Inverclyde council

AGENDA ITEM NO. 19

Report To: **Environment and Regeneration Committee** **Date: 30 August 2012**

Report By: **Corporate Director Environment, Regeneration and Resources** **Report No:** **SCC/ENV/IM/12.133**

Contact Officer: **Robert Graham** **Contact No:** **01475 714827**

Subject: **Road Asset Investment Strategy**

1.0 PURPOSE

1.1 The purpose of this report is to advise Committee on the progress and development of the Road Asset Investment Strategy and to seek approval of the recommendation.

2.0 SUMMARY

2.1 An effective Road Asset Management Strategy will address the long term investment required to deliver a robust and effective programme of improvements to the roads assets and to maintain a steady state condition which will improve the wellbeing of the area and deliver wide ranging benefits to the general community.

Attachment 1 has been developed on the basis of this strategy. The options within the attachment are 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.

2.2 In general the report in attachment 1 takes a broad overview of deterioration and investment requirements at a network wide level. The tools within the assessment models are used to obtain indicative levels of funding to meet given service level scenarios rather than enabling the identification of actual work locations on different parts of the asset.

2.3 The report details the primary investment areas that are being developed within the Roads Asset Investment Strategy.

2.4 The Strategy provides options in terms of investment to address the backlog of maintenance with options on the period of time over which the investment could be spread. In addition the Strategy provides details of the investment required to maintain the Roads assets in a steady state for the future.

2.5 Previous assessments provided details on the backlog and cost to maintain carriageways only. The attached Strategy document provides details of the four main investment areas, carriageways, footways, street lighting and structures.

2.6 The focus of the Road Asset Investment Strategy has been on the four main investment areas however there are a small number of other roads assets that have not been completed in detail. An allowance has been included in Section 5 of Attachment 1 for Other Assets.

2.7 The Strategy considered a number of investment options including related timescales for investment. The 5 year initial investment plan will reap benefits in terms of future revenue investment however this investment will also provide benefits in terms of improved community safety and wellbeing, improvements in the environment, reduction in the carbon footprint and a likely reduction in complaints and claims against the Council.

3.0 RECOMMENDATIONS

3.1 That Committee note the contents of the Roads Asset Investment Strategy and remit the consideration of the resultant financial implications to the 2013/16 budget process.

Ian Moffat
Head of Environmental and Commercial Services

4.0 BACKGROUND

Long Term Investment

4.1 It was approved at the Safe, Sustainable Communities Committee on 25 October 2011 that the Head of Environmental and Commercial Services would submit for approval to a future Committee a long term investment strategy for the roads network and associated infrastructure.

4.2 Approval was also given to appoint Exp Consulting to complete the Roads Asset Management Plan (RAMP) which would be used to develop a long term investment strategy as referred to in 4.1 above.

4.3 Carriageways

The review involved detailed analysis of the road condition survey data information and applying various models and options to address the maintenance backlog.
Modelling studies included carrying out minimum renewal investment as well as investment to maintain a steady state. Minimum investment would lead to continuing deterioration of the network and therefore was discounted at an early stage of the options.
Investment to provide a steady state condition would maintain the assets in their current condition however there would be no improvement in the assets.
The modelling also addressed the investment required to eliminate the backlog of maintenance with options covering a 5, 10 and 20 year period.
The 20 year investment option has been discounted as not meeting the aspirations of the Council.

Details of the various investment options and implications are outlined in Attachment 1.
Table 6.1 of Attachment 1 details the various financial commitments that would be required to either maintain a steady state condition or to reduce the maintenance backlog over the timelines as noted above.

4.4 Footways

The review involved looking at the footway condition survey data information and applying various models to address the backlog of maintenance.
Options considered for footways were as 4.3 above with both the minimum renewal investment and the 20 year investment option being discounted at an early stage.

Details of the various investment options and implications are outlined in Attachment 1.
Table 6.1 of Attachment 1 details the various financial commitments that would be required to either maintain a steady state condition or to reduce the maintenance backlog over the timelines as noted above.

4.5 Street Lighting

The review has identified that there are currently around 3,600 lighting columns within Inverclyde that have exceeded their expected service life (ESL). Projections indicate that with the current level of investment this will rise to 4,800 within 5 years.
The models looked at were as 4.3 above however a high level of investment over a 5 year period is recommended.

Details of the various investment options and implications are outlined in Attachment 1.
Table 6.1 of Attachment 1 details the various financial commitments that would be required to either maintain a steady state condition or to reduce the maintenance backlog over the timelines as noted above.

Embarking on a wide scale replacement programme over a 5 year period for lighting provides the opportunity to engineer in to the design process sustainable and energy efficient components.
As referred to in table 3.1 of Attachment 1 there are potential energy cost savings over a 10 year period of £854,000. There is also the potential to reduce the Council's carbon footprint by over 6,000 tonnes within the same period.

4.6 Structures

Inverclyde has around 127 roads structures, excluding retaining walls and sea walls, which are included in this review.
These structures consist of a variety of materials, designs and functions and therefore applying single modelling techniques is not always appropriate for these assets.
In some instances a relatively low level of investment is required to extend the life of some of the assets whereas in the case of a bridge replacement a high level of investment will be required over a short period.
The review identifies 65 structures that currently require works to be carried out on them.
The remainder of the structures (62) will be funded, as maintenance requirements dictate from the annual maintenance costs identified in Table 5.1 of Attachment 1.
Options on the investment required to eliminate the backlog of maintenance on structures is being looked at over a 5, 10 and 20 investment period as well as the funding required to maintain these structures in a steady state for the future.
The 20 year investment option has been discounted as not meeting the aspirations of the Council.

Details of the various investment options and implications are outlined in Attachment 1.
Table 6.1 of Attachment 1 details the various financial commitments that would be required to either maintain a steady state condition or to reduce the maintenance backlog over the timelines as noted above.

4.7 Other Assets

As previously stated the review has concentrated on the four main investment areas within the Road Asset Investment Strategy however it should be noted that although no significant backlog exists for the above assets, as detailed in section 5 of Attachment 1, it is estimated that a further £600k per annum, excluding inflation, should be allocated for the future routine maintenance/improvement of these assets over the next 10 years.

5.0 DELIVERY OPTIONS

5.1 It is essential that the long term investment in the Roads Network and Infrastructure is supported by appropriate delivery mechanisms in design, construction and staffing levels.

It is also essential as part of the planning process that realistic timescales and logical programming are recognised in being able to deliver such a significant programme of works across the full spectrum of the Roads Network and Infrastructure within the timeframe being proposed.

5.2 Design

Although some of the above requirements will need a minimum of design input others, in particular lighting and 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 a spectrum of professional resources.

5.3 Construction

As in 5.2 above it will be necessary in many instances to establish framework contracts for the execution of the Works across the main investment areas to facilitate the construction phase of the programme for the next 10 years.

It is recognised that, in addition to the in-house workforce, significant resources will be needed to deliver the construction phase of any programme that is agreed.
Phasing and programming of these Works are essential to ensure that the likely ensuing disruption to the community is carried out in a planned, controlled and timely manner.

It is therefore envisaged that extensive consultation with stakeholders will be carried out prior to the construction phase of any of these major programmes.

5.4 Staffing

It is essential as part of this review that consideration is given to the staffing resources that will be needed to deliver such an extensive and sustained programme of work.

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 provide a further detailed report on how this will be resourced.

6.0 CONSULTATIONS

6.1 Finance

Approved funding for the Road Asset Investment Strategy are as detailed below:

