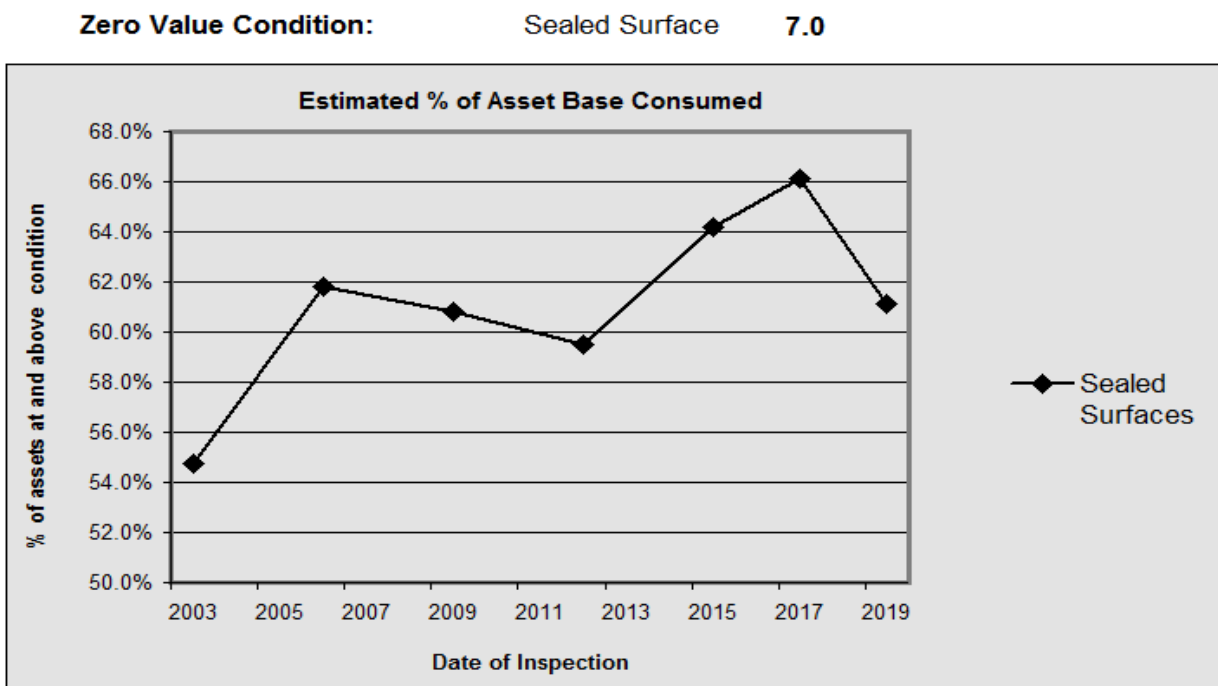


Figure S2-B Long term percentage of asset consumption

The long term trend here is a little up and down but is similar to that found for the extent of poor condition assets. The trend from 2003 to 2017 has generally been a loss of overall asset valuation. But there has been a strong turn around over the last 2 years with renewal expenditure at 122% of the estimated level of annual liability.

Figure S2-A looks at the movement in the extent of very poor condition assets while S2-B is a single figure representing the estimated remaining value within the whole sub asset set.

5.1.3 Summary - Internal Benchmarking

Asset condition generally declined between 2003 and 2017 but much higher levels of renewal expenditure over the last 2 years has begun to turn that position around.

5.1.4 External condition Benchmarking

Figure S3 provides external benchmarking based on the same key performance indicators as used internally in figure S2. The total number of councils assessed by MAMS on exactly the same basis is 69 for this sub asset class. The graph then displays the number of councils ranked better and worse than Southern Grampians Shire for each of the five performance indicators. The dark green bars represent the number of councils that Southern Grampians Shire is ranked better than, while the light green is the number that Southern Grampians is ranked worse than.

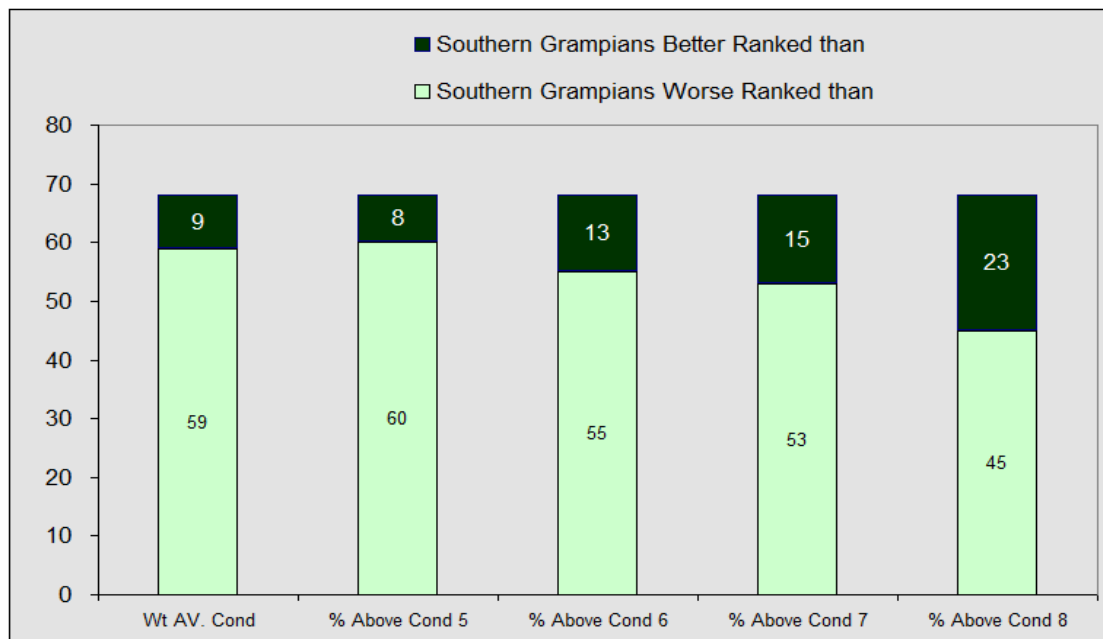


Figure S3 Key Condition Indicators as Compared with other Councils surveyed

Figure S3 indicates that Southern Grampians does not compare well with the 69 councils assessed by MAMS. Southern Grampians Shire is within the poorest 15% for the weighted average asset condition but is a little better with its extent of poor condition assets. Overall asset condition is described as "Poor".





5.2 Sealed Surface Financial Modelling Analysis

The Sealed surface assets will be modelled in like performing data sets with the results aggregated into one presentation for the whole sub asset group

5.2.1 Sealed Surface – Selection of Retreatment Intervention Level

The point at which you choose to intervene to renew or replace an asset will have a big impact on the predicted future renewal demand. The intervention level can be seen as the level of service for the asset set. High intervention level equates to low level of service while low intervention level relates to a high level of service.

Detailed below are a series of photographs illustrating various sealed surface condition ratings. They do not cover the complete condition range but hopefully will provide some guidance to the selection of an acceptable retreatment intervention level.

	
Condition 0 – 1 Seal in excellent near new condition	Condition 5 Cracking but seal not too oxidized
	
Condition 6.5 - 7 Oxidized and stripping	Condition 8 Fully Oxidized and falling apart

It is very difficult to cover sealed surface condition in such a limited range of photographs but hopefully they will provide some idea of asset condition in the 6 – 9 condition range where most interventions will take place. Sealed surfaces can be within this condition range for a number of different reasons and the photos will cover only a limited range of these situations. They should be seen as one possible condition situation and not the only situation for that condition rating.

5.2.2 Sealed Surfaces – Financial Modeling Results

Modelling Parameter	All Asphalt Surfaces	Spray Seal Urban Link and Collector Rds	Spray Seal Urban Non Link and Collector Rds	Spray Seal Rural Link and Collector Rds	Spray Seal Rural Non Link and Collector Rds	Totals
Asset Quantity in sqm	73,186	133,613	1,233,582	1,282,919	4,929,839	7,653,139
Unit Renewal Rate	\$22.90	\$7.12	\$6.56	\$6.20	\$6.20	
Total Asset Group Renewal Cost	\$1,675,842	\$950,984	\$8,086,813	\$7,954,096	\$30,564,999	\$49,232,734
Annual Renewal Exp.	\$80,000	\$120,000	\$400,000	\$450,000	\$1,940,000	\$2,990,000
Retreat. Intervention Condition	7.0	7.0	7.0	7.0	7.0	
Life to Condition 10 in Years	35.0	22.0	22.0	22.0	22.0	
Life in years to Intervention	32.7	19.9	19.9	19.9	19.9	

Figure S4 – Summary of Modelling Input Parameters for Sealed Surface Assets

The sealed surfaces will be modelled within five like performing data sets as detailed within Figure S4 above. Retreatment intervention levels have been set as per council advice and are in line with what council is currently achieving. Service lives have been lifted a little since our last report but are lower than those adopted by council for accounting purposes. Council has adopted a service life of 28 years for their spray seals which is higher than any other council we have encountered.

The adopted modelling life to condition 10 of 22 years delivers a service life of 19.9 years which does tend to be at the upper end of the industry range and is about as far as we are comfortable to go. But the long lives will tend to produce an optimistic financial outcome.

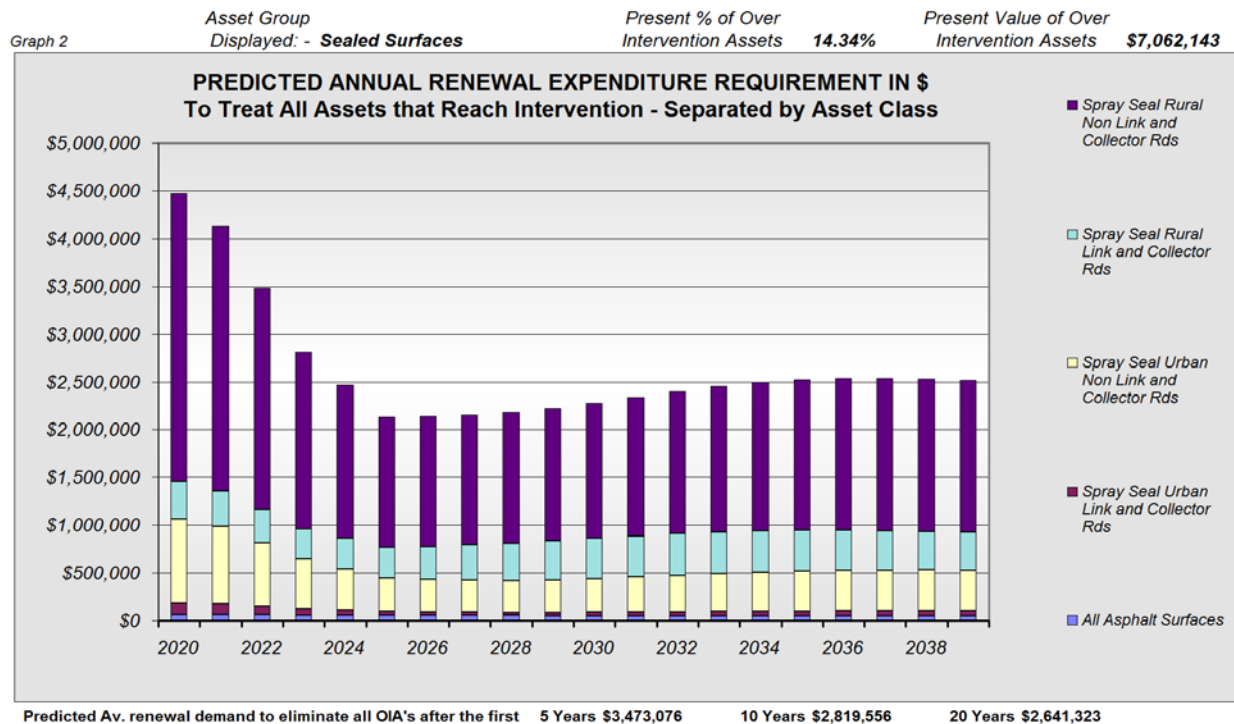


Figure S5 Predicted Renewal Demand to treat all assets that reach the Intervention level in future years

Figure S5 plots the annual funding profile required to eliminate all over intervention assets. If there is a large backlog of over intervention assets such that the raw year one demand is 30% or greater than the year two demand then the Moloney model eases the difference in over the first five years (this will show up as a reducing demand over the first five years). For this reason we prefer to quote the present renewal demand as the average figure for the first 5 years. In this case the first 5 year average renewal demand is estimated at \$3,475,000 pa. If this expenditure is maintained all OIA's will be eliminated within 5 years.

Figure S5 indicates that the capital renewal demand to treat all assets that are predicted to reach the retreatment intervention level over the next 20 years has an average figure for the first 5 - years of \$3,473,076 pa. This also represents the peak demand over the next 20 years, further suggesting that asset condition is relatively poor.

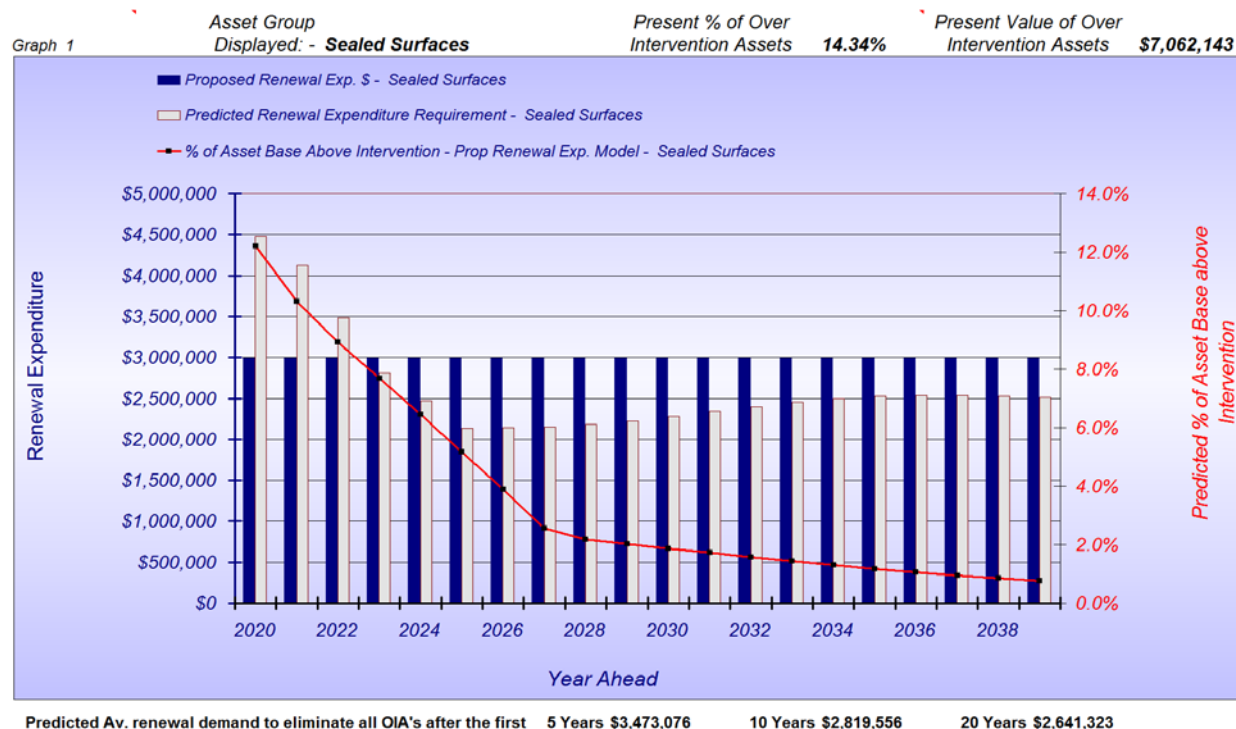


Figure S6 Future Predicted Condition Based on planned expenditure profile

Figure S6 plots the extent of the asset base that is predicted to rise above the intervention level (red line) based upon the continuation of the planned level of renewal expenditure (in blue bars). It also plots the predicted renewal demand to treat all over intervention assets within the grey bars (Same aggregate figures as within Figure S5 but not split into the individual modelling sets).

The planned renewal expenditure profile in figure S6 is a flat \$2,990,000 pa. The extent of over intervention assets is currently at 14.34% which equates to around 3.0 years of annual liability and as such is at the top of the "Just Acceptable" range as per Appendix D. The planned expenditure is predicted to result in a lowering of the OIA's after 10 years down to 2.03%.

Council has correctly identified this sub asset class as requiring short term additional funding. The planned renewal spend of \$2,990,000 pa will quite rapidly bring the assets back into line, as it has already commenced to do over the last 2 years. The planned funding level could be lowered in the long term.

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model can also be used to allocate funding between the sub asset groups to deliver the best overall condition outcome for all road assets.

Please refer to Appendix D which explains why and how we set the desired extent of over intervention assets in terms of the number of year's worth of annual liability that it represents. Appendix D4 also provides an explanation of the Moloney funding scenario finder along with its three basic input criteria requirements. The three input criteria adopted for the sealed surface assets are as detailed within figure S7 below with the results of the funding scenario finder operation contained within figure S8.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2. Years to achieve Desired Condition outcome	Criteria 3 Annual % of Compounding funding increase (if required)
	Expressed as the % of One Years Annual Liability	Expressed as a % of The Total Asset Set Replacement Valuation		
Sealed Surfaces	132%	6.56%	10	0.00%

Figure S7 Modelling scenario finder inputs - Sealed Surface Assets

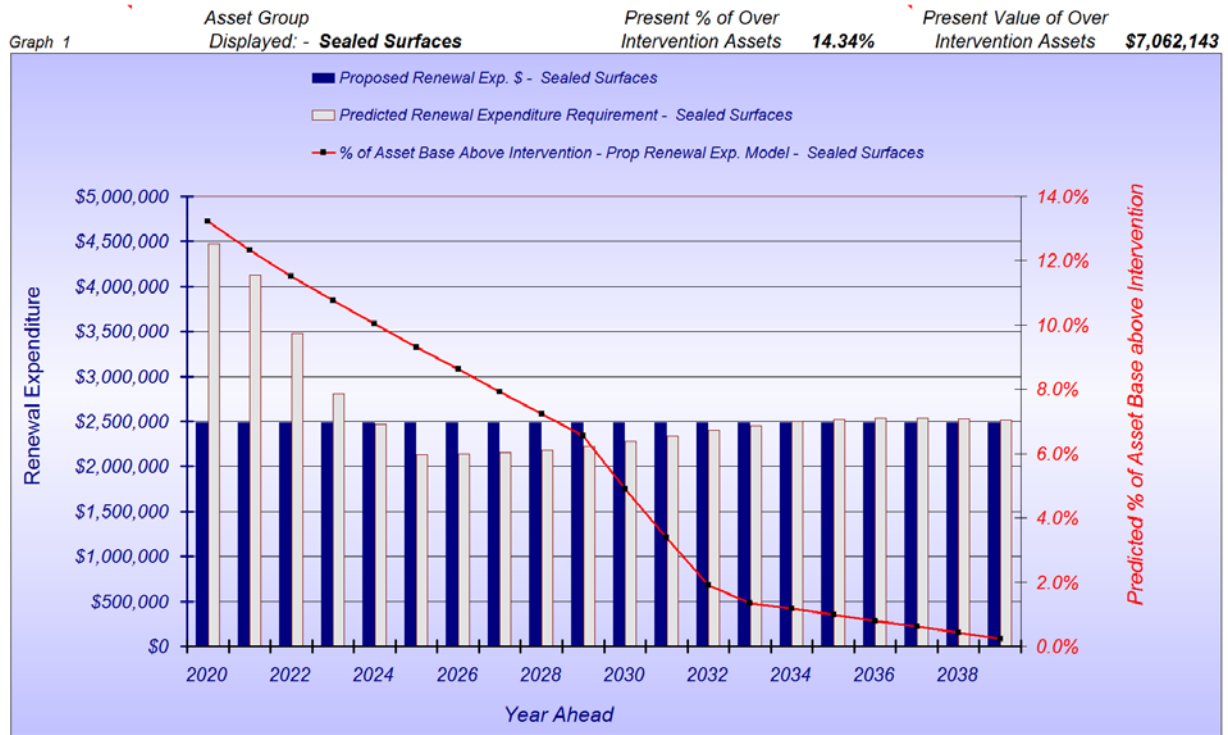


Figure S8 Recommended Renewal funding Strategy

For the sealed surfaces we have set the level of over intervention assets at 132% of one year's annual liability, which equates to 6.56% of the network. The current level being 14.34%. We have set the desired extent of over intervention assets around the middle of the "Very Good" Range (See Appendix D Figure D 1 for details relating to this classification range).

The model predicts that a flat renewal expenditure of \$2,485,000 pa will deliver the desired outcome as outlined within figure S7.

