Appendix 1

Road Asset Management Plan:

Argyll and Bute Council

Annual Status and Options Report:

October 2014

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Document Information

Title	Road Asset Management Plan - Annual Status and Options Report
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Description	The document enables authorities to report the current condition of their Road assets to management and Elected Members and to structure and present options for future investment based upon the predicted condition and level of performance possible for different budget levels.

Document History

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1.0	Draft	Oct 2014	J.MacCormick	Not applicable
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Contents

1 Executive Summary

As Scotland's second largest local authority, our road network extends some 1400 miles and is the largest and most valuable asset in Argyll and Bute, with an estimated value of over £2.5billion.

Our unique geography, with over a third of our road network on islands, presents challenges to the ongoing maintenance of the network in terms of both costs and logistics, particularly when it comes to resurfacing work, where materials have to be sourced from mainland suppliers then transported to the islands by sea.

Connectivity is absolutely vital and is clearly a key economic driver for the area, keeping communities connected, allowing for the transport of goods, for commuting, for living and for working in our stunning area.

The importance of our transport infrastructure has been recognised by our communities in a Citizens Panel survey earlier this year and was also highlighted by key players from local and national government as well as business experts at the recent Argyll and Bute Economic Summit, hosted by the Community Planning Partnership.

The road network is responsible for conveying the vast majority of our visitors and the freight that is crucial to supporting our economy and can provide the ideal tool to market Argyll as a great place to live in, to work in and to visit. Its significance cannot be overstated.

A major part of the council's Lorn Arc regeneration initiative funded through the Tax Incremental Finance (TIF) scheme is the development of the road network around Oban. These improvements will allow for the free and easy movement of traffic around Oban, unlocking the huge development opportunities around renewables and marine science, allowing for access to new business parks and housing developments.

The council has made a major investment of over £23million in the last three financial years, including this one, which improved the overall condition of our road network. This successful investment project has seen a mix of resurfacing work, patching, surface dressing and in-situ surface recycling throughout the council area.

Using the Road Condition Index (RCI), the nationally accepted methodology for establishing the fitness of a road network, we can see that the road network has improved, on average, by over 3% because of the roads reconstruction programme.

It should, however, be noted that this system, developed by the Society of Chief Officers of Transportation in Scotland (SCOTS), does not necessarily take into account the unique topography of Argyll and Bute and can indicate that some of our roads are in a red condition when they are, in fact, entirely serviceable. The methodology also considers all 'A' designated roads in the same way, whereas in practical terms these roads can differ greatly, from Great Western Road in Glasgow to an 'A' road on Jura.

In practical terms this investment means there are now more roads throughout the council area regarded to be in green or good condition and, more importantly, fewer roads in the red or at risk state. Almost 90% of our 'A' class roads are in good or fair condition. By the end of 2014/15 we will have upgraded almost 360 miles or 25% of our road network, including over a third of our 'A' designated roads.

By the end of financial year 15/16 we will have upgraded around 45% of our 'A' roads and 35% of our 'B' roads. Over the course of the three year programme to date we have upgraded a number of strategic routes such as:

- In Helensburgh and Lomond the A814 and the A818
- In Bute and Cowal the A815 and A886
- In Oban, Lorn and the Isles the A819 and A816
- In Mid-Argyll, Kintyre and the Islands the A83 south of Kennacraig prior to its trunking
- On Mull the A848. A884 and the A848
- On Islay the A846 and the A847
- We have also upgraded the B836 Glen Lean route across the Cowal peninsula, opening up the route for timber transport

Despite the success of our roads capital programme and the general improvement in our road condition there is a continuing need to invest in order to enhance the network further, in line with the Scottish national average.

By their very nature roads will deteriorate over time, mainly as a result of traffic and water penetration, although a number of factors will affect the speed of this weakening. The value of regular preventative maintenance is difficult to quantify exactly, however, it is a generally accepted principle that regular low-cost preventative maintenance is the most effective way to maintain a road network. In practical terms, if we spend regularly on maintaining the integrity of a given road this will be cheaper than not maintaining it and having to carry out a full reinstatement some time down the line. Adequate preventative maintenance is the key to avoiding future financial liabilities for the council.

This report gives a detailed summary of the council's road assets (including structures such as bridges and walls, streetlights, street furniture and traffic lights) as of April 2014, and a range of future investment options.

The detail of this report is based on the current available data; a full survey of the network has started this year, the results of which will be used to inform a more detailed benchmarking in future years.

1.1 Options

The options presented for each asset group consider that funding will continue at its current level, give details of the indicative costs of maintaining our current standards and predict the effects of budget changes. Where possible the impact of each option is assessed in terms of the service for users, the future financial

risks for the council and the condition of the assets and provides a number of scenarios based on levels of investment and treatment types.

This report is designed to help inform members' future investment decisions and highlights the significant risks to the integrity of the road network as well as the council's reputation and the long-term financial liabilities should we not continue to invest in our roads infrastructure in the short to medium term.

1.2 Grant Aided Expenditure (GAE)

Grant Aided Expenditure (GAE) and Special Islands Needs Allowance (SINA) are the first steps in the calculation of the General Revenue Grant (GRG) which each local authority receives annually from the Scottish Government. GAE is split into 94 individual service level GAE 'lines' (for example, Primary School Teaching Staff) each with its own methodology and these lines are summed to give GAE totals for each authority.

GAE is a systematic means of allocating the pre-determined Spending Review funding totals equitably amongst local authorities based on a 'client group' approach. The Client Group approach is an evidence-based method used to estimate relative proportions for local authorities of individual GAE lines. The method takes into account variations in demands for services and the costs of providing them to a similar standard, and with a similar degree of efficiency.

The GAE allocation for Argyll and Bute Council over the period 2012-15 for all transport lines is detailed in Table 1.2a below. It should be noted that values do not reflect any changes due to the recent Trunking of the A83 Kennacraig to Campbeltown Road.

Table 1.2a GRANT AIDED EXPENDITURE

Local Government Finance Settlement 2012 - 2015

GAE Category	**2012-13 (£000`s)**	**2013-14 (£000`s)**	**2014-15 (£000`s)**
Road Maintenance	£7,419	£7,419	£7,419
Winter Maintenance	£2,576	£2,576	£2,576
Road Lighting	£1,302	£1,302	£1,302
Road Administration	£1,594	£1,594	£1,594
Sub Total	**£12,891**	**£12,891**	**£12,891**
Support for Buses	£498	£495	£491
Concessionary Fares	£542	£543	£541
Support for Ferries	£898	£898	£898
Support for Airports and Harbours etc	£467	£467	£467
Support of Glasgow Underground	£110	£110	£110
Grand Total GAE Allocation	**£15,405**	**£15,402**	**£15,398**

Comment – Rounding of values may influence totals

Data Source – 'Green Book' for Grant Aided Expenditure 2012-15

It is important to note that individual service GAE allocations are not, and have never been, budgets or spending targets but are simply an allocation methodology designed to distribute the overall levels of resources to be made available. They are not intended to be used by local authorities to allocate resources. The decisions about the amounts allocated to individual services are made entirely by the local authority on the basis of local needs, having first fulfilled its statutory obligations and the jointly agreed set of national and local priorities.

The budget allocations made by Argyll and Bute Council in respect of the road asset are detailed within Table 1.2b below. The values for financial year 2012-13 are actual spend.

	Table 1.2b Argyll and Bute Council Budget Spend and Allocation			
Category	**2012-13 (£000`s)**	**2013-14 (£000`s)**		**2014-15 (£000`s)**
Revenue Budget	**Spend**	**Spend**		**Budget Allocation**
Road Maintenance (Carriageways, Footways, Structures, Street Furniture)	£4.756	£4.544		£4.200
Winter Maintenance	£2.534	£2.034		£1.250
Road Lighting (Street Lighting , Traffic Signals)	£0.408	£0.436		£0.104
Revenue Total	**£7.698**	**£7.014**		**£5.554**
Capital Budget				
Road Maintenance (Carriageways, Footways, Structures, Street Furniture)	£9.605	£8.873		£7.109
Road Lighting (Street Lighting , Traffic Signals)	0.693	£0.620		0.709
Capital Total	**£10.298**	**£9.424**		**£7.818**
Grand Total	**£17.996**	**£16.438**		**£13.372**
	Comment – 2012-13 & 2013-14 Values are Annual Spend. Data Source – WGA			

1.3 Road Asset Status Summary

The current status of each asset group is:

Carriageways
– There is a noticeable improvement to the condition of the road network, particularly the strategic road network following the recovery programme.Latest RCI results are – A Class 46.23%, B Class 63.18% C Class 60.60% U Class 53.38 % which shows an average 3.29% improvement across all road classes following delivery of the roads reconstruction programme. Full details are included in table 3.10.3. – The latest Road Condition Index (RCI) results (Oct 2014) following a full network survey shows a marked improvement reflecting the positive impact made from the £21m investment in the roads reconstruction programme approved by council in February 2012. – Lower revenue funding reduces the amount of preventative maintenance that can be afforded and accelerates the deterioration rate of the road asset leading to increased reactive maintenance costs and greater demand for capital investment to restore asset condition. It is false economy to reduce preventative maintenance as any savings realised in the short term will only incur several times greater expense in the longer term. Adequate preventative maintenance is the key to realising the greatest annual savings and minimising the whole life cost of sustaining assets for this and future generations. – The milder climate is increasing vegetation growth on road verges which may affect forward visibility and other drainage assets. A review of the current verge maintenance strategy / regime / practice will be carried out to establish what level of work is required to ensure the continued safety of road users. – Investment levels are insufficient to sustain current asset condition and consideration is being given to exploring alternative funding options such as funding carriageway patching works from capital in order to release revenue for more preventative maintenance to slow down asset deterioration. Alternatively increasing GAE allocation for proactive maintenance would help to ensure that the fundamental basics such as ditching and drainage works are delivered. – The Road Asset Management and Maintenance Strategy will be reviewed to reflect changes in future investment levels and derive the best value possible from available funding. This combined with a revised Road Asset Management Plan will provide a longer term view and a clearer indication of the levels of service that can be afforded in future years.
Footways
– Footway maintenance is undertaken based on information from regular safety inspections (combined with carriageways) and in response to reported defects. It is proposed that a detailed footway inventory be established and this coupled with a condition survey will allow investment needs to be determined and a programme of reconstruction and resurfacing works developed. It is proposed that a programme of footway works be combined with the roads reconstruction programme. This will be based on proportionate treatments that extend service life of the asset, reduce reactive maintenance and will also reduce the potential for public liability claims.

Street Lighting

- One of our priorities is to provide an accurate lighting inventory. The existing lighting inventory is not accurate and a high proportion of the stock is in a poor condition (estimated at around 30%).
- Whilst there has been year on year cable replacement, much of the existing cable network is owned and maintained by Scottish Power and in general is 5th core. The current inventory is (approximately);
  - 13,000 lighting units
  - 800 illuminated traffic signs
  - 200 illuminated bollards
- One of our significant costs, which are increasing, is energy. In order to make accurate returns to our energy supplier, which will help to reduce our on-going costs we need to carry out an accurate inventory collection. In order to gather accurate inventory information (which could also be used for considering future maintenance options) various survey techniques are being appraised with a view to carrying out a survey and updating the inventory in 2014. A report was considered at the August ED&I Committee setting out the approach for lighting where a comprehensive inventory survey is carried out followed by an energy consumption model. From this a business case will be produced setting out the options for lighting options in the future.

Structures

- The structures inventory includes 907 bridges which have passed the Construction and Use Regulations Bridge Assessment (44Tonnes), 24 bridges or approximately 2.5% of the overall assets have not passed the assessment. 6 Bridges have special monitoring regimes in place. (Increased inspection frequency, surveying, etc), 10 bridges are subject to weight restrictions (excluding acceptable weight restrictions e.g where a suitable alternative route exists) and 1 bridge is subject to width restriction.
- Work is on-going to update the bridges inventory. Known retaining walls will be added to the inventory with any unchartered walls and structures being added as and when found.
- Knowledge of coastal infrastructure is very limited and needs to be increased. We estimate that there is 214km of Council road within 25metres of the High Water mark and we currently have asset details of 5% of this length. Surveying assets is time consuming and consideration is being given to the use of electronic survey methods which can be deployed on small boats to ascertain the extent and condition of coastal protection assets. This will allow a programme of prioritised maintenance to be developed to ensure the continued protection of the carriageway asset and to avoid more expensive reactive repairs as a result of severe weather events.
- Increased use of asset management techniques based on assessment of asset condition can improve the forward planning of asset maintenance and the potential use of cheaper treatments earlier in the deterioration cycle to preserve asset condition and reduce reactive maintenance costs.

Traffic Signals
− This is the smallest asset group with only 11 pedestrian crossings and 6 controlled junctions within Argyll. − It is proposed to collect the asset condition as part of the lighting asset inventory collection. − Maintenance is historically only been carried out in response to reported defects or system failure mainly by external contractors. − New development may require additional controlled junctions or the refurbishment of existing systems to meet the demands of increased traffic flows etc. Any additional expenditure from such projects will, in general, be sought from developers contributions to assist with the future maintenance liabilities.
Street Furniture
Street furniture inventory data will also be collected as part of the street lighting data collection process.

1.4 Option Summary

The options assessed are summarised as follows:

Carriageways					
No.	**Options**		**Predicted Condition (RCI)**		**Comment**
	Description	**Annual Funding**	**Year 1 2015**	**Year 20 2035**	
1	Continuation of current funding. Capital treatments spread across Amber 1, 2 and Red RCI condition bands	Capital £4.0m Revenue £ 4.2m **	55.6% (54.71%)*	62.76% (61.87%)*	Carriageway condition is predicted to deteriorate undermining the previous £21m investment in roads reconstruction projects.
2	Continuation of current funding Capital prioritised towards treatment of all RCI condition bands but with increased priority on amber 2 condition and less on red condition.	Capital £4.0m Revenue £4.2m **	55.6% (54.71%)*	61.63% (60.74%)*	Carriageway condition is predicted to deteriorate at a marginally slower rate than option 1.
3	Continuation of current funding with Capital prioritised towards treatment of amber RCI condition bands only. available funding split 80% amber 2 RCI condition and 20% amber 1 RCI condition.	Capital £4.0m Revenue £5.0m **	55.6% (54.71%)*	49.18% (48.29%)*	Carriageway condition is predicted to improve in terms of RCI through investment in cheaper treatments earlier in the deterioration cycle. However this option does not provide funding for routes in the poorest condition which will incur increasing costs for reactive maintenance.
4	Continuation of current funding with capital prioritised towards treatment of Red and Amber 1 condition bands (worst condition	Capital £4.0m Revenue £4.2m**	55.6% (54.71%)*	77.22% (76.33%)*	Carriageway condition is predicted to deteriorate significantly. This option demonstrates the need to prioritise investments towards more preventative

	routes)				maintenance earlier in the deterioration cycle.
5	Steady State	Capital £8.0m Revenue £4.2m**	55.6% (54.71%)*	55.6% (54.71%)*	SCOTS Estimated steady state calculation required to maintain current condition across all RCI condition bands, Red, Amber 1 & 2
6	Continuation of current funding as per option 3 with the addition of Structural Patching funded from Capital investment.	Capital £4.0m Capital £1.3m Revenue £4.3m	This option offers a potential mechanism to increase funding for essential preventative maintenance within Revenue budget to extend service life of assets and uses Capital funding for structural patching to tackle the increasing reactive maintenance costs on worst condition roads.		

RCI = Road Condition Index = percentage of the asset in need of maintenance (combined red + amber condition bands)

**Note – Revenue budget figures are estimated and may be subject to change.

*Note – RCI values from SCOTS cost projection tool calculation which are based on road surface area.

Footways

No.	**Options**		**Predicted Condition (FCI)**		**Comment**
	Description	**Annual Funding**	**Year1 2015**	**Year 20 2035**	
1	**Assumed Steady State** (Based on criteria within – Table 4.8.1a)	Capital £353k Revenue N/A	N/A N/A	N/A N/A	Estimated by officers to be required to replace surfacing on average every 60 years
2	Current Funding	Capital £0k Revenue £156k			Current Capital funding does not provide any investment in surface renewal.

FCI = Footway Condition Index = the percentage of footway in a deteriorated condition (functional and structural deterioration added together)

Footway condition surveys are not currently undertaken.

Comment – Steady state figure is based on estimated values and therefore may be subject to change as more detailed data becomes available.

Street Lighting					
No.	**Options**		**Predicted Condition (SLCI)**		**Comment**
	Funding	**Annual Funding**	**Yr1 2015**	**Year 20 2035**	
1	Assumed Steady State	Capital £960k Revenue £500k*	N/A	N/A	Capital Investment based on Annual Depreciation Table 5.2.1. Street Lighting Valuation.
2	Current Funding	Capital £529k Revenue £104k			
	*Note – Value is estimated The ongoing lighting project will provide a range of delivery and funding options for lighting. Comment – There is currently insufficient data to provide future predictions of funding need and investment options.				

Structures					
No.	**Options**		**Predicted Condition (STCI)**		**Comment**
	Description	**Annual Funding**	**Yr1 2015**	Year 20 2035	
1	Current Funding 2015-16	Capital £685k Revenue £225k	N/A	N/A	
2	Assumed Steady State	Planned/Capital £1.0m* Revenue £500k*	N/A	N/A	Estimated by officers to be required to maintain stock in a reasonable condition
	*Note – Figures are estimated and may be subject to change Comment – Cost projection tools are currently not sufficiently sophisticated to enable prediction of future condition and funding need based on present structures data.				

Traffic Signals					
No.	**Options**		**Predicted Condition (TSCI)**		**Comment**
	Description	**Annual Funding**	**Year1 2015**	**Year 20 2035**	
1	Assumed Steady State	Capital £23.5k	N/A	N/A	Capital investment based Annual Depreciation Table 7.2.2 Asset Valuation
2	Current Funding	Capital £180k Revenue £30k			Capital investment for traffic Safety measures (Signing, Lines, Anti-Skid surfacing etc) This budget provides a wide range of safety related works - not necessarily Traffic Signals
TSCI – Traffic Signal Condition Indicator Comment – Funding is currently controlled via Street Lighting and Traffic and Development					

Street Furniture					
No.	**Options**		**Predicted Condition (SFCI)**		**Comment**
	Description	**Annual Funding**	**Year1 2015**	**Year 20 2035**	
1	Assumed Steady State	Capital £287k Revenue not known	N/A	N/A	Capital investment based Annual Depreciation Table 8.7 Asset Valuation
2	Current Funding 2015/16	Capital £0k Revenue £5k			Capital investment for Traffic management (RARP)
SFCI – Street Furniture Condition Indicator					

1.5 Recommended Option

1. Maintaining good access is crucial to sustaining our communities and Argyll and Bute Council roads are considered to be in the poorest condition in terms of the national road condition index. The recovery strategy set out in the Roads Maintenance and Management Strategy approved by council in 2012 has delivered a noticeable improvement and has provided a steady state condition over two consecutive years.

   The benefits delivered through the recovery strategy though can only be continued with sustained investment in roads reconstruction combined with increased preventative maintenance to retard asset deterioration and accelerate improvement.

   Recommend – continued focus on delivering the recovery strategy combined with emphasis on increasing preventative maintenance activities to prolong asset service life.

2. Reductions in revenue budgets counteract the need to increase the use of preventative maintenance to prolong the service life of assets and delay the need for capital investment to restore asset condition. It is vital that efforts are made to increase available funding to facilitate a more proactive approach through adequate preventative maintenance earlier in the deterioration cycle. Asset maintenance is constant, lower investment in preventative maintenance now, necessitates several times greater expense than any savings realised later.

Recommend consideration be given to a higher proportion of GAE allocation being made available for essential preventative maintenance or alternatively funding structural patching from capital instead of revenue budgets.

3. Maintaining current capital budget levels of around (£7.0m) would enable a year on year improvement to the condition of the road asset. Revenue funded maintenance raises the greatest concern as the current level of investment allows around 56% of activity (RAMP 2004) to be completed. This focuses the current level of revenue investment more towards safety and serviceability of the asset rather than ensuring sufficient investment in preventative maintenance undertaken to preserve assets and alleviate increasing pressure for capital borrowing to restore asset condition. Notwithstanding the noticeable improvement to the condition of the road network the maintenance backlog for Argyll and Bute identified by SCOTS has grown to over £209m (SCOTS Headline Backlog Figure Calculated 2013). It is worth stating that this is considered a theoretical value based on significant overlays being applied rather than structural patching, overlays and surface dressing which are the general treatments carried out in our existing strategy based on network recovery.

   Recommend – continued focus on safety and serviceability of the asset with a review of service standards to establish appropriate, proportionate and affordable levels of service for core maintenance activities.

4. Footways – Overall condition is generally considered to be fair although only safety inspections are carried out, condition surveys are not currently undertaken and therefore condition can only be estimated based on local engineering judgement. Maintenance is currently undertaken to correct safety defects and failed areas. Footway inventory needs to be collected and a suitable condition index established to enable assessment of investment need and a proportionate programme of improvement works developed.

Recommend detailed footway inventory and suitable condition survey be undertaken to assess future investment needs.

5. Street Lighting – Carry out an accurate inventory collection to be used to inform a business case for future investment options. Rising energy costs and an ageing asset profile are presently the greatest challenge facing street lighting.
   Recommend – That a detailed inventory collection recently completed is used to provide an up to date energy model and business case for future delivery.

6. Structures - Inventory to be updated to allow a business case approach for future investment decisions. Inventory and condition details on coastal protection assets need to be captured to assess and prioritise maintenance needs to ensure adequate protection against severe weather events.
   Recommend structures inventory to updated and consideration is given to the procurement of a bespoke survey of coastal protection assets to inform future maintenance needs.

7. Traffic Signals – Inventory and condition survey to be updated as part of the lighting inventory exercise.
Recommend signals inventory to be updated.

8. Street Furniture – Street furniture inventory is not complete. Street furniture inventory items to be collected as part of the street lighting data collection. Street furniture is considered generally to be a lower risk and therefore a lower priority than other road related inventory items. General safety condition issues are picked up as part of the routine safety inspection regime.
Recommend sufficient data is captured to allow more detailed analysis to be undertaken.

9. Preventative maintenance is the key to delivering minimal whole life costs through the extended life of asset components. Affordable service standards for core maintenance activities need to be agreed and supported where required with adequate funding.
Recommend regular reporting of performance on the physical quantities and actual costs for core maintenance tasks against agreed service standards to clearly demonstrate value and delivery of essential road maintenance services within our communities.

2 Introduction

This report presents a summary of the council's Road assets as at April 2014. It

- Describes the current condition of the asset.
- Details the service that the asset and a range of budgets are able to provide.
- Presents the options available for the future.

The report complements the Road Asset Management Plan (RAMP). It provides information that will enable choices to be made about future levels of investment in the highway asset.

2.1 Options

The report presents where current data allows, the following options as a minimum for each asset group:

- A continuance of current funding levels.
- The predicted cost of maintaining current standards.
- Predicted effect of specified budget changes.

Options are presented separately for carriageways, footways, street lighting, structures, traffic management systems and street furniture based on current levels of data. The number of options will be extended as data becomes available. The groupings match those used in the CIPFA Transport Asset Code for financial reporting.

2.2 Long Term Forecasts

As highway assets deteriorate slowly it is not possible to determine the impact of a level of investment by looking at the next couple of years. The report therefore includes where available data permits forecasts covering a 20 year period to ensure that decisions can be taken with an understanding of their long term implications.

2.3 Impacts

The report includes, where possible, an assessment of the impacts associated with the options presented.

2.4 Limitations

In some instances the level of detail that it is appropriate to present, for both the options and their impacts, is hindered by an absence of data. A number of proposed improvements to the asset data held by the council are required in order to improve the accuracy of the predictions included in future versions of this report. These are detailed in the improvement actions in section 9 of the Road Asset Management Plan (RAMP).

The following sections present the options for each asset type.

3 Carriageways

3.1 The Asset

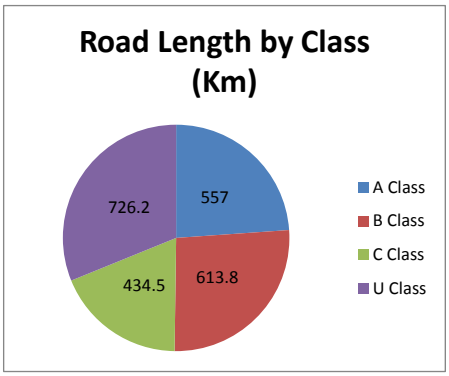
The council's carriageway asset as at 1st April 2014 totals 2,332 km and is detailed in Table 3.1 below. The asset length therefore includes the A83 Kennecraig to Campbeltown road (52 km) which has been trunked on 4th August 2014 and the maintenance responsibility for this road now lies with Transport Scotland. The change in asset length will be detailed in future versions of this report as shown in green text in table 3.1 below.

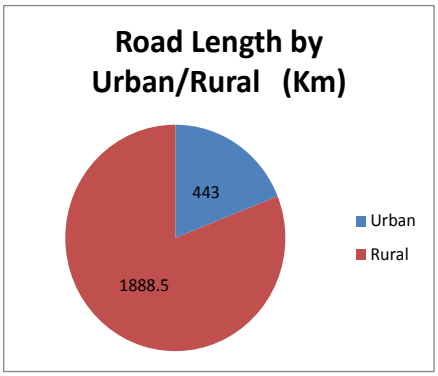
Table 3.1 Carriageway Asset Length

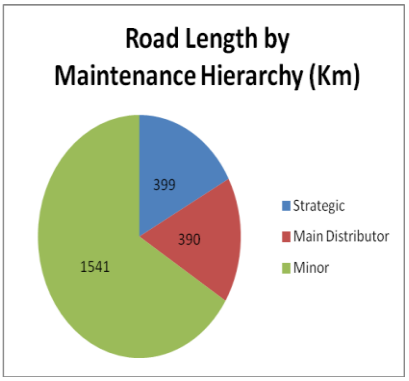
Class	Urban (km)	Rural (km)	Totals by Class (Km)
A	85.700	471.300	**557.0** (505)
B	43.100	570.700	**613.8**
C	42.000	392.500	**434.5**
U	272.200	454.000	**726.2**
Total By Urban/Rural	**443.0**	**1888.5**	**2331.5** (2279.5)

Data source – Public List of Roads

Note – Revised road lengths due to A83 Kennecraig- Campbeltown Rd being trunked are shown in brackets with green text







There is **865** Km or **37%** of Argyll and Bute Council carriageway assets located on islands.

