Inverclyde council

AGENDA ITEM NO: 14

Report To:	**Environment and Regeneration Committee**	**Date:**	**12 January 2017**
Report By:	**Corporate Director Environment, Regeneration and Resources**	**Report No:**	**ERC/ENV/ RG/16.298**
Contact Officer:	**Robert Graham**	**Contact No:**	**5910**
Subject:	**Road Asset Management Strategy 2018 - 2023**		

1.0 PURPOSE

1.1 The purpose of this report is to advise the Committee of the development of the Road Asset Management Strategy 2018 – 2023 and to seek approval of the recommendations in 3.0 below.

2.0 SUMMARY

2.1 In 2012 the Council commissioned the production of a Roads Asset Investment Strategy Option Report in order to determine the level of funding required to improve and protect the Council's Roads Asset.

2.2 The report proposed a number of different investment scenarios and included predictions of their effect on the roads network based upon the output from a suite of prediction tools developed through the SCOTS Roads Asset Management Project.

2.3 The Council made the decision to adopt a 5 year investment plan. This resulted in an increased capital investment in the roads assets of £29 million over the 5 year period of 2013/14 to 2017/18.

2.4 The 5 year investment period will come to an end in March 2018 and this document is intended to report on the monies spent within the first 3 years of investment and the effect that this has had upon the roads assets within Inverclyde.

2.5 Attachment 1 looks at the predicted effect of the investment allocated for 2016/17 and 2017/18 and subsequently provides options for future investment for the 5 year period from 2018/19 to 2022/23 that will preserve and/or continue to improve the condition of the roads assets within Inverclyde.

3.0 RECOMMENDATIONS

3.1 That the Committee note the progress and improvement in the roads assets as a result of the investment over the past 3-4 years.

3.2 That the Committee note the options for future investment in roads assets contained within Attachment 1, Roads Asset Management Strategy 2018 – 2023.

3.3 That the Committee note the recommendations in section 6 of Attachment 1 and that option 3 in 6.2 below is adopted as it offers the optimum solution in terms of continuing to improve the condition of the network.

3.4 That the Committee remit consideration of the resultant financial implications to the 2017/18 budget process.

Robert Graham
Head of Environmental and Commercial Services

4.0 BACKGROUND

4.1 In 2012 Inverclyde Council commissioned the production of a Roads Asset Investment Strategy Option report in order to determine the level of funding required to improve and protect the Council's Road Assets.

4.2 The report proposed a number of different investment scenarios and included predictions of their effect on the roads network based upon the output from a suite of prediction tools developed through the SCOTS Roads Asset Management Project.

4.3 The renewal investment scenarios reported within the document were:

1. Continuance of existing spend
2. Maintain a Steady State
3. Reduce the backlog of life expired assets over a 5 year period
4. Reduce the backlog of life expired assets over a 10 year period

4.4 The Council made the decision to adopt a 5 year investment plan based initially upon the first 3 years of option 4 above, which was later increased to a full 5 year investment. This resulted in an increased capital investment in the roads assets of 29 million over the 5 year period of 2013/14 to 2017/18.

4.5 That 5 year investment period will come to an end in March 2018 and this report is intended to demonstrate as a result of the monies spent within the first 3 years of investment the effect that this has had upon the roads assets within Inverclyde. It will predict the effect of the future investment allocated for 2016/17 and 2017/18 and subsequently provide options for the future investment for the 5 year period from 2018/19 to 2022/2023 that will preserve and/or continue to improve the condition of the roads assets within Inverclyde.

5.0 PROGRESS TO DATE

5.1 Carriageways

The carriageway asset is comprised of approx. 369Km of road, the Road Condition Index (RCI) value for Inverclyde, measured using the SRMCS survey machine, has improved from 49% in 2013 to 41% in 2016. Approx. 9% of the Council's roads are now in the poorest (Red) condition, having improved from 12% in 2013.
It is predicted that by the end of the current investment period (2017/18) the RCI will have reduced to approx. 36% and the poorest (Red) condition will have reduced to 6%.

5.2 Footways

The footway asset is comprised of approx. 450Km of pavement. The condition of the footways, measured from sample coarse visual inspection in 2012 showed approx. 20% of the footways exhibiting signs of deterioration where rehabilitation works should be considered. With 5% falling into the poorest (Red) condition where structural maintenance should be considered. It is estimated that these figures have fallen to 15% and 2% respectively by 2016 following the recent increased investment.
It is predicted that by the end of the current investment period (2017/18) the RCI will have reduced to approx. 12% and the poorest (Red) condition will have reduced to 1%.

5.3 Street Lighting

The street lighting asset is comprised of approx. 11,750 lighting columns, 12,300 lanterns (luminaires) and 350Km of buried cable.
The age profile of the lighting columns show approx. 4500 columns and 2400 lanterns that have exceeded their expected service life (ESL).
It is expected that this will have reduced to 3661 columns and 0 luminaires remaining in service having exceeded their ESL by the end of the current investment period (2017/18).

5.4 Structures

Structures assets comprise 79 road bridges, 8 footbridges, 71 culverts, 16 slipways, 25 sea walls, 4 subways and underpasses.
The condition of the structures is measured by the national Bridge Condition Indicator (BClav & BCIcrit).
Retaining walls have been excluded from this investment due to lack of inventory and/or condition information. These will be added to the assets when condition surveys have been completed.
The recent investment has allowed for refurbishment works to be undertaken on 19 structures, which resulted in an outstanding 79 structures requiring refurbishment as of 2016. (It should be noted that an additional 18 structures were added to the list during this period following their scheduled condition inspection).
It is planned to spend an additional capital sum of £600,000 during 2016 – 2018 on 24 structures, which will have the effect of reducing the number of outstanding structures requiring refurbishment works to 55, given that there will be no deterioration in any of the other structures.

5.5 Other Assets

Assets within this group include drainage, traffic signals, verges, road markings, trees, safety barriers, pedestrian guard rail, traffic signs and kerbing.
As yet these assets have not been quantified and assessed however across the board improvements have been carried out where necessary based on officer experience and knowledge of these assets over the past 4 years.

6.0 PROPOSALS AND DELIVERY OPTIONS

6.1 The options contained within Attachment 1 have been derived from a number of deterioration and investment tools developed through the Society of Chief Officers of Transportation in Scotland (SCOTS) asset management project. The methodology and input information used has been agreed by experienced engineers from all 32 local authorities who have, where necessary, developed and agreed the use of estimated information where empirical data is unavailable.

6.2 The models make an assessment based on 20 years funding scenarios however for ease of reference summary options reported in tables 5.1 and 5.2 of attachment 1 deal only with a 5 year period.
The options explored for **all assets** are:

1. Maintain Steady State (£8.1M)
2. £7.5M Total Roads Capital Investment over 5 years
3. £15.0M Total Roads Capital Investment over 5 years
4. £22.5M Total Roads Capital Investment over 5 years
5. Continue to remove the worst condition assets over 5 year period (£18.9M)

6.3 The tools used for this exercise work on a network wide basis do not deal with individual lengths of road, as such although the output suggests a complete removal of red condition assets this is unlikely to be the case in practice and it is likely that there will always be some small element of red condition asset present within the network.

6.4 Inflation in roads construction costs can vary significantly due to the fluctuating price of oil however allowing for an annual 5% inflation will provide a guide to the changes in funding requirements over the coming years.

6.5 Carriageways

Table 0.2 details the outturn figure for the explored options in terms of change in condition and total 5 year investment allowing for 5% annual inflation.
Full year on year details can be found in table 5.1 of attachment 1.

Table 0.2 Carriageway	Predicted 2023 RCI %	Predicted 2023 Red %	Initial Annual Investment	Total 5 year Investment
Maintain Condition	36	6	£942,000	**£5,203,000**
£7.5M Total Roads Investment	37	9	£815,000	**£4,502,000**
£15.0M Total Roads Investment	29	3	£1,629,000	**£9,002,000**
£22.5M Total Roads Investment	12	2	£2,444,000	**£12,176,000**
Continue to Remove Worst Cond'n	22	0	£2,150,000	**£11,882,000**

6.6 Footways

Table 0.4 details the outturn figure for the explored options in terms of change in condition and total 5 year investment allowing for 5% annual inflation.
Full year on year details can be found in table 5.1 of attachment 1.

Table 0.4 Footway	Predicted 2023 3 & 4 Condition %	Predicted 2023 Red 4 Condition %	Initial Annual Investment	Total 5 year Investment
Maintain Condition	12	1	£306,000	**£1,690,000**
£7.5M Total Roads Investment	17	1	£154,000	**£853,000**
£15.0M Total Roads Investment	12	1	£309,000	**£1,709,000**
£22.5M Total Roads Investment	7	1	£564,000	**£2,566,000**
Continue to Remove Backlog	11	0	£439,000	**£2,425,000**

6.7 Street Lighting

Table 0.6 details the outturn figure for the explored options in terms of change in condition and total 5 year investment allowing for 5% annual inflation.
Full year on year details can be found in table 5.1 of attachment 1.

Table 0.6 Lighting	Columns past ESL 2023	Initial Annual Investment	Total 5 year investment
Maintain Condition	3661	£277,000	**£969,000**
£7.5M Total Roads Investment	3619	£195,000	**£1,079,000**
£15.0M Total Roads Investment	2593	£390,000	**£2,157,000**
£22.5M Total Roads Investment	1825	£586,000	**£3,241,000**
Continue to Remove Backlog	0	£1,330,000	**£5,424,000**

Structures

6.8 Table 0.8 details the outturn figure for the explored options in terms of change in condition and total 5 year investment allowing for 5% annual inflation.
Full year on year details can be found in table 5.1 of attachment 1.

Table 0.8 Structures	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	No. of Structures Treated	No. of Structures Remaining	Total 5 Yrs
Maintain Condition	£45,000	£47,000	£50,000	£52,000	£55,000	**15**	**55**	**£249,000**
£7.5M Total Roads Investment	£82,000	£86,000	£91,000	£95,000	£99,000	**19**	**51**	**£454,000**
£15.0M Total Roads Investment	£165,000	£173,000	£183,000	£191,000	£200,000	**45**	**25**	**£912,000**
£22.5M Total Roads Investment	£247,000	£259,000	£272,000	£286,000	£255,000	**70**	**0**	**£1,319,000**
Continue to Remove Backlog	£235,000	£247,000	£259,000	£272,000	£285,000	**70**	**0**	**£1,298,000**

6.9 Other Assets

In depth assessment of the financial needs for the minor asset groups have not been included within this report however following an investigation of spending over the last 4 years and an assessment of required works backlog an allowance has been made for the continued funding of the maintenance of these assets which is described in section 5.0 of Attachment 1 and shown in tables 5.1 and 5.2 as Other Assets. The assets included within this sum are: Drainage, Traffic Signals, Verge, Road Markings, Trees, Pedestrian Guard Rail, Safety Barrier, Traffic Signs & Kerbing.

Table 0.5 Other Assets	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total 5 Yrs
Capital Refurbishment	£190,000	£200,000	£209,000	£220,000	£231,000	**£1,050,000**
Routine Maintenance	£260,000	£273,000	£287,000	£301,000	£316,000	**£1,437,000**

6.10 Design

Although some of the above requirements will need a minimum of design input others, in particular structures, will need detailed design to ensure that they are cost effective, are sustainable and are fit for purpose.

Given the limited design resources within the Service it will be necessary to establish access to specific design resources that can provide the professional support required to deliver this investment within the agreed timescales.

It is estimated that the full procurement process for design resources may take 9 - 12 months to put in place. Where it is necessary to procure engineering design and contract documentation then framework contracts will be used, where they exist, or they will need to be established to provide access to the appropriate professional resources.

6.11 Revenue

It is estimated that the required Routine Revenue Investment which excludes Winter Maintenance, energy costs and feasibility costs is £1,284,000 per annum and that an allowance should be made for inflation. The current comparable maintenance budget stands at £1,123,000 for 2017/18, a shortfall of £161,000 from that recommended. It should be noted that failure to fund the additional revenue budget as outlined

above will have an adverse impact on the rate of improvement in the condition of the network.

6.12 Staffing

Staffing levels were enhanced to ensure delivery of the extensive and sustained programme of work identified in the Roads Asset Investment Strategy 2013/18.

It is essential as part of this review that consideration is given to the staffing resources that will be needed to deliver the Roads Asset Management Strategy 2018/23.

The Head of Environmental and Commercial Services, in consultation with the Head of Organisational Development, HR & Communications and the Chief Financial Officer, will review the necessary staffing resources needed to deliver the projects and, subject to the agreed funding model, will make adjustments to these as appropriate.

7.0 IMPLICATIONS

7.1 **Finance**

Financial Implications:

One off Costs

Cost Centre	Budget Heading	Budget Years	Proposed Spend this Report £000	Virement From	Other Comments
Roads Capital	RAMS	2018/19 2019/20 2020/21 2021/22 2022/23	2,683 2,819 2,959 3,107 3,262		Roads Capital currently receives £1.4m recurring annual allocation from General Capital Grant. Any allocation over & above this will require to be funded and will be addressed through the 2017/18 Budget process

Annually Recurring Costs/ (Savings)

Cost Centre	Budget Heading	With Effect from	Annual Net Impact £000	Virement From (If Applicable)	Other Comments
Roads Revenue	Routine Maintenance	2018/19	1,284		Required increase (£161k) in Roads routine maintenance budget associated with the Roads Asset Management Strategy. The shortfall will require to be considered as part of the 2018/19 budget process

8.0 CONSULTATIONS

8.1 The Head of Legal and Property Services has been consulted with regard to the content of this report.

8.2 The Chief Financial Officer has been consulted on this report.

8.3 The Head of Organisational Development, HR and Communications has been consulted on this report.

Inverclyde council

ROADS ASSET MANAGEMENT STRATEGY 2018-2023




Road Asset Management Strategy 2018-2023

Status and Options Report

Contents

Executive Summary **4**
Financial Need Projections 4
Carriageways 5
Footways 6
Street Lighting 8
Structures 9
Other Assets 11
Assets Not Included 11
Recommendations 12

1 Introduction **14**

2 Asset Status **14**
2.1 Carriageway 14
2.1.1 Size of the Asset 14
2.1.2 Capital Investment and Condition 15
2.1.3 Routine Maintenance Investment 16
2.2 Footway 16
2.2.1 Size of the Asset 16
2.2.2 Capital Investment and Condition 17
2.2.3 Routine Maintenance Investment 17
2.3 Street Lighting 17
2.3.1 Size of the Asset 17
2.3.2 Capital Investment and Condition 18
2.3.3 Energy Usage 19
2.3.4 Routine Maintenance Investment 20
2.4 Roads Structures 20
2.4.1 Size of the Asset 20
2.4.2 Capital Investment & Condition 21
2.4.3 Routine Maintenance Investment 22
2.5 Other Assets 22

3 Investment Options **23**
3.1 Carriageway 23
3.1.1 Treatment Options and costs 23
3.1.2 Treatment Lifecycles 23
3.1.3 Condition 24

3.1.4 Treatment Efficiency 25
3.1.5 Routine Reactive and Cyclic Maintenance 25
3.1.6 Renewal Investment Scenarios 25
3.1.6.1 Maintain Steady State 26
3.1.6.2 £4.5M Capital Investment Over 5 Years 27
3.1.6.3 £9.0M Capital Investment over a 5 year period 27
3.1.6.4 £13.5M Capital Investment over a 5 year period 28
3.1.6.5 Continuance of Investment In Order to Remove Backlog of Worst Condition Roads 29
3.1.7 Backlog Removal 30
3.2 Footways 31
3.2.1 Treatment Options, Lifecycles & Costs 31
3.2.2 Footway Areas 33
3.2.3 Condition 33
3.2.4 Deterioration Prediction 34
3.2.5 Routine Reactive and Cyclic Maintenance 35
3.2.6 Budget Vs Condition Scenarios 35
3.2.6.1 Maintain Steady State 35
3.2.6.2 £850,000 Capital Investment over a 5 year period 36
3.2.6.3 £1,700,000 Capital Investment over a 5 year period 37
3.2.6.4 £2,560,000 Capital Investment over a 5 year period 37
3.2.6.5 Continuance of investment in order to reduce backlog of worst condition 38
3.3 Street Lighting 40
3.3.1 Size of the Asset 40
3.3.2 Apparatus Lifecycles 40
3.3.3 Replacement Costs 40
3.3.4 Annual Replacement Investment Requirement 42
3.3.5 Routine Reactive and Cyclic Maintenance 43
3.3.6 Current Condition / Age Profile 43
3.3.7 Budget Vs Condition Scenarios 44
3.3.7.1 Maintain Steady State 45
3.3.7.2 £1,080,000 Capital Investment over a 5 Year Period 46
3.3.7.3 £2,160,000 Capital Investment over a 5 Year Period 47
3.3.7.4 £3,240,000 Capital Investment over a 5 Year Period 47
3.3.7.5 Continue to Remove the Life Expired Assets over a 5 Year Period 48
3.4 Road Structures Assets 50
3.4.1 SCOTS Road Structures Prioritisation Project 50
3.4.2 Routine, Reactive and Cyclic Maintenance 51
3.4.3 Strengthening / Major Refurbishment Works 52
3.4.4 Investment Options 53
3.4.4.1 Maintain Steady State 54
3.4.4.2 6.1% of a £7.5M Capital Investment over a 5 year Period 54
3.4.4.3 6.1% of a £15.0M Capital Investment over a 5 year Period 54
3.4.4.4 6.1% of a £22.5M Capital Investment over a 5 year Period 55
3.4.4.5 Remove the “Backlog” of outstanding schemes over a 5 year Period 56

4 Other Assets 56

4.1 Assets Included 56
4.2 Basis of Estimate 57
4.3 Estimated Annual Investment Requirements 57

5 Option Summary 57
5.1 Chosen Options for Renewals Investment 57

6 Recommendations 60

Appendix A - Basis of Financial Need Projections 62

Executive Summary

In 2012 Inverclyde Council commissioned the production of a Roads Asset Investment Strategy Option Report in order to determine the level of funding required to improve and protect their Road Assets.

The report proposed a number of different investment scenarios and included predictions of their effect on the highway network based upon the output from a suite of prediction tools developed through the SCOTS Roads Asset Management Project.

The Council made the decision to adopt a 5 year investment plan. This resulted in an increased capital investment in the roads assets of £29 million over the 5 year period of 2013/14 to 2017/18.

That five year investment period will come to an end in March 2018 and this document is intended to report on the monies spent within the first 3 years of investment and the effect that this has had upon the roads assets within Inverclyde

It goes on to look at the predicted effect of the investment allocated for 2015/16 and 2017/18 and subsequently provide options for future investment for the 5 year period from 2018/19 to 2022/23 that will preserve and/or continue to improve the condition of the roads assets within Inverclyde..

Financial Need Projections

A long term cost projection is a key output from asset management planning.

The options contained within this report have been derived from a number of deterioration and investment tools developed through the Society of Chief Officers of Transportation in Scotland (SCOTS) asset management project. The methodology and input information used has been agreed by experienced engineers from all 32 local authorities, who have where necessary, developed and agreed the use of estimated information where empirical data is unavailable.