5.3 Sealed Surface Summary

The sealed surface assets were found to be in poor overall condition but had experienced a strong improvement in overall condition since our last survey in 2016.

It is recommended that an average annual renewal expenditure of \$2,485,000 pa be allocated to this asset class with allowance for an annual CPI increase. Funding should be reviewed again following the next condition survey.

Section 6: Unsealed Road Pavement Sub - Assets

This section will deal with the unsealed road Pavement Sub assets. It will look at both internal and external benchmarking of asset condition as well as providing financial forecasting of future renewal demand and projected asset condition.

6.1 Condition and Performance of Unsealed Pavements

The same eight common key performance indicators are used for all road sub assets. An explanation for each is available within sections 4.1 to 4.1.6 above rather than duplicating those details here. Five of the eight condition indicators that were appropriate to the Unsealed Pavement assets are detailed here.

6.1.1 Internal Benchmarking of asset condition

This section will deal with your internal condition performance firstly in a detailed way since the last condition survey in 2016 and then over the longer term covering all MAMS inspections of the assets.

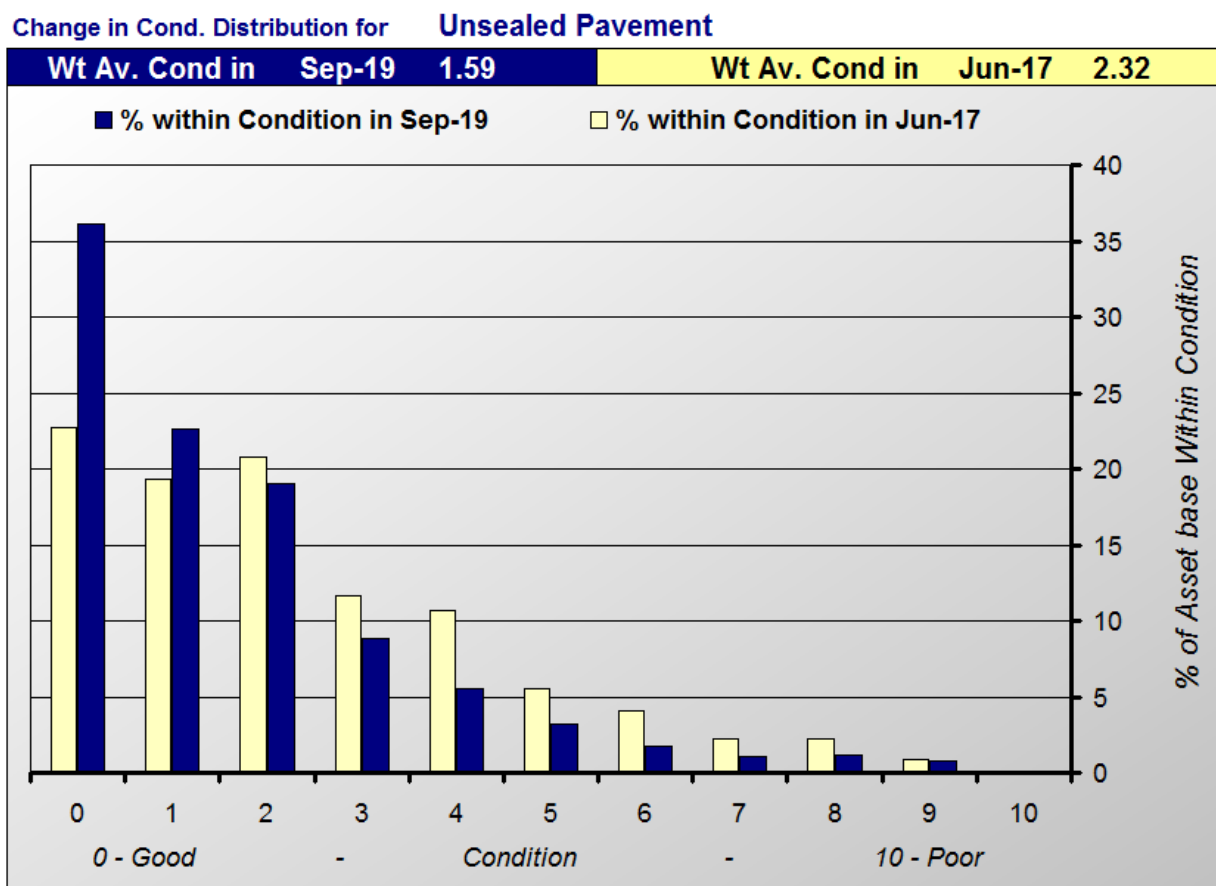


Figure U1 Condition Distribution Comparison Graph – Between Surveys all Unsealed Pavements

Key Cond. Indic. No.	Unsealed Pavement Condition Indicator	Figures from Last Survey in Jun-17	Figures from Current Survey in Sep-19	Change between Surveys New Minus Old	% Change Between Surveys	Better or Worse Since last Survey
1	Weighted Average Asset Condition	2.32	1.59	0.725	10.4%	Better
2	% of Pavement Failures	1.59	0.67	0.924	58.0%	Better
3	Average Pavement Roughness	3.43	3.38	0.048	1.4%	Better
4	Average Pavement Profile	2.98	2.63	0.350	11.8%	Better
5	Average Pavement Depth in mm	82	93	10.734	13.1%	Better
6	% of Asset Base above Condition 6	9.35	4.74	4.612	49.3%	Better
7	% of Asset Base above Condition 7	5.32	3.01	2.308	43.4%	Better
8	% of Asset Base above Condition 8	3.12	1.96	1.159	37.2%	Better
Renewal Demand Being Met For:		% of Annual Liability expenditure Planned in Future years		% of Annual Liability expenditure Since the time of the last survey		
UnSealed Rd Pavement Asset Group		16.3%		81.2%		

Figure U2 Condition Change since last survey & Renewal demand being met

The above 2 figures provide internal benchmarking that details how asset condition has changed since the last survey. Figure U1 provides the condition distribution for each survey along with the first of the key condition indicators, the weighted average asset condition.

Figure U2 contains five of the eight possible key performance indicators that relate to this asset class. See section 4.2 above for a detailed explanation of each indicator. Figure U2 also shows how the indicators have changed since the previous survey. At the bottom of the table are two very important figures. These indicate the percentage of the annual liability rate that has been met since the last survey, along with the percentage planned for future years.

Figure U2 indicates that overall condition (weighted average asset condition) has improved by 10.4% since 2017. The extent of poor condition assets at and above condition 8 has improved by 37.2% and those within condition 7 have improved by 43.4%. This is considered to be an outstanding achievement given that the average annual renewal expenditure since 2016 has been at only 81.2% of the estimated consumption rate. However there may have been some substantial investment around flood events which could be impacting on the results.

6.1.2 Long term Internal Benchmarking

MAMS has undertaken 5 condition assessments of the unsealed road pavement assets since 2006 all on exactly the same basis and mostly with the same staff. This has enabled us to plot some long term condition trends. It is felt that the most important indicator is the extent of poor condition assets at and above conditions 6 - 8. These are the assets that will need to be rehabilitated over the next few years depending upon your level of service.

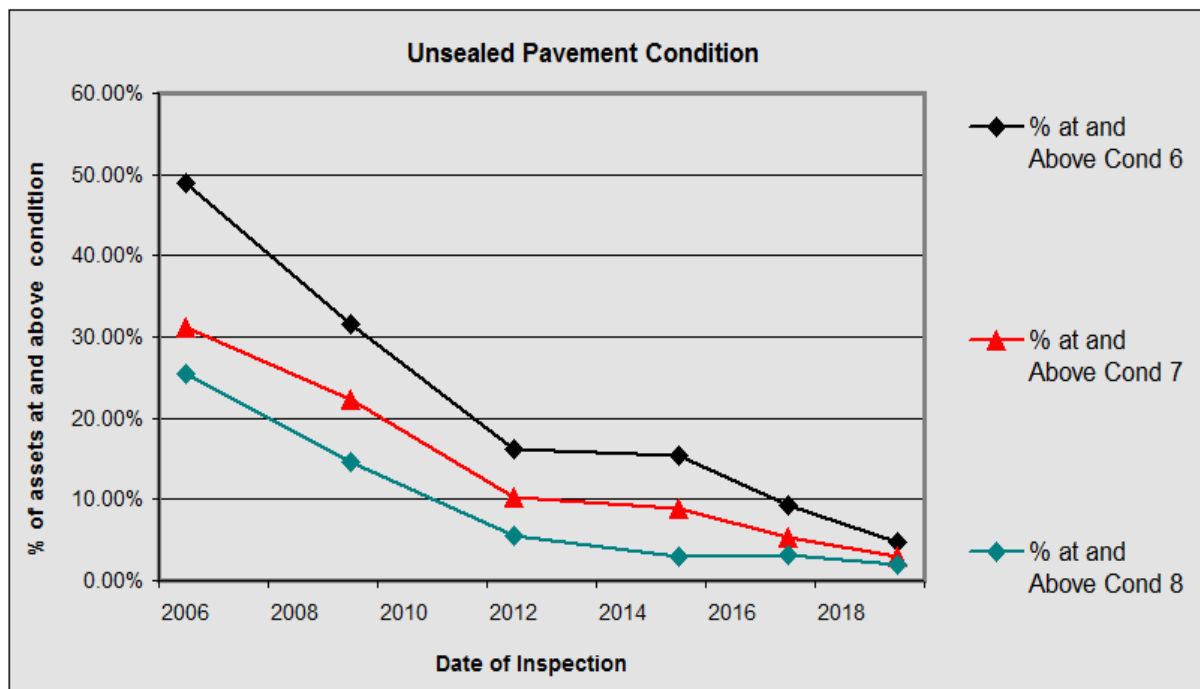


Figure U2-A Long term extent of poor condition assets.

Figure U2-A shows a continual improvement in condition since 2006. An even stronger indicator for the unsealed road pavements is the average depth of imported pavement material that was found to be present. During the survey we dug every unsealed pavement segment to establish the depth of imported pavement material that was present. Figure U2-B below shows the movement in the average depth of imported pavement material across the whole network.

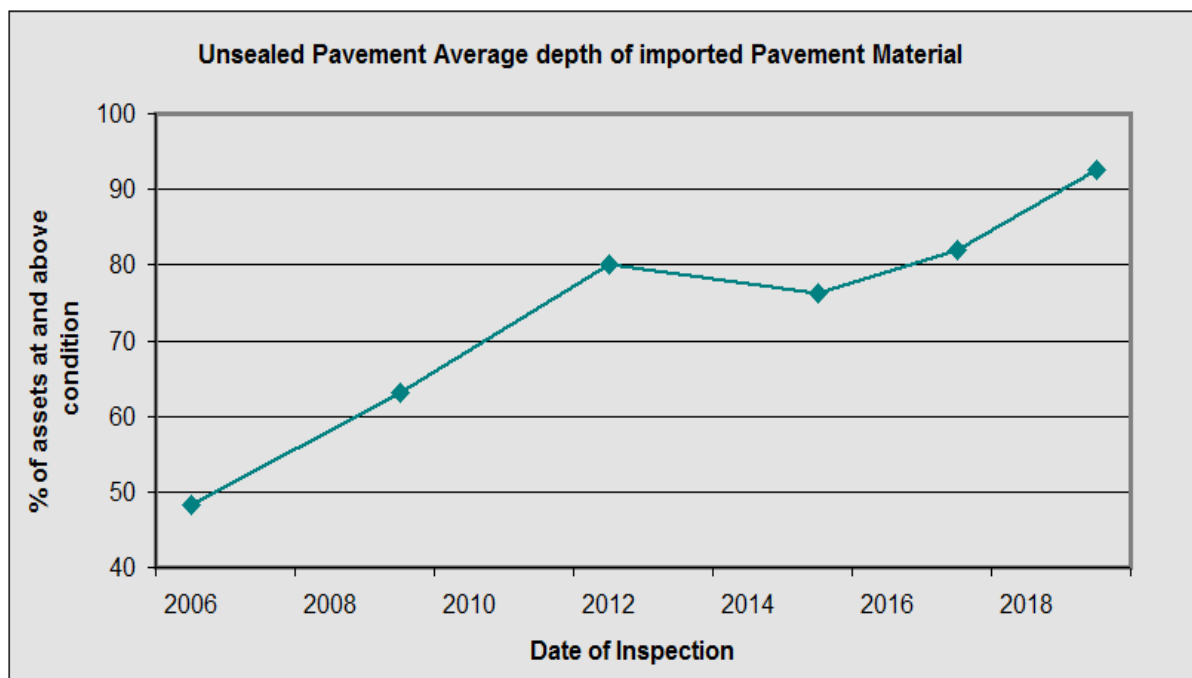


Figure U2-B Average depth of imported pavement material present

6.1.3 Summary - Internal Benchmarking

Southern Grampians has experienced a very strong condition improvement with its Unsealed Pavements over the long term. The best measure of overall performance is considered to be average depth of imported pavement material. This has risen from 48 mm in 2006 up to 93 mm in 2019. This is a really outstanding performance.

61.4 External condition Benchmarking

Figure U3 provides external benchmarking based on the same key performance indicators as used internally in figure U2. The total number of councils assessed by MAMS on exactly the same basis is 69 for this sub asset class. The graph then displays the number of councils ranked better and worse than Southern Grampians Shire for each of the five performance indicators. The dark green bars represent the number of councils that Southern Grampians Shire is ranked better than, while the light green is the number that Southern Grampians is ranked worse than.

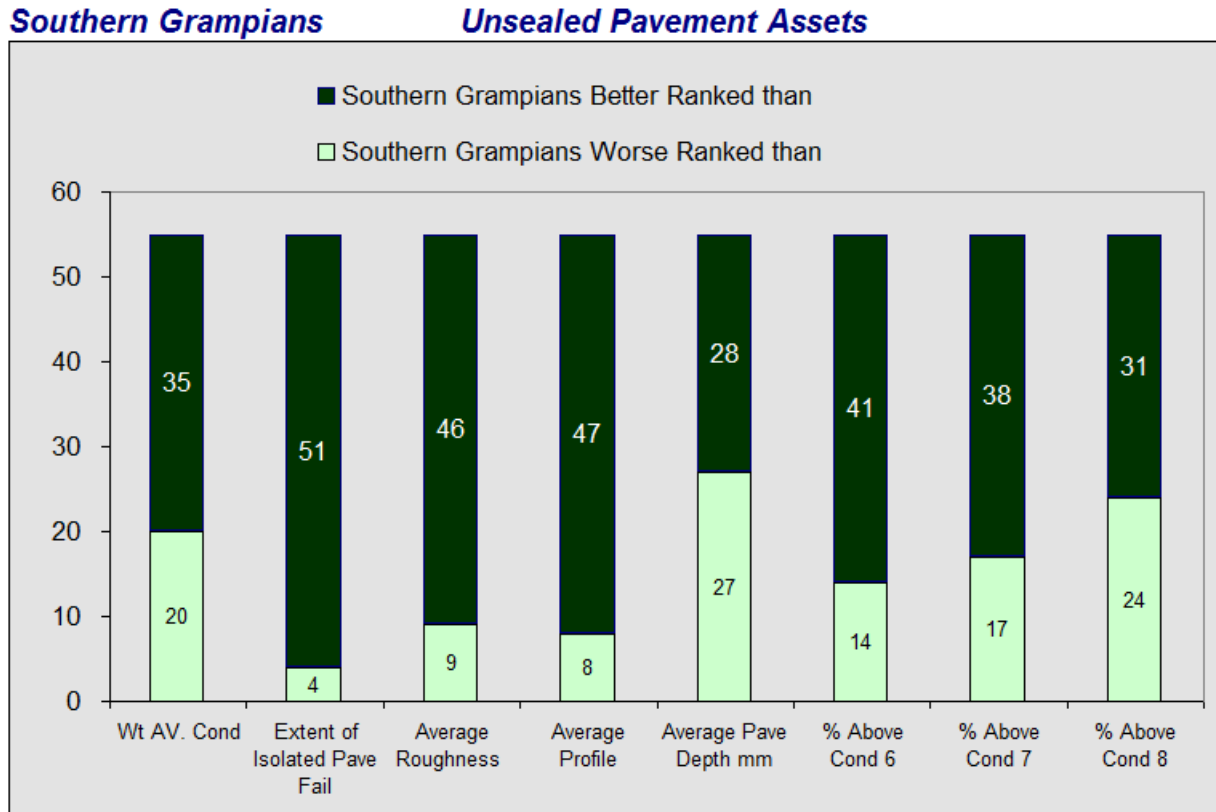


Figure U3 Key Condition Indicators as Compared with other Councils surveyed

Figure S3 indicates that Southern Grampians compares extremely well with the 56 councils assessed by MAMS. Southern Grampians Shire is within the best 8% for the extent of isolated pavement failures and also ranks well within the better half of the councils assessed for overall condition as well as the extent of poor condition assets.

6.2 Unsealed Pavement Financial Modelling Analysis

The Unsealed Pavement assets will be modelled in like performing data sets with the results aggregated into one presentation for the whole sub asset group

6.2.1 Unsealed Pavement – Selection of Retreatment Intervention Level

The point at which you choose to intervene to renew or replace an asset will have a big impact on the predicted future renewal demand. The intervention level can be seen as the level of service for the asset set. High intervention level equates to low level of service while low intervention level relates to a high level of service.

Detailed below are a series of photographs illustrating various Unsealed Pavement condition ratings. They do not cover the complete condition range but hopefully will provide some guidance to the selection of an acceptable retreatment intervention level.



Condition 0 – 1 Average Depth 150 mm



Condition 7 – Average depth 20 – 30 mm only



Condition 6.5 - 7 Oxidized and stripping



Condition 8 Fully Oxidized and falling apart

It is very difficult to cover Unsealed Pavement condition in such a limited range of photographs but hopefully they will provide some idea of asset condition in the 6 – 9 condition range where most interventions will take place. Unsealed Pavements can be within this condition range for a number of different reasons and the photos will cover only a limited range of these situations. They should be seen as one possible condition situation and not the only situation for that condition rating.

6.2.2 Unsealed Pavements – Financial Modeling Results

Unsealed Rd Pavement - Modelling Parameters

Modelling Parameter	Unsealed Roads All Others	Unsealed Roads Limited Access	Totals
Asset Quantity in sqm	2,923,402	324,330	3,247,732
Unit Renewal Rate	\$7.60	\$7.60	
Total Asset Group Renewal Cost	\$22,217,855	\$2,464,905	\$24,682,760
Annual Renewal Exp.	\$110,000	\$30,000	\$140,000
Retreat. Intervention Condition	7.0	7.0	
Life to Condition 10 in Years	35.0	35.0	
Life in years to Intervention	28.8	28.8	

Figure U4 – Summary of Modelling Input Parameters for Unsealed Pavement Assets

The Unsealed Pavements will be modelled within Two like performing data sets as detailed within Figure U4 above. Retreatment intervention levels have been set as per council advice and are in line with what council is currently achieving. Service lives have been lifted a little since our last report but are lower than those advised by council as used for asset valuation purposes. The adopted service lives of 28.8 years compared to the accounting lives of 35 years will have only a minimal impact on the modelling results because of the exceptionally good present condition of the assets.

