Appendix 1

Road Asset Management Plan:

Argyll and Bute Council

Annual Status and Options Report:

October 2015

Author	John MacCormick
Owner	Head of Roads & Amenity Services
Date	October 2015
Version	Draft 1.0

Document Information

Title	Road Asset Management Plan - Annual Status and Options Report
Author	John MacCormick
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

Version	Status	Date	Author	Changes from Previous Version
1.0	Draft	Oct 2015	J.MacCormick	Not applicable
1.1				
1.2				
1.3				
1.4				
1.5				

Document Control

Version	Status	Date	Authorised for Issue by Departmental Management Team
			Comment – Confirm document control authorisation

Contents

1 Executive Summary

Argyll and Bute has an abundance of natural assets, with scenic landscapes, coastlines, wildlife and a rich history there is something for everyone that makes it a great place to live, work and visit. The authority also has 25 inhabited islands, more than any other Scottish local authority which clearly shows connectivity for the transport of goods and people is absolutely vital to the area and is a key component to developing a thriving economic climate for our communities and delivering our corporate goals and objectives.

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 £2.2billion.

Modern society has become ever more reliant on our road infrastructure to deliver the everyday goods and services we need. It is therefore worth taking just a moment to reflect on the important role our road infrastructure actually plays in our daily lives. This is too often not realised until such times as our use of the road network is restricted in some way and we quickly voice our demands for urgent action to restore its use.

A significant number of our roads provide lifeline links to our communities where no alternative route or transport mode is readily available. This means that a single asset for example a bridge can play a critical part in serving a community's needs and requires adequate investment in a robust maintenance regime to protect these crucial assets from potential damage so as to ensure their continued use and service to the community.

The capital roads reconstruction programme has delivered a welcome improvement to the road network in terms of the Road Condition Index (RCI) over the previous three years from 57.6% to 54.4%. This level of investment, at just above the estimated steady state figure has halted the deterioration of the surfacing and is a contributory factor in reducing the number of CAT 1 & 2 defects. However with a Headline Maintenance Backlog figure of £187million there is still much to be done.

Current investment in road infrastructure equates to less than 0.8% of the Gross Replacement Cost (GRC). This level of investment does not provide a sustainable maintenance regime and will over time increase the number of restrictions having to be placed upon the road network. There is a recognised need for increased investment in road infrastructure assets albeit at a time when it can be least afforded.

Reduced funding for road maintenance in recent decades has made it difficult to deliver maintenance cost-effectively with too much reactive works in response to flooding and other events and not enough focus on preventative work which is less expensive in the long term. Infrastructure UK has reported that savings of 10-20% are associated with certainty of funding which allows long-term programmes of preventative work to be developed and this is the most efficient way of maintaining road infrastructure assets. While there will always be a need to perform some emergency and reactive activities there is a need to plan and prioritise maintenance tasks over the longer term or whole life of assets to get best value for money.

A good understanding of the state of the roads infrastructure is absolutely essential for planning cost-effective preventative maintenance. Knowing what assets you have, what condition they are in, how they

deteriorate and the cost of maintenance is important information for decision making on where and when to spend available monies. Using accepted asset management techniques to manage infrastructure assets builds up information and knowledge and uses a more evidence based approach so as to better anticipate, predict and prevent disrepair as well as providing more informed choices to relevant decision makers.

A commitment to using asset management to manage road infrastructure assets will allow the development of a revised Road Asset Management Plan (RAMP) that sets out the agreed condition standards that can be expected to be delivered over the plan period. This enables a longer term view to be considered such that programmes of work can be developed to ensure agreed condition standards can be achieved. Compliance with achieving these standards can then be reported on through this report so that prudent stewardship of infrastructure assets and best value can be demonstrated.

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 2015, and a range of future investment options.

The detail of this report is based on the current available data.

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 adequately in our roads infrastructure in the short to medium term.

1.2 Road Asset Status Summary

The current status of each asset group is:

Carriageways

- The latest Road Condition Index (RCI) results 54.4% (Oct 2015) shows a marked improvement on road surface condition reflecting the positive impact made from the £21m investment in the roads reconstruction programme approved by council in February 2012. Full details are provided within the report.
- Vegetation growth on road verges is a rising concern as it affects forward visibility and impacts on the safety of road users and drainage assets. A review of the current verge maintenance regime is needed to establish the appropriate condition standard that can be afforded to ensure the continued safety of road users.
- Good drainage of the road network is vital so as to protect it against damage from flooding and water penetration which accelerates deterioration. A recent sample survey highlighted that over 75% of rural drainage assets were in need of maintenance many of which were seriously affected by vegetation growth restricting water flow and preventing access for cleaning. The survey showed a clear need for investment and a programme of works to ensure drainage assets are functioning effectively. Full details are provided within the report.
- Current investment levels do not provide for a sustainable maintenance regime. Work is needed to establish affordable levels of service or condition standards for infrastructure assets. This will enable maintenance operations to be planned and prioritised sufficiently in advance to ensure compliance with agreed standards and make the most of available monies whilst spreading the workload over the whole year to reduce peak demands on limited resources.
- The Road Maintenance Strategy needs to be reviewed to reflect changes in investment levels and to determine future priorities. This combined with a revised Road Asset Management Plan should 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 currently undertaken based on information from regular safety inspections (combined with carriageways) and in response to reported defects.
- There is no condition survey undertaken on the footway asset at present. This hinders the ability to determine maintenance priorities and future investment needs.
- Improved information is needed to allow the requirements of a sustainable maintenance regime to be ascertained.

Street Lighting

- Reducing the energy costs of street lighting remains a top priority and work is underway to populate a detailed energy model that will enable a number of choices to be considered. This involves evaluating a number of investment options to replace existing assets with new low energy units that will reduce overall energy consumption.
- A detailed inventory of assets has now been collected and this will assist in providing better information on which to base future maintenance priorities and goes some way to implementing an asset management approach to deliver best value.
- The street lighting asset is served by a significant amount of cable network that is owned and maintained by Scottish Power and in general is 5th Core. This network is considered a weakness in the street lighting infrastructure and ideally needs replaced with a modern equivalent to reduce outages and improve reliability. There may be scope to consider replacement options as part of the drive to reduce energy costs.

Structures

- The structures inventory includes 874 bridges which have passed the Construction and Use Regulations Bridge Assessment (44Tonnes), 21 bridges or approximately 2.3% of the overall assets have not passed the assessment. 11 Bridges have special monitoring regimes in place (Increased inspection frequency, surveying, Etc), are subject to weight restrictions (excluding acceptable weight restrictions e.g where a suitable alternative route exists) or subject to width restriction.
- Current investment levels do not present a sustainable maintenance regime and are likely to lead to increasing numbers of structures being subject to weight restrictions.
- Work is on-going to populate the SCOTS Valuation tool with the structures inventory. Completion of this task will allow the Depreciated Replacement Cost to be computed in order to comply with the Whole of Government Accounts reporting requirements. When fully populated the tool will also assist in developing forward works programmes and help support the business case for future investment needs.
- 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 improved. It is estimated that there is approximately 214km of Council road within 25metres of the High Water mark and we currently have asset details of around 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. − Maintenance has 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 developer contributions to assist with the future maintenance liabilities.
Street Furniture
Street furniture inventory data is limited and is only collected as and when available resources permit. There is no condition assessment undertaken on Street furniture assets and maintenance is generally only undertaken in response to reported defects or from information obtained from regular safety Inspections.

2 Introduction

This report presents a summary of the council's Road assets as at April 2015. It

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

The report 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.

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 2015 totals 2282km and is detailed in Table 3.1 below. This represents a reduction on previous years as the A83 Kennecraig to Campbeltown road (52km) has been trunked on the 4th August 2014 and maintenance responsibility for this road now lies with Transport Scotland. The reduction in asset length will have an effect on the Grant Aided Expenditure which the authority receives annually from the Scottish Government.

Table 3.1 Carriageway Asset Length

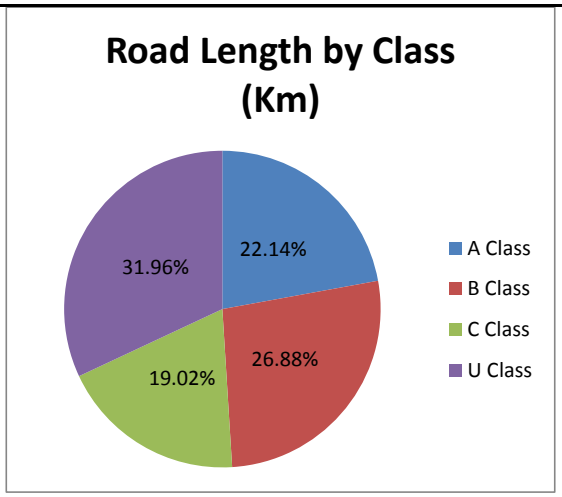
Class	Urban (km)	Rural (km)	Totals by Class (Km)
A	82.386	422.904	**505.3**
B	43.552	569.956	**613.5**
C	41.717	392.548	**434.3**
U	273.264	456.300	**729.6**
Total By Urban/Rural	**440.9**	**1841.7**	**2282.6**

Data source – Public List of Roads

The road network can be classified in many different ways depending on individual circumstances.

The National Classification of Roads is the method used to report the results of the annual Road Condition survey (RCI). Table 3.1 above details the lengths within each Classification A, B, C or U with corresponding percentage split shown in chart opposite and table below.

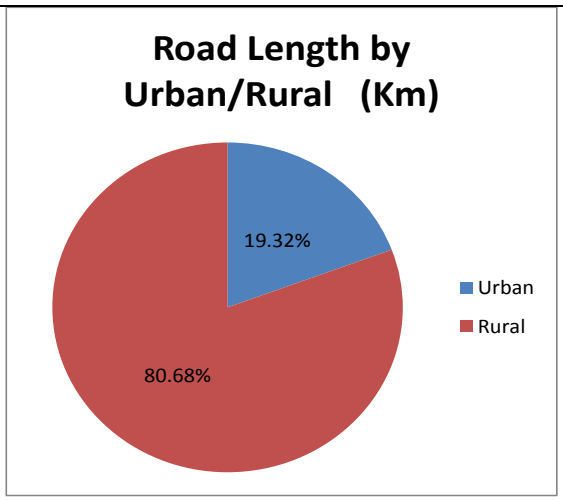
A Class	B Class	C Class	U Class
22.14%	26.88%	19.02%	31.96%



Argyll and Bute Council road network as detailed in table 3.1 above shows the environmental split between rural and urban routes within each of the National Classification categories.

The percentage split between Urban/Rural is shown in chart opposite and table below.

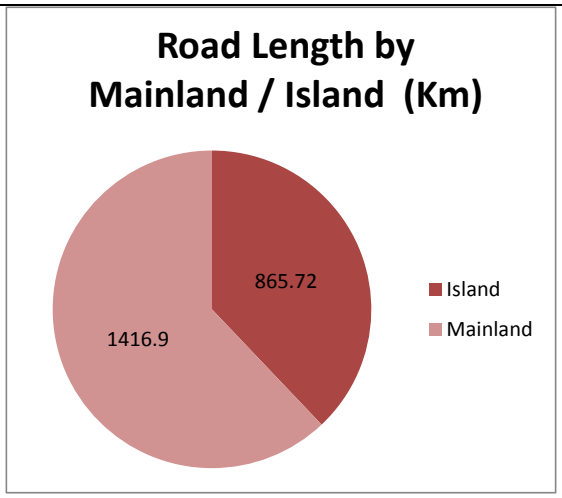
Rural	Urban
1841.7 km	440.9 Km
80.68%	19.32%



There is **865** Km or 38**%** 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.

Mainland	Island
1416.9 Km	865.72 Km
62.07%	37.93%



A Roads Maintenance Hierarchy is used for the allocation of roads into groups containing roads with similar functions and risks in order that similar types of road can be managed and maintained in a consistent manner.

Strategic	Main Distributor	Minor
351 Km	390 Km	1541 Km
15.38%	17.09%	67.53%

The existing maintenance hierarchy is currently under review.

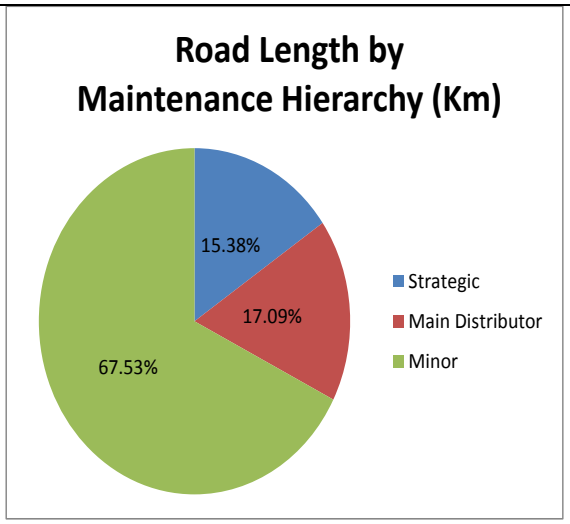


Table 3.1a below details the roads on founded on peat within Argyll and Bute.

There are 657 Km or 28% of Argyll and Bute carriageway assets that are constructed 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.

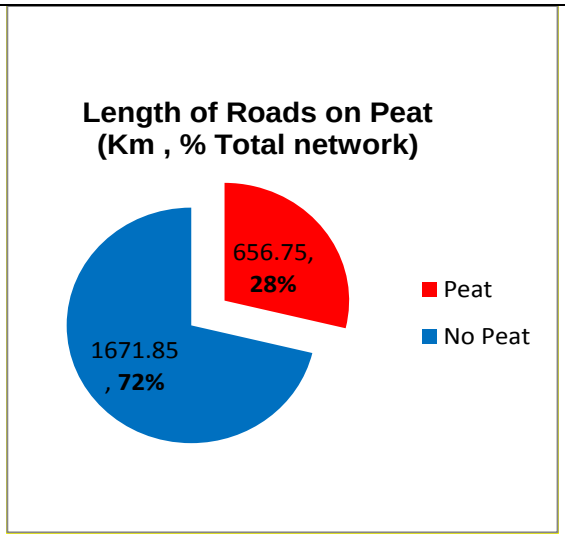
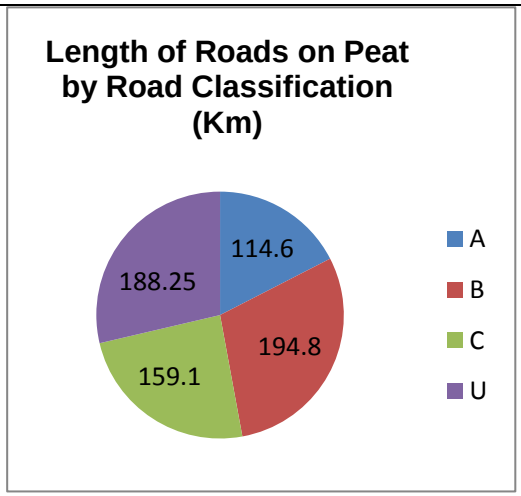


Table 3.1a Roads on Peat

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**	**188.2**	**656.7**



3.2 Asset Growth

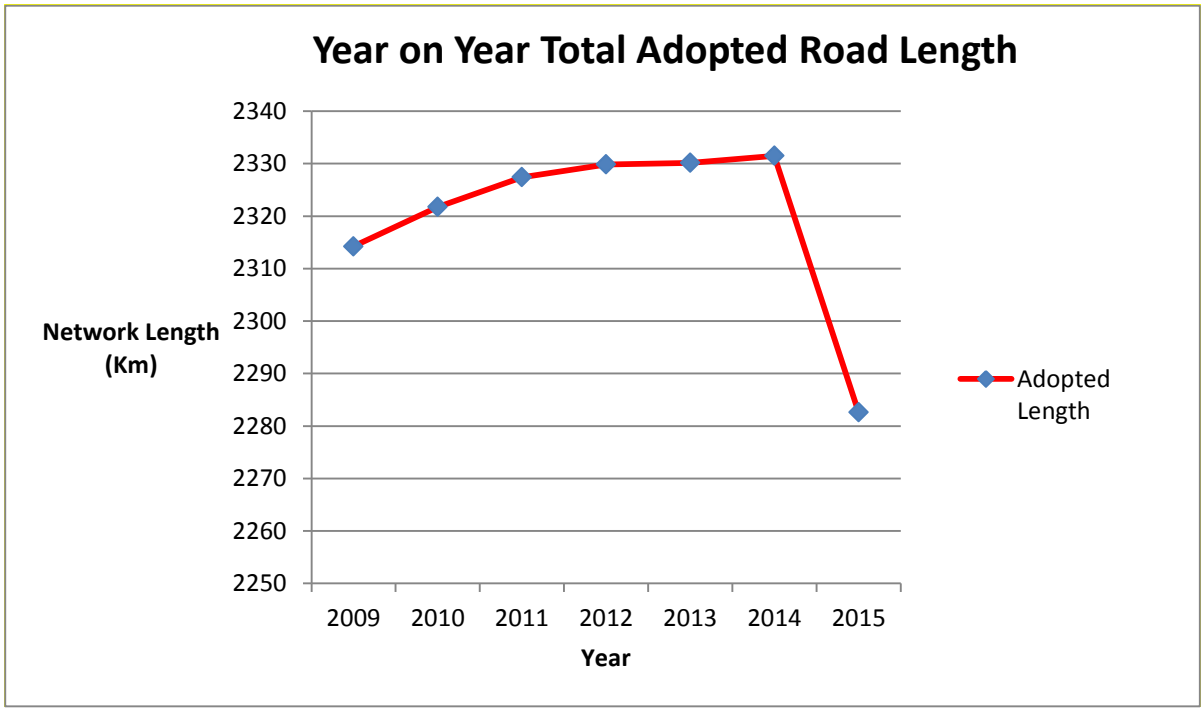
The length of carriageway maintained by the council has reduced as a result of the A83 Kennecraig to Campbeltown (52km) being trunked. However new road adoptions are being added mainly as a result of urban developments which although they may not initially require significant maintenance will incur additional costs in relation to increased energy use on routes containing street lighting.