This is a significant portion of the network and incurs increased costs in delivering essential maintenance tasks particularly with regard to resurfacing works where materials have to be sourced from mainland suppliers and rely heavily on the availability of suitable ferry services.

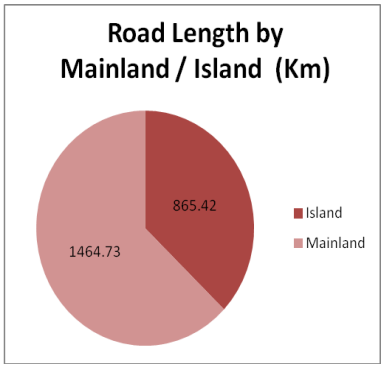


Table 3.1a below details the roads on peat within Argyll and Bute.

There are 657 Km or 28% of Argyll and Bute carriageway assets that are founded on peat. This incurs increased maintenance costs in addressing regular defects to sustain the passage of vehicles and requires restrictions on the weight of vehicles using the route. These restrictions can have an impact on businesses and employment within the area.

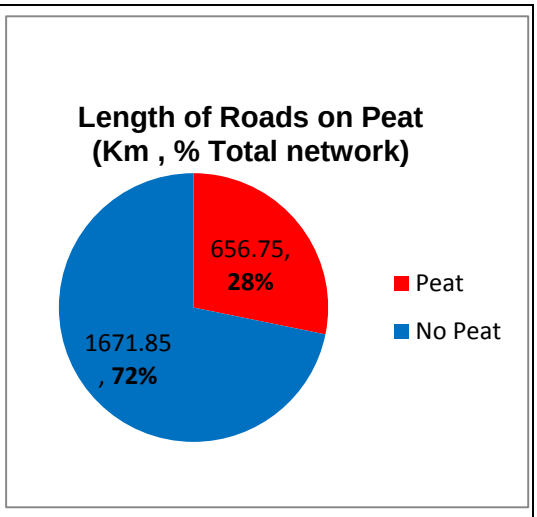
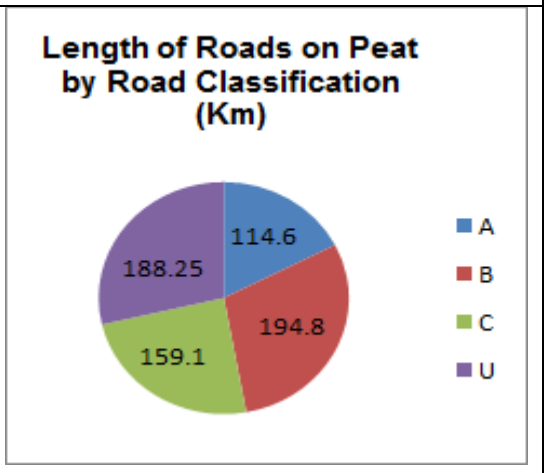


Table 3.1a Roads on Peat

Number of Lanes	A Roads	B Roads	C Roads	U Roads	Total Length
Single Track	38.8	189.7	158.4	186.3	573.2
Two Lane	75.8	5.1	0.7	1.95	83.55
Totals	**114.6**	**194.8**	**159.1**	**188.25**	**656.75**

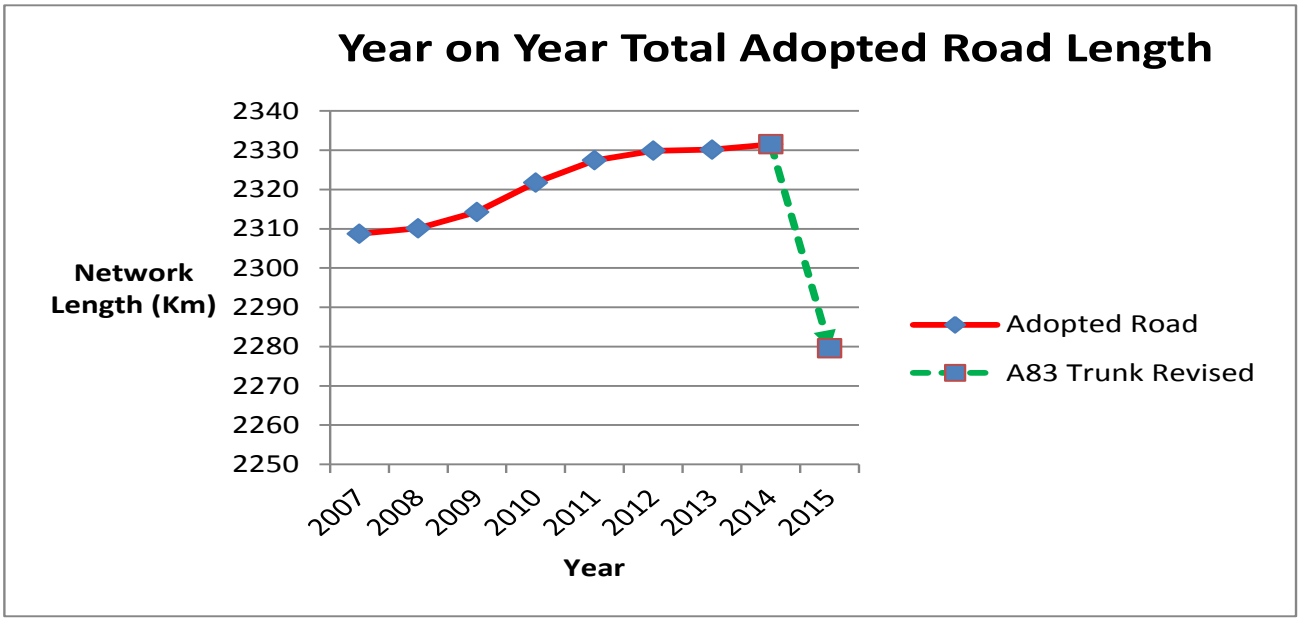


3.2 Asset Growth

The length of carriageway maintained by the council increased by 18.48 km between 2008 – 14 mainly as a result of adoption of housing estates and new developments. New road adoptions may not initially require significant maintenance however routes containing street lighting have an immediate effect on maintenance budgets through increased energy use. The data relates to Road lengths maintained by the council as at 1st April 2014 and therefore still includes the A83 Kennecraig to Campletown road although since being trunked on August 4th 2014 the maintenance responsibility now lies with Transport Scotland. The asset growth is detailed in Table 3.2 below:

Table 3.2 Asset Growth

THE ASSET	Route Type		Growth Statistics (2008-14)		2008		2014	
	Environment	Class	Length (Km)	% Percentage	length (Km)	% of network	length (Km)	% of network
	RURAL	A	-6.88	-0.30%	478.183	20.71%	471.3	20.41%
		B	-0.40	-0.02%	571.103	24.74%	570.7	24.72%
		C	-2.29	-0.10%	394.792	17.10%	392.5	17.00%
		U	0.68	0.03%	453.322	19.64%	454	19.66%
		Total	**-8.90**	-0.39%	**1897.4**	**82.18%**	**1888.5**	**81.80%**
	URBAN	A	6.87	0.30%	78.827	3.41%	85.7	3.71%
		B	2.90	0.13%	40.199	1.74%	43.1	1.87%
		C	5.79	0.25%	36.212	1.57%	42	1.82%
		U	14.72	0.64%	257.48	11.15%	272.2	11.79%
		Total	**30.28**	1.31%	**412.718**	**17.88%**	**443**	**19.19%**
	TOTAL NETWORK (KM)		**21.38**	**0.93%**	**2310.12**		**2331.50**	



3.3 Asset Value

The council's carriageway asset was valued at 1st April 2014 in accordance with the CIPFA Transport Asset Code for Whole of Government Accounts (WGA) and is detailed within Table 3.3 below.

Table 3.3 Carriageway Asset Valuation: April 2014

Classification	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Annualised Depreciation (AD)
Total	£2,599,497,606	£2,307,301,691	£20,534,996

Data source – WGA valuation spreadsheet 2014

3.4 Annualised Depreciation and Useful Life of Treatments

The Annualised Depreciation (AD) is the aggregated cost of all capital replacement/treatments needed to maintain/restore the assets service potential over the lifecycle, spread over the estimated number of years of the cycle. In other words it is the estimated value of the annual level of investment needed in capital resurfacing treatments.

The calculation of the AD has been established by the CIPFA Transport Asset Code and provides a consistent methodology for local authorities to value their assets in compliance with Whole of Government Accounts (WGA) requirements. The method assumes that the top 100mm of each pavement will be replaced on average every 21 years.

The CIPFA Transport Asset Code uses a value of 21 years useful life for surface treatments which may be considered more appropriate to roads with higher volumes of traffic than Argyll and Bute. The method was therefore re calculated using various values for the useful life and the results are detailed in Table 3.4 below.

Table 3.4 Annual Depreciation Cost versus Surface Treatment Useful Life

Estimated Useful Life of Treatments (Years)	Annual Depreciation (AD)		Estimated Useful Life of Treatments (Years)	Annual Depreciation (AD)
25	£17,249,396		65	£6,634,383
30	£14,374,497		70	£6,160,499
35	£12,320,997		75	£5,749,799
40	£10,780,873		80	£5,390,436
45	£9,582,998		85	£5,073,352
50	£8,624,694		90	£4,791,499
55	£7,840,635		95	£4,539,315
60	£7,187,248		100	£4,312,349
Data source – WGA valuation spreadsheet 2014				

In theory the AD represents the average annual investment required in renewal of the carriageway surfacing (100mm) over a given time period. The AD and Steady State however are not the same as both are based on two different calculation processes. AD figure is based on CIPFA Transport Asset Code replacing surfaces every 21 years whereas Steady State is for a much reduced treatment regime aimed at maintaining existing road condition at minimal expense.

3.5 Maintenance Backlog

The Scottish Road Machine Condition Survey (SRMCS) is used annually to determine a Road Condition Indicator (RCI) value for each local authority road network. From these results a financial model was developed to determine the budget required to remove the Headline Backlog. The headline backlog is the cost of achieving in one year a network free from any sections in an amber or red condition using the latest survey

data. The figure has been calculated using the 2012 SRMCS data. The previous 2011 headline backlog figure (£162,377,018) has been re-calculated using 2010 condition data, 2012 carriageway areas, and 2012 treatment rates and adjusted for inflation to allow the current and previous backlog figures to be compared. The results for Argyll and Bute Headline Backlog are detailed in Table 3.5 below:

Table 3.5 Maintenance Backlog

Headline Backlog			
	2011	2013	Change between 2011 - 2013
Argyll and Bute	£222,670,161 (£162,377,018)	£209,911,106	- £12,590,055
Comment – 2011 figure in brackets has been re-calculated using 2010 condition data, 2012 areas and treatment rates then adjusted for inflation to allow results to be compared. Data source – SCOTS using 2012 SRMCS data			

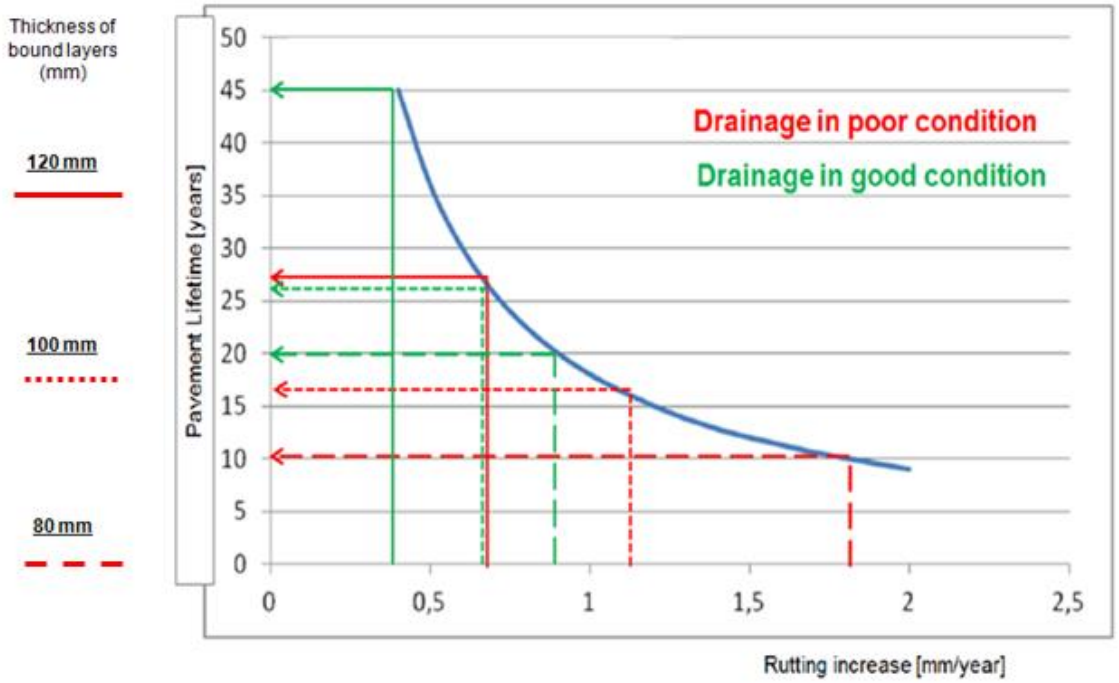
Although treating all the amber and red condition road sections in one year is not a practical maintenance option the headline backlog is a useful figure for comparing one year with another and gauging the scale of investment needed to bring the road asset to good condition. However because of the lower traffic volumes it is considered that the figure for Argyll and Bute is overstated although it meets Audit Scotlands requirement to calculate a figure using a commonly accepted methodology.

3.6 Drainage Management and Pavement Lifetime

Research is now available to support Road Engineers opinion that road drainage is the most significant individual factor affecting the long term performance of a road. Drainage has a great influence for example on bearing capacity, frost heaves and permanent deformations of the road and sections with poor drainage can always be considered the “weakest link” when discussing pavement lifetime.

Pavement lifetime can be described as a function of the annual increase in roughness and rutting values as well as cracking. If drainage can be kept in good condition, the annual rut depth growth can be significantly reduced. This means a longer pavement lifetime, and at least 20 – 35% savings in annual paving costs.

To demonstrate the potential extension of pavement life that can be achieved with good drainage the research carried out a range of calculations on the effect of road drainage to pavement lifetime using typical traffic volumes (Annual Average Daily Traffic (AADT) 500 including 5% HGV) and pavement structure. The results are illustrated below.



For many years preventative maintenance budgets have been steadily reduced. Maintaining drainage systems does not only include undertaking routine inspection and cleaning schedules but also carrying out adequate verge maintenance which has also been subject to long term budget reductions, propagating the growth of vegetation within watercourses which directly affects water flow, access for cleaning and ultimately pavement life. Capital roads reconstruction schemes have generally taken a holistic approach and have included ditching and drainage to leave a finished job and to ensure that the fundamental objective of removing surface water is achieved.

Water is by far one of the most destructive elements which can cause serious damage to a road very quickly.

Photo 3.6a shows the extent of flooding damage to a slip road onto the the A9 at Raigmore in Inverness (2002) which closed the road for several days. The damage was caused by a blocked drain and demonstrates just how powerful water can be when simple preventative maintenance measures are neglected.

Photo 3.6a

It is vital therefore that adequate provision and focus is given to undertaking sufficient preventative maintenance measures to ensure road drainage systems are working effectively to maximise pavement life and reduce the whole life cost of providing a sustainable road network that is fit for purpose and available for future generations.

Further information on the research can be obtained at www.roadex.org

3.7 Investment

To provide context for the funding need predictions (options) historical investment levels in carriageways are given below.

3.7.1 Historical Investment

Historical investment in the carriageway asset is detailed in Table 3.7.1 below:

Table 3.7.1 Investment Levels							
Year	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**
Capital Spend	£1.89m	£3.16m	£7.02m	£4.64m	£8.11m	£9.05m	£8.26m
Revenue	£3.43m	£2.32m	£3.13m	£6.02m	£4.80m	£4.23m	£3.96m
Total Spend	£5.32m	£5.48m	£10.15m	£10.66m	£12.91m	£13.28m	£12.22m
Data source – Finance end of year accounts							

The average capital investment on planned maintenance and surface treatments over the last 5 years at approximately £7.4m pa equates to 36.1% of the estimated annualised depreciation (based on CIPFA Transport Asset Code). However, recent investment levels have delivered a steady state/marginal improvement in RCI which aligns with the SCOTS cost projection tool predictions of £6.35 - £8m estimated investment required for steady state condition across all RCI condition bands

3.7.2 Last Year's Investment

During 2013-14 the investment in the carriageway asset was as shown in Table 3.7.2 below:

Table 3.7.2 Previous Years Investment 2013/14				
Category of Maintenance Work	**Revenue Spend (£)**	**Capital Spend (£)**	**Total Spend**	**Percentage of Total Spend**
Planned Maintenance	£1,177,668	£8,257,750	£9,435,418	77%
Reactive Maintenance	£866,250		£866,250	7%
Routine Maintenance	£1,911,269		£1,911,269	16%
Total	**£3,955,187**	**£8,257,750**	**£12,212,937**	**100%**
Data source – R10 Road Maintenance / APSE Return / WGA				

In 2013-2014 £12.2m was invested in maintenance of the carriageway asset. This represents 59.5% of the estimated annual depreciation of £20,534,996 (CIPFA Transport Asset Code). Our delivery strategy aims to reduce reactive work further.

These are initial estimates and will be refined in future years. However based upon this method of calculation current investment levels are predicted to lead to reducing asset value/deteriorating condition as the current levels of renewal as shown below are longer than this.

3.8 Output

Output from investment during 2013-14 is detailed within Table 3.8 below;

Table 3.8 Output from Investment (2013/14) Argyll and Bute Council Roads Reconstruction Programme		
Category		**Output**
Capital	**£8.26m**	
Capital schemes (planned maintenance)	Add Cost	– Resurface 10.28 Km (46070 Sqm) Helensburgh & Lomond – Resurface 8.88 Km (49367 Sqm) Bute & Cowal – Resurface 12.63 Km (66658 Sqm) Mid Argyll & Kintyre – Resurface 13.22 Km (67000 Sqm) Oban & Lorn – **Total 45.01 Km (229095 Sqm)** – **Note –** A number of schemes include edge strengthening works.
Capital surface dressing	**Add Cost**	– Surface Dressing 8.15Km (46774 Sqm) Helensburgh & Lomond – Surface Dressing 8.29 Km (48058 Sqm) Bute & Cowal – Surafce Dressing 8.49 Km (48469 Sqm) Mid Argyll & Kintyre – Surface Dressing 18.80 Km (93700 Sqm) Oban & Lorn – **Total 43.72 Km (237001 Sqm)**
Revenue		
Reactive Repairs		– Potholing - £702k – Boundary fences/walls - £2k – Sweeping & Cleaning - £2k – Emergency Incidents - £65k – Summer Standby - £77k
Routine -		– Jet Patcher - £518k – Culverts - £273k – Ditches - £506k – Grass cutting - £209k – Scrub/Tree Maintenance - £75k – Road Markings - £105k – Gully Emptying - £225k
Planned Maintenance	£1.18m	– Patching - £1.18m
Data source – R10 Road Maintenance, Road Operations Manager Note – Works costs includes all associated scheme works ie. Traffic management, road markings, accommodation works, drainage, landscape works, ironwork, site supervision etc. **Note – All measurements and costs are indicative only and should not be used for any other purpose. The values are derived from current available data at the time of this report and subject to verification.** Work is currently on going to link the WDM system with the council's TOTAL financial system. One of the outcomes from this will be true unit costs for each scheme carried out.		

3.9 Carriageway Surfacing Renewal

3.9.1 Carriageway Surface Dressing

The frequency of surface dressing treatments is detailed in Table 3.9.1 below:

Table 3.9.1 Surface Dressing Renewal

Year	Length Treated (Km)	Percentage of Network Length	Network Renewal Rate (Years)
2007/08	69.87	2.9%	33
2008/09	79.99	3.4%	29
2009/10	42.5	1.8%	55
2010/11	39.08	1.7%	60
2011/12	77.8	3.3%	30
2012/13	96.24	4.1%	24
2013/14	43.72	1.9%	53

Based on previous years treatments, on average, investment levels allow for surface dressing treatments once every **40** Years. Desired interval is 10 – 15 years.

Data source – Road Operations Manager

3.9.2 Carriageway Resurfacing

The frequency of resurfacing treatments is detailed in Table 3.9.2 below:

Table 3.9.2 Carriageway Resurfacing Treatments

Year	Length Treated (Km)	Percentage of Network Length	Network Renewal Rate (Years)
2007/08	28.4	1.2%	82
2008/09	24.81	1%	94
2009/10	47.43	2%	49
2010/11	58.78	2.5%	40
2011/12	64	2.7%	36
2012/13	42.8*	1.8% *	54*
2013/14	45	1.9%	52

Based on previous years treatments, on average investment levels allow for renewal of carriageway surfacing once every **58** Years (2007-12). Desired interval is 25 – 40 years.

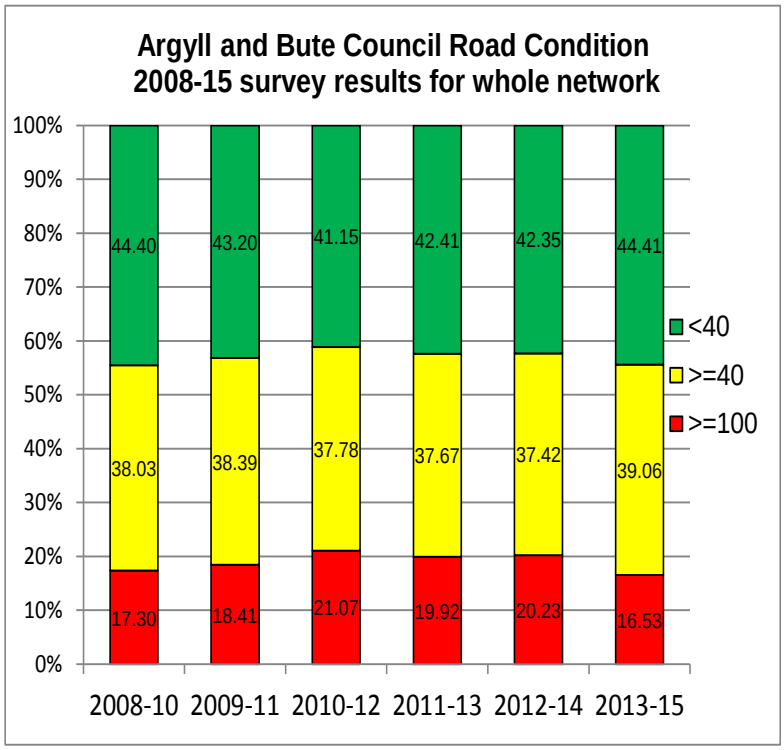
* Note - values need to be verified.

Data source – Road Operations Manager

3.10 Condition

The Scottish Road Maintenance Condition Survey (SRMCS) is the main method of condition assessment of the road network. The survey method is undertaken throughout Scotland to a nationally accepted standard. Red condition represents lengths of road in need of maintenance/resurfacing etc, amber represents road lengths in need of investigation for potential maintenance i.e. some but not all of these road lengths will warrant treatment in the short term.

Road Condition Survey results for Argyll and Bute from 2008 – 2015 are shown below;

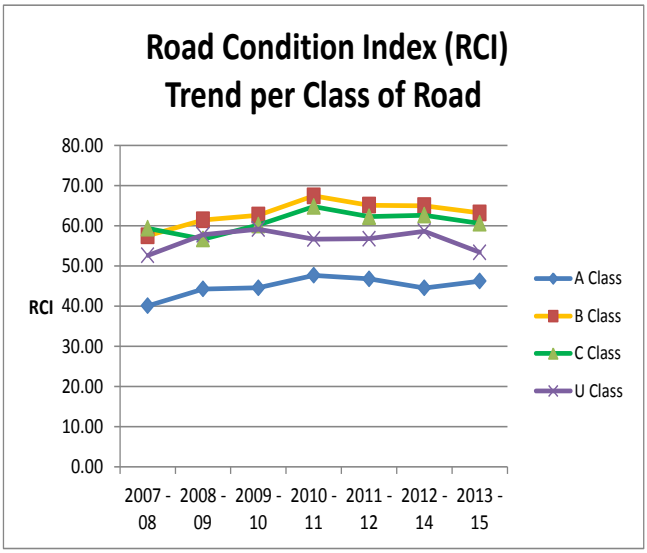


The data represented is collected using a nationally accepted specification. The survey results for A, B, C and U roads are based upon machine surveys.

Not all of the road network is surveyed each year. The survey is carried out on 100% of A Class (in one direction only), 50% B Class, 25% C Class and 10% U Class. The annual results are reported based on an average of 2 years results.

Additonal survey works were also undertaken in 2010-12 and 2013-15 to provide full network coverage and direct comparison of condition against roads reconstruction investment. This has provided confirmation of the improvement achieved through investment and delivery of the roads reconstruction programme.