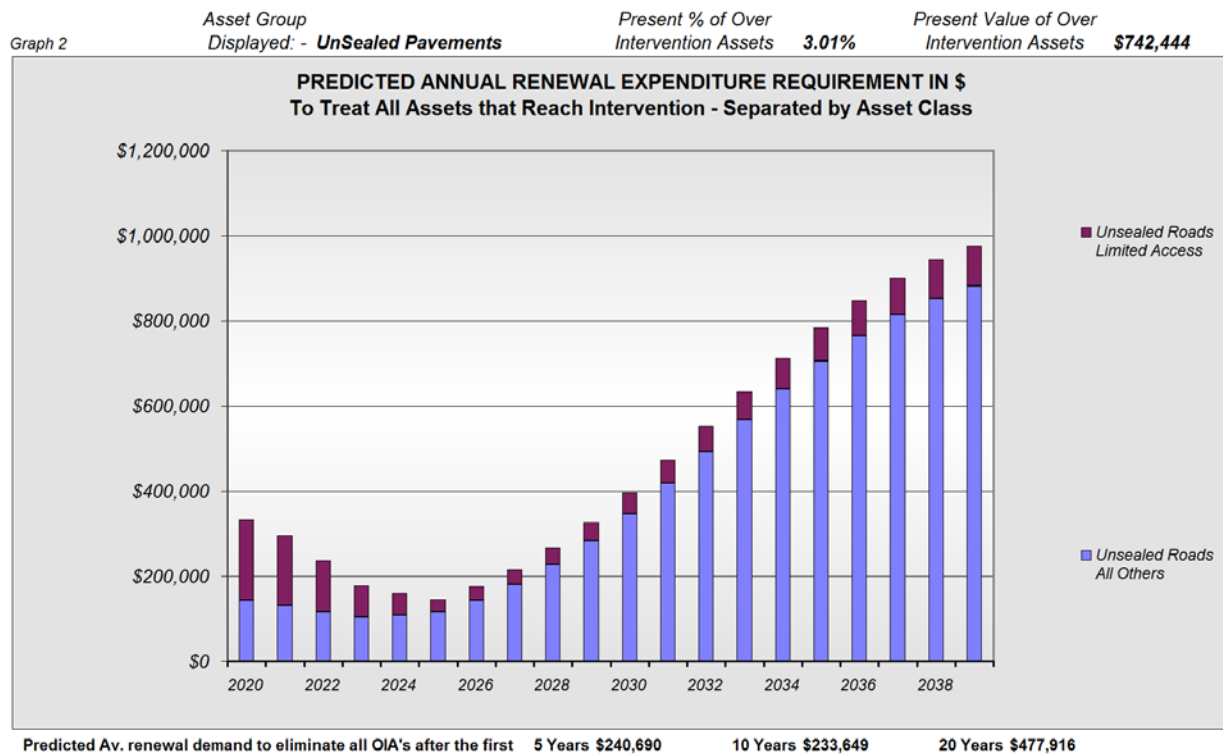


Figure U5 Predicted Renewal Demand to treat all assets that reach the Intervention level in future years

Figure U5 plots the annual funding profile required to eliminate all over intervention assets. If there is a large backlog of over intervention assets such that the raw year one demand is 30% or greater than the year two demand then the Moloney model eases the difference in over the first five years (this will show up as a reducing demand over the first five years). For this reason we prefer to quote the present renewal

demand as the average figure for the first 5 years. In this case the first 5 year average renewal demand is estimated at \$240,690 pa. If this expenditure is maintained all OIA's will be eliminated within 5 years.

Figure U5 indicates that the capital renewal demand to treat all assets that are predicted to reach the retreatment intervention level over the next 20 years has an average figure for the first 5 - years of \$240,690 pa. The peak demand over the next 20 years is predicted at \$976,000 in the year 2039.

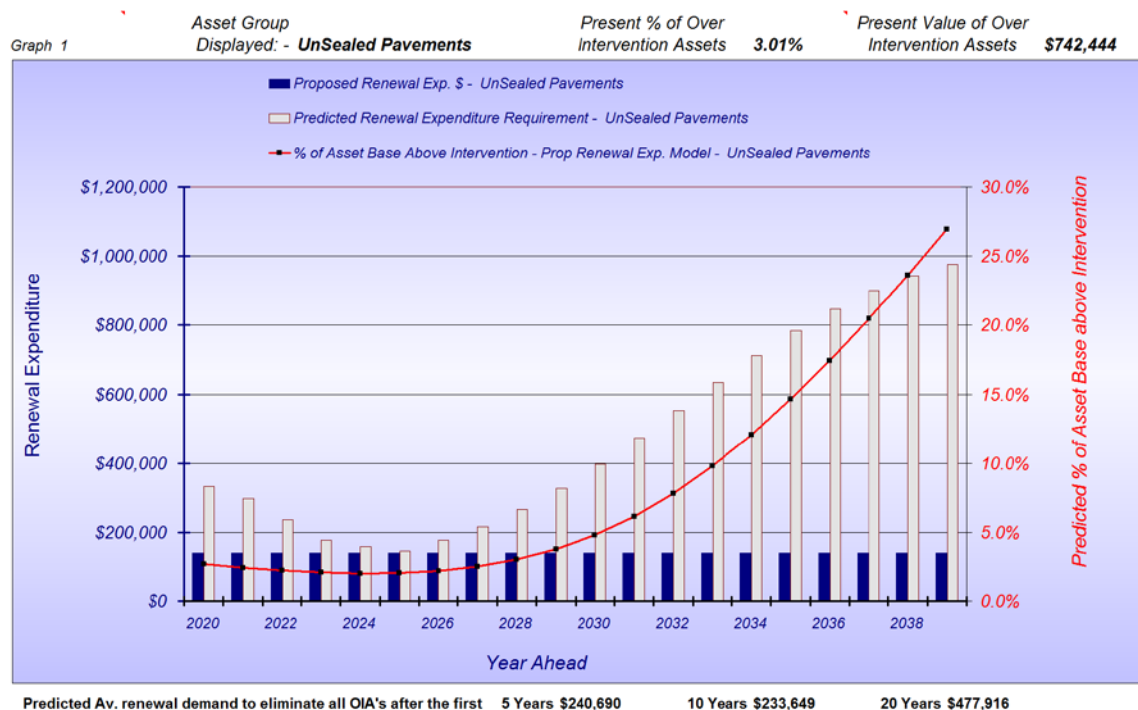


Figure U6 Future Predicted Condition Based on planned expenditure profile

Figure S6 plots the extent of the asset base that is predicted to rise above the intervention level (red line) based upon the continuation of the planned level of renewal expenditure (in blue bars). It also plots the predicted renewal demand to treat all over intervention assets within the grey bars (Same aggregate figures as within Figure S5 but not split into the individual modelling sets).

The planned renewal expenditure profile in figure S6 is a flat \$140,000 pa. The extent of over intervention assets is currently at 3.01% which equates to around 0.9 years of annual liability and as such falls within the "Excellent" range as per Appendix D. The planned expenditure is predicted to result in a very small rise in the extent of OIA's after 10 years up to 3.79%. But funding will need to be lifted in the longer term.

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model can also be used to allocate funding between the sub asset groups to deliver the best overall condition outcome for all road assets.

Please refer to Appendix D which explains why and how we set the desired extent of over intervention assets in terms of the number of year's worth of annual liability that it represents. Appendix D4 also provides an explanation of the Moloney funding scenario finder along with its three basic input criteria requirements. The three input criteria adopted for the Unsealed Pavement assets are as detailed within figure S7 below with the results of the funding scenario finder operation contained within figure S8.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2. Years to achieve Desired Condition outcome	Criteria 3 Annual % of Compounding funding increase (if required)
	Expressed as the % of One Years Annual Liability	Expressed as a % of The Total Asset Set Replacement Valuation		
Unsealed Rd Pavements	132%	4.59%	10	0.00%

Figure U7 Modelling scenario finder inputs - Unsealed Pavement Assets

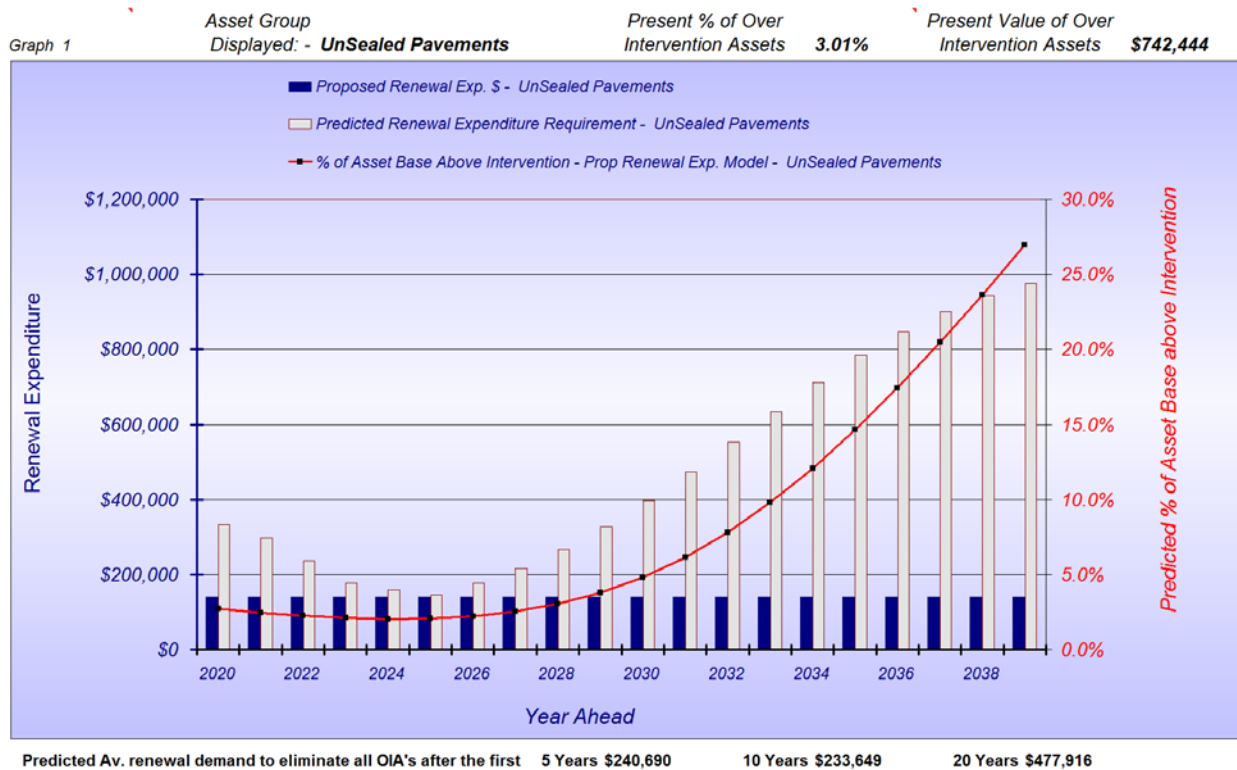


Figure U8 Recommended Renewal funding Strategy

For the Unsealed Pavements we have set the level of over intervention assets at 132% of one year's annual liability, which equates to 4.59% of the network. The current level being 3.01% we have set the desired extent of over intervention assets around the middle of the "Good" Range (See Appendix D Figure D 1 for details relating to this classification range).

The model predicts that an average renewal expenditure of \$122,000 pa plus CPI increases over the next 10 years will deliver the required condition outcome as detailed within figure U7 above.

5.3 Unsealed Pavement Summary

The Unsealed Pavement assets were found to be in excellent overall condition and had experienced a strong improvement in overall condition since our last survey in 2017.

It is recommended that the average renewal funding level be set at \$122,000 pa for the next 5 - 10 years and be reviewed again following the next condition assessment.

Section 7: Kerb Sub Assets

This section will deal with the Kerb Sub assets. It will look at both internal and external benchmarking of asset condition as well as providing financial forecasting of future renewal demand and projected asset condition.

7.1 Condition and Performance of Kerb assets

The same eight common key performance indicators are used for all road sub assets. An explanation for each is available within sections 4.1 to 4.1.6 above rather than duplicating those details here. Seven of the eight condition indicators that were appropriate to the kerb assets have been used here.

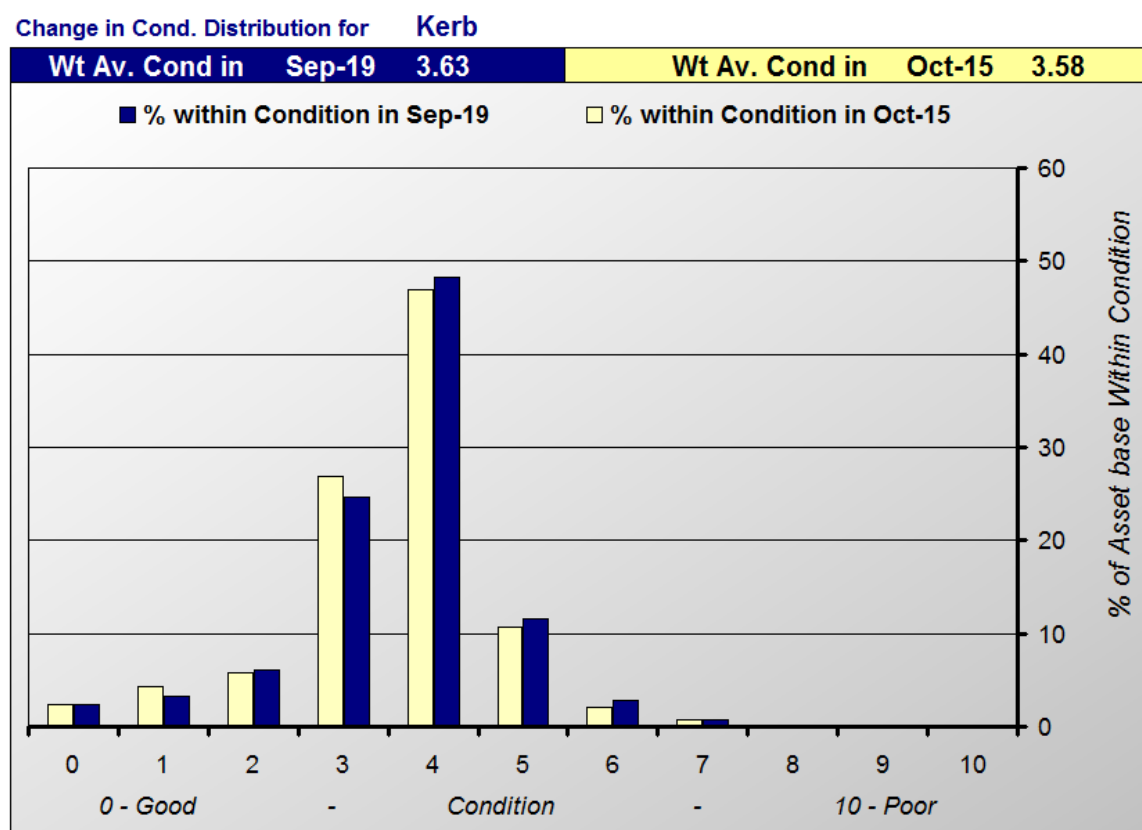


Figure K1 Condition Distribution Comparison Graph – Between Surveys

Key Cond. Indic. No.	Kerb Condition Indicator	Figures from Last Survey in Oct-15	Figures from Current Survey in Sep-19	Change between Surveys New Minus Old	% Change Between Surveys	Better or Worse Since last Survey
1	Weighted Average Asset Condition	3.577	3.634	-0.058	-0.72%	Worse
2	% of Urgent Failures	6.811	6.996	-0.185	-2.7%	Worse
3	% of Other Failures	25.371	25.193	0.178	0.7%	Better
4	% of Asset Base above Condition 5	13.803	15.250	-1.446	-10.5%	Worse
5	% of Asset Base above Condition 6	3.117	3.640	-0.522	-16.8%	Worse
6	% of Asset Base above Condition 7	1.004	0.857	0.147	14.67%	Better
7	% of Asset Base above Condition 8	0.226	0.140	0.086	37.90%	Better
Renewal Demand Being Met For:		% of Annual Liability expenditure Planned in Future years		% of Annual Liability expenditure Since the time of the last survey		
Kerb Asset Group		25%		33%		

Figure K2 Condition Change since last survey & Renewal demand being met

The above 2 figures provide internal benchmarking that details how asset condition has changed since the last survey. Figure K1 provides the condition distribution for each survey along with the first of the key condition indicators, the weighted average asset condition.

Figure K2 contains seven of the eight key condition indicators that are appropriate to the kerb assets. It also shows how they have changed since the previous survey. At the bottom of the table are two very important figures. These indicate the percentage of the annual liability rate that has been met since the last survey, along with the percentage planned for future years.

The kerbs were found to be in fair overall condition. Weighted average asset condition had declined slightly by -0.72% since 2015. But the extent of poor condition assets had reduced indicating very good targeting of the scarce renewal resources.

7.1.1 Long term Internal Benchmarking

MAMS has undertaken 4 condition assessments of the kerb assets since 2009 all on exactly the same basis and mostly with the same staff. This has enabled us to plot some long term condition trends. It is felt that the most important indicator is the extent of poor condition assets at and above conditions 6 - 8. These are the assets that will need to be rehabilitated in the immediate future depending upon your level of service.

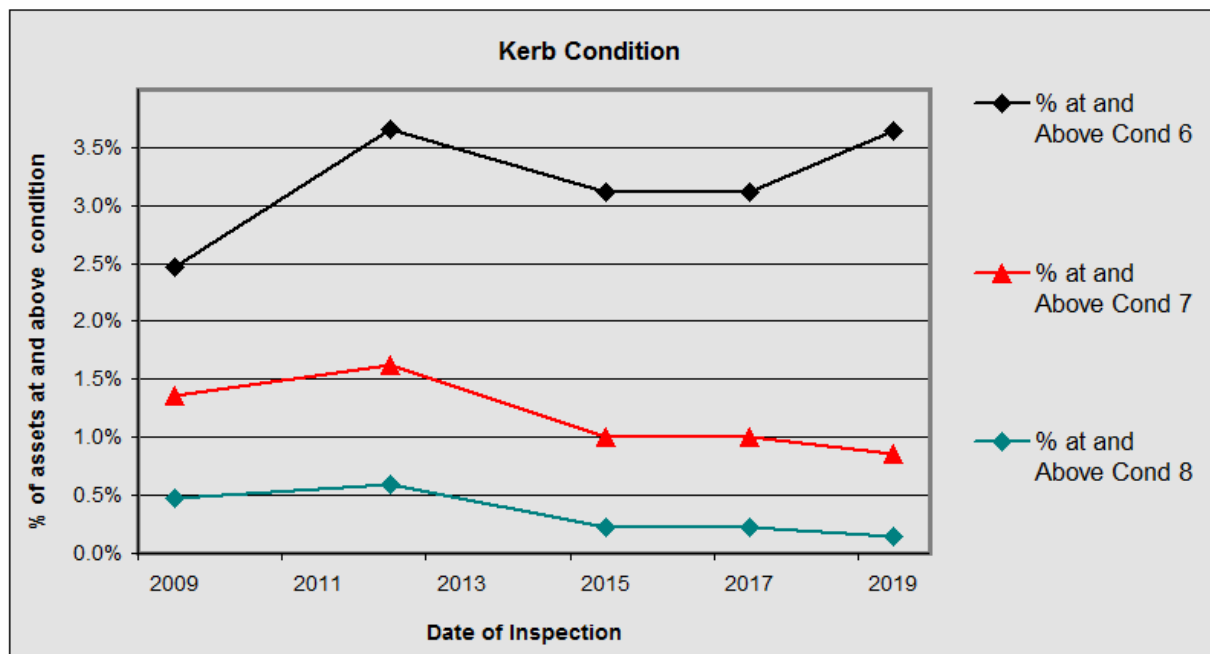


Figure K2-A Long term extent of poor condition assets.

Figure U2 - A shows a long term improvement in the extent of very poor condition assets at and above condition 7 but the extent over condition 6 has risen. Note that the 2017 survey was a partial survey covering all of the rural road but did not include the kerbs. Hence the values here are the same as for the 2015 survey.

Another way of looking at the whole picture is to track the "Weighted average asset condition" with time. This figure can be converted to a percentage of the asset base that has been consumed. Figure K2-B below tracks the estimated percentage of the asset base that has been consumed. The percentage runs to zero at condition 8.0 for kerbs as indicated at the top of the graph.

Figure K2-A looks at the movement in the extent of very poor condition assets while K2-B is a single figure representing the estimated value within the whole sub asset group.

Zero Value Condition: Kerbs 8.0

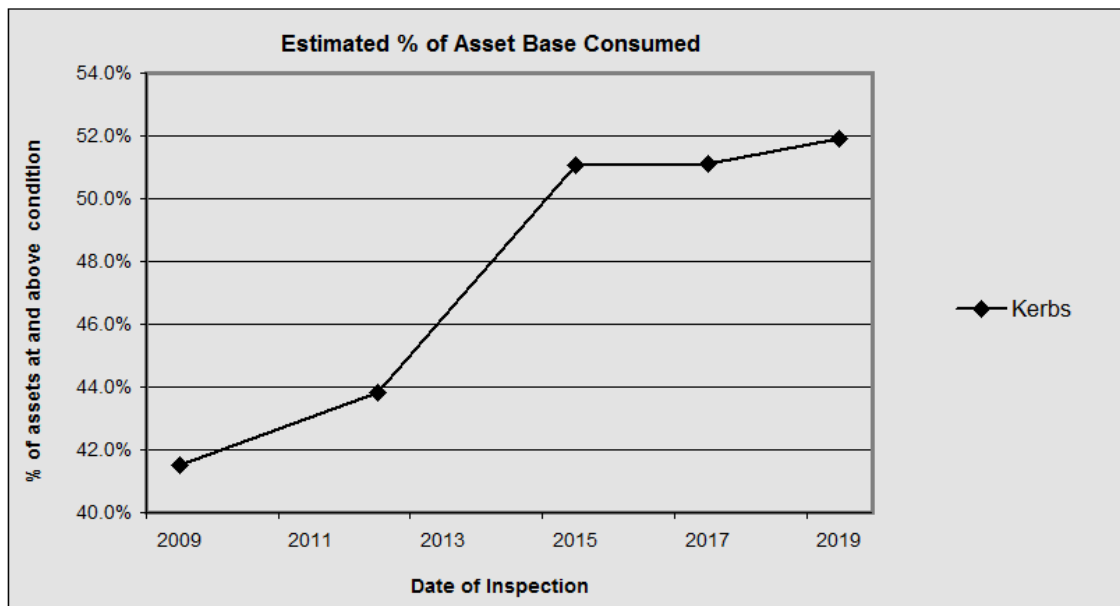


Figure K2-B Long term percentage of asset consumption

7.1.2 Summary - Internal Benchmarking

Southern Grampians has experienced a continual overall condition decline since our first survey in 2009. But with very low levels of renewal expenditure on these long term assets this is to be expected and is in no way meant as a criticism. Figure K2-A indicates that is managing the level of very poor condition assets quite well with a long term decline in the extent of condition 7 and 8 assets.