Table 3.2 below details the change in asset length between 2009–2015

Table 3.2 Asset Growth

	Route Type		Growth Statistics (2009-15)		2009		2015	
	Environment	Class	Length (Km)	% Percentage	length (Km)	% of network	length (Km)	% of network
THE ASSET	RURAL	A	-53.35	-2.31%	476.251	20.63%	422.904	18.32%
		B	-0.55	-0.02%	570.503	24.71%	569.956	24.69%
		C	1.21	0.05%	391.341	16.95%	392.548	17.00%
		U	2.34	0.10%	453.956	19.66%	456.3	19.76%
		Total	**-50.34**	-2.18%	**1892.051**	**81.95%**	**1841.717**	**79.77%**
	URBAN	A	1.63	0.07%	80.759	3.50%	82.386	3.57%
		B	2.75	0.12%	40.799	1.77%	43.552	1.89%
		C	2.05	0.09%	39.663	1.72%	41.717	1.81%
		U	12.29	0.53%	260.977	11.30%	273.264	11.84%
		Total	**18.72**	0.81%	**422.198**	**18.29%**	**440.919**	**19.10%**
	TOTAL NETWORK (KM)		**-31.62**	**-1.37%**	**2314.25**		**2282.64**	

The Chart below illustrates the change in public adopted road length over the period 2009-2015



3.3 Asset Value

The council's carriageway asset was valued at 1st April 2015 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 2015

Classification	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Annualised Depreciation (AD)
Total	£2,190,824,315	£1,910,048,383	£19,934,831

Data source – WGA valuation spreadsheet 2015

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	£16,745,258		65	£6,440,484
30	£13,954,382		70	£5,980,449
35	£11,960,898		75	£5,581,753
40	£10,465,786		80	£5,232,893
45	£9,302,921		85	£4,925,076
50	£8,372,629		90	£4,651,461
55	£7,611,481		95	£4,406,647
60	£6,977,191		100	£4,186,314

Data source – WGA valuation spreadsheet 2015

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 recalculated using data collected in 2013 and 2014 for the classified roads and from 2011 to 2014 for the unclassified roads. The unit costs used in the February 2015 backlog report were increased by a factor of 1.65% from those used in 2013. The increase in unit costs was derived from the Department for Business Innovation and Skills Construction Resource Cost Indices. 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 (Revised)	2013	2015
Argyll and Bute	£222,670,161 (£162,377,018)	£209,911,106	£187,295,000
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 Backlog Modelling Report February 2015			

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 Investment

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

3.6.1 Historical Investment

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

Table 3.7.1 Investment Levels							
Year	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Capital Spend	£3.16m	£7.02m	£4.64m	£8.11m	£9.05m	£8.26m	£7.42m
Revenue	£2.32m	£3.13m	£6.02m	£4.80m	£4.23m	£3.96m	£4.93m
Total Spend	£5.48m	£10.15m	£10.66m	£12.91m	£13.28m	£12.22m	£12.36m
Data source – Finance end of year accounts (WGA)							

The average capital investment on planned maintenance and surface treatments over the last 7 years at approximately £6.8m pa equates to 34.1% 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

3.6.2 Last Year's Investment

During 2014-15 the investment in the carriageway asset was as shown in Table 3.7.2 below:

Table 3.7.2 Previous Years Investment 2014/15				
Category of Maintenance Work	**Revenue Spend (£)**	**Capital Spend (£)**	**Total Spend**	**Percentage of Total Spend**
Planned Maintenance	£2,653,479	£7,425,511	£10,078,990	89%
Reactive Maintenance	£685,935		£685,935	6%
Routine Maintenance	£527,042		£527,042	5%
Total	**£3,866,456**		**£11,291,697**	**100%**
Data source – R10 Road Maintenance / APSE Return / WGA				

In 2014-15 £11.3m was invested in maintenance of the carriageway asset. This represents 56.6% of the estimated annual depreciation of £19,934,831 (CIPFA Transport Asset Code). Our delivery strategy aims to minimise reactive work.

These are initial estimates based on activity spend and will be refined in future years as more data is captured.

3.7 Output

Output from investment during 2014-15 is detailed within Table 3.8 below;

Table 3.8 Output from Investment (2014/15) Argyll and Bute Council Roads Reconstruction Programme		
Category		**Output**
Capital	**£7.42m**	
Capital schemes (planned maintenance)		– Resurface 7.87 Km (45011 Sqm) Helensburgh & Lomond – Resurface 13.0 Km (46300 Sqm) Bute & Cowal – Resurface 10.3* Km (26187 Sqm) Mid Argyll & Kintyre (*estimate) – Resurface 6.26 Km (28079 Sqm) Oban & Lorn – **Total 37.44* Km (145577 Sqm) (*estimated)** – **Note** – A number of schemes include edge strengthening works.
Capital surface dressing		– Surface Dressing 14.45 Km (79475 Sqm) Bute & Cowal – Surface Dressing 24.4* Km (75141Sqm) Mid Argyll & Kintyre – Surface Dressing 80.31 Km (252334 Sqm) Oban & Lorn – **Total 119.16* Km (366950Sqm) (* estimated)**
Revenue	**£4.11m**	
		– Potholing - £620k – Boundary fences/walls - £13k – Sweeping & Cleaning - £4k – Emergency Incidents - £258k – Summer Standby - £63k – Cattle grids - £26k – Traffic signs – £67k – Vehicle safety fences - £3k

		– Jet Patcher - £471k – Culverts - £306k – Ditches - £389k – Grass cutting - £201k – Scrub/Tree Maintenance - £177k – Road Markings - £172k – Gully Emptying - £283k
		– Patching - £869k

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.

3.8 Carriageway Surfacing Renewal

3.8.1 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
2014/15	119.16	5.2%	19

Based on previous 8 years treatments, on average, investment levels allow for surface dressing treatments once every **38** Years. Desired interval is 10 – 15 years.

Data source – Road Operations Manager

3.8.2 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
2014/15	37.44	1.6%	61

Based on previous 8 years treatments, on average investment levels allow for renewal of carriageway surfacing once every **65** Years. Desired interval is 25 – 40 years.

* Note - values need to be verified.

Data source – Road Operations Manager

3.9 Condition

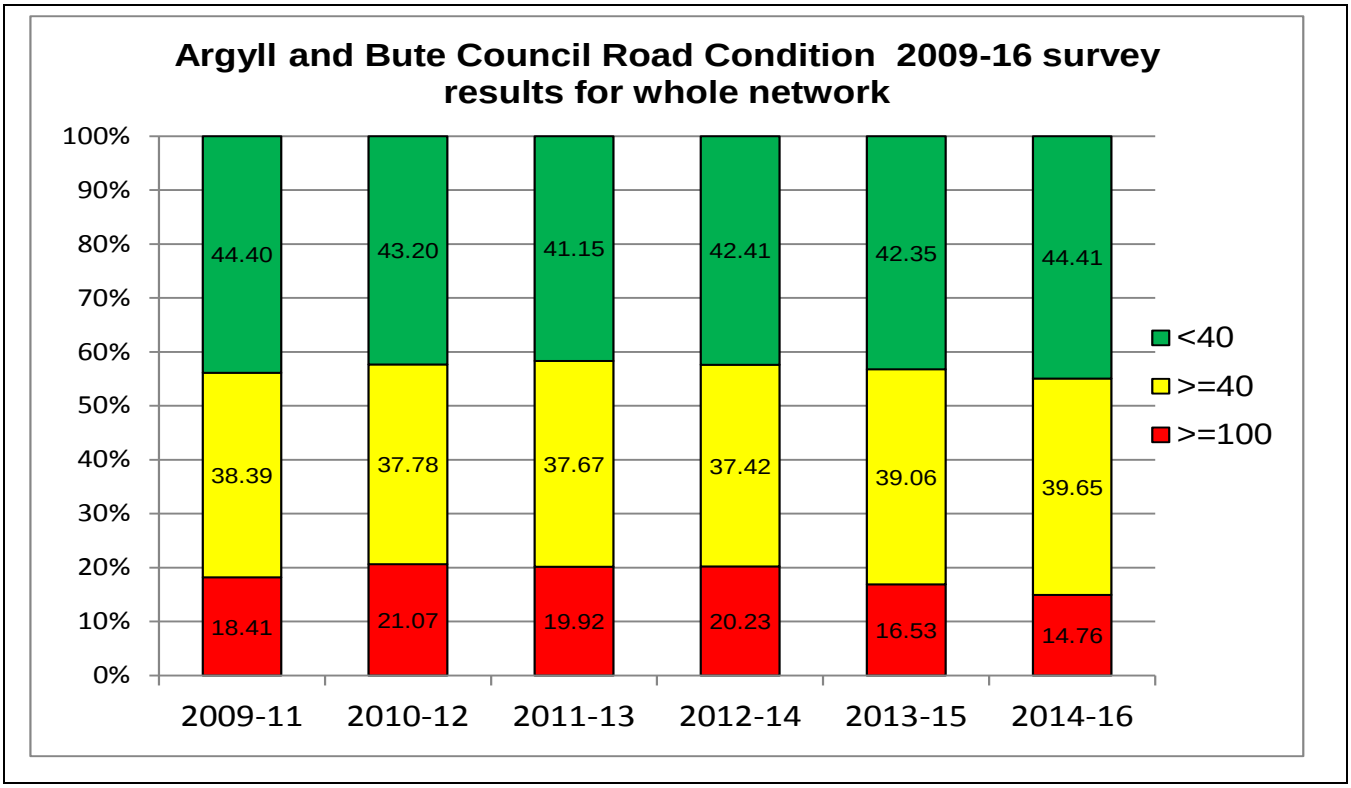
The Scottish Road Maintenance Condition Survey (SRMCS) is the main method of condition assessment of the road network. The survey method is undertaken throughout Scotland to a nationally accepted standard. Red condition represents lengths of road in need of maintenance/resurfacing etc, amber represents 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 2009 – 2016 are shown below;

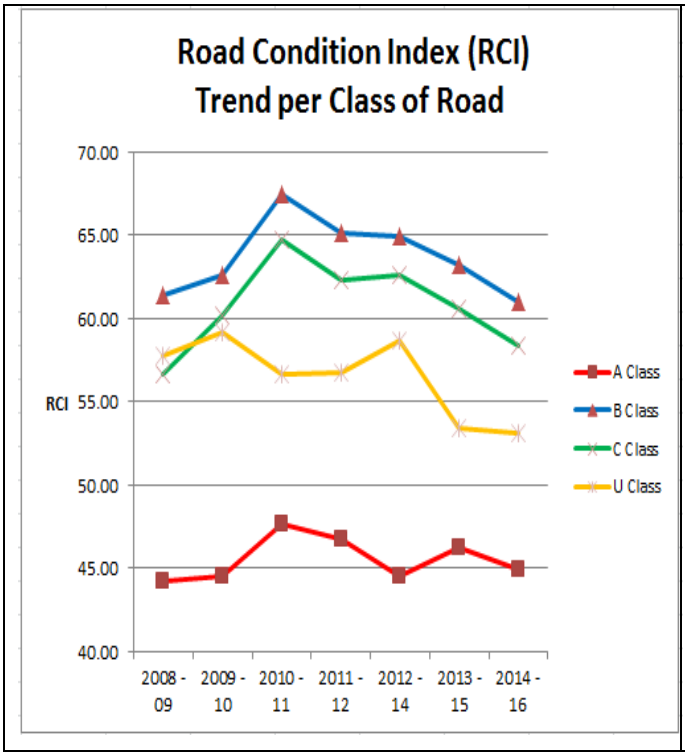
The data represented is collected using a nationally accepted specification. The survey results for A, B, C and U roads are based upon machine surveys.

Not all off 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.

Additional 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.