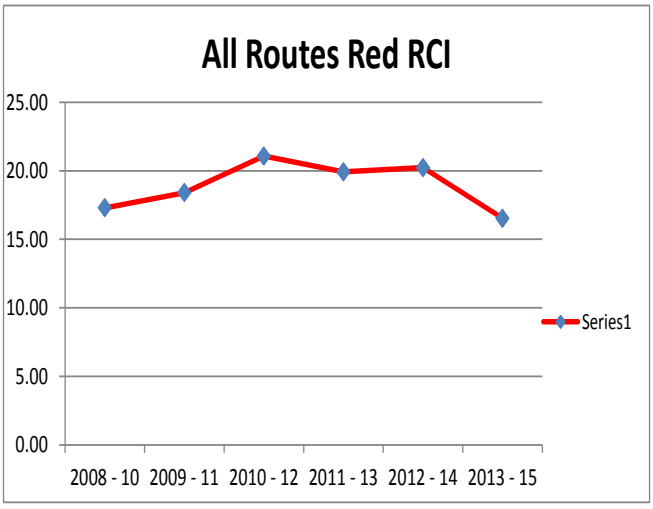
3.10.1 Condition Trend



The historical trend in condition across each class of road is shown and can be summarised as follows:

- A roads have seen a steady reduction in deterioration rate with condition now more or less steady state.
- B & C roads have seen a marked improvement on previous year.
- U roads have improved on previous year.

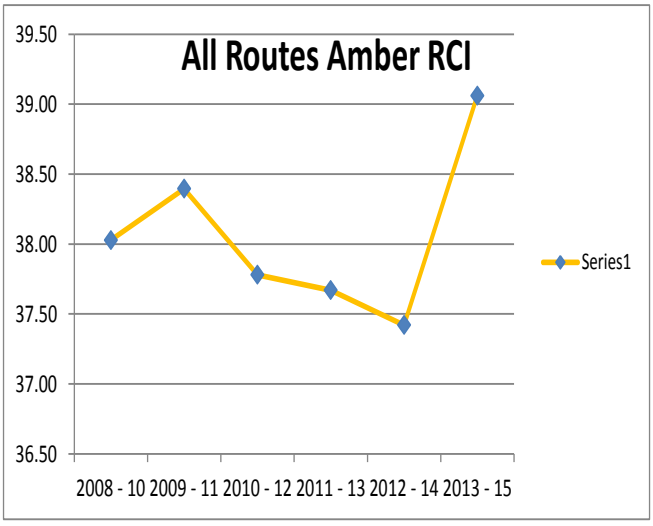
In general terms recent investment has made a substantial contribution to improving the whole network.



The historical trend in condition for all routes in red condition band can be summarised as follows:

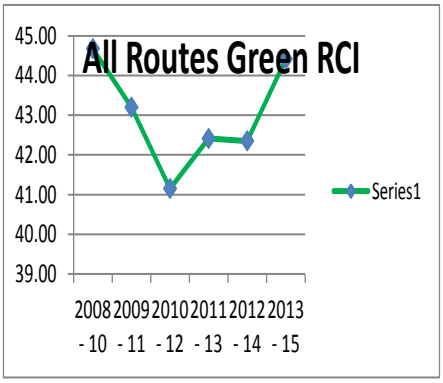
The all routes red condition RCI has been improving over the past 3 years reflecting recent investment in the roads reconstruction programme.

All Routes Red RCI				
2009-11	**2010-12**	**2011-13**	**2012-14**	**2013-15**
18.41	21.07	19.92	20.23	16.53



The all routes amber condition RCI has shown an initial improvement year on year however the latest results show a partial increase.

All Routes Amber RCI				
2009-11	**2010-12**	**2011-13**	**2012-14**	**2013-15**
38.39	37.78	37.67	37.42	39.06



The all routes green condition RCI has shown an initial deterioration in condition with a steady improvement over the last 3 years which can be attributed to the recent investment and delivery of the roads reconstruction programme.

All Routes Green RCI				
2009-11	**2010-12**	**2011-13**	**2012-14**	**2013-15**
43.2	41.15	42.41	42.35	44.4

The RCI condition results by Road Class are shown in Table 3.10.1 below;

Table 3.10.1 Road Condition Index (RCI) Results by Road Class 2012/13

	Class A		Class B		Class C		Class U			**Whole Network**	
RCI =	Length (Km)	%	Length (Km)	%	Length (Km)	%	Length (Km)	%		**Length (Km)**	%
>=100	61.88	11.11	126.75	20.65	85.99	19.79	110.9	15.27		**385.52**	**16.53**
>=40	195.62	35.12	261.05	42.53	177.32	40.81	276.75	38.11		**910.74**	**39.06**
<40	299.5	53.77	226.0	36.82	171.19	39.40	338.55	46.62		**1035.24**	**44.41**

Note – Road lengths have been corrected to match List of Roads data.
Data source – SRMCS results

The RCI condition results by Rural / Urban are shown in Table 3.10.2 below;

Table 3.10.2 Road Condition Index (RCI) Results by Urban/Rural 2012/13

	Urban		Rural			**Whole Network**	
RCI =	Length (Km)	%	Length (Km)	%		**Length (Km)**	%
>=100	21.57	4.87	361.27	19.13		**382.84***	**16.42***
>=40	140.12	31.63	769.00	40.72		**909.12***	**39.00***
<40	281.31	63.5	758.23	40.15		**1039.54***	**44.58***

Note – Road lengths have been corrected to match List of Roads data.

* Note values may be different to that in table 3.10.1 due to the accumulated effect of rounding.

Data source – SRMCS results

The annual network surveys were extended for the 2010-12 and 2013-15 results to provide as far as practicable two full network surveys which could be used to provide a direct comparison of road condition results following investment in the roads reconstruction programme approved by council in February 2012. The results provide confirmation that investment targeted through the Road Asset Management and Maintenance Strategy and delivered via the roads reconstruction programme has provided improvements averaging 3.29% RCI across each road class as detailed in table 3.10.3 below;

Table 3.10.3

Road Classification	2010-12 Survey				2013-15 Survey				Difference
	Road Condition Index				Road Condition Index				
	Red	Amber	Green	RCI	Red	Amber	Green	RCI	RCI
A	13.48	34.18	52.34	47.66	11.11	35.12	53.77	46.23	1.43%
B	26.22	41.2	32.58	67.42	20.65	42.53	36.82	63.18	4.24%
C	23.72	41.05	35.23	64.77	19.79	40.81	39.4	60.6	4.17%
U	20.98	35.7	43.32	56.68	15.27	38.11	46.62	53.38	3.30%

Note - RCI condition has improved on average by 3.29% within each road class as a result of the invetsment and delivery of the road reconstruction programme approved by council in February 2012

3.11 Ractive Repairs

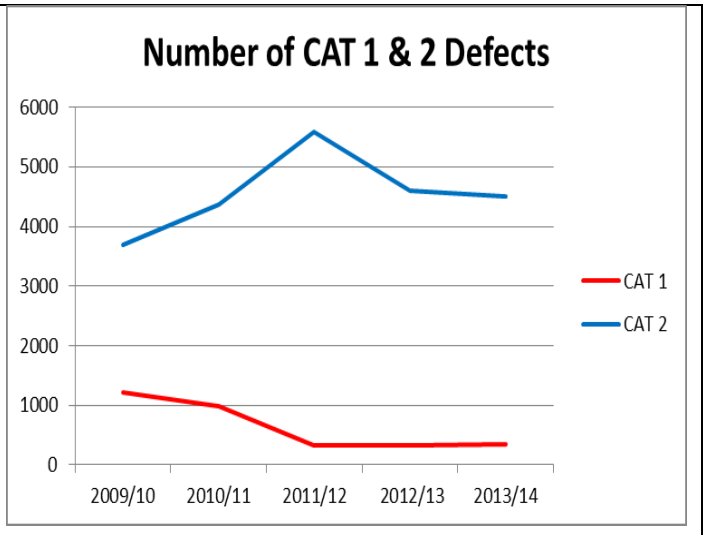
The figures above are based upon a set of defects that can be measured by a machine survey (SCANNER) and not necessarily all the defects that may exist on a section of road. A full picture of the condition of the carriageway asset also needs to take into account the amount of reactive repair that is undertaken e.g. pothole repairs, patching and other small scale maintenance works. Table 3.11 below details the number of Cat 1 defects reported to APSE/SCOTS since 2008/09.

Table 3.11 Number of defects (Carriageway)

	2009/10	2010/11	2011/12	2012/13	2013/14
CAT 1E	15	15	37	124	89
CAT 1	1206	974	280	203	261
Total CAT 1	**1221**	**989**	**317**	**327**	**350**
CAT 2	3700	4366	5591	4591	4508

Data source – APSE, WDM

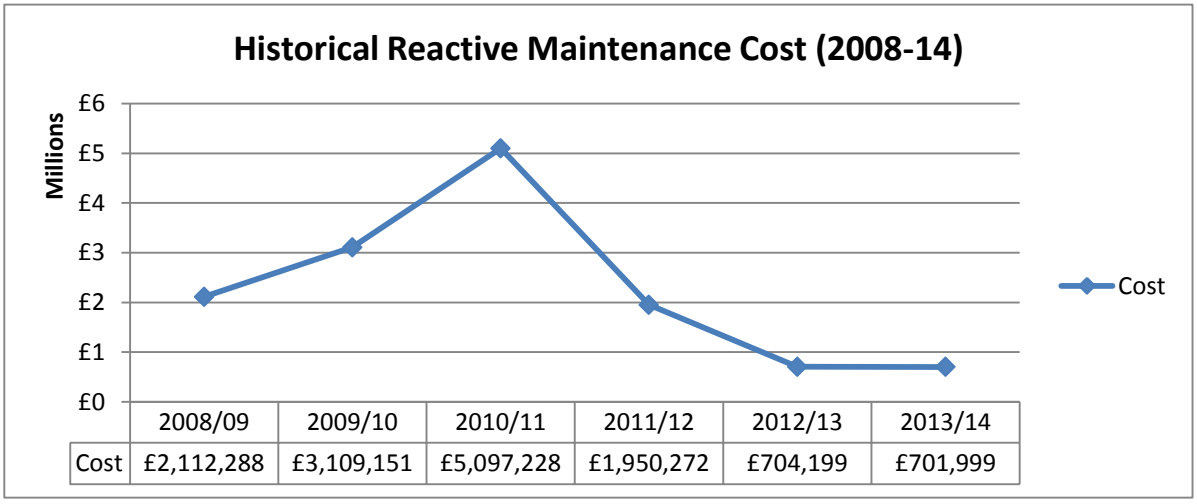
Carriageway Cat 1 defects have reduced significantly since the harsh winters of 2009 and 2010. The number of Cat 2 defects provides an indicative measure of the scale of carriageway deterioration.



3.11.1 Reactive Maintenance cost

Table 3.11.1 below details the cost of reactive maintenance as reported to APSE/SCOTS.

Table 3.11.1 Historical Reactive Maintenance Cost					
2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
£2,112,288	£3,109,151	£5,097,228	£1,950,272	£704,199	£701,999
Comment – Figures reported to APSE					



Reactive Maintenance costs increased sharply over two consecutive winters exposing the weak resilience of the asset to harsh weather conditions. Costs have been significantly reduced however they remain an area of concern and require close monitoring.

Reactive maintenance costs as reported by APSE are the highest in Scotland within the family group – Rural. Table 3.11.2 below details reactive maintenance costs compared with other Scottish Councils (APSE National Output Report for 2011/12)

Table 3.11.2 Reactive Maintenance Cost per Kilometre Network

Council	Cost per Km of Reactive Maintenance	% Budget spent on Reactive Maintenance	Road Condition Indicator (RCI)	Family Group Averages	
				Average Reactive Maintenance Cost/Km	
Aberdeenshire	£437	17.06%	**24.3%**	**Average**	£447
Angus	£709	13.52%	**27.9%**	**High**	£837
Argyll and Bute	£837	16.31%	**57.6%**	**Low**	£102
Scottish Borders	£235	11.63%	**41.7%**	**Average Reactive Maintenance Percentage**	
Highland	£607	27.94%	**33.2%**	**Average**	14.81%
Moray	£102	3.61%	**26.1%**	**High**	27.94%
Perth & Kinross	No Data	No Data	**35.3%**	**Low**	3.61%

Note – Based on APSE National Report 2011/12 Scottish Family Group – Rural

Comment – The results do not necessarily provide a true comparison of costs. The SCOTS /APSE group are currently in discussion with local authorities to agree which costs/activities are to be included for benchmarking purposes in order to compare like with like.

3.12 Performance in completing repairs

Relevant performance indicators relating to the carriageway are detailed within Table 3.12 below;

Table 3.12 SCOTS RAMP Core performance

Performance Indicator	2010-11	2011-12	2012-13	2013-14	Comments
% of Cat 1 defects made safe within response times.	84 %	100%		90%	
% of safety inspections completed on time	61%	64%		n/a	
Total number of Cat 1 defects	972	317	327	350	
Total number of 3rd party claims	182	199	95	314	
Average response time to completion of non-planned salting treatment (Hours)	2.25	2.25	2.25	2.25	
% of occasions that target response times for pre salting specified in Winter Maintenance Plan were met	86 %	N/A	100%	100%	
% of network salted regularly	52%	52%	52%	52%	
% of carriageway network that should be considered for maintenance treatment (RCI)	56.8%	58.85%	57.6%	55.6%	

Data source – Road Operations manager, WDM

3.13 Benchmarking

A benchmarking questionnaire was sent to 14 different councils across England, Scotland and Wales in December 2012. Three councils returned information as detailed in Table 3.13 below;

Table 3.13 Benchmarking

BENCHMARK	Argyll and Bute Council			Highland Council		Devon County Council		Scottish Borders	
Length of all roads maintained (km)	2329			6,742				2962	
Area (square km)	6909			30,659		6564		4732	
Population	90,900			212,000		750,100		112430	
Population density (people/square km)	13			9		114		24	
% of road network which should be considered for maintenance	A class: 42.7% (9.23% red, 33.47% amber) B class: 57.81% (15.05% red, 42.76% amber) C Class: 59.91% (19.22% red, 40.69% amber) Unclassified: 57.58% (17.13 % red, 40.45% amber)			A class: 24.6% (3.08% red, 21.56% amber) B class:33.5% (5.6% red, 27.89% amber) C Class: 34.6% (7.22% red,27.39% amber) Unclassified: 36.4% (7.65 % red,28.72% amber)		A class 26.2% (3.6% R, 23.6% A) – 2012/3 results better B class 28.2% (4.1% R, 24.1% A) – 2012/13 results better C class 56% (19.2% red, 36.8% amber) no 2012/13 yet UnClass 72.1% (31.8R, 40.3%A) no 2012/13 yet		A Class: 26.5% (4.07% red, 22.44% amber) B Class: 38.6% (5.64% red, 32.93% amber) C Class: 39.5% (6.44% red, 33.09% amber) Unclassified: 47.2% (10.63 % red, 36.56% amber)	
Unit costs	**Treatment Type**	**Description of Treatment**	**Unit Rate £/m²**	**Description of Treatment**	**Unit Rate £/m²**	**Description of Treatment**	**Unit Rate £/m²**	**Description of Treatment**	**Unit Rate £/m²**
carriageway surface treatment	**Surface dressing**	Pre patch + Premium SD	5	Pre patch + SD (Surfix 80)	3	Cat 3-6 inc lining Cat 3-6 rno lining Patching	£4.32/m2 £3.50/m2 £2/ m2 of SD		4.5
	Thin/micro surface	25mm overlay	9.5	Not Used	Not Used	6mm SMA 53psv 50-500 sqm band	£10.44/m2		
	Thin overlay	40mm overlay	12.5	40mm overlay	14	10mm AC 53psv 5-50band	£12.04/m2		27.5

Table 3.13 Benchmarking (Cont)

Benchmark		Argyll and Bute Council		Highland Council		Devon County Council		Scottish Borders Council	
	Treatment Type	Description of Treatment	Unit Rate £/m²	Description of Treatment	Unit Rate £/m²	Description of Treatment	Unit Rate £/m²	Description of Treatment	Unit Rate £/m²
Carriageway Surface Treatment	Structural overlay	100mm overlay	27.5	100mm overlay	21	60mm/40mm x 10mm AC 53psv 5-50sqm band	£27.67/m2		
	Thin inlay	40mm inlay	14.5	40mm inlay	16	10mm AC 53psv + milling 5-50 sqm	£13.71/m2		32
	Moderate inlay	60mm inlay	22.5	60mm inlay	21	10mm AC 53psv 5-50 sqm band + regulating 20mm + milling	£19.69/m2		
	Structural inlay	100mm inlay	39.13	100mm inlay	36	60mm/40mm x 10mm AC 53psv + milling 5-50 sqm	£31.64/m2		35
	Full reconstruction	1.5 wide flex-edge strength/deep patching	104.27	Per m²	Estimate £134.00 (Can't afford to do this anymore)	Excav to 450mm + disposal. Sub base 250mm + 100mm base + 60mm binde + 40mm AC 53psv 5-50 sqm band.	£78.72/m2		110

Table 3.13 Benchmarking (Cont)

	Treatment Type	Description of Treatment	Unit Rate	Description of Treatment	Unit Rate	Description of Treatment	Unit Rate	Description of Treatment	Unit Rate
Other Treatments	**Footway**	Reconstruction (m^2)	£18.13/sq.m	Per m^2	£20.00	F1 fway/ F1A fway	£24.29/ 17.29 m2		
	Drainage	Clear ditch including offlet	£1865.47/km		Not Available	Type 4 road Type 5 road	£659/km £646/km		
	Gully	Clean gully no.	£7.844/ea	Clean only, no jetting	Aver £7.50 per pot	Type 4/ Type 5	£7.26/ £4.50 each	Clean gully no.	£7.844/ea
	Grass verge	Safely cut verge km	£32.8/km*		Not available	Type 4/ Type 5	£53.38/£22.78 per km		
	Weed killing	m^2	£0.125/sq.m	m^2	£0.13/m^2		Dayworks?		
	Pot hole (cat/response)	no	£50.00/ea**		Depends on size of pothole but say £36.00 each		£45.00 each		

*grass verge safety cut, rate for 1 cut, 1 swathe

**Pot hole is an approximate average. Rate can vary across Areas and urban/rural spit

3.14 Winter Maintenance

Maintenance of the road network also includes reacting to adverse weather conditions and in particular winter maintenance. A benchmarking questionnaire was sent to 14 different councils across England, Scotland and Wales with three councils returning info as detailed in Table 3.14 below;

Table 3.14 Benchmarking Winter Maintenance

Benchmark	Argyll and Bute Council	Highland Council	Devon County Council	Scottish Borders Council
Response time winter maintenance	Actual response time in hours for completion of planned pre-salting: 1.55 Average response time in hours (including allowed mobilisation time for now): 2.5 Planned salting (priority routes): 31no.	2.5 hours 3.0 hours 42 Priority 1 routes	Contractual response time: 1 hour Treatment time allowed: 3 hours in normal conditions Typical average treatment time: 2:40 Primary routes: 37	Actual response time in hours for completion of planned pre-salting: 2 Average response time in hours (including allowed mastering time for now): 2.5 Planned salting (priority routes): 33no.
% of main network subject to salting regime (winter maintenance)	52%	98%	21%	37%
Annual cost of salting per km of network salted 2011/12	£8.67/km for 20g/sq.m treatment	Unknown	£5.48/Treated km Free Run = £1.11/km	
Gritting mileage	Mileage of gritting on planned routes: 94075 miles Treatment mileage of gritting vehicles on planned routes: 45547 miles	Unknown Unknown	Total mileage on planned routes: 2,506 Treated mileage~: 1648	Mileage of gritting on planned routes: 214139 miles Treatment mileage of gritting vehicles on planned routes: 132846 miles

3.15 Investment Options

The investment options for carriageways focus on the options available for planned maintenance in capital funded surfacing treatments only using the SCOTS cost projection tool.

3.15.1 Reactive Maintenance

The impact of changes in condition resulting from differing levels of planned maintenance should be felt in the level of reactive maintenance required. The data held on reactive repairs is however not sufficiently robust to enable a relationship to be derived between measured condition and the extent of defects and subsequent reactive repairs. It is however logical to assume that if the carriageway asset is in a more deteriorated state as evidenced from measured condition then a higher level of minor defects and required reactive repairs will occur. This risk has been expressed qualitatively in this report.

3.15.2 Winter Maintenance

The winter maintenance service is generally provided between 1st November and mid to end of April although these dates may be varied slightly to accommodate unexpected weather patterns. The service is delivered in accordance with the Winter Maintenance Policy within the requirements of the Drivers` Hours Regulations and Working Time Directive. The service plays a vital role in ensuring communities and businesses can function normally during periods of adverse weather conditions.

Budgets for the provision of winter services are difficult to plan considering our unpredictable climate and are therefore generally based on an “average winter” or 58 planned treatment runs.

Service resilience is the greatest concern as year on year budget reductions take effect. Gritter numbers have been reduced to a level where there are now only two spare vehicles available for the whole of Argyll. Minor breakdowns therefore can have a significant effect on service delivery and compliance with agreed target levels of service. The ability to sustain service delivery during widespread severe weather events is also compromised by Driver Hours Regulations coupled with reduced LGV driver numbers. Put simply there is an inadequate number of drivers and second men to sustain continuous operations on a widespread adverse weather event. Additional resources provided in these conditions are likely to result in an overspend of the core budget.

Details of performance indicators for winter maintenance as reported to APSE over the previous four years are detailed in Table 3.14.2 below;

Table 3.15.2 Winter Maintenance					
Performance Indicator	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Km of total carriageway network treated on receipt of an adverse weather forecast	1205	1205	1205	1205	1205
Km travelled to achieve the above treatment. (i.e. include non-treated lengths)	2491	2491	2491	2491	2491
Route efficency	48.37%	48.37%	48.37%	48.37%	48.37%
Number of precautionary treatment routes	31	31	31	31	31
Number of gritters available	37	33	33	33	33
Total number of planned treatment runs	99	108	59	106	65
Actual number of days on which any non-planned winter maintenance function was carried out during year	21	27	6	17	0
Total aggregate annual treatment mileage travelled by all gritting vehicles on all planned routes	76357	83439	72875	80261	50688
Total tonnage of salt used on carriageways	18744	19727	10431	17777	9962
Total Winter actual spend carriageways (All inclusive - Administration, Salt Sorage , Vehicle maintenance, Fuel, Labour, Training, Weather stations, Communication systems, Vehicle tracking, Gritter hire, Weather forecasting etc)	£3,060,675	£3,402,695	£1,670,677	£2,534,435	£2,034,463
Average Cost per Planned treatment run (all inclusive)	£30,915.91	£31,506.44	£28,316.56	£23,910	£31,299
Average cost per mile of planned treatment (all inclusive)	£40.08	£40.78	£22.93	£31.58	£40.14

3.15.3 Regular Preventative Maintenance

The value of regular preventative maintenance is difficult to measure, however it`s contribution to lowering the whole of life costs of sustaining an asset cannot be underestimated although it is seldom realised. The deterioration process of a road is constant and regular low cost preventative maintenance activities are essential to abate it`s progress and minimise expense.

To better understand the contribution and impact regular preventative maintenance can make in reducing annual maintenance costs it is perhaps worth explaining the road deterioration process for a typical road network.

Roads deteriorate over time mainly as a result of water and traffic, although many different factors may influence the rate at which a road deteriorates. Materials, volume and weight of traffic, climate, oil spillage and level of maintenance all play a part in the service life and sustainability of the road network.

Figure 3.15.3a -*This photo depicts a recently resurfaced urban road in good condition*

Water can cause deterioration of the road surface, embankments and even the road sub base, as well as damage to the physical road structures. This happens either through erosion, whereby the road material is washed away and physical structures are undermined, or through stagnation, whereby the road and the base of the physical structures are weakened under the influence of the water. In the case of traffic, the deterioration is caused by the wear or loss of surface material as a result of the vehicle tyres, and the deformation of the road surface by the weight of the vehicles, leading to cracks, ruts, potholes and corrugations.

These two causes of road deterioration tend to aggravate each other, as a road weakened by water is more susceptible to damage by vehicles, whilst road deformation by vehicles can prevent surface water from flowing safely away from the road, resulting in increased erosion and water stagnation.

Figure 3.15.3b – *Surface cracking*

Road deterioration is not generally visible until the first cracks on the road surface appear, indicating a problem and allowing water to penetrate the road structure, thus accelerating the deterioration of the carriageway. Figure 3.15.3b shows the initial stage of deterioration which can best be seen when the road surface begins to dry out after a period of rain.

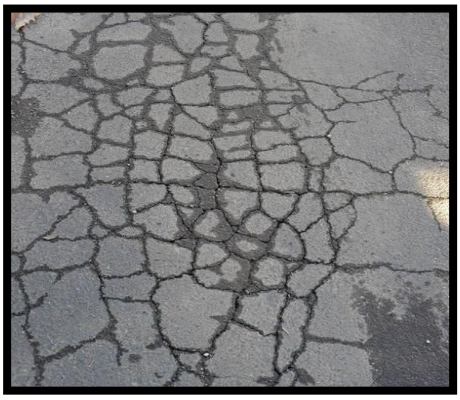


Figure 3.15.3c – Increased cracking

Figure 3.15.3d – *Surface begins to pothole and rut.*

As water penetrates the road surface it begins to affect the road structure, the area of cracking increases and becomes more susceptible to frost damage or potholing. Figure 3.15.3c shows how the level of cracking intensifies with time.