7.1.3 External condition Benchmarking

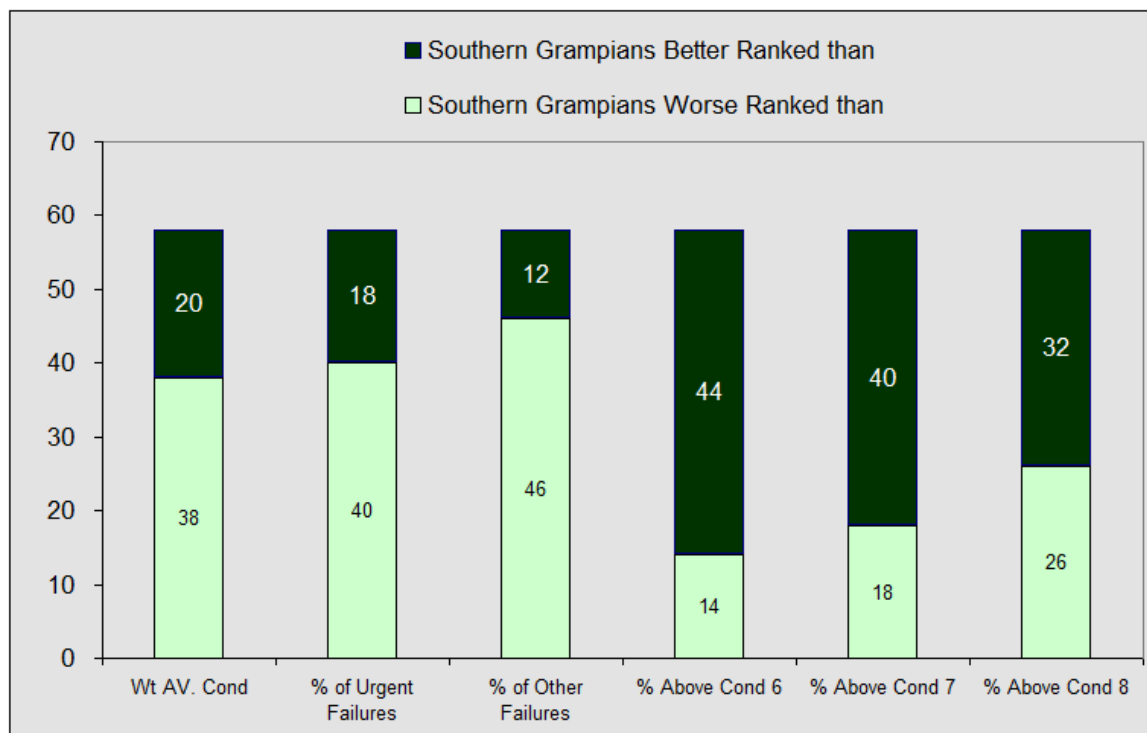


Figure K3 Key Condition Indicators as Compared with other Councils surveyed

Figure K3 provides external benchmarking based on the same key performance indicators as used internally in figure K2. The total number of councils assessed by MAMS on exactly the same basis is 59

for this sub asset class. The graph displays the number of councils ranked better and worse than Southern Grampians Shire for each of the six performance indicators. The dark green bars represent the number of councils that Southern Grampians Shire is ranked better than, while the light green is the number that Southern Grampians is ranked worse than.

The comparison with all 59 councils assessed by MAMS within Figure K3 indicates a set of ageing assets that are being very well managed. While overall condition is ranked quite low the extent of very poor condition assets ranks very well.

7.2 Kerb Financial Modelling Analysis

Most kerb assets are modelled within a single data set as their performance is generally quite uniform across all assets. We do sometimes separate them when significant stone kerbs are present as these tend to have longer service lives and higher unit renewal rates than concrete kerbs. We sometimes treat the state assets that by default become a council responsibility as a separate asset set.

7.2.1 Kerb Assets – Selection of Retreatment Intervention Level

The point at which you choose to intervene to renew or replace an asset will have a big impact in the predicted future renewal demand. The intervention level can be seen as the level of service associated with the asset set. High intervention level equates to low level of service, while low intervention level relates to a high level of service.

Detailed below are a series of photographs illustrating various kerb condition ratings. They do not cover the complete condition range but hopefully will provide some guidance to the selection of the retreatment intervention level.



Condition 3 Old but only minor loss of shape & movement



Condition 6 Movement and concrete breakdown



Condition 8 Large movement and holding of water



Condition 9 Extreme movement and lack of function

It is very difficult to cover kerb condition in such a limited range of photographs but hopefully they will provide some idea of asset condition in the 6 – 9 condition range where most interventions will take place. Kerbs can be within this condition range for a number of different reasons and the photos will cover only a limited range of these situations. They should be seen as one possible condition situation and not the only situation for that condition rating.

7.2.2 Kerb Assets – Financial Modeling Results

Modelling Parameter	All Kerbs
Asset Quantity in lineal metres	201,792
Unit Renewal Rate	\$193.78
Total Asset Group Renewal Cost	\$39,103,425
Annual Renewal Exp.	\$78,200
Retreat. Intervention Condition	7.0
Life to Condition 10 in Years	140.0
Life in years to Intervention	126.9

Figure K4 – Summary of Modelling Input Parameters for Kerb Assets

Kerbs have been modelled within a single group as detailed in Figure K4 above.

The intervention level has been set at condition 7.0 as per councils asset management plan. This is considered to be a high level of service by industry standards where the intervention level tends to be around condition 8.0. The life cycle for the modelling work has been lifted from the 97 years adopted for accounting purposes up to 126.9 years to better reflect the lives coming out of our degradation curve analysis.

The ongoing repair of isolated kerb failures does tend to extent the asset lives coming out of our degradation curve analysis as the assets tend to sit within the 4 - 6 condition range for longer than they would without the regular repairs. Thus it can be difficult to pin down a firm service life within the model.

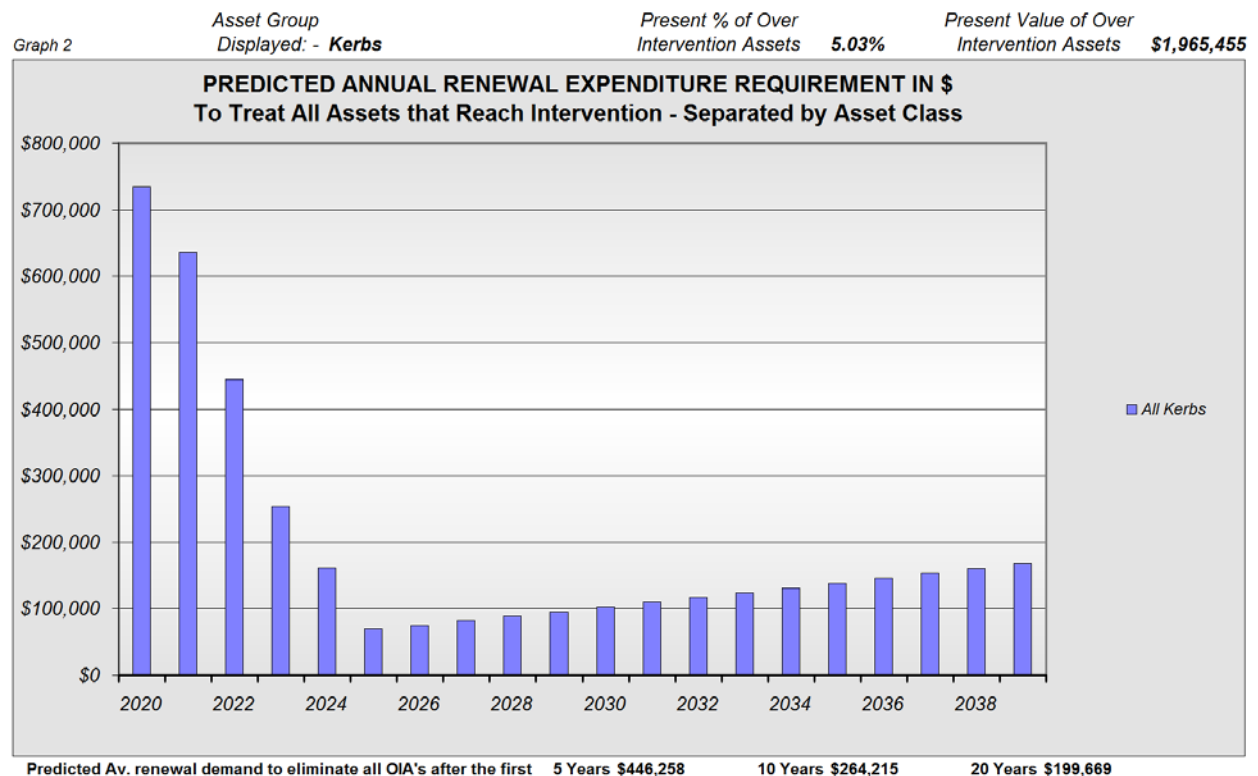


Figure K5 Predicted Renewal Demand to treat all assets that reach the Intervention level through normal decay

Figure K5 plots the annual funding profile required to eliminate all over intervention assets. If there is a large backlog of over intervention assets such that the raw year one demand is 30% or greater than the year two demand then the Moloney model eases the difference in over the first five years (this will show up as a reducing demand over the first five years). For this reason we prefer to quote the present renewal demand as the average figure for the first 5 years. In this case the first 5 year average renewal demand is estimated at \$446,000 pa. If this expenditure is maintained all OIA's will be eliminated after 5 years.

All of the isolated kerb failures that were identified during the survey were converted into small pieces of poor condition asset and then included within the model to be repaired at a higher than normal unit rate because of their short lengths. In this way the model is covering all of the full length poor condition assets as well as the isolated kerb failures within its calculations. This action is a strong contributor to the high spike in the years 1 - 5 renewal demand within Figure K5.

We should perhaps include an allowance within the actual capital expenditure on these assets to cover the funds spent on the repair of isolated kerb failures as this expenditure is considered capital in terms on the modelling work and the repairs have been added to the predicted renewal demand.

Figure K5 indicates that the capital renewal demand pattern to treat all assets that are predicted to reach the retreatment intervention level over the next 20 years has an average annual renewal demand of \$446,000 pa for the first 5-years. This also represents peak demand over the next 20 years.

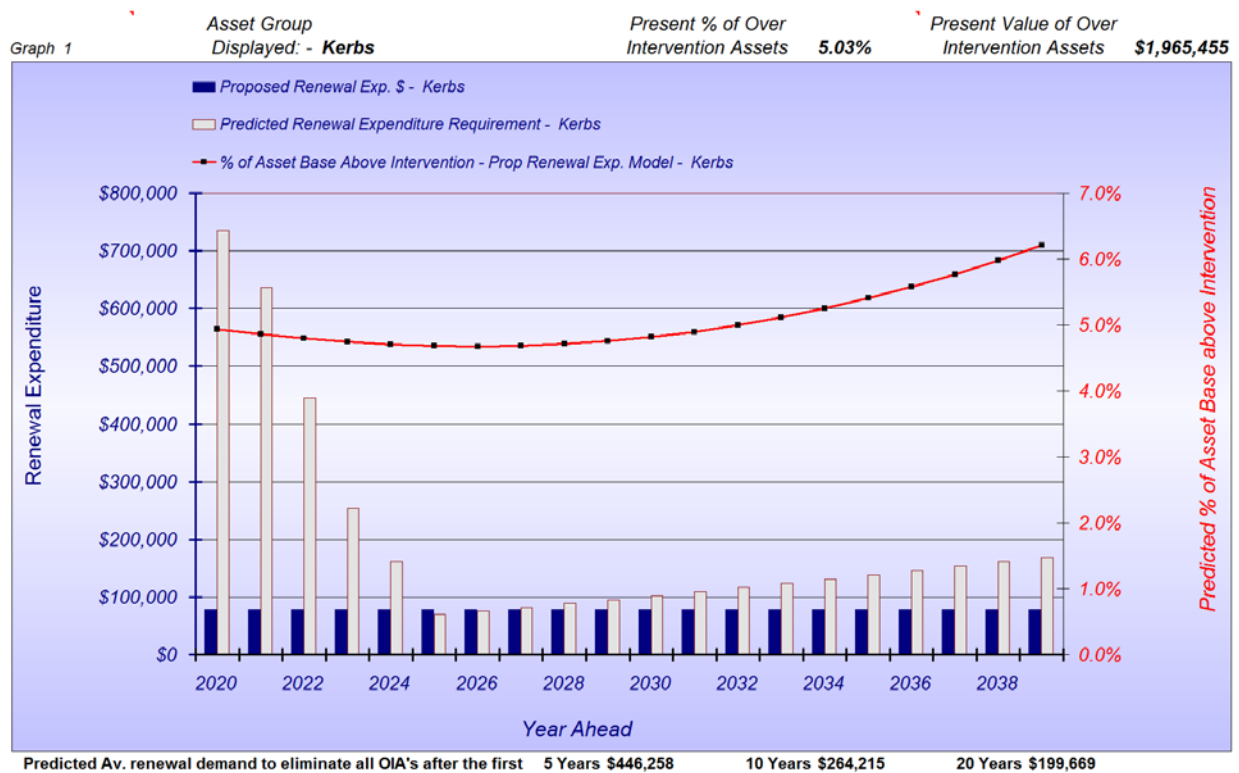


Figure K6 Future Predicted Condition Based on planned expenditure profile

Figure K6 plots the extent of the asset base that is predicted to rise above the intervention level (red line) based upon the continuation of the planned level of renewal expenditure (in blue bars). It also plots the predicted renewal demand to treat all over intervention assets within the grey bars (Same aggregate figures as within Figure K5 but not split into the individual modelling sets).

Figure K6 indicates that the planned renewal expenditure at \$78,200 pa, if maintained, will result in the present extent of over intervention assets of 5.03% being reduced to 4.76% after 10 years.

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model can also be used to allocate funding between the sub asset groups to deliver the best overall condition outcome for all road assets.

Please refer to Appendix D which explains why and how we set the desired extent of over intervention assets in terms of the number of year's worth of annual liability that it represents. Appendix D4 also provides an explanation of the Moloney funding scenario finder along with it's three basic input criteria

requirements. The three input criteria adopted for the kerb assets are as detailed within figure K7 below with the results of the funding scenario finder operation contained within figure K8.

For the kerbs we have set the level of over intervention assets at 132% of one year's annual liability which equates to 1.04% of the network. The current level being 5.03%. We have set the desired extent of over intervention assets just above the middle of the "Very Good" Range (Refer to Appendix D Figure D 1 for details).

The aim with the funding scenario finder is to deliver a consistent extent of over intervention assets across all road sub asset classes based on the number of years of annual liability that the over intervention assets represent. In this way the model also distributes the total renewal funding across all sub asset classes based on the actual renewal demand.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2. Years to achieve Desired Condition outcome	Criteria 3 Annual % of Compounding funding increase (if required)
	Expressed as the % of One Years Annual Liability	Expressed as a % of The Total Asset Set Replacement Valuation		
Kerbs	132%	1.04%	10	0.00%

Figure K7 Modelling scenario finder inputs - Sealed Pavement Assets

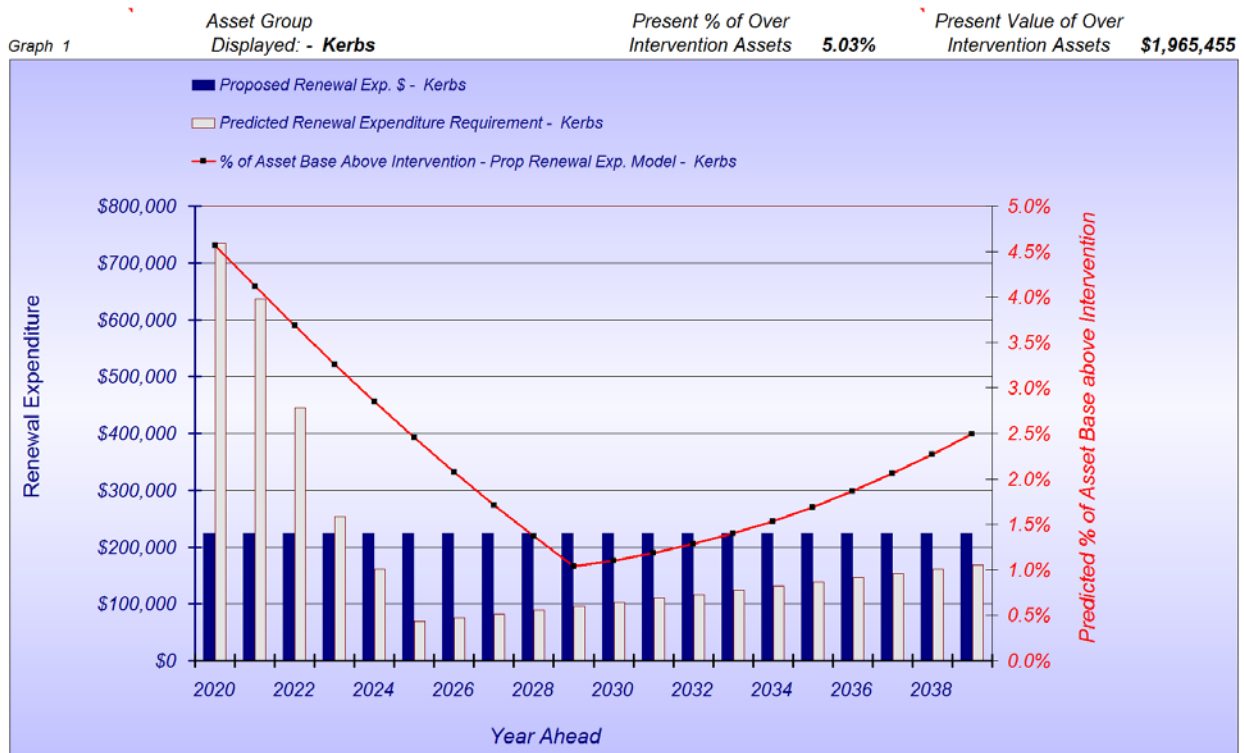


Figure K8 Recommended future Renewal funding strategy

The recommended that the average funding level over the next 10 years be set at \$225,000 pa. This is predicted to deliver on the condition outcome as detailed within Figure K7 above

7.3 Kerb Summary

The kerb assets were found to be in fair overall condition. Overall condition has declined over the long term but the extent of very poor condition assets has reduced over the same period.

It is recommended that the average funding level over the next 10 years be set at \$225,000 pa and reviewed again following the next condition survey

Section 8: Footpath Sub Assets

This section will deal with the Footpath Sub assets. It will look at both internal and external benchmarking of asset condition as well as providing financial forecasting of future renewal demand and projected asset condition.

8.1 Condition and Performance of Footpath assets

The same eight common key performance indicators are used for all road sub assets. An explanation for each is available within sections 4.1 to 4.1.6 above rather than duplicating those details here. Seven of the eight condition indicators that were appropriate to the Footpath assets have been used here.