The models make an assessment based on 20 year funding scenarios however for ease of reference summary options reported in tables 5.1 and 5.2 deal only with a 5 year period. The options explored for **all assets** are:

1. Maintain Steady State (£9.1M)
2. £7.5M Total Roads Capital Investment over 5 Years
3. £15.0M Total Roads Capital Investment over 5 Years
4. £22.5M Total Roads Capital Investment over 5 Years
5. Continue to remove the worst condition assets over a 5 year period (£21.5M)

It should be borne in mind that the tools used for this exercise work on a network wide basis and do not deal to individual lengths of the road, as such although the output suggests a complete

removal of red condition assets this is unlikely to be case in practice and it is likely that there will always be some small elements of red condition asset present within the network.

Inflation in road construction costs can vary significantly due to the fluctuating price of oil however allowing for an annual 5.0% inflation will provide a guide to the changes in funding requirements over the coming years.

Carriageways

The Inverclyde Council carriageway asset is comprised of approximately 369Km of road, the Road Condition Index (RCI) value for Inverclyde, measured using the SRMCS survey machine, has improved from 49% in 2013 to 41% in 2016 of the roads where more detailed monitoring or investigation is required. Approximately 9% of the Council's roads are now in the worst (Red) condition, having improved from 12% in 2013.

Table 0.1 shows the change in carriageway condition for the monies invested since 2013 and the predicted condition at the end of the investment period (2018)

Table 0.1 Carriageway	Carriageway Spend / Budget	Actual / Predicted RCI %	Actual / Predicted Red %
2012/13	£1,220,000	49.2	12.7
2013/14	£2,977.000	46.3	10.8
2014/15	£3,654,000	43.1	10.1
2015/16	£4,111,000	40.5	8.6
2016/17	£3,349,000	36.9	6.7
2017/18	£2,100,000	35.7	5.8

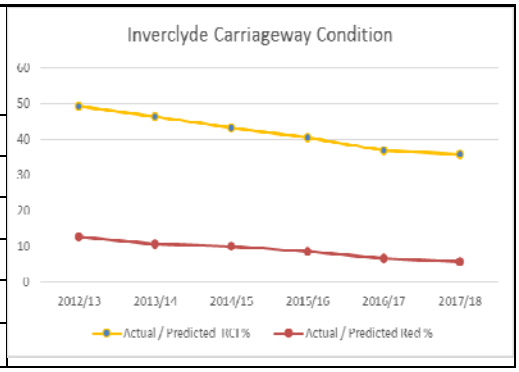
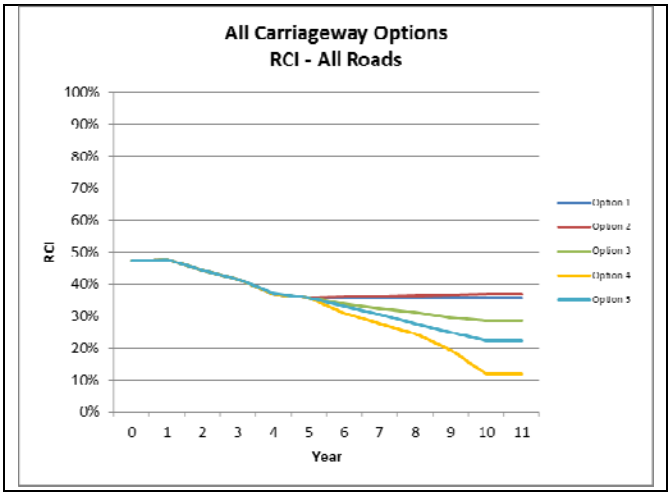
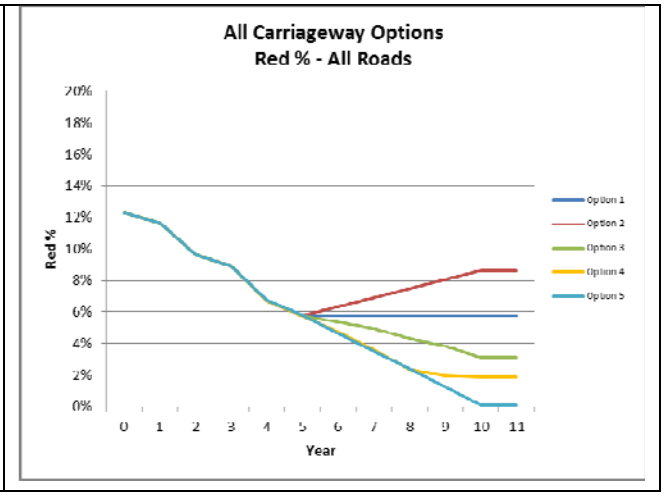


Table 0.2 details the outturn figures for the explored options in terms of change in condition and total 5 year investment allowing for 5% annual inflation. Full year on year details can be found in table 5.1.

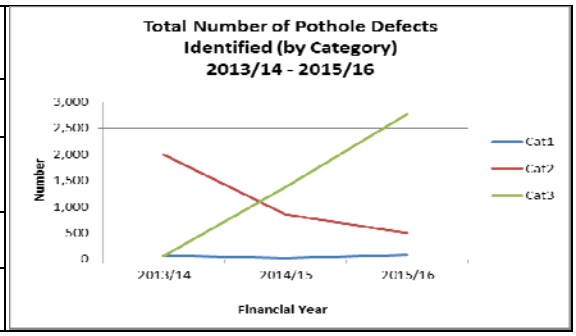
Table 0.2 Carriageway	Predicted 2023 RCI %	Predicted 2023 Red %	Initial Annual Investment	Total 5 year Investment
Maintain Condition	36	6	£942,000	**£5,203,000**
£7.5M Total Roads Investment	37	9	£815,000	**£4,502,000**
£15.0M Total Roads Investment	29	3	£1,629,000	**£9,0002,000**
£22.5M Total Roads Investment	12	2	£2,444,000	**£12,176,000**
Continue to Remove Worst Cond'n	22	0	£2,150,000	**£11,882,000**





Routine maintenance spend has averaged approximately £635,000 per year approximately £129,000 of which has been provided from earmarked reserves. This resulted in the following repairs being completed.

Routine Maintenance Repairs Completed				
Year	Cat1	Cat2	Cat3	Total
2013/14	76	1996	60	1885
2014/15	29	850	1370	2280
2015/16	77	503	2767	3332



Of most significance is the reduction in category 2 repairs due to a better overall network condition and the increase in category 3 repairs that previously may have been omitted due to lack of available funding. The increase in category 3 repairs also follows the introduction of the new road safety inspection guidance.

Ongoing revenue investment requirement for carriageways is estimated at £635,000 p.a.

Footways

The Inverclyde Council footway asset is comprised of approximately 450km of pavement. The condition of the footways, measured from sample coarse visual inspection in 2012, showed approximately 20% of the footways exhibiting signs of deterioration where rehabilitation works should be considered. With 5% falling into the worst (Red) condition where structural maintenance should be considered. It is estimated that these figures have fallen to 15% and 2% respectively in 2016 following the recent increased investment.

Table 0.3 shows the estimated change in footway condition for the monies invested since 2013 and the predicted condition at the end of the investment period (2018)

Table 0.3 Footway	Footway Spend / Budget	Condition 3 & 4 Amber and Red %	Condition 4 Red %
2013/14	£303,000	21	4.3
2014/15	£308,000	22	3.6
2015/16	£673,000	21	1.6
2016/17	£884,000	18	1.0
2017/18	£1,141,000	12	1.0

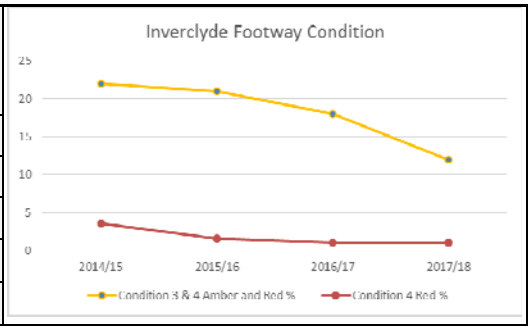
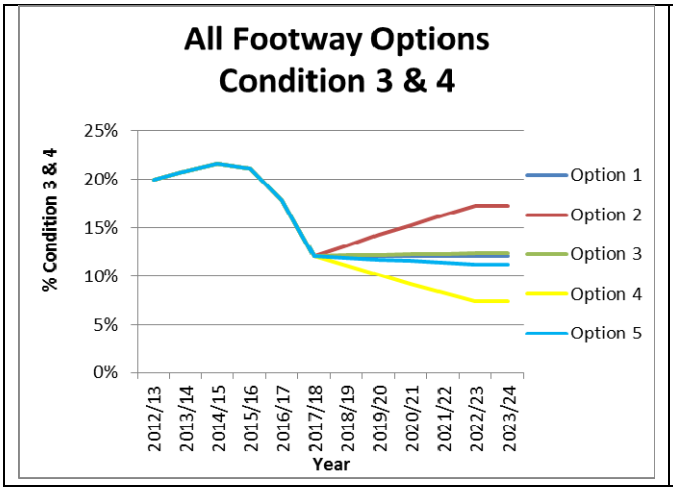
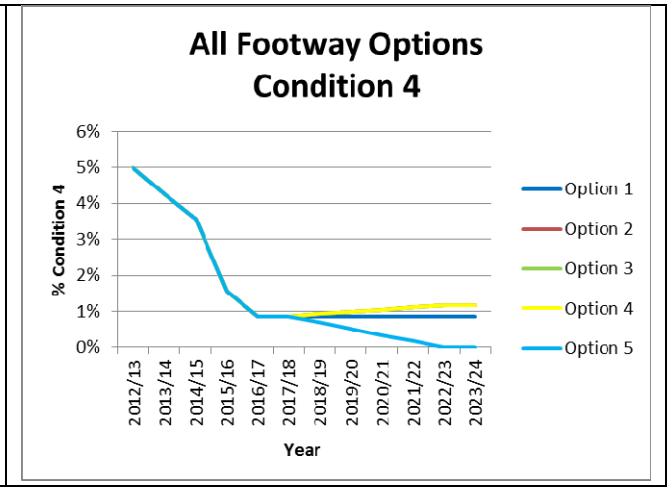


Table 0.4 details the outturn figures for the explored options in terms of change in condition and total 5 year investment allowing for 5% annual inflation. Full year on year details can be found in table 5.1.

Table 0.4 Footway	Predicted 2023 3 & 4 Condition %	Predicted 2023 Red 4 Condition %	Initial Annual Investment	Total 5 year Investment
Maintain Condition	12	1	£306,000	**£1,690,000**
£7.5M Total Roads Investment	17	1	£154,000	**£853,000**
£15.0M Total Roads Investment	12	1	£309,000	**£1,709,000**
£22.5M Total Roads Investment	7	1	£564,000	**£2,566,000**
Continue to Remove Backlog	11	0	£439,000	**£2,425,000**





The on-going routine (cyclic and reactive) maintenance required to keep the footways in a safe condition has resulted in an average spend of £10,000 p.a. with an additional £2,500 form earmarked reserves over the last 4 years. However it should be borne in mind that footway repairs are often included within the carriageway repair budget.

Street Lighting

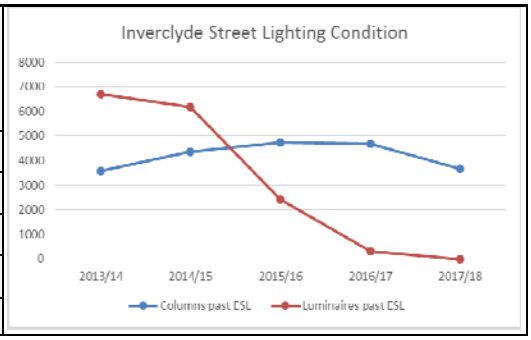
The Inverclyde Council street lighting asset is comprised of approximately 11,750 lighting columns, 12,300 lanterns (luminaires) and 350Km of buried cable. The age profile of the lighting columns show approximately 4500 columns and 2400 lanterns that have exceeded their expected service life.

It is expected that this will have reduced to 3661 columns and 0 luminaires remaining in service having exceeded their expected service life by the end of the current investment period (2018)

This investment will also enable the replacement of all high energy lanterns with low energy lanterns in order to reduce energy usage and carbon emissions.
This has reduced the amount of annual energy being expended on street lighting assets by over 1 million kilowatt hours and reduced the annual cost of energy by £70,000.

Table 0.5 shows the change in street lighting condition for the monies invested since 2013 and the predicted condition at the end of the investment period (2018)

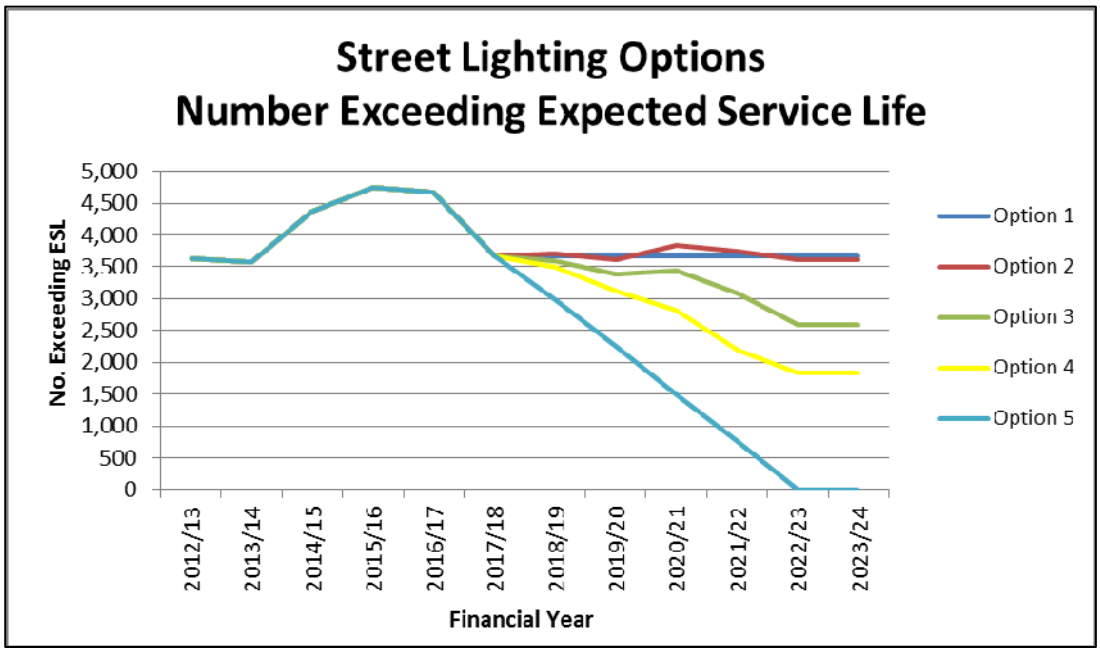
Table 0.5 Street Lighting	Street Lighting Spend / Budget	Columns past ESL	Luminaires past ESL
2013/14	£113,000	3570	6707
2014/15	£266,000	4372	6184
2015/16	£890,000	4743	2419
2016/17	£1,000,000	4679	311
2017/18	£1,910,000	3661	0



The renewal investment scenarios for the lighting assets focus on reducing the number of aged lighting columns rather than making any additional changes to the lanterns.

Table 0.6 details the outturn figures for the explored options with an allowance for 5% annual inflation over a 5 year period. Full year on year details can be found in table 5.1.

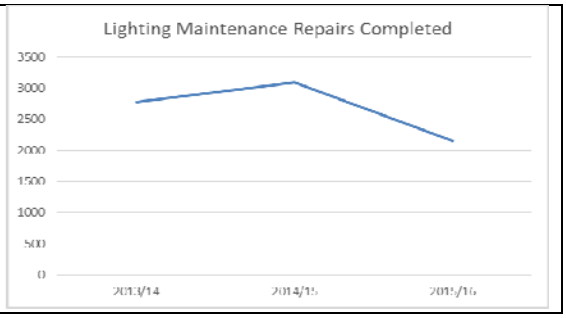
Table 0.6 Lighting	Columns past ESL 2023	Initial Annual Investment	Total 5 year investment
Maintain Condition	3661	£277,000	**£969,000**
£7.5M Total Roads Investment	3619	£195,000	**£1,079,000**
£15.0M Total Roads Investment	2593	£390,000	**£2,157,000**
£22.5M Total Roads Investment	1825	£586,000	**£3,241,000**
Continue to Remove Backlog	0	£1,330,000	**£5,424,000**



Average investment for the on-going routine (cyclic and reactive) maintenance required to keep the lighting asset in a safe condition is approximately £360,000 p.a. Along with a substantial amount for energy costs (£400,000).

The amount of repairs undertaken for the money invested is detailed below

Routine Maintenance Repairs Completed			
Year	Lights	TM	Total
2013/14	2703	75	2778
2014/15	3040	56	3096
2015/16	2100	50	2150



It is to be expected that with the introduction of LED lighting maintenance visits and costs will reduce.

The lit signs & bollards assets have not been included within this report, additional work is required to assess the renewal funding requirements for these assets.

Structures

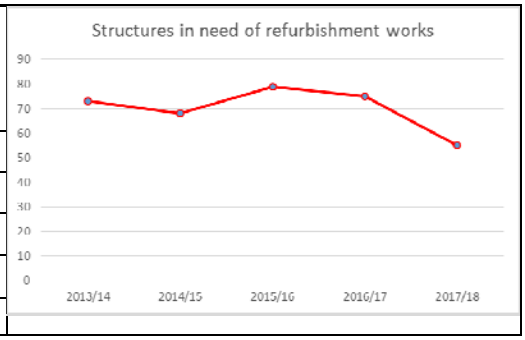
The Inverclyde Council structures asset is comprised of 79 road bridges, 8 footbridges, 71 culverts, 16 slipways and 25 Sea Walls and 4 subways and underpasses. The condition of the structures is measured by the national Bridge Condition Indicator (BCIav & BCIcrit).

The recent investment has allowed for refurbishment works to be undertaken on 12 structures, which resulted in an outstanding 79 structures requiring refurbishment as of March 2016. (It should be noted that an additional 18 structures were added to the list during this period following their scheduled condition inspection). The investment has also allowed works to be undertaken on 7 structures that are not included in the RAMP, the works included replacement of cattle grids, strengthening of retaining walls and the installation of road restraint systems.

Retaining walls and slipways have been excluded from this investment report due to lack of inventory and/or condition information.