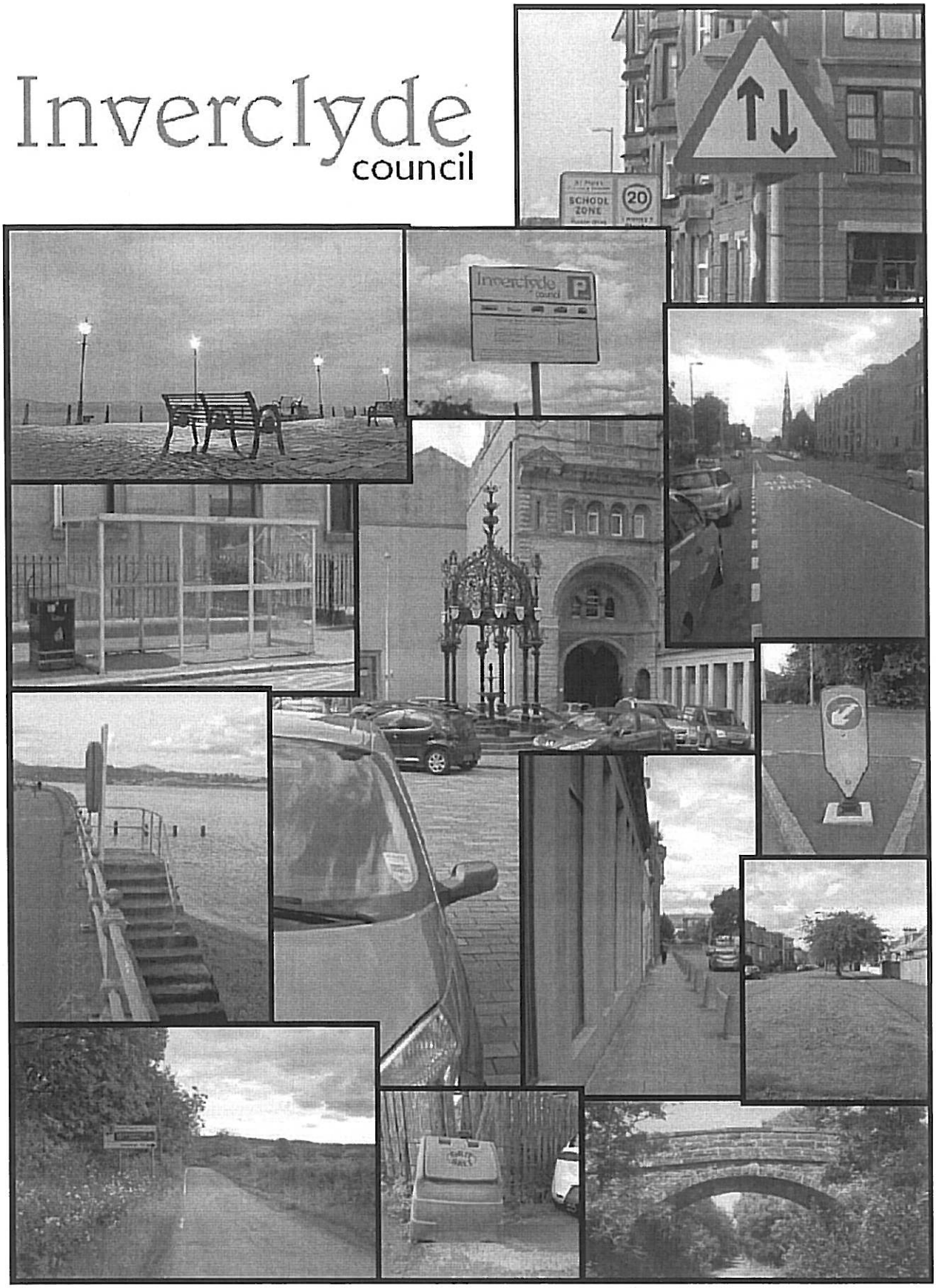
Cost Centre	Budget Heading	Proposed spend this report	Virement from	Other comments
	Capital Funding	£3,000,000	n/a	One – off funding approved Feb 2012
	Revenue Funding	£600,000		As above & to fund short term increase in pot hole investment and capital investment preparatory work.
	Revenue Funding	£1,631,000		2012/13 recurring
	Capital Funding	£1,400,000		2012/13 recurring

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

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

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

Inverclyde council



ROAD ASSET INVESTMENT STRATEGY

Road Asset Investment Strategy – Options Report

Contents

Executive Summary

This document puts forward a number of differing funding options in regard to the maintenance of the Road Assets within Inverclyde. It is based upon the information contained within the many documents, spreadsheets, IT systems and analysis tools that go to make up the Inverclyde Council Road Asset Management Plan (RAMP).

Financial Need Projections

A long term cost projection is a key output from asset management planning. A long term projection of anticipated costs will enable the council to plan more effectively; it can be used to enable an appropriate assessment of the future risk and benefits of alternative investment strategies.

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 6.1 and 6.2 deal only with a 10 year period. The options explored for all assets are: Maintain Current Level of Investment, Maintain Steady State, Reduce Backlog over 5 years and Reduce Backlog over 10 years. Additional options have been explored for each asset group but have been discounted as viable options within this report.

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. It is estimated that this figure for carriageways will remain somewhere between 3% and 5% 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.

In general the tools take a broad overview of deterioration and investment requirements at a network wide level and are used to obtain indicative levels of funding to meet given service level scenarios rather than enabling the identification of actual work locations on different parts of the asset.

The identification and programming of actual works remains in the hands of the suitably qualified and highly experienced personnel working within Inverclyde Council.

Carriageways

The Inverclyde Council carriageway asset is comprised of approximately 365Km of road, the Road Condition Index (RCI) value for Inverclyde, measured using the SRMCS survey machine, stands at 47.6% of the roads where more detailed monitoring or investigation is required. Approximately 13% of the Council's roads are in the worst (Red) condition where structural maintenance should be considered as a matter of some importance.

A deterioration and investment prediction tool has been developed through the SCOTS asset management project using the best available data and, where empirical data is unavailable, through the experience of road engineers across Scotland, it has been used to estimate the change in carriageway condition on a network wide basis dependent upon differing levels of investment.

The renewal investment scenarios reported within this document are:

1. Maintain Current Level of Investment
2. Maintain Steady State Local Scenario
3. Reduce the backlog of red condition roads over a 5 year period
4. Reduce the backlog of red condition roads over a 10 year period

Table 0.1 details the outturn figures for the above options with an allowance for 5% annual inflation over a 10 year period. Full year on year details can be found in table 6.1.

Table 0.1 Carriageway	Yr 1	Yr 5	Yr 6	Yr 10	Total 10 Yrs
Maintain Current Funding	£2,865,000	£950,000	£997,000	£1,212,000	**£11,910,000**
Maintain Condition	£1,976,000	£2,402,000	£2,522,000	£3,066,000	**£24,858,000**
Reduce backlog over 5 years	£4,584,000	£5,572,000	£2,400,000	£2,917,000	**£38,592,000**
Reduce backlog over 10 years	£3,319,000	£4,035,000	£4,236,000	£5,149,000	**£41,750,000**

Allowance has also been made for the on-going routine (cyclic and reactive) maintenance required to keep the carriageways in a safe condition and this is detailed in Table 6.2.

Footways

The Inverclyde Council footway asset is comprised of approximately 450Km of pavement, the condition of the footways, measured from sample coarse visual inspection, shows 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 as a matter of some importance.

A basic deterioration and investment prediction tool has been developed through the SCOTS asset management project using the best available data and, where empirical data is unavailable, through the experience of road engineers across Scotland, it has been used to estimate the change in footway condition on a network wide basis dependent upon differing levels of investment.

The renewal investment scenarios reported within this document are:

Option 1 – Maintain Current Levels of Investment
Option 2 – Maintain existing condition
Option 3 – Reduce backlog (red condition) over 5 years
Option 4 – Reduce backlog (red condition) over 10 years

Table 0.2 details the outturn figures for the above options with an allowance for 5% annual inflation over a 10 year period. Full year on year details can be found in table 6.1.

Table 0.2 Footway	Yr 1	Yr 5	Yr 6	Yr 10	Total 10 Yrs
Maintain Current Funding	£200,000	£244,000	£256,000	£311,000	**£2,521,000**
Maintain Condition	£543,000	£661,000	£694,000	£843,000	**£6,836,000**
Reduce backlog over 5 years	£911,000	£1,108,000	£690,000	£838,000	**£8,846,000**
Reduce backlog over 10 years	£734,000	£893,000	£937,000	£1,139,000	**£9,236,000**

Allowance has also been made for the on-going routine (cyclic and reactive) maintenance required to keep the footways in a safe condition and this is detailed in Table 6.2.

Street Lighting

The Inverclyde Council street lighting asset is comprised of approximately 12,000 lighting columns and 350Km of buried cable along with associated wall brackets, underpass lighting and controller cabinets, the age profile of the lighting columns show approximately 3600 columns that have exceeded their expected service life and should be inspected with regard to prioritising their replacement as soon as possible.

A deterioration and investment prediction tool has been developed through the SCOTS asset management project using the best available data and, where empirical data is unavailable, through the experience of lighting engineers across Scotland, it has been used to estimate the change in street lighting condition on a network wide basis dependent upon differing levels of investment.

The renewal investment scenarios reported within this document are:

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

Table 0.3 details the outturn figures for the above options with an allowance for 5% annual inflation over a 10 year period. Full year on year details can be found in table 6.1.

Table 0.3 Lighting	Yr 1	Yr 5	Yr 6	Yr 10	Total 10 Yrs
Maintain Current Funding	£200,000	£244,000	£256,000	£311,000	**£2,521,000**
Maintain Condition	£500,000	£608,000	£281,000	£342,000	**£4,318,000**
Reduce backlog over 5 years MEE	£1,400,000	£1,702,000	£179,000	£218,000	**£8,726,000**
Reduce backlog over 10 years MEE	£750,000	£912,000	£958,000	£1,164,000	**£9,439,000**
Reduce backlog over 5 years LED	£1,450,000	£1,763,000	£192,000	£233,000	**£9,075,000**
Reduce backlog over 10 years LED	£780,000	£949,000	£996,000	£1,211,000	**£9,815,000**

Allowance has also been made for the on-going routine (cyclic and reactive) maintenance required to keep the lighting asset in a safe condition this includes a substantial amount for energy costs.