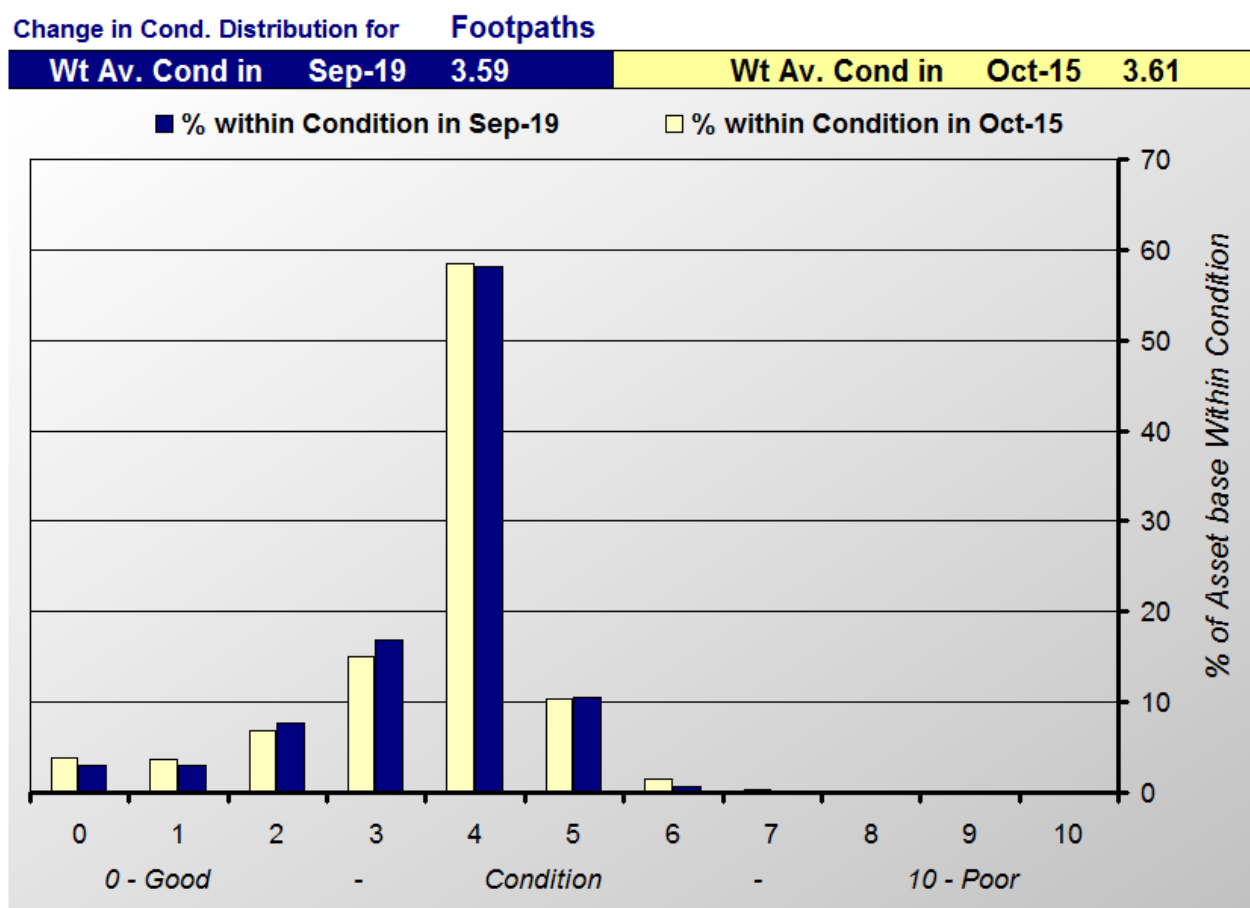


Figure F1 Condition Distribution Comparison Graph – Between Surveys

Key Cond. Indic. No.	Footpath Condition Indicator	Figures from Last Survey in Oct-15	Figures from Current Survey in Sep-19	Actual Change Negative is a Condition Decline	% Change Between Surveys	Better or Worse Since last Survey
1	Weighted Average Asset Condition	3.61	3.59	0.01	0.2%	Better
4	% of Asset Base above Condition 5	12.31	11.38	0.93	7.5%	Better
5	% of Asset Base above Condition 6	2.01	0.85	1.16	57.7%	Better
6	% of Asset Base above Condition 7	0.437	0.207	0.23	52.6%	Better
7	% of Asset Base above Condition 8	0.155	0.077	0.08	50.7%	Better
Renewal Demand Being Met For:		% of Annual Liability expenditure Planned in Future years		% of Annual Liability expenditure Since the time of the last survey		
Footpath Asset Group		12%		62%		

Figure F2 Condition Change since last survey & Renewal demand being met

The above 2 figures provide internal benchmarking that details how asset condition has changed since the last survey. Figure F1 provides the condition distribution for each survey along with the first of the key condition indicators, the weighted average asset condition.

Figure F2 contains seven of the eight key condition indicators that are appropriate to the Footpath assets. It also shows how they have changed since the previous survey. At the bottom of the table are two very important figures. These indicate the percentage of the annual liability rate that has been met since the last survey, along with the percentage planned for future years.

The Footpaths were found to be in fair overall condition. Weighted average asset condition had improved very slightly by 0.2% since 2015. But the extent of poor condition assets had reduced quite measurably since 2015. Council appears to be targeting the asset renewals very well.

8.1.1 Long term Internal Benchmarking

MAMS has undertaken 4 condition assessments of the Footpath assets since 2009 all on exactly the same basis and mostly with the same staff. This has enabled us to plot some long term condition trends. It is felt that the most important indicator is the extent of poor condition assets at and above conditions 6 - 8. These are the assets that will need to be rehabilitated in the immediate future depending upon your level of service.

Note that the footpath assets were not inspected in 2017 hence the result here is the same as it was in 2015. The 2017 survey is contained within our template for road pavements and hence appears here as well.

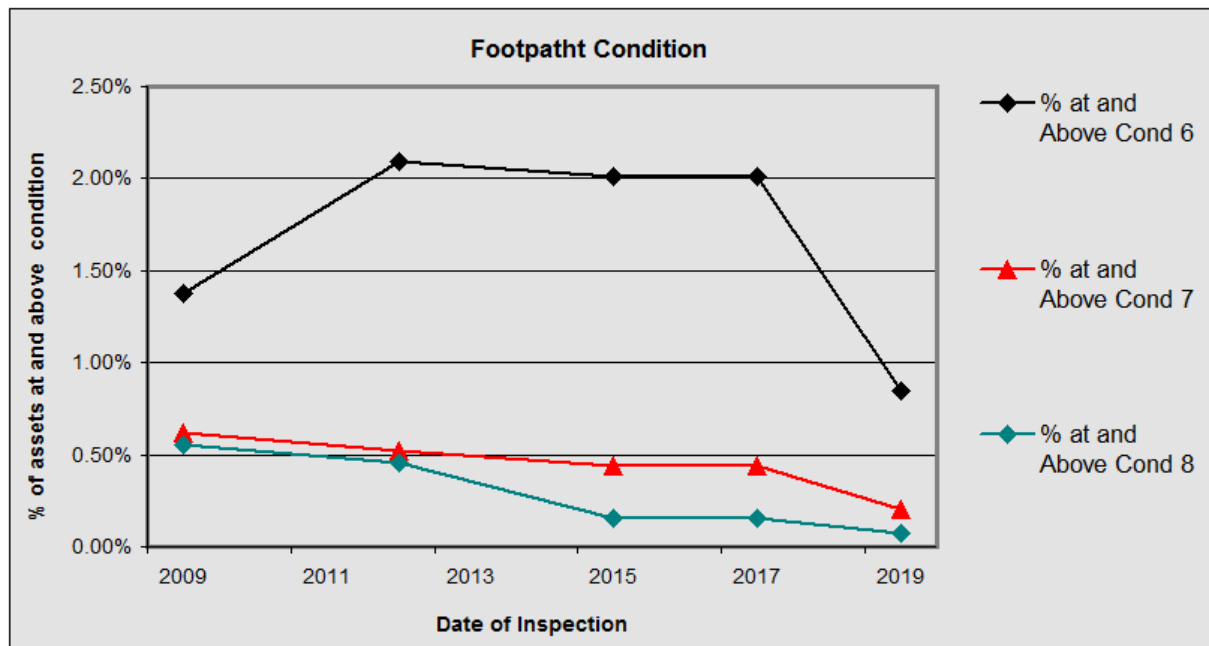


Figure F2-A Long term extent of poor condition assets.

Figure F2 - A shows a long term improvement in the extent of very poor condition assets at and above conditions 6 - 8.

Another way of looking at the whole picture is to track the "Weighted average asset condition" with time. This figure can be converted to a percentage of the asset base that has been consumed. Figure F2-B below tracks the estimated percentage of the asset base that has been consumed. The percentage runs to zero at condition 7.0 for Footpaths as indicated at the top of the graph.

Figure F2-A looks at the movement in the extent of very poor condition assets while F2-B is a single figure representing the estimated value within the whole sub asset group.

Zero Value Condition:

F/Path 7.0

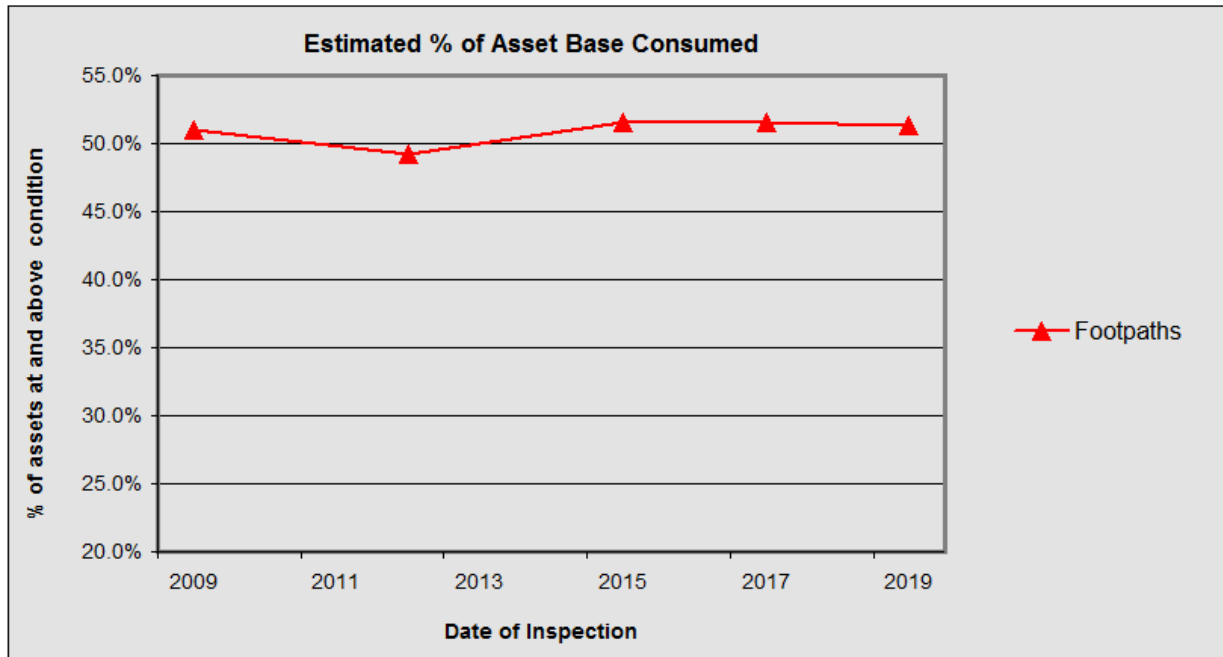


Figure F2-B Long term percentage of asset consumption

8.1.2 Summary - Internal Benchmarking

Figure F2-B indicates a very small overall condition decline trend since our first survey in 2009. But figure F2-A indicates that the extent of very poor condition assets at and above conditions 7 - 8 has been on a slow but steady decline since 2009.

8.1.3 External condition Benchmarking

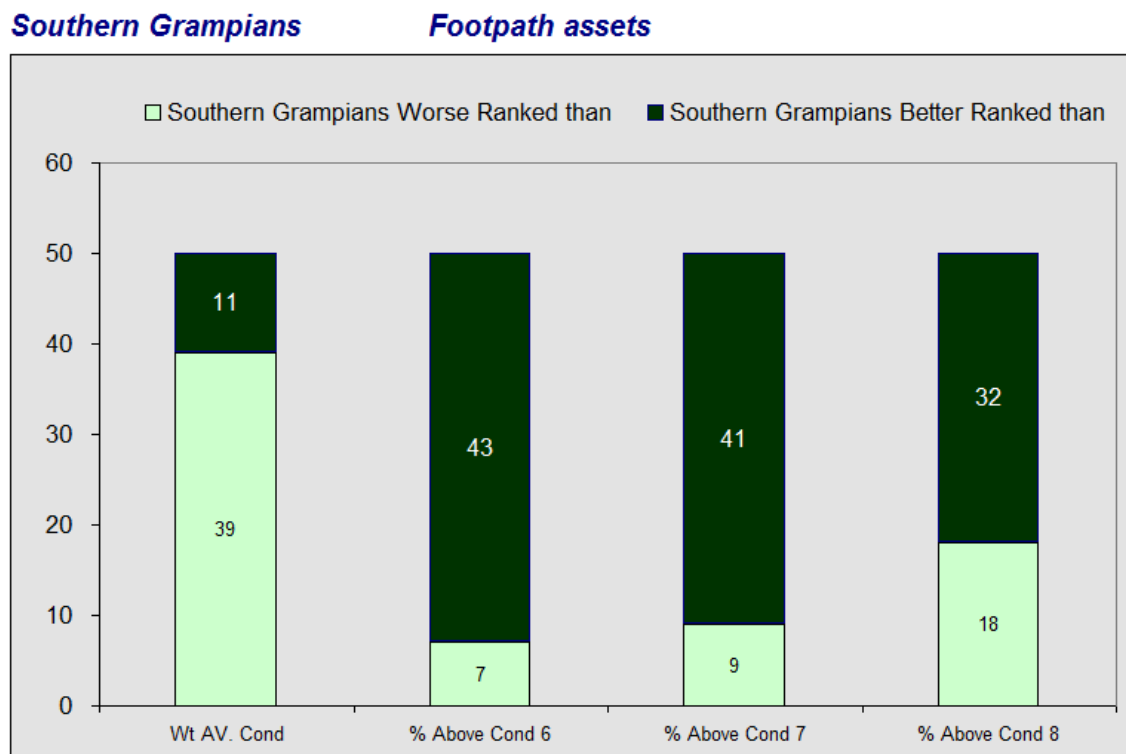


Figure F3 Key Condition Indicators as Compared with other Councils surveyed

Figure F3 provides external benchmarking based on the same key performance indicators as used internally in figure F2. The total number of councils assessed by MAMS on exactly the same basis is 42

for this sub asset class. The graph displays the number of councils ranked better and worse than Southern Grampians Shire for each of the six performance indicators. The dark green bars represent the number of councils that Southern Grampians Shire is ranked better than, while the light green is the number that Southern Grampians is ranked worse than.

The comparison with all 42 councils assessed by MAMS within Figure F3 indicates a set of ageing assets that are being very well managed. While overall condition is ranked quite low the extent of very poor condition assets ranks very well. Meaning that council is managing these ageing assets exceptionally well.

8.2 Footpath Financial Modelling Analysis

Footpath assets are modelled within several groups of like performing assets.

8.2.1 Footpath Assets – Selection of Retreatment Intervention Level

The point at which you choose to intervene to renew or replace an asset will have a big impact in the predicted future renewal demand. The intervention level can be seen as the level of service associated with the asset set. High intervention level equates to low level of service, while low intervention level relates to a high level of service.

Detailed below are a series of photographs illustrating various Footpath condition ratings. They do not cover the complete condition range but hopefully will provide some guidance to the selection of the retreatment intervention level.

	
Condition 0 – 1 Excellent condition	Condition 6 Extensive movement
	
Condition 7 Extensive cracking and movement	Condition 9 Very poor – Cracking and breaking up

It is very difficult to cover Footpath condition in such a limited range of photographs but hopefully they will provide some idea of asset condition in the 6 – 9 condition range where most interventions will take place. Footpaths can be within this condition range for a number of different reasons and the photos will cover only a limited range of these situations. They should be seen as one possible condition situation and not the only situation for that condition rating.

8.2.2 Footpath Assets – Financial Modeling Results

Footpath - Modelling Parameters

Modelling Parameter	Asphalt Footpaths	Concrete Footpaths	Brick Footpaths	Gravel Footpaths	Totals
Asset Quantity in sqm	25,374	128,846	15,776	14,246	184,242
Unit Renewal Rate	\$23.45	\$128.00	\$141.22	\$9.00	
Total Asset Group Renewal Cost	\$595,028	\$16,492,243	\$2,227,907	\$128,219	\$19,443,396
Annual Renewal Exp.	\$5,000	\$20,000	\$0	\$0	\$25,000
Retreat. Intervention Condition	7.0	7.0	7.0	7.0	
Life to Condition 10 in Years	35.0	120.0	80.0	35.0	
Life in years to Intervention	32.1	110.1	73.4	29.8	

Figure F4 – Summary of Modelling Input Parameters for Footpath Assets

Footpaths have been modelled within four groups as detailed in Figure F4 above.

The intervention level has been set at condition 7.0 as per council's asset management plan and is considered to be the industry standard intervention condition. The life cycle for the modelling work has been lifted from the 73 years for concrete paths adopted for accounting purposes up to 110 years to better reflect the lives coming out of our degradation curve analysis.

The ongoing repair of isolated Footpath failures does tend to extent the asset lives coming out of our degradation curve analysis as the assets tend to sit within the 4 - 6 condition range for longer than they would without the regular repairs. Thus it can be difficult to pin down a firm service life within the model.

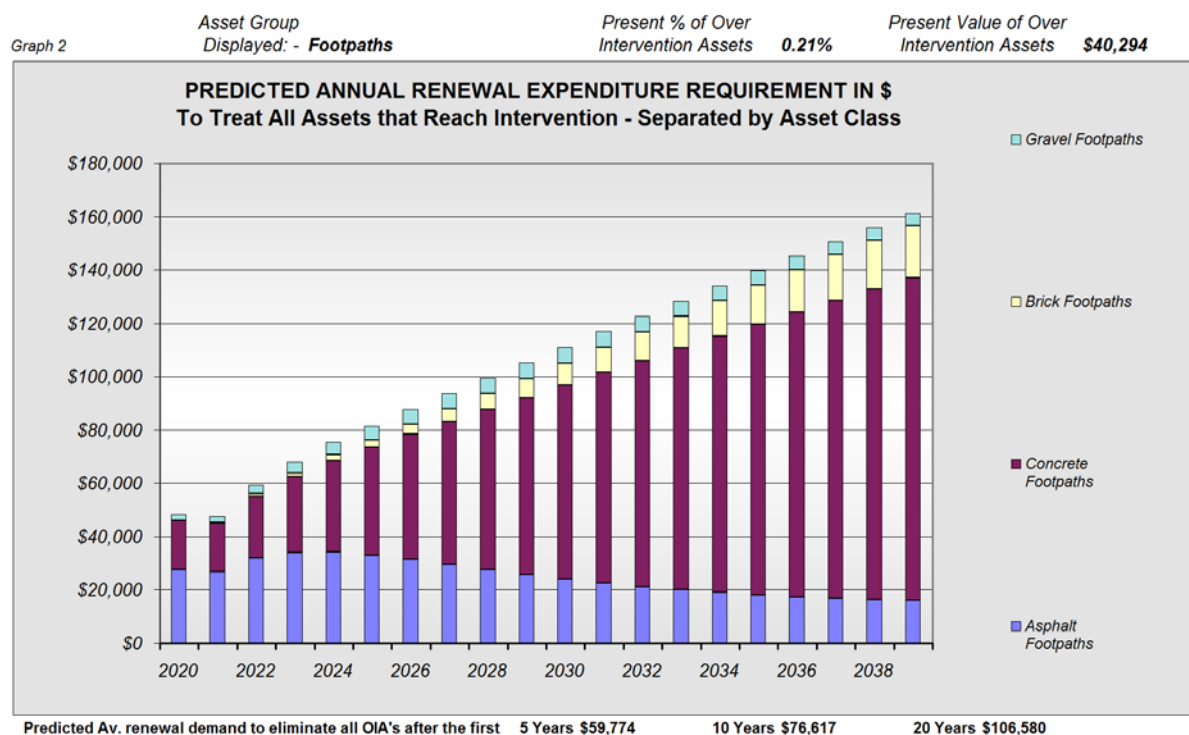


Figure F5 Predicted Renewal Demand to treat all assets that reach the Intervention level through normal decay

Figure F5 plots the annual funding profile required to eliminate all over intervention assets. If there is a large backlog of over intervention assets such that the raw year one demand is 30% or greater than the year two demand then the Moloney model eases the difference in over the first five years (this will show up as a reducing demand over the first five years). For this reason we prefer to quote the present renewal demand as the average figure for the first 5 years. In this case the first 5 year average renewal demand is estimated at \$60,000 pa. If this expenditure is maintained all OIA's will be eliminated after 5 years.

We did not assess footpath isolated failures so we were unable to include them within the financial modelling demand predictions.

Figure F5 indicates that the capital renewal demand pattern to treat all assets that are predicted to reach the retreatment intervention level over the next 20 years has an average annual renewal demand of \$60,000 pa for the first 5-years. The peak demand over the next 20 years was found to be \$161,000 in the year 2039.