It is planned to spend an additional £600,000 on structures capital works during the period 2016 – 2018 on 24 structures, which will have the effect of reducing the number of outstanding structures requiring refurbishment works to 55 given that there will be no deterioration in any of the other structures. Table 0.7 shows the change in structures condition for the monies invested since 2013 and the predicted condition at the end of the investment period (2018)

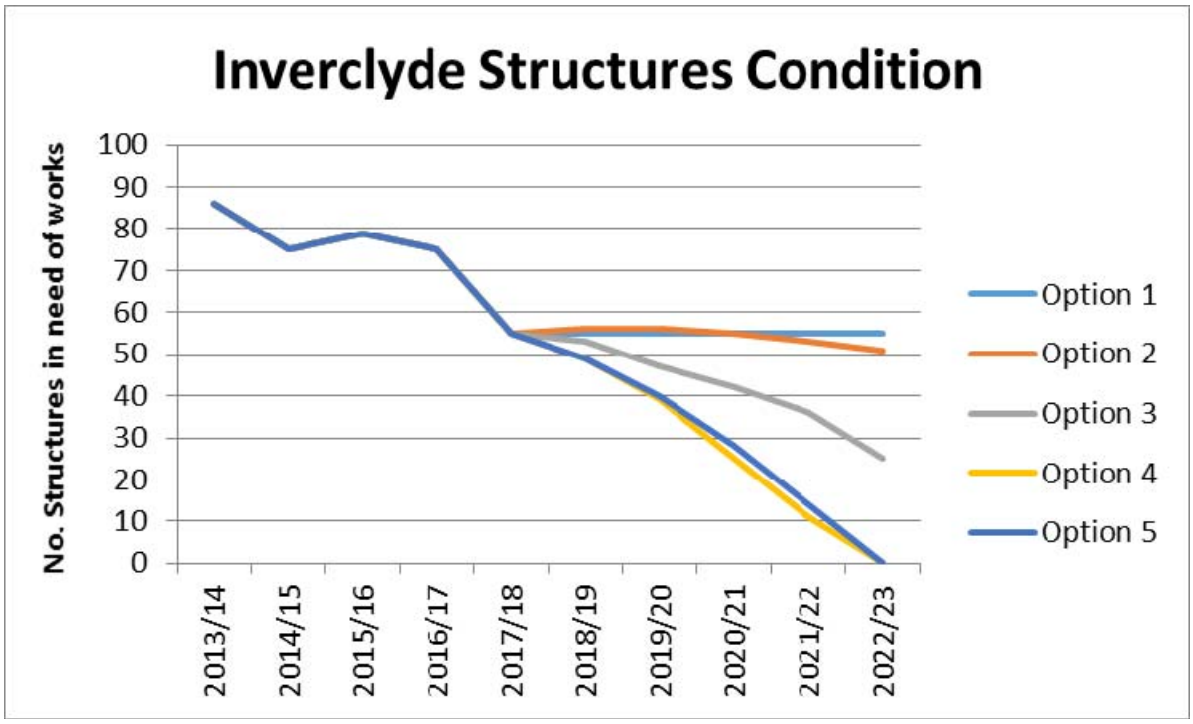
Table 0.7 Structures	Structures Spend / Budget	Structures in need of refurbishment
2013/14	£10,000	73
2014/15	£505,000	68
2015/16	£192,000	79
2016/17	£100,000	75
2017/18	£500,000	55



The tool additionally has been used to identify the on-going routine (cyclic and reactive) maintenance required to keep the structures in a safe condition.

Table 0.8 details the outturn figures for the assessed options with an allowance for 5% annual inflation over a 5 year period. Full year on year details can be found in table 5.1. (N.B. An allowance has been made for an additional 3 structures per year to have deteriorated into a condition that requires refurbishment works.)

Table 0.8 Structures	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	No. of Structures Treated	No. of Structures Remaining	Total 5 Yrs
Maintain Condition	£45,000	£47,000	£50,000	£52,000	£55,000	**15**	**55**	**£249,000**
£7.5M Total Roads Investment	£82,000	£86,000	£91,000	£95,000	£99,000	**19**	**51**	**£454,000**
£15.0M Total Roads Investment	£165,000	£173,000	£183,000	£191,000	£200,000	**45**	**25**	**£912,000**
£22.5M Total Roads Investment	£247,000	£259,000	£272,000	£286,000	£255,000	**70**	**0**	**£1,319,000**
Continue to Remove Backlog	£235,000	£247,000	£259,000	£272,000	£285,000	**70**	**0**	**£1,298,000**



Inverclyde routine maintenance costs for structures over the last 4 years averages approximately £10,000 per annum.

Other Assets

In depth assessment of the financial needs for the minor asset groups have not been included within this report however following an investigation of spending over the last 4 years and an assessment of required works backlog an allowance has been made for the continued funding of the maintenance of these assets which is described in section 5.0 and shown in tables 5.1 and 5.2 as Other Assets. The assets included within this sum are: Drainage, Traffic Signals, Verge, Road Markings, Trees, Pedestrian Guard Rail, Safety Barrier, Traffic Signs & Kerbing.

Table 0.5 Other Assets	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total 5 Yrs
Capital Refurbishment	£190,000	£200,000	£209,000	£220,000	£231,000	**£1,050,000**
Routine Maintenance Other Assets	£211,000	£221,550	£232,628	£244,259	£256,472	£1,165,908
Earmarked Reserves (Drainage)	*£56,000*	*£58,800*	*£61,740*	*£64,827*	*£68,068*	*£309,435*
Grand Total (RM)	£267,000	£280,350	£294,368	£309,086	£324,540	£1,475,344

Assets Not Included

There are a number of road assets not included within this report due to a lack of inventory and /or condition information the table below details those assets and the predicted timescale over which it is intended that the required information will be collected and analysed.

Table 0.6 Road Assets Not Included in this Report		
Asset	**Action Required**	**Timescale**
Retaining Walls	Identify all Retaining walls and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	12 Months
Slipways	Identify all slipways and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	24 Months
Illuminated Signs & Bollards	Assess the maintenance requirements of the illuminated signs and bollards asset using an appropriate analysis tool.	6 Months

There are also a number of council owned assets that have not been included as they do not form part of the highway asset these include.

Table 0.7 Other Assets Not Included in this Report		
Asset	**Action Required**	**Timescale**
Council owned roads and pavements within parks and cemeteries etc.	Identify all roads & pavements and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	12 Months
Other un-adopted roads	Identify all un-adopted roads and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	24 Months
Privately owned structures	Identify all structures and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	24 Months
Privately owned or community council owned lighting equipment	Identify all public lighting equipment and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	24 Months

Recommendations

The report puts forward a number of differing funding options and details the impact on the assets subject to the level of funding and the associated timescale of each.

The investment needed for the major assets looked at five options; 1. Maintain the Current Condition (Steady state); 2. A percentage of a proposed £7.5M 5 year overall roads budget; 3. A

percentage of a proposed £15.0M 5 year overall roads budget; 4. A percentage of a proposed £22.5M 5 year overall roads budget; 5. Continue to reduce the backlog over a 5 year period.

It is recommended that option 3 in table 5.1 be adopted as it offers the optimum solution in terms of continuing to improve the condition of the network whilst also reducing the amount of capital investment from current levels. Although not fully meeting the original goals of the 10 year investment plan the improved condition is substantial and will make ongoing maintenance achievable within realistic budgets.

1 Introduction

In 2012 Inverclyde Council commissioned the production of a Roads Asset Investment Strategy Option Report in order to determine the level of funding required to improve and protect their Road Assets.

The report proposed a number of different investment scenarios and included predictions of their effect on the highway network based upon the output from a suite of prediction tools developed through the SCOTS Roads Asset Management Project.

The renewal investment scenarios reported within the document were:

1. Continuance of existing spend
2. Maintain Steady State
3. Reduce the backlog of life expired assets over a 5 year period
4. Reduce the backlog of life expired assets over a 10 year period

The Council made the decision to adopt a 5 year investment plan based initially upon the first 3 years of option 4, which was later increased to a full 5 year investment. This resulted in an increased capital investment in the roads assets of £29 million over the 5 year period of 2013/14 to 2017/18.

That five year investment period will come to an end in March 2018 and this document is intended to report on the monies spent within the first 3 years of investment and the effect that this has had upon the roads assets within Inverclyde. It will go on to look at the predicted effect of the investment allocated for 2015/16 and 2017/18 and subsequently provide options for future investment for the 5 year period from 2018/19 to 2022/23 that will preserve and/or continue to improve the condition of the roads assets within Inverclyde.

2 Asset Status

2.1 Carriageway

2.1.1 Size of the Asset

The carriageway asset within Inverclyde is comprised of 286Km of Urban roads and 83Km of rural roads.

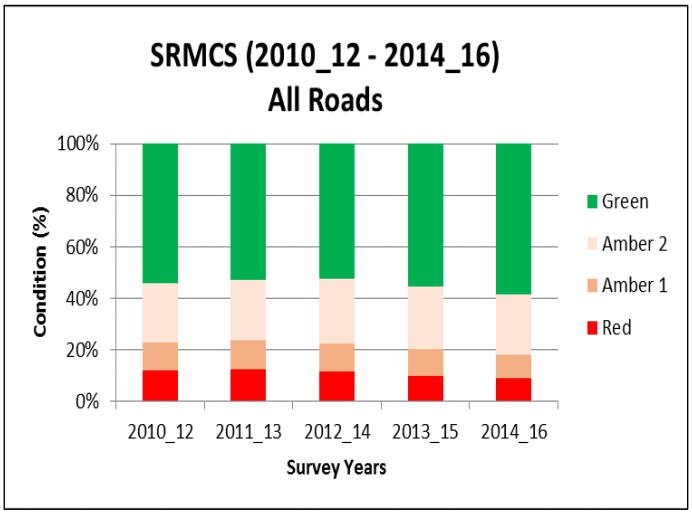
Using the known length and estimated width information it has been possible to determine the areas of carriageway for each of the different road categories (Table 2.1).

Table 2.1 Carriageway Area Within Inverclyde				
Category	U-R	Length (m)	Width (m)	Area (sqm)
Principal (A) Roads (cat 2)	Urban	14300	7.5	107250
	Rural	9200	6.8	62560
Classified (B) Roads (cat 3a)	Urban	6000	7	42000
	Rural	16700	5.2	86840
Classified (C) Roads (cat 3b)	Urban	26700	6.8	181560
	Rural	27300	4.3	117390
Unclassified Roads (cat 4a & 4b)	Urban	238600	5.8	1383880
	Rural	29800	3.5	104300

The asset has increased in size by 1.6Km in the last 3 years due to adoption of new assets all of which are unclassified urban roads.

2.1.2 Capital Investment and Condition

2013/14	2014/15	2015/16	2016/17	2017/18
£2,977,000	£3,654,000	£4,111,000	£3,349,000	*£2,100,000*



Over the first 3 years of the increased investment period Inverclyde Council spent £10,742,000 on carriageway capital works. This allowed approximately 524,400 m^2 of works to be undertaken, which resulted in the condition of the roads improving from an RCI (Road Condition Index - roads where works should be considered) of 49.2% to 40.5% and a change in red condition (worst condition roads) from 12.7% to 8.6% of the network.

It is planned to spend an additional £5,409,612 on carriageway capital works during the period 2016 – 2018, which is predicted to have the effect of improving the road condition further to an RCI of approximately 35.7% and reducing the overall red percentage to 5.8%.

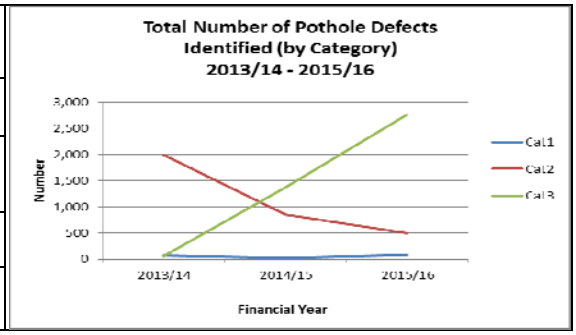
2.1.3 Routine Maintenance Investment

IC routine carriageway investment over the last 4 years is detailed below

Routine Maintenance Spend £	2012/13	2013/14	2014/15	2015/16	Ave
carriageway potholes	425,000	490,000	447,000	455,000	£454,250
emergency repairs	57,000	65,000	57,000	30,000	£52,250
earmarked reserves	186,000	27,000	197,000	106,000	£129,000
Carriageway Total	**£668,000**	**£582,000**	**£701,000**	**£591,000**	**£635,500**

This resulted in the following amount of repairs being undertaken

Routine Maintenance Repairs Completed				
Year	Cat1	Cat2	Cat3	Total
2013/14	76	1996	60	1885
2014/15	29	850	1370	2280
2015/16	77	503	2767	3332



Of most significance is the reduction in category 2 repairs due to a better overall network condition and the increase in category 3 repairs that previously may have been omitted due to lack of available funding. The increase in category 3 repairs also follows the introduction of the new road safety inspection guidance. The ongoing routine maintenance investment requirement is estimated at £455,000 p.a.

2.2 Footway

2.2.1 Size of the Asset

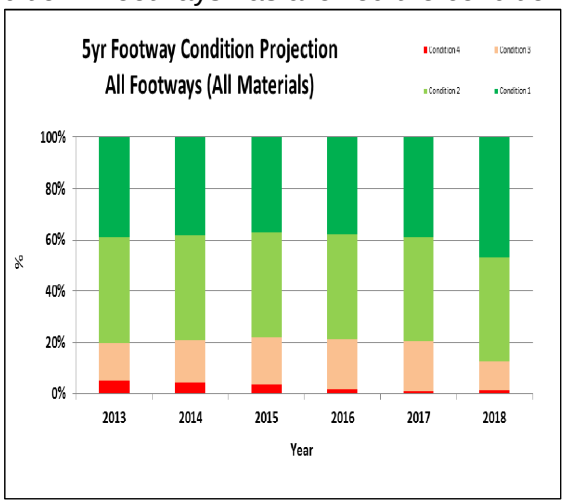
The footway network in Inverclyde consists of approximately 450 Km of differing hierarchy and material. Approximately 75% of which is bituminous construction, 24% is Pre-cast concrete slab with minor areas of Concrete and PC blocks.

Table 2.2 Footway Areas by material			
	Length of Footway (m)	Average Width (m)	Total Area of Footway (sqm)
Bituminous	385034	2.2	847074.8
PCC Slabs	49681	2.2	109298.2
Stone	0	0	0
Concrete	1070	2.2	2354
PCC Blocks	14909	2.2	32799.8

2.2.2 Capital Investment and Condition

2013/14	2014/15	2015/16	2016/17	2017/18
£303,000	£308,436	£672,806	*£884,000*	*£1,141,000*

Over the first 3 years of the increased investment period Inverclyde Council spent £1,285,000 on footway capital works. This allowed approximately 28,927 m^2 of works to be undertaken, which it is estimated resulted in the condition of the footways reducing from 5% in condition 4 (footways requiring works) to an estimated 2%. It is however predicted that the works undertaken focussing primarily on condition 4 footways has allowed the condition 3 footways (those where preventative maintenance works should be considered) to deteriorate from an estimated 15% to 19.5%.



It is planned to spend an additional £2,025,000 on footway capital works during the period 2016 – 2018, which is predicted to have the effect of reducing the condition 4 footways to less than 1% and reducing the condition 3 footways to 11.5% of the network.

2.2.3 Routine Maintenance Investment

IC routine footway maintenance investment over the last 4 years is detailed below

Routine Maintenance Spend £	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**Ave**
Footway repair	15,000	15,000	0	0	£7,500
earmarked reserves	1,000	9,000	0	0	£2,500
fway Total	**£16,000**	**£24,000**	**£0**	**£0**	**£10,000**

In 2014/15 and 2015/16 repairs to the footway were undertaken using the carriageway budget and thus exact figures are unavailable. Likewise outturn figures on the amount of works undertaken are also unavailable at this time.

2.3 Street Lighting

2.3.1 Size of the Asset

The Street Lighting asset in Inverclyde consists of 11,746 columns of differing height and material and 196 wall brackets carrying 12,292 lanterns of differing type and wattage.

Column Material	Height (m)	Supply	Col Nos.
Non Galvanised Steel	5	Private Supply	31
		DNO Supply	24
	6	Private Supply	932
		DNO Supply	1,029
	8	Private Supply	95
		DNO Supply	347
	10	Private Supply	203
		DNO Supply	95
Galvanised Steel	5	Private Supply	109
		DNO Supply	40
	6	Private Supply	3,244
		DNO Supply	975
	8	Private Supply	1,306
		DNO Supply	126
	10	Private Supply	1,305
		DNO Supply	245
Concrete	6	Private Supply	20
		DNO Supply	846
	8	Private Supply	159
		DNO Supply	2
	12	Private Supply	3
		DNO Supply	0
	10	Private Supply	306
		DNO Supply	56
Aluminium	6	Private Supply	22
		DNO Supply	0
	10	Private Supply	6
		DNO Supply	0
Stainless Steel	8	Private Supply	220
		DNO Supply	0

In addition there is approximately 339 Km of cabling and 537 control cabinets.

2.3.2 Capital Investment and Condition

Street Lighting	2013/14	2014/15	2015/16	2016/17	2017/18
Columns	£61,000	£180,000	£360,000	*£493,000*	*£1,403,000*
Luminaires	£52,000	£86,000	£530,000	*£508,000*	*£508,000*

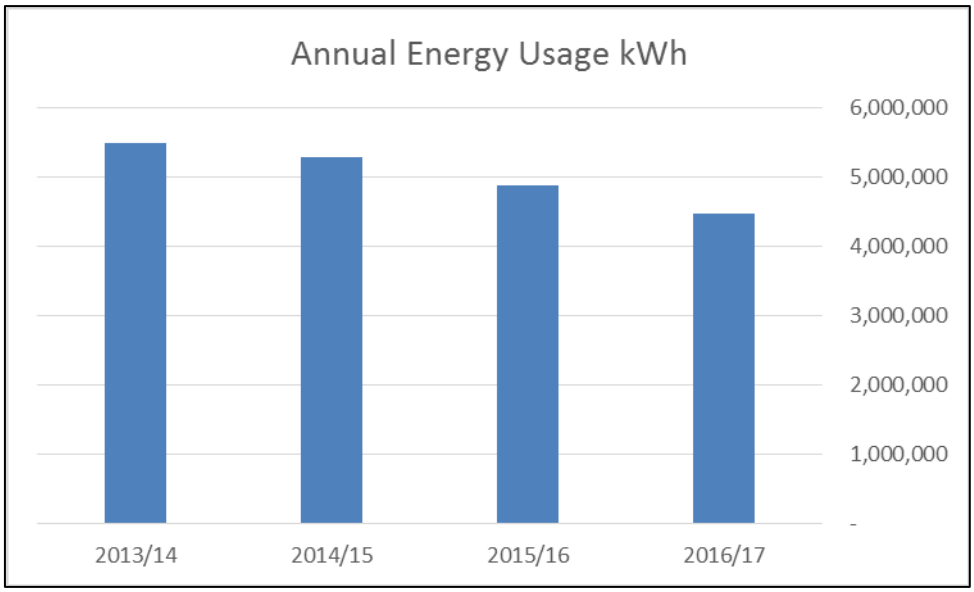
Over the first 3 years of the increased investment period Inverclyde Council spent £1,269,000 on street lighting capital works. This allowed for the replacement/introduction of 646 Columns and 2038 Luminaires. This resulted in an outstanding 4743 columns and 2419 luminaires remaining in service having exceeded their expected service life.

It is planned to spend an additional £2,910,000 on street lighting capital works during the period 2016 – 2018, which is predicted to have the effect of leaving an outstanding 3661 columns and 0 luminaires remaining in service having exceeded their expected service life.