Figure 3.15.3e – *Surface begins to pothole between areas already patched.*

Figure 3.15.3d shows how the weakened road surface now begins to pothole and rut, which in turn prevents water from draining, forming a puddle which traffic pumps further into

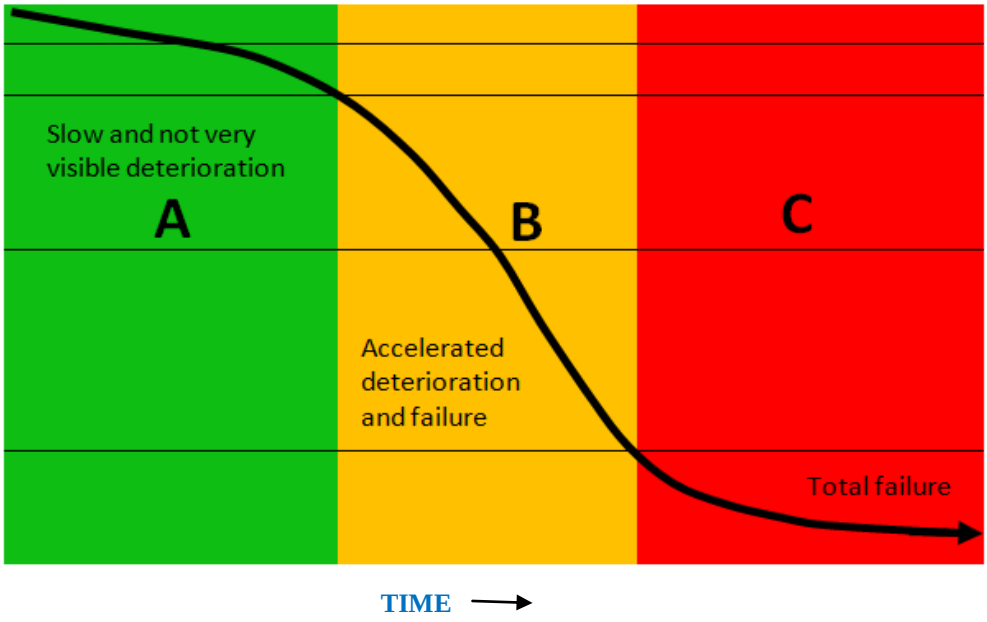
the road surface and structural layers. With the road continuing to deteriorate, material loss accelerates, potholes form between areas already repaired and more water penetrates the surface (Figure3.15.3e) increasing the defective area requiring reactive repairs to mitigate damage claims.

Over a period of time the defects become so numerous and widespread that the entire road is affected and is in a very poor condition. This results in the whole area needing to be resurfaced or reconstructed to eliminate damage claims, reduce reactive maintenance and restore asset condition. At this stage the rate of deterioration generally slows down, mainly because there is little left to deteriorate (Figures 3.15.3f & g)

Figure 3.15.3f – Defects become more widespread.

Figure 3.15.3g – Whole road surface needs replaced.

The road deterioration process is illustrated in the graph below and shows the deterioration as a black line with the steepness representing the rate of deterioration. The deterioration is generally slow at first and not very visible, taking the form of wear and tear and minor damage to the road surface and the drainage system (Phase A). The road user tends not to notice the deterioration, despite the gradual increase of isolated minor failures. As a result, the deterioration may remain unchecked during this phase, resulting in the road deteriorating from a good to fair condition. At this time the deterioration tends to increase in speed, as the road base and the foundations of the physical road structures start to become affected (Phase B). This is especially due to water, which is no longer guided safely away from the road as a result of deterioration of the surfacing and drainage system, and remains on the road or causes erosion,



thus damaging and weakening the road and making it more susceptible to damage by traffic. Although the damage to the road is very localised at the beginning of this phase, it spreads out until the entire road can be said to be in poor condition. Once the road condition has become very poor, the deterioration tends to decrease, mainly because there is little left to deteriorate (Phase C).

Poor road condition results in longer travel times, more damage claims and increased costs, and in the end may result in traffic and transport ceasing altogether when the road is no longer motorable.

The condition of the road can be improved by carrying out corrective maintenance. Repairs are made to the road surface, drainage system and the other physical road structures. The improved road condition generally results in lower travel times and reduced costs with a decrease in the speed of road deterioration as the deterioration process starts from scratch. The more deteriorated the road is, however, the more intensive and thus costly the repairs will be. For instance, corrective maintenance when the road is still in good or fair condition (Figure3.15.3j - arrow 1) may entail repairing potholes, small areas of patching to the road surface and minor repairs to the drainage system and other road structures, whereas corrective maintenance carried out once the road is already in poor condition (Figure 3.15.3j - arrow 2), is likely to entail larger areas of patching or complete resurfacing of large stretches of road, and possibly re-establishing an effective drainage system with localised edge strengthening works. The distance from the black line indicating the road condition, to the desired good or very good condition of the road is therefore indicative of the level of corrective maintenance required, and thus for the cost of this maintenance. Corrective maintenance needs to be carried out repeatedly, and although maintenance carried out when the road is still in good to fair condition will have to be repeated more frequently, this results in lower overall maintenance costs and better overall road conditions than waiting till the road has deteriorated to a poor condition.

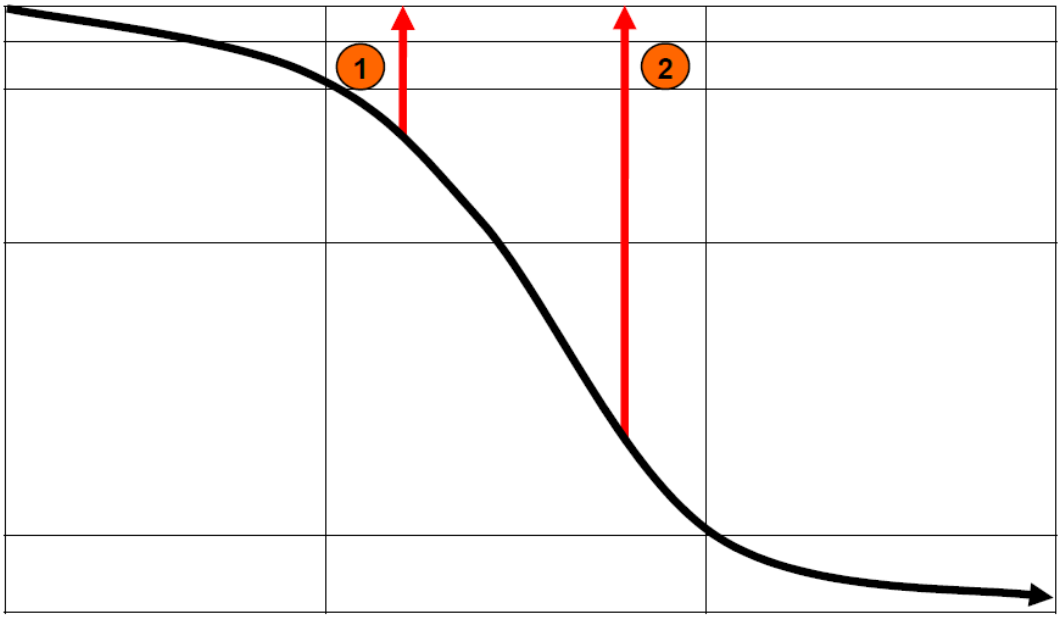


Figure 3.15.3 j – Corrective Maintenance

Apart from corrective maintenance once the road has already deteriorated, it is possible to carry out preventative maintenance aimed at slowing down the rate of deterioration of the road. Such maintenance is often carried out on a continuous regular basis and consists primarily of clearing and cleaning activities aimed at preventing damage to the road i.e. Drainage: - Cleaning offlets, road gullies, ditches, culvert inlets and

outfalls. Verges and embankments: - cutting grass and scrub. Road surface: - repairing potholes, loose manhole covers, sealing cracks in order to prevent more serious damage from occurring. As a result of such preventative maintenance activities, the rate of deterioration of the road is slowed down considerably, as can be seen in the graph below (Figure 3.15.3 k - arrow 3). Consequently, corrective maintenance is required less frequently (Figure 3.15.3 k - arrow 1) leading to reduced maintenance costs, and the road is generally in better condition, resulting in lower travel times, reduced claims and lower overall costs.

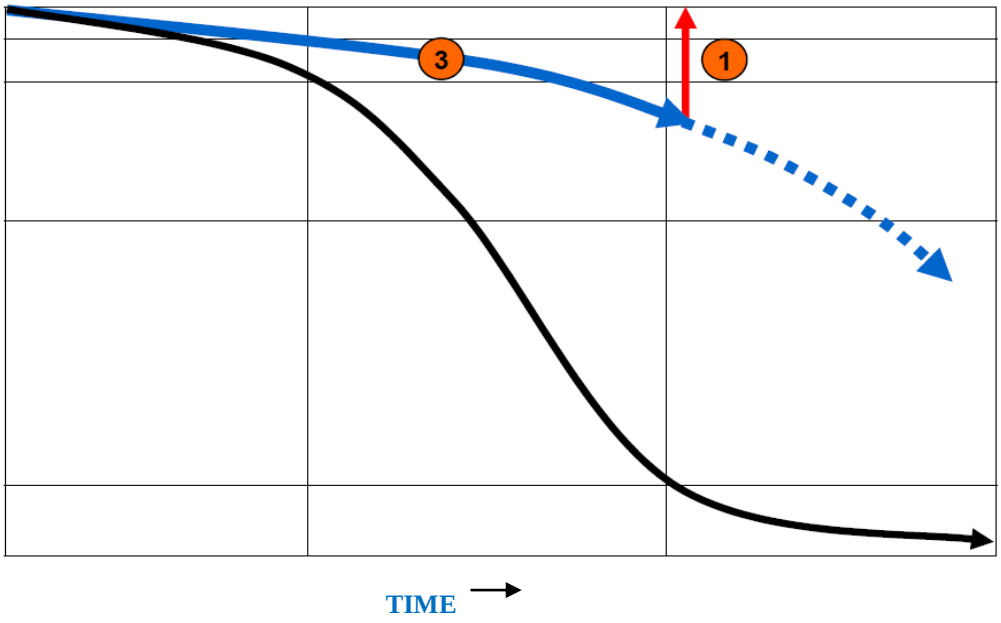


Figure 3.15.3 k - Preventative Maintenance

Put simply, investing in preventative maintenance is the key to realising savings over the longer term. The savings are generated through preventative maintenance lengthening the service life of assets, therefore extending the period between corrective maintenance treatments and significantly reducing the whole life cost of maintaining the asset.

It is imperative that the importance of carrying out regular preventative maintenance is clearly understood and recognition of contribution routine and cyclic maintenance activities make to sustaining the assets integrity and value cannot be overlooked if minimal whole life costs are to be realised.

3.16 Road Maintenance Cycle

In highway maintenance, the most important balance is that between planned, preventative and reactive repairs. If preventative maintenance on any asset is less than adequate, this can initiate a “vicious cycle” where reactive repairs soak up an ever increasing proportion of available preventative maintenance budgets.

The resulting deterioration in road condition and increase in reactive repairs have an impact on all road users and therefore on the economy generally in terms of increased vehicle running costs, increased journey times and decreased journey reliability. Figure 3.17a below illustrates the vicious cycle inadequate maintenance.

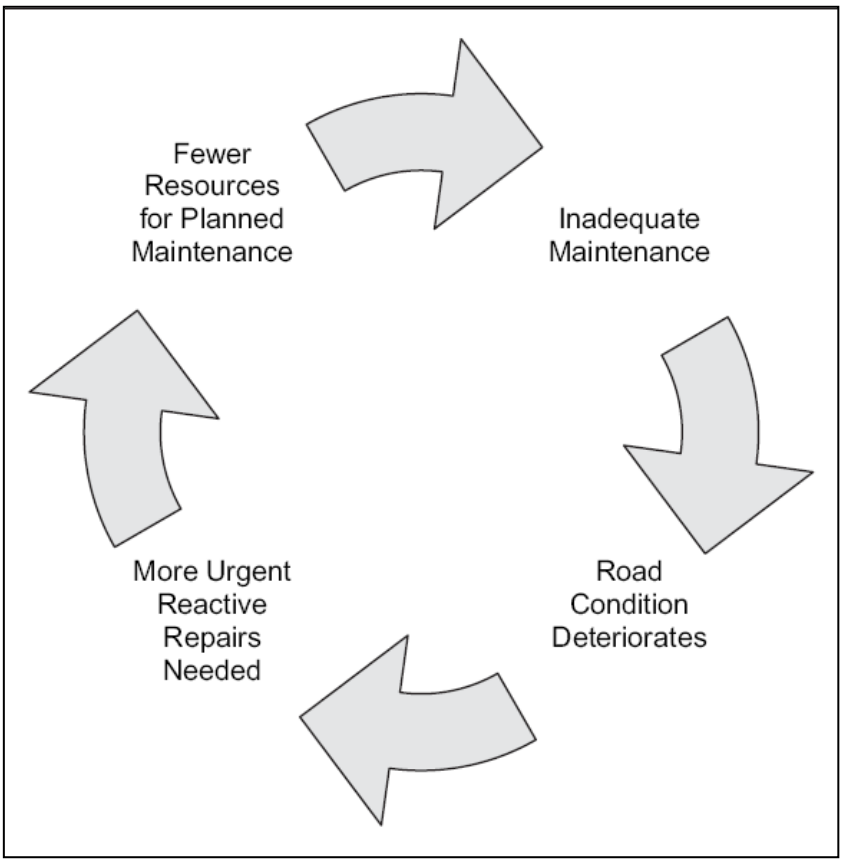


Figure 3.17a The Vicious Cycle of Inadequate Maintenance

Once commenced this vicious cycle can be a very difficult to break and requires a change in approach. There will always be a time when prompt action is required to attend to a particular issue. However it should not become normal practice for maintenance tasks to be postponed until such times as prompt action is required at the expense of planned works currently being undertaken.

The pre- planning of works is essential to realise the best outcome and minimise cost. This can be done through the development of agreed levels of service for core maintenance activities and requires data on inventory, funding and the desired frequency of service for each activity. This data allows the ability to determine the annual quantity of works that can be afforded, therefore permitting forward works programmes to be developed and schedules of work issued.

Monitoring of these core maintenance activities works will provide performance data which can be used to, update annual programmes, determine budget requirements and demonstrate service delivery and value for money as well as supporting the development of a sound business case for future investment needs.

3.16.1 Structural Patching

Roads deteriorate over time and require constant regular maintenance to slow the rate of deterioration, extend service life, delay the need for corrective treatments and therefore reduce the whole life cost of sustaining asset condition.

One treatment option available is structural patching which can be used to treat localised areas of defective surfacing to restore asset condition, reduce the need for potential reactive maintenance and prolong service life of the asset.

Undertaking structural patching can be more expensive (per Sqm) than resurfacing the carriageway but less area needs to be treated therefore reducing the overall cost. Patching will also target specific areas of road that are in the red RCI condition band only whereas resurfacing a section of road may be cheaper (per Sqm) but may incur treatment of a combination of red, amber and green condition bands. There is a balance that has to be struck between when to patch or resurface which is best determined by experienced road maintenance practitioners. Generally the decision will be based around a cost/benefit analysis of each treatment option. Structural patching is a useful treatment in targeting 100% red condition band areas and maximising impact on RCI.

Currently patching is funded generally from the revenue maintenance budget with only a small percentage of structural maintenance having been funded through capital. Consideration should be given to funding these works from Capital budgets where works can be shown to significantly increase the life of the asset.. This would provide more scope for revenue funding to be utilised for increased preventative maintenance that will preserve asset condition and help avoid entering the vicious cycle of inadequate maintenance with the resultant increase in costs and deterioration of the asset.

3.16.2 Waste Reduction – Use of Innovative Materials & Processes

Road maintenance can be costly and we must constantly seek out ways and means of minimising expense. Waste reduction coupled with a government desire to reduce carbon emissions requires us to look closely at our maintenance operations to identify any potential savings and reduce waste.

One newly developed product called RoadCem is currently being considered for potential use on public roads particularly for use on islands where bituminous material supply is dependent on mainland suppliers and suitable ferry services.

RoadCem enables the binding of nearly all kinds of materials to form a suitable road, making use of in situ materials such as clay, sand and peat. This principle makes the supply or disposal of materials unnecessary.

RoadCem claims to be;

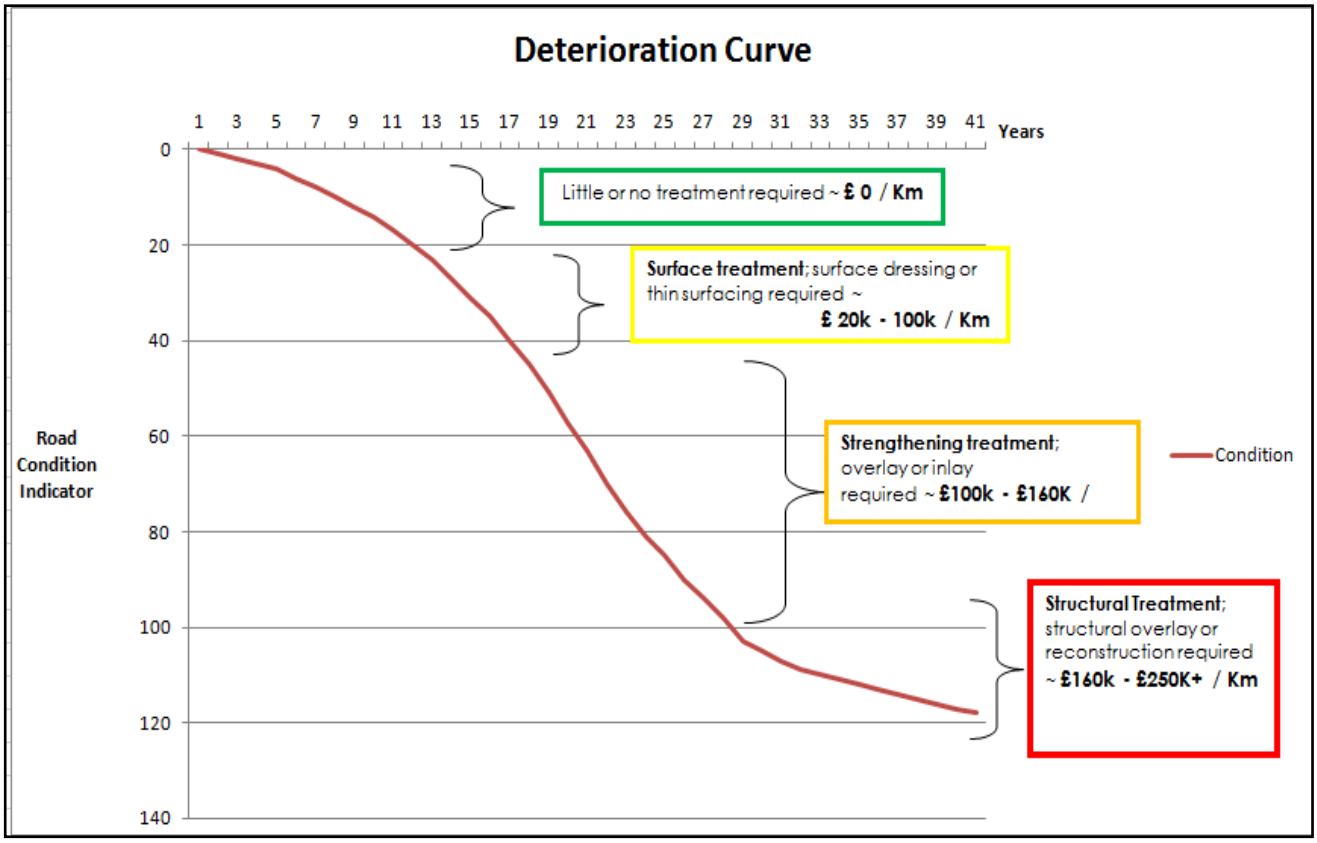
- Cost-effective
- Shorter construction time
- Use of in situ materials
- Use of secondary materials
- Durability and quality
- Used worldwide in extreme areas

The RoadCem product has been successfully used worldwide for the stabilisation of earthworks, road building and hydraulic engineering projects and is currently being considered for a trial in conjunction with the timber industry. This will allow the product to be evaluated for its suitability for use on the public road network as well as considering its potential to reduce future road maintenance costs. A suitable demonstration site is being sought to enable the process to be monitored for suitability and cost effectiveness.

3.17 Planned Maintenance Projections

The following projections have been prepared using a spreadsheet projection model provided by SCOTS. The spreadsheet uses deterioration profiles from the guidance document Technical Note 46 – Part 1 Financial Information to support Asset Management – Guidance notes for UKPMS Developers for 2010/11. This document provides a deterioration curve which is used to calculate the change in condition over time. The profile has been amended to reflect a more realistic reflection of deterioration based upon the actual levels of deterioration being recorded in recent survey results.

The curve below illustrates the way in which carriageways deteriorate over time along with potential treatments and estimated costs to restore network condition.



Initially carriageway pavements deteriorate very little as illustrated by the flatness of the curve in the first years. During this period little or no treatment is required.

1. Initial deterioration then occurs in the surface layers. During this period the surface can be restored using a surface dressing or a thin surfacing (Surface Treatment 25 – 60mm). These treatments are comparatively cheap. This period of deterioration therefore offers an opportunity for cost effective

preventative maintenance via the use of these treatments as a strategy to prevent more deep seated and expensive treatments being necessary to extend service life.

2. If a preventative treatment is not applied deterioration continues and increases causing deeper distresses in the pavement. Pavements in this middle level of deterioration become unsuitable for preventative maintenance treatments such as surface dressing. Such treatments could be applied but would have a very limited life, much shorter than their normal expected life. Pavements in the middle levels of deterioration are usually restored using resurfacing treatments of inlays or overlays (Strengthening Treatment 60 – 100mm) .
3. If a resurfacing treatment is not applied at this middle level and further deterioration occurs, structural damage to the pavement can occur requiring more extensive treatments to be required comprising of deep overlays or inlays (Structural Treatment > 100mm) or in some circumstances reconstruction.

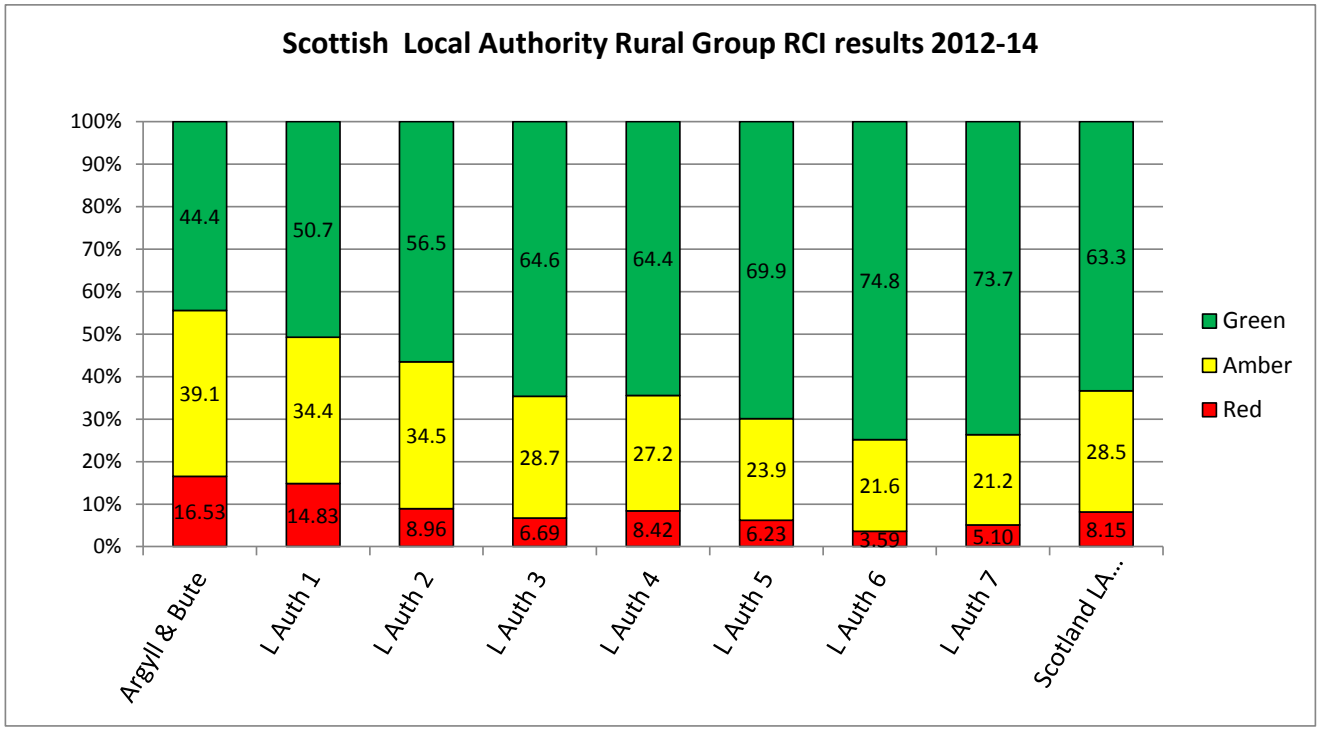
Deterioration curves following this pattern of deterioration have been used on the cost projection models in this report.