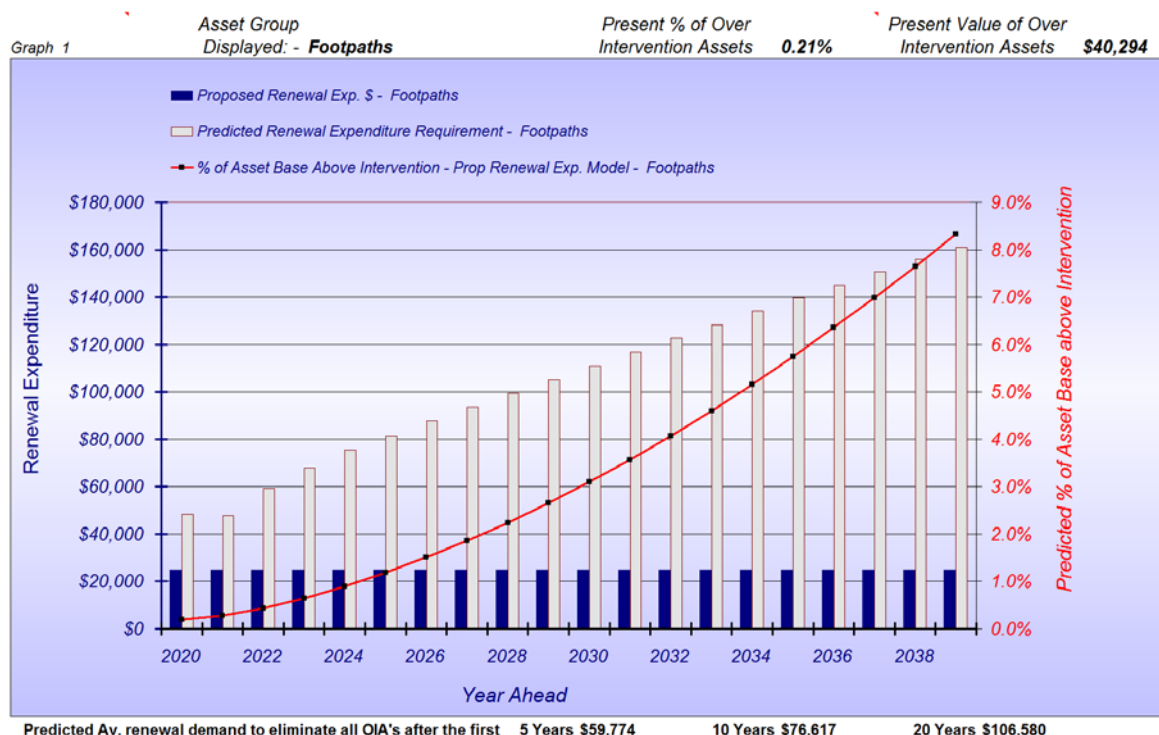


Figure F6 Future Predicted Condition Based on planned expenditure profile

Figure F6 plots the extent of the asset base that is predicted to rise above the intervention level (red line) based upon the continuation of the planned level of renewal expenditure (in blue bars). It also plots the predicted renewal demand to treat all over intervention assets within the grey bars (Same aggregate figures as within Figure F5 but not split into the individual modelling sets).

Figure F6 indicates that the planned renewal expenditure at \$25,000 pa, if maintained, will result in the present extent of over intervention assets of 0.21% rising to 2.65% after 10 years.

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model can also be used to allocate funding between the sub asset groups to deliver the best overall condition outcome for all road assets.

Please refer to Appendix D which explains why and how we set the desired extent of over intervention assets in terms of the number of year's worth of annual liability that it represents. Appendix D4 also provides an explanation of the Moloney funding scenario finder along with its three basic input criteria requirements. The three input criteria adopted for the Footpath assets are as detailed within figure F7 below with the results of the funding scenario finder operation contained within figure K8.

For the Footpaths we have set the level of over intervention assets at 132% of one year's annual liability which equates to 1.38% of the network. The current level being 0.21%. We have set the desired extent of over intervention assets just above the middle of the "Very Good" Range (Refer to Appendix D Figure D 1 for details).

The aim with the funding scenario finder is to deliver a consistent extent of over intervention assets across all road sub asset classes based on the number of years of annual liability that the over intervention assets represent. In this way the model also distributes the total renewal demand across all sub asset classes based on the actual demand.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2. Years to achieve Desired Condition outcome	Criteria 3 Annual % of Compounding funding increase (if required)
	Expressed as the % of One Years Annual Liability	Expressed as a % of The Total Asset Set Replacement Valuation		
Footpaths	132%	1.38%	10	0.00%

Figure F7 Modelling scenario finder inputs - Sealed Pavement Assets

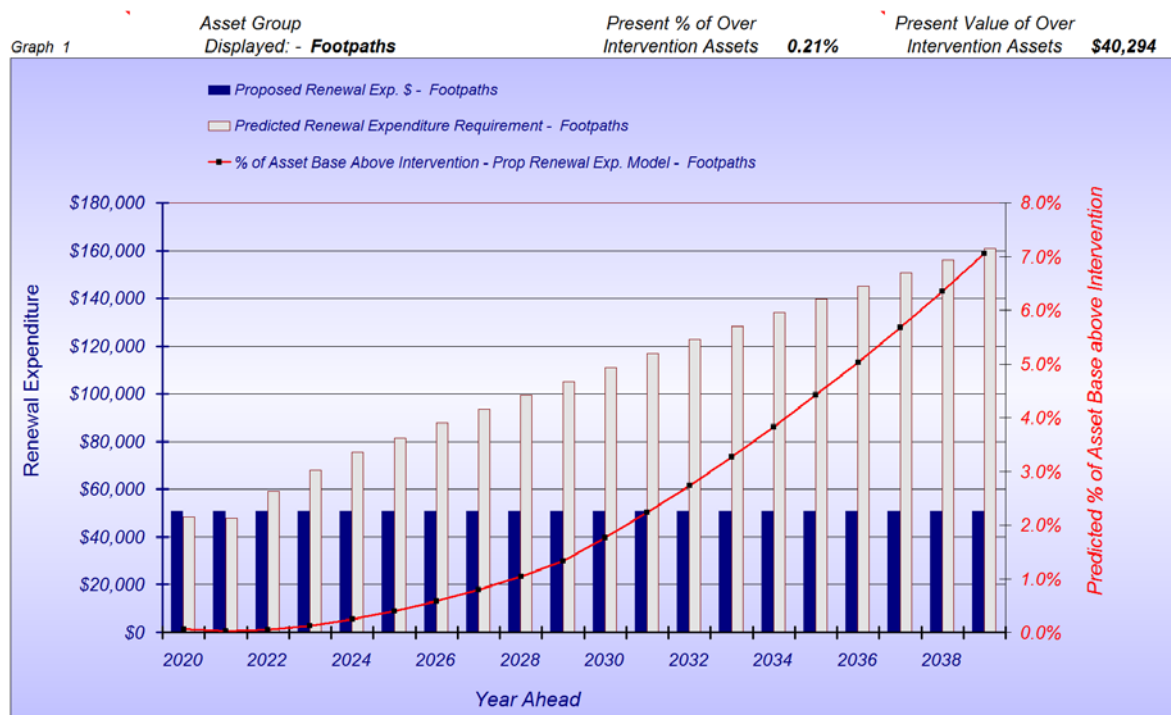


Figure F8 Recommended future Renewal funding strategy

It is recommended that the average annual renewal expenditure be set at \$51,000 pa for the next 10 years. This is predicted to deliver on the condition outcome as detailed within Figure F7 above.

8.3 Footpath Summary

The Footpath assets were found to be in fair overall condition but the extent of poor condition assets has been reduced over the long term.

It is recommended that the average annual renewal expenditure be set at \$51,000 pa for the next 10 years and reviewed again following the next condition assessment.

Section 9: Aggregated Modelling Results for the Road Network

9.1 Overall Financial Reporting

Accurate network modelling within the Moloney system depends upon several independent modelling variables. Council now has a good handle on most of these variables and the modelling results are becoming quite meaningful. Modelling has been based upon the ongoing rehabilitation of the existing asset base only and does not allow for an expanding asset base. Any proposed expenditure on the upgrading of existing assets must be added to the figures delivered within this report.

The Moloney System allows for the modelling of up to 40 individual asset sets and to then combine these results firstly into up to ten reporting groups (Sub asset sections in this report). Then finally into an aggregated set of reports for the whole road network. This section will deal with the aggregated modelling results for the whole roads group.

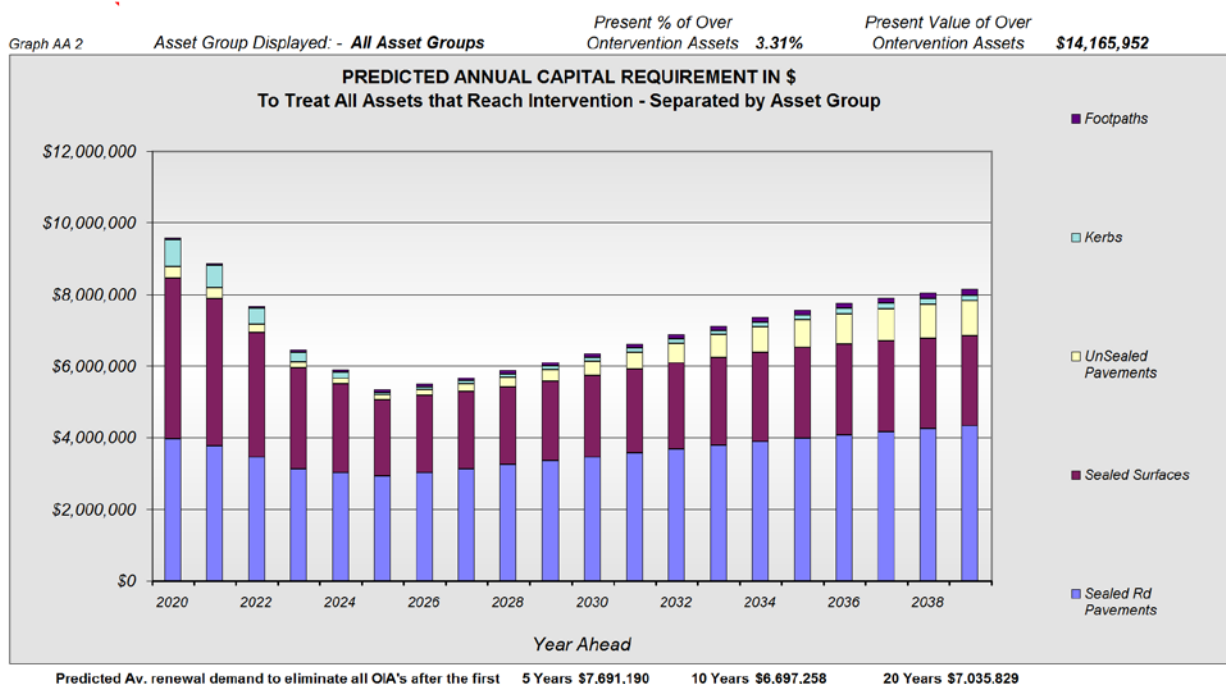


Figure Agg 1 Predicted Renewal Demand to treat all assets that reach the Intervention level

Figure Agg 1 plots the annual funding required to treat all over intervention assets within the first 5 years. It also splits the total renewal demand into the sub asset sets that were analysed within sections 4 to 8 above.

Figure Agg 1 plots the 20 year estimated renewal demand to treat all assets that are predicted to reach the retreatment intervention level through normal decay with time. Because the model is programmed to ease in the year one demand over 5 years when the raw year one demand is 30% greater than year two, it is best to report the commencing renewal demand as an average figure for the first 5 years. The average renewal demand over the first 5 years for the whole roads group is estimated at \$7,691,000. The peak demand over the next 20 years is \$8,145,000 in the year 2039.

Agg 1 also displays at the top of the graph the present extent of over intervention assets for the whole roads group expressed in three ways. Firstly as 3.31% of the total asset base valuation, which equates to a total renewal value of \$14,165,952. Finally as the number of year's worth of annual liability at 174% of one year's figure. The Moloney standardised condition descriptor table in Figure D 1 of Appendix D reports this extent of over intervention assets for the whole road network as being at the top of the "Good" condition range.

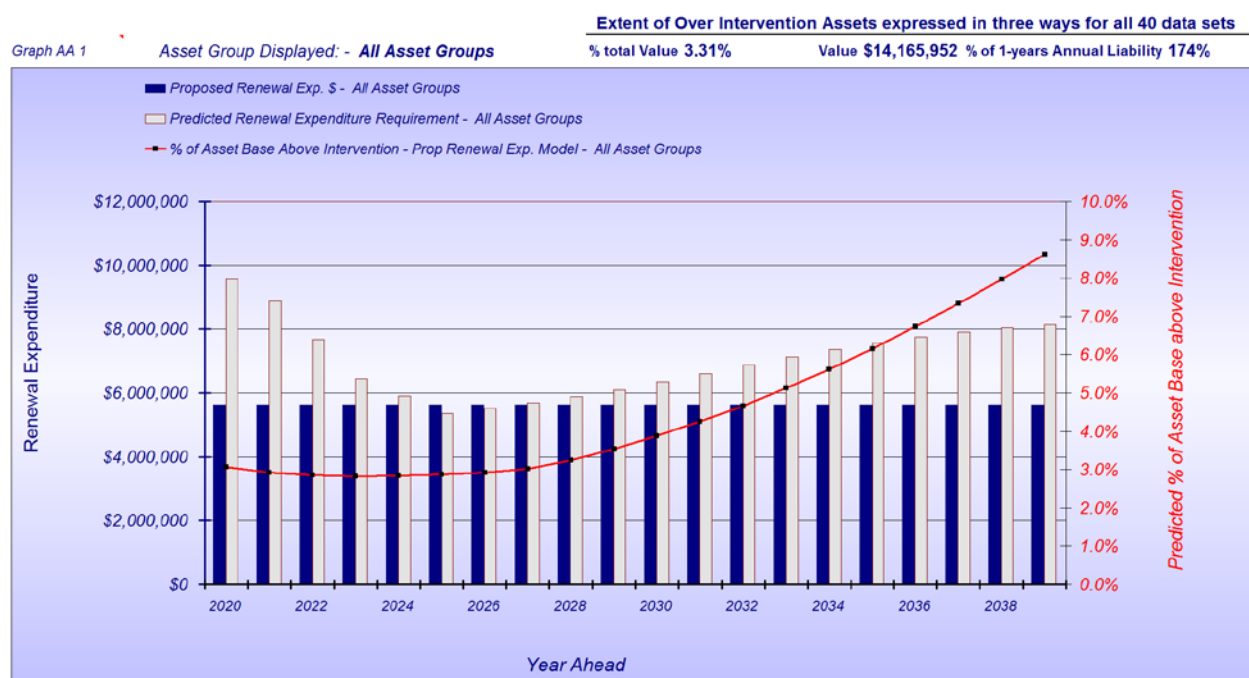


Figure Agg 2 – Future Predicted Condition - Based on the continuation of the planned expenditure profile

Figure Agg 2 plots the extent of the asset base that is predicted to rise above the intervention level (red line) based upon the continuation of the planned level of renewal expenditure (in blue bars) on the same basis as the present split between the road sub assets. It also plots the predicted renewal demand to treat all over intervention assets within the grey bars (Same aggregate figures as within Figure Agg 1 but not split into the sub asset modelling groups).

If the planned renewal expenditure of \$5,633,200 is maintained for the next 10 years figure Agg 2 indicates that the present extent of over intervention assets at 3.31% will rise to 3.54% after 10 years. But will further rise to 8.63% after 20 years. The better performance within Figure Agg 3 below with the same total starting renewal expenditure is as a result of the funding scenario finder better allocating the renewal expenditure strictly on a needs basis between the various sub asset sets.

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model is also used to allocate funding between the sub asset groups on a needs basis to deliver the best overall condition outcome for the whole roads group.

Please refer to Appendix D which explains why and how we set the desired extent of over intervention assets in terms of the number of year's worth of annual liability that it represents. Appendix D4 also provides an explanation of the Moloney funding scenario finder along with its three basic input criteria requirements.

Road Sub Asset Set Description	Criteria 1. Extent of OIA's		Criteria 2. Years to achieve Desired Condition outcome	Criteria 3	
	Desired extent of Over intervention assets as a % of one Years Annual Liability	Desired Over Intervention Assets as a % of total asset base		Annual % of Compounding funding increase (if required)	Annual Compounding increase in renewal expenditure expressed in \$
Sealed Rd Pavements	132%	1.93%	10	0.00%	\$0
Sealed Surfaces	132%	6.56%	10	0.00%	\$0
Unsealed Rd Pavements	132%	4.59%	10	0.00%	\$0
Kerbs	132%	1.04%	10	0.00%	\$0
Footpaths	132%	1.38%	10	0.00%	\$0
All Assets	132%	2.51%	10	0.00%	\$0

Figure Agg 3 Modelling scenario finder inputs - All Assets

The three input criteria adopted for each of the road sub asset sets are as detailed within figure Agg 3 with the results of the funding scenario finder operation contained within figure Agg 4.

Figure Agg 4 contains the results of the above three input criteria being applied to the Moloney funding scenario finder for each of the five road sub asset sets that were modelled. The same three criteria were adopted for all sub assets.

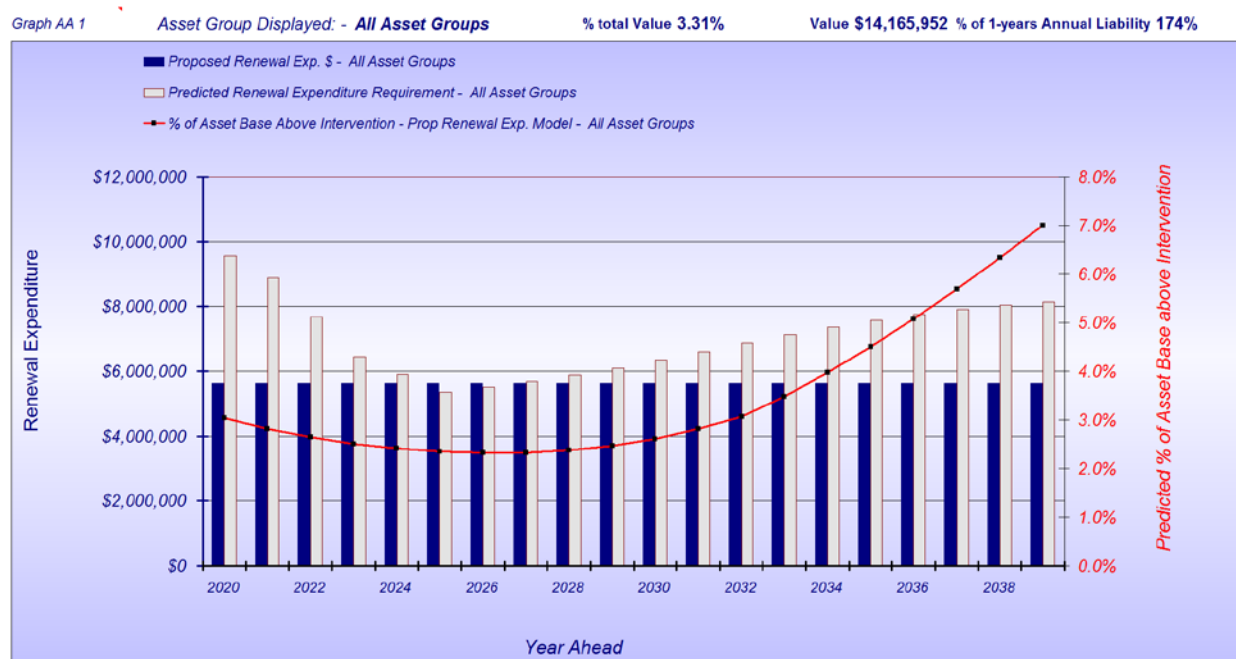


Figure Agg 4 – Recommended future funding Strategy

Figure Agg 4 details the recommended total renewal expenditure level for the next 10 years.

It was found that an average expenditure of \$5,633,000 pa would deliver the required condition outcome of 132% of one years annual liability or 2.47% of the total network replacement value at the end of 10 year.

Other scenarios can be run to achieve different outcomes on different time frames. The Moloney model is extremely versatile and it is strongly recommended that council spend the time to understand it and use it, as it will be a most valuable tool in the development of the 10 year financial plan for the organization. Note also that the model is not limited to road assets and can be set up to analyse any assets that are created, decay with time and then require replacement or renewal.

The model can also be set to allow for annual CPI increases. But over a 10 - 20 year time frame it can be difficult to distinguish between real increasing renewal demand and that relating to inflation. Hence our preference is to report in today's values only.

It is also stressed that the recommended funding strategy should be seen more as an average expenditure requirement over the 10 year modelling time frame. There may be years when expenditure is higher or lower, or where the funding split between the sub asset classes is changes. The primary aim of the financial modelling work is to deliver the average renewal demand across all of the road sub assets that were included.