An assessment has been undertaken using a street lighting energy evaluation tool as to the benefits of replacing the existing lantern types with more energy efficient lanterns as part of the column replacement programme. Replacing the existing with new LED lanterns has estimated a possible carbon reduction of 6,186 tonnes equating to a cost saving of £854,000 over the ten year period. Full details of the options explored can be found within section 3.9 with outturn year on year costs being detailed in table 6.2

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 81 road bridges, 8 footbridges, 62 culverts and 16 slipways the condition of the structures measured by the national Bridge Condition Indicator (BCIav & BCIcrit) show approximately 65 structures that require strengthening or major refurbishment work. Sea Walls, retaining walls and slipways have been excluded from this investment report due to lack of inventory and/or condition information,

A deterioration and investment prediction tool has been developed through the SCOTS asset management project using the best available data and, where empirical data is unavailable, through the experience of road engineers across Scotland, it has been used to identify the sub-standard structures and to estimate the priority for each of the structural repairs required to enable a programme to be produced.

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.

The renewal investment scenarios reported within this document are:

1. Maintain Existing Funding
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

Table 0.4 details the outturn figures for the above options with an allowance for 5% annual inflation over a 10 year period. Full year on year details can be found in table 6.1.

Table 0.4 Structures	Yr 1	Yr 5	Yr 6	Yr 10	Total 10 Yrs
Maintain Current Funding	£35,000	£43,000	£45,000	£55,000	**£444,000**
Maintain Condition	£200,000	£244,000	£256,000	£311,000	**£2,521,000**
Reduce backlog over 5 years	£740,000	£669,000	£256,000	£311,000	**£4,680,000**
Reduce backlog over 10 years	£240,000	£450,000	£460,000	£559,000	**£4,965,000**

Contingencies

Also included within the renewal maintenance figure is a contingency allowance to cover all asset groups 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.

Table 0.5 Contingencies	Yr 1	Yr 5	Yr 6	Yr 10	**Total 10 Yrs**
Contingencies Capital Works	£100,000	£122,000	£128,000	£156,000	**£1,262,000**

It should be borne in mind that the predicted investment requirements are based upon using existing average rates, however should there be a large investment resulting in a heavily increased workload it is expected that there will be some economies of scale that will also provide an additional contingency allowance.

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 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.

Table 0.6 Other Assets	Yr 1	Yr 5	Yr 6	Yr 10	Total 10 Yrs
Routine Maintenance Other Assets	£500,000	£608,000	£639,000	£776,000	**£6,293,000**

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**
Sea Walls	Identify all sea walls and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	12 Months
Retaining Walls	Identify all sea walls and their ownership and maintenance responsibilities. Identify current condition and all renewal and routine maintenance required	24 Months
Slipways	Identify all sea walls 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

Table 0.7 Other Assets Not Included in this Report		
Asset	**Action Required**	**Timescale**
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

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 and has 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 2011/12 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 inflation from 2015 onwards vary between 2.9% and 4.7% (Faithful & Gould Construction Inflation Report 2012). 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 6.1 & 6.2) have only been detailed for the coming 10 years for ease of reference.

1 Carriageway

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 1.1.

Table 1.1 Inverclyde Council Carriageway Treatment Options & Unit Rates

Code	Treatment	Description	Average Cost of Treatment (£/m²)
OL1	Overlay – Surfacing	Addition of new DBM/SMA surfacing materials on top of existing construction up to 40mm thick.	£20.00
OL3	Overlay – Surfacing	Addition of new HRA surfacing materials on top of existing construction up to 40mm thick.	£20.00
RS1	Resurfacing (surface)	Removal of existing surfacing materials, surface course, and replacement with new DBM/SMA surfacing materials up to 40mm thick.	£29.50
RS3	Resurfacing (surface)	Removal of existing surfacing materials, surface course, and replacement with HRA up to 40mm thick.	£29.50
RSB1	Resurfacing (surface & binder)	Removal of existing surface & binder courses, and replacement with 60mm DBM binder course & DBM/SMA surfacing materials up to 40mm thick.	£39.50
RSB3	Resurfacing (surface & binder)	Removal of existing surface & binder courses, and replacement with 60mm DBM binder course & HRA up to 40mm thick.	£39.50
SD1	Surface Dressing (Incl. pre-patching)	Pre-patching of failed areas and application of bituminous emulsion and aggregate to the road surface	£10.00

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 1.2 IC Estimated Carriageway Lifecycles			
Category	HRA / SMA	Amount of time before carriageway reaches amber 1 condition (years)	Amount of time before carriageway reaches red condition (years)
Principal (A) Roads (cat 2)	HRA	17	24
	SMA	15	22
Classified (B) Roads (cat 3a)	HRA	20	27
	SMA	18	25
Classified (C) Roads (cat 3b)	HRA	20	27
	SMA	20	27
Unclassified Roads (cat 4a & 4b)	HRA	25	35
	SMA	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.

1.3 Carriageway Area

The carriageway asset within Inverclyde is comprised of 282Km of Urban roads and 83Km of rural roads.

Using the known length and width information it has been possible to determine the areas of carriageway for each of the different road categories (Table 1.3).

Table 1.3 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	235110	5.8	1363638

Table 1.3 Carriageway Area Within Inverclyde				
Category	U-R	Length (m)	Width (m)	Area (sqm)
	Rural	29800	3.5	104300

1.4 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 2010/12 shows that the Road Condition Index (RCI) value for Inverclyde stands at **47.6%** 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 **13%** 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 1.4 Inverclyde Carriageway Condition Bands									
		Red		Amber 1		Amber 2		Green	
Category	U-R	%	Area (sqm)	%	%	%	Area (sqm)	%	Area (sqm)
Principal (A) Roads (cat 2)	Urban	5.75	6167	8.96	9610	17.92	19219	67.37	72254
	Rural	7.74	4842	6.69	4183	13.37	8366	72.20	45168
Classified (B) Roads (cat 3a)	Urban	3.68	1546	10.10	4242	20.20	8484	66.01	27724
	Rural	7.43	6452	12.46	10823	24.93	21646	55.18	47918
Classified (C) Roads (cat 3b)	Urban	4.00	7262	7.90	14343	15.80	28686	72.23	131141
	Rural	29.29	34384	14.59	17127	29.18	34254	26.94	31625
Unclassified Roads (cat 4a & 4b)	Urban	11.04	150546	11.55	157546	23.11	315091	54.30	740455
	Rural	35.37	36891	13.06	13618	26.11	27236	25.46	26555

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.

1.5 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% was included.

1.6 Routine Reactive and Cyclic Maintenance

The level of adhoc patch repairs required, which has recently been running at approximately **£450,000** p.a. (although this figure increased substantially in 2010/11 to **£1,100,000** due to the previous harsh winters) is not included within the calculation undertaken by this evaluation tool. It is anticipated that this will only fall if the condition of the network is improved substantially. Once this improvement has been undertaken it has been estimated that there could be a reduction in reactive repairs of up to **£100,000** p.a.

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.

1.7 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. Current Levels of Investment - using the known renewals investment budgets over the coming 2 years with the second year's budget continuing whilst also managing the deterioration such that the amount of carriageway in the red condition for each road category will be minimised.

2. Maintain Steady State Local Scenario - maintain the existing condition of the carriageways using locally preferred treatment options

3. Reduce the backlog of red condition roads over a 5 year period, whilst maintaining the level of amber condition roads and then maintaining the outturn condition

4. Reduce the backlog of red condition roads over a 10 year period, whilst maintaining the level of amber condition roads and then maintaining the outturn condition

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.

1.7.1 Maintain Current Levels of Investment

This scenario allows for using the known renewals investment budgets over the coming 3 years with the third year's budget continuing and managing the deterioration such that the amount of carriageway in the red condition for each road category will be minimised.

This would entail investments of Year 1 **£2,865,000** and Year 2 **£820,000**. Allowing for 5% inflation from then on the total investment over 10 years would be approximately **£11,910,000**.