3.17.1 Investment Options Compared To Other Local Authorities.

The 2012-14 RCI results for all 32 Scottish Local Authorities were obtained to determine investment options against desired goals and objectives. Each authority is placed within one of five groups – Island, Rural, Semi-Rural, Urban or City to facilitate comparisons of data between authorities with similar characteristics. The recent investment in roads reconstruction has produced a year on year visible improvement in the actual road condition. **With the lag between surfacing works, the condition surveys and the RCI results, future RCI results are expected to improve and reflect the noticeable improvement to carriageway condition on the ground.** The RCI results for Scottish Rural Group Authorities (Argyll & Bute, Borders, Angus, Aberdeenshire, Moray, Dumfries & Galloway & Highland) are detailed in Table 3.15.5a and graphically below;

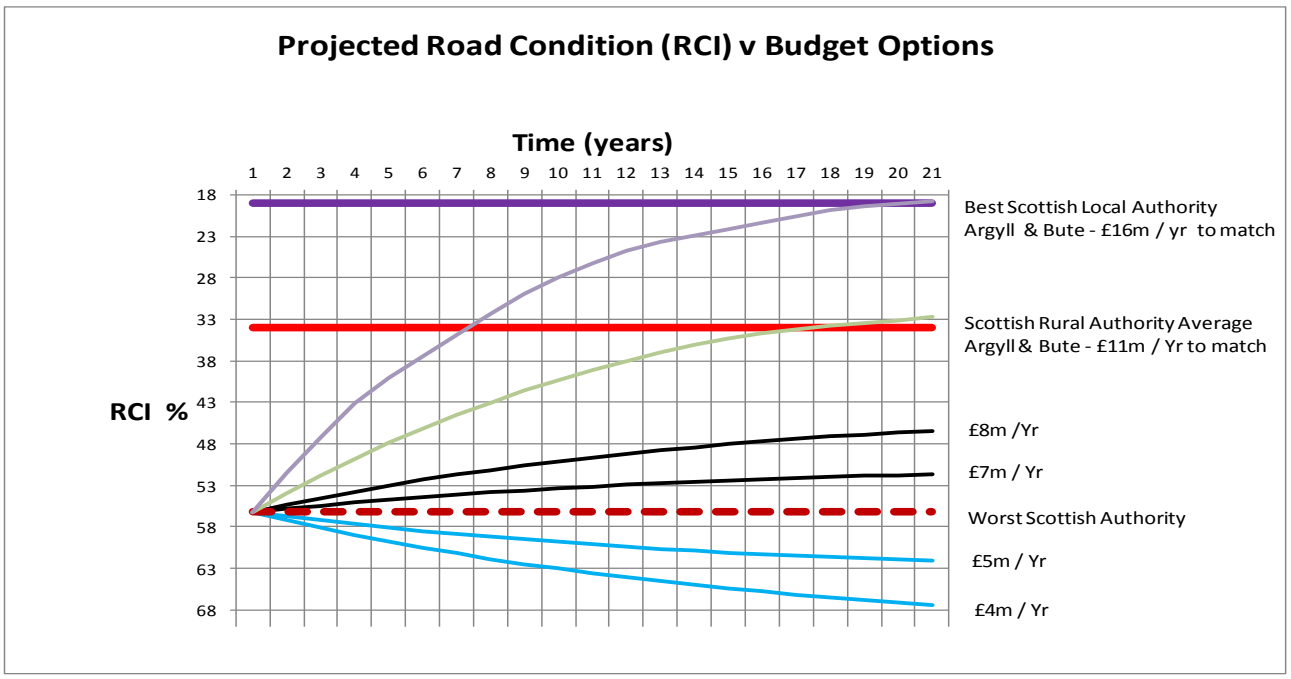
Table 3.15.5a Rural Scottish Local Authority RCI 2012-14 results

Ranking Position	Rural Scottish Authority	Network Condition			
		Red	Amber	Green	RCI
32nd	Argyll & Bute (2013-15 results)	16.53	39.1	**44.4**	**55.6**
31th	Local Authority 1	14.83	34.4	**50.7**	**49.3**
22nd	Local Authority 2	8.96	34.5	**56.5**	**43.5**
16th	Local Authority 3	6.69	28.7	**64.6**	**35.4**
19th	Local Authority 4	8.42	27.2	**64.4**	**35.6**
14th	Local Authority 5	6.23	23.9	**69.9**	**30.1**
3rd	Local Authority 6	3.59	21.6	**74.8**	**25.2**
9th	Local Authority 7	5.10	21.2	**73.7**	**26.3**
19th	**Scotland LA Average**	**8.15**	**28.5**	**63.3**	**36.7**



The recent £21m investment approved by council in February 2012 for the roads reconstruction programme has seen a noticeable improvement in road condition. This improvement has been confirmed via a full network condition survey carried out in late summer 2014.

The SCOTS cost projection model as described in the following sections (3.15.6 – 3.15.13) was used to project road condition RCI results for several different budget options over a 20 year period and the results were compared with other Scottish Local Authorities RCI results. The following graph indicates the predicted funding levels required to meet desired targets within a given timescale based on the SCOTS cost projection tool calculations for carriageway resurfacing works only.



3.17.2 Cost Projection Modelling for Carriageway Resurfacing Treatments

The SCOTS financial modelling tool has been revised and updated as part of a continuous improvement process. This has been achieved through the submission of robust and detailed historical carriageway data from a number of authorities which has permitted comparisons to be made between the modelling tool predictions and the actual condition over time to be evaluated. The exercise showed that the original modelling tool predicted a slightly greater deterioration rate than was actually the case and has therefore been updated to take account of the evaluation findings. The tool will be regularly reviewed over time as more data becomes available and will continue to improve.

The revised modelling tool has been used to assess future carriageway condition in relation to carriageway treatments and costs and presents a range of investment options for consideration.

Estimated costs of treatments have been used for each class of road to calculate the amount of works that can be undertaken for each of the budget options. The works that can be afforded and their predicted effect on condition are deducted from the deteriorated condition to predict future condition in each year.

The estimated unit rates and surface treatments entered to the modelling tool are shown in Table 3.15.6 below.

Table 3.15.6 SCOTS cost projection tool unit rates

Treatment Type	Description of Treatment	Unit Rate (£/sqm)
Surface Dressing	Pre-Patch & Premium SD	£5.00
Thin / Micro surface	25mm Thin surfacing	£12.50
Thin Overlay	40mm Overlay	£15.40
Moderate Overlay	60mm Overlay	£28.44
Structural Overlay	100mm Overlay	£46.61
Thin Inlay	40mm Inlay	£18.50
Moderate Inlay	60mm Inlay	£30.00
Structural Inlay	100mm Inlay	£48.00
Fully Reconstructed	1.5m wide Flex-Edge Strength/Deep Patching	£104.27
Data source – Estimated average rates derived from mixed sources		

The spreadsheet produces predictions of future condition based upon average deterioration rates and the cost of treatment. Both of these inputs may vary in the future.

Steady State

The spreadsheet also computes a steady state calculation which is based upon prevention is better than cure approach. The calculation estimates the amount of surface treatment and resurfacing required to prevent

condition bands of Amber 1 and 2 getting any bigger or moving to a red condition. This means that a regime of much lesser treatment much less frequently than every 21 years (CIPFA Annual Depreciation Calculation) is used. This is felt to be more realistic. In reality of course some "red" condition roads would be treated BUT roads are not in a single red, amber or green condition they are a combination along the length, also for many authorities strengthening treatment is often a similar treatment to resurfacing and the price difference between treating a road after it has become red rather than prior to it entering red is nominal. As such as a crude estimate of steady state it is a simple calculation the logic of which can be explained. It may be on the optimistic side but until more data is collected and reviewed this cannot be accurately assessed.

The results should be read in that context.

Investment Options presented.

The SCOTS cost projection tool has been used to present four different investment options based on the current available capital funding of £4.0m. These options illustrate the affect that different maintenance strategies can have on road condition based on the same level of funding. The maintenance strategies available within the SCOTS cost projection tool are user defined based on prioritising available funding towards Strengthening, Resurfacing or Surface Treatments.
The options considered are as follows;

Option 1 – considers continuation of current funding across all treatments (Treats Red, Amber 1 & 2 condition bands).
Option 2 – considers reducing strengthening and increasing funding of surface treatments (Treats Red, Amber 1 & 2 condition bands).
Option 3 – considers funding 80% surface and 20% surfacing treatments (Treats Amber 1 & 2 condition bands only).
Option 4 - considers funding strengthening and resurfacing treatments only (Treats Red & Amber 1 condition bands).

The model uses the allocated funding for each road class to treat the RCI condition bands as follows;

- Funding for surface treatments is used to treat amber 2 condition band.
- Funding for resurfacing treatments is used to treat amber 1 condition band.
- Funding for strengthening treatments is used to treat red condition band.

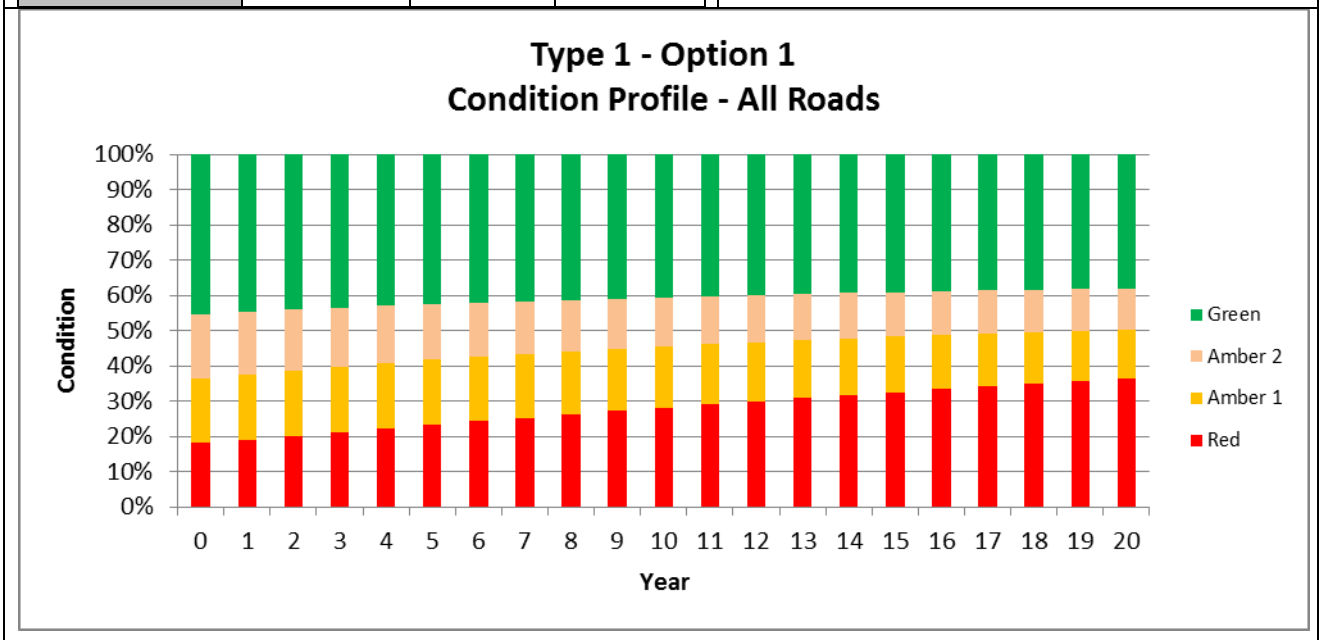
3.18 Option 1 – Continuation of Current Funding £4.0m across all treatments

		Option 1	Continuation of Current Funding	
Year 1 Budget: Type 1 - Option 1		**£4,000,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£50,000	£300,000	
	Rural	£300,000	£600,000	£500,000
Classified (B) Roads (cat 3a)	Urban	£50,000	£100,000	
	Rural	£100,000	£300,000	£250,000
Classified (C) Roads (cat 3b)	Urban	£50,000	£100,000	
	Rural	£100,000	£300,000	£350,000
Unclassified Roads (cat 4a & 4b)	Urban	£50,000	£100,000	
	Rural	£50,000	£100,000	£250,000
Treatment Totals		**£750,000**	**£1,900,000**	**£1,350,000**

Continuation of current funding at £4.0m is lower than the predicted steady state budget (Preventative) of £8.0m and is delivered across all treatments. Model treats all condition bands.

The SCOTS model predicts that this level of funding and will result in continued asset deterioration with increased reactive maintenance costs and a potential increase in insurance claims.

The predicted RCI at the end of 20 years would be 61.87% or a 7.17% deterioration on current condition.



This option demonstrates the effect of under investment which will allow the current road condition to deteriorate significantly, propagating increased potholes and reactive maintenance costs whilst escalating the risk of insurance claims for damage.

This option illustrates that current funding levels will also undermine the recent £21m investment in roads reconstruction over the previous three years and will impact on the progress already made in arresting deterioration of the road network. Options 2,3 & 4 show how the RCI results can be affected by prioritising available funding towards different treatments.

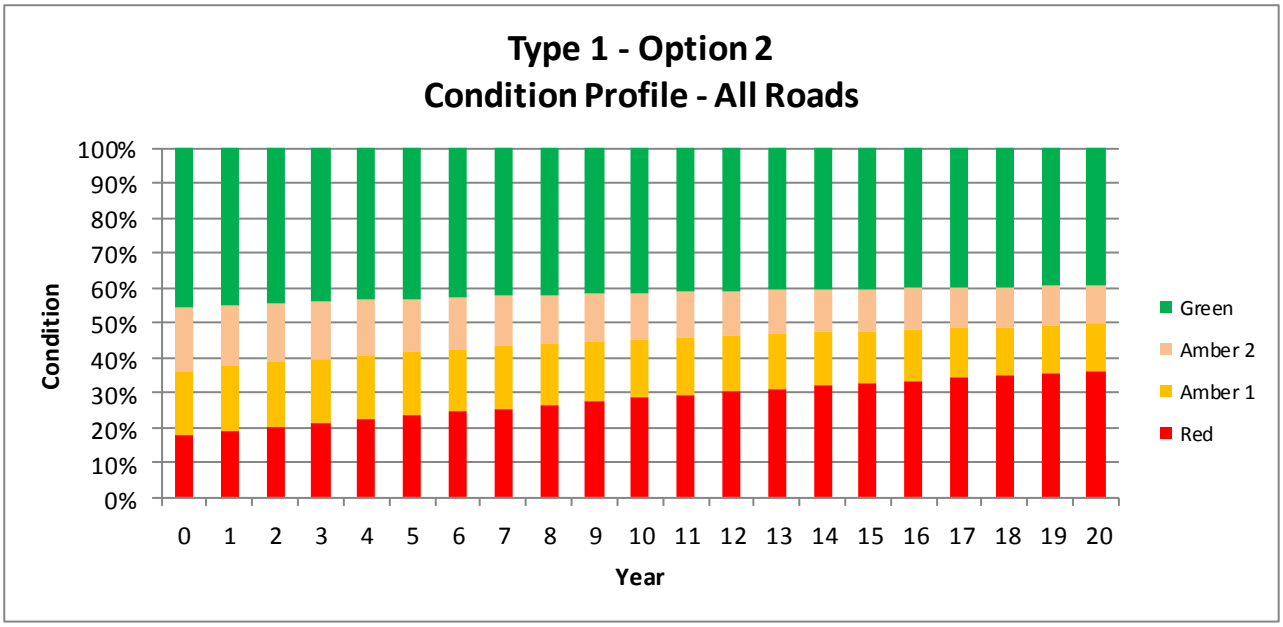
3.19 Option 2 – Continuation of Current Funding £4.0m with increased surface treatments

		Option 2	Increase Preventative	
Year 1 Budget: Type 1 - Option 1		**£4,000,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£100,000	£400,000	
	Rural	£250,000	£700,000	£800,000
Classified (B) Roads (cat 3a)	Urban		£150,000	
	Rural	£100,000	£200,000	£300,000
Classified (C) Roads (cat 3b)	Urban		£100,000	
	Rural		£100,000	£250,000
Unclassified Roads (cat 4a & 4b)	Urban		£200,000	
	Rural		£100,000	£250,000
Treatment Totals		**£450,000**	**£1,950,000**	**£1,600,000**

Continuation of current funding at £4.0m is lower than the predicted steady state budget (Preventative) of £8.0m. Available funding is prioritised towards increased surface treatments and reduced strengthening.(Model treats more amber less red condition)

The SCOTS model predicts that this level of funding will result in continued asset deterioration with only a marginal improvement on option 1 RCI at end of 20 years.

The predicted RCI at the end of 20 years would be 60.74% or a 6.03% deterioration on current condition.



This option shows a slight improvement on RCI over 20 years compared with Option 1 however funding is lower than steady state and deterioration of the asset will continue with increased demand for reactive maintenance.

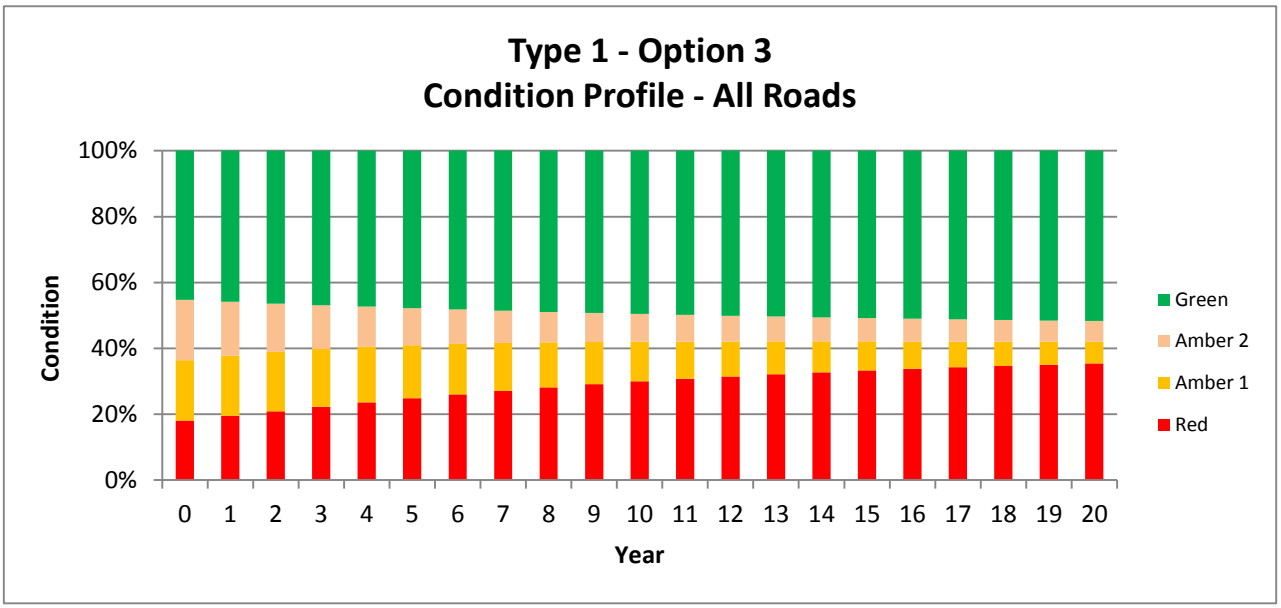
3.20 Option 3 – Continuation of Current Funding £4.0m with 80% surface and 20% resurfacing treatments

		Option 3	80/20 Preventative	
Year 1 Budget: Type 1 - Option 1		**£4,000,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban		£100,000	£400,000
	Rural		£350,000	£1,400,000
Classified (B) Roads (cat 3a)	Urban		£30,000	£120,000
	Rural		£120,000	£480,000
Classified (C) Roads (cat 3b)	Urban		£20,000	£80,000
	Rural		£70,000	£280,000
Unclassified Roads (cat 4a & 4b)	Urban		£40,000	£160,000
	Rural		£70,000	£280,000
Treatment Totals		**£0**	**£800,000**	**£3,200,000**

Continuation of current funding at £4.0m is lower than the predicted steady state budget (Preventative) of £8.0m. Available funding is prioritised 80% on surface and 20% resurfacing treatments with no strengthening treatments. Model treats amber 1 & 2 condition bands only.

The SCOTS model predicts that this level of funding will result in an improved RCI over the 20 year period although the length of road within red condition band will increase.

The predicted RCI at the end of 20 years would be 48.29% or a 6.42% improvement on current condition.



This option demonstrates the effect of prioritising funding towards more preventative treatments and treating only the amber condition bands (80% amber 2 and 20% amber 1). The model predicts an improvement in the overall RCI however roads within the red condition band would remain untreated and will continue to deteriorate necessitating increased reactive maintenance.

This option shows the best option to improve RCI however the natural tendency is to prioritise treatments towards roads in the worst condition.

3.21 Option 4 – Continuation of Current Funding £4.0m with increased strengthening and resurfacing treatments and no surface treatments.

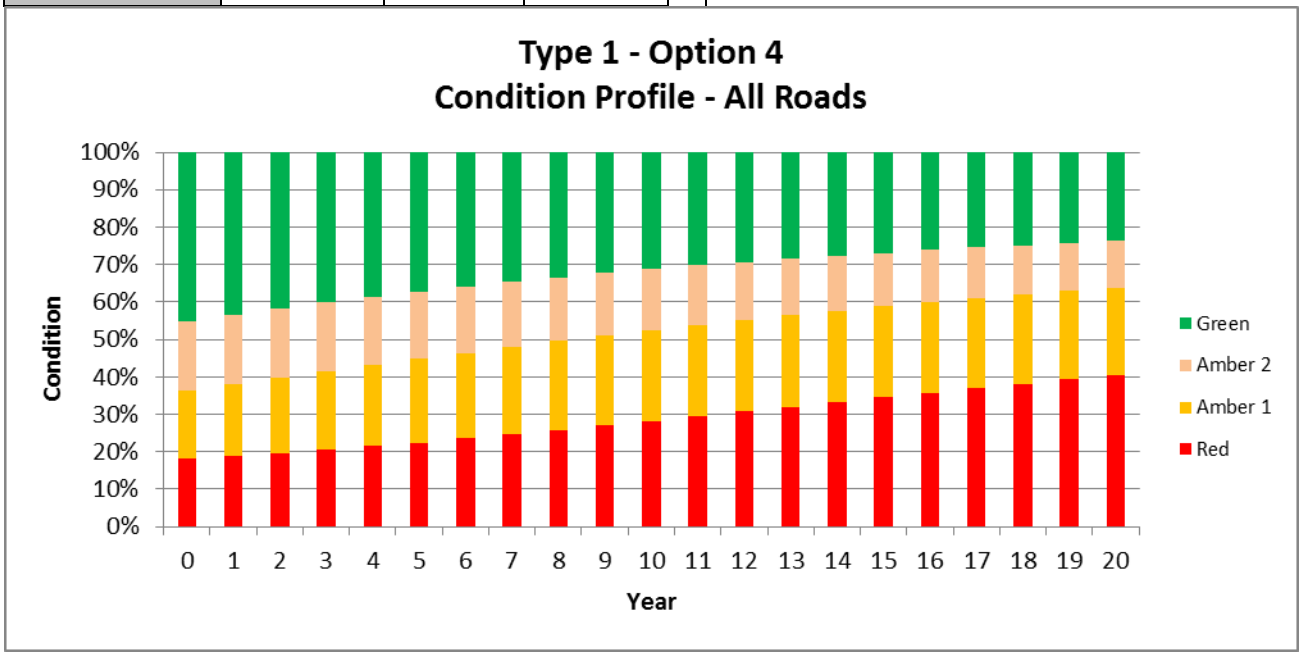
		Option 4	Increased Strengthening	
Year 1 Budget: Type 1 - Option 1		**£4,000,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£150,000	£400,000	
	Rural	£550,000	£800,000	
Classified (B) Roads (cat 3a)	Urban	£50,000	£150,000	
	Rural	£200,000	£450,000	
Classified (C) Roads (cat 3b)	Urban	£50,000	£100,000	
	Rural	£200,000	£400,000	
Unclassified Roads (cat 4a & 4b)	Urban	£50,000	£200,000	
	Rural	£50,000	£200,000	
Treatment Totals		**£1,300,000**	**£2,700,000**	**£0**

Continuation of current funding at £4.0m is lower than the predicted steady state budget (Preventative) of £8.0m. Available funding is prioritised towards resurfacing and strengthening treatments only. The model treats red and amber 1 condition bands only.

The SCOTS model predicts option 4 as having the greatest deterioration and the worst RCI over 20 years.

The predicted RCI at the end of 20 years would be 76.33% or a 21.62% deterioration on current condition.

£0



This option demonstrates the effect of prioritising funding towards roads in the poorest condition and clearly shows this will give the worst outcome for available funding. This is because prioritising funding towards routes in the poorest condition requires more expensive treatments and therefore less area can be attended. Meanwhile roads in good condition that could be maintained using much cheaper treatments are left unattended and continue to deteriorate more rapidly, necessitating the use of more expensive treatments to restore asset condition later in the deterioration cycle.

The SCOTS cost projection tool has been developed to provide predictions of future asset condition to assist decision makers making more informed choices. The model predictions are based around current available asset data from many local authorities and will be continually updated to ensure that model predictions match as closely as possible with actual road condition. There are other modelling tools available that use different criteria to predict future asset condition however it is felt that the SCOTS model because it has been developed in conjunction with Scottish local authorities actual data provides the most accurate predictions.

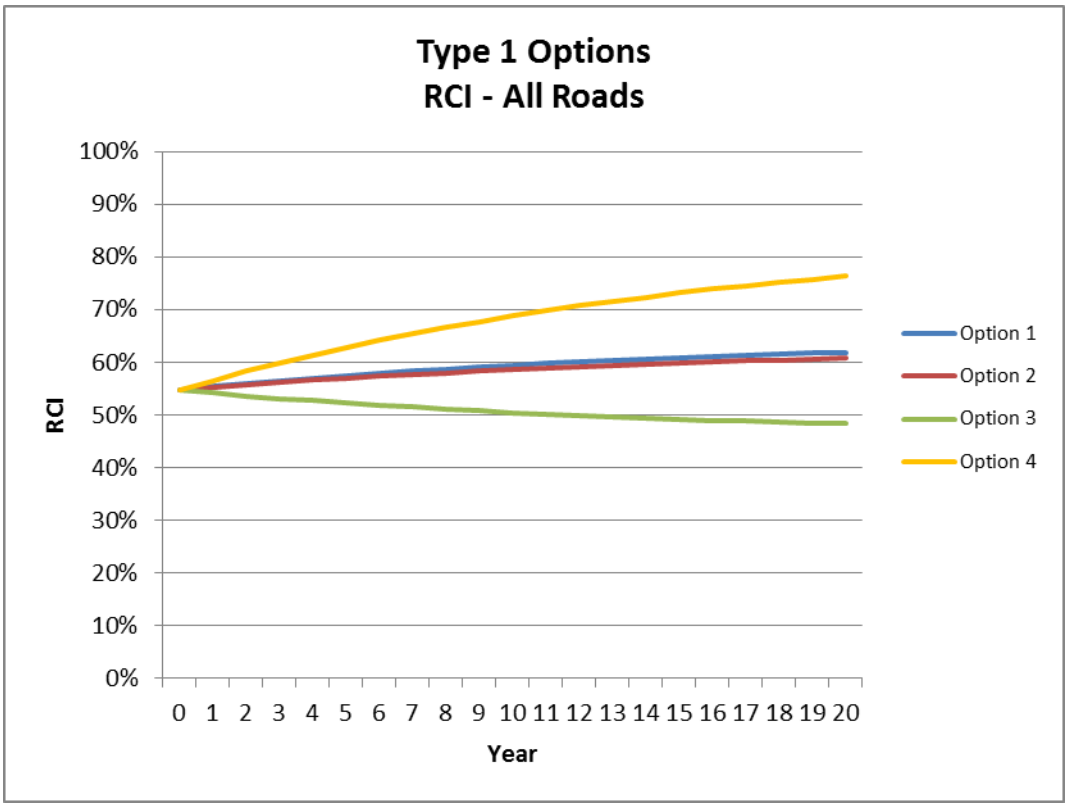
A key issue to note is that the latest SCOTS model predicts that an estimated steady state figure of £8.0m is required to maintain current road surface condition RCI. This has increased from previous model (£6.35m) due to an increase in treatment rates. Considering the models accuracy the recent £21m investment in roads reconstruction averaging £7.0m each year has arrested deterioration and provided a steady state RCI for two consecutive years. This would suggest that the SCOTS model predictions between £6.35 & £7.0m are quite reliable.