3.9.1 Condition Trend

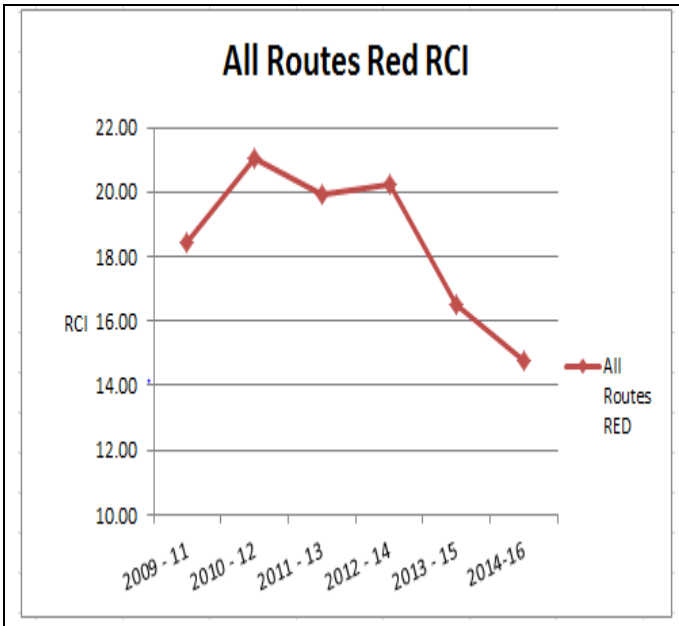


The historical trend in condition across each class of road is shown and can be summarised as follows:

- A Class roads show the best RCI condition in line with current funding priorities.
- B & C Class roads are showing a similar improvement trend although they are the poorest condition Classes.
- U Class roads show marginal improvement or steady state condition

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

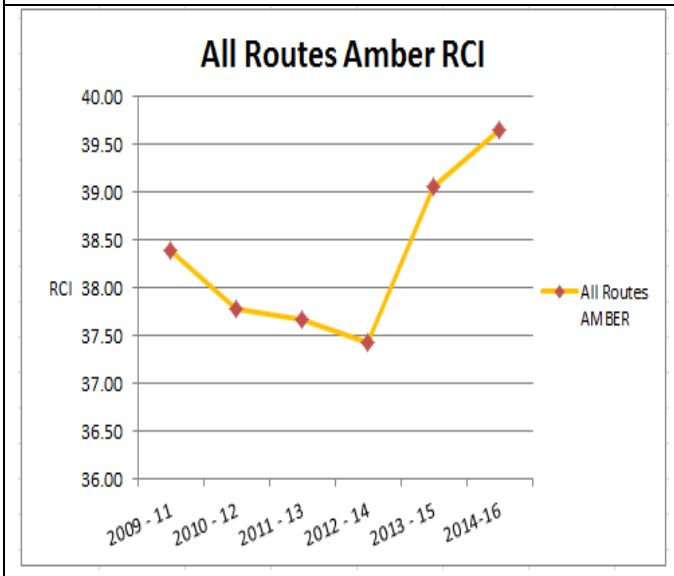
2014-16 RCI results by Road Class				
All	**A Class**	**B Class**	**C Class**	**U Class**
54.4	44.9	61.0	58.4	53.1



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

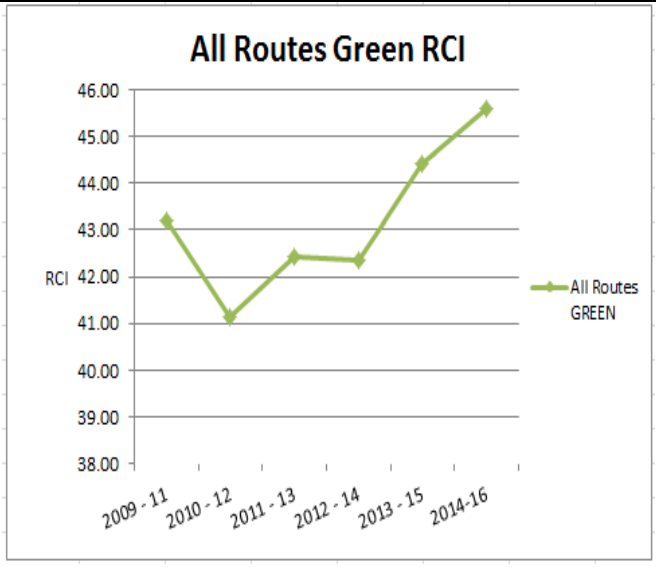
The all routes red condition RCI has been improving reflecting recent investment levels in line with the estimated SCOTS Steady State figure (£6.35 - £8.0m/pa) in the roads reconstruction programme.

All Routes Red RCI				
2010-12	**2011-13**	**2012-14**	**2013-15**	**2014-15**
21.07	19.92	20.23	16.53	14.76



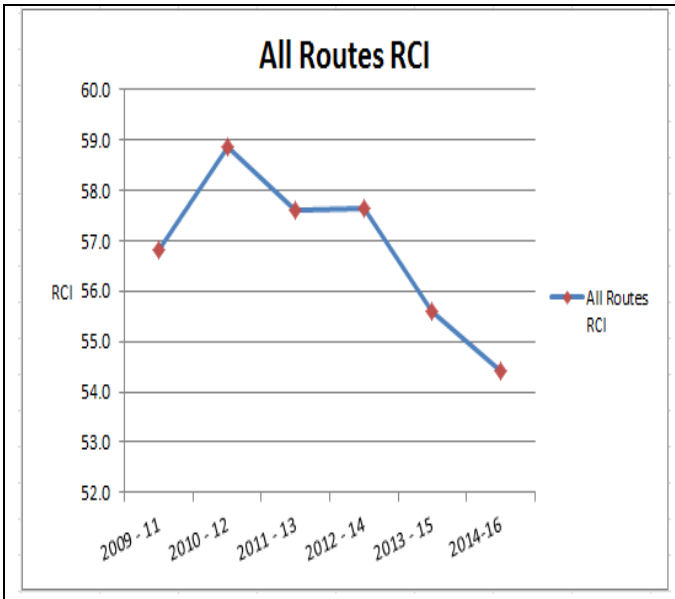
The all routes amber condition RCI has shown an initial improvement year on year however the latest results show an increasing trend which may be indicative of asset renewal treatments not being on a par with the rate of asset deterioration. This will need further analysis beyond the scope of this report.

All Routes Amber RCI				
2010-12	**2011-13**	**2012-14**	**2013-15**	**2014-15**
37.78	37.67	37.42	39.06	39.65



The all routes green condition RCI has shown steady improvement which can be attributed to the recent investment and delivery of the roads reconstruction programme. Reduced investment may affect this trend and efforts need to be concentrated on activities that minimise the rate of asset deterioration and preserve asset condition until higher investment levels can be afforded.

All Routes Green RCI				
2010-12	**2011-13**	**2012-14**	**2013-15**	**2014-15**
41.15	42.41	42.35	44.4	45.6



The RCI results across all routes has shown steady and marked improvement over the last five years reflecting recent investment in roads reconstruction. There is however some way to go to equal the Scottish average 36.7 (2012-14) RCI value. Investment levels are being reduced therefore it is important to protect the significant improvement already made through enhanced focus on preventative maintenance activities to minimise the rate of asset deterioration.

All Routes RCI				
2010-12	**2011-13**	**2012-14**	**2013-15**	**2014-15**
58.9	57.6	57.7	55.6	54.4

The RCI condition results by Road Class are shown in Table 3.9.1 below;

Table 3.9.1 Road Condition Index (RCI) Results by Road Class 2015/16

	Class A		Class B		Class C		Class U			**Whole Network**	
RCI =	Length (Km)	%	Length (Km)	%	Length (Km)	%	Length (Km)	%		**Length (Km)**	%
>=100	46.3	9.17	107.0	17.44	72.9	16.78	110.3	15.19		**336.5**	**14.76**
>=40	180.4	35.72	267.1	43.52	180.8	41.61	275.5	37.94		**903.8**	**39.65**
<40	278.3	55.11	239.7	39.04	180.8	41.61	340.4	46.87		**1039.1**	**45.58**

Note – Road lengths used are from survey data.
Data source – SRMCS results

The RCI condition results by Rural / Urban are shown in Table 3.9.2 below;

Table 3.9.2 Road Condition Index (RCI) Results by Urban/Rural 2015/16

	Urban		Rural			**Whole Network**	
RCI =	Length (Km)	%	Length (Km)	%		**Length (Km)**	%
>=100	19.2	4.34	317.4	17.27		**336.5**	**14.76**
>=40	140.3	31.75	763.6	41.55		**903.8**	**39.65**
<40	282.4	63.91	756.7	41.18		**1039.1**	**45.58**

Note – Road lengths used are from survey data.

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 3.9.3 below;

Table 3.9.3

Road Classification	2010-12 Survey				2013-15 Survey				
	Road Condition Index				Road Condition Index				Difference
	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%

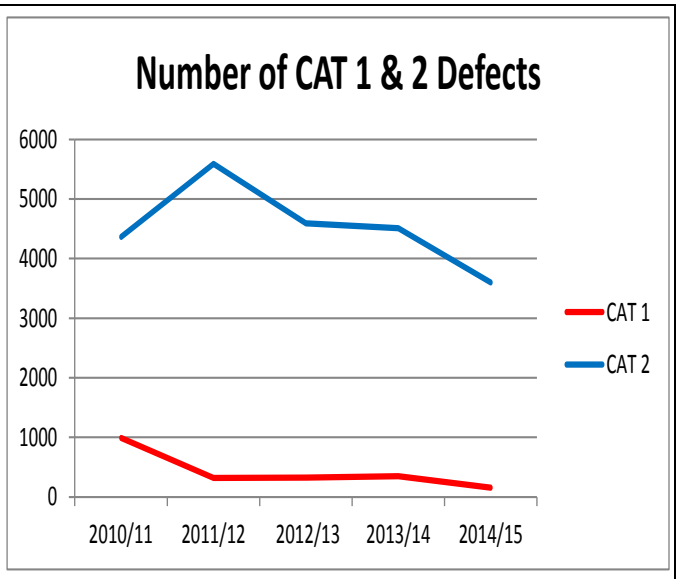
Note - RCI condition has improved on average by 3.29% within each road class as a result of the invetsment and delivery of the road reconstruction programme approved by council in February 2012

3.10 Reactive 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 3.10 below details the number of Cat 1 defects reported to APSE/SCOTS since 2010/11.

Table 3.10 Number of defects (Carriageway)					
	2010/11	2011/12	2012/13	2013/14	2014/15
CAT 1E	15	37	124	89	32
CAT 1	974	280	203	261	124
Total CAT 1	**989**	**317**	**327**	**350**	**156**
CAT 2	3700	4366	5591	4591	3601
Data source – APSE, WDM					

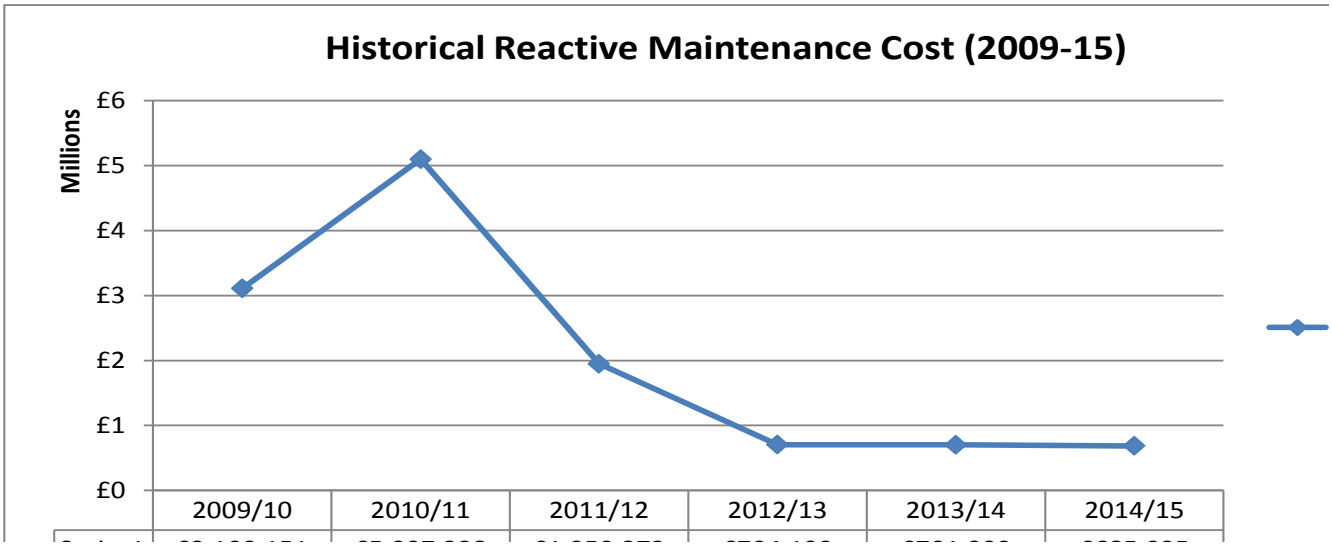
Carriageway defects have reduced since 2011 which can be associated with the recent investment in the roads reconstruction programme.



3.10.1 Reactive Maintenance cost

Table 3.10.1 below details the cost of reactive maintenance as reported to APSE/SCOTS.

Table 3.10.1 Historical Reactive Maintenance Cost					
2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
£3,109,151	£5,097,228	£1,950,272	£704,199	£701,999	£685,935
Comment – Figures reported to APSE					



Reactive Maintenance costs have been significantly reduced and may be attributed to the recent investment in the roads reconstruction programme however they remain an area of concern and require close monitoring.

3.11 Performance in completing repairs

Relevant performance indicators relating to the carriageway are detailed within Table 3.11 below;

Table 3.11 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

3.12 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.

3.12.1 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.

3.12.2 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 five years are detailed in Table 3.12.2 below;

Table 3.12.2 Winter Maintenance					
Performance Indicator	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Km of total carriageway network treated on receipt of an adverse weather forecast	1205	1205	1205	1205	1199
Km travelled to achieve the above treatment. (i.e. include non-treated lengths)	2491	2491	2491	2491	2471
Route efficency	48.37%	48.37%	48.37%	48.37%	48.52%
Number of precautionary treatment routes	31	31	31	31	31
Number of gritters available	33	33	33	33	33
Total number of planned treatment runs	108	59	106	65	82
Actual number of days on which any non-planned winter maintenance function was carried out during year	27	6	17	0	0
Total aggregate annual treatment mileage travelled by all gritting vehicles on all planned routes	83439	72875	80261	50688	99746
Total tonnage of salt used on carriageways	19727	10431	17777	9962	19104
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)	£3,402,695	£1,670,677	£2,534,435	£2,034,463	£2,450,175
Average Cost per Planned treatment run (all inclusive)	£31,506.44	£28,316.56	£23,909.76	£31,299	£29,880
Average cost per mile of planned treatment (all inclusive)	£40.78	£22.93	£31.58	£40.14	£24.56

3.13 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 3.13a below illustrates the vicious cycle inadequate maintenance.

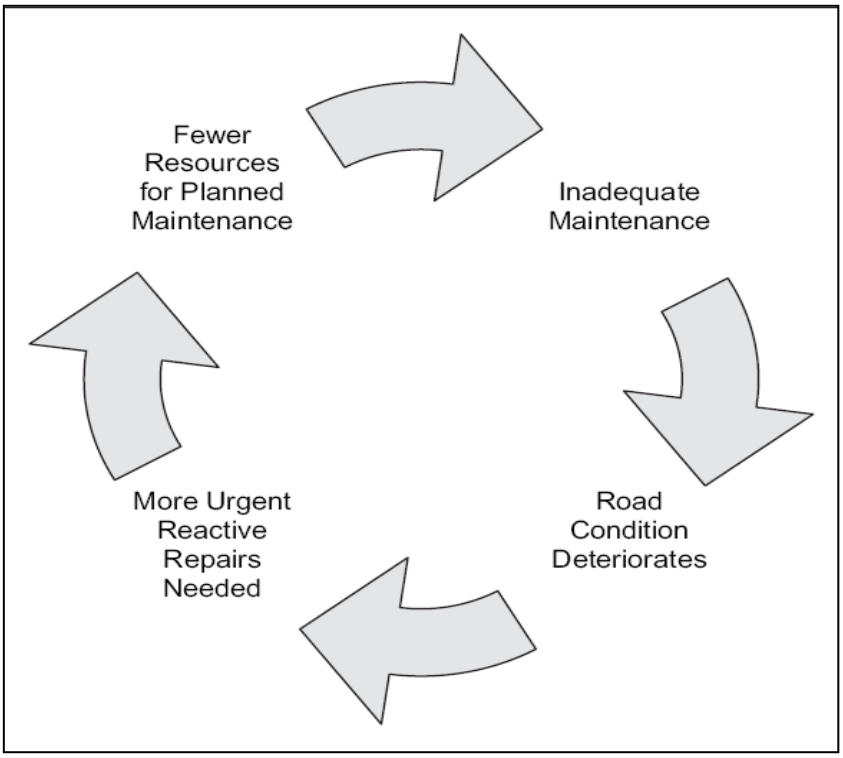


Figure 3.13a The Vicious Cycle of Inadequate Maintenance

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 effects of undertaking inadequate preventative maintenance activities and the vicious cycle described above can perhaps be best illustrated in the photograph below which was taken on a road in Argyll in September 2015.

Figure 3.13b Photo Showing Consequences of Inadequate Preventative Maintenance

The photo above clearly demonstrates the sequence of events that has led to the premature failure of the carriageway surfacing at this locus. It also provides visible evidence of how the various elements of the whole road asset play perhaps an indirect but nevertheless integral part and vital contribution to preserving the longevity and condition of the road. Investing adequately and appropriately in preventative maintenance activities will reduce demand for expensive surfacing repairs and generate long term savings.