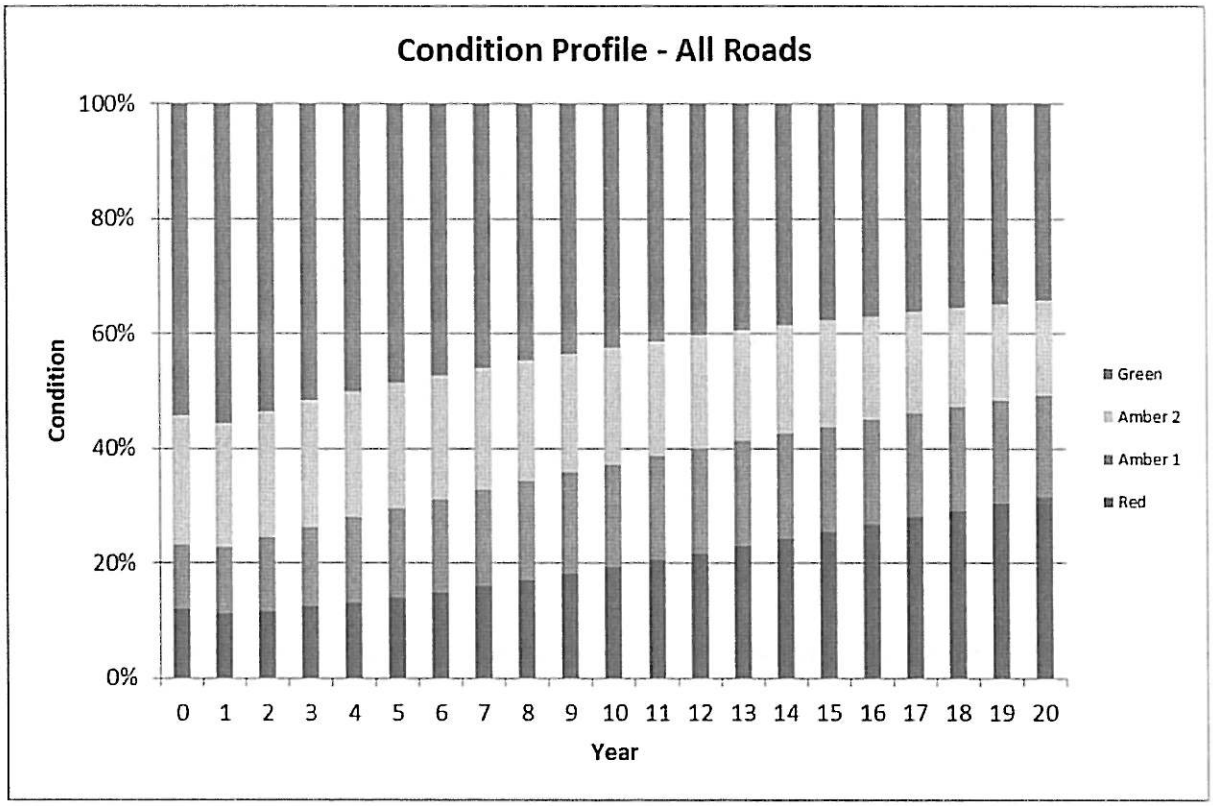


Fig 1.7.1 Maintain Current Investment Levels

It is estimated that this will result in an increase in red condition roads from 12% to 32% and an increase in RCI from 47% to 66% over a 20 year period.

1.7.2 Maintain Steady State Local

This Scenario allows for a greater level of road reconstruction and resurfacing, treating the worst condition roads, rather than using mainly preventative treatments such as surface dressing.

This shows an initial year 1 investment of **£1,976,000** (£2.0M) which with 5% inflation will rise to **£2,402,000** after 5 years and result in a total investment over 10 years of **£24,858,000** in order to maintain the carriageways within Inverclyde in their present

condition, this figure is calculated based on using some intervention treatment to prevent further deterioration of the network but with a higher amount of resurfacing and reconstruction treating the worst condition roads that are not suitable for a surface dressing.

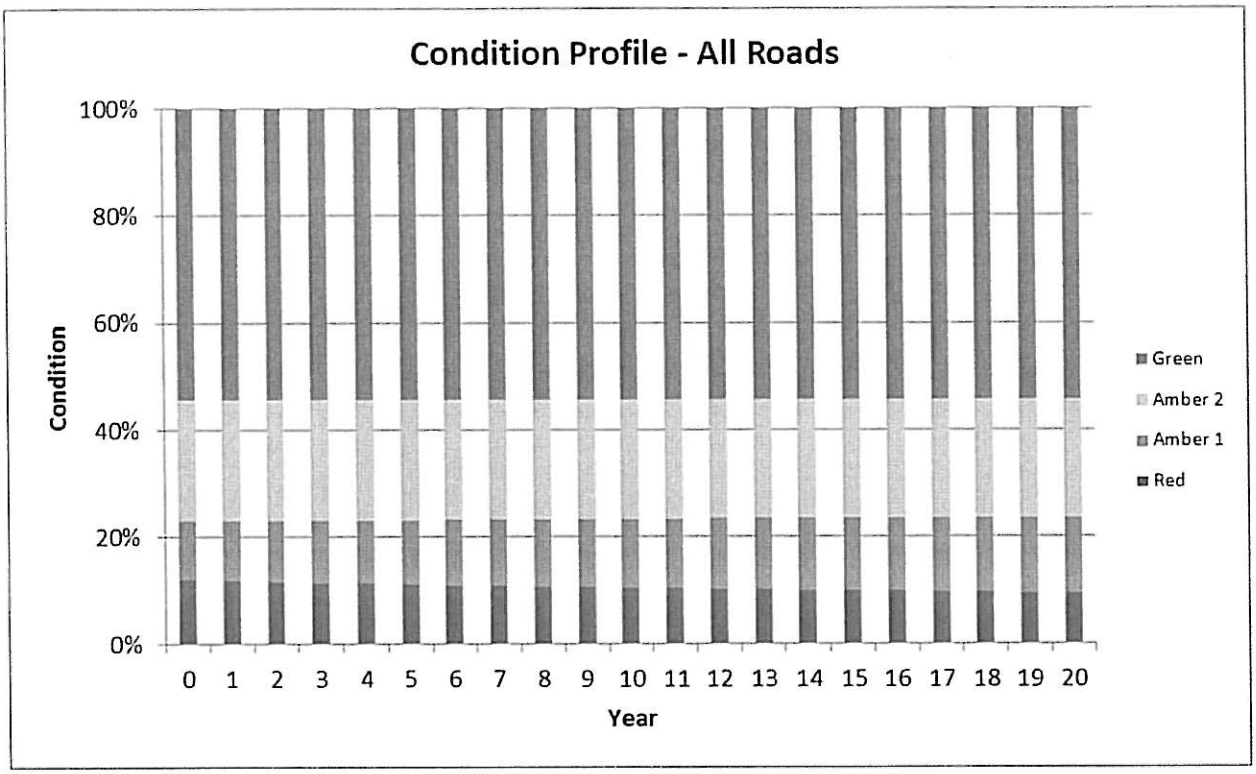


Fig 1.7.2 Maintain Current condition

1.7.3 Remove backlog over a 5 year period

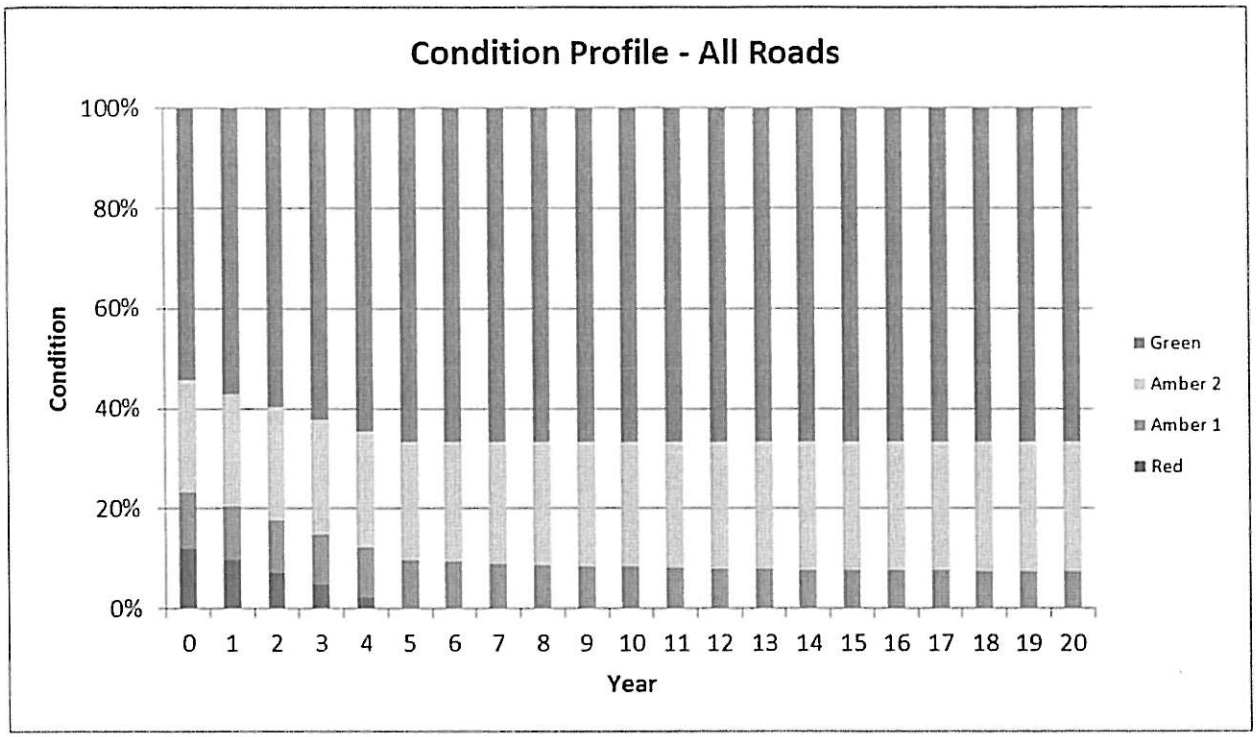


Fig 1.7.3 Remove Backlog over a 5 year period

In order to achieve this it is estimated that the initial year 1 investment of **£4,584,000** which with 5% inflation will rise to **£5,572,000** after 5 years, will then reduce to **£2,400,000** in year 6, due to the much improved condition of the roads and result in a total investment over 10 years of **£38,592,000.**

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.