Sub Asset Description	Present Annual Expenditure on Upgrades and New Assets	Average Planned renewal expenditure next 5 Years	Average Annual Liability (Based upon modelling lives and valuations)	Annual Depreciation based on Accounting valuations and lives	Average Capital Renewal Demand for next 5-years to eliminate all over intervention assets	Year of Condition Inspection	Recommended Commencing Year 1 funding level with a 0.0% annual compounding increase for 10
Sealed Pavements	\$5,320,000	\$2,400,000	\$4,325,766	\$2,519,513	\$3,470,000	2019	\$2,750,000
Sealed Surfaces	\$80,000	\$2,990,000	\$2,446,173	\$1,621,454	\$3,475,000	2019	\$2,485,000
Unsealed Pavements	\$0	\$140,000	\$857,437	\$684,009	\$240,000	2019	\$122,000
Kerbs	\$0	\$78,200	\$308,045	\$403,464	\$446,000	2019	\$225,000
Footpaths	\$100,000	\$25,000	\$202,963	\$302,121	\$60,000	2019	\$51,000
Totals	\$5,500,000	\$5,633,200	\$8,140,383	\$5,530,561	\$7,631,000		\$5,633,000
C - B Estimated Annual Consumption Rate		\$2,507,183					

Figure Agg 5 – Summary Table of Current & Recommended Renewal Expenditure Levels

Figure Agg 5 provides some important overall financial figures. It shows that Southern Grampians Shire is presently funding its road renewal program at an appropriate total level of \$5,633,200 pa. The full annual liability is estimated at \$8,140,383 pa, so the assets will be consumed at around \$2,507,183 pa.

There are some large differences between the "Annual Liability" (AL) figures and the "Annual Depreciation" (AD) Figures. The largest single difference relates to the sealed road pavement assets where the AL figure includes a sizeable allowance for the ongoing renewal of the gravel shoulders at the side of the sealed roads which are not included within the AD figure.

The other differences mostly relate to the different asset lives used in the development of the AL and AD figures. The AD figures are bound to Australian and international accounting standards that are really designed to deliver a tax deductible figure for business, while we have far more freedom with the AL figures to deliver the best estimate of the actual ongoing annual liability to manage the assets.

All figures within this report are in today's values. No allowance has been made for CPI increases. The Moloney software does have the capacity to report with an allowance for CPI if required. But over a 10-20 year time frame CPI lifts values quite markedly and it can be difficult to discern if a rising renewal demand is due to CPI or real growth in demand. Thus we prefer to report the predicted renewal demand in today's values.

Peter Moloney MIEAust Membership No 284058

Moloney Asset Management Systems

peter@moloneys.com.au

Appendix A: Asset Valuations

This appendix deals with asset valuations

A.1 Estimated Asset Valuations

Following the completion of the survey the data was placed into the Moloney asset management system and the table below represents a summary of the overall asset quantities and valuations. The annual depreciation figure of \$5,530,561 pa is based upon the best available accounting greenfields construction costs and the adopted accounting service lives.

Annual Depreciation has not been used within this report as the basis of the average long term renewal demand. We have adopted what we call the "Annual Liability" for this purpose. See Appendix E for the definitions of both figures.

The annual liability figures are all based on the estimated rehabilitation costs (Not greenfields construction costs) and we have more flexibility to set service lives that are closer to the lives coming out of the degradation curve analysis. In this way our financial modelling results can be more accurate and we can compare planned or recommended expenditure levels to the actual average annual long term liability rather than the annual depreciation which is designed to deliver a tax deductible figure for use in business tax calculations.

ASSET DESCRIPTION	Total Quantity	Units	Replace. Value \$	Asset Life in Years	Written Down Value \$	Accumul. Deprec. \$	Annual Deprec. \$	Average Date of Cond. Assessment	Annual Liability from Modelling inputs
Footpath	123,890	Lin. Met	19,443,396	67.4	10,711,251	8,732,145	302,121	1-Sep-19	\$202,963
Kerb	221,141	Lin. Met	38,572,668	92.4	18,556,258	20,016,410	403,464	1-Sep-19	\$308,045
Sealed Pavements	1,657,792	Lin. Met	258,515,589	92.7	112,133,858	146,381,730	2,519,513	1-Sep-19	\$4,325,766
Unsealed Pavement	863,100	Lin. Met	24,682,760	35.0	19,167,726	5,515,034	684,009	1-Sep-19	\$857,437
Sealed Surface	1,658,206	Lin. Met	49,305,350	28.4	19,359,099	29,946,251	1,621,454	1-Sep-19	\$2,446,173
			\$390,519,762		\$179,928,192	\$210,591,570	\$5,530,561		\$8,140,383

Figure 3.1 Table of asset valuations for financial modelling purposes

There is some variation between the annual depreciation and annual liability figures within Figure 3.1. Sometimes accounting valuations are restrained by Australian and international accounting standards that are more focused on delivering an annual depreciation figure for taxation purposes than an annual ongoing liability estimate.

We tend to ignore the accounting unit rates and life cycles if we feel they do not relate to delivering an accurate "annual liability" figure. The unit rates and life cycles used within the modelling process are focused on the best and most accurate actual financial outcomes and can vary from a strict interpretation of the accounting standards.

There are some large differences between the "Annual Liability" (AL) figures and the "Annual Depreciation" (AD) Figures. The largest single difference relates to the sealed road pavement assets where AL figure includes a sizeable allowance for the ongoing renewal of the gravel road shoulders which is not included within the AD figure.

The other differences mostly relate to the different asset lives used in the development of the AL and AD figures. The AD figures are bound to Australian and international accounting standards that are really designed to deliver a tax deductible figure while we have far more freedom with the AL figures to deliver the best estimate of the actual of councils ongoing annual liability to manage the assets.

Appendix B: Asset Degradation – Performance Curves

Asset degradation or performance curves, unique to the district, can be developed once two or more consistent condition surveys have been undertaken. This is done in the Moloney system by examining all assets within a given condition rating following the first survey and determining which have degraded by the time of the second and or subsequent surveys.

The condition change between surveys is used to predict the annual statistical probability of an asset degrading from one asset condition to the next. In turn this equates to an expected average life within each condition rating. The degradation curves serve two very important functions. Firstly they are used within the financial modelling section of the Moloney system to predict future asset condition movement and financial demand. Secondly they should form the basis of the justification for the selection of depreciation or service life cycles within the accounting system.

The term Degradation Curve comes from a particular format that the degradation data can be presented in. Figure B 1 below is a graphical representation of one of the pavement groups to be modelled and shows how an average asset within the group would perform. In this case it commences at year zero in condition zero at the top left side of the graph and progresses to reach condition 10 after 155 - years.

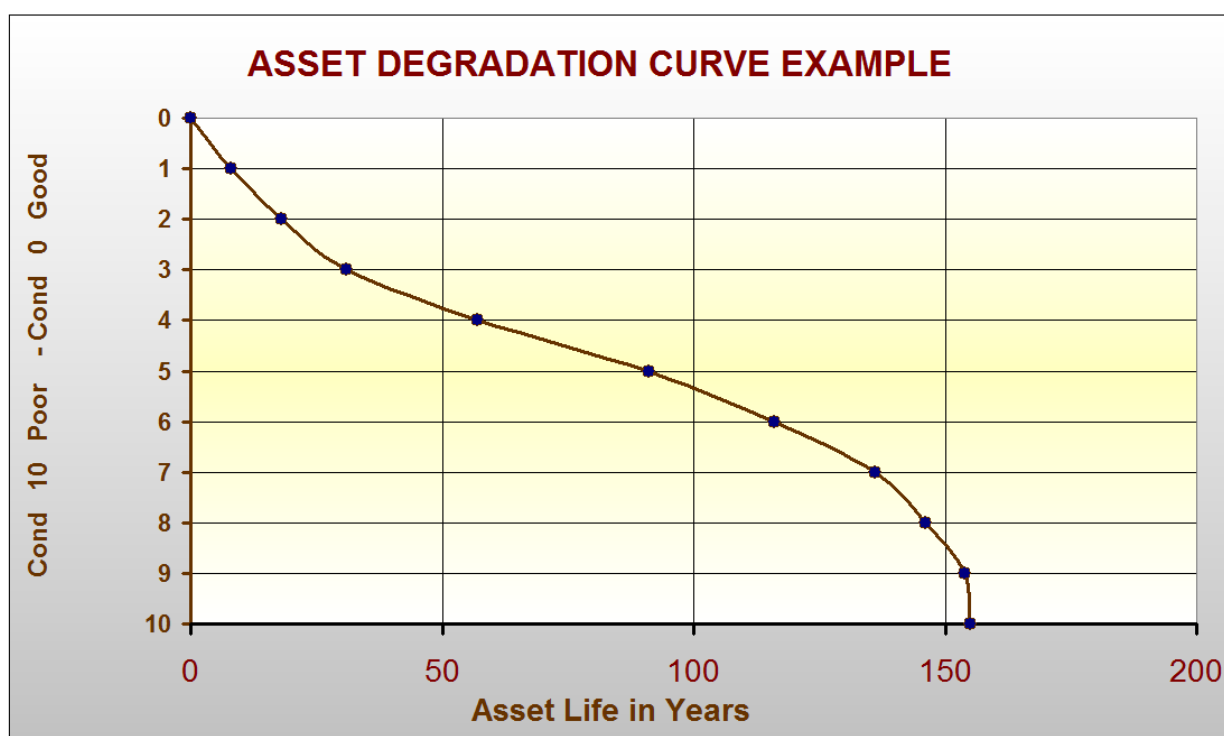


Figure B 1 Example of a Degradation Curve (See Fig B 2 First Column)

Within the asset degradation tables below the results are expressed as an expected life in years within each of the condition ratings 0 to 9. Little or no asset life is allocated above condition 8 as this is generally considered the upper condition limit for an asset to remain in service.

Figures sometimes need to be manually adjusted to remove inconsistencies resulting from small sample size at the extreme ends of the condition range. In all cases the total expected life will be reduced because of the small sample size. In no situations will the total life be increased other than the rare case where there are no assets present within a condition range that have degraded between the two surveys.

B.1 Degradation Curves as developed by MAMS

Degradation curves were produced for Southern Grampians Shire by analysing the change in asset condition over seven condition surveys since 2004

The total life illustrated in all of the tables within this section is the life to condition 10. In practice you will often intervene and rehabilitate before reaching condition 10. The total life is input into the financial model

and the life to the selected intervention level will be less than that figure depending upon where you choose to intervene.

If you choose a low intervention level (High level of service) then your life to intervention can be very much lower than the total life to Condition 10. Think of the car tyre analogy. Down to the indicator lugs at, 40,000 km. fully worn through at 70,000 km.

B.1.1 Sealed Road Pavement - Degradation Curves

Asset Condition Rating Range	All Urban Sealed Rd Pavements 2019 - 2004	All Rural Sealed Rd Pavements 2019 - 2004	All Urban Sealed Rd Pavements 2009 - 2013	All Rural Sealed Rd Pavements 2009 - 2013	All Rural Sealed Rd Pavements 2006 - 2013	All Rural Access Sealed Rd Pavements 2004 - 2015
9 - 10	1.0	2.0	1.0	1.0	1.0	1.0
8 - 9	8.0	5.0	2.0	2.0	2.0	2.0
7 - 8	10.0	15.0	20.0	15.0	10.0	10.0
6 - 7	20.0	15.0	28.0	15.0	15.0	15.0
5 - 6	25.0	20.0	20.0	10.0	10.0	16.5
4 - 5	34.0	13.8	15.0	8.7	7.7	10.4
3 - 4	26.0	10.8	14.0	8.0	6.9	7.5
2 - 3	13.0	8.0	12.0	5.4	6.0	6.0
1 - 2	10.0	5.9	6.0	3.9	4.7	4.1
0 - 1	8.0	5.9	4.0	2.0	3.4	4.5
	155	101	122	71	67	77

Figure B.2 Sealed Rd Pavement Degradation Table

Figure B 2 displays the average service life within each of the 10 condition rating changes starting with the life between zero and one and ending with the life from nine to ten.

Life cycles on the sealed road pavements were developed for urban and rural roads separately. The results tend to be a little higher than average and suggest the life to condition 10 for the urban sealed pavements will be around 120 - 150 years and for rural pavements 80 - 100 years. The service life to the respective intervention levels being around 110 and 70 years respectively.

B.1.2 Sealed Surface - Degradation Curves

Asset Condition Rating Range	All Asphalt Surfaces 2012 - 2019	All Spray Sealed Surfaces 2012 - 2019	All Asphalt Surfaces 2009 - 2015	All Spray Seals 2012 - 2015
9 - 10	0.0	0.0	1.0	0.0
8 - 9	1.0	1.0	2.0	2.0
7 - 8	2.0	2.0	6.0	6.8
6 - 7	7.0	5.0	8.0	4.4
5 - 6	7.2	6.3	4.5	3.7
4 - 5	9.0	5.0	6.4	3.2
3 - 4	8.3	3.4	5.0	2.1
2 - 3	3.1	2.8	3.9	1.8
1 - 2	3.4	2.2	2.8	1.7
0 - 1	4.2	2.2	4.1	1.7
	45	30	44	27

Figure B.3 Sealed Surface Degradation Table

The sealed surface assets are broadly in line with results from most other council district with total life to condition of 30 years for Spray seals and 44 for asphalt. The ideal intervention level for these assets is

within the 6.5 - 7.0 condition range so the life to intervention would be around 25 years for spray seals and 38 for asphalt.

B.1.3 Kerb - Degradation Curves

Asset Condition Rating Range	All Kerbs 2012 - 2019	All Kerbs 2009 - 2019	All Kerbs 2009 - 2015
9 - 10	0.0	0.0	1.0
8 - 9	5.0	5.0	2.0
7 - 8	10.0	10.0	10.0
6 - 7	25.0	30.0	20.0
5 - 6	35.0	35.0	25.1
4 - 5	35.0	40.0	35.0
3 - 4	26.7	18.0	12.5
2 - 3	12.3	9.8	6.6
1 - 2	6.0	6.1	4.5
0 - 1	5.8	6.5	4.1
	161	160	121

Figure B.4 Kerb Degradation Table

The kerb assets were found to have a total life to condition 10 of around 120 - 160 years and a life to the selected intervention level of condition 7 of around 105 - 130 Years. There are problems with the analysis of both kerb and Footpath degradation curves because of the way in which the assets are managed. They are not simply constructed and then follow the condition scale up with time. Isolated failures are often repaired as they occur and so the assets can sit for a very long time in the condition 3 - 7 range. Thus some care must be exercised in the use of these lives.

B.1.4 Footpath - Degradation Curves

Asset Condition Rating Range	All Asphalt Footpaths 2009 - 2019	All Concrete Footpaths 2009 - 2015	All Asphalt Footpaths 2009 - 2015	All Concrete Footpaths 2009 - 2015
9 - 10	0.0	0.0	0.0	1.0
8 - 9	1.0	5.0	1.0	2.0
7 - 8	2.0	6.0	2.0	10.0
6 - 7	3.0	9.7	3.0	11.6
5 - 6	3.0	35.0	5.0	40.0
4 - 5	5.0	35.0	5.0	35.0
3 - 4	5.0	20.3	5.0	10.3
2 - 3	5.0	12.7	6.0	6.8
1 - 2	7.0	5.1	8.0	3.1
0 - 1	4.9	4.8	4.0	4.1
	36	134	39	124

Figure B.5 Footpath Degradation Table

The two main footpath types within the shire are Asphalt and concrete. The life to condition 10 for the asphalt paths was found to be around 36 years and for concrete 125. The life to the intervention level being 30 and 110 respectively.

B.1.5 Unsealed Pavement - Degradation Curves

Asset Condition Rating Range	All Unsealed Pavements 2012 - 2019	All Unsealed Pavements 2016 - 2012
9 - 10	0.0	1.0
8 - 9	1.0	1.0
7 - 8	2.0	5.0
6 - 7	3.0	7.3
5 - 6	4.0	6.2
4 - 5	7.0	6.4
3 - 4	7.0	4.0
2 - 3	7.0	3.9
1 - 2	5.0	2.7
0 - 1	5.0	1.8
	41	39

Figure B.6 Unsealed Road Pavements Degradation Table

The unsealed pavements all have a full design depth of imported pavement material of 100 mm. The life to condition 10 was found to be around 40 years. The life to the intervention level around 30 years.

B. 2 Benefit of Unique Degradation Curves

Unique degradation curves developed via an analysis of condition change between surveys takes all variables into account to deliver a time - condition performance profile based upon the actual council locality. It is then used within the Moloney model to predict future condition change with time and greatly enhances the overall financial Modelling outcome.

In an indirect way the unique degradation curves take all variables into account. If council has a very poor attention to the maintenance of table drains alongside the rural sealed roads for example, the roads will decay more quickly and this will be reflected within the unique curves.

Appendix C - The Moloney Financial Model

C.1 The basis of the model

Predictive modelling is undertaken within the Moloney financial modelling software in the following way

- It is a whole of asset set model that predicts overall performance of the asset set not an individual asset.
- The model commences with the present condition distribution (series1 figures within each of the of the sub assets sections),
- The degradation curves are applied to the present condition distribution annually. If there was a 10 year life found within the degradation curves between conditions 3 and 4 then the model would degrade 1/10 or 10% of the condition 3 assets to condition 4 annually. This process operates across the condition range annually.
- From this point there are two distinct modelling paths. Model 1 and Model 2.
- Within Model No 2 - A retreatment intervention condition is nominated (level of service) and all assets that rise above the intervention level through the degradation process are returned as a capital renewal requirement. The primary output being a 20 year capital renewal profile to deliver a zero level of over intervention assets. (See the series 5 figures in each of the sub asset sections above). The model returns the repaired assets back to condition zero annually and they start their cycle again.
- Within Model No 1 - A proposed 20 year capital renewal expenditure profile is input and the model predicts the resulting asset condition change with time. (See the series 6 figures in the sub asset sections).
- Model No 1 takes the annual value of the planned renewal expenditure from the worst end of the condition distribution and put back to condition zero each year. Condition change can be monitored in a number of ways but the extent of the asset base that rises above the selected intervention level each year is considered to be the most useful. This is referred to as the level of "Over intervention Assets" or OIA's.
- We have also reverse engineered model No 1 through an iterative process to deliver a desired extent of OIA's after a selected number of years. The model delivers the annual expenditure necessary to achieve this outcome. We call this operation the "funding scenario finder" and a further explanation is available within Appendix D below. A detailed explanation is available from our web site at www.moloneys.com.au off the [Information](#) Tab - 1 The Funding Scenario Finder Aug 2018

C .1.1 More detail on the operation of the Financial Model

For a more detailed explanation of the model and how it works please refer to our web site at www.moloneys.com.au and from the Information tab download the PDF document titled "The basis of the Moloney Model". There is also an extensive amount of other background information. No log in or other details are required to be input on the web site for access to this information.

C.2 Source and Status of the Modelling Inputs

Modelling outcome is very much dependent upon the accuracy of the input data and how assets are grouped. The basic five input criteria required for the modelling process are detailed below with their source identified.

Rehabilitation Cost	—	Supplied by Council
Present Expenditure Levels	—	Supplied by Council
Asset Quantity	—	Directly from this survey
Asset Condition	—	Directly from this survey
Degradation Curves	—	Unique Degradation curves developed by MAMS

Modelling outcome is dependent upon all 5 of the above variables. If any one is of poor or questionable quality then the whole process can be flawed.

The degradation curves used in the modelling process within this report have been specifically developed for Southern Grampians Shire via a statistical analysis of asset condition change over seven condition surveys since 2004.

*For **Southern Grampians Shire** the modelling inputs are now considered to be quite strong and reliable.*

C.2.1 Asset Unit Renewal Rates

The asset unit renewal rates used within the modelling sections of this report are all based upon the projected cost to renew or rehabilitate the asset. Unit rates used within the asset valuation section may vary depending upon the accounting requirements of the council and may not directly relate to the values and or service lives used within the model.

C.2.2 Modelling Projections

This report is limited in its financial analysis of the costs associated with the ongoing cyclical rehabilitation of the existing road network. Costs associated with new or upgraded assets would need to be added to the total expenditure levels delivered here. The financial analyses undertaken within the report can best be seen as an estimate of the ongoing financial demand to maintain the present asset base in perpetuity.

Any variation from this approach would be detailed within the sub asset report sections. For example council may have a policy to reconstruct all sealed rural roads of a particular class to a minimum width of say 6.8 m. We can adjust the model to accommodate this policy and if this were done it would be explained within the relevant sub asset section.

Appendix D Setting the Extent of Over Intervention assets and the funding scenario finder

This Appendix will deal with the setting of the Intervention Level and the setting of the extent of Over Intervention Assets. It will also briefly cover the operations of the Moloney "funding scenario finder".

D.1 Definitions

D.1.1 Intervention Level - Level of Service

The Intervention level is the condition rating at which it is believed the asset should be replaced or rehabilitated. An asset usually commences at condition zero when new or newly rehabilitated and then progresses with time up the 0 - 10 condition rating scale. While the scale ends at condition 10 it would be normal to intervene to replace or rehabilitate the asset within the condition range 6 - 9 depending upon the desired level of service.