The latest SCOTS model provides the opportunity to compare four different maintenance scenarios based on the same funding. The four options presented provide an indication of how different treatment strategies can affect the RCI over time. Table 3.21 below details the predicted RCI results for all options over a twenty year period based on available funding of £4.0m. It should be noted that the year 0 RCI (54.71%) is different than reported RCI condition of 55.6%. This is because the reported RCI is based on network length whereas the SCOTS cost projection tool uses network area to calculate RCI.

Table 3.21 SCOTS Cost Projection Model Predicted RCI results

All Roads RCI (Type1)				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	54.71%	54.71%	54.71%	54.71%
1	55.34%	55.22%	54.15%	56.55%
2	55.93%	55.70%	53.62%	58.27%
3	56.48%	56.14%	53.12%	59.89%
4	57.00%	56.56%	52.66%	61.41%
5	57.48%	56.96%	52.23%	62.84%
6	57.93%	57.33%	51.82%	64.18%
7	58.35%	57.68%	51.45%	65.44%
8	58.74%	58.01%	51.09%	66.62%
9	59.11%	58.32%	50.76%	67.73%
10	59.45%	58.61%	50.46%	68.78%
11	59.77%	58.89%	50.17%	69.76%
12	60.07%	59.15%	49.90%	70.68%
13	60.35%	59.39%	49.65%	71.55%
14	60.61%	59.62%	49.41%	72.36%
15	60.86%	59.83%	49.19%	73.13%
16	61.09%	60.04%	48.99%	73.85%
17	61.30%	60.23%	48.79%	74.53%
18	61.51%	60.41%	48.62%	75.16%
19	61.70%	60.58%	48.45%	75.76%
20	61.87%	60.74%	48.29%	76.33%
RCI Difference Years 0-20	**- 7.16%**	**- 6.03%**	**+ 6.42%**	**- 21.62%**

The four options are presented graphically in terms of RCI for all roads below.



The model shows options one and two as having similar outcomes with both showing a continuing deterioration of the network in line with funding being less than the estimated steady state figure.

The model clearly shows option three as being the best. This option prioritises funding towards the use of cheaper treatments earlier in the deterioration cycle, therefore retarding deterioration and preserving roads already in reasonable condition whilst delaying the need for expensive corrective maintenance treatments. This option does not however provide any funding for roads in poorer condition or in the red condition band and these routes will continue to require reactive maintenance.

Option four demonstrates that prioritising funding towards roads in the poorest condition will deliver the worst outcome in terms of RCI. This option is provided because the natural tendency is for funding to be directed towards treating the worst condition sections of road. The model illustrates that this does not necessarily make the best use of available funding.

Populating the model provides useful comparisons between different funding options in order to derive the best value for money in terms of improving the RCI. It is obvious from the model that prioritising funding towards treatments earlier in the deterioration cycle will deliver the best opportunity of providing a sustainable asset for minimum expense.

The model also validates the opinion of road maintenance practitioners that maintenance strategies and available funding should be directed towards slowing down the rate of deterioration through increased preventative maintenance aimed at preserving or extending the service life of assets. This in turn will facilitate the opportunity to make the most of available investment in roads maintenance

and will deliver the best outcome in terms of improving road condition and contributing to the economic health and well-being of Argyll and Bute.

3.22 Road Condition Profiling – Funding Prioritisation

In the context of road maintenance the timing of maintenance treatments is critical to achieving best value in terms of whole life costing. A cheaper treatment carried out on a road which is still in good condition can be seen as wasteful "why spend money on a good road?" equally, leaving the treatment until the road is in a very poor state will incur the use of more expensive treatments and therefore a shorter length afforded to be treated. The key is achieving the right treatment at the right time on the right road.

A simple cost projection modelling tool has been created to illustrate how the timing of maintenance treatments can influence the road condition indicator (RCI) over time. The spreadsheet allows the facility for different configurations of budgets, lifecycles and maintenance treatments to be input with the results shown as a graphical prediction of the Road Condition Indicator (RCI) profile based on three different funding priorities over a period of time.

The spreadsheet undertakes calculations as follows;

1. Total available funding is prioritised in the order preventative, reactive with any available balance used for the selected treatments.
2. The funding is prioritised from three different perspectives, either green, amber or red condition routes first to generate a condition profile over time.
3. It is assumed that all treatments that can be afforded will result in that length of road being in green condition.
4. It is assumed that all treatments that cannot be afforded will be result in that length of road being added to the nest lower condition band.

This condition profiling tool demonstrates how the same level of funding can influence the road condition profile depending on which road condition band is targeted for treatment.

The modelling tool has been input with data to represent a typical road network (not Argyll and Bute data) in order to demonstrate the process.

EXECUTIVE SUMMARY - FUNDING PRIORITISATION - ROAD CONDITION PROFILES

ROAD NETWORK DATA

Enter the total length of Road Network to be profiled	2330	Km
Enter the percentage of the Road network defined as **GREEN** within the Road Condition Indicator (RCI) Survey for the commencement year of plan	43.0%	%
Enter the percentage of the Road network defined as **AMBER** within the Road Condition Indicator (RCI) Survey for the commencement year of plan	36.0%	%
Enter the percentage of the Road network defined as **RED** within the Road Condition Indicator (RCI) Survey for the commencement year of plan	21.0%	%
Enter the cost per kilometre of annual routine maintenance as defined within the Roads Asset Maintenance Plan (RAMP)	£1,843	£/Km

TREATMENT COST DATA

Enter the cost per kilometre to **PATCH** 5% of the carriageway surface area at 40mm deep	£12,500	£/Km
Enter the cost per kilometre **SURFACE DRESS** the existing carriageway as per the current design guide.	£21,741	£/Km
Enter the cost per kilometre to **RESURFACE** the existing carriageway at 40mm thick.	£118,926	£/Km
Enter the cost per kilometre to **PATCH, REGULATE & RESURFACE** the carriageway at 100mm thick	£161,158	£/Km
Enter the cost per kilometre to **PROVIDE DRAINAGE , RECONSTRUCT**(Edge strengthning) **REGULATE & RESURFACE** the carriageway at 100mm thick.	£244,535	£/Km

NETWORK LIFECYCLE DATA

Enter the predicted duration that the road network will remain in **GOOD CONDITION** assuming initial new construction.	18	Yrs
Enter the predicted duration that the road network will remain in **FAIR CONDITION** assuming initial new construction.	9	Yrs
Enter the predicted duration that the road network will remain in **POOR CONDITION** assuming initial new construction.	7	Yrs
Enter the predicted duration that the road network will remain in **VERY POOR CONDITION** assuming initial new construction.	3	Yrs
Enter the predicted duration that the road network will remain in **FAILED CONDITION** assuming initial new construction.	3	Yrs
LIFECYCLE OF ROAD NETWORK	40	Yrs

REACTIVE MAINTENANCE DATA

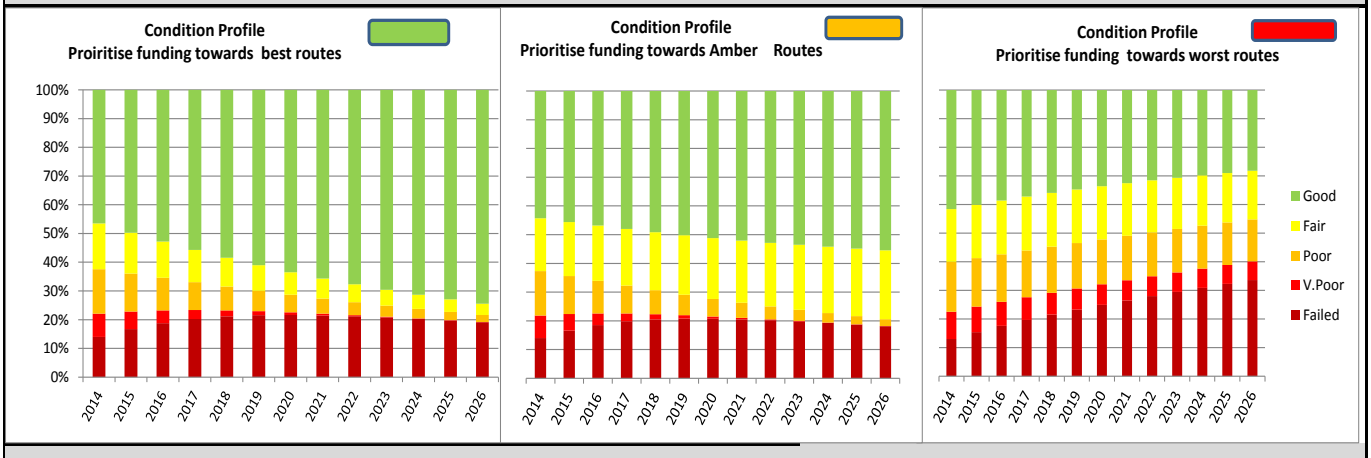
Enter percentage allowance for reactive works to be added to Routine Maintenance for a Road network in **GOOD CONDITION.**	0	%
Enter percentage allowance for reactive works to be added to Routine Maintenance for a Road network in **FAIR CONDITION.**	25	%
Enter percentage allowance for reactive works to be added to Routine Maintenance for a Road network in **POOR CONDITION.**	50	%
Enter percentage allowance for reactive works to be added to Routine Maintenance for a Road network in **VERY POOR CONDITION.**	75	%
Enter percentage allowance for reactive works to be added to Routine Maintenance for a Road network in **FAILED CONDITION.**	100	%

BUDGET DATA

Enter the annual budget available -	**REVENUE**	£6,400,000
Enter the annual budget available -	**CAPITAL**	£5,000,000
TOTAL BUDGET AVAILABLE		£11,400,000

TIMESCALE

Enter the year of commencement of plan	2014



PREDICTED RCI CONDITION PROFILE FOR YEAR 2026

PRIORITISE FUNDING TOWARDS	BEST		AMBER		WORST	
Percentage of the Road network defined as **GREEN** within the Road Condition Indicator (RCI) Survey	74.5%	%	54.8%	%	28.2%	%
Percentage of the Road network defined as **AMBER** within the Road Condition Indicator (RCI) Survey	6.3%	%	26.4%	%	31.6%	%
Percentage of the Road network defined as **RED** within the Road Condition Indicator (RCI) Survey	19.2%	%	18.8%	%	40.1%	%

It can be seen from the spreadsheet output that targeting where available funding is spent can have a significant influence on road condition.

In the network represented for profiling the predicted RCI results favours prioritising treatments towards good or green RCI roads as the best option RCI 25.5%. Prioritising in favour of amber condition bands shows RCI 45.2% whereas prioritising red condition bands shows RCI 71.8%.

However it is a natural tendency for treatments to be focused on sections of road that have already failed or are in the poorest condition although as can be seen in the modelling tool this will not necessarily tackle the overall network condition and it will continue to deteriorate.

This tool supports the SCOTS cost projection tool in demonstrating that the main issue is ensuring that adequate preventative maintenance is undertaken to preserve asset condition and extend expected service life. Understanding this message is the key to realising our potential to reduce whole life costs to a level that can be sustained within the constraints of available budgets.

3.23 Impacts

Currently insufficient data is available to determine the relationship between measured condition and the amount of reactive repair on the network. It is however logical to expect that a network in a more deteriorated condition will create an increased need for reactive repair. Recent atypically harsh winters have illustrated that the network is not resilient. Deterioration of condition as predicted in most of the options above can be expected to exacerbate this vulnerability.

It is probable that lower investment levels, i.e. lower than the maintain current condition option will lead to an increase in reactive repairs, possibly have a knock on effect into 3rd party claims costs and result in lower levels of public satisfaction with carriageways.

3.24 New Roads and Streetworks Act and Scottish Roadworks Register

All Roads Authorities have a statutory obligation to co-ordinate, monitor and inspect the works of others in the roads community. This requires the council to manage and co-ordinate their works, the works of external contractors and public utility companies in accordance with the New Roads and Streetworks Act 1991.

The aim is to minimise disruption and delay to road users and to improve the quality and longevity of reinstatement works within the highway boundary. Section 118 (1) of the New Roads and Street Works Act 1991 states that the Roads Authority has a duty to use its best endeavours to co-ordinate the execution of works of all kinds in the roads under its responsibility;

- In the interest of safety
- To minimise the inconvenience to persons using the road (having regard, in particular to the needs of the disabled) and,
- To protect the structure and integrity of the road including any apparatus within it.

3.24.1 Utility Company Activity

Actual start notices of intended works are detailed within table 3.17.1 below;

Table 3.17.1 Actual Start Notices Issued in each area for utility activity 2013-14									
Utility Company	**Bute**	**Cowal**	**Helensburgh**	**Kintyre**	**Mid Argyll**	**Lorn**	**Mull**	**Islay**	**Totals**
Scottish Water	13	33	78	32	38	43	14	17	**268**
BT	2	59	154	46	34	54	15	14	**378**
SGN	6	20	18	14	0	8	0	0	**66**
S&S - Scottish Power	13	14	21	8	16	3	0	6	**81**
Totals 2013-14	**34**	**126**	**271**	**100**	**88**	**108**	**29**	**37**	**793**
Totals from previous year 2012-13	**83**	**317**	**227**	**89**	**86**	**109**	**32**	**47**	**990**
Data source – NRSWA Co-ordinator									

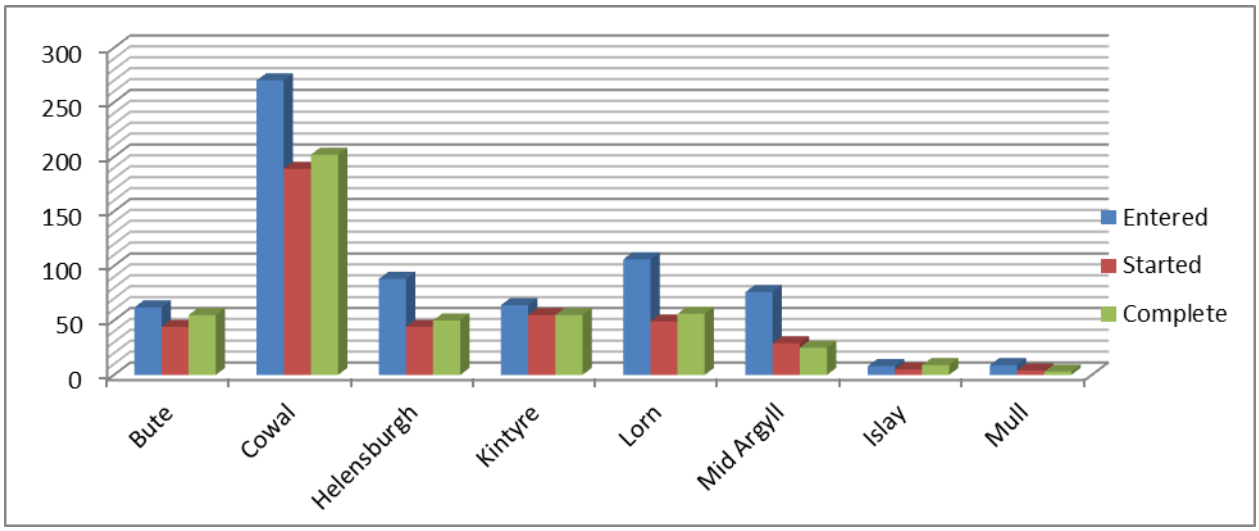
3.24.2 Utility Inspections

In accordance with the New Roads and Streetworks Act 1990 the council carries out several types of inspection to ensure compliance with the Act and to monitor the quality of reinstatements undertaken by utility companies. Table 3.17.2 below details the type and number of inspections carried out during 2013-14.

Table 3.17.2 Inspections									
Inspection Type	**Bute**	**Cowal**	**Helensburgh**	**Kintyre**	**Mid Argyll**	**Lorn**	**Mull**	**Islay**	**Totals**
Sample									
A - Works in Progress	13	34	67	2	14	6	1	1	**138**
B – Within 6 Months	11	16	44	14	18	2	1	1	**107**
C – Prior to end of Guarantee	9	34	42	6	15	23			**129**
Defects									**374**
DAR – Defective Apparatus reported		11		5					**364 (2012-13)**
DAT – Defective apparatus 3rd party report	7	25	5	6		2		1	
D/A2 – Defect follow up report	22	161	4	19		1			
D/2 – Defect follow up inspection	1	21	23	14					
D/3 – Defect completion inspection		1	16	10					
T/A – Target sample A inspection		1	2						
TPR – Third party report all categories		6	3						
RTN – Routine inspection all categories		2	1			4			
Totals 2013-14	**63**	**312**	**207**	**76**	**47**	**38**	**2**	**3**	
Totals from previous year 2012-13	**49**	**191**	**200**	**313**	**47**	**56**	**2**	**1**	
Data source - NRSWA Co-ordinator									

3.24.3 Register of Council Works

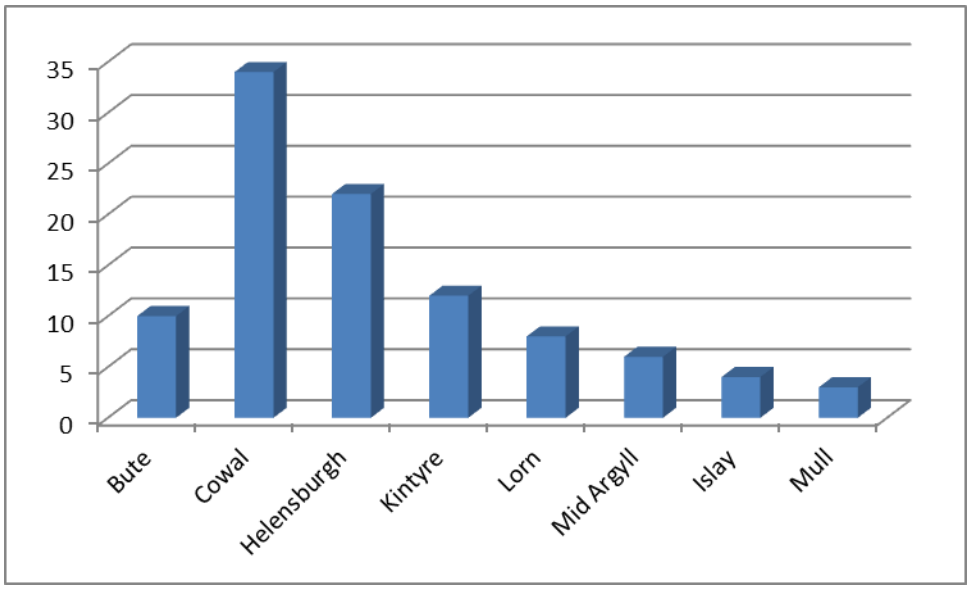
It is also a requirement for the council to enter some works (Type that require advance notification) on the Scottish Roadworks Register. The graph below illustrates the noticing activity for works being undertaken by the council.



There may be some variation between the number of notices entered, started and completed on the register. Reasons for this include; Weather, Budgetary constraints, works rescheduled or perhaps works have been cancelled.

3.24.4 Road Opening permits, Skips, Scaffolds and Parades

The Roads Authority is also responsible for logging permissions and permits on the Scottish Roadworks Register – Skips, Scaffolds Road Opening Permits and Parades. The graph below shows the level of such activity for 2013-14 within each council area.

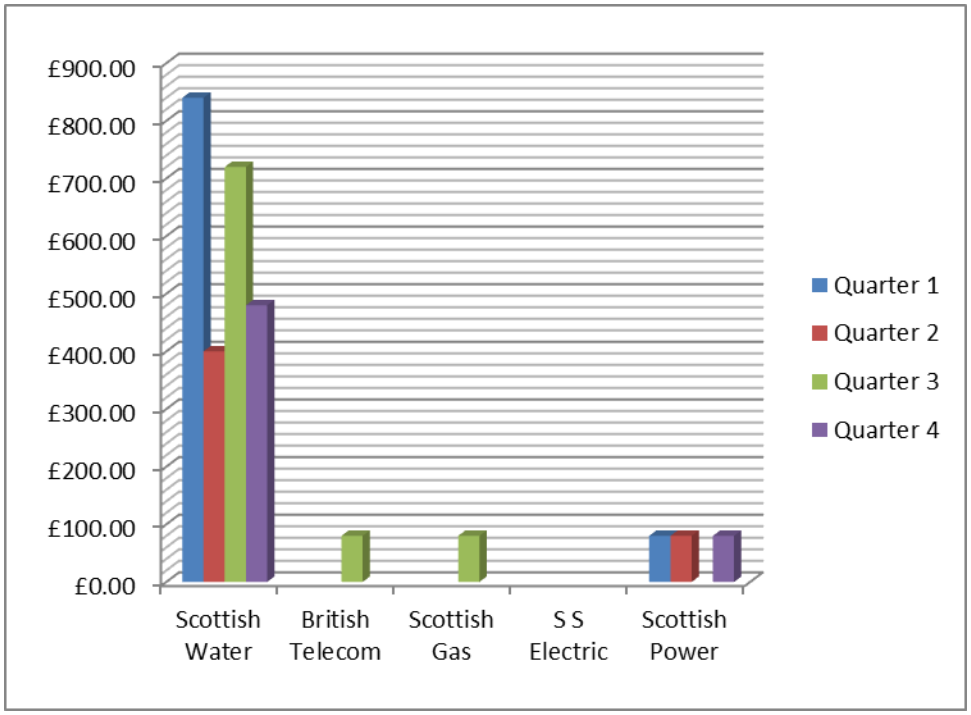


3.24.5 Inspection Fees and Penalties for Non Compliance

The council in exercising its duty to co-ordinate, monitor and inspect utility works can recoup some of the associated management costs through an agreed system of inspection fees, fixed penalty notices and an associated fine for any breach of legislation regards the Scottish Roadworks Register.

Roads Authorities are not currently served with fixed penalty notices but can currently be fined up to £50,000 (potential increase to £200k) by the Commissioner for poor performance.

The graph below shows the costs recouped from each utility company in fines for Fixed Penalty Notices during 2013-14.



The income generated from the chargeable inspections and fees contributes to funding service provision.

3.24.6 Utility Coring Results

Results from the national coring exercise demonstrate an overall improvement in the quality of utility reinstatements undertaken within Argyll and Bute Council between 2006 – 2012. This in part can be attributed to the council having a dedicated team of Inspectors focusing solely on utility works. This developed a good working relationship with contracting companies and ensured quality reinstatements were being delivered. The coring results are detailed within Table 3.17.6 below;

Table 3.17.6 Percentage Failed Utility Coring Results				
Year	**2006**	**2008**	**2010**	**2012**
British Telecom (BT)	50	0	0	0
SGN	37.5	33.33	0	0
Scottish Power (SP)	16.67	37.5	0	0
Scottish & Southern Electricity (SSE)	36.36	33.3	0	0
Scottish Water (SW)	58.33	0	7.69	5
THUS	44.44			
Data source - NRSWA Co-ordinator				

3.25 Loss

Options for changes to 3rd party claims/loss costs have not been explored as part of this carriageway annual assessment. Table 3.18 below details the historical claims data reported to APSE.

Table 3.18 Third Party Claims						
	2008/09	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**
Number of claims received	57	103	182	199	95	144
Number of claims settled	12	21	17	35	16	19
Value of settled claims	£1442.08	£2318.41	£8132.74	£9,308	£6,151.18	£4,629.40
Number of Non-Repudiated 3rd party claims settled in previous 3 years	31	43	50	73	68	70

3.26 Operating Costs

Options for changes to operating costs have not been explored as part of this annual assessment. However as more data is captured on maintenance activities, overheads and other fixed costs will need to be assessed to identify any potential saving in the provision of a best value service.

3.27 Improvement Actions

The following actions are recommended to improve the accuracy of carriageway asset data in future versions of this report

- Inventory collection to fully populate database.
- Improved record keeping of all maintenance works including capital reconstruction within WDM particularly physical quantities.

- Currently carriageway condition is reported via the Road Condition Index (RCI) which relates only to surface condition. Good drainage of the carriageway is also vital to prolonging service life and minimising whole life costs and consideration should be given to establishing a condition index and regular survey of drainage assets to establish necessary investment needs and works programmes.

3.28 Option Summary

A summary of the aforementioned investment options is detailed below and within the Executive Summary.

Carriageways					
No.	**Options**		**Predicted Condition (RCI)**		**Comment**
	Description	**Annual Funding**	**Year 1 2015**	**Year 20 2035**	
1	Continuation of current funding. Capital treatments spread across Amber 1, 2 and Red RCI condition bands	Capital £4.0m Revenue £ 4.2m **	55.6% (54.71%)*	62.76% (61.87%)*	Carriageway condition is predicted to deteriorate undermining the previous £21m investment in roads reconstruction projects.
2	Continuation of current funding Capital prioritised towards treatment of all RCI condition bands but with increased priority on amber 2 condition and less on red condition.	Capital £4.0m Revenue £4.2m **	55.6% (54.71%)*	61.63% (60.74%)*	Carriageway condition predicted to deteriorate at a marginally slower rate than option 1.
3	Continuation of current funding with Capital prioritised towards treatment of amber RCI condition bands only. available funding split 80% amber 2 RCI condition and 20% amber 2 RCI condition.	Capital £4.0m Revenue £5.0m **	55.6% (54.71%)*	49.18% (48.29%)*	Carriageway condition predicted to improve in terms of RCI through investment in cheaper treatments earlier in the deterioration cycle. However this option does not provide funding for routes in the poorest condition which will incur increasing costs for reactive maintenance.