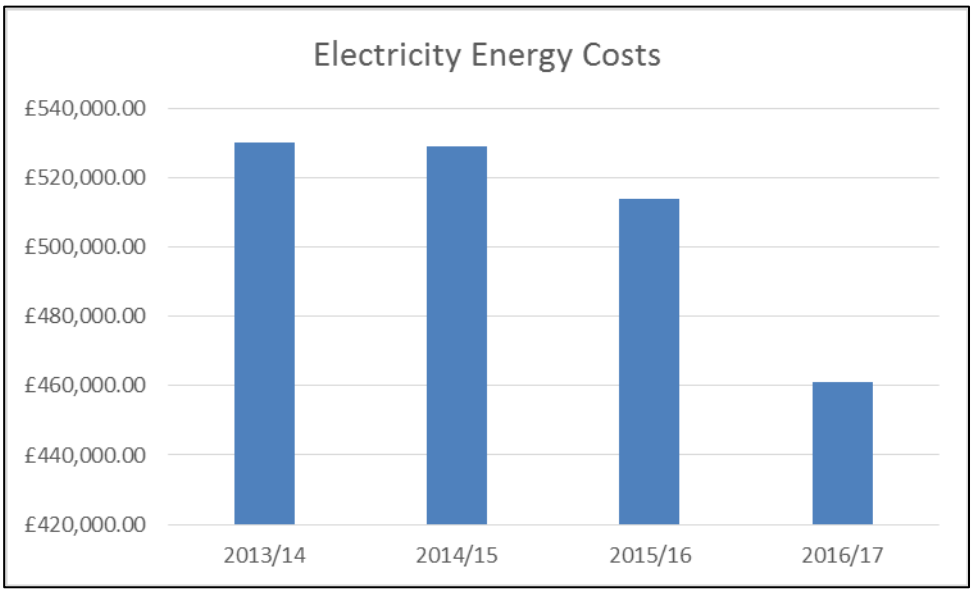
This investment will also enable the replacement of all high energy lanterns with low energy lanterns in order to reduce energy usage and carbon emissions.

2.3.3 Energy Usage

The investment in replacing high energy usage lanterns with low energy usage lanterns has reduced the amount of annual energy being expended on street lighting assets by over 1 million kilowatt hours.



Due to fluctuating energy costs the energy saving has not been wholly matched in cost savings with the actual fall in costs between 2013/14 and 2015/16 being restricted to £16,000 but with anticipated energy costs for 2016/17 reducing by a further £54,000.



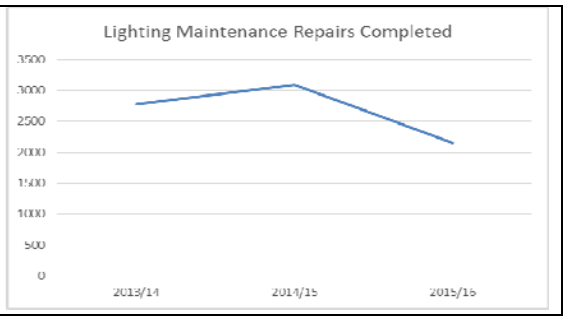
2.3.4 Routine Maintenance Investment

IC routine street lighting maintenance investment over the last 4 years is detailed below

Routine Maintenance Spend £	2012/13	2013/14	1214/15	2015/16	Ave
Lighting repair	223,000	262,000	365,000	430,000	£320,000
earmarked reserves	0	0	28000	0	£7,000
Street Lighting Total	**£223,000**	**£262,000**	**£393,000**	**£430,000**	**£327,000**

This resulted in the following amount of repairs being undertaken

Routine Maintenance Repairs Completed			
Year	Lights	TM	Total
2013/14	2703	75	2778
2014/15	3040	56	3096
2015/16	2100	50	2150



2.4 Roads Structures

2.4.1 Size of the Asset

The road structures asset within Inverclyde is comprised of:

Table 3.1 Inverclyde Council Road Structures Inventory		
Type of Structure	**Construction Material (primary structural element)**	**Number of Structures**
Road Bridges	Masonry	59
	Steel Composite	6
	Reinforced Concrete	14
Footbridges	All	8
Unusual Structures	Slipways	16
Culverts	All	71
Subway	Subway and Underpasses	4
Sea Walls	All	25
Total Road Structures		**203**

2.4.2 Capital Investment & Condition

2013/14	2014/15	2015/16	2016/17	2017/18
£10,700	£505,500	£192,000	*£100,000*	*£500,000*

Over the first 3 years of the increased investment period Inverclyde Council spent £708,000 on structures capital works. This allowed for refurbishment works to be undertaken on 18 structures, which resulted in an outstanding 79 structures requiring refurbishment as of March 2016. (It should be noted that an additional 18 structures were added to the list during this period due to their poor condition as ascertained following their scheduled condition inspection)

The investment has also allowed works to be undertaken on 7 structures that have not been included in the RAMP at this stage, the works included replacement of cattle grids, strengthening of retaining walls and the installation of road restraint systems.

Structure Type	No. Requiring Works	Total Estimated Cost	No. Priority 2	Estimated Cost	No. Priority 3	Estimated Cost	No. Priority 4	Estimated Cost
Roadbridge	29	£795,000	4	£20,000	14	£565,000	11	£210,000
Footbridge	1	£50,000	1	£50,000	0	£0.00	0	£0.00
SeaWalls	9	£195,000	0	£0.00	0	£0.00	9	£195,000
Culverts	40	£430,000	8	£75,000	10	£130,000	22	£225,000
Total	**79**	**£1,470,000**	**13**	**£145,000**	**24**	**£695,000**	**42**	**£630,000**

It is planned to spend an additional £600,000 on structures capital works during the period 2016 – 2018 on 24 structures, which will have the effect of reducing the number of outstanding structures requiring refurbishment works to 55.

2.4.3 Routine Maintenance Investment

IC routine structures maintenance investment over the last 4 years is detailed below

Routine Maintenance Spend £	2012/13	2013/14	1214/15	2015/16	Ave
Structures repair	15,000	10,000	10,000	7,000	£10,500
earmarked reserves	0	2000	0	0	£500
Structures Total	**£15,000**	**£12,000**	**£10,000**	**£7,000**	**£11,000**

Figures relating to the amount and type of routine maintenance work undertaken is not available at this time.

2.5 Other Assets

In depth assessment of the financial needs for the minor asset groups have not been included within this report however following an investigation of spending over the last 5 years and an assessment of required works backlog using the knowledge and experience of the appropriate officers with Inverclyde Council an allowance has been made for the continued funding of the maintenance of these assets which is included in table 5.2 as Other Assets

Routine Maintenance Spend £	2012/13	2013/14	2014/15	2015/16	Ave
Drainage	£65,000	£85,000	£71,000	£72,000	**£73,250**
Signals	£12,000	£12,000	£12,000	£14,000	**£12,500**
Verge/ trees/Hedges	£86,000	£86,000	£70,000	£88,000	**£82,500**
Road Markings & Signs	£41,000	£52,000	£39,000	£40,000	**£43,000**
Total	**£204,000**	**£235,000**	**£192,000**	**£214,000**	**£211,250**
Earmarked Reserves					
Drainage		**£10,000**	**£43,000**	**£116,000**	**£56,333**
Grand Total	**£204,000**	**£245,000**	**£235,000**	**£330,000**	**£267,583**

It has been estimated that a capital investment spend of £190,000 per annum will be able to maintain a steady state condition for these assets with an additional routine maintenance investment of £267,000 p.a.

3 Investment Options

3.1 Carriageway

3.1.1 Treatment Options and costs

In order to assess the costs of the work required for the on-going maintenance of the carriageways within Inverclyde it is first necessary to identify the treatment options available for each of the road categories and the treatment cost rates applicable using today's prices, the average rates include all applicable on-costs such as traffic management, design & supervision costs and ancillary works such as pre-patching, tack coat, adjustment of iron-work etc. See table 3.1.

Table 3.1 Inverclyde Council Carriageway Treatment Options & Unit Rates

Treatment Type	Description of Treatment	Unit Rate (£/sqm)
Surface Dressing	Pre-patching of failed areas and application of bituminous emulsion and aggregate to the road surface	£4.22
Thin / Micro surface	Apply thin / micro surface to existing surface course up to 25mm thick	£6.92
Thin Inlay	Removal of existing surfacing materials, surface course, and replacement with new CGBM/HRA surfacing materials up to 60mm thick.	£12.04
Moderate Inlay	Removal of existing surface & binder courses, and replacement with DBM/HRA binder course & CGBM/HRA surface course 60mm to 100mm thick.	£25.57
Fully Reconstructed	Remove existing road construction and reconstruct to current specification	£60.68

3.1.2 Treatment Lifecycles

Actual lifecycle information for these treatments is not available however using the engineering judgement of appropriately experienced officers, from within the authority, estimates of the time taken for the road to deteriorate into a condition where structural treatment is required has been made for each of the different road categories.

Table 3.2 IC Estimated Carriageway Lifecycles			
Category	U-R	Amount of time before carriageway	Amount of time before carriageway

		reaches amber 1 condition (years)	reaches red condition (years)
Principal (A) Roads (cat 2)	Urban	17	24
	Rural	15	22
Classified (B) Roads (cat 3a)	Urban	20	27
	Rural	18	25
Classified (C) Roads (cat 3b)	Urban	20	27
	Rural	20	27
Unclassified Roads (cat 4a & 4b)	Urban	25	35
	Rural	25	35

These lifecycles are estimates based on average deterioration of the asset as a whole and take into account those small areas of premature failure of surfacings that are known to occur on occasion, as well as those where the asset remains in a fair condition well past these ages.

3.1.3 Condition

The condition of the asset is assessed by regular inspection using the Scottish Road Maintenance Condition Survey (SRMCS) machine survey.

The latest survey for 2014/16 shows that the Road Condition Index (RCI) value for Inverclyde stands at **40.5%** of IC road network, which has reached a condition where more detailed monitoring or investigation is appropriate to establish if or when remedial measures are required. Approximately **9%** of the Council's roads are in the worst (Red) condition where structural maintenance should be considered as a matter of some importance.

The detailed output from this survey has given a current network condition, broken down by road class of:

Table 3.3 Inverclyde Carriageway Condition Bands 2014/2016 (SRMCS)

		Red		Amber 1		Amber 2		Green	
Category	U-R	%	Area (sqm)	%	Area (sqm)	%	Area (sqm)	%	Area (sqm)
Principal (A) Roads (cat 2)	Urban	3.24	3475	6.58	7057	19.86	21300	70.31	75407
	Rural	3.69	2308	5.02	3141	24.77	15496	66.51	41609
Classified (B) Roads (cat 3a)	Urban	3.17	1331	5.45	2289	18.45	7749	72.93	30631
	Rural	6.16	5349	5.94	5158	27.39	23785	60.50	52538
Classified (C) Roads (cat 3b)	Urban	3.33	6046	6.99	12691	17.75	32227	71.93	130596
	Rural	14.97	17573	11.35	13324	33.89	39783	39.79	46709
Unclassified Roads (cat 4a & 4b)	Urban	8.36	115692	9.04	125103	23.80	329363	58.79	813583
	Rural	32.89	34304	16.99	17721	20.81	21705	29.31	30570

Where a Red condition indicates the site should be investigated for a structural scheme; an Amber 1 condition indicates the site should be investigated for a resurfacing scheme; an Amber 2 condition indicates the site should be investigated for a preventative treatment & a Green condition indicates no treatment is necessary.

3.1.4 Treatment Efficiency

It was recognised that when a treatment was undertaken on the carriageway it would not wholly treat a single condition, in order to reflect this within the cost projection model a treatment efficiency factor of 70% has been included.

3.1.5 Routine Reactive and Cyclic Maintenance

The level of routine reactive and cyclic maintenance spend, which has recently been running at approximately **£900,000** p.a. was reduced to **£800,000** in 2015/16 possibly due to the improved condition of the network. This spend is not included within the calculation undertaken by the evaluation tool.

Inverclyde Council has recognised that the network will always have some level of deterioration that requires immediate intervention and thus there will always be a need for reactive patching work. It has also been recognised that a small amount of full depth reconstruction will always be required where other treatments have failed to prevent the continuing deterioration of small areas of the network.

3.1.6 Renewal Investment Scenarios

Using the previously detailed information it has been possible to estimate the on-going network condition based on a number of funding scenarios with treatments being identified to maximise the amount of works undertaken and to prolong the life of the asset where possible.

1. Maintain Steady State - maintain the existing condition of the carriageways using a preventative maintenance regime.
2. 60% of a £7.5M 5 year Roads Capital Budget (£4.5M) – Average approximately £900,000 p.a. using a preventative maintenance strategy
3. 60% of a £15.0M 5 year Roads Capital Budget – Average approximately £1,860,000 p.a. using a mix of corrective and preventative maintenance strategies
4. 60% of a £22.5M Roads Capital Budget – Average approximately £2,790,000 p.a. using a mix of corrective and preventative maintenance strategies
5. Investment required to remove the backlog of worst road condition over the 5 year period.

The exercise was undertaken for each of the different road categories individually and the detailed output from these can be found in the appropriate spreadsheets. The information

given below shows the predicted condition profile for all road categories over a 20 year investment period.

Where year 0 equates to 2013, Year 3 equates to 2016 (current), Year 5 equates to 2018 (end of current investment period), Years 6 to 10 equates to 2018/19 – 2023 (the proposed investment period) and years 11 to 20 years 2023 – 2033 (based on the funding required to maintain a steady state following the proposed investment period 2).

3.1.6.1 Maintain Steady State

This scenario allows for maintaining the carriageway infrastructure in its present condition using a preventative maintenance strategy based on providing an intervention treatment to prevent the carriageway from deteriorating from one condition band to the next. This will entail undertaking a mix of surface treatments and thin inlays with only a small amount of moderate (up to 100mm) inlays being undertaken.

This would entail base annual investments of **£941,100**. Allowing for 5% inflation from then on the total investment over 5 years would be approximately **£5,200,000**.

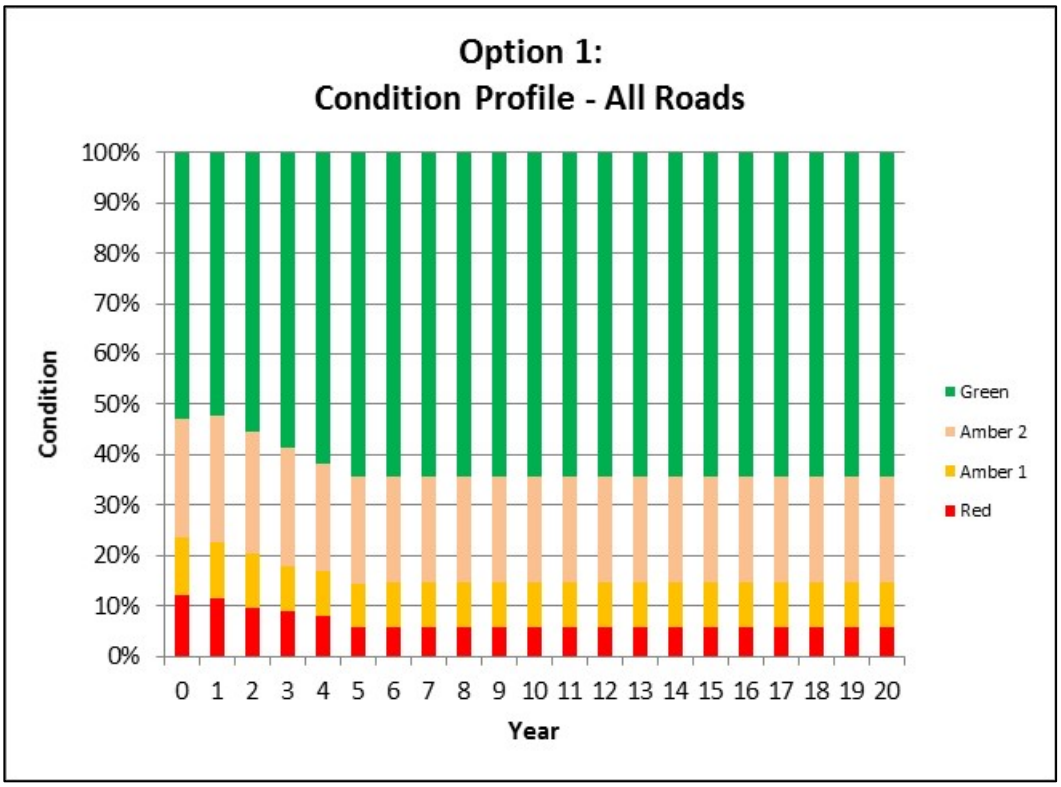


Fig 3.1.1 Maintain Current Condition

It is estimated that this will result in red condition roads remaining at 5.8% and maintaining an RCI of 36%.

3.1.6.2 £4.5M Capital Investment Over 5 Years

This shows an initial year 2018/19 investment of **£814,400** which with 5% inflation will rise to **£989,900** after 5 years and result in a total investment over 5 years of **£4,500,000**. This figure is calculated based on using mainly intervention treatment to prevent further deterioration of the network but with a small amount of resurfacing and reconstruction treating the worst condition roads that are not suitable for a surface dressing.

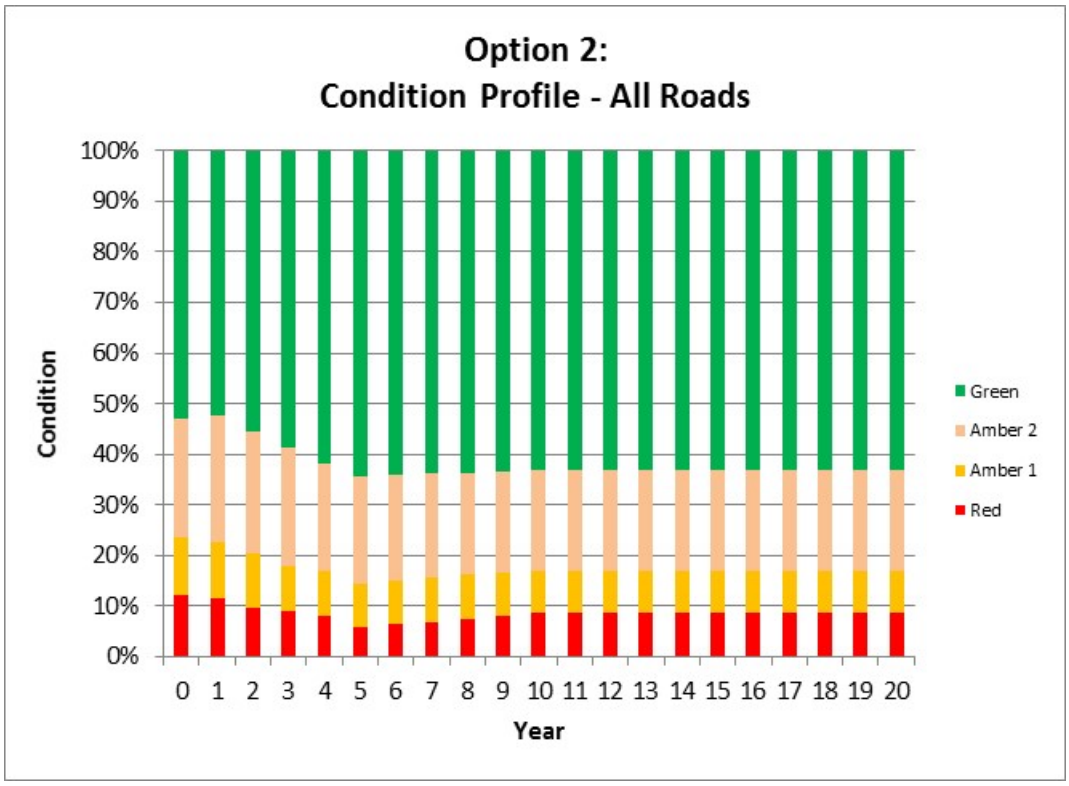


Fig 3.1.2 £4.5M over 5 years

It is estimated that this will result in an increase in red condition roads from 5.8% up to 8.6% over the 5 year period and an increase in RCI from 36% to 37%.

3.1.6.3 £9.0M Capital Investment over a 5 year period

This shows an initial year 2018/19 investment of **£1,629,000** which with 5% inflation will rise to **£1,980,000** after 5 years and result in a total investment over 5 years of **£9,000,000**. This figure is calculated based on using both intervention treatments to prevent further deterioration of the network and an amount of resurfacing and reconstruction treating the worst condition roads that are not suitable for a surface dressing.