1.7.4 Remove backlog over a 10 year period

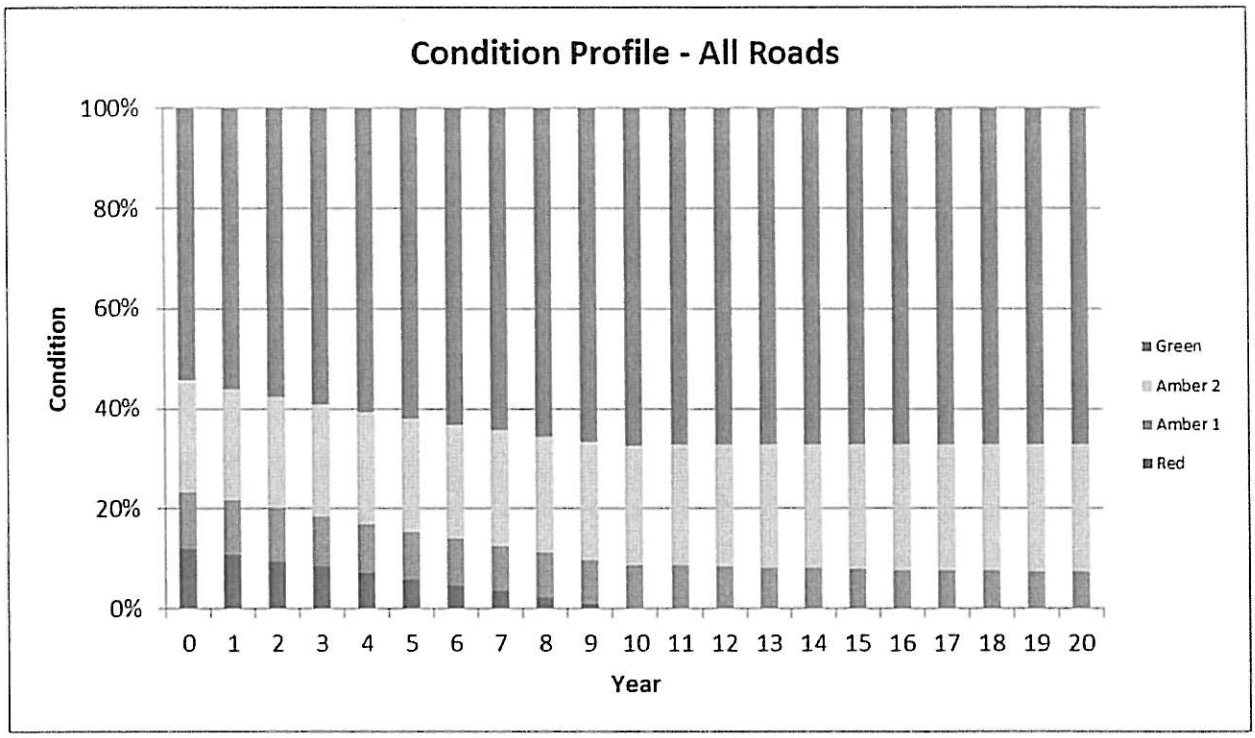


Fig 1.7.4 Remove Backlog over a 10 year period

In order to achieve this it is estimated that the initial year 1 investment of **£3,319,000** which with 5% inflation will rise to **£4,035,000** after 5 years will result in a total investment over 10 years of **£41,750,000.**

1.8 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 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 3% and 5% 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.

2 Footways

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.

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 was 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 4.1.

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 4.1 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.	15	£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.	80	£55.00
Reconstruction of Concrete Footway	Removal of existing footway construction, full depth including sub-base, and replacement with new concrete construction.	80	£80.00
Reconstruction (PC Blocks)	Removal of existing block footway construction, full depth including sub-base, and replacement with new.	80	£65.00

Table 4.1 Footway Renewal Treatment Options Used Within Inverclyde			
Treatment	**Description**	**Lifecycle (yrs) (Frequency of treatment)**	**Average Cost of Treatment (£/m²)**
Reconstruction (PC Slabs)	Removal of existing flagged footway construction, full depth including sub-base, and replacement with new.	80	£65.00
Reconstruction (Stone)	Removal of existing stone footway construction, full depth including sub-base, and replacement with new.	80	£45.00
Relay (PC Blocks)	Take up and relay existing block footway surface, including replacement of damaged blocks.	20	£37.00
Relay (PC Slabs)	Take up and relay existing flagged footway surface, including replacement of broken slabs.	20	£37.00
Relay (Stone)	Take up and relay existing stone footway surface, including replacement of broken slabs.	20	£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.	40	£60.00
Resurface (PC Blocks)	Removal of existing block footway surface and replacement with new PC blocks	40	£45.00
Resurface (PC Slabs)	Removal of existing flagged footway surface and replacement with new PC Slabs.	40	£45.00
Resurface (Stone)	Removal of existing stone footway surface and replacement with new.	40	£37.00
Slurry Seal	Application of a thin screed surfacing to the existing bituminous footway. Includes pre-patching and regulating as required.	8	£7.00

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.

Table 4.2 Footway Areas by material

	Cat 1A footway	Cat 1 footway	Cat 2 footway	Cat 3 footway	Cat 4 footway
Bituminous	10060	21581	44000	148254	623180
PCC Slabs	5908	12674	6000	84717	0
Stone	0	0	0	0	0
Concrete	0	0	0	2353	0
PCC Blocks	0	0	0	0	32799

2.3 Condition

A series of course visual condition assessments have been undertaken on a number of trial sites within the Inverclyde area the results of these surveys have been aggregated and assumed to be consistent across the authority. The results of these will need revisiting in the future as there is some scepticism about the information gained being accurate for the whole of the Inverclyde footway network.

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.

	Condition	Definition
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.
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

This has produced an estimated footway condition for Inverclyde of:

Table 4.3: Footway - Individual Condition Percentages for Each Material Type

Material Type	Condition 1		Condition 2		Condition 3		Condition 4	
	%	Area (sqm)	%	Area (sqm)	%	Area (sqm)	%	Area (sqm)
Bituminous	39.00%	330359	41.00%	355771	15.00%	127061	5.00%	42354
PCC Slabs	39.00%	42627	41.00%	45906	15.00%	16395	5.00%	5465
Stone	39.00%	0	41.00%	0	15.00%	0	5.00%	0
Concrete	39.00%	918	41.00%	988	15.00%	353	5.00%	118
PCC Blocks	39.00%	12792	41.00%	13776	15.00%	4920	5.00%	1640

2.4 Deterioration Prediction

Using the above condition information, the treatment cost information and the treatment frequencies (Table 4.1) 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.