4	Continuation of current funding with capital prioritised towards treatment of Red and Amber 1 condition bands (worst condition routes)	Capital £4.0m Revenue £4.2m**	55.6% (54.71%)*	77.22% (76.33%)*	Carriageway condition is predicted to deteriorate significantly. This option demonstrates the need to prioritise investments towards more preventative maintenance earlier in the deterioration cycle.
5	Steady State	Capital £8.0m Revenue £4.2m**	55.6% (54.71%)*	55.6% (54.71%)*	SCOTS Estimated steady state calculation required to maintain current condition across all RCI condition bands, Red, Amber 1 & 2
6	Continuation of current funding as per option 3 with the addition of Structural Patching funded from Capital investment.	Capital £4.0m Capital £1.3m Revenue £4.3m	This option offers a potential mechanism to increase funding for essential preventative maintenance within Revenue budget to extend service life of assets and uses Capital funding for structural patching to tackle the increasing reactive maintenance costs on worst condition roads.		

RCI = Road Condition Index = percentage of the asset in need of maintenance (combined red + amber condition bands)

**Note – Revenue budget figures are estimated and may be subject to change.

*Note – RCI values from SCOTS cost projection tool calculation which are based on road surface area.

4 Footways & Footpaths

4.1 The Asset

The council's footways (path adjacent to carriageway) asset totals 943km. The quantities of footway are estimated using formulae from Whole of Government Accounts (WGA) valuation based on Carriageway lengths and Rural/Urban environment. The formulae applied are footway length = double urban carriageway length and/or Footway length = 3% of Rural carriageway length. These formulae were applied to the carriageway hierarchy and detailed in Table 4.1a below. These quantities will be reviewed and updated as more inventory data is collected.

Table 4.1a Footways Quantities by Hierarchy

Footway Hierarchy	Length (m)	Area (sqm)
Category 1A	171,400	428,500
Category 1	86,200	155,160
Category 2	84,000	126,000
Category 3	56,655	79,317
Category 4	544,400	653,280
Total	**942,655**	**1,442,257**
Comment – Hierarchy is from Well Maintained Highways Cop. Quantities are estimated and will be updated as data becomes available.		

The council's Footpath (path remote from carriageway) asset is detailed within the Public List of Roads and totals 8.34Km as in Table 4.1b below;

Table 4.1b All Footpath Quantities

Quantity	Length (m)	Area (sqm)
All Footpaths	8,344	10,013
Total	**8,344**	**10,013**
Data Source - Public List of Roads Note – Area is estimated based on average width of 1.2m		

4.2 Asset Value

The council's footways assets were valued in accordance with the CIPFA Transport Asset Code and are detailed in Table 4.2 below;

Table 4.2 Footway Asset Valuation: 2013/14 as at 1st April 2014

Classification	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Annualised Depreciation (AD)
Footways	£144,225,700	£118,722,697	£2,307,611
Footpaths	£1,001,280	£781,799	£16,020
Total	**£145,226,980**	**£119,504,496**	**£22,323,631**
Data source – WGA valuation spreadsheet 2014			

4.3 Maintenance Backlog

There is insufficient data available to calculate the footway asset maintenance backlog.

4.4 Investment

4.4.1 Historical Investment

Historical investment in footways has been as shown in Table 3.2 below;

Table 4.4.1 Historical Investment in Footway Asset							
	2007-2008	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Footways (Revenue)	£166,202	£138,791	£215,907	£186,990	£61,675	£226,263	£187,066
Footways (Capital)	£10,875	£25,056	Nil	£144,057	£0 *	£271,265	£81,609
Cycleways (Capital)	£90,505**	Nil	Nil	£552,449**	£0 *	£93,954	
* Note - Value needs confirmation ** Note – Value may include works on non-adopted cycleways Data source – Finance end of year accounts							

4.4.2 Last Year's investment

During 2013-14 the investment in the footway asset was as detailed in Table 4.4.2 below;

Table 4.4.2 Previous Years Investment 2013/14		
Cost of All Maintenance Work on Footway	**Spend (£)**	**Percentage of Total F/way Spend**
Cost of Planned Maintenance	£81,609	30.4 %
Cost of Reactive Maintenance	£122,090	45.4 %
Cost of Routine Maintenance	£64,976	24.2 %
Total	**£268,675**	**100 %**
Data Source – WGA / APSE returns Note - Planned maintenance may include works externally funded on non- adopted cycleways.		

The average annual capital invested in footway maintenance/renewals over the period 2007 – 2014 was £76k (Total £532,852 / 7 years). This equates to a renewal rate of approx. once every 280 years. (Note: this is based on Footway Surface Treatment (FST) being the only planned treatment undertaken on footways and asset data within Table 4.8.1a Estimated Steady State).

4.5 Output

Output from investment during 2013-14 is detailed in Table 4.5 below. The Table will be populated as more data becomes available.

Table 4.5 Output from Investment		
Category		**Output**
Capital	**£82k**	
Capital schemes (planned maintenance)	£82k	– Jarvisfield Mull £18k – Westfield Cowal £15k – Bute various £7k – East Clyde St Helensburgh £13k – East King St Helensburgh £30k For Discussion – difference in cost
Externally funded schemes		
Revenue	**£186k**	
Routine Maintenance	£64k	– Weed Spraying - £64k
Reactive Maintenance	£122k	– Footways/Kerbs & Cycleway Patching - £122k
Data source – Road Operations Manager, R10 Maintenance.		

4.6 Condition

There is currently no footway condition survey undertaken therefore a detailed analysis of the assets condition cannot be undertaken.

4.6.1 Condition Index

Asset condition data is a valuable tool which can be used to predict and report on future funding needs. It also provides information on whether current investment levels are adequate to ensure the asset is fit for purpose and meets user requirements or whether it is deteriorating or improving. There is an obvious need to assess the condition of the footway asset in order that investment needs can be determined and planned maintenance programmed. The SCOTS forum has been developing a cost effective method of implementing the assessment of footway condition using existing road inspectors and a simple condition index which is based on the Footway Network Survey (FNS) methodology.

The condition index provides a four level indicator as detailed in Table 4.6.1 below.

Table 4.6.1 Footway Condition Index					
Condition Level		Description	Examples	Comment	
1		As New	Brand New footway, recently resurfaced or good sound condition with no defects.		
2		Aesthetically Impaired	Sound footways with patching, Modular footways with sound bituminous patches. Modular footways with elements of different colour/age/material.		
3		Functionally Impaired	Cracked but level flags/blocks. Minor surface deterioration/fretting/cracking		
4		Structurally Unsound	Cracked uneven slabs Major fretting and potholing Poor shape , potential trip hazards etc		

Implementing the use of the footway condition index will require some in-house training to develop a consistent approach delivering reliable results that can be used to determine future investment need.

There is also potential for this simple condition index to be applied to practically any asset including ditches, safety barriers, cattle grids Etc. with the advantage that it may be carried out through the course of existing inspection schedules.

4.7 Reactive Repairs

Table 4.4.2 above shows that £122,090 (45.4% of available budget) was spent on reactive maintenance in 2013/14.

4.8 Options: Planned Maintenance

There is currently insufficient data available to project future condition and maintenance costs. The only option presented is an estimated steady state budget based on current available data.

4.8.1 Steady State

The following steady state projection is based upon estimated asset length (moderate confidence), estimated average width and estimated unit rate for the replacement of surfacing materials along with Engineers estimate for expected service life (60years) of surfaces. The basis of the calculation is detailed within Table 4.8.1a below, illustrated graphically and tabulated for various expected service life scenarios in Table 4.8.1b. These calculations will be updated in future versions of this report as more detailed data on the footway asset becomes available.

Table 4.8.1a Estimated Steady State Budget

Asset Inventory (estimated)					
Asset Length		**Average Width**		**Total Area**	
942	Km	1.5	m	1413000	Sqm
Estimated unit rate for surfacing		**Expected Service Life**		**Annual Surfacing Quantity**	
£15.00	Sqm	60	Years	23550	Sqm
Estimated Steady State Budget				Annual Resurfacing length	
£353,250				**15.70**	**Km**

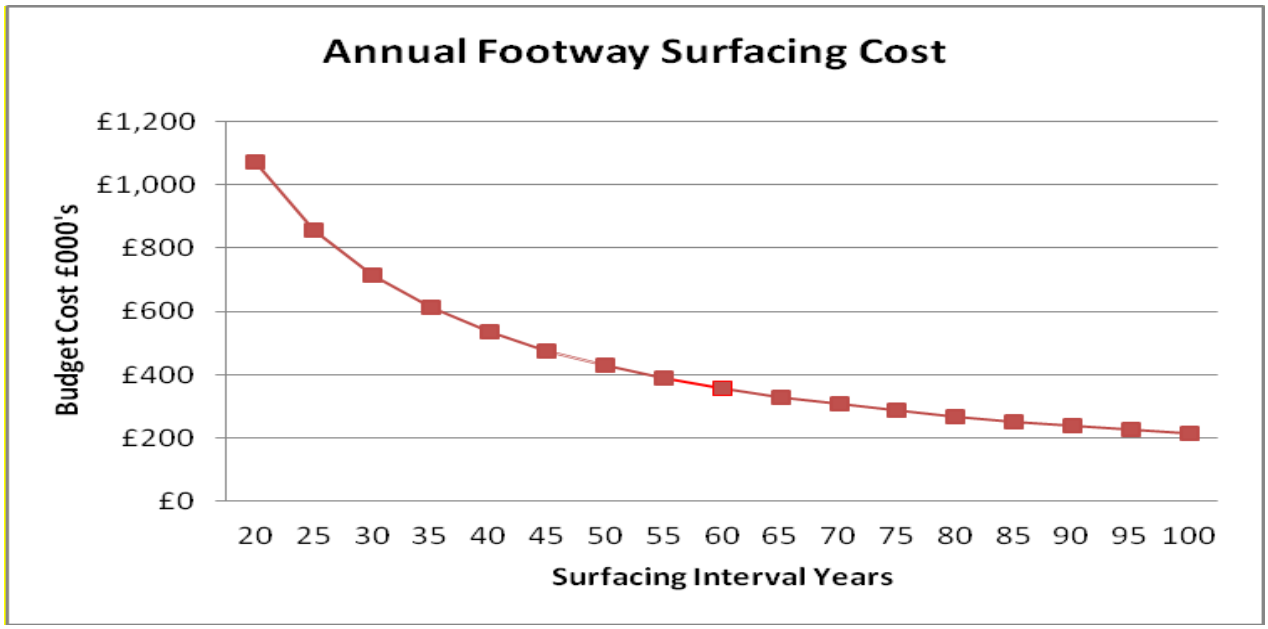


Table 4.8.1b Expected Service Life versus Estimated Annual Budget				
Expected Service Life	**Annual Budget Required**		**Expected Service Life**	**Estimated Annual Budget**
20	£1,072,913		65	£330,127
25	£858,330		70	£306,546
30	£715,275		75	£286,110
35	£613,093		80	£268,228
40	£536,456		85	£252,450
45	£476,850		90	£238,425
50	£429,165		95	£225,876
55	£390,150		100	£214,583
60	£357,638		135	£158,950
			300	£71,527
Note - values based on Table 4.8.1a data.				

4.9 Improvement Actions

There is merit in collecting additional data on the footway asset to permit more detailed reporting on the assets future maintenance requirements. The actions required to project future investment needs include;

- The extent and size of the asset should be determined through a programme of detailed inventory collection.
- A suitable condition index combined with a survey of the asset is required to quantify maintenance needs.
- The existing maintenance hierarchy should be reviewed to align with the functionality and scale of use of the asset.
- Capturing maintenance cost data to allow accurate financial modelling using SCOTS cost projection tools.

More detailed investment options can be developed as this data becomes available.

4.10 Option Summary

Footways					
No.	**Options**		**Predicted Condition (FCI)**		**Comment**
	Description	**Annual Funding**	**Year1 2015**	**Year 20 2035**	
1	**Assumed Steady State** (Based on criteria within – Table 4.8.1a)	Capital £353k Revenue N/A	N/A N/A	N/A N/A	Estimated by officers to be required to replace surfacing on average every 60 years
2	Current Funding	Capital £0k Revenue £156k			Current Capital funding does not provide any investment in surface renewal.
FCI = Footway Condition Index = the percentage of footway in a deteriorated condition (functional and structural deterioration added together) Footway condition surveys are not currently undertaken. **Comment** – Steady state figure is based on estimated values and therefore may be subject to change as more detailed data becomes available.					

5 Street Lighting

5.1 The Asset

The council's street lighting assets are detailed within Table 5.1 below:

Table 5.1 Street Lighting Asset Inventory					
Street Lighting Columns by Material Type					
Material Type					**Total**
Non Galvanised Steel					
Galvanised Steel					9693
Concrete					92
Aluminium					3680
Cast Iron					
Wood Poles					445
Wall Brackets					1225
Total					**15135**
Street Lighting Lamp Assets					
Lamp Type	**UMSUG Assessed Circuit Wattage (W)**				**Total**
	0-50W	**50-100W**	**100W-150W**	**150W+**	
SON (High Pressure Sodium vapour)		9332	42	3048	12422
SOX (Low pressure Sodium Vapour)	399	1261	164	1	1825
HQI (High Intensity discharge ?)				3	3
TH		80			80
MCF	150				150
TUN	13	12	8		33
TOTAL					**14513**
Street Lighting Cable Assets					
Location					**Total (m)**
Carriageway (based on 10% asset length)					41730
Footway (based on 50% asset length)					208650
Verge (based on 40% asset length)					166920
Total (based on estimated 30 Lin m per S/L column)					**417.3 Km**
Asset growth	Over the last 5 years the street lighting asset has grown by (Data not currently available % & Qty) lighting columns primarily due to estate adoptions.				

5.2 Asset Value

The Council's street lighting asset was valued in accordance with the CIPFA Transport Infrastructure Asset Code and a summary of the results detailed in Table 5.2.1 below;

Table 5.2.1 Street Lighting Asset Valuation				
Street Lighting Assets	**Gross Replacement Cost (GRC)**	**Depreciated Replacement Cost (DRC)**	**Accumulated Consumption (AC)**	**Annualised Depreciation (AD)**
Columns	£36,818,493	£20,627,214	£16,191,278	£801,010
Luminares	£2,902,600	£1,517,630	£1,384,970	£145,130
Illuminated Signs	£250,000	£87,500	£162,500	£12,500
Illuminated Bollards	£35,700	£17,970	£17,730	£3,570.
Total	**£40,006,793**	**£22,250,315**	**£17,756,478**	**£962,211**

AD is the average amount by which the asset will depreciate in one year if there is no investment in renewal of the asset. It is based upon replacement of components at the end of Expected Service Life (ESL).

A detailed valuation of the street lighting column asset is shown in Table 5.2.2 below;

Table 5.2.2 Street Lighting Column Valuation				
Street Lighting Column Assets	**Gross Replacement Cost**	**Depreciated Replacement Cost**	**Annualised Depreciation Cost**	**Total Depreciation**
Non Galvanised Steel	£0	£0	£0	£0
Galvanised Steel	£9,345,674	£3,299,693	£311,522	£6,045,981
Concrete	£85,344	£54,051	£2,845	£31,293
Aluminium (pre 2000)	£2,996,830	£1,311,113	£74,921	£1,685,717
Cable Assets	£0	£0	£0	£0
Cable under Carriageway	£0	£0	£0	£0
Cable under Footway	£0	£0	£0	£0
Cable under Verge				
Other Street Lighting Assets	£2,772,000	£1,824,900	£46,200	£947,100
Wall Bracket	£12,390,000	£8,156,750	£206,500	£4,233,250
Wooden Pole	£8,400,000	£5,530,000	£140,000	£2,870,000
Total	**£36,818,493**	**£20,627,215**	**£801,011**	**£16,191,278**

Unit rates used to compile valuation are shown in Table 5.2.3 below;

Table 5.2.3 Unit Rates Used For Street Lighting Asset Valuation					
Column Material	**Height (m)**	**Supply**	**Renewal Rate**	**Basis**	**Comment**
Galvanised Steel	5	Private Supply	£761.00	Average Rate	Unit rates are based on average cost of replacement – All new Columns being galvanised steel.
		DNO Supply	£1,311.00	Average Rate	
	6	Private Supply	£794.00	Average Rate	
		DNO Supply	£1,344.00	Average Rate	
	8	Private Supply	£1,069.00	Average Rate	
		DNO Supply	£1,619.00	Average Rate	
	10	Private Supply	£1,250.00	Average Rate	
		DNO Supply	£1,800.00	Average Rate	
All Luminaires	All units		£200/ each	Estimated average	
Cable	Carriageway	All	£66.00	Average Rate	
	Footway	All	£59.00	Average Rate	
	Verge	All	£50.00	Average Rate	
Wall Bracket	inc. surface cabling / supply	Private Supply	£400.00	Estimated	
		DNO Supply	£400.00	Estimated	

5.3 Condition

The condition of lighting assets is normally judged on the age of the asset and whether it has exceeded its design life. Detailed condition data for the council street lighting asset is hindered by the absence of records relating to installation dates for each asset type. Currently there is only data available over approx the past decade and therefore the condition data presented within this report is based on the following assumption. Where no data relating to an asset is available the inventory quantity for that item will be evenly distributed over the full estimated service life period for that asset. The assumed age profile of the street lighting column asset is shown below;

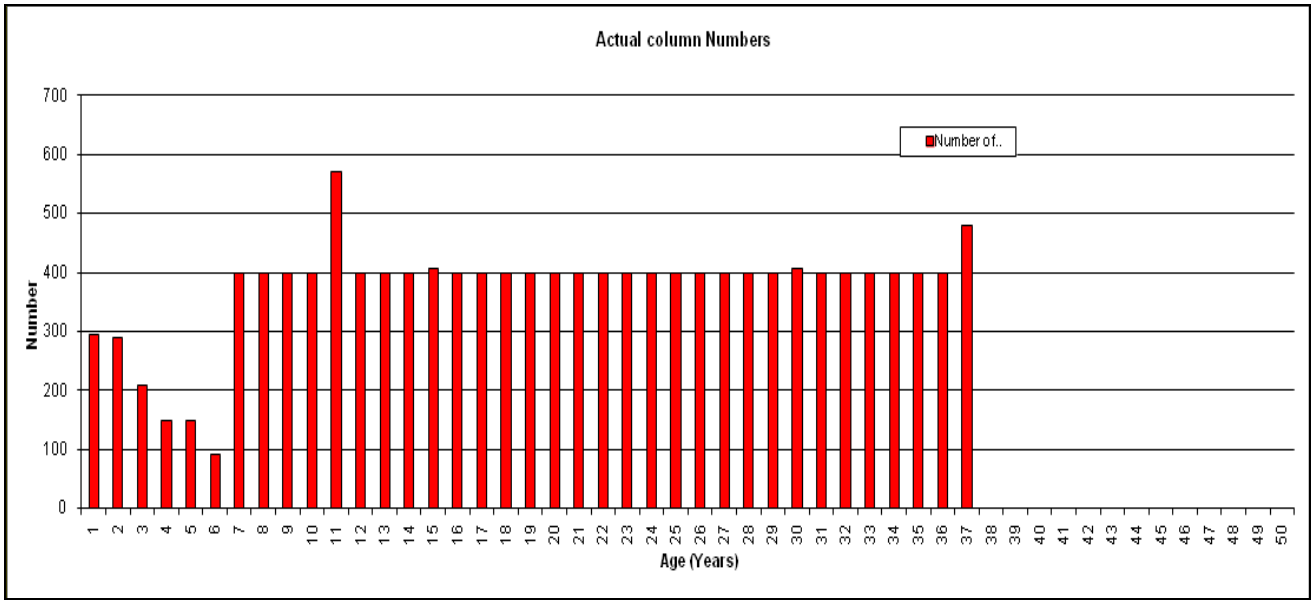


Table 5.3 below details the average expected service lives (ESL) of street lighting components.

Table 5.3 Average Expected Service Life (Years) By Material Type	
Column Type	**ESL (Years)**
Non Galvanised Steel	20
Galvanised Steel	40
Concrete	30
Aluminium	40
Stainless Steel	70
Cast Iron	100
Other (Wall Mounted Equipment)	25

5.3.1 Structural Condition

There is currently no programme of structural testing carried out on lighting columns other than a visual inspection.

5.4 Lanterns /Equipment Age and Obsolescence

Luminaires and other equipment have a finite life. They can require replacement either as a result of reaching the end of their service life or as a result of becoming obsolete/in need of replacement with more modern equipment. Luminaires and other equipment are routinely replaced discretely from the columns they are fixed to. The current lamp inventory is shown in Table 5.1 above.

5.5 Age Profile

The age profile of the lighting asset is generally unknown with many of the asset components considered to be beyond their ESL. Data on the age of components exists only for recent works within last ten years approx therefore confidence in the age profile is low.

In addition to columns and lamps a length of street lighting cable is owned by the council as shown/estimated in Table 4.1 above. The cable infrastructure is considered by officers to be well past its design life with reactive

repairs to 5th core failures increasing. The 5th core cable network is owned and maintained by Scottish and Southern Electricity(SSE) and this can lead to lengthy delays in returning sections of street lighting to working order whilst SSE undertake repair. It can also entail the need for Argyll and Bute Council to install new cabling along a whole street or section, often at short notice to rectify lighting system 5th core failures.

5.6 Asset Growth

There is insufficient data available at present to determine growth statistics.

5.7 Energy Use and Cost

Increasing energy costs are a significant challenge requiring increased investment in low energy components to offset costs. This coupled with a desire to reduce carbon adds greater pressure to invest wisely in asset renewal/replacement.

The cost of energy is calculated based on the total wattage of street lamps and other illuminated signs, actual charge per unit and estimated annualised burning hours.

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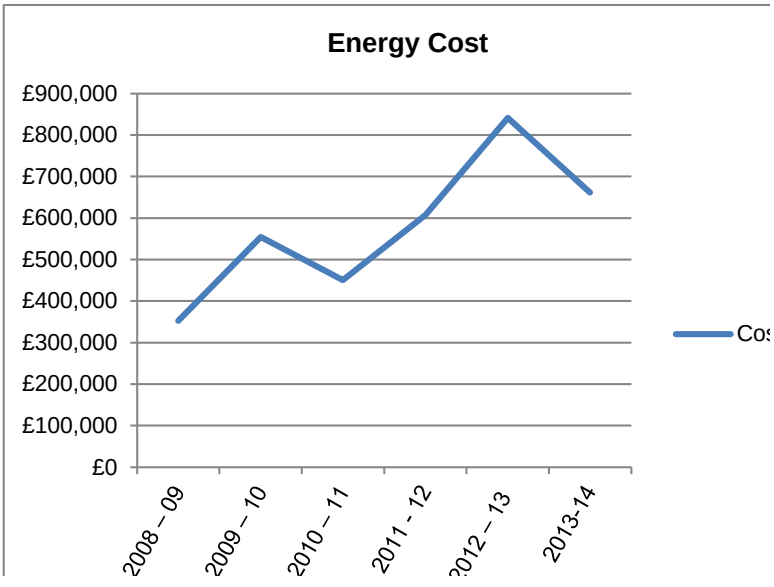
Table 5.7 below details historical energy costs since 2008.

Table 5.7 Street Lighting Energy Costs

Year	Cost
2008 – 09	£352,316
2009 – 10	£553,971
2010 – 11	£450,379
2011 - 12	£607,005
2012 – 13	£841,333
2013 - 14	£661,513

Data Source – Finance



Energy costs in financial 2013-14 have been reduced through the wider use of low energy lamp replacements and the renewal of energy supply contract. Energy costs still present a significant challenge and need to be closely monitored to ensure they are kept to a minimum and that investment is targeted towards reducing annual expenditure.

5.8 Performance

Basic safety is delivered via a regime of visual inspection, electrical testing and reactive repair. Statistics illustrating current performance in meeting standards for reactive repair and testing as defined by our

maintenance agreement, electrical wiring regulations and the recommendations of the Institute of Lighting Professionals are shown in table 5.8 below;

	Table 5.8 Performance Indicators			
Indicator	**2010-11 results**	**2011-12 results**	**2012 – 13 Results**	**Comments**
Number/Percentage of Street lights with a valid electrical certificate	2500/18.5 %			2500/13465 columns
Number of street lighting faults	1999			
Number of Dark lamps reported	1449	1701		
Percentage of dark lamps restored to working condition within 5 days	76%	93%		
Number of 5th core cable failures requiring replacement.	52	98		Likely to increase each year due to poor cable circuitry condition which is far exceeding its design life expectancy
Average time to repair lamps	N/A	N/A		No data

5.9 Benchmarking

A benchmarking questionnaire was sent to 14 different councils across England, Scotland and Wales in December 2012 with three councils returning information as detailed in Table 5.9 below;

Table 5.9 Benchmarking				
	Argyll and Bute Council	**Highland Council**	**Devon County Council**	**Scottish Borders**
Number of lighting units	14813	51,283	76549	
Spending street lighting (Capital and Revenue) 2011/12	Revenue: £375,000.00 Capital: £530,000.00	Revenue - £1,044,000 Capital- £500K	Revenue: £4,634,100.00 Capital: £300,000.00	Revenue: £716,298.00 Capital: £350,000.00
Actual charge per unit (electricity supplier) 2011/12	£ 12p/kwH	12P/Kwhr	£ 9p/kwH for first six months and £ 10.5p/kwH for remainder.	8.8p/kwH
Age profile of lighting columns	30% over 40 years 20% 30 - 40 years 10% 20 - 30 years 40% under 20 years	4% 16% 20% 60%	35% over 30 years 4% 25 - 30 years 7% 20 – 25 years 54% under 20 years	7% over 40 years 1.5% 30 - 40 years 43.5% 20 - 30 years 48% under 20 years
Street lighting – the % of all street lighting repairs completed within 7 days	95% (check pyramid)	94%	2011/12: 99.36% (5 day response)	NO DATA
Traffic light repairs – the % of all traffic light repairs completed within 48 hours	100%	100%	Our standard is **4 hour** response – we achieve 87%. So we probably achieve 100% in 48 hours	NOT RECORDED

5.10 Investment in Lighting

5.10.1 Historical investment

Historical investment in lighting has been as shown in the table 5.10.1 below:

Table 5.10.1 Historical investment						
	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Capital	£376,871	£585,647	£740,616	£729,376	£532,925	£551,264
Revenue	£1,115,590	£619,130	£623,624	£815,379	£375,416	£356,724

5.10.2 Last Year's investment

During 2013-14 the investment in the street lighting asset was as shown in table 5.10.2 below;

Table 5.10.2 Previous Years Investment 2013/14		
Cost of All Maintenance Work on Street Lighting	**Spend (£)**	**Percentage of Total Spend**
Planned Maintenance (Capital)	£551k	60.6%
Reactive Repairs (Revenue)	£284k	31.2%
Routine Maintenance (Revenue)	£73k	8.2%
Total	**£908k**	**100%**
Data source – Finance, Street lighting. * Values include for works on Traffic Signal Asset.		