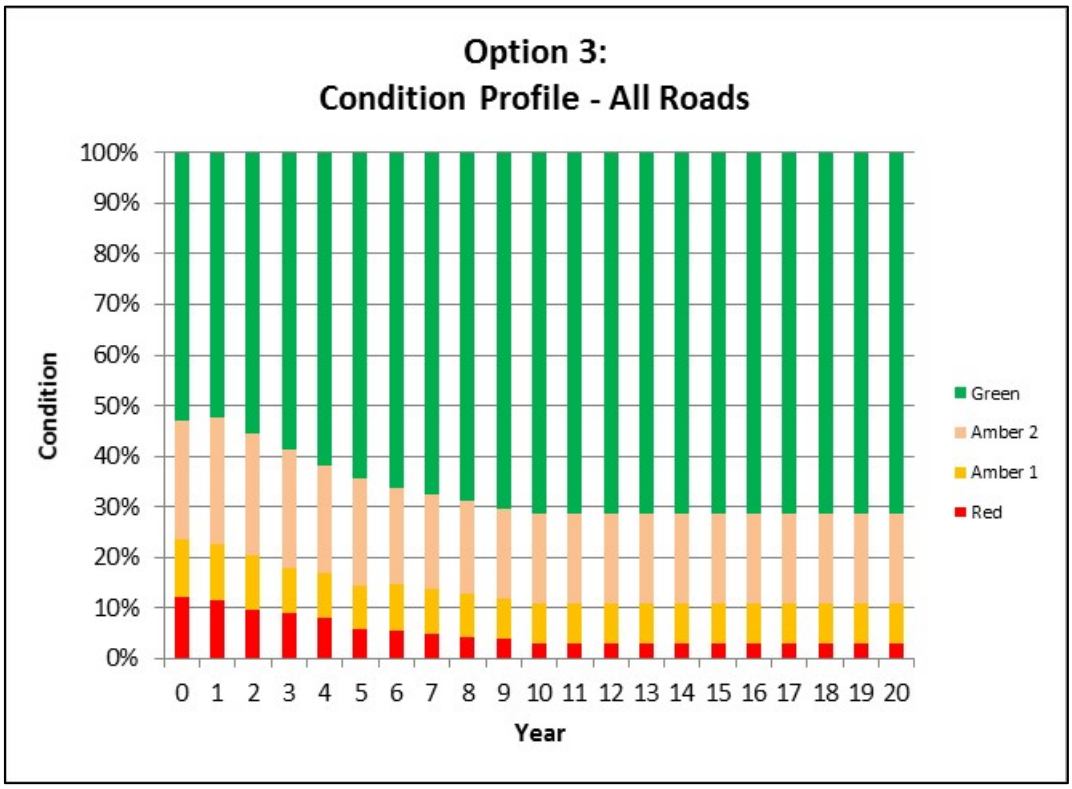


Fig 3.1.3 £9.0M Over 5 years

It is estimated that this will result in a reduction in red condition roads from 5.8% to 3.1% over the 5 year period and a decrease in RCI from 36% to 29%.

The improvement in the condition of the network should result in a reduction in reactive maintenance requirements and in public liability claims, although it has not been possible to accurately quantify this saving it has been estimated at approximately **£50,000** p.a.

3.1.6.4 £13.5M Capital Investment over a 5 year period

This shows an initial year 2018/19 investment of **£2,443,000** which with 5% inflation will rise to **£2,970,000** after 5 years and result in a total investment over 5 years of **£13,500,000**. This figure is calculated based on using both intervention treatments to prevent further deterioration of the network and a greater amount of resurfacing and reconstruction treating the worst condition roads that are not suitable for a surface dressing.

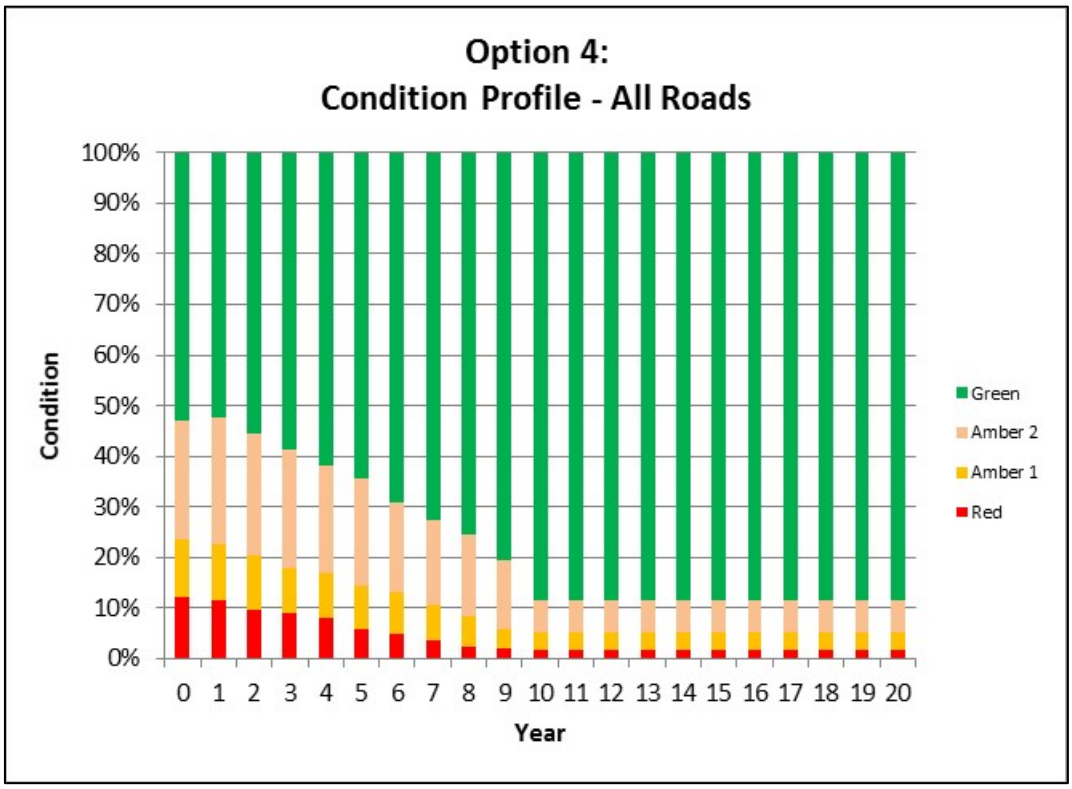


Fig 3.1.4 Remove Backlog over a 10 year period

It is estimated that this will result in a reduction in red condition roads from 5.8% to 1.9% over the 5 year period and a decrease in RCI from 36% to 12%.

The improvement in the condition of the network should result in a reduction in reactive maintenance requirements and in public liability claims, although it has not been possible to accurately quantify this saving it has been estimated at approximately **£100,000** p.a.

3.1.6.5 Continuance of Investment In Order to Remove Backlog of Worst Condition Roads

This shows an initial year 2018/19 investment of **£2,150,000** which with 5% inflation will rise to **£2,613,000** after 5 years and result in a total investment over 5 years of **£11,880,000**. This figure is calculated based on using some intervention treatments to prevent further deterioration of the network but with a greater amount of resurfacing and reconstruction treating the worst condition roads that are not suitable for a surface dressing.

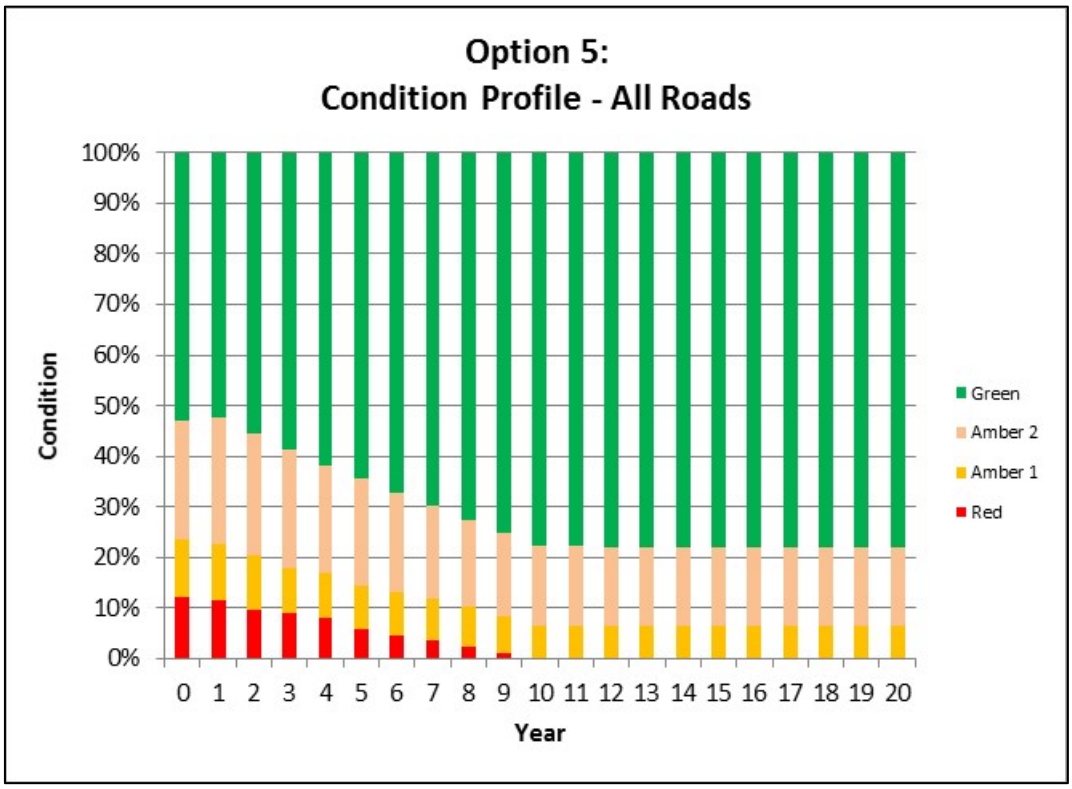


Fig 3.1.5 Continue to Remove Backlog over the 10 year period

It is estimated that this will result in a reduction in red condition roads from 5.8% to 0% over the 5 year period and a decrease in RCI from 36% to 22%.

The improvement in the condition of the network should result in a reduction in reactive maintenance requirements and in public liability claims, although it has not been possible to accurately quantify this saving it has been estimated at approximately **£100,000** p.a.

3.1.7 Backlog Removal

It should be borne in mind that the tool used for this exercise works on a network wide basis and does not deal to individual lengths of the road, as such although the output suggests a complete removal of red condition carriageway this is unlikely to be the case in practice and it is likely that there will always be some small lengths of red condition carriageway present within the network. It is estimated that this figure will remain somewhere between 1% and 3% of the network, although much of this may be given a red rating due to an uneven road surface that would not be a repair priority particularly on low speed urban roads.

3.2 Footways

3.2.1 Treatment Options, Lifecycles & Costs

In order to assess the costs of the work required for the on-going maintenance of the footways within Inverclyde it is first necessary to identify the treatment options available for each of the footway material types and the treatment cost rates using today's prices, See table 3.4.

Actual lifecycle information for these treatments is not available however using the engineering judgement of appropriately experienced officers, from within the authority, estimates of the appropriate treatment and their frequencies for each of the different footway material types were made.

Table 3.4 Footway Renewal Treatment Options Used Within Inverclyde

Treatment	Description	Lifecycle (yrs) (Frequency of treatment)	Average Cost of Treatment (£/m²)
Overlay	Scarify existing surface up to 25mm depth. Addition of new surfacing on top of existing bituminous base construction.	20	£15.00
Reconstruction (Bituminous)	Removal of existing footway construction, full depth including sub-base, and replacement with new including strengthening. Also includes replacement of a flagged footway with bituminous construction.	40	£55.00
Reconstruction of Concrete Footway	Removal of existing footway construction, full depth including sub-base, and replacement with new concrete construction.	100	£80.00
Reconstruction (PC Blocks)	Removal of existing block footway construction, full depth including sub-base, and replacement with new.	60	£65.00
Reconstruction (PC Slabs)	Removal of existing flagged footway construction, full depth including sub-base, and replacement with new.	60	£65.00

Table 3.4 Footway Renewal Treatment Options Used Within Inverclyde			
Treatment	**Description**	**Lifecycle (yrs) (Frequency of treatment)**	**Average Cost of Treatment (£/m²)**
Reconstruction (Stone)	Removal of existing stone footway construction, full depth including sub-base, and replacement with new.	60	£45.00
Relay (PC Blocks)	Take up and relay existing block footway surface, including replacement of damaged blocks.	60	£37.00
Relay (PC Slabs)	Take up and relay existing flagged footway surface, including replacement of broken slabs.	40	£37.00
Relay (Stone)	Take up and relay existing stone footway surface, including replacement of broken slabs.	50	£65.00
Resurface (Bituminous)	Removal of existing footway surface and binder courses and replacement with new. Also includes replacement of a flagged footway with bituminous construction	30	£35.00
Resurface (Concrete)	Removal of existing concrete surfacing and replacement with new.	100	£60.00
Resurface (PC Blocks)	Removal of existing block footway surface and replacement with new PC blocks	60	£45.00
Resurface (PC Slabs)	Removal of existing flagged footway surface and replacement with new PC Slabs.	50	£45.00
Resurface (Stone)	Removal of existing stone footway surface and replacement with new.	60	£37.00
Slurry Seal	Application of a thin screed surfacing to the existing bituminous footway. Includes pre-patching and regulating as required.	10	£7.00

3.2.2 Footway Areas

Accurate information is available for the size of the footway asset however a number of assumptions have been made in order to derive the footway areas for each construction material, this information will be improved over time and the accuracy of the predictions will improve accordingly.

3.2.3 Condition

A series of course visual condition assessments were undertaken on a number of trial sites within the Inverclyde area in 2013 the results of these surveys were aggregated and assumed to be consistent across the authority.

The condition ratings used are described in the following table.

	Condition	Definition
1	Acceptable	The footway is in an acceptable condition and currently requires no work to be carried out on it.
2	Safe but of poor appearance	The footway is free of defects and is safe. It however does not look good as a result of: • patches and/or trenches; • slabs or blocks of different colours / materials (including bituminous reinstatements in flagged footways); • cracked but sound flags/blocks with no movement; • Loss of coloured surfacing or severely faded material.
3	Minor deterioration	The footway has minor deterioration such as: • cracked flags/blocks showing some signs of movement; • missing joint filler; • minor fretting, fatting up, scaling or minor cracking of bituminous footways; • moderate local settlement/subsidence or trips <13mm.

	Condition	Definition
4	Major deterioration	The footway has no immediate safety defects but has indications that these may occur prior to the next due inspection: • cracked and depressed flags/blocks; • flags/blocks with exaggerated movement; • major cracking, fretting or scaling; • trip hazards between 13mm and 20mm.
K	Kerb Deterioration	Always recorded as a separate item no matter the overall condition of the adjacent footway: Kerb disintegration; inadequate upstand <50mm; kerb misalignment > 50mm; missing kerbs

Since 2013 no additional footway condition surveys have been undertaken. In order to estimate the current and short term future condition of the footway network the known historical spend and works output and known future investment were entered into the cost projection tool and the resultant outturn figures used to estimate the footway network condition for 2014 to 2018.

This has produced an estimated footway condition for Inverclyde of:

Table 3.5: Footway - Individual Condition Percentages

Year	Condition 1		Condition 2		Condition 3		Condition 4	
	%	Area (sqm)	%	Area (sqm)	%	Area (sqm)	%	Area (sqm)
2013	39.0%	386696	41.0%	406526	15.0%	148729	5.0%	49576
2014	38.0%	376894	41.0%	406047	16.6%	164286	4.5%	44300
2015	37.3%	369719	40.9%	405348	18.1%	179219	3.8%	37241
2016	37.9%	375906	40.8%	404498	19.5%	193605	1.8%	17518
2017	38.8%	384978	40.7%	403834	19.5%	193622	0.9%	9093
2018	46.0%	466303	40.7%	403424	12.3%	112165	1.0%	9635

3.2.4 Deterioration Prediction

Using the initial condition information, the treatment cost information and the treatment frequencies (Table 3.4) it has been possible to estimate the on-going network condition based on a number of funding scenarios.

In order to do this deterioration rates were estimated using the experience of Inverclyde personnel which assumed straight line deterioration throughout the life of the hard materials, with no deterioration allowed for the granular materials.

3.2.5 Routine Reactive and Cyclic Maintenance

For the purposes of this exercise the level of routine reactive and cyclic maintenance required (currently running at approximately **£ 10,000**) has been excluded, as it is anticipated that this will only fall if the condition of the network is substantially improved. Inverclyde has recognised that the network will always have some level of deterioration that requires immediate intervention and thus there will always be a need for some reactive work.

3.2.6 Budget Vs Condition Scenarios

A number of renewal funding scenarios were undertaken with treatments being identified to maximise the amount of works undertaken and to prolong the life of the asset where possible:

1. Maintain Steady State - maintain the existing condition of the footways using a preventative maintenance regime.
2. 11.4% of a £7.5M 5 year Roads Capital Budget (£851K) – Average approximately £170,000 p.a. using a preventative maintenance strategy
3. 11.4% of a £15.0M 5 year Roads Capital Budget – Average approximately £340,000 p.a. using a mix of corrective and preventative maintenance strategies
4. 11.4% of a £22.5M 5 year Roads Capital Budget – Average approximately £510,000 p.a. using a mix of corrective and preventative maintenance strategies
5. Investment required to remove the backlog of worst footway condition over the 5 year period.

3.2.6.1 Maintain Steady State

This scenario allows for maintaining the footway infrastructure in its 2017/18 condition using a preventative and corrective maintenance strategy based on providing treatments to correct the ongoing footway deterioration. This will entail undertaking predominantly slurry seal and overlay of bituminous footways with only a small amount of resurfacing being undertaken.

This would entail a base annual investment of **£305,500** in year 2018/19 rising to **£371,300** (5% inflation per annum) in 2022/23 where the total investment over 5 years would be approximately **£1,690,000**.