The sequence of events can be described as follows;

- **Recent single swathe grass cut** - Insufficient width of cut to prevent vegetation growth restricting forward visibility and affecting road drainage.
- **Right hand side drainage ditch not functioning** - Growth of bushes and vegetation restricts water flow in ditch.
- **Surface water on road –** Restricted water flow in ditch results in water flowing across road surface causing potential flooding and winter hazard.
- **Road surface on left hand side is deforming** – Restricted water flow in ditch over time allows water ingress and weakens the road structure.
- **Road surface cracking –** Weakened structure allows surface to flex and crack as vehicles pass over. When combined with surface water, vehicles effectively pump more surface water into the cracks accelerating the deterioration process.
- **Drainage offlet left hand side –** Not functioning to remove surface water overflow from ditch which creates ponding and intensifies the road surface deterioration process.

The road surface condition either side of the locus appears sound and fit for purpose however the consequential cycle of inadequate preventative maintenance activities is avoidable surface deterioration which demands an otherwise unnecessary surface repair operation to be undertaken promptly to minimise further expense.

This illustration clearly demonstrates the potential savings in terms of reduced demand for surface defect repairs that can be gained from ensuring sufficient investment is made in preventative maintenance activities such as grass cutting, scrub cutting and drainage cleaning. After all, the repair operation will require these activities to be carried out anyway to be successful.

The forward planning of works is essential to realise the best outcome and minimise cost. This can be achieved 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 activities will provide performance data that can help to improve service delivery and demonstrate prudent stewardship of assets. There may be limited data available for example on inventory data, however initially estimated values can be used to develop annual programmes and as works progress inventory can be collected and updated. Over time and with the collection of increased condition and maintenance data there will be greater scope to prioritise and target works programmes in line with asset needs, corporate goals and objectives.

3.14 Road Drainage Condition Survey

Functioning drainage is a prerequisite of good pavement management. Without adequate drainage, or with drainage facilities that are blocked or broken, water will get into the pavement and over time weaken it and accelerate its deterioration. This simple principle is well known to road maintenance practitioners.

The SCOTS Asset Management Project recognises the importance of good drainage to protect road infrastructure and has developed a good practice guide to assess the condition of existing drainage systems. This simple condition index which can be used by existing Road Inspectors provides a valuable tool in determining where available drainage investment should be prioritised.

This method deals only with how existing drainage infrastructure is, or is not, operating. It does not take into account wider flood risk or the capacity of the receiving storm water /sewer system.

3.14.1 Drainage Condition Index

The SCOTS project has developed a draft drainage condition index for use by local authorities. The table below outlines the principle of the index in determining a suitable condition rating for existing drainage assets.

DRAINAGE CONDITION INDEX (Rural drainage)			
Condition Rating	**Action**	**Drainage Rating**	**Description**
Very Poor	Drainage needs improvement as soon as possible	**Red**	Drainage very poor or not functioning properly - Poor ditch shape, obstructions to flow, heavy vegetation growth, possible water seepage to road affecting road structure and surface. Should be considered for priority maintenance.
Poor	Drainage needs improvement shortly	**Amber**	Drainage poor or not fully functioning – sections of poor ditch shape, or some obstructions to water flow, areas of vegetation growth generally not affecting road structure or surface at present but should be considered for maintenance shortly.
Fair	Maintain existing cyclic cleaning regime	**Blue**	Existing drainage is functioning adequately with only minor or isolated sections restricting water flow or grass growth to sides. Generally drainage considered for maintenance only as part of normal cyclic regime.
Good	No action required	**Green**	Continuance of routine cleaning etc. required.

It is perhaps more useful to visualise the index using photographs to grasp the principle of allocating sections of drainage to a particular rating. It will be found however that when undertaking the survey several factors may need to be considered to make a judgement on the allocated rating.

DRAINAGE CONDITION INDEX (Rural drainage)				
Condition Rating	**Action**	**Drainage Rating**	**Description**	
Very Poor	Drainage needs improvement as soon as possible	**Red**		
Poor	Drainage needs improvement shortly	**Amber**		
Fair	Maintain existing cyclic cleaning regime	**Blue**		
Good	No action required	**Green**		

The index is currently being evaluated by SCOTS members.

3.14.2 Sample Survey

The SCOTS drainage assessment tool was utilised to undertake a sample survey on a selection of rural routes within Oban Lorn & Isles to provide data on the condition of existing drainage assets and to evaluate the tool

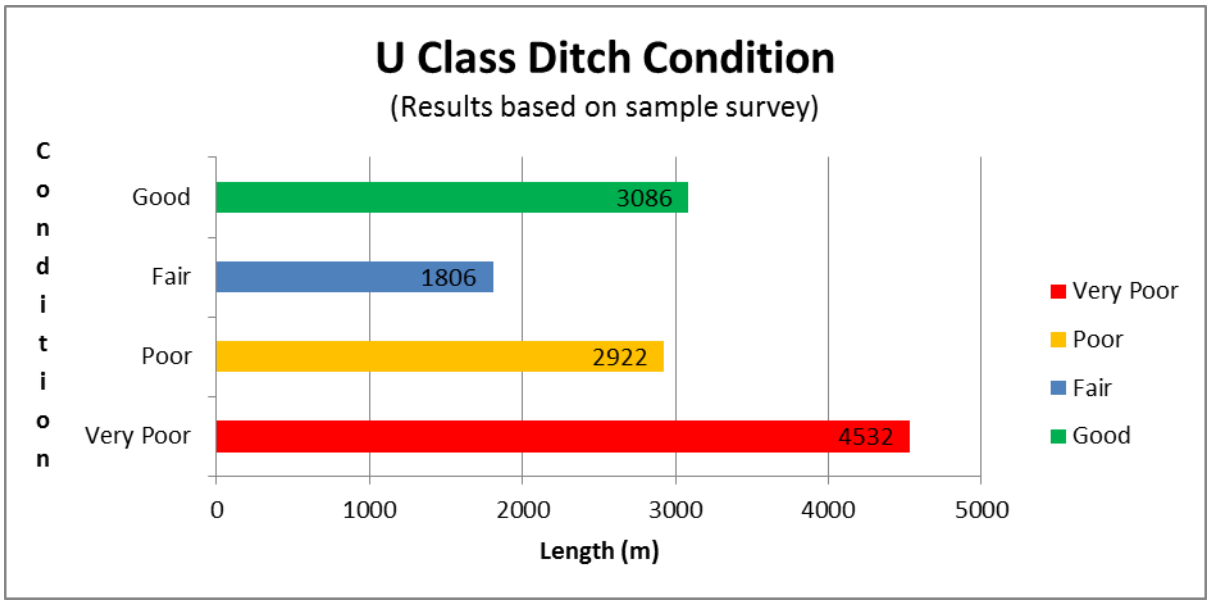
for potential wider use through normal inspection cycle. The survey is based on a visual inspection via a driven survey.

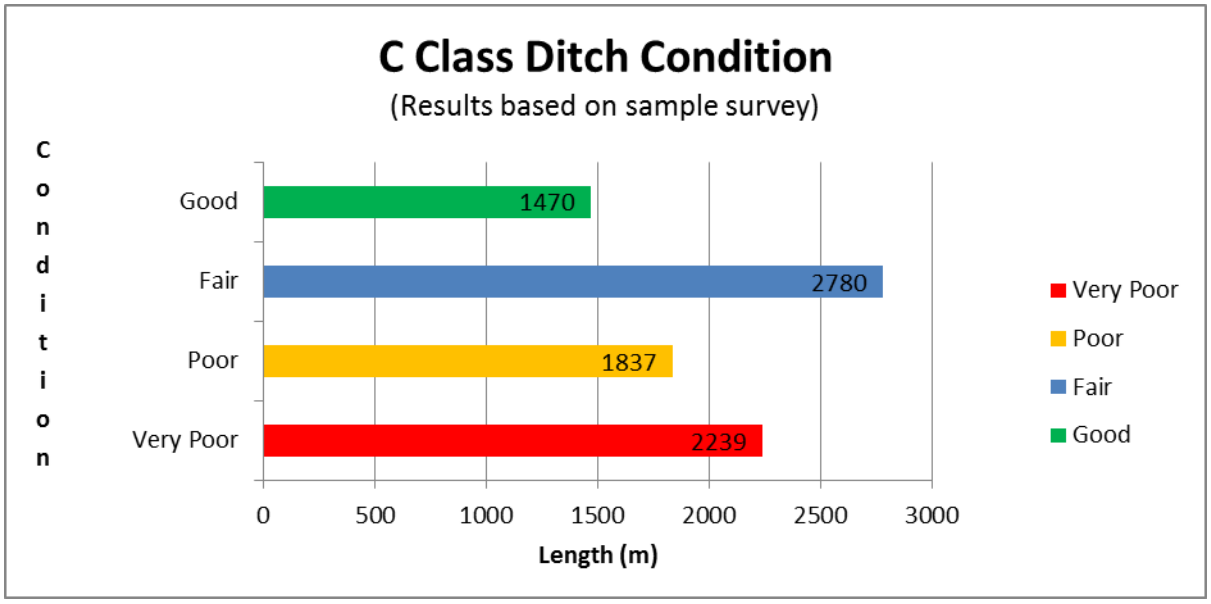
The survey was undertaken on routes within each of the national classification of roads (A,B,C & U) in order to provide a comparison with the SRMCS Road Condition survey results. The routes surveyed are detailed in the table below.

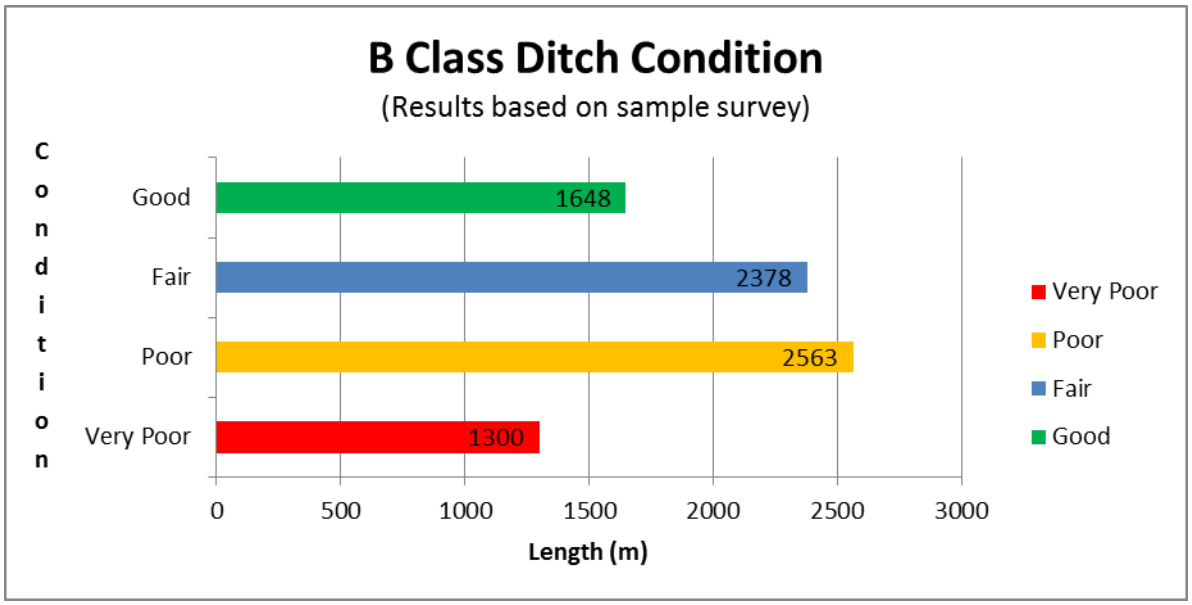
Route	Description	Route Length (km)	Identified Ditch length (Km)	Percentage ditch to Route length	Comments
U 29	Kilmelford - Barnaline	16.18	12.35	76%	Survey complete whole route
C 32	Glencruitten - Taynuilt	17.15	8.32	49%	Survey complete 95% route (exclude urban sections)
B845	Baracaldine - Bonawe	11.07	7.88	71%	Survey complete whole route
A816	Oban - Kilninver	11.96km			Unable to survey due to extensive scrub – Visually estimated condition

3.14.3 Survey Results

The results from the survey were analysed and are illustrated on the charts below;

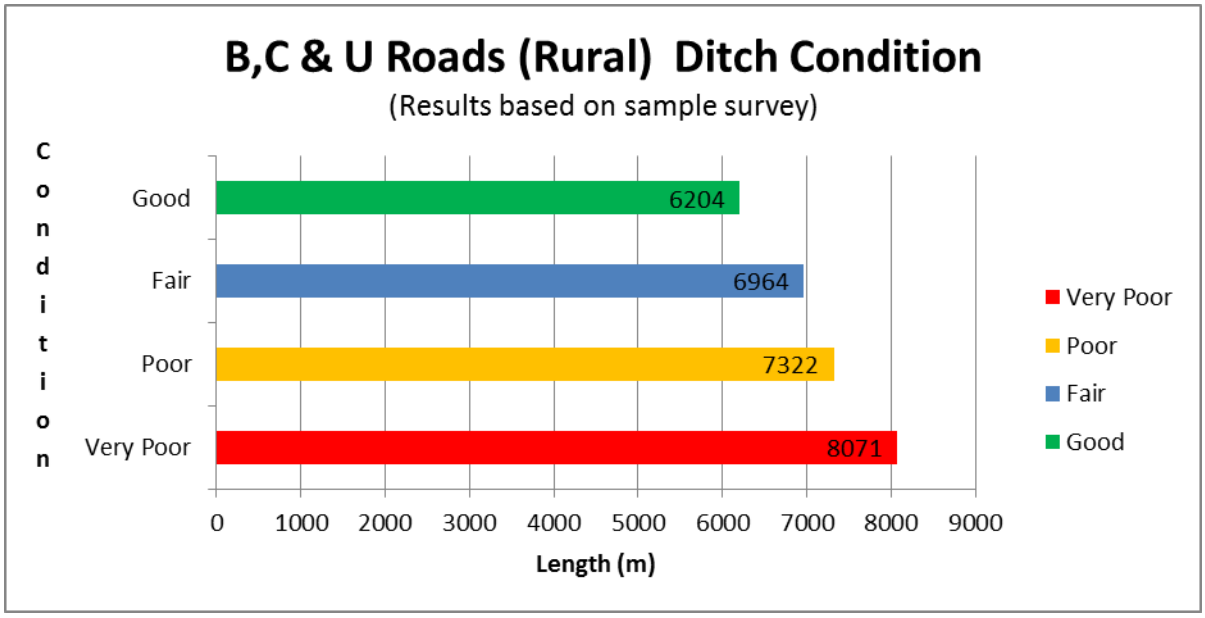






The A Class survey was unable to be completed due to extensive scrub and vegetation making visual identification of drainage assets during driven survey very difficult.

The results of each survey were then summarised to provide an overall condition for all roads surveyed (B, C & U) as detailed in chart below;



Using the same principle as the Road Condition Index (RCI) the percentage of ditch within the red and amber condition bands was combined to provide a Drainage Condition Index (DCI) ranking. An additional consideration is that drainage in condition band BLUE will also be in need of normal cyclic maintenance and therefore the percentage ditching based on maintenance need was calculated as the RED + AMBER + BLUE to provide an indication of the level of maintenance works required.

The results are shown in Table below:

Road Class	Drainage Condition Index (DCI) Red + Amber	Drainage Maintenance Needed (Red + Amber + Blue)
U class	60.38%	**75%**
C Class	48.96%	**82%**
B Class	48.97%	**79%**
All Roads B,C & U Class	**53.90%**	**78%**

It is interesting to note that when the ditch survey results are compared to the latest RCI results (54.4%) it would appear to indicate a relationship between the condition of roadside drainage and the RCI of the carriageway.

3.14.4 Headline Backlog Figure

The SCOTS project has previously calculated a Headline Backlog figure for carriageway defects to provide an indication of the scale of asset deterioration and investment need. The following tables show the Headline Backlog figure calculated for drainage assets using the results obtained from the sample survey.

The drainage inventory was calculated from sample survey results. Where no survey results were available an estimated quantity was used.