5.11 Output from Investment

The output from investment in during 2013-14 is detailed in Table 5.11 below;

Table 5.11 Output from Investment		
Category		**Output**
Capital	**£552k**	– Mid Argyll, Kintyre & Islands (£64k) – Oban, Lorn & Isles (£83k) – Bute & Cowal (£172k) – Lomond (£233k)
Revenue	**£357k**	
Reactive Repairs	£284k	– Mid Argyll, Kintyre & Islands (£69k) – Oban, Lorn & Isles (£39k) – Bute & Cowal (£98k) – Lomond (£78k)
Routine maintenance	£73k	– Mid Argyll, Kintyre & Islands (£21k) – Oban, Lorn & Isles (£19k) – Bute & Cowal (£19k) – Lomond (14k)
Total Investment	**£909k**	Capital + Revenue
Data source – Finance, Street lighting Costs include for all works (cabling, columns, lanterns, trench reinstatement, site supervison etc) **Note – All measurements and costs are indicative only and should not be used for any other purpose. They are based on data available at time of this report and subject to verification.**		

5.12 Investment Options

An updated inventory survey is proposed. This will allow a detailed business case to be produced detailing investment opportunities and options.

5.13 Predicted Future Funding Need

Future funding needs can only be accurately predicted once an up to date asset inventory has been established. Appraisal of the current options is taking place with a view to carrying out the inventory update in 2014/15.

5.14 Maintenance/Cost Impacts

The impact on reactive maintenance costs attributed to more columns exceeding their expected service life cannot be quantified at this time. Further work needs to be undertaken to understand the relationship between street lighting asset (column) age/condition and corresponding reactive maintenance costs if these impacts are to be understood better.

5.15 Improvement Actions

The following actions are recommended to improve the accuracy of future versions of this report;

- Inventory collection to fully populate WDM database.
- Provide IT link between WDM and TOTAL to enable true unit costs to be produced.

- Improved record keeping of all maintenance works including capital replacement within WDM.
- There is merit in attempting to establish a more accurate age profile of the street lighting asset in order to facilitate using the SCOTS cost projection and energy modelling tools to predict future investment needs. This exercise would attribute an installation date based on available records or officer opinion and would allow more comprehensive reporting of the asset condition and investment needs.

5.16 Option Summary

<table>
<tr><th colspan="6">Street Lighting</th></tr>
<tr><th>No.</th><th colspan="2">Options</th><th colspan="2">Predicted Condition (SLCI)</th><th>Comment</th></tr>
<tr><td></td><td>Funding</td><td>Annual Funding</td><td>Yr1 2015</td><td>Year 20 2035</td><td></td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Assumed Steady State</td><td>Capital £960k</td><td rowspan="4">N/A</td><td rowspan="4">N/A</td><td rowspan="2">Capital Investment based on Annual Depreciation Table 5.2.1. Street Lighting Valuation.</td></tr>
<tr><td>Revenue £500k*</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Current Funding</td><td>Capital £529k</td><td rowspan="2"></td></tr>
<tr><td>Revenue £104k</td></tr>
<tr><td></td><td colspan="5">*Note – Value is estimated
Comment – There is currently insufficient data to provide future predictions of funding need and investment options.</td></tr>
</table>

6 Structures

6.1 The Asset

The structures listed within this report relate only to structures owned and maintained by the Council which form an integral part of the carriageway asset. It does not include;

- Structures not owned or maintained by Argyll and Bute Council.
- Structures located on the Trunk road network which are maintained by Transport Scotland.
- Structures located on private roads or maintained by others
- Buildings or property

6.2 Inventory

The authority's structures asset is detailed in Table 6.2 below:

Table 6.2 Structures Assets

Type of Structure	Description	Number of Structures
Bridge	Road over Road	5
	Road over Rail	7
	Road over River single span	852
	Road over River two or more spans	53
	Footbridge	14 (see note 3)
	Total Number of Bridge Structures	**931**
Retaining Walls		Approx length 118Km or 1500 No.
Culverts		360 [see Note 2}
Other Structures		See Note 1

Notes; 1. There are other owners of structures on the network, e.g. Network Rail for which some financial liability may rest with the council. There are also a number of coastal structures.

2. Culverts of span 0.9m – 1.5m total span only. However, the database is not complete. Culverts of lesser spans are not currently recorded.
3. Some footbridges are located remotely from the road asset on unadopted footpaths. These structures may have ownership/maintenance liability to be resolved.

6.3 Growth

Inventory data is being colleced to present in future versions of this report although there is not expected to be much change year on year.

6.4 Asset Value

The Councils structures assets were valued in 2012/13 and are detailed within Table 6.4 below;

Table 6.4 Structures Asset Valuation: 2011/12

Classification	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Annualised Depreciation (AD)
Total	£685,133,500		

The Depreciated Replacement Cost (DRC) has not been calculated due to insufficient data

The Annualised Depreciation (AD) calculation has not been calculated as the methodology is still under development and review by CSS Wales.

6.5 Inspection

The inspection regime applied to the structures stock is as illustrated below:

Table 6.5 Inspections

Performance Indicator	APSE Ref.	No.
Number of general inspections scheduled to be undertaken.	SNGIS	380
Number of general inspections undertaken on time.	SNGIU	Unavailable
The frequency of general inspections (in years)	SFGIS	2

6.6 Structural Condition: Failed Assessment/Strength

A number of structures on the network have failed structural assessment (40T). These are potentially in need of strengthening works and are detailed in Table 6.6a below;

Table 6.6a Assessment Statistics

Performance Indicator	APSE Ref.	No.
Number of council owned / maintained bridges that failed assessment	BSBFA	24
Number of privately owned bridges within council's road network that failed assessment (passed 3t assessment)	BSPFA	3
Number of council owned / maintained bridges subject to monitoring/special inspection regimes	BSBSI	6

For some of the structures included in the statistics above a continuance of the special monitoring/special inspection regime is acceptable in the short term as shown in Table 6.6b below;

Table 6.6b Weight Restrictions		
Type of Restriction	**APSE Ref.**	**No.**
Council owned / maintained weight restricted bridges (excluding acceptable weight restriction)	NBWRB	10
Council owned / maintained height / width restricted bridges	NBHWR	1 [See Note]
Note - Ownership uncertain – to be determined		

6.7 Current Structural Condition

6.7.1 Bridge Stock Indicator

The bridge condition indicator scores for the structures stock computed using inspection results up to and including 2013/14 are detailed in Table 6.7.1 and graphically from WDM database below.

Table 6.7.1 Bridge Stock Condition Indicator				
Bridge Stock Indicator	**2010/11**	**2011/12**	**2012/13**	**2013/14**
$BSCI_{ave}$	N/A	92	90.75	
$BSCI_{crit}$	N/A	N/A	85.65	

- $BSCI_{ave}$: The bridge stock condition indicator (ave) is the numerical value of a bridge stock evaluated as an average of the bridge condition indicator values weighted by the deck area of each bridge.
- $BSCI_{crit}$: The bridge stock indictor (crit) is the numerical value of the critical condition index for the bridge stock evaluated using the BCIcrit values for each bridge.

6.8 Output from Investment

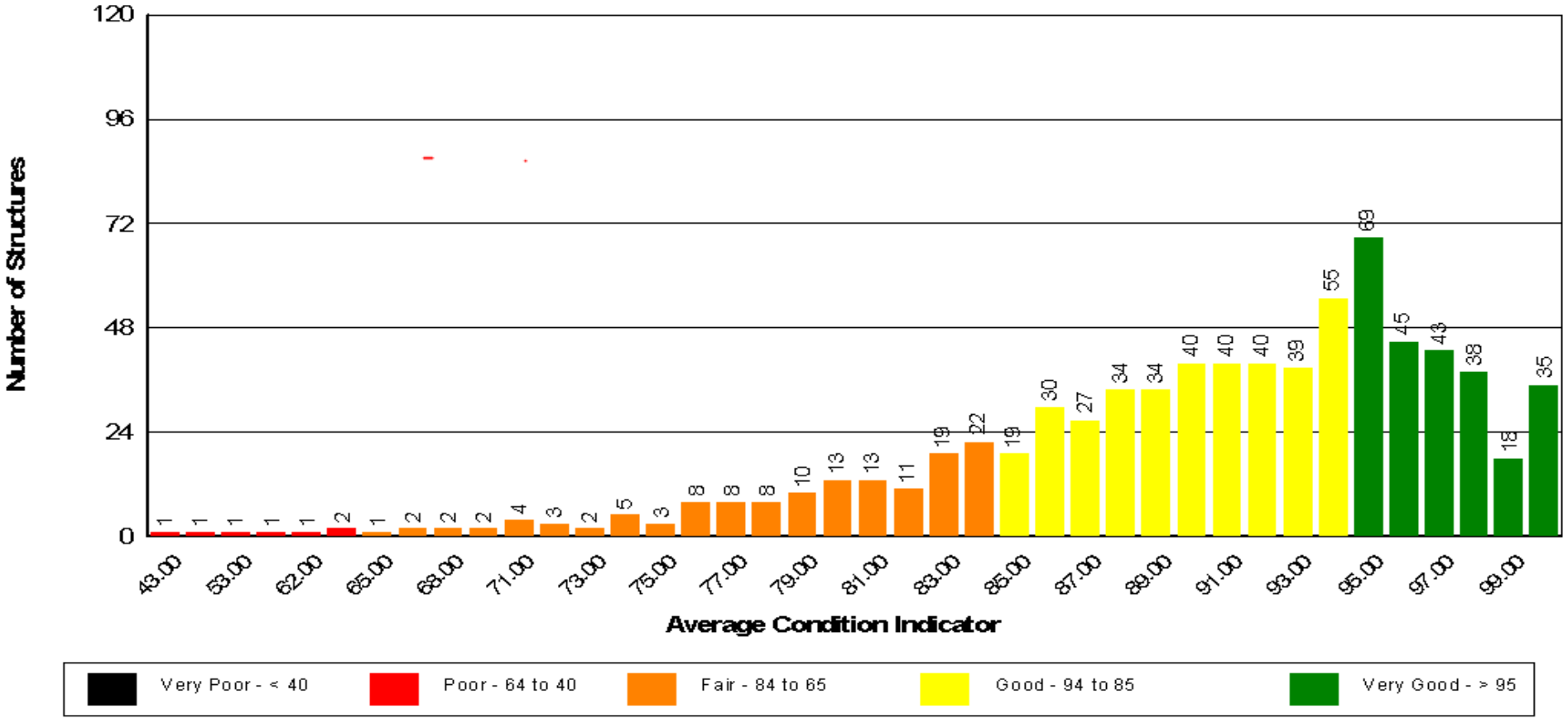
The output from investment in during 2013-14 is detailed in Table 6.8 below;

Table 6.8 Output from Investment		
Category		**Output**
Capital	**£533k**	– A83 Beachmeanach ~ Bridge Replacement – U44 Soroba Lane ~ Bridge Replacement and new footbridge – A817 Ballevoulin ~ Bridge Waterproofing/resurfacing – U25 Kilbride Bridge ~ propping. – Preliminary design work
Revenue	**£447k**	– Bridge and Retaining Wall Assessment £39,000; – Bridge Maintenance Works £163,500 – Bridge Inspections £54,000 – Abnormal Load Routing £8,000 – Management of Structures £6,500 – Planned inspections and works £176,000
Reactive Repairs	£370k	– Emergency inspections and works £370,000.
Total Investment	**£1.35m**	Capital + Revenue
Data source – Design Services		

WDM® Structures Management System

Average Condition Indicator Report Summary

749 Structures included in this summary for 8/9/2013



6.9 Specific Issues with Structures Stock

- There is currently insufficient data available at time of this report to detail any specific issues with structures stock.

6.10 Options

Structures					
No.	**Options**		**Predicted Condition (STCI)**		**Comment**
	Description	**Annual Funding**	**Yr1 2015**	**Year 20** 2035	
1	Current Funding 2013-14	Capital £685k Revenue £225k	N/A	N/A	
2	Assumed Steady State	Planned/Capital £1.0m* Revenue £500k*	N/A	N/A	Estimated by officers to be required to maintain stock in a reasonable condition
	*Note – Figures are estimated and may be subject to change Comment – Cost projection tools are currently not sufficiently sophisticated to enable prediction of future condition and funding need based on present structures data.				

7 Traffic Signals

7.1 The Asset

The council's Traffic Signal assets are made up of:

- 6 number of junctions
- 13 number pedestrian crossings

These are detailed in Table 7.1 below;

Table 7.1 Traffic Management System Quantities

Location	Pedestrian Crossing	Controlled Junction	Poles	Signal Heads
Oban, Lorn & Isles	3	1	15	24
Helensburgh & Lomond	6	4	51	97
Cowal & Bute	0	1	8	16
Mid Argyll, Kintyre & Islay	2	0	6	14
Totals	**11**	**6**	**80**	**151**

Comment – Data is based on current available data

7.2 Asset Value

Estimated replacement rates for the traffic signals asset are shown in Table 7.2.1 below;

Table 7.2.1 Estimated Replacement Rates

Traffic Signal (Junction) Subtypes	Estimated Replacement Cost (Equipment)	Estimated Replacement Cost (Civils)
Minor Junction		
Medium Junction	£18,000	£15,000
Major Junction		
Complex Junction		
Traffic Signal (Pedestrian Crossing) Subtypes		
Single Carriageway	£15,000	£8,000
Double Carriageway		

The Traffic Signals asset was valued using estimated rates from Table 7.2.1 in March 2014 and is detailed in Table 7.2.2 below;

Table 7.2.2 Asset Valuation

Traffic Signal Types	Quantity	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Accumulated Consumption (AC)	Annualised Depreciation (AD)
Junctions	6	£198,000	£66,750	£131,250	£10,500
Pedestrian Crossings	11	£253,000	£148,350	£104,650	£12,650
Total	**17**	**£451,000**	**£215,100**	**£235,900**	**£23,150**

Annualised Depreciation (AD) is the average amount by which the asset will depreciate in one year if there is no investment in renewal of the asset.

7.3 Equipment Condition / Age

The average expected service lives (ESL) for traffic signal assets are detailed in table 7.3 below;

Table 7.3 Average Expected Service Life

Signal Type	Equipment	Civil Component
Junction	18	20
Pedestrian Crossing	20	20

7.4 Asset Growth

There is insufficient data available to present asset growth figures although it is generally expected to remain more or less constant unless new development requires changes to be made.

7.5 Routine and Reactive Repairs

Basic safety is delivered via a regime of visual inspection, electrical testing and reactive repair. The inspection regime, defect definition and response times used are defined in SCC Traffic Signal Maintenance Contract and meet DfT guidance.

7.6 Maintenance Backlog

The maintenance backlog has not been computed.

7.7 Investment in Traffic Signals

7.7.1 Historical investment

Historical investment in traffic signals has been as shown in Table 7.7.1 below:

Table 7.7.1 Historical Investment

Budget Head	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Capital							
Revenue	£289	Nil	£12,000	£26,607	£25,417	£32,640	£147,797

Data source – WGA / APSE returns

7.8 Previous Years Investment

During 2013-14 investment in the Traffic Signal asset was as shown in Table 7.8 below;

Table 7.8 Previous Years Investment

Cost of all Maintenance Work	Spend	Percentage of Total Spend
Planned Maintenance	£68,750	46.5%
Reactive Maintenance	£79,047	53.5%
Routine Maintenance		
Total	**£147,797**	**100%**

Data Source – WGA/APSE returns

* Note - Value to be confirmed

7.9 Output From Investment

Table 8.5 Output from Investment (2013/14)

Category		Output
Capital	**£68,750**	
Capital schemes (planned maintenance)	£68,750	NEED SCHEME DETAILS
Revenue	**£79,047**	
Reactive Repairs	£79,047	– Repairs to traffic signals

Data source – WGA

7.10 Traffic Signal Equipment Age

In general the majority of the traffic signal asset is reaching or has exceeded its Expected Service life (ESL). Each junction has been subject to various upgrades over many years and are now a conglomerate of components of varying ages with any renewals/upgrades often having being funded by new development.

7.11 Predicted Future Funding Need

Data will be collected to predict future funding need and will be used to enhance the information detailed in Table 7.2.2.

7.12 Maintenance/Cost Impacts

The impact on reactive maintenance costs attributed to more traffic signal equipment exceeding their expected service life cannot be quantified at this time. Further work will be undertaken to understand the relationship between traffic signal asset age/condition and corresponding reactive maintenance costs if these impacts are to be understood better.

7.13 Improvement Actions

The following actions are recommended to improve the accuracy of future versions of this report;

- Inventory collection to fully populate WDM database.
- Improved record keeping of maintenance works within WDM.

7.14 Options

<table>
<tr><th colspan="6">Traffic Signals</th></tr>
<tr><th>No.</th><th colspan="2">Options</th><th colspan="2">Predicted Condition (TSCI)</th><th>Comment</th></tr>
<tr><th></th><th>Description</th><th>Annual Funding</th><th>Year1 2015</th><th>Year 20 2035</th><th></th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Assumed Steady State</td><td>Capital £23.5k</td><td rowspan="3">N/A</td><td rowspan="3">N/A</td><td>Capital investment based Annual Depreciation Table 7.2.2 Asset Valuation</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Current Funding</td><td>Capital £180k</td><td rowspan="2">Capital investment for traffic Safety measures (Signing, Lines, Anti-Skid surfacing etc) not necessarily Traffic Signals</td></tr>
<tr><td>Revenue £30k</td></tr>
<tr><td colspan="6">TSCI – Traffic Signal Condition Indicator
Comment – Funding is currently controlled via Street Lighting and Traffic and Development</td></tr>
</table>

8 Street Furniture

8.1 The Asset

The Street Furniture assets included in this report are;

Table 8.1 Street Furniture Assets Included		
Level 1 : Asset Type	**Level 2: Asset Group**	**Components**
Street Furniture	– Traffic Signs – Safety Fences – Pedestrian Barriers – Bollards – Grit Bins – Cattle Grids – Verge Marker Posts	Sign Poles, Clips, Base Plates, Foundations, other fixings.

The following Street Furniture assets are not included:

- Refuse Bins
- Bus Stops/Shelters
- Seating
- Gates
- Public Utility Apparatus
- Street furniture not owned or maintained by Argyll and Bute Council
- Street Furniture located on Trunk Roads
- Weather Stations

8.2 Quantities

The quantities of Street Furniture asset included are based on current inventory records which are not fully complete and are being updated as new data becomes available.

Table 8.2 Street Furniture Quantities		
Street Furniture Assets	**Quantity of Assets**	**Unit**
Traffic Signs (non-illuminated)	4950	Number
Safety Fences	59135	Length (m)
Pedestrian Barriers	857	Length (m)
Bollards	267	Number
Grit Bins	578	Number
Cattle Grids	161	Number
Verge Marker Posts	2322	Number
Weather Stations	0	Number
Total	**68131**	

8.3 Asset Growth

There is currently insufficient data available to present growth statistics for the asset.

8.4 Asset Value

The asset valuation is based on existing inventory data, estimated renewal rates and service lives. It should therefore be considered as an estimated value only.

Table 8.4 Street Furniture Valuation				
Street Furniture Assets	**Gross Replacement Cost**	**Depreciated Replacement Cost**	**Annualised Depreciation Cost**	**Total Depreciation**
Traffic Signs (non-illuminated)	£1,237,500.00	£587,875.00	£61,875.00	£649,625.00
Safety Fences	£5,913,500.00	£2,513,237.50	£147,837.50	£3,400,262.50
Pedestrian Barriers	£85,700.00	£40,742.50	£2,142.50	£44,957.50
Street Name Plates	£0.00	£0.00	£0.00	£0.00
Bins	£0.00	£0.00	£0.00	£0.00
Bollards	£53,400.00	£27,180.00	£1,780.00	£26,220.00
Bus Shelters	£0.00	£0.00	£0.00	£0.00
Grit Bins	£87,800.00	£39,590.00	£4,390.00	£48,210.00
Cattle Grids	£1,610,000.00	£829,400.00	£64,400.00	£780,600.00
Gates	£0.00	£0.00	£0.00	£0.00
Trees	£0.00	£0.00	£0.00	£0.00
Seating	£0.00	£0.00	£0.00	£0.00
Verge Marker Posts	£69,660.00	£29,034.00	£4,644.00	£40,626.00
Weather Stations	£0.00	£0.00	£0.00	£0.00
Total	**£9,057,560.00**	**£4,067,059.00**	**£287,069.00**	**£4,990,501.00**
Data Source – WGA				

8.5 Output from Investment

Previous year's investment in Street Furniture is detailed in Table 8.5 below;

Table 8.5 Output from Investment (2013/14)		
Category		**Output**
Capital	**£ 0K**	
Capital schemes (planned maintenance)		
Revenue	**£168k**	
Reactive Maintenance		– Cattlegrids - £40192 – Traffic Signs - £94736 – Safety Fences - £28473 – Pedestrian Guardrails - £2587 – Street Name Plates - £1921
Total Investment	**£168k**	
Data source – R10 Road Maintenance, Road Operations Manager		

8.6 Condition

At present there is no condition surveys undertaken for street furniture assets. Assets are generally repaired in response to reported defects or safety inspections with renewals at end of service life. Table 8.6 below details the estimated expected service lives of street furniture assets used to calculate Whole of Government Accounts (WGA).

Table 8.6 Street Furniture Useful Lives

Street Furniture Assets	Useful Life	Basis
Traffic Signs (non-illuminated)	20	Local Engineer Estimate
Safety Fences	40	Local Engineer Estimate
Pedestrian Barriers	40	Local Engineer Estimate
Street Name Plates	0	0
Bins	0	0
Bollards	30	Local Engineer Estimate
Bus Shelters	0	0
Grit Bins	20	Local Engineer Estimate
Cattle Grids	25	Local Engineer Estimate
Gates	0	0
Trees	0	0
Seating	0	0
Verge Marker Posts	15	Local Engineer Estimate
Weather Stations	0	0

8.7 Previous Years Investment

During 2013-14 the investment in the street furniture asset was as shown in Table 8.7 below;

Table 8.7 Previous Years Investment 2013/14

Category of Maintenance Work	Revenue Spend (£)	Capital Spend (£)	Total Spend (£)	Percentage of Total Spend
Planned Maintenance	£0	£0	£0	0%
Reactive Maintenance	£167,909	£0	£167,909	100%
Routine Maintenance	£0	£0	£0	0%
Total	**£167,909**	**£0**	**£167,909**	**100%**

Data source – R10 Road Maintenance / APSE Return / WGA

In 2013-2014 there was no investment in planned maintenance/renewal of street furniture assets. This represents an unsustainable future investment plan considering the estimated annual depreciation of £287,069 (CIPFA Transport Asset Code).

8.8 Predicted Future Funding Need

There is currently insufficient data available to predict future funding need other than Annual Depreciation as calculated for Whole of Government Accounts (WGA) as detailed in Table 8.4 above.

8.9 Improvement Actions

The following actions are recommended to improve the accuracy of street furniture asset data in future versions of this report.

- Inventory collection to fully populate database.
- Condition data to assess investment needs.
- Unit Rates for renewal/replacement based on actual service delivery.
- Improved financial and physical works records.

8.10 Options

<table>
<tr><th colspan="6">Street Furniture</th></tr>
<tr><th>No.</th><th colspan="2">Options</th><th colspan="2">Predicted Condition (SFCI)</th><th>Comment</th></tr>
<tr><th></th><th>Description</th><th>Annual Funding</th><th>Year1 2015</th><th>Year 20 2035</th><th></th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Assumed Steady State</td><td>Capital £287k</td><td rowspan="4">N/A</td><td rowspan="4">N/A</td><td>Capital investment based Annual Depreciation Table 8.7 Asset Valuation</td></tr>
<tr><td>Revenue not known</td><td rowspan="3">Capital investment for Traffic management (RARP)</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Current Funding 2015/16</td><td>Capital £0k</td></tr>
<tr><td>Revenue £5k</td></tr>
<tr><td colspan="6">SFCI – Street Furniture Condition Indicator</td></tr>
</table>

9 Photographs

9.1 Road Resurfacing

These images detail typical resurfacing works being carried out as part of the Roads Reconstruction Programme.

Argyll and Bute have invested in two paving machines to increase the capability and responsiveness of the in house surfacing squads.

9.2 Road widening and visibility improvement

Improvement works being carried out to allow localised road widening and improve safety through increasing forward visibility.

9.3 Edge Strengthening and Drainage

Edge strengthening and ditching work. These works will be followed up with surface treatments in subsequent years such as surface dressing. This will seal the road surface, improve skid resistance, and prolong the life of the asset through planned and proportionate works.

9.4 Winter Maintenance

9.5 Street lighting

Replacement LED street lighting installed in Kilkerran Road Campbeltown. Works consisted of installing new columns, LED lanterns and new ducting and cabling.

9.6 Structures

New Bridge constructed on A83 just north of Muasdale in Kintyre in July/August 2013