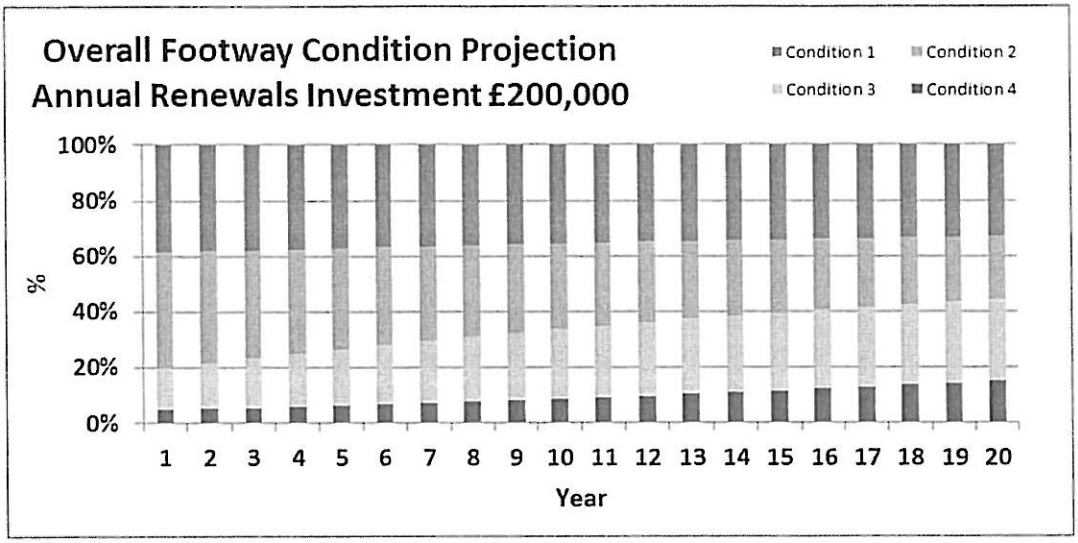
For the purposes of this exercise the level of adhoc repairs required (currently running at approximately **£ 20,000**) has been excluded, as it is anticipated that this will only fall if the condition of the network is substantially improved. Inverclyde has recognised that the network will always have some level of deterioration that requires immediate intervention and thus there will always be a need for some reactive work.

2.5 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:

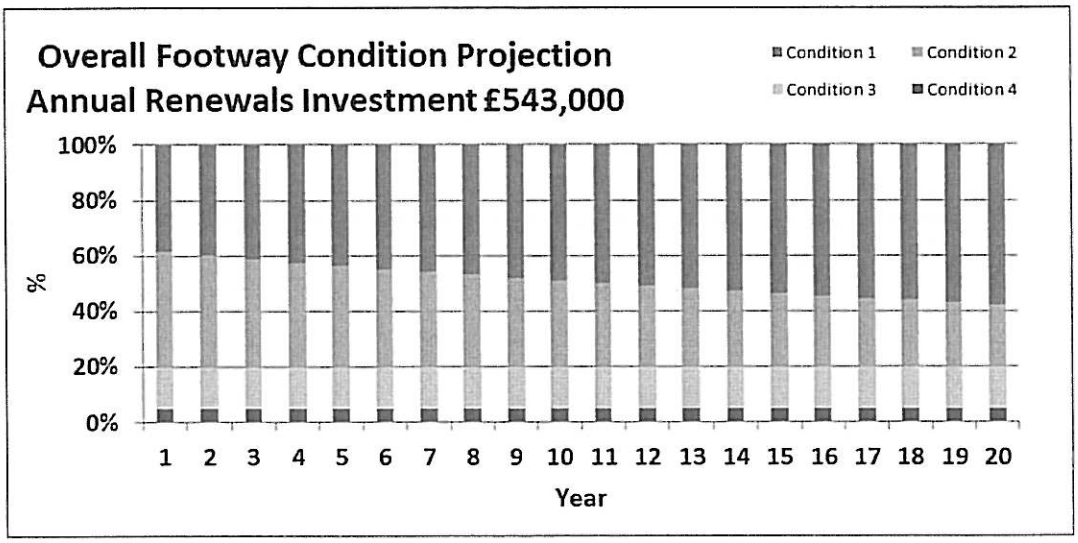
Option 1 – Maintain Current Funding (approx. £200,000 per annum plus inflation)
Option 2 – Maintain existing condition (Steady State)
Option 3 – Reduce backlog (red condition) over 5 years
Option 4 – Reduce backlog (red condition) over 10 years

The overall footway condition deterioration for these scenarios is demonstrated in the following graphs:



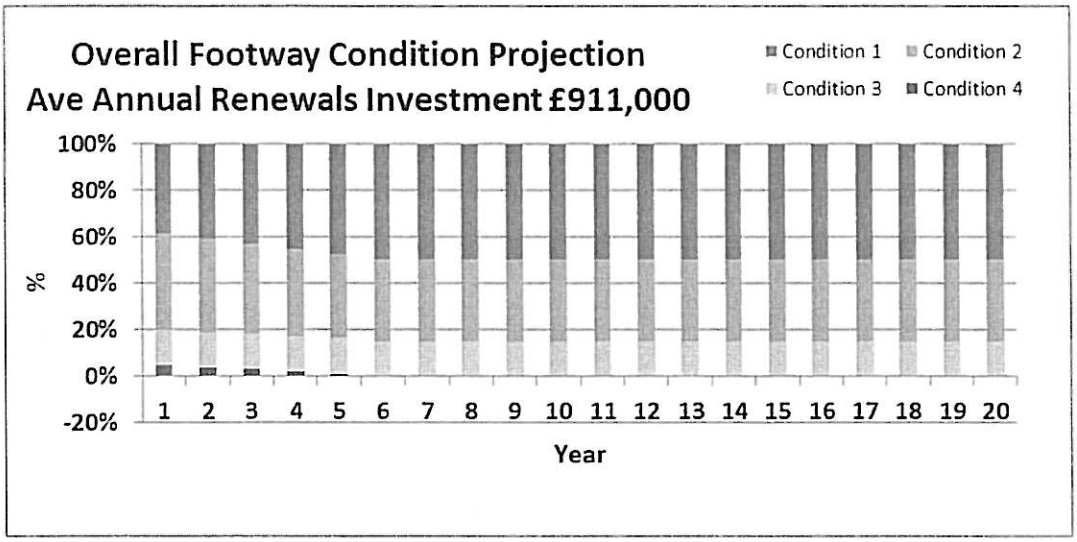
Option 1 – Maintain Current Funding

This shows a deterioration in the footway condition from 5% to 15% in condition 4 and from 15% to 30% in condition 3, it is assumed that the level of reactive maintenance required will increase due to the worsening condition of the network, however it has not been possible to accurately assess this amount. The levels of investment being **£200,000** for year 1, rising to **£244,000** in year 5 and giving a total 10 year investment of **£2,521,000**



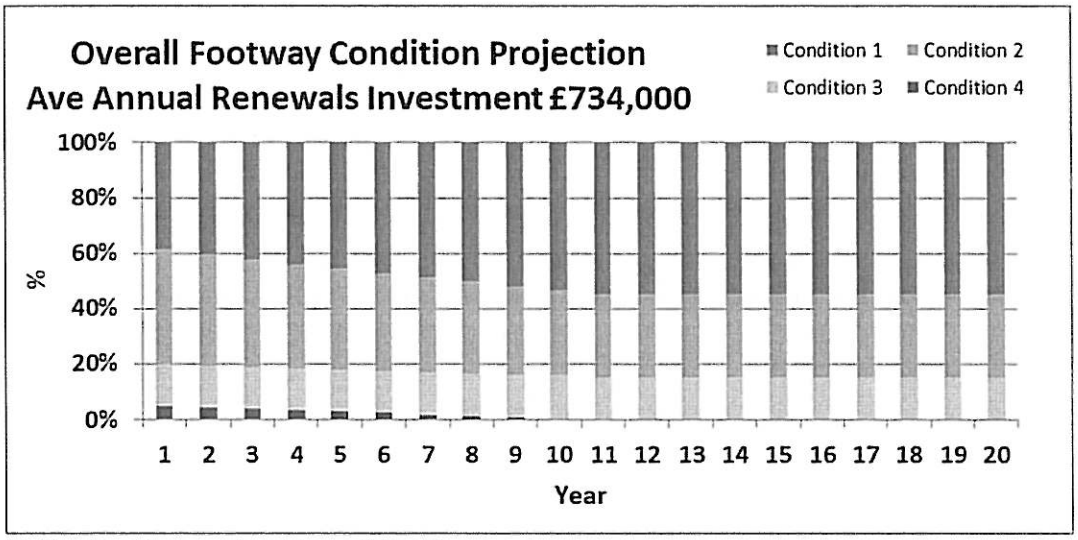
Option 2 – Steady State

The deterioration model has calculated that in order to maintain the current condition levels of the footway network across Inverclyde would require an annual renewals investment of approximately **£543,000** in year 1 rising by 5% inflation to **£661,000** in year 5 and giving a total 10 year investment of **£6,836,000**.



Option 3 – Remove backlog within 5 years

The deterioration model has calculated that in order to remove the backlog of red condition footways across Inverclyde within 5 years would require an annual renewals investment of commencing at **£911,000** for year 1 rising to **£1,108,000** in year 5, reducing to **£690,000** in year 6. The overall investment required over the 10 year period being **£8,846,000**.



Option 4 – Remove backlog within 10 years

The deterioration model has calculated that in order to remove the backlog of red condition footways across Inverclyde over a 10 year period would require an annual renewals investment commencing at approximately **£734,000** in year 1 rising to **£893,000** in year 5. The overall investment required over the 10 year period being **£9,236,000**.

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.