Class	Rural (km)	% Ditch over Rd length	Est. ditch length (km)	Comment
A	422.904	80.00%	338.3232	Estimated
B	569.956	70.94%	404.33	Based on sample survey results
C	392.548	48.55%	190.58	
U	456.3	76.30%	348.16	
	1841.7		1281.39	

Condition results for each road classification were used to determine the estimated total length of ditch within each condition band and combined with estimated service cost for each as detailed in table below.

Carriageway Ditching Maintenance Backlog (A Class condition estimated as 15% Good 15% Fair, 30% Poor,30% Very Poor)								
Ditch Condition	**Road Classification**				**Total Length (Km)**	**Service Cost (£/Lin.m)**	**Estimated Cost**	**Comments**
	A Class (Est Condition)	**B Class**	**C Class**	**U Class**				
Good	50.7	84.9	34.3	87	256.9	£2.50	£642,250	Cost does not include for Scrub Clearance
Fair	50.7	121.3	62.9	48.7	283.6	£3.00	£850,800	
Poor	101.5	133.4	41.9	83.6	360.4	£3.75	£1,351,500	
Very Poor	101.5	64.7	51.5	128.8	346.5	£4.50	£1,559,250	
						Estimated Total Cost	£4,403,800	

The use of the drainage condition index has provided valuable insight to the condition of drainage assets and provides a useful tool that can be utilised on a more widespread basis to assess the condition of the whole network as well as being able to be adapted for use on any asset.

The results of the survey have clearly shown a desperate need for investment in restoring drainage to a functioning condition so that ample protection can be afforded to the carriageway asset from unnecessary and avoidable damage.

The visual survey also showed a clear and present need to review the current verge maintenance regime which would appear to be wholly inadequate in terms of allowing vegetation growth to overwhelm drainage assets such that they cannot perform their intended function.

The sample survey would indicate that until such times as adequate attention can be afforded to maintaining drainage assets in a good and functioning condition then it is most likely that improvement in terms of Road Condition Index (RCI) is limited because poor drainage is accelerating the deterioration of the carriageway asset above the level of asset renewal that current or future investment levels can afford.

3.14.5 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.

3.14.6 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

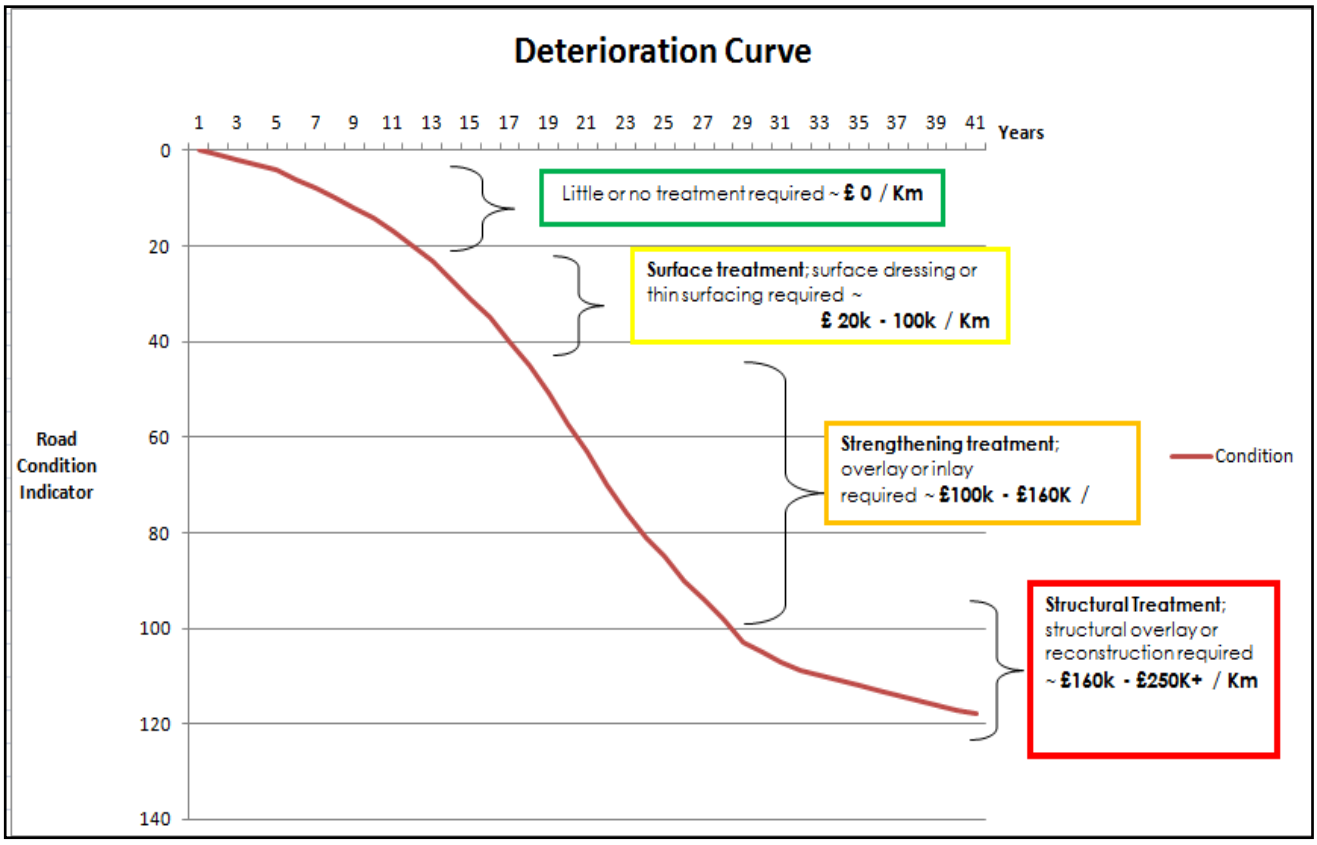
The RoadCem product has been successfully used worldwide for the stabilisation of earthworks, road building and hydraulic engineering projects and is currently being considered for a trial in conjunction with the timber industry. This will allow the product to be evaluated for its suitability for use 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.

3.15 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 surveys.

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.

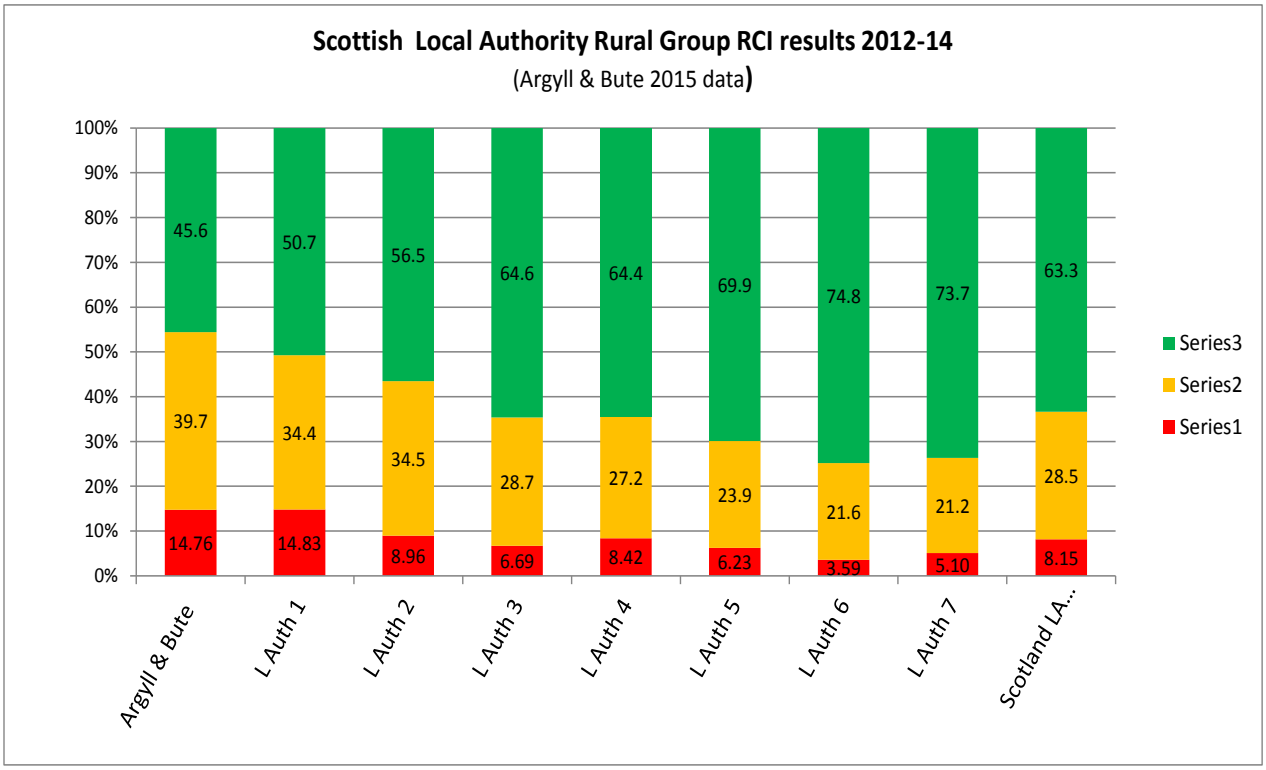
Deterioration curves following this pattern of deterioration have been used on the cost projection models in this report.

3.15.1 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;

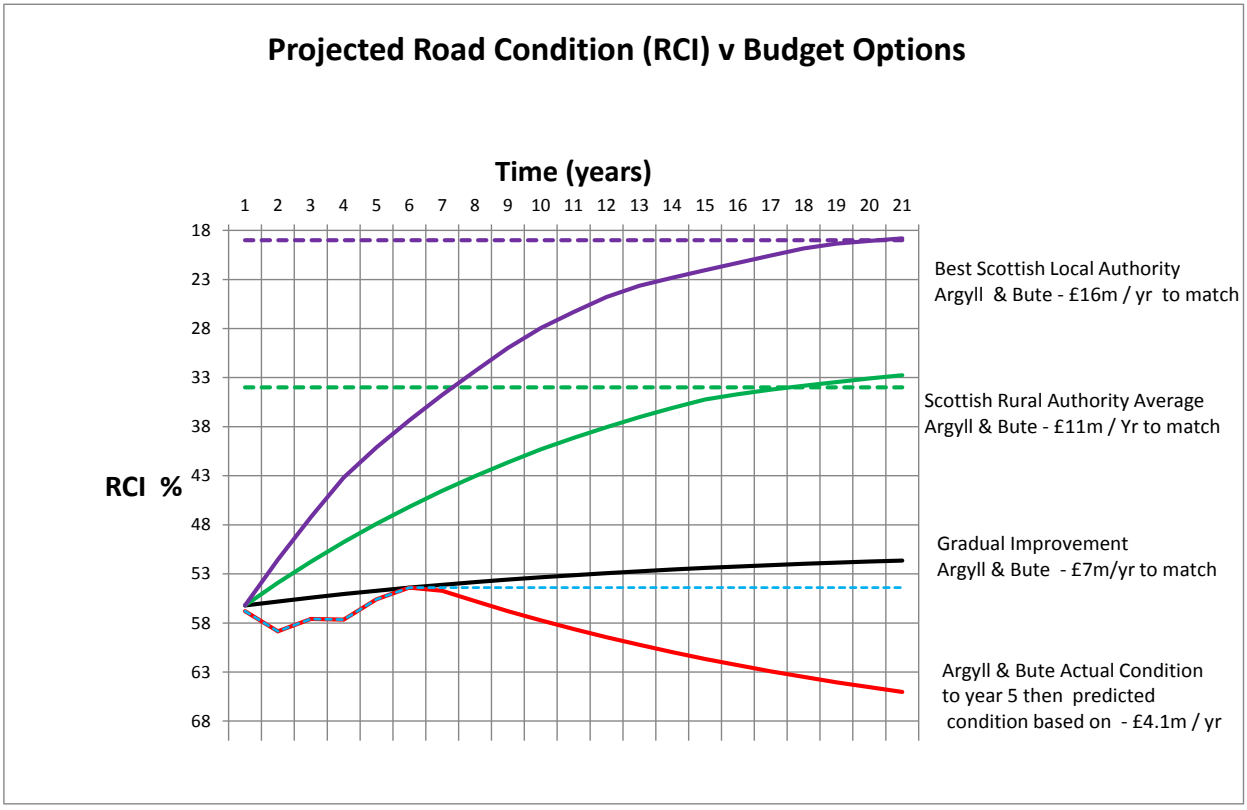
Table 3.15.5a Rural Scottish Local Authority RCI 2012-14 results

Ranking Position	Rural Scottish Authority	Network Condition			
		Red	Amber	Green	RCI
32nd	Argyll & Bute (2014-16 results)	14.76	39.65	45.6	**54.4**
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. It also shows the actual condition for Argyll and Bute network with condition projected based on £4.1m per year in surfacing treatments only.



3.15.2 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.

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

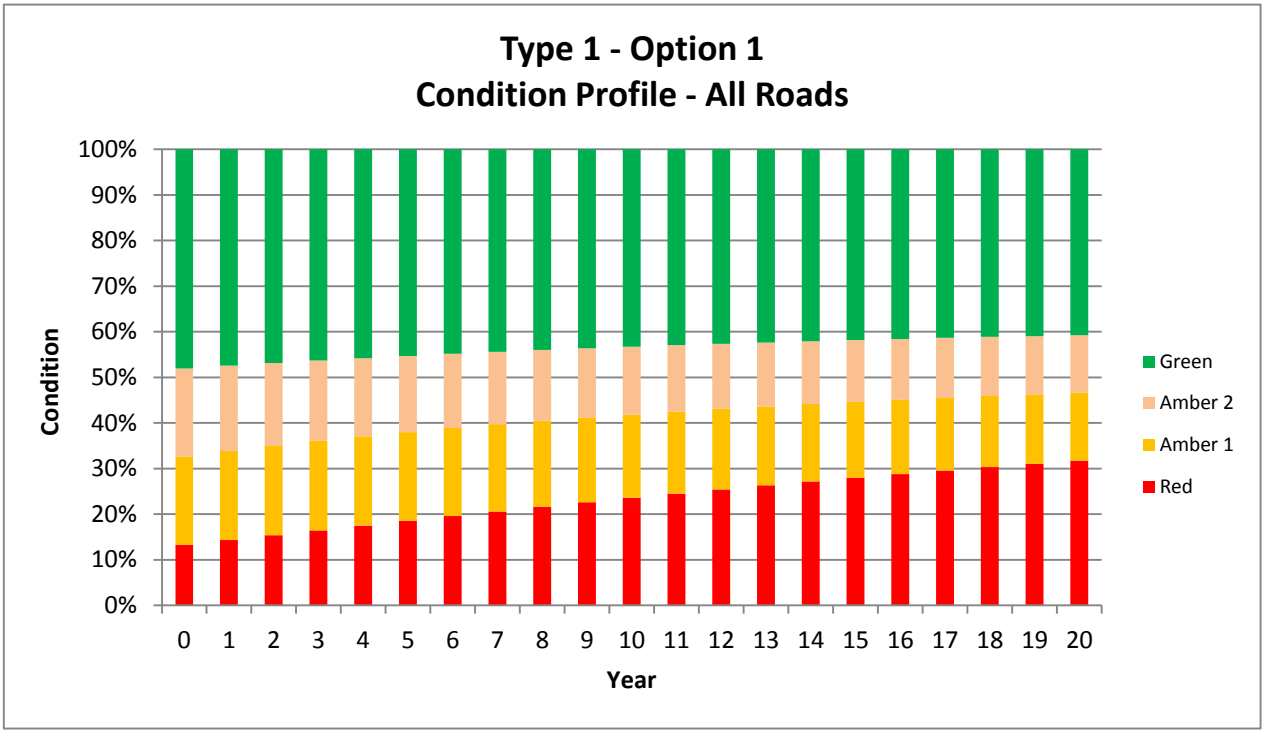
		Option 1	Continuation of Current Funding	
Year 1 Budget: Type 1 - Option 1		**£4,139,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£51,738	£320,425	£0
	Rural	£310,425	£620,850	£517,375
Classified (B) Roads (cat 3a)	Urban	£51,738	£103,475	£0
	Rural	£103,475	£310,425	£258,688
Classified (C) Roads (cat 3b)	Urban	£51,738	£73,475	£0
	Rural	£103,475	£310,425	£362,163
Unclassified Roads (cat 4a & 4b)	Urban	£51,738	£103,475	£0
	Rural	£51,738	£123,475	£258,688
Treatment Totals		**£776,063**	**£1,966,025**	**£1,396,913**

Continuation of current funding at £4.1m is lower than the predicted steady state budget (Preventative) of £8.1m and is delivered across all treatments. Model treats all condition bands.