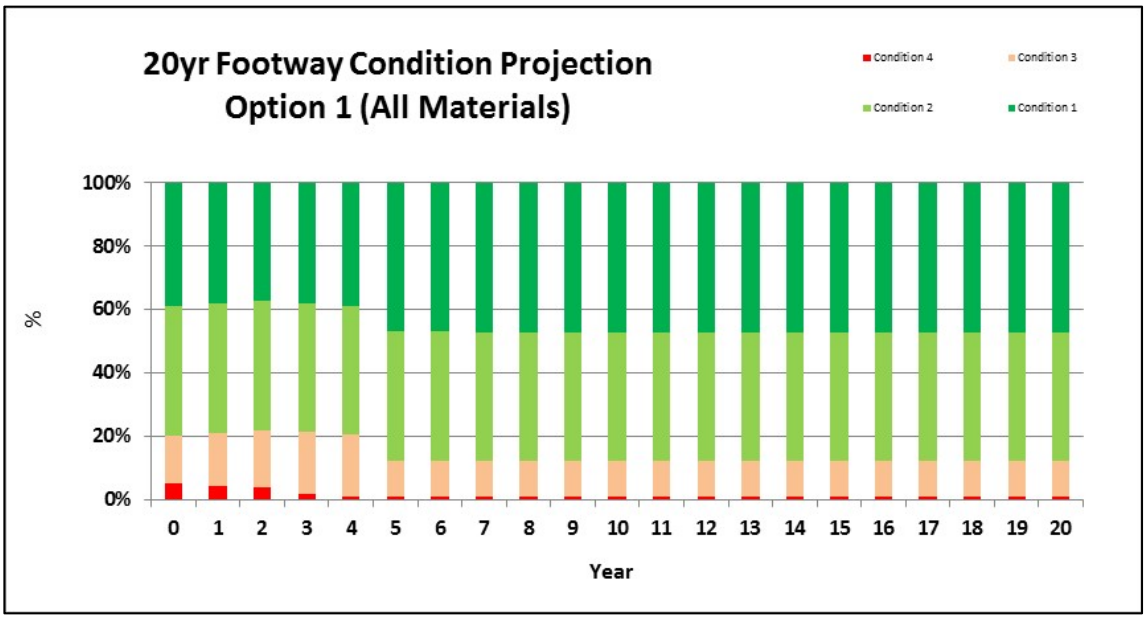


Fig 3.2.1 Option 1 – Maintain Steady State

This option would provide a steady state condition estimated at: condition 1 = 46%, condition 2 = 41%, condition 3 = 12% and condition 4 = 1%.

3.2.6.2 £850,000 Capital Investment over a 5 year period

This would entail a base annual investment of **£154,000** in year 2018/19 rising to **£187,200** in 2022/23 where the total investment over 5 years would be approximately **£850,000**.

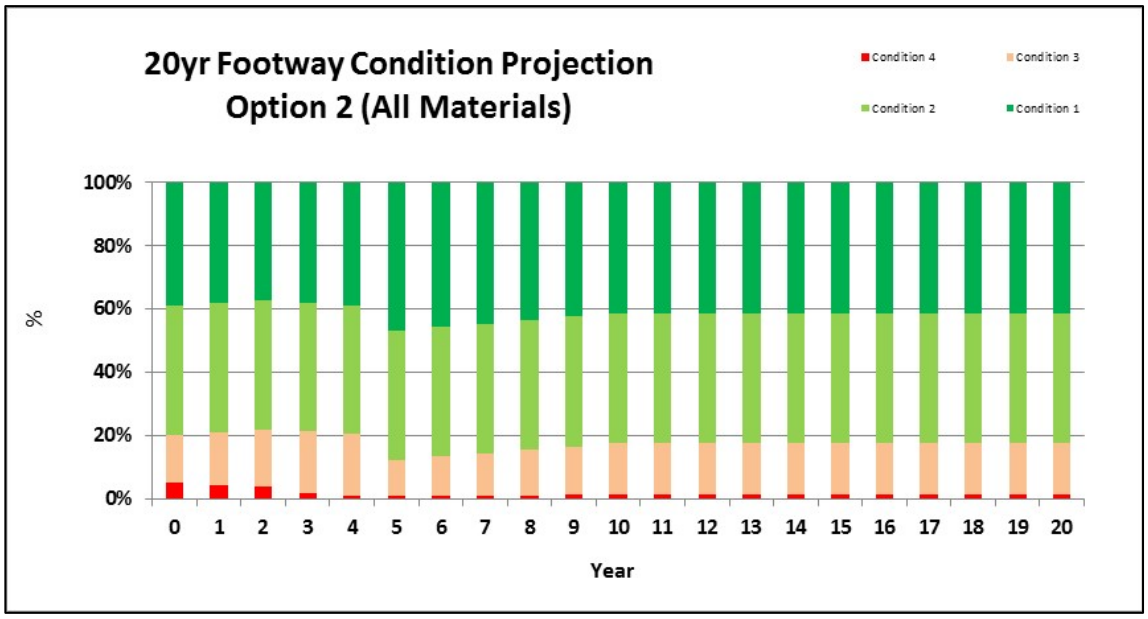


Fig 3.2.2 Option 2 – £850K over 5 years

This option would provide a change in condition estimated at: condition 1 = 46% reducing to 41%, condition 2 = increasing slightly from 41% to 41.5%, **condition 3 = increasing from 12% to 17%** and condition 4 = increasing slightly from 1% to 1.5%.

3.2.6.3 £1,700,000 Capital Investment over a 5 year period

This would entail a base annual investment of **£309,000** in year 2018/19 rising to **£375,600** in 2022/23 where the total investment over 5 years would be approximately **£1,710,000**.

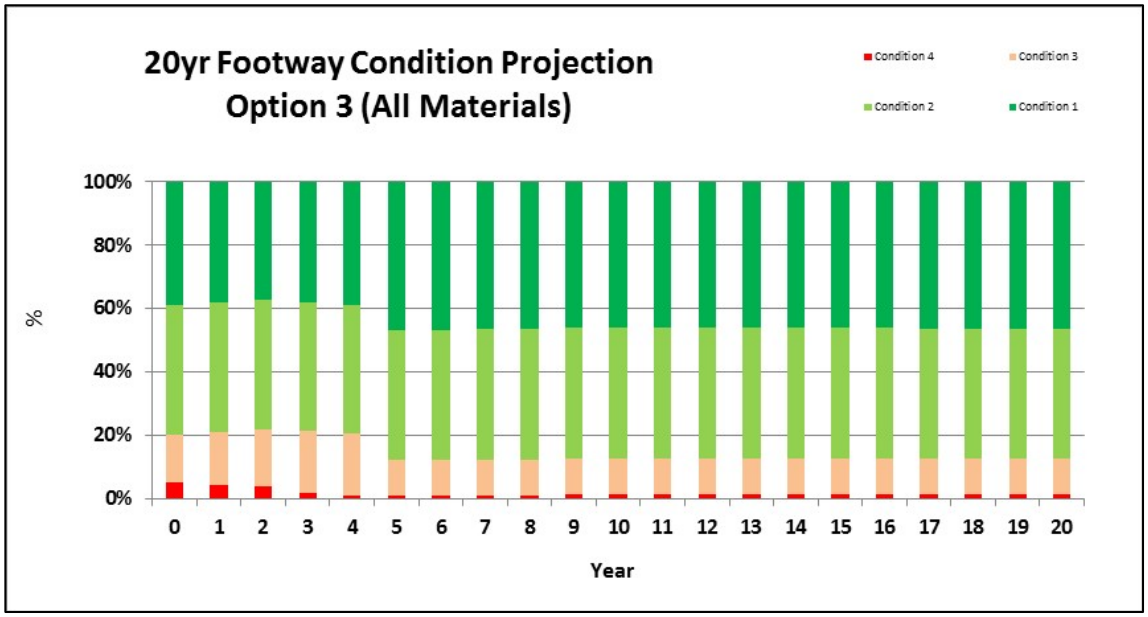


Fig 3.2.3 Option 3 – £1.7M over 5 years

This option would provide an approximate steady state condition estimated at: condition 1 = 46%, condition 2 = 41%, condition 3 = 12% and condition 4 = 1%.

3.2.6.4 £2,560,000 Capital Investment over a 5 year period

This would entail a base annual investment of **£464,000** in year 2018/19 rising to **£564,000** in 2022/23 where the total investment over 5 years would be approximately **£2,566,000**.

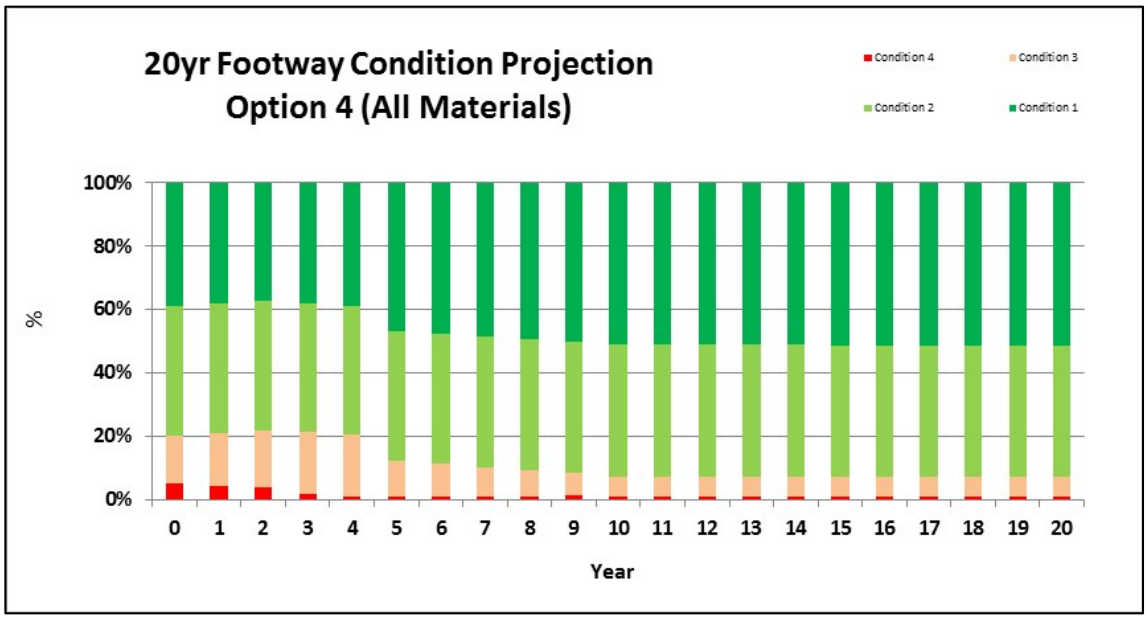


Fig 3.2.4 Option 4 – £2.56M over 5 years

This option would provide an imprvement in condition estimated at: condition 1 = 46% increasing to 51%, condition 2 = increasing from 41% to 42%, **condition 3 = decreasing from 16% to 7%** and condition 4 remaining at approximately 1%.

3.2.6.5 Continuance of investment in order to reduce backlog of worst condition

This would entail a base annual investment of **£439,000** in year 2018/19 rising to **£533,000** in 2022/23 where the total investment over 5 years would be approximately **£2,425,000**.

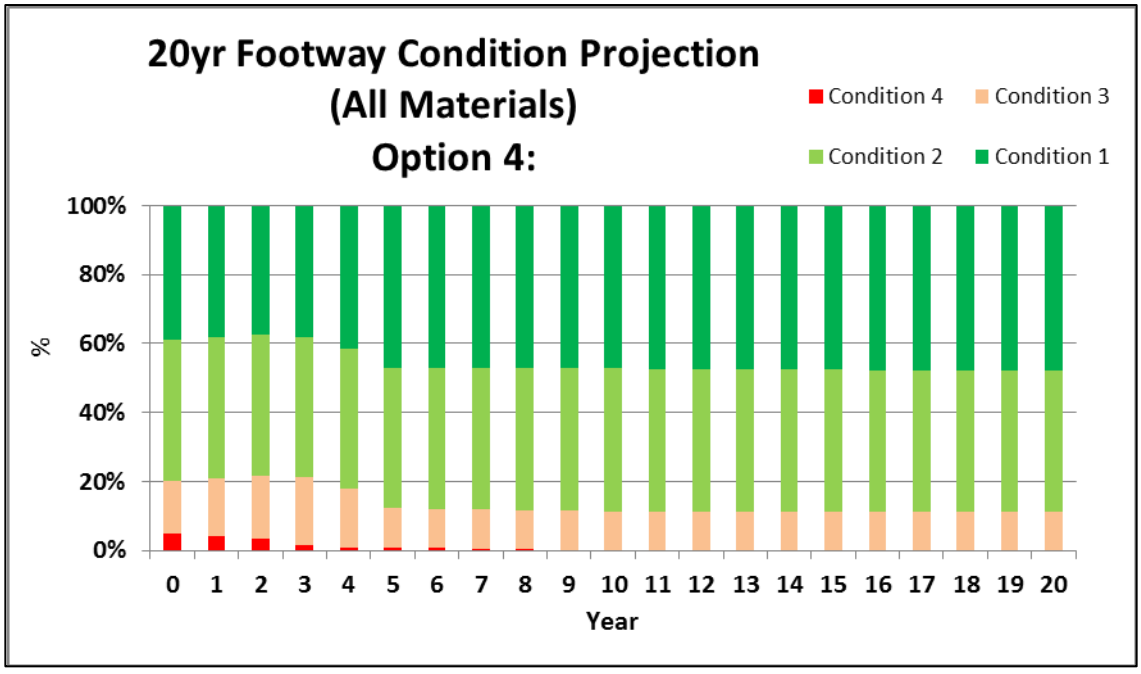


Fig 3.2.5 Option 5 – Reduce backlog of worst condition

This option would provide a change in condition estimated at: condition 1 = Increasing from 46% to 48%, condition 2 = remaining at approximately 41%, **condition 3 = reducing to 11%** and **condition 4 reducing to 0%**.

It should be borne in mind that in all these scenarios the output will be affected by the input information (deterioration rates, treatment costs and existing condition) and the validity of the this information should be checked and updated on a regular basis.

3.3 Street Lighting

3.3.1 Size of the Asset

In order to assess the costs of the work required for the on-going maintenance of the street lighting within Inverclyde it was first necessary to identify the number & type of street lighting installations within Inverclyde. See tables 3.6 and 3.7.

Assets excluded from this analysis: Illuminated Signs & Bollards

3.3.2 Apparatus Lifecycles

Actual lifecycle information for the street lighting apparatus often exceeds the design life and although reliable data is not presently available, using the engineering judgement of appropriately experienced officers, from within the authority and across Scotland, estimates of the appropriate replacement frequencies for each of the different types of apparatus were made.

3.3.3 Replacement Costs

In order to calculate the long term costs involved in replacing the assets as required, the cost of replacing individual assets at today's prices were calculated.

Tables 3.6 and 3.7 below provides details of Inverclyde's Lighting Stock, Replacement Costs and Expected Service lives.

Table 3.6 Inverclyde Street Lighting Column Inventory 2016

Column Material	Height (m)	Supply	Useful Life (years)	Column Nos	Replacement Rate (£)
Non Galvanised Steel	6	Private Supply	25	1,143	£450.00
		DNO Supply	25	1,241	£1,050.00
	8	Private Supply	25	415	£500.00
		DNO Supply	25	380	£1,100.00
	10	Private Supply	25	203	£550.00
		DNO Supply	25	24	£1,150.00
Galvanised Steel	5	Private Supply	30	637	£450.00
		DNO Supply	30	99	£1,050.00
	6	Private Supply	30	3,645	£450.00
		DNO Supply	30	783	£1,050.00
	8	Private Supply	30	1,570	£500.00
		DNO Supply	30	220	£1,100.00

Table 3.6 Inverclyde Street Lighting Column Inventory 2016					
Column Material	**Height (m)**	**Supply**	**Useful Life (years)**	**Column Nos**	**Replacement Rate (£)**
	10	Private Supply	30	1,113	£550.00
		DNO Supply	30	70	£1,150.00
Concrete	6	DNO Supply	30	542	£1,050.00
Aluminium (post 2000)	6	Private Supply	50	28	£550.00
		DNO Supply	50	0	£1,150.00
	8	Private Supply	50	7	£600.00
		DNO Supply	50	0	£1,200.00
	10	Private Supply	50	3	£650.00
		DNO Supply	50	0	£1,250.00
Cable	Carriageway	All	60	5,258	£49.00
	Footway	All	60	268,182	£39.00
	Verge	All	60	15,775	£22.50
Wall Bracket	inc. surface cabling / supply	Private Supply	40	174	£500.00
		DNO Supply	40	0	

Table 3.7 Inverclyde Street Lighting Luminaire Inventory 2016					
Luminaire Type	**Luminaire Subtype**	**Circuit Wattage (W)**	**ESL (yrs)**	**Replacement Rate (£)**	**Luminaire No**
CDO	100W Elec	112	20	£180.00	165
CDO	150W Elec	162	20	£180.00	234
CDO	70W Elec	78	20	£180.00	557
CPO	45W	51	20	£250.00	1,289
CPO	60W	68	20	£250.00	718
CPO	90w	99	20	£250.00	586
CPO	140w	157	20	£250.00	891
CPO	TWIN 140w	298	20	£500.00	10
LED	gewiss street 03	104	20	£400.00	10
LED	iguzzini archilede 39w	55	20	£400.00	9
LED	iguzzini ufo fitting BL09	45	20	£400.00	2
LED	Iguzzini ufo fitting BL11	45	20	£400.00	10
LED	Philips Iridium 2 50w	53	20	£300.00	10
LED	Philips Jargeau 28W	28	20	£550.00	42
LED	philips metronomis 28w	28	20	£550.00	43
LED	philips luma 50W P24	50	20	£350.00	32
LED	philips luma 52W P25	52	20	£350.00	40
LED	Philips luma 60W P23	60	20	£350.00	69
LED	Philips LUMa 68W	68	20	£350.00	243
LED	Philips 73W dim P9	73	20	£350.00	199
LED	philips 89W dim	89	20	£350.00	116

Table 3.7 Inverclyde Street Lighting Luminaire Inventory 2016					
Luminaire Type	**Luminaire Subtype**	**Circuit Wattage (W)**	**ESL (yrs)**	**Replacement Rate (£)**	**Luminaire No**
LED	Luma 113W 3a dim	113	20	£400.00	69
LED	Luma 117W dim P2	117	20	£400.00	65
LED	Luma 124w dim P22	124	20	£500.00	17
LED	Phosco 32W	32	20	£200.00	8
LED	Axia 16 LED 350mA	21	20	£200.00	39
LED	Axia 40w dimmable	30	20	£200.00	105
LED	wrtl stella 42w	42	20	£400.00	5
LED	vision 30W LED	30	20	£200.00	62
LED	103W Holophane Vmax	103	20	£280.00	14
LED	19W TRt Aspect	19	20	£200.00	17
LED	27W TRT Aspect	27	20	£200.00	1
LED	35W trt ASPECT	35	20	£200.00	88
LED	42w TRT Aspect	42	20	£200.00	7
LED	68W TRT Aspect	68	20	£250.00	32
LED	trt Aspect 95W	95	20	£280.00	34
LED	Orangetek Arialed 55W	55	20	£280.00	47
MBF	80W	94	20	£138.00	1
MBI	250W	278	20	£138.00	0
MCF	36w PLL Polar	36	20	£78.00	32
MCF	55W PLL	62	20	£78.00	3
QL	induction 55w	55	20	£138.00	5
SON	50W	62	20	£98.00	2
SON	100W	114	20	£78.00	13
SON	100W electronic	112	20	£78.00	280
SON	150W	172	20	£138.00	92
SON	150W electronic	164	20	£138.00	287
SON	250W	279	20	£188.00	34
SON	70W	84	20	£98.00	925
SON	70W electronic	79	20	£98.00	1,443
SOX	135WL	159	20	£250.00	239
SOX	35WL	58	20	£160.00	18
SOX	55W HF	59	20	£160.00	350
SOX	55WL	67	20	£160.00	2,037
SOX	90WL	104	20	£160.00	524

3.3.4 Annual Replacement Investment Requirement

Using the above asset numbers, lifecycle and rate information it has been possible to estimate the annual investment required to replace the asset at the intervals detailed.

It is intended that the known investment for 2016/17 and 2017/18 will replace all of the lanterns put in prior to 2007, which encompasses all the high energy usage lanterns, this will mean that no further lantern replacements will be needed over the following 10 years.