2.6 Current Spending Levels

The current spending on footway maintenance of approximately £200,000 allows for a manageable deterioration of the network that will need to be monitored. If levels are set for a target condition the footway network can be allowed to deteriorate to this condition at which time an increase in funds will be required in order to maintain the steady state.

2.7 Backlog Calculation

Using the condition information reported in table 4.3 and the treatment cost information from table 4.1 it has been possible to calculate the cost of repairing all footways within condition 3 and 4 that require maintenance work, using the appropriate treatment for each material type and condition.

The Headline Backlog figure for footways has been calculated at **£4,525,000**. (£2,716,000 condition 3 and £1,809,000 condition 4).

2.8 Short Term Investment Requirements

At present the footways within Inverclyde appear to be in a reasonable condition the levels of investment currently in place are managing a deterioration of the network, which with a little extra investment could be slowed substantially.

However additional investment as described above will enable a much improved condition to be achieved and this will have significant benefit for all footway users.

3 Street Lighting

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 table 2.1.

Assets excluded from this analysis: Illuminated Signs & Bollards

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 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.

Table 3.1 below provides details of Inverclyde's Lighting Stock, Replacement Costs and Expected Service lives.

Table 3.1 Street Lighting Inventory, Replacement Costs & Expected Service Lives

Column Material	Height (m)	Supply	Replacement Rate	Col Nos.	ESL
Non Galvanised Steel	5	Private Supply	£550.00	31	25
		DNO Supply	£1,650.00	24	25
	6	Private Supply	£600.00	932	25
		DNO Supply	£1,700.00	1,029	25
	8	Private Supply	£750.00	95	25
		DNO Supply	£1,850.00	347	25
	10	Private	£800.00	203	25

Table 3.1 Street Lighting Inventory, Replacement Costs & Expected Service Lives					
Column Material	**Height (m)**	**Supply**	**Replacement Rate**	**Col Nos.**	**ESL**
		Supply			
		DNO Supply	£1,900.00	95	25
Galvanised Steel	5	Private Supply	£550.00	109	30
		DNO Supply	£1,650.00	40	30
	6	Private Supply	£600.00	3,244	30
		DNO Supply	£1,700.00	975	30
	8	Private Supply	£750.00	1,306	30
		DNO Supply	£1,850.00	126	30
	10	Private Supply	£800.00	1,305	30
		DNO Supply	£1,900.00	245	30
Concrete	6	Private Supply	£550.00	20	30
		DNO Supply	£1,600.00	846	30
Galvanised Steel folding Column	5	Private Supply	£600.00	159	30
		DNO Supply	£1,700.00	2	30
	6	Private Supply	£650.00	306	30
		DNO Supply	£1,750.00	56	30
	8	Private Supply	£900.00	3	30
Aluminium	6m fold	Private Supply	£800.00	22	50
	10	Private Supply	£1,000.00	3	50
Transmission Poles including cables	8	private supply	£1,000.00	220	70
Cable	Carriageway		£50.00	61,656m	60
	Footway		£25.00	262,038 m	60
	Verge		£12.00	15,414m	60
Wall Bkt	inc. surface cabling / supply	private supply	£1,100.00	195	40
		DNO Supply	£1,800.00	1	40
underpass /		Private Supply	£300.00	108	15

Table 3.1 Street Lighting Inventory, Replacement Costs & Expected Service Lives					
Column Material	Height (m)	Supply	Replacement Rate	Col Nos.	ESL
Bulkhead		DNO Supply	£1,400.00	8	15
Control Cabinets		Large	£2,000.00	536	50
		Mini	£1,500.00	1	50

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.

The **average** annual replacement investment requirement over the next 20 years is approximately **£440,000** allowing 5% annual inflation.

For the purposes of this exercise the level of cyclic maintenance and adhoc repairs required (Currently running at approximately **£330,000** p.a.) has been excluded, as it is anticipated that this will not fall even if the condition of the apparatus is substantially improved, as the nature of the faults are generally electrical and the cyclic operations of bulk lamp changing and cleaning will still be required. Inverclyde has recognised that the lighting asset will always have some level of deterioration that requires immediate intervention and thus there will always be a need for reactive work.

The many assumptions used to derive this figure will require verification or amendment, which when completed, will enable a greater level of confidence in the outturn figure.

However it should be noted that the overall requirement is not expected to fall substantially.

3.5 Additional Annual Investment Requirements

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 5 years costs and include an anticipated rise in energy costs.

Table 3.2 Additional Annual Investment	
Work Item	2012/13 Anticipated Costs
Reactive Maintenance	**£240,000**
Cyclic Maintenance	**£80,000**

Table 3.2 Additional Annual Investment	
Work Item	2012/13 Anticipated Costs
3rd Party Claims	**£10,000**
Energy Costs	**£500,000**
Total	**£830,000**

3.6 Total Annual Investment Requirements

The actual investment required to maintain the lighting stock at its current service level (columns exceeding ESL) differs annually due to the age profile of the assets, based on the age information it has been possible to assess the actual replacement investment that would be required over the next 20 years to ensure that the percentage of stock exceeding ESL remains at its present level of 29%.table 3.3 below allows for a 5% annual rate of inflation.

Table 3.3 Annual Steady State Replacement Budget Requirements	
Year	**Steady State Budget**
2012	£9,000
2013	£1,479,000
2014	£694,000
2015	£483,000
2016	£67,000
2017	£391,000
2018	£39,000
2019	£731,000
2020	£102,000
2021	£36,000
2022	£314,000
2023	£112,000
2024	£776,000
2025	£420,000
2026	£435,000
2027	£539,000
2028	£305,000
2029	£1,941,000
2030	£1,024,000
2031	£628,000

3.7 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 3600 lighting columns that have exceeded their ESL.

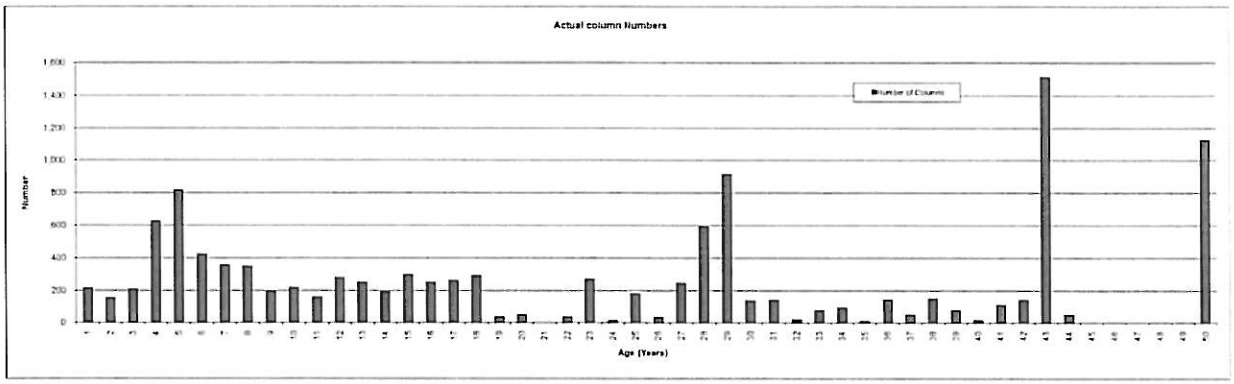


Fig 2.1

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.