The SCOTS model predicts that this level of funding 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 59.27%. This represents a **7.32%** deterioration on current condition 51.95% (Based on network area).

£1,396,913



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.

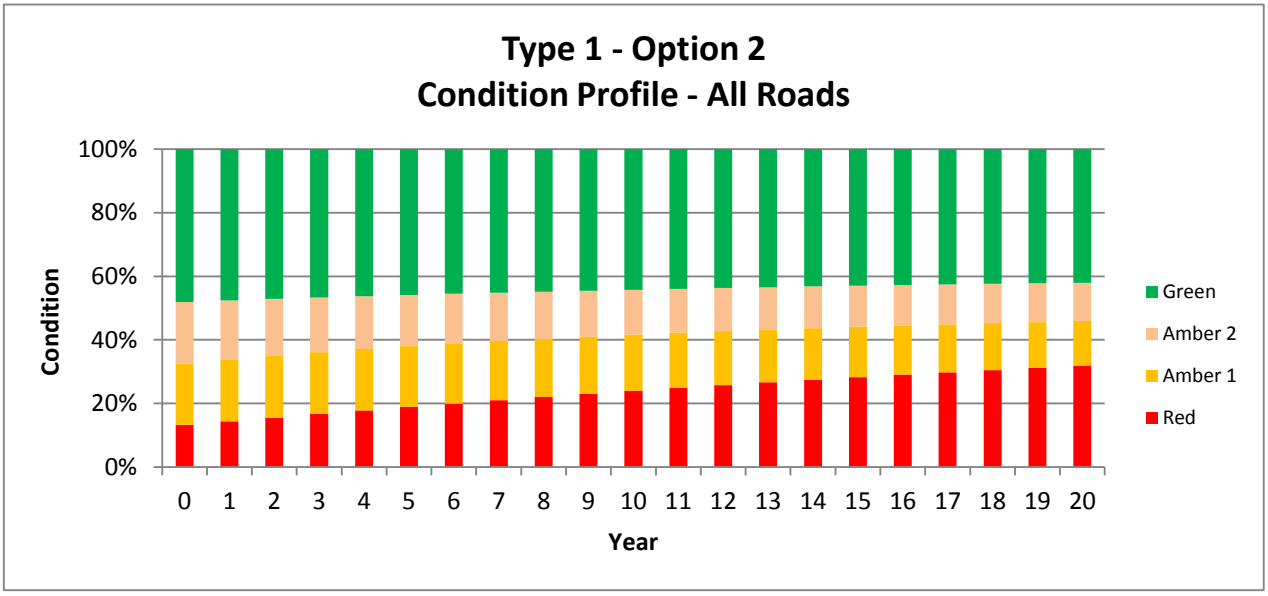
3.17 Option 2 – Continuation of Current Funding £4.1m with increased surface treatments

		Option 2	Increase Preventative	
Year 1 Budget: Type 1 - Option 1		**£4,139,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£103,475	£413,900	£0
	Rural	£258,688	£724,325	£827,800
Classified (B) Roads (cat 3a)	Urban	£0	£155,213	£0
	Rural	£103,475	£206,950	£310,425
Classified (C) Roads (cat 3b)	Urban	£0	£103,475	£0
	Rural	£0	£103,475	£258,688
Unclassified Roads (cat 4a & 4b)	Urban	£0	£206,950	£0
	Rural	£0	£103,475	£258,688
Treatment Totals		**£465,638**	**£2,017,763**	**£1,655,600**

Continuation of current funding at £4.1m is lower than the predicted steady state budget (Preventative) of £8.1m. 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 59.20% This represents a **7.32%** deterioration on current condition 51.95% (Based on network area).



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.

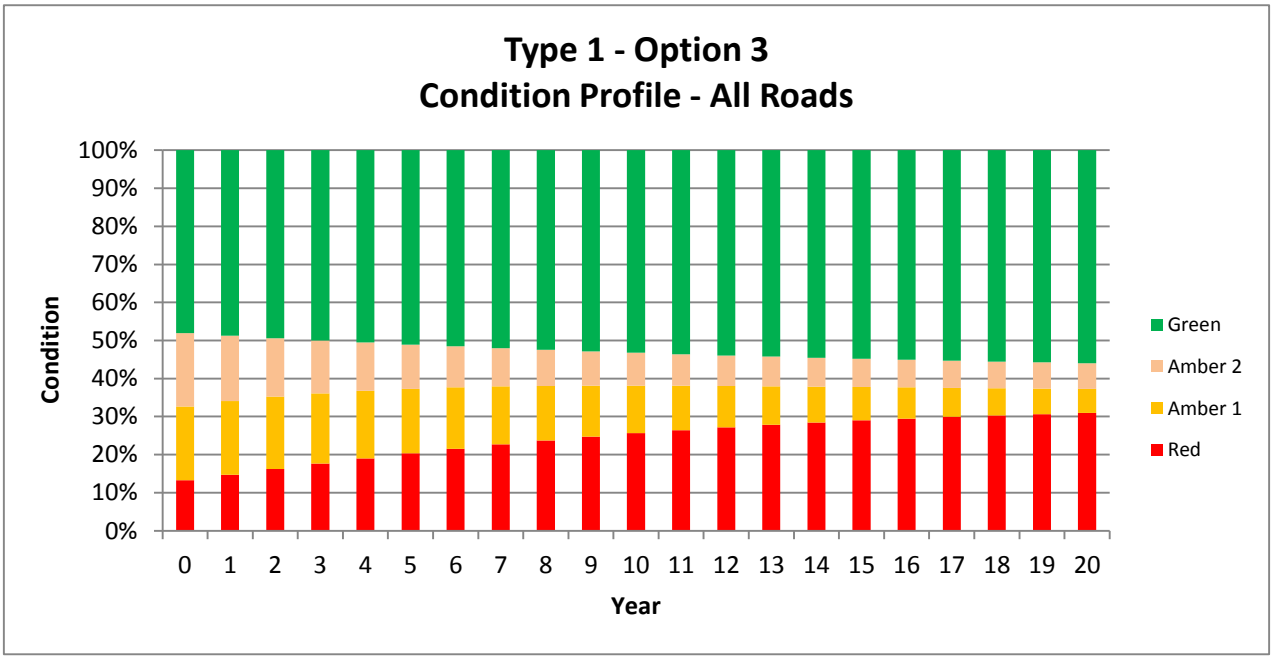
3.18 Option 3 – Continuation of Current Funding £4.1m with 80% surface and 20% resurfacing treatments

		Option 3	80/20 Preventative	
Year 1 Budget: Type 1 - Option 1		**£4,139,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£0	£103,475	£463,900
	Rural	£0	£362,163	£1,228,650
Classified (B) Roads (cat 3a)	Urban	£0	£31,043	£174,170
	Rural	£0	£124,170	£456,680
Classified (C) Roads (cat 3b)	Urban	£0	£20,695	£82,780
	Rural	£0	£72,433	£339,730
Unclassified Roads (cat 4a & 4b)	Urban	£0	£41,390	£265,560
	Rural	£0	£72,433	£299,730
Treatment Totals		**£0**	**£827,800**	**£3,311,200**

Continuation of current funding at £4.1m is lower than the predicted steady state budget (Preventative) of £8.1m. 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 significantly

The predicted RCI at the end of 20 years would be 44.05%. This represents a **7.90%** improvement on current condition 51.95% (Based on network area).



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.

3.19 Option 4 – Continuation of Current Funding £4.1m with increased strengthening and resurfacing treatments and no surface treatments.

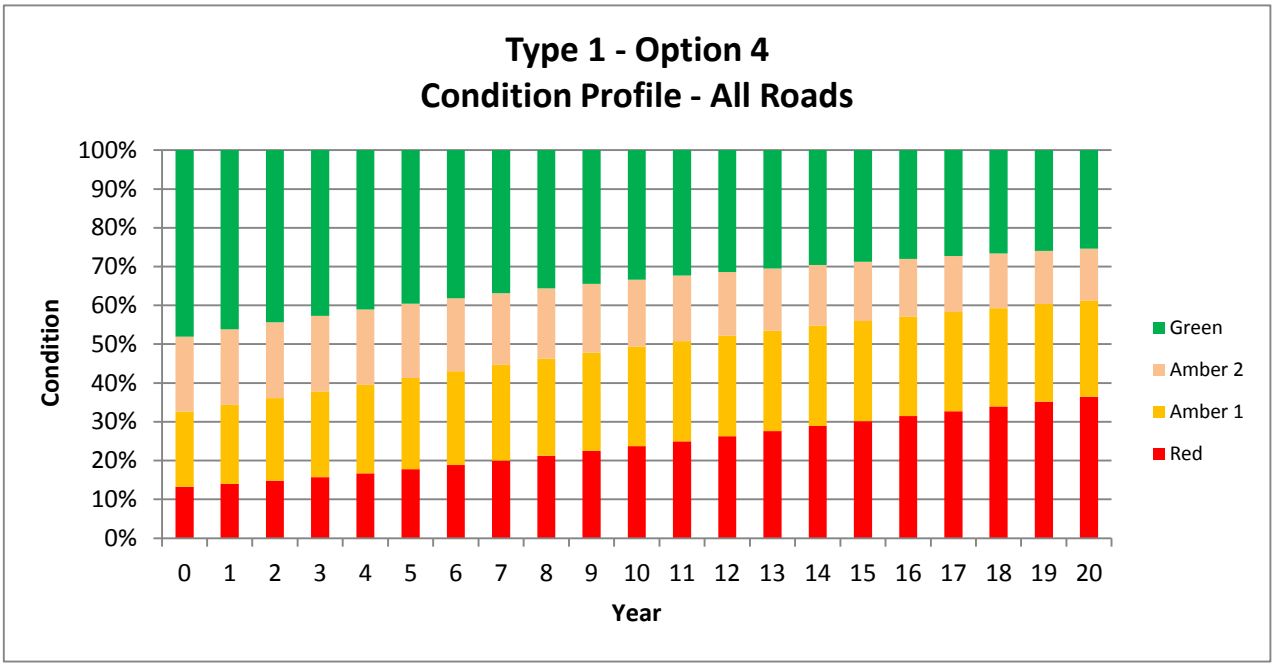
		Option 4	Increased Strengthening	
Year 1 Budget: Type 1 - Option 1		**£4,000,000**		
Category	**U-R**	**Strengthening Treatment**	**Resurfacing Treatment**	**Surface Treatment**
Principal (A) Roads (cat 2)	Urban	£155,213	£413,900	£0
	Rural	£569,113	£827,800	£0
Classified (B) Roads (cat 3a)	Urban	£51,738	£155,213	£0
	Rural	£206,950	£465,638	£0
Classified (C) Roads (cat 3b)	Urban	£51,738	£73,475	£0
	Rural	£206,950	£423,900	£0
Unclassified Roads (cat 4a & 4b)	Urban	£51,738	£206,950	£0
	Rural	£51,738	£226,950	£0
Treatment Totals		**£1,345,175**	**£2,793,825**	

Continuation of current funding at £4.1m is lower than the predicted steady state budget (Preventative) of £8.1m. 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 74.64%. This represents a **22.69%** deterioration on current condition 51.95% (Based on network area).

£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.

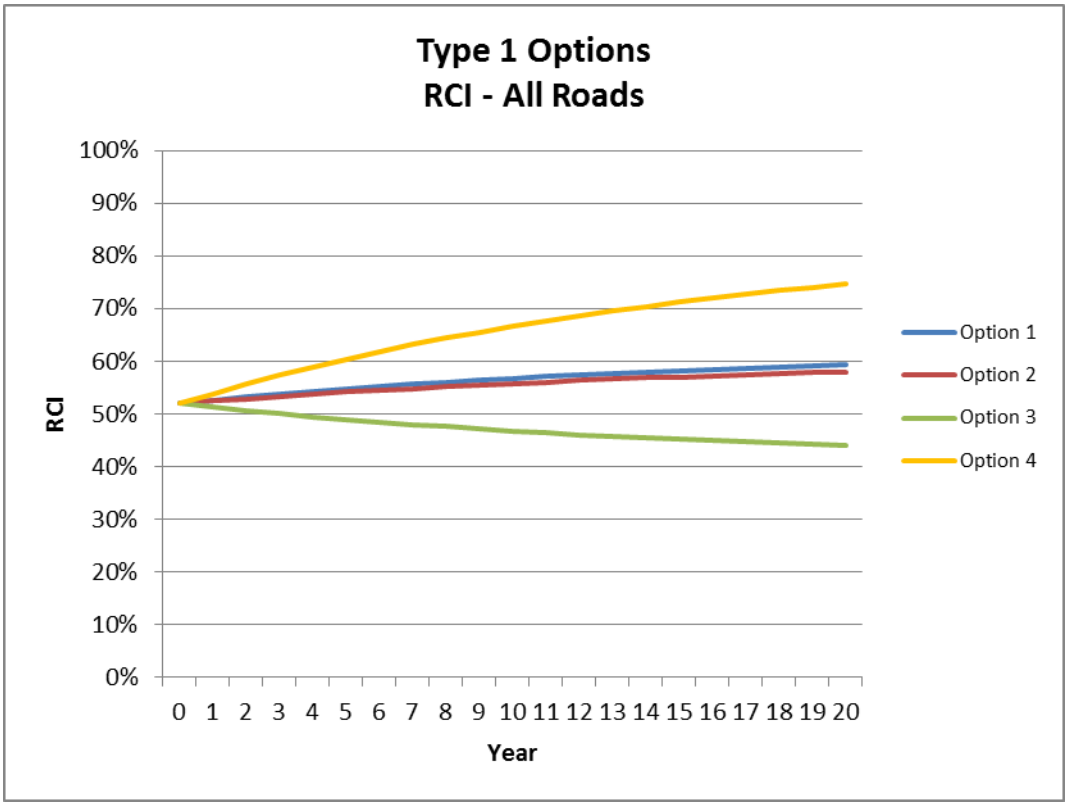
A key issue to note is that the latest SCOTS model predicts that an estimated steady state figure of £8.1m is required to maintain current road surface condition RCI. This has increased from previous model (£6.35m) due to an increase in treatment rates. Considering the models accuracy the recent £21m 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 & £8.1m 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 £4.1m. It should be noted that the year 0 RCI (51.95%) is different than reported RCI condition of 54.4%. 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	51.95%	51.95%	51.95%	51.95%
1	52.58%	52.44%	51.27%	53.86%
2	53.16%	52.90%	50.63%	55.65%
3	53.71%	53.33%	50.03%	57.34%
4	54.23%	53.74%	49.47%	58.92%
5	54.71%	54.13%	48.94%	60.41%
6	55.16%	54.50%	48.45%	61.81%
7	55.59%	54.85%	47.99%	63.13%
8	55.99%	55.18%	47.56%	64.37%
9	56.36%	55.49%	47.15%	65.54%
10	56.72%	55.78%	46.77%	66.63%
11	57.05%	56.06%	46.41%	67.67%
12	57.36%	56.33%	46.08%	68.64%
13	57.65%	56.58%	45.76%	69.55%
14	57.93%	56.81%	45.47%	70.42%
15	58.19%	57.04%	45.19%	71.23%
16	58.43%	57.25%	44.94%	71.99%
17	58.66%	57.45%	44.69%	72.71%
18	58.87%	57.64%	44.47%	73.39%
19	59.08%	57.82%	44.25%	74.03%
20	59.27%	58.00%	44.05%	74.64%
RCI Difference Years 0-20	**-7.32%**	**-6.05%**	**+7.90%**	**-22.69%**

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.