The **average** annual replacement investment requirement over the 10 year period between 2018/19 and 2027/28 in order to maintain the age profile of the lighting columns is approximately **£230,000** allowing for 5% annual inflation**.**

3.3.5 Routine Reactive and Cyclic Maintenance

The maintenance of the street lighting assets does not only entail the replacement of worn out apparatus it also includes a number of additional works that require regular investment. These additional investment requirements are detailed below based on the last 3 years costs and include an anticipated reduction in energy costs due to the introduction of low energy lanterns.

Table 3.8 Additional Annual Investment	
Work Item	2017/18 Anticipated Costs
Reactive Maintenance	**£300,000**
Cyclic Maintenance	**£80,000**
3rd Party Claims	**£10,000**
Energy Costs	**£400,000**
Total	**£790,000**

3.3.6 Current Condition / Age Profile

The age profile of the lighting columns within Inverclyde is detailed below, when calculated against expected service life this shows approximately 3660 lighting columns that have exceeded their ESL remaining in service in 2018.

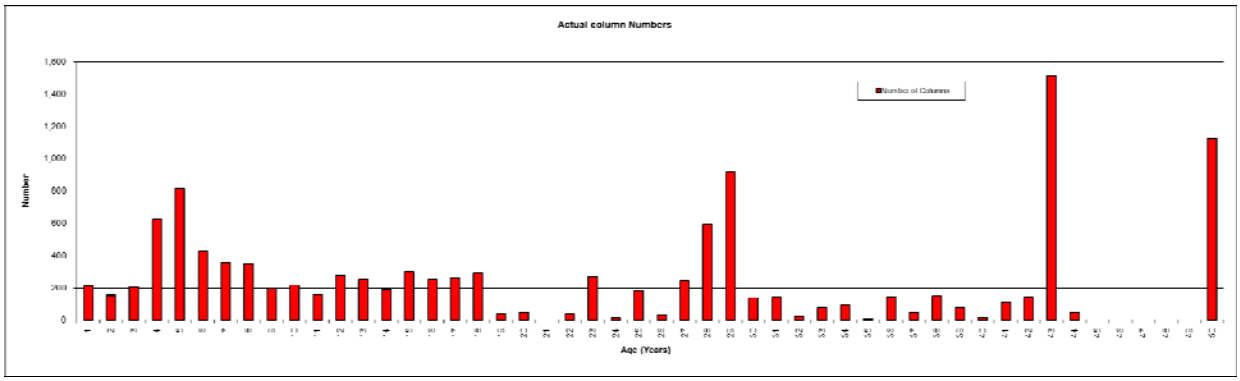


Fig 2.1

These columns can become a major risk to the Council if not monitored or replaced as there have been a number of incidents of column failure/collapse due to aging and wear and tear.

Using the above and assuming that the columns are replaced at the end of their design life the amount of annual investment required can be calculated as detailed below.

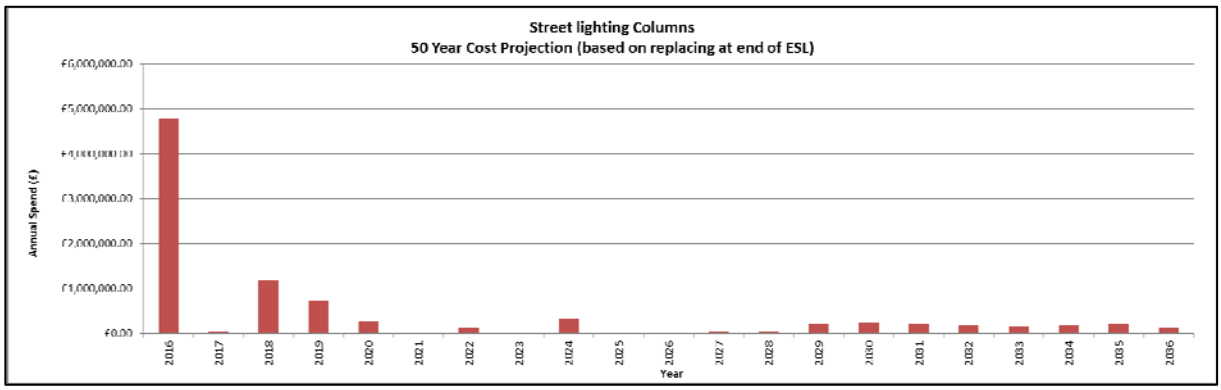


Fig 2.2

The graph demonstrates the major investment requirement in order to replace the existing aged stock of approximately **£4.7 Million** (Backlog figure) and the on-going substantial budgetary requirement for the following 5 years however the level of annual renewal investment between 6 and 20 years is substantially lower.

3.3.7 Budget Vs Condition Scenarios

Using the existing age profile data it is possible to calculate the number of columns that will remain in service past their expected service lives (ESL) for differing levels of annual investment in column replacement.

A number of renewal funding scenarios were undertaken:

1. Maintain Steady State - maintain the existing condition of the street lighting using a replacement regime of expired service life assets.

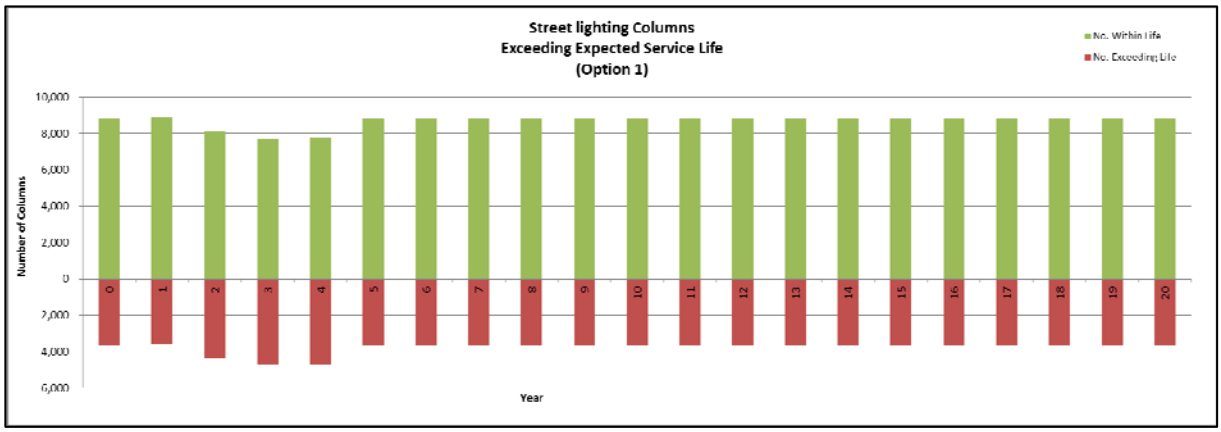
2. 14.4% of a £7.5M 5 year Roads Capital Budget (£1080K) – Average approximately £216,000 p.a. using a replacement regime of expired service life assets
3. 14.4% of a £15.0M 5 year Roads Capital Budget – Average approximately £432,000 p.a. using a replacement regime of expired service life assets
4. 14.4% of a £22.5M 5 year Roads Capital Budget – Average approximately £648,000 p.a. using a replacement regime of expired service life assets
5. Investment required to remove the backlog of life expired assets over the 5 year period.

3.3.7.1 Maintain Steady State

Based on the maintaining the number of lighting columns that have exceeded their expected service life at 3105 from 2018 onwards the anticipated capital investment requirement has been calculated at:

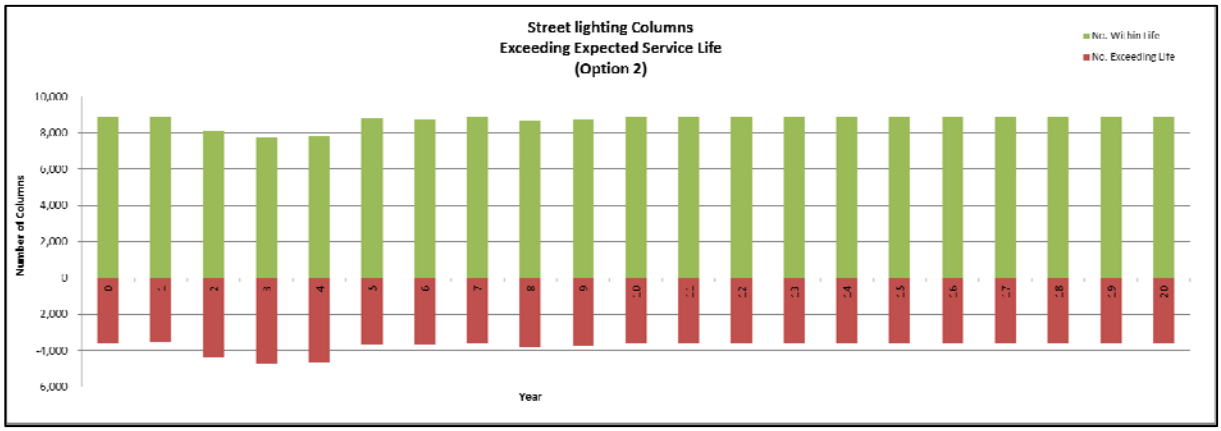
Table 3.9 Annual Street Lighting Capital Investment to Option 1 - Maintain Steady state

Year	Base Investment	Investment allowing 5% annual inflation
2018	£277,000	£277,000
2019	£31,000	£32,550
2020	£535,500	£590,389
2021	£52,000	£60,197
2022	£7,000	£8,509
2023	£84,000	£107,208
2024	£68,000	£91,127
2025	£337,000	£474,193
2026	£261,000	£385,616
2027	£187,000	£290,098



3.3.7.2 £1,080,000 Capital Investment over a 5 Year Period

This would entail a base annual investment of **£195,000** in year 2018/19 rising to **£237,000** in 2022/23 where the total investment over 5 years would be approximately **£1,080,000**. This would increase the amount of life expired assets to 3,619 in 2023.



Following this initial 5 year investment period a steady state investment requirement has been calculated as detailed below.

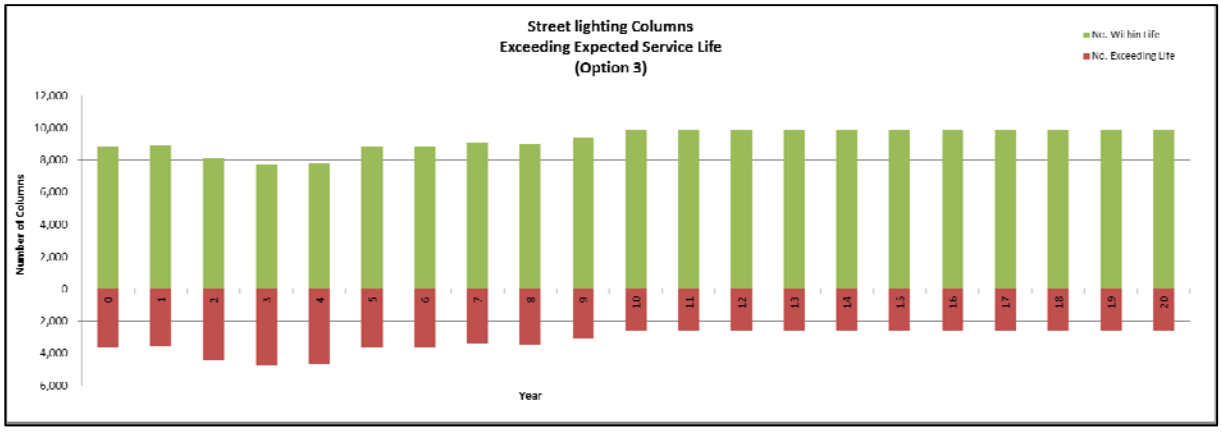
Table 3.10 Annual Street Lighting Capital Investment Option 2 Average £216,000 p.a. then Maintain Steady state

Year	Base Investment	Investment allowing 5% annual inflation
2018	£195,000	£195,000
2019	£195,000	£204,750
2020	£195,000	£214,988
2021	£195,000	£225,737
2022	£195,000	£237,024
2023	£84,000	£107,208
2024	£29,000	£38,863
2025	£368,000	£517,813
2026	£222,500	£328,734
2027	£195,500	£303,285

The total cost over 10 years being **£2,373,400** allowing for 5% annual rate of inflation.

3.3.7.3 £2,160,000 Capital Investment over a 5 Year Period

This would entail a base annual investment of **£390,000** in year 2018/19 rising to **£474,000** in 2022/23 where the total investment over 5 years would be approximately **£2,155,000**. This would reduce the amount of life expired assets to 2,593 in 2023.



Following this initial 5 year investment period a steady state investment requirement has been calculated as detailed below.

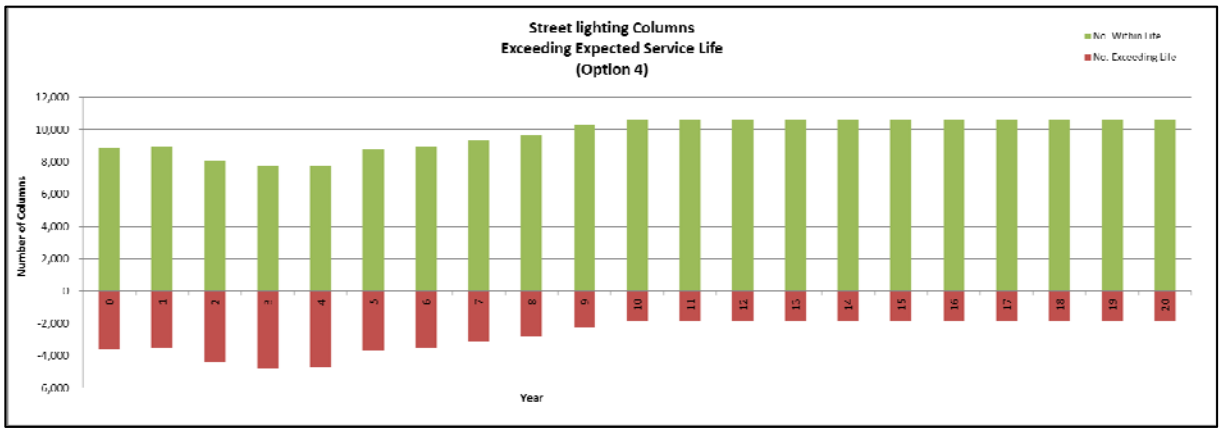
Table 3.11 Annual Street Lighting Capital Investment Option 3 Average £431,000 p.a. then Maintain Steady state

Year	Base Investment	Investment allowing 5% annual inflation
2018	£390,000	£390,000
2019	£390,000	£409,500
2020	£390,000	£429,975
2021	£390,000	£451,474
2022	£390,000	£474,047
2023	£59,000	£75,301
2024	£60,000	£80,406
2025	£263,000	£370,067
2026	£462,000	£682,584
2027	£293,000	£454,539

The total cost over 10 years being **£3,817,894** allowing for 5% annual rate of inflation.

3.3.7.4 £3,240,000 Capital Investment over a 5 Year Period

This would entail a base annual investment of **£586,000** in year 2018/19 rising to **£712,000** in 2022/23 where the total investment over 5 years would be approximately **£3,240,000**. This would reduce the amount of life expired assets to 1,825 in 2023.



Following this initial 5 year investment period a steady state investment requirement has been calculated as detailed below.

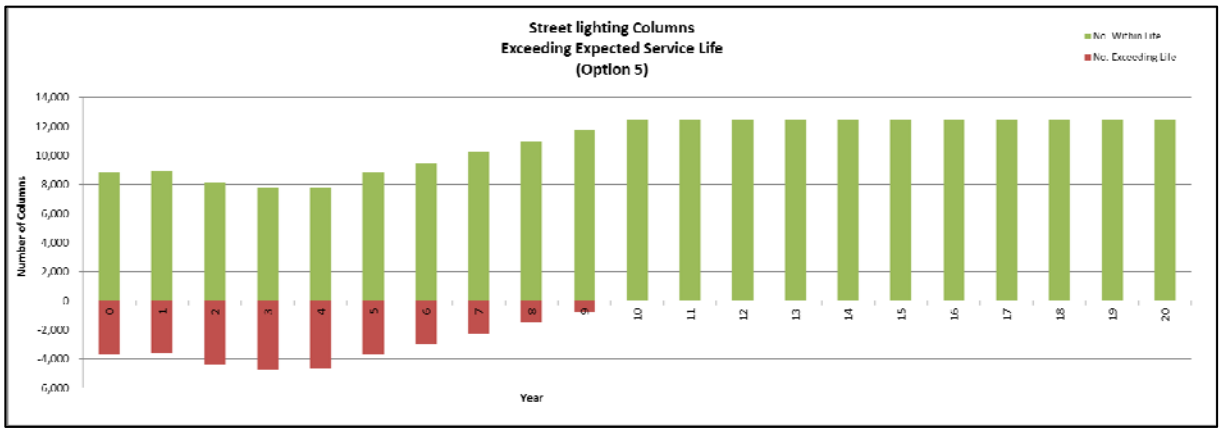
Table 3.12 Annual Street Lighting Capital Investment Option 4 Average £648,000 p.a. then Maintain Steady state

Year	Base Investment	Investment allowing 5% annual inflation
2018	£586,000	£586,000
2019	£586,000	£615,300
2020	£586,000	£646,065
2021	£586,000	£678,368
2022	£586,000	£712,287
2023	£40,000	£51,051
2024	£30,000	£40,203
2025	£372,000	£523,441
2026	£383,000	£565,865
2027	£234,500	£363,786

The total cost over 10 years being **£4,782,367**allowing for 5% annual rate of inflation.

3.3.7.5 Continue to Remove the Life Expired Assets over a 5 Year Period

This would entail a base annual investment of **£1,330,000** in year 2018/19, averaging **£1,084,850** Per annum making the total investment over 5 years approximately **£5,425,000**. This would reduce the amount of life expired assets to 0 in 2023.



Following this initial 5 year investment period a steady state investment requirement has been calculated as detailed below.

Table 3.13 Annual Street Lighting Capital Investment Option 5 Remove all life expired then Maintain Steady state

Year	Base Investment	Investment allowing 5% annual inflation
2018	£1,330,000	£1,330,000
2019	£610,000	£640,500
2020	£1,325,500	£1,461,364
2021	£942,000	£1,090,483
2022	£742,000	£901,906
2023	£29,500	£37,650
2024	£31,250	£41,878
2025	£258,000	£363,032
2026	£245,000	£361,977
2027	£163,500	£253,642

The total cost over 10 years being **£6,482,431** allowing for 5% annual rate of inflation.

All figures in the sections above exclude the lit signs and bollards; additional work is required to assess the renewal funding requirements for these assets.

3.4 Road Structures Assets

3.4.1 SCOTS Road Structures Prioritisation Project

The Society of Chief Officers for Transportation in Scotland (SCOTS), as part of their Road asset Management project and in association with the Bridges Group have devised a works prioritisation methodology for determining the costs involved in maintaining each authorities road structure assets.

A prioritisation tool has been produced to enable bridge engineers from each authority to make their assessments in a comparable manner.

The tool uses input information gained from the local engineers that relate to:

- Structure Reference
- Structure Name
- Structure type
    - Road Bridge
    - Footbridge
    - Special Structures
    - Culverts / Subways
    - Retaining Walls
    - Height sign & Signal Gantries
- Primary material
    - Masonry
    - Reinforced concrete
    - Steel Composite etc.
- Structure Crosses
    - Road
    - Rail
    - Water
- Length

- Deck Area
- Bridge Condition Indices
    - BCIav and BCIcrit gained from the bridge condition inspections
- Capacity – Height / Weight
- Location and Criticality to Network
- Any recent works undertaken
- Parapet Information

Using the above information along with nationally agreed amounts and rates for the routine and cyclic maintenance work required on each structure type the tool provides an easy way to assess the average annual routine costs to maintain each individual structure.