The intervention Level is simply the condition rating point at which the authority decides an asset should ideally be replaced or rehabilitated. You may not always achieve this level of service and the extent of the asset base that is above the selected intervention level at any time is your level of over intervention assets or your level of OIA's.

D.1.2 The Extent of Over Intervention Assets (OIA's)

The extent of OIA's is a very strong indicator of overall condition performance. In very simple terms it is the extent of the asset base that is above the selected Intervention level. It can be applied at an individual asset set level, a sub asset group level or at a whole of roads group level. It can also be expressed in a number of different ways three of which are illustrated at the top of Figure Agg 2 above and are as described below.

1. The OIA's as a Percentage of the total asset set valuation
2. The Dollar value of the OIA's
3. The OIA's as a percentage of the value of one year's average annual liability or consumption rate.

D.1.3 Annual Liability

The term "Annual Liability" is a practical substitute for the accounting term of "Annual Depreciation". They can be equal or quite close in value in some cases. But can also be very different in value. The problem stems from the purpose of each figure. Annual depreciation is designed to deliver the amount that can be claimed for taxation purposes for the ongoing consumption of an asset and has some strong restrictions in terms of international and Australian accounting standards.

Annual liability is aimed at providing an estimate of the future liability associated with the ongoing ownership and replacement of an asset. They are both derived in the simplest sense by dividing the replacement cost by the service life. But for a variety of reasons the best estimate of the replacement cost and the service life used in the derivation of annual depreciation can be quite different to your actual future liability to maintain the asset.

To simplify matters and to ensure consistent reporting within this document we have adopted "Annual liability" as our reporting figure that links to the future renewal demand associated with your assets.

Our annual liability figure comes directly from the replacement cost divided by the life to the selected intervention level as used for each individual asset set that is modelled. (You can see these two figures for each asset set within the series 4 tables within each of the sub asset set sections).

D.2 Setting the Extent of Over Intervention Assets (OIA's)

If you had \$1,000 as the level of OIA's on a total asset base of \$100,000 your extent of OIA's would be 1.0% (See 1 in D.1.2 above). Its value would be \$1,000 (See 2 in D.1.2 above). However, there is a problem in reporting on a simple percentage of OIA's across assets with different service lives. Just as there is in comparing the dollar value between authorities with very different asset replacement values.

For example, if reporting on a single asset set with a service life of 100 years that had OIA's of 10% of the asset base, this would represent a very poor situation, with 10 years worth of average annual liability as

the backlog. But if reporting on an asset set with a service life of 10 years that same 10% level of OIA's, would represent only 1 year's level of average annual liability and would be a very sound position to be in. Hence straight reporting of the percentage of OIA's does not translate well between assets with different service lives.

Similarly the total dollar value of OIA's cannot be compared between authorities with different asset base valuations and unit renewal rates.

To address this problem the extent of OIA's can be expressed as the number of years worth of annual liability (in accounting terms the number of years worth of annual depreciation) that the level of OIA's represents. The size of the backlog of OIA's expressed in this way provides a really strong indicator that is independent of both asset service life, total asset valuation and the unit renewal rate.

This is of particular value when using the Moloney funding scenario finder on multiple asset sets with different service lives. In this situation the desired extent of OIA's can be set just once within the model as a percentage of one year's annual liability, rather than manually selecting different percentages of OIA's to match expected service life. Service life is thus eliminated as a variable. The model can then apply the same condition outcome in financial terms to sub asset sets with quite different service lives.

D.3 Standardised descriptors for the level of over Intervention Assets OIA's

Figure D 1 has been developed as a guide to the selection of a suitable level of OIA's. The figures within the table are based on our 25 years of road condition rating experience, involving in excess of 245 full council road network surveys.

Guide to the acceptable extent of over intervention assets (OIA's)

% Range of one years Annual Liability	Your Asset Base renewal value at the top of this range	Value expresses as a % of the total Asset Base	Standardised Condition Description	Additional Comments on Descriptor
0% - 50%	\$4,070,191	1.0%	Exceptionally good	Extremely low levels of over intervention assets
50% - 100%	\$8,140,383	2.1%	Excellent	Very low level of over intervention assets
100% - 150%	\$12,210,574	3.1%	Very Good	low level of over intervention assets
150% - 200%	\$16,280,766	4.2%	Good	Low to acceptable level of over intervention assets
200% - 250%	\$20,350,957	5.2%	Fair	Condition only Fair and a little below the good range
250% - 300%	\$24,421,148	6.3%	Acceptable	Level of OIA's at the upper extent of the acceptable range
250% - 350%	\$28,491,340	7.3%	Poor	Moving into the start of the problem area
350% - 400%	\$32,561,531	8.3%	Very Poor	In need of urgent reduction
400% and Above	\$40,701,914	10.4%	Disastrous	Severe problems with assets in this condition

Figure D 1 Standardised descriptors for the level of OIA's

Figure D 1 displays nine ranges of OIA's expressed in years worth of annual liability. As explained above, linking the extent of OIA's back to the number of years of annual liability eliminates the problem that can occur with different asset lives. Reporting the extent of OIA's in this way provides a uniform platform that enables strong external benchmarking of Council performance as well as eliminating the bias that can occur with short life assets that may have what at first appears to be a high level of OIA's. It also allows the setting of a single and consistent extent of OIA's across several data sets with different service lives when using the Moloney model.

What the table is saying in the simplest of terms is that a level of one year's annual liability as the value of OIA's is an excellent position. Two years remains at a good level. Three years is at the top of the acceptable range and four year and more is considered to be a very poor overall condition.

Another way of looking at it is to think of it as the number of years you are behind in meeting the renewal demand in terms of year's worth of unmet annual liability, or average annual renewal demand.

Present extent of OIA's expressed in three ways			Your overall road asset condition based in the extent of OIA's	
Current % of OIA's expresses in years worth of average annual liability	Your present value of OIA's in \$	Your OIA's as a % of your total asset base valuation	Moloney standardised condition description	Additional comments on standardised condition descriptor
174%	\$14,165,952	3.31%	Good	Low to acceptable level of over intervention assets

Figure D 2 Your extent of Over Intervention Assets as a Percentage of one years annual liability

Figure D 2 presents your level of OIA's expressed as a percentage of one year's level of annual liability. Your figure being 174%. The table also records the total value of your OIA's in straight dollar terms as well as it's percentage of the total asset base replacement value.

IMPORTANT NOTE: The figures quoted within Figure D1 for Southern Grampians Shire are based on "Standardised Intervention Levels". We adopt the same intervention levels for all councils in the delivery of these figures so that your ranking as per Figure D1 will be consistent and comparable with all other councils.

Your figure at 174% of one year's annual liability is within the "Good" range as per figure D1 above.

Note that all figures used within the report that represent the average annual asset consumption rate (annual liability) are all linked to the asset lives and unit rates used within the modelling process. The report is in no way bound to accounting lives or unit renewal rates, as these can have accounting standards constraints that render them quite problematic in the prediction of future renewal demand.

D.4 The Moloney funding scenario finder and it's inputs

The Moloney financial modelling software has the capacity to develop a recommended renewal funding profile that will deliver a nominated extent of over intervention assets within a selected time frame. A global outcome can be set for the whole roads group. In this way the model is also used to allocate funding between the sub asset groups to deliver the best overall condition outcome for the whole roads network.

There are three input criteria that can be set independently for each sub asset class or they can all be set to a common figure for all sub assets. They are generally set to a common figure but sometimes there may be sound reasons why certain sub assets are set independently. For example you may require a zero level of over intervention assets on the Unsealed Pavements because of their perceived higher public risk while accepting some extent of OIA's on other sub assets.

The funding scenario finder operates within the Moloney model in an iterative way to find a recommended funding profile that will deliver on a desired condition outcome. There are three basic input criteria.

1. Desired extent of over intervention assets (OIA's)
2. Year ahead by which you wish to achieve this outcome
3. The value of any annual compounding percentage increase in renewal funding

D.4.1 Desired extent of over intervention assets

As detailed within D3 above the extent of over intervention assets is generally set in terms of the number of year's worth of annual liability that it represents. It is often set to the same figure for all road sub assets. But it can be varied if required.

D.4.2 Year ahead to achieve the condition outcome

This can be set within the model for any time frame from 3 - 50 years. The most common time frame used is 10 years, but in some cases this is extended to 20 years.

D.4.3 Annual compounding increase in renewal expenditure

This facility was included to enable the year one commencing expenditure to be lowered to match the planned renewal expenditure. In this way a funding strategy can be developed that commences from your present level of renewal expenditure and ends up at a higher level in later year. Most councils do have a growing renewal demand and this facility caters for that situation. It is designed to deliver a proposed future funding strategy that starts from where you currently are and gets you to where you need to be with asset condition in future years.

D.4.4 The funding scenario finder operation

The program uses the Moloney Model No 1 (see Appendix C 1 above) in an iterative way to deliver the recommended funding strategy. Model No 1 was designed to deliver the predicted condition outcome for a selected renewal expenditure profile over a 3 - 50 years time frame.

An iterative process has been set up within Model No 1 based on the above three input criteria. It commences by estimating the year one commencing funding level required to achieve the condition outcome. It then keeps adjusting that figure by lifting or dropping it depending upon the condition

outcome. When the condition outcome is within 0.05% of the desired level (as set in 1 above) the process ceases and that figure is returned as the required year one commencing expenditure level.

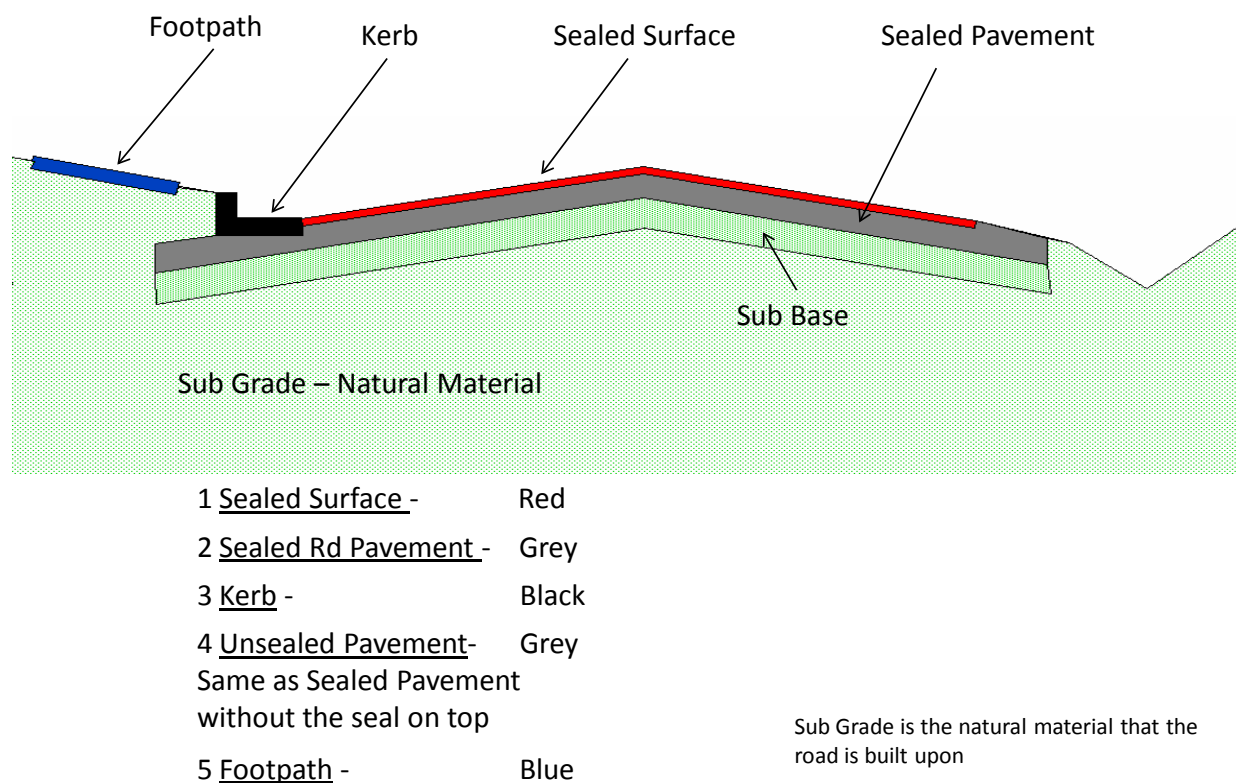
Within the Moloney software the scenario finder can be run for a single asset set or more commonly for all road sub assets. When running it for multiple road sub asset sets it has the added advantage of splitting the total renewal funding on a needs basis between the different road sub asset classes and ensuring that none of them get forgotten.

Appendix E: Road make up and the Road sub Assets

This section will provide details of the five possible sub asset components that make up the full road asset group.

E.1 The Road Sub Asset components

The infrastructure assets within council's road reservations consist broadly of the following five sub assets.



Sub Base is a second pavement layer that may or may not be present

Figure E.1 Road cross section showing the five possible road sub asset sets to be examined

The total road asset is broken down into five like performing sub asset sets as detailed above. The main reason for separating the road assets is to group them into like performing assets with the same service life. For example the sealed surface on the top of a sealed road pavement may have a service life of 10 - 20 years while the underlying pavement may be in the 50 - 150 year range. Hence they cannot be examined or modelled as a single asset set.

E.1.1 The Sealed Surface Sub Asset Set - Red

The sealed surface is the thin sprayed bitumen seal or asphalt surfacing that seals off the underlying pavement from the intrusion of water. Its primary purpose is to waterproof the underlying pavement as well as maintain a more constant moisture content within the pavement layer. It also provides a smooth wearing surface. Typical service life 15 - 30 years

E.1.2 The Sealed Road Pavement Sub Asset Set - Grey

The sealed road pavement is made up of a granular material (crushed rock, gravel or the like) that is used to distribute the imposed vehicle wheel load to the underlying soil over a greater area than the wheel contact area, such that there is little or no deformation or movement in the underlying soil. Pavements do break down and move with time and typically their service life would be in the 50 - 150 year range.

E.1.3 The Kerb Sub Asset Set - Black

Kerbs in urban areas are normally constructed of concrete and are used to drain water away from the pavement. They tend to have a life similar to the sealed road pavement. They also assist in retaining the pavement edge in place.

E.1.4 The Unsealed Road Pavement Sub Asset Set - Grey

The unsealed road pavement performs the same role as the sealed pavement except that it does not have the additional protection of a sealed surface. Its service life is generally shorter than the sealed pavement and typically would have a life of 15 - 30 years.

E.1.5 The Unsealed Pavement Sub Asset Set - Blue

Unsealed Pavement assets are not really related to the road itself and can be seen as pavements for foot traffic. Their life may vary greatly and can be quite extensive if localised failures are repaired as they occur. Typical service life for concrete Unsealed Pavements is 40 - 80 years.

As can be seen from the above very brief descriptions, the adopted road sub asset components all have different lives and performance requirements. This is why they are examined and modelled separately.

This survey has covered all of the above road sub assets.

Appendix F: What the condition Inspection has Delivered

This appendix will deal with and explanation of what the condition survey has delivered.

F.1 Segmentation and measurement of the road network

The linear road network was broken down into like performing segments that were generally constructed at the same time. Then each of the five sub asset components that were present within each segment and were to be part of the condition survey were measured quantified and condition rated.

For Southern Grampians Shire the full road network was broken down into 4,045 individual like performing segments. Each segment was then measured and condition rated for the particular sub assets that were present.

F.2 What has been delivered

Once this data was placed within the MAMS System, the software delivered a range of outputs including those listed below.

F.2.1 Capital works programs

Works programs in priority order, based upon both the condition of the assets and the hierarchy or relative importance of the road, can be delivered within the following areas:

- Reseal – resurfacing program on sealed roads
- Sealed Road Pavement Rehabilitation program
- Sealed Road Pavement Major Patching or dig out repair program
- Sealed Road shoulder repair program
- Unsealed Road Resheeting program.
- Unsealed road spot patching program.
- Kerb Renewal program and a separate Isolated Failure repair program.
- Unsealed Pavement Renewal program and a separate Isolated Failure repair program.
- A host of other major maintenance reports such as crack sealing report, edge break report etc. These can be extracted from the data and are programmed directly into the MAMS road software.

F.2.2 Asset valuations

Asset valuations can be delivered based on either the condition or the age of the assets. For a detailed explanation of the road asset valuation methodology adopted by MAMS please refer to the document titled [Road Asset Valuations June 2017](#) available on our web site at Moloneys.com.au under the Information tab.

But a note of caution, the asset valuations presented within this report may vary from those adopted for accounting purposes. There are a lot of matters to be considered in the delivery of the accounting valuation figures and unless we were specifically engaged to deliver accounting valuations our figures may vary from councils adopted figures and you are advised to undertake your own accounting valuations using the survey data set as the basis of that operation.

F.2.3 Prediction of future financial renewal demand

The Moloney financial model can be used in conjunction with the survey information to deliver a prediction of the ongoing renewal demand and a recommended future funding strategy. See Appendix C and D for more details relating to the operation of the Moloney Model.

F.2.4 Performance benchmarking

Council's asset performance since the last survey is benchmarked against a series of key performance indicators. We also provide longer term benchmarking where there has been more than 2 condition inspections undertaken. Externally benchmarked is provided against all councils assessed by MAMS on the same performance indicators, currently 69 councils.

Appendix G Glossary of Terms and Definitions

The table below contains a list of explanations for some common terms and phrases that have been used within the report

Term Used in Report	Explanation
Asset Condition Rating Scale	The condition Rating scale for all assets is on a (0 - 10) scale with 0- Brand new and 10 - No remaining value
Annual Depreciation	This is an accounting term designed to deliver the annual tax deductibility associated with an asset. It is largely irrelevant to Local Government financial management and forecasting, but Australian accounting standards dictate that it be reported upon even though councils do not pay income tax.
Annual Liability	This is the average annualised cost of the future replacement of the full extent of the asset base. It can vary dramatically from "Annual Depreciation". Financial Forecasting needs to be linked to the Liability of future renewal or replacement cost rather than historic cost. Throughout the report any reference to "Annual Liability" will be linked to the financial modelling unit rates and service lives and not those used for accounting purposes.
Asset set	This is an individual set of assets that is modelled within the Moloney model as a single asset set. There may be five sealed road pavement "Asset Sets" that make up the Sealed Rd Pavement asset group or "Sub Asset Set". They are generally modelled separately because of different "Service Lives" and or different "Levels of Service"
Backlog	This is an alternative term used to express the extent of Over Intervention Assets as a backlog of unmet renewal demand.
Funding Scenario Finder	The Moloney Financial Model has an inbuilt function that can create a recommended funding profile across the whole of the roads group based on a desired extent of over intervention assets (OIA's) after a set time frame. The scenario finder enables all asset sets to be modelled together and to also have the renewal expenditure optimised between the sub asset groups.
Greenfields - Brownfields Construction costs	These are accounting terms that can have a huge impact on financial modelling outcome. Greenfields construction cost is the original cost when the site was vacant with no traffic or other incumbrances. Brownfields construction cost is the cost associated with the reconstruction of the asset with all of the additional incumbrances such as other services, traffic etc. ALL replacement costs within this report are based on Brownfields costs as this is the only realistic way to undertake meaningful financial modelling.
Intervention Level - Or Retreatment Intervention Level	This is the point within the condition rating scale (0 - 10) that you determine the asset needs to be replaced or rehabilitated. It represents your planned level of service and is normally within the 6 - 9 cond. Range
Level of Service	Level of service within this report is directly related to the selected "Intervention Level". Low intervention level delivers high level of service, while high intervention level delivers Low level of service.
MAMS	Moloney Asset Management Systems.
Moloney Standardised Condition Descriptor	This is a description developed by MAMS that links overall asset condition to the extent of over intervention assets expressed as the number of years worth of "Annual Liability"
OIA's	"Over Intervention Assets"
Over Intervention Assets OIA's	This is the extent of the asset base that is above the selected intervention level. It is the extent of the asset base that needs renewal now. Sometimes referred to as the backlog of OIA's
Replacement Value	All replacement values used within this report (other than within Appendix A dealing with accounting valuations) are based on the actual planned replacement or rehabilitation cost of the asset. Also referred to as the "Renewal Cost". It may vary considerably from the accounting replacement cost. (See "Greenfields - Brownfields" Definition)
Service Life	This is the expected life in years that an asset on average will remain in service. Service life will reduce as your level of service improves with lower intervention levels. You don't get the additional asset life that could be obtained beyond the intervention level (if adopting a higher level of service).
Sub Asset Set	For reporting purposes this document has adopted up to five road sub asset sets within the broader roads asset group. They are, Sealed Rd Pavements, Sealed Surfaces, Unsealed Rd Pavements, Kerbs and Footpaths. The asset sets are modelled and reported upon separately within the report, broadly in line with councils funding categories.

Figure G 1 Glossary of terms and Definitions used in report