A key issue to note is that all of the options presented predict that the percentage network within the red condition band is likely to increase significantly over the next 20 years based on current investment levels. Details are provided in table below.

All Roads Red% (Type1)				
Year	**Option 1**	**Option 2**	**Option 3**	**Option 4**
0	13.29%	13.29%	13.29%	13.29%
1	14.32%	14.40%	14.74%	14.03%
2	15.37%	15.52%	16.20%	14.85%
3	16.42%	16.64%	17.62%	15.75%
4	17.48%	17.76%	19.00%	16.72%
5	18.53%	18.86%	20.31%	17.77%
6	19.57%	19.94%	21.54%	18.87%
7	20.60%	20.99%	22.69%	20.02%
8	21.62%	22.02%	23.76%	21.22%
9	22.61%	23.01%	24.74%	22.45%
10	23.58%	23.97%	25.63%	23.71%
11	24.52%	24.90%	26.45%	24.99%
12	25.44%	25.80%	27.19%	26.29%
13	26.33%	26.66%	27.86%	27.58%
14	27.19%	27.49%	28.46%	28.88%
15	28.01%	28.29%	29.00%	30.17%
16	28.81%	29.05%	29.48%	31.46%
17	29.58%	29.78%	29.92%	32.73%
18	30.32%	30.49%	30.31%	33.98%
19	31.03%	31.16%	30.66%	35.21%
20	**31.71%**	**31.81%**	**30.97%**	**36.42%**

The SCOTS model predicts that for all options the area of road within the red condition band is likely to more than double over the next twenty years. This is as a direct result of current investment levels being around half the estimated steady state figure of £8.1m. This will intensify the demand year on year for reactive treatments to the point where lack of available funding will lead to sections of the network having to be restricted in use or considered unsafe and closed to traffic.

3.20 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.

3.21 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.

3.21.1 Utility Company Activity

Actual start notices of intended works are detailed within table 3.22.1 below;

Table 3.22.1 Actual Start Notices Issued in each area for utility activity 2014-15

Utility Company	Bute	Cowal	Helensburgh	Kintyre	Mid Argyll	Lorn	Mull	Islay	Totals
Scottish Water	15	131	82	35	88	75	17	18	461
BT	81	152	169	109	61	329	69	57	1027
SGN	10	61	56	28	0	13	0	0	168
S&S - Scottish Power	11	30	69	22	17	9	0	0	158
Totals 2014-15	117	374	376	194	166	426	86	75	1814
Totals from previous year 2013-14	34	126	271	100	88	108	29	37	793

Data source – NRSWA Co-ordinator

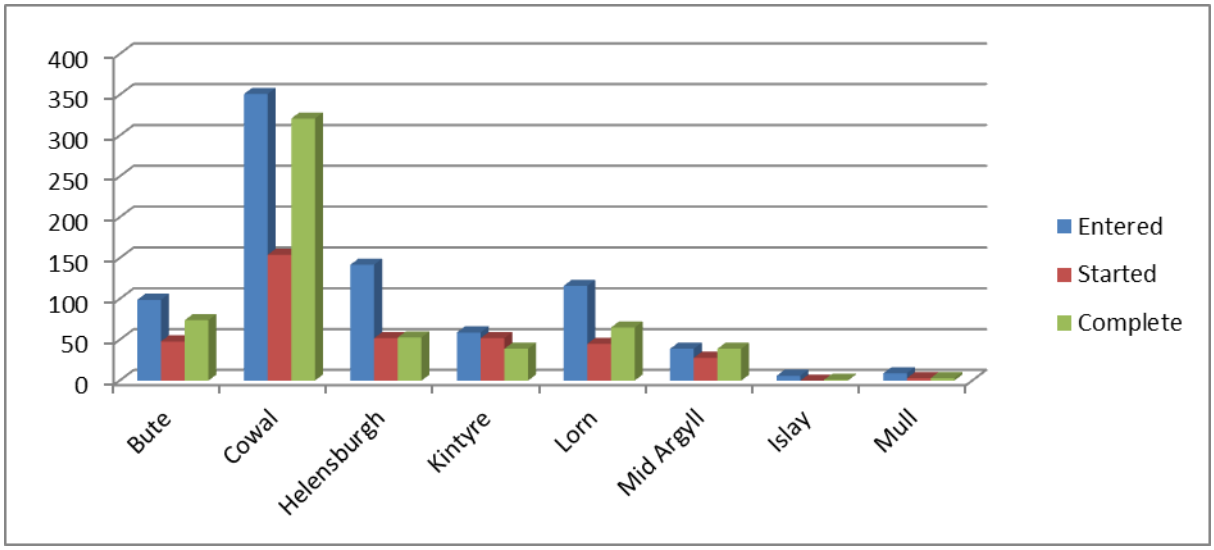
3.21.2 Utility Inspections

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 3.22.2 below details the type and number of inspections carried out during 2014-15.

Table 3.22.2 Inspections									
Inspection Type	**Bute**	**Cowal**	**Helensburgh**	**Kintyre**	**Mid Argyll**	**Lorn**	**Mull**	**Islay**	**Totals**
Sample									
A - Works in Progress	13	73	27	3	9	3	0	0	128
B – Within 6 Months	17	60	52	12	9	26	1	0	177
C – Prior to end of Guarantee	12	52	65	5	15	19	1	0	169
Defects									**474**
DAR – Defective Apparatus reported		11	1	3		8		1	**374 (2013-14)**
DAT – Defective apparatus 3rd party report	4	36		5		2			
D/A2 – Defect follow up report	38	134	2	29		18			
D/2 – Defect follow up inspection	4	21	36	8	1				
D/3 – Defect completion inspection	4	5	5	7	1	1			
T/A – Target sample A inspection	2	16	8	1					
TPR – Third party report all categories	1	1	1	3		3			
RTN – Routine inspection all categories	2	9		7	1		1		
Totals 2014-15	97	418	197	83	36	80	3	1	
Totals from previous year 2013-14	63	312	207	76	47	38	2	3	
Data source - NRSWA Co-ordinator									

3.21.3 Register of Council Works

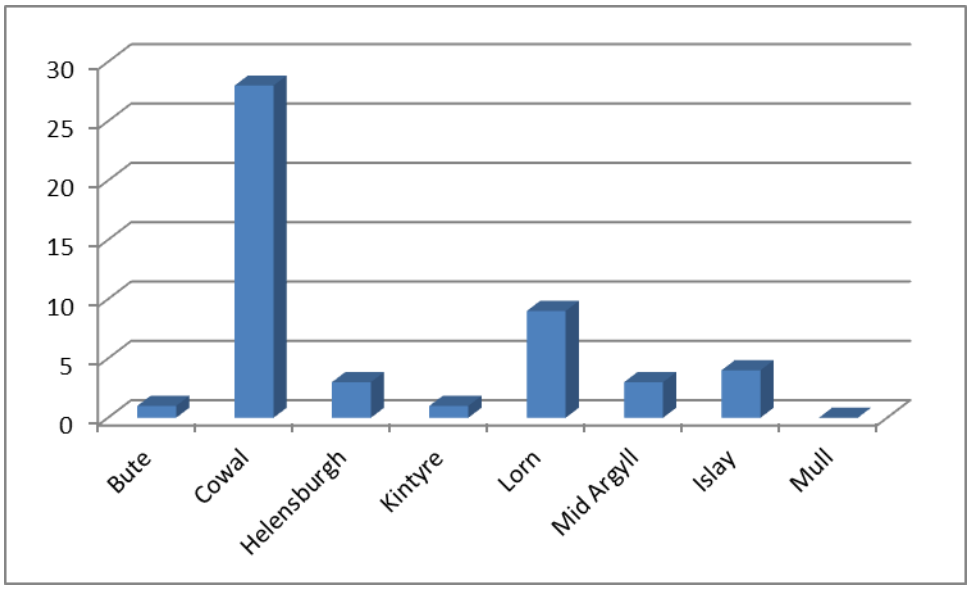
It is also a requirement for the council to enter some works (Type that require advance notification) on the Scottish Roadworks Register. The graph below illustrates the noticing activity for works being undertaken by the council.



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.

3.21.4 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 2014-15 within each council area.

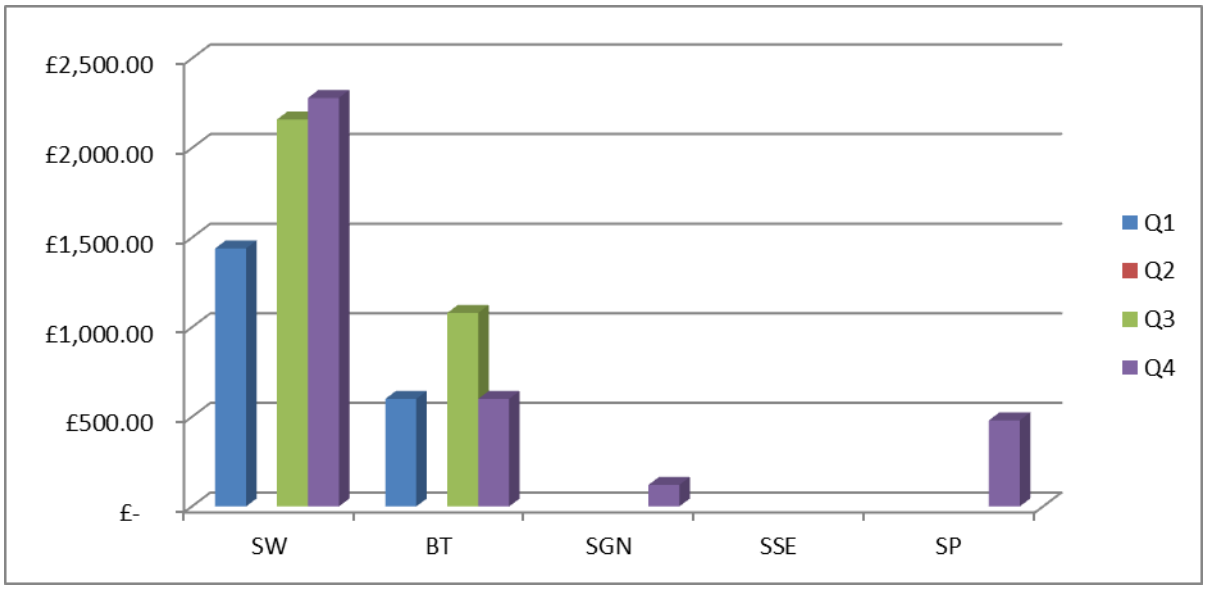


3.21.5 Inspection Fees and Penalties for Non Compliance

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 2014-15.



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

3.21.6 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 – 2014. 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 3.22.6 below;

Table 3.22.6 Percentage Failed Utility Coring Results					
Year	2006	2008	2010	2012	2014
British Telecom (BT)	50	0	0	0	0
SGN	37.5	33.33	0	0	0
Scottish Power (SP)	16.67	37.5	0	0	0
Scottish & Southern Electricity (SSE)	36.36	33.3	0	0	0
Scottish Water (SW)	58.33	0	7.69	5	7.2
THUS	44.44				
Data source - NRSWA Co-ordinator					

3.22 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 3.23 Third Party Claims						
	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Number of claims received	103	182	199	95	144	55
Number of claims settled	21	17	35	16	19	16
Value of settled claims	£2318.41	£8132.74	£9,308	£6,151.18	£4,629.40	£3,926.68
Number of Non-Repudiated 3rd party claims settled in previous 3 years	43	50	73	68	70	51

3.23 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.

3.24 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 so that this can be related to costs so as to demonstrate value.

- 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.
- Consideration should be given to a review of current verge maintenance standards and to increase preventative maintenance activities in general to protect road asset and generate longer term savings.

3.25 Option Summary

A summary of the aforementioned investment options is detailed below.

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 £4.1m Revenue £ 4.2m **	54.4% (51.95%)*	61.72% (59.27%)*	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 £4.1m Revenue £4.2m **	54.4% (51.95%)*	60.45% (58.00%)*	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 £4.2m **	54.4% (51.95%)*	46.50% (44.05%)*	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 £4.1m Revenue £4.2m**	54.4% (51.95%)*	77.09% (74.64%)*	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 Est £8.0m Revenue £4.2m**	54.4% (51.95%)*	54.4% (51.95%)*	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 £4.1m 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 420km. The quantities of footway are based on current available inventory data stored within the pavement management system WDM. 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)
Higher Amenity Footways	41,977	117,536
Other Footways	377,796	755,592
Total	**419,773**	**873,128**

Quantities based on current WDM inventory data.

The council's Footpath (path remote from carriageway) asset is detailed within the Public List of Roads and totals 9.2Km as in Table 4.1b below;

Table 4.1b All Footpath Quantities

Quantity	Length (m)	Area (sqm)
All Footpaths	9,195	11,034
Total	**9,195**	**11,034**

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: 1st April 2015

Classification	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Annualised Depreciation (AD)	Accumulated Depreciation
Footways	£63,268,159	£45,644,857	£800,780	£17,623,302
Footpaths	£781,538	£557,050	£9,900	£224,488
Total	**£64,049,697**	**£46,221,907**	**£810,680**	**£17,847,790**

Data source – WGA valuation spreadsheet 2015

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 4.4.1 below;

Table 4.4.1 Historical Investment in Footway Asset

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Footways (Revenue)	£138,791	£215,907	£186,990	£61,675	£226,263	£187,066	
Footways (Capital)	£25,056	Nil	£144,057	£0 *	£271,265	£81,609	
Cycleways (Capital)	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 2014-15 the investment in the footway asset was as detailed in Table 4.4.2 below;

Table 4.4.2 Previous Years Investment 2014/15

Cost of All Maintenance Work on Footway	Spend (£)	Percentage of Total F/way Spend
Cost of Planned Maintenance	£470,258	97%
Cost of Reactive Maintenance	£13,291	3%
Cost of Routine Maintenance	£nil	0%
Total	**£483,549**	**100 %**

Data Source – WGA / APSE returns

Note - Planned maintenance may include works externally funded on non- adopted cycleways.

4.5 Output

Output from investment during 2014-15 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	**£316k**	
Capital schemes (planned maintenance)	£316k	Various schemes throughout Argyll
Revenue	**£168k**	
	£56k	– Weed Spraying - £56k
	£112k	– Footways/Kerbs & Cycleway Patching - £112k
Data source – Road Operations Manager, R10 Maintenance.		

4.6 Condition

There is currently no footway condition survey undertaken therefore a detailed analysis of the asset 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 £13,291 (3% of total cost) was spent on reactive maintenance in 2014/15.