It also allows identification of any major refurbishment or strengthening works required and allows the Bridge Engineers to input estimated costs for these works.

3.4.2 Routine, Reactive and Cyclic Maintenance

Routine maintenance needs are different for each structure type these have been identified within the tool and include:

- Bearing replacement
- Waterproofing replacement
- Painting
- Joint repair/ replacement
- Pointing
- Resurfacing of footbridges

The Structures Tool has identified the regular maintenance needs for the Council's road structure assets and has estimated the average annual costs required to undertake the work as described above.

TABLE 3.14 ANNUAL ROAD STRUCTURES MAINTENANCE NEED COSTS:

	Priority 1	Priority 2	Priority 3	Priority 4
Road Bridges	£0	£6,204	£24,816	£146,827
Footbridges	£0	£0	£28,433	£5,170

TABLE 3.14 ANNUAL ROAD STRUCTURES MAINTENANCE NEED COSTS:				
	Priority 1	**Priority 2**	**Priority 3**	**Priority 4**
Sea Walls	£0	£0	£0	£3,747
Culverts and Subways	£30,000	£0	£0	£83
TOTALS	**£30,000**	**£6,204**	**£53,249**	**£155,744**

The total annual investment required in order to maintain the road structures stock (excluding slipways and retaining walls) is estimated at **£245,000**, of which a sum of £200,000 could be classified as on-going refurbishment from existing capital investment.

The priority bands signify the importance of undertaking the regular maintenance identified, priority 1 works are those that should be undertaken as a matter of greatest importance, priority 4 works are those that require regular attention but will not cause immediate major problems if the intervals between treatments are extended.

Reactive Maintenance for Structures is minimal and has recently been less than £10,000 per annum.

3.4.3 Strengthening / Major Refurbishment Works

The tool using information provided by the Council's engineer has identified a number of structures that require strengthening or major refurbishment works and estimated costs for undertaking these have been included.

This has identified a total of 79 structures that currently require works at an estimated cost of **£1,650,000**

Table 3.15 below identifies the number of each structure type that require works and the total estimated cost of undertaking all of the works required.

TABLE 3.15 STRUCTURE STRENGTHENING NEEDS:			
Structure Type	Work Type	Number of Structures	Estimated Cost
Road Bridges	Structure Strengthening Works	7	£515,000
	Parapet Upgrade & Scour Protection Works	22	£280,000
Pedestrian Bridges	Structure Strengthening Works	1	£50,000
	Parapet Upgrade Works	0	£0

Sea Walls	Parapet Upgrade & Scour Protection Works	9	£195,000
Culverts and Subways	Structure Strengthening Works	10	£90,000
	Parapet Upgrade & Scour Protection Works	30	£340,000
Total	**ALL**	**79**	**£1,470,000**

Investment requirements for sea walls and slipways are unavailable due to lack of inventory and/or condition information.

3.4.4 Investment Options

In order to calculate the investment required to remove this backlog over a given time period it has been necessary to identify the individual scheme costs and to prioritise them in order of their importance.

These costs can vary substantially year on year dependent upon the relative size and costs of the individual schemes identified.

A number of investment options have been identified and the schemes that can be undertaken for each year's investment have been identified from the prioritised list.

Using the known investment for 2016/17 and 2017/18 it is anticipated that the number of schemes undertaken will be:

Year	Renewals Investment	No of schemes
2016/17	£100,000	4
2017/18	£500,000	14

Going forward from 2018 onwards the options considered are:

1. Maintain Steady State - maintain the existing condition of the structures using a regime of minor maintenance works and small refurbishment schemes.
2. 6.1% of a £7.5M 5 year Roads Capital Budget (£457K) – Average approximately £91,000 p.a. using a regime of refurbishment schemes
3. 6.1% of a £15.0M 5 year Roads Capital Budget – Average approximately £182,000 p.a. using a using a regime of refurbishment schemes
4. 6.1% of a £22.5M 5 year Roads Capital Budget – Average approximately £273,000 p.a. using a using a regime of refurbishment schemes

5. Investment required to remove the backlog of life expired assets over the 5 year period.

3.4.4.1 Maintain Steady State

Based on the maintaining the number of structures requiring refurbishment works at 55 from 2018 onwards the anticipated investment requirement could be regarded as being equivalent to the ongoing maintenance need of approximately £45,000 per annum rising to £55,000 in 2022/23 and making a total of approximately £250.000 over the 5 year period.

This would be a reasonable assumption over a short period of 5 years however ongoing deterioration of the stock would require substantial additional investment in years to come.

3.4.4.2 6.1% of a £7.5M Capital Investment over a 5 year Period

This would entail a base annual investment of **£82,000** in year 2018/19 rising to **£99,700** in 2022/23 where the total investment over 5 years would be approximately **£455,000**.

This would allow for the following amounts of structures to be refurbished each year

Year	Renewals Investment	No of schemes
2018/19	£82,000.00	2
2019/20	£86,000.00	3
2020/21	£90,500.00	4
2021/22	£95,000.00	5
2022/23	£99,500.00	5

This would leave 51 refurbishment schemes outstanding in 2023 allowing for three additional schemes to be added each year that are identified following the annual bridge inspection exercise.

3.4.4.3 6.1% of a £15.0M Capital Investment over a 5 year Period

This would entail a base annual investment of **£165,000** in year 2018/19 rising to **£200,000** in 2022/23. The total investment over 5 years would be approximately **£912,000**.

This would allow for the following amounts of structures to be refurbished each year

Year	Renewals Investment	No of schemes
2018/19	£165,000.00	5
2019/20	£173,000.00	9
2020/21	£182,500.00	8
2021/22	£191,000.00	9
2022/23	£200,000.00	14

This would leave 25 refurbishment schemes outstanding in 2023 allowing for three additional schemes to be added each year that are identified following the annual bridge inspection exercise.

3.4.4.4 6.1% of a £22.5M Capital Investment over a 5 year Period

This would entail a base annual investment of **£247,000** in year 2018/19 rising to **£286,000** in 2021/22 and then reducing to £255,000 in 2022/23as the backlog of schemes is completed. The total investment over 3 years would be approximately **£1,319,000**.

This would allow for the following amounts of structures to be refurbished each year

Year	Renewals Investment	No of schemes
2018/19	£247,000.00	9
2019/20	£259,000.00	13
2020/21	£272,000.00	17
2021/22	£286,000.00	17
2022/23	£255,000.00	14

This would leave 0 refurbishment schemes outstanding in 2023 allowing for three additional schemes to be added each year that are identified following the annual bridge inspection exercise.

3.4.4.5 Remove the "Backlog" of outstanding schemes over a 5 year Period

This would entail a base annual investment of **£235,000** in year 2018/19 rising to **£285,000** in 2022/23. The total investment over 5 years would be approximately **£1,298,000**.

This would allow for the following amounts of structures to be refurbished each year

Year	Renewals Investment	No of schemes
2018/19	£235,000.00	9
2019/20	£247,000.00	12
2020/21	£259,000.00	15
2021/22	£272,000.00	17
2122/23	£285,000.00	17

This would leave 0 refurbishment schemes outstanding in 2023 allowing for three additional schemes to be added each year that are identified following the annual bridge inspection exercise.

4 Other Assets

In depth assessment of the financial needs for the minor asset groups have not been included within this report however following an investigation of spending over the last 5 years and an assessment of required works backlog using the knowledge and experience of the appropriate officers with Inverclyde Council an allowance has been made for the continued funding of the maintenance of these assets which is included in table 5.2 as Other Assets.

4.1 Assets Included

- Drainage
- Traffic signals
- Verge
- Road Markings
- Trees
- Safety Barriers
- Pedestrian Guard Rail
- Traffic Signs
- Kerbing

4.2 Basis of Estimate

In order to produce an estimate of required on-going routine maintenance funding for these assets an investigation of historical spend was undertaken.

Additionally an estimate of the outstanding works requirements was obtained from relevant officers within the council.

Estimates were then made in regard to the annual routine maintenance requirements based on undertaking the outstanding minor repairs and continuing to be able to fund continued cyclic maintenance and additional defect repair as they arose.

4.3 Estimated Annual Investment Requirements

Table 4.1 Estimated Maintenance Investment – Other Assets		
	Routine	Capital
Drainage	£100,000	£50,000
Traffic signals	£15,000	£90,000
Verge	£95,000	
Road Markings & Traffic Signs	£48,000	£50,000

Table 5.2 details the annual cost of undertaking this work with an allowance for a 5% annual inflation.

5 Option Summary

5.1 Chosen Options for Renewals Investment

The tables below detail the estimated costs for the 5 chosen options.

1. Maintain Steady State
2. £7.5M Capital Investment over 5 Years
3. £15.0M Capital Investment over 5 Years
4. £22.5M Capital Investment over 5 Years
5. Reduce backlog over a 5 year period

The figures in the tables allow for a 5% per annum inflation increase.

Table 5.1 Inverclyde Road Asset Investment Option Summary Table Capital Investment allowing for 5% inflation p.a.						
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
Carriageways						
Maintain Condition	£942,000	£989,000	£1,038,000	£1,090,000	£1,144,000	£5,203,000
£7.5M 5yr Total Roads Budget	£815,000	£856,000	£898,000	£943,000	£990,000	£4,502,000
£15M 5yr Total Roads Budget	£1,629,000	£1,711,000	£1,796,000	£1,886,000	£1,980,000	£9,002,000
£22.5M 5yr Total Roads Budget	£2,444,000	£2,566,000	£2,694,000	£2,829,000	£2,970,000	£13,503,000
Remove Backlog	£2,150,000	£2,258,000	£2,371,000	£2,489,000	£2,614,000	£11,882,000
Footways						
Maintain Condition	£306,000	£321,000	£337,000	£354,000	£372,000	£1,690,000
£7.5M 5yr Total Roads Budget	£154,000	£162,000	£170,000	£179,000	£188,000	£853,000
£15M 5yr Total Roads Budget	£309,000	£325,000	£341,000	£358,000	£376,000	£1,709,000
£22.5M 5yr Total Roads Budget	£464,000	£488,000	£512,000	£538,000	£564,000	£2,566,000
Remove Backlog	£439,000	£461,000	£484,000	£508,000	£533,000	£2,425,000
Street Lighting						
Maintain Condition	£277,000	£32,500	£590,000	£60,000	£8,500	£968,000
£7.5M 5yr Total Roads Budget	£195,000	£205,000	£215,000	£226,000	£238,000	£1,079,000
£15M 5yr Total Roads Budget	£390,000	£410,000	£430,000	£452,000	£475,000	£2,157,000
£22.5M 5yr Total Roads Budget	£586,000	£616,000	£647,000	£679,000	£713,000	£3,241,000
Remove Backlog	£1,330,000	£641,000	£1,461,000	£1,090,000	£902,000	£5,424,000
Structures						
Maintain Condition	£45,000	£47,000	£50,000	£52,000	£55,000	£249,000
£7.5M 5yr Total Roads Budget	£82,000	£86,000	£91,000	£95,000	£100,000	£454,000
£15M 5yr Total Roads Budget	£165,000	£173,000	£183,000	£191,000	£200,000	£912,000
£22.5M 5yr Total Roads Budget	£247,000	£259,000	£272,000	£286,000	£255,000	£1,319,000
Remove Backlog	£235,000	£247,000	£259,000	£272,000	£285,000	£1,298,000
Other Assets						
Maintain Condition	£190,000	£200,000	£209,000	£220,000	£231,000	£1,050,000

Table 5.2 Inverclyde Road Asset Investment Option Summary Table Revenue Investment allowing for 5% inflation p.a.						
Carriageways						Total
Routine Maintenance Costs	£506,000	£531,300	£557,865	£585,758	£615,046	£2,795,969
Earmarked Reserves	*£129,000*	*£135,450*	*£142,223*	*£149,334*	*£156,800*	*£712,806*
Grand Total	£635,000	£666,750	£700,088	£735,092	£771,846	£3,508,776
Footways						
Routine Maintenance Costs	£10,000	£10,500	£11,000	£12,000	£12,000	£55,500
Earmarked Reserves	*£2,500*	*£2,600*	*£2,800*	*£2,900*	*£3,000*	*£13,800*
Grand Total	£12,500	£13,100	£13,800	£14,900	£15,000	£69,300
Street Lighting						
Routine Maintenance Costs	£353,000	£370,650	£389,183	£408,642	£429,074	£1,950,548
Energy Costs Baseline	£366,000	£420,000	£441,000	£463,000	£486,000	£2,176,000
Earmarked Reserves	*£7,000*	*£7,300*	*£7,700*	*£8,100*	*£8,500*	*£38,600*
Grand Total	£726,000	£797,950	£837,883	£879,742	£923,574	£4,165,148
Structures						
Routine Maintenance Costs	£10,000	£10,500	£11,000	£12,000	£12,000	£55,500
Earmarked Reserves	*£0*	*£0*	*£0*	*£0*	*£0*	*£0*
Grand Total	£10,000	£10,500	£11,000	£12,000	£12,000	£55,500
Other Assets						
Routine Maintenance Other Assets	£211,000	£221,550	£232,628	£244,259	£256,472	£1,165,908
Earmarked Reserves (Drainage)	*£56,000*	*£58,800*	*£61,740*	*£64,827*	*£68,068*	*£309,435*
Grand Total	£267,000	£280,350	£294,368	£309,086	£324,540	£1,475,344
All Assets Routine Mtce Total	**£1,456,000**	**£1,564,500**	**£1,642,675**	**£1,725,659**	**£1,810,592**	**£8,199,425**
All Assets Earmarked Reserves	***£194,500***	***£204,150***	***£214,463***	***£225,161***	***£236,369***	***£1,074,642***
All Assets Grand Total	**£1,650,500**	**£1,768,650**	**£1,857,138**	**£1,950,819**	**£2,046,960**	**£9,274,067**

6 Recommendations

The report puts forward a number of differing funding options and details the impact on the assets subject to the level of funding and the associated timescale of each.

The investment needed for the major assets looked at five options; 1. Maintain the Current Condition (Steady state); 2. A percentage of a proposed £7.5M 5 year overall roads budget; 3. A percentage of a proposed £15.0M 5 year overall roads budget; 4. A percentage of a proposed £22.5M 5 year overall roads budget; 5. Continue to reduce the backlog over a 5 year period.

1. Carriageways: It is recommended that option 3 in table 5.1 above be adopted as it offers the optimum solution in terms of continuing to improve the condition of the network whilst also reducing the amount of capital investment from current levels. Although not fully meeting the original goals of the 10 year investment plan the improved condition is substantial and will make ongoing maintenance achievable within realistic budgets.

2. Footways: It is recommended that option 3 in table 5.1 above be adopted as it offers the optimum solution in terms of continuing to improve the condition of the network whilst also reducing the amount of capital investment from current levels. With limited condition data available the levels of investment within option 3 make sense as a means of ensuring ongoing condition improvements.

3. Street Lighting: It is recommended that option 3 in table 5.1 above be adopted as it offers the optimum solution in terms of continuing to improve the condition of the network whilst also reducing the amount of capital investment from current levels. This level of investment will reduce the amount of life expired assets to a reasonable level that can be monitored and tested to ensure their replacement at the optimum time. Whilst also coming in at approximately half the cost of continuing to replace all of the life expired assets.

4. Road Structures: It is recommended that option 3 in table 5.1 above be adopted as it offers the optimum solution in terms of continuing to improve the condition of the network whilst also reducing the amount of capital investment from current levels. This level of investment will reduce the amount of life expired assets to a reasonable level that can be monitored and inspected to ensure their refurbishment at the optimum time.

The investment needed for the minor asset groups requires an in-depth assessment. However from an investigation on spend over the last 5 years an assessment of the backlog, using the knowledge and experience of Officers within Inverclyde Council, has determined an allowance to maintain these assets over a 10 year period.

5. It is recommended that this allowance is built into the capital budget for the future maintenance of these assets.

   Revenue spend on each of the assets over the last 4 years has been averaged to produce an estimated need figure going forward. Reducing this budget would mean a likely reduction in service standard either intervention criteria or reaction time would be necessary.

6. It is recommended that the revenue budget be set as per table 5.2 to include sums that were previously noted as being earmarked reserves.

The completion of the Road Asset Management Strategy report is only the beginning of the journey. As empirical information is built up more accurate forecasting is possible which will ensure the investment needed for the future replacement/maintenance of these major assets of the Council is planned in a way that will prevent a backlog and ensure that the assets are maintained in a sound steady state.

Appendix A - Basis of Financial Need Projections

In order to facilitate potential future cross asset risk and benefit assessment it is highly desirable that long term projections are produced in a consistent manner to enable future comparison. At this stage the detailed information required to produce these long term financial assessments is limited in some respects and will require a further exercise to record and interrogate information such as; levels of service, asset condition, treatment costs, asset age and particularly life expectancy.

Empirical data with regard to the life expectancy of differing constructions and material types is not available at present due to the lack of reliable historical data recorded on a local, national and international level.

However using currently available information based upon the experience of appropriate personnel at a local and national level within Scotland a prediction of long-term performance and cost has been calculated for the major asset groups (Carriageways, footways, Street Lighting and Structures) based upon the estimated cost of continuing to deliver existing standards and investigating a series of differing service level scenarios.

This can be used as an initial assessment, and as the ability to improve asset management practice increases, the benefits of those improvements can then be evaluated by comparison against this baseline assessment when re-evaluation is undertaken in future years.

The investment and deterioration tools used for this assessment have been produced through the SCOTS asset management project using information supplied by experienced engineers from all Scottish local authorities, they have been tested and where necessary updated over the last 4 years and have been used to provide a nationally comparable output for steady state calculations. Local condition and treatment variations have been allowed for within the explored options.

In depth assessment of the financial needs for the minor asset groups have not been included within this report however following an investigation of spending over the last 5 years and an assessment of required works backlog an allowance has been made for the continued funding of the maintenance of these assets which is described in section 5.0 and shown in table 6.2 as Other Assets. The assets included within this sum are: Drainage, Traffic Signals, Verge, Road Markings Trees, Pedestrian Guard Rail, Safety Barrier, Traffic Signs & Kerbing repairs.

Also included within this report is a contingency allowance of £100,000 p.a. for unexpected additional works such as; provision of edge support to unrestrained roads, additional drainage issues to be repaired during schemes, unusually high levels of pre-patching prior to surface dressing etc.

All financial outturn information is based on the 2016/17 rates applicable at the time of undertaking this exercise, funding requirements have been estimated over a 20 year period and the outturn information has then been subject to an estimated annual inflation of 5%.

Figures for predicted Construction materials inflation from 2016 onwards vary between 3.5% and 4.0% with an additional 2.0% rise in construction wages (BCIS Construction Briefing, September

2016). The CIPFA guidance in regard to valuation of road assets within the Whole of Government Accounts allows for inflation over 2 years of approximately 10% making an annual inflation for roads costs of approximately 5%

Inflation in road construction costs can vary significantly due to the fluctuating price of oil however allowing for an annual 5.0% inflation will provide a guide to the changes in funding requirements over the coming years.

The options for consideration within the summary option spend tables (Table 5.1 & 5.2) have only been detailed for the coming 5 years for ease of reference.