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 4.8.1 Estimated Steady State Budget					
Asset Inventory (estimated)					
Asset Length		**Average Width**		**Total Area**	
429	Km	2.06	m	883740	Sqm
Unit Rate for surfacing		**Expected Service Life**		**Annual Surfacing Quantity**	
£15.00	Sqm	60	Years	14729	Sqm
Estimated Steady State Budget				Annual Surfacing length	
£220,935				**7.15**	**Km**

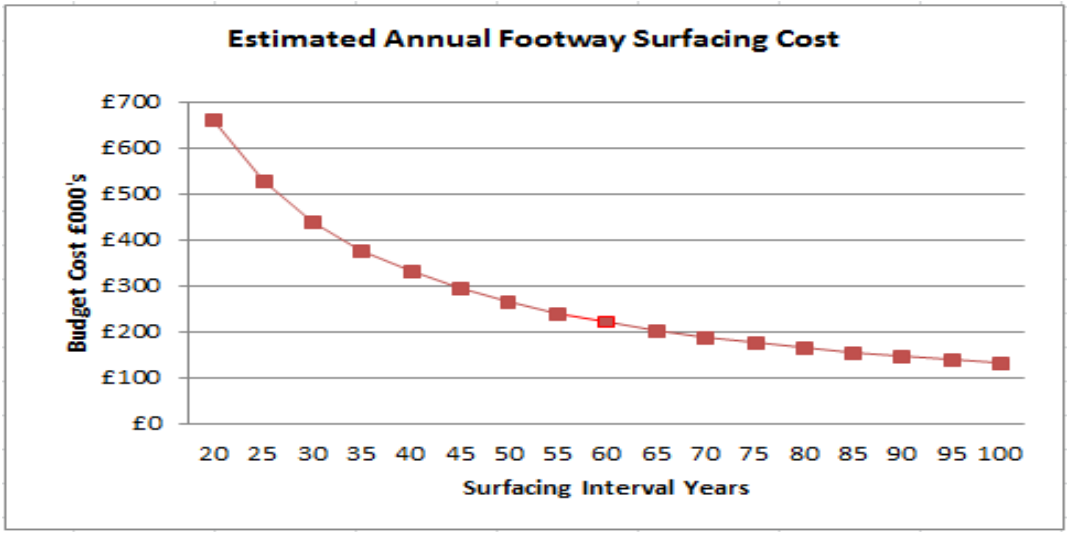


Table 4.8.1b Expected Service Life versus Estimated Annual Budget				
Expected Service Life	**Annual Budget Required**		**Expected Service Life**	**Estimated Annual Budget**
20	£662,805		65	£203,940
25	£530,244		70	£189,373
30	£441,870		75	£176,748
35	£378,746		80	£165,701
40	£331,403		85	£155,954
45	£294,580		90	£147,290
50	£265,122		95	£139,538
55	£241,020		100	£132,561
60	**£220,935**			
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 of the asset should be determined through a programme of detailed inventory collection.
- A suitable condition index used to assess and quantify maintenance needs.
- The existing maintenance hierarchy reviewed to align with the functionality and use of the asset.
- Capturing maintenance cost data to allow accurate financial modelling.

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

4.10 Option Summary

<table>
<tr><td colspan="6">Footways</td></tr>
<tr><td rowspan="2">No.</td><td colspan="2" rowspan="2">Options</td><td colspan="2">Predicted Condition (FCI)</td><td rowspan="2">Comment</td></tr>
<tr><td>Year1 2015</td><td>Year 20 2035</td></tr>
<tr><td></td><td>Description</td><td>Annual Funding</td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>Assumed Steady State (Based on criteria within – Table 4.8.1a)</td><td>Capital £221k
Revenue N/A</td><td rowspan="2">N/A
N/A</td><td rowspan="2">N/A
N/A</td><td>Estimated by officers to be required to replace surfacing on average every 60 years</td></tr>
<tr><td>2</td><td>Current Funding</td><td>Capital £0k
Revenue £96k</td><td>Current Capital funding does not provide any investment in surface renewal.</td></tr>
<tr><td colspan="6">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.</td></tr>
</table>

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					2959
Galvanised Steel					9657
Concrete					45
Aluminium					1087
Fibreglass					6
Cast Iron					
Wood Poles					183
Wall Brackets					
Total					**13937**
Street Lighting Lamp Assets					
Lamp Type	**UMSUG Assessed Circuit Wattage (W)**				**Total**
	0-50W	**50-100W**	**100W-150W**	**150W+**	
SON (High Pressure Sodium vapour)		10596	2847	100	13543
SOX (Low pressure Sodium Vapour)	7	133	6		146
HQI (High Intensity discharge ?)		3			3
MCF	422				422
TUN	65		4		69
PLS	45				45
LED	137	66			203
TOTAL					**14431**
Street Lighting Cable Assets					
Location					**Total (m)**
Carriageway (based on 10% asset length)					41811
Footway (based on 50% asset length)					209055
Verge (based on 40% asset length)					167244
Total (based on estimated 30 Lin m per S/L column)					**418.11 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	£43,367,583	£23,522,721	£19,844,861	£1,061,674
Luminares	£2,163,300	£1,034,040	£1,129,260	£108,165
Illuminated Signs	£212,000	£103,980	£108,020	£8,480
Illuminated Bollards	£13,800	£6,852	£6,948	£552
Total	**£45,756,683**	**£24,667,593**	**£21,089,089**	**£1,178,871**

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	£4,287,087	£171,483	£171,483	£4,115,604
Galvanised Steel	£13,839,419	£7,811,640	£461,314	£6,027,779
Concrete	£35,494	£1,183	£1,183	£34,311
Aluminium (pre 2000)	£860,200	£354,991	£21,505	£505,209
Aluminium (post 2000)	£0	£0	£0	£0
Stainless Steel	£13,440	£12,864	£192	£576
Cast Iron	£0	£0	£0	£0
Cable Assets				
Cable under Carriageway	£2,845,920	£1,778,700	£47,432	£1,067,220
Cable under Footway	£12,722,760	£7,951,725	£212,046	£4,771,035
Cable under Verge	£8,624,000	£5,390,000	£143,733	£3,234,000
Other Street Lighting Assets				
Wall Bracket	£0	£0	£0	£0
Wooden Pole	£139,263	£50,135	£2,785	£89,128
High Mast Column	£0	£0	£0	£0
Control Cabinet	£0	£0	£0	£0
Total	**£43,367,583**	**£23,522,721**	**£1,061,674**	**£19,844,862**

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. It is intended to undertake a condition survey of lighting assets and on completion of same details can be reported in future versions of this report.

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

5.4 Structural Condition

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

5.5 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.

5.6 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.

5.7 Asset Growth

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

5.8 Energy Use and Cost

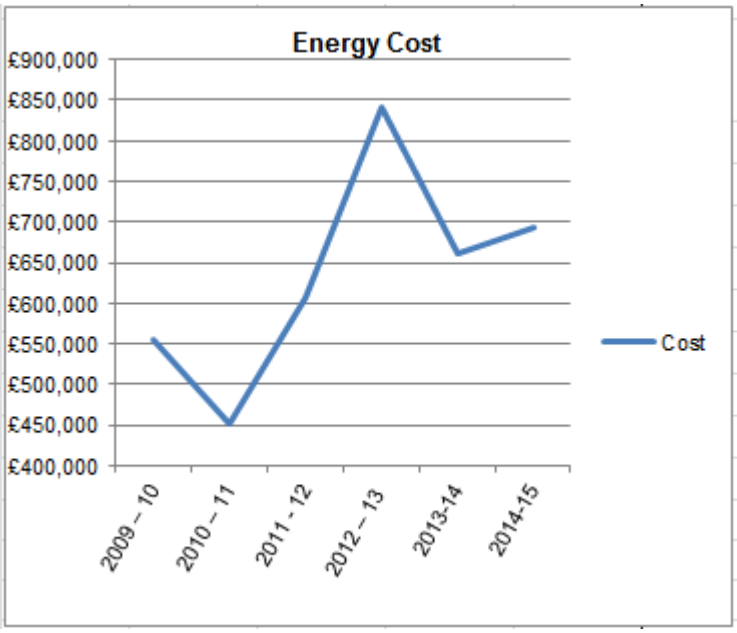
Increasing energy costs are a significant challenge requiring increased investment in low energy components to offset costs. This coupled with a desire to reduce carbon adds greater pressure to invest wisely in asset renewal/replacement.

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.

.

Table 5.8 below details historical energy costs.

Table 5.8 Street Lighting Energy Costs	
Year	**Cost**
2009 – 10	£553,971
2010 – 11	£450,379
2011 - 12	£607,005
2012 – 13	£841,333
2013 - 14	£661,513
2014 – 15	£692,994
Data Source – Finance	



Energy costs in financial year 2014-15 are on a par with previous year but still present a significant challenge and need to be closely monitored to ensure they are kept to a minimum and that available investment is targeted towards reducing annual expenditure.

5.9 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 5.9 below;

	Table 5.9 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 %		9,400	2500/13465 columns
Number of street lighting faults	1999		2800	
Number of Dark lamps reported	1449	1701	2317	
Percentage of dark lamps restored to working condition within 5 days	76%	93%	91.89	

Number of 5th core cable failures requiring replacement.	52	98	114	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	2.48 days	No data

5.10 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 5.10 below;

Table 5.10 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

5.11 Investment in Lighting

5.11.1 Historical investment

Historical investment in lighting has been as shown in the table 5.11.1 below:

Table 5.11.1 Historical investment

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Capital	£585,647	£740,616	£729,376	£532,925	£551,264	£562,800
Revenue	£619,130	£623,624	£815,379	£375,416	£356,724	£387,984

5.11.2 Last Year's investment

During 2014-15 the investment in the street lighting asset was as shown in table 5.11.2 below;

Table 5.11.2 Previous Years Investment 2014/15

Cost of All Maintenance Work on Street Lighting	Spend (£)	Percentage of Total Spend
Planned Maintenance (Capital)	£562800	59%
Reactive Repairs (Revenue)	£306609	32%
Routine Maintenance (Revenue)	£81375	9%
Total	**£950784**	**100%**

Data source – Finance, Street lighting.

* Values include for works on Traffic Signal Asset.

5.12 Output from Investment

The output from investment in during 2014-15 is detailed in Table 5.12 below;

Table 5.11 Output from Investment Table		
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.**		

5.13 Investment Options

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

5.14 Predicted Future Funding Need

Future funding needs can be predicted more accurately as more information on asset inventory, condition, and maintenance costs becomes available. This is a recognised benefit of implementing and practicing an accepted asset management approach.

5.15 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.

5.16 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.

5.17 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 £1.18m</td><td rowspan="3">N/A</td><td rowspan="3">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 £292k</td><td></td></tr>
<tr><td>Revenue £352k</td><td></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	774
	Road over River two or more spans	94
	Footbridge	15 (see note 3)
	Total Number of Bridge Structures	895
Retaining Walls		Approx. length 130 Km or 1556 No.
Culverts		369 [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 collected as available resources permit although there is not expected to be much change year on year. Trunking of A83 Kennecraig to Campbeltown has resulted in a small reduction in the structures inventory.

6.4 Asset Value

The Councils structures assets were valued at April 2015 as detailed within Table 6.4 below;

Table 6.4 Structures Asset Valuation: 1st April 2015

Classification	Gross Replacement Cost (GRC)	Depreciated Replacement Cost (DRC)	Annualised Depreciation (AD)
Total	£560,561,334	N/A	N/A

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	305
Number of general inspections undertaken on time.	SNGIU	303
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	21
Number of privately owned bridges within council's road network that failed assessment (passed 3t assessment)	BSPFA	N/A
Number of council owned / maintained bridges subject to monitoring/special inspection regimes	BSBSI	11

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	11
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 2014/15 are detailed in Table 6.7.1

Table 6.7.1 Bridge Stock Condition Indicator				
Bridge Stock Indicator	**2010/11**	**2011/12**	**2012/13**	**2014/15**
$BSCI_{ave}$	N/A	92	90.75	90.12
$BSCI_{crit}$	N/A	N/A	85.65	85.70

- $BSCI_{ave}$: 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 2014-15 is detailed in Table 6.8 below;

Table 6.8 Output from Investment		
Category		**Output**
Capital	**£338k**	– 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	**£176k**	– 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		– Emergency inspections and works £370,000.
Total Investment	**£514k**	Capital + Revenue
Data source – Design Services		

6.9 Abnormal Loads

Before a large or heavy load can travel on the road, we need to check that there are no problems with the route it proposes to take. These checks include;

- Route proposed
- Date of journey
- Vehicle sizes
- Vehicle weight and axle configuration

The number of enquires relating to abnormal load notifications is detailed in Table 6.9.1 below;

Table 6.9.1 Abnormal Loads			
Description	**2012-13**	**2013-14**	**2014-15**
Number of enquires relating to abnormal loads	391		504
Number of enquiries dealt with within identified response time	391		504

6.10 Specific Issues with Structures Stock

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

6.11 Options

Structures					
No.	**Options**		**Predicted Condition (STCI)**		**Comment**
	Description	**Annual Funding**	**Yr1 2015**	**Year 20** 2035	
1	Current Funding 2014-15	Capital £318k Revenue £212k	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 2015 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	£80,750	£117,250	£10,500
Pedestrian Crossings	11	£253,000	£123,050	£129,950	£12,650
Total	**17**	**£451,000**	**£203,800**	**£247,200**	**£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	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Capital							
Revenue	Nil	£12,000	£26,607	£25,417	£32,640	£147,797	£272,173

Data source – WGA / APSE returns

7.8 Previous Years Investment

During 2014-15 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	£272,173	100%
Reactive Maintenance		
Routine Maintenance		
Total	**£272,173**	**100%**

Data Source – WGA/APSE returns

* Note - Value to be confirmed

7.9 Output From Investment

Table 8.5 Output from Investment (2014/15)

Category		Output
Capital	**£259,125**	
Capital schemes (planned maintenance)	£259,125	Replacement Traffic Signals, Road Accident Reduction Plan (RARP) Schemes, Traffic islands and calming features.
Revenue	**£13,068**	
Planned maintenance	£13,068	

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 £89k</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 £21k</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 – Bus Shelters – Grit Bins – Cattle Grids – Verge Marker Posts – Weather Stations	Sign Poles, Clips, Base Plates, Foundations, other fixings.

The following Street Furniture assets are not included:

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

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)	4,989	Number
Safety Fences	59,643	Length (m)
Pedestrian Barriers	2,841	Length (m)
Bollards	271	Number
Bus Shelters	123	
Grit Bins	584	Number
Cattle Grids	162	Number
Verge Marker Posts	2322	Number
Weather Stations	15	Number
Total	**70950**	

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)	£1,247,250.00	£623,737.50	£62,362.50	£623,512.50
Safety Fences	£5,964,300.00	£2,982,165.00	£298,215.00	£2,982,135.00
Pedestrian Barriers	£284,100.00	£139,214.00	£11,364.00	£144,886.00
Street Name Plates	£0.00	£0.00	£0.00	£0.00
Bins	£0.00	£0.00	£0.00	£0.00
Bollards	£54,200.00	£26,568.00	£2,168.00	£27,632.00
Bus Shelters	£447,966.00	£224,529.30	£22,398.30	£223,436.70
Grit Bins	£116,800.00	£60,386.67	£7,786.67	£56,413.33
Cattle Grids	£1,620,000.00	£794,800.00	£64,800.00	£825,200.00
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	£35,994.00	£4,644.00	£33,666.00
Weather Stations	£172,500.00	£89,125.00	£8,625.00	£83,375.00
Total	**£9,976,776.00**	**£4,976,519.47**	**£482,363.47**	**£5,000,256.53**
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 (2014/15)		
Category		**Output**
Capital	**£ 0K**	
Capital schemes (planned maintenance)		
Revenue	**£97k**	
	£97k	– Cattlegrids - £25,644 – Traffic Signs - £67,345 – Safety Fences - £3,373 – Street Name Plates - £1,162
Total Investment	**£97k**	
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 2014-15 the investment in the street furniture asset was as shown in Table 8.7 below;

Table 8.7 Previous Years Investment 2014/15				
Category of Maintenance Work	**Revenue Spend (£)**	**Capital Spend (£)**	**Total Spend (£)**	**Percentage of Total Spend**
Planned Maintenance	£90,510		£90,510	93%
Reactive Maintenance	£7,186		£7,186	7%
Routine Maintenance	£nil		£nil	0%
Total	**£97,696**		**£97,696**	**100%**
Data source – R10 Road Maintenance / APSE Return / WGA				

In 2014-2015 there was £90,510 investment in planned maintenance/renewal of street furniture assets. This represents 18.7% of the estimated annual depreciation of £482,363 (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.

8.10 Options

Street Furniture					
No.	**Options**		**Predicted Condition (SFCI)**		**Comment**
	Description	**Annual Funding**	**Year1 2015**	**Year 20 2035**	
1	Assumed Steady State	Capital £482k	N/A	N/A	Capital investment based Annual Depreciation Table 8.4 Asset Valuation
		Revenue not known			
2	Current Funding 2015/16	Capital £0k			Capital investment for Traffic management (RARP)
		Revenue £5k			
SFCI – Street Furniture Condition Indicator					