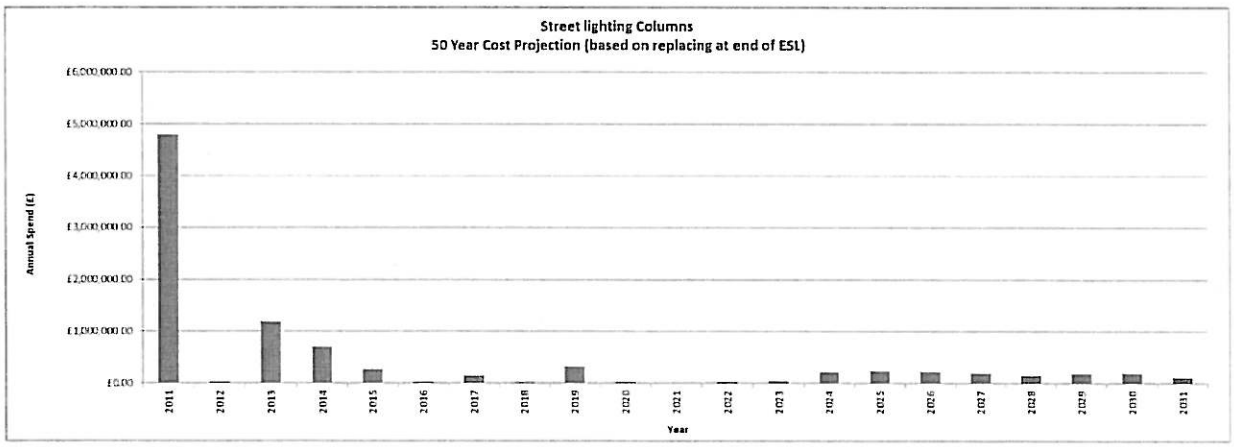


Fig 2.2

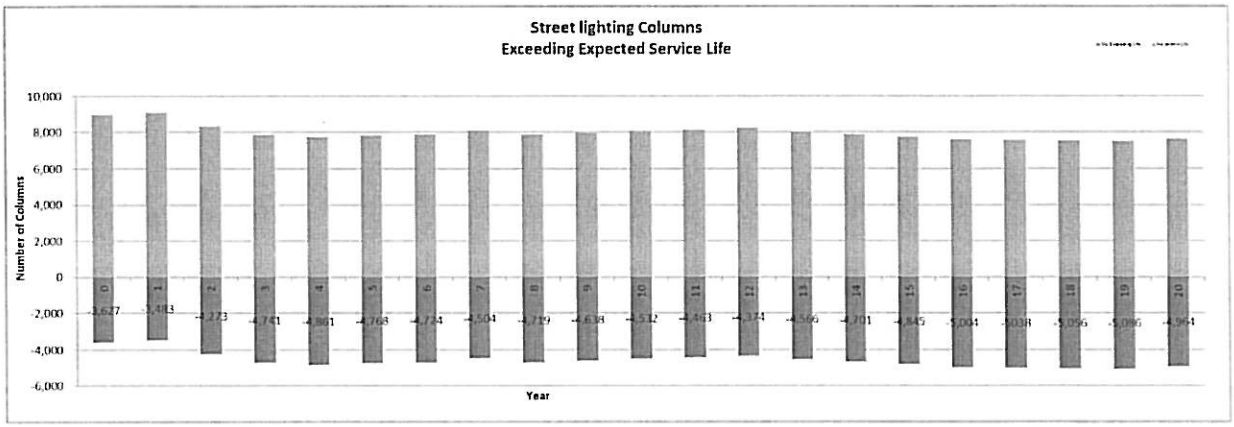
The graph demonstrates the major investment requirement in order to replace the existing aged stock of approximately **£4.8 Million** (Backlog figure) and the on-going substantial budgetary requirement for the following 5 years however the level of annual renewal investment between 6 and 20 years is substantially lower.

3.8 Replacement 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.

3.8.1 Existing Budget

Based on the existing annual budget for asset replacement commencing at approximately **£200,000** in year 1 and rising to **£244,000** in year 5, the overall investment required over the 10 year period has been calculated at **£2,521,000.** The number of columns exceeding their expected service life is shown below.



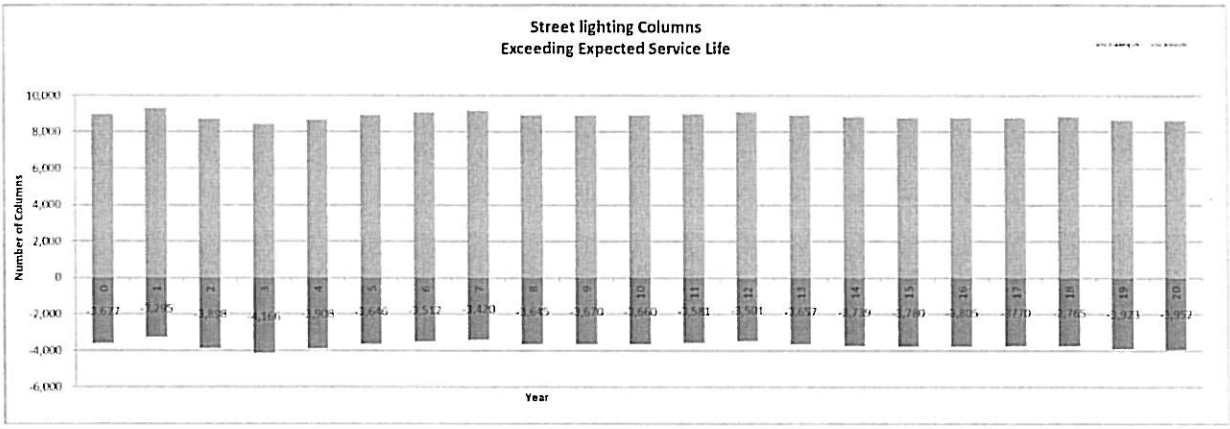
This demonstrates that with existing levels of investment after 5 years the number of columns still in service beyond their ESL will have increased from 3600 to 4,768 and after 10 years this will have reduced to 4,532.

3.8.2 Steady State

In order to maintain the steady state over the five year period using a more consistent level of investment an annual investment on column renewals commencing at approximately **£500,000** and rising to **£608,000** in year 5 would be required.

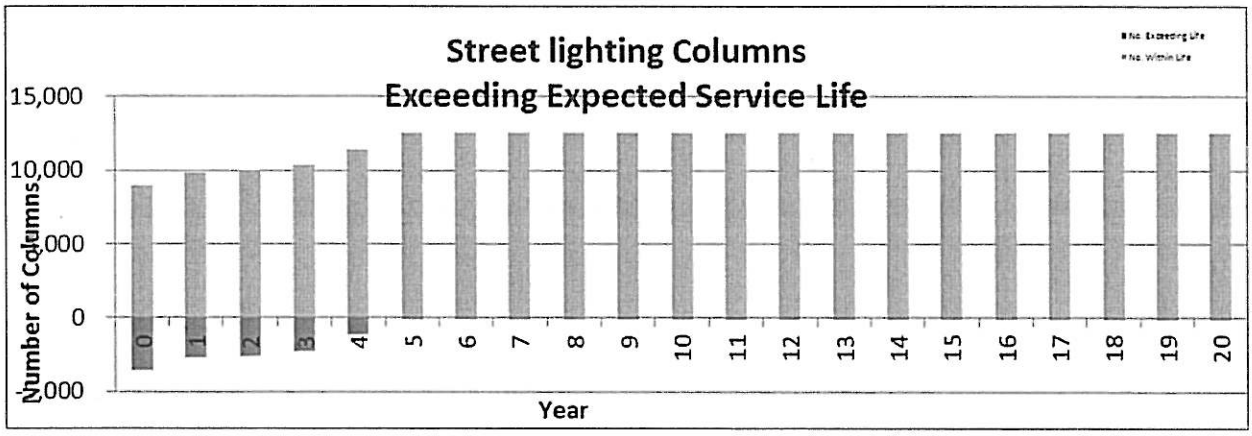
Following this initial 5 year investment period a reduction back to approximately **£281,000** in year 6 rising to **£342,000** in year 10, will allow an approximate steady state to be maintained. The total cost over 10 years being **£4,318,000**.

This allows for a 5% annual rate of inflation.



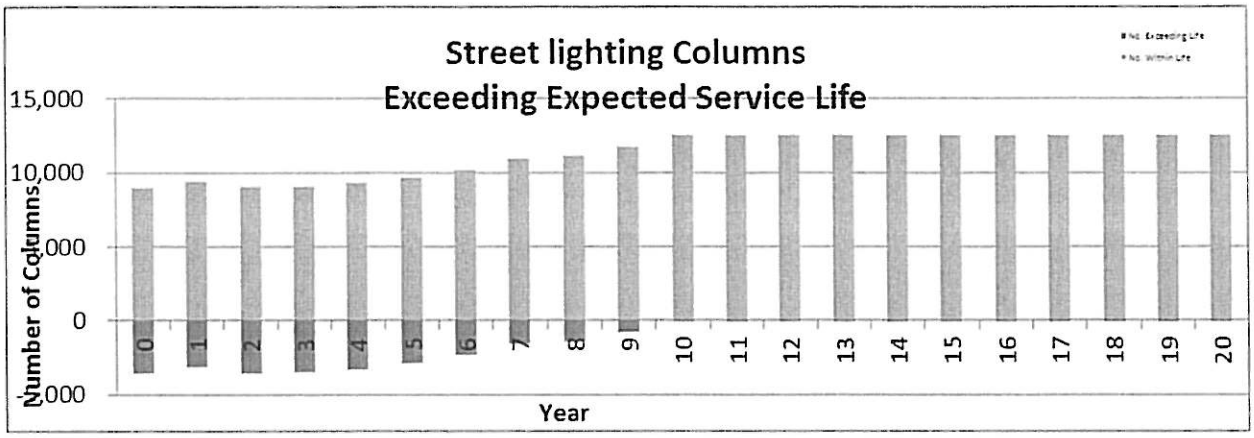
3.8.3 Backlog Removal within 5 years

The priority at the moment is to replace the concrete and non-galvanised steel columns that are well in excess of their expected service lives and are showing signs of failure. In order to do this within the next 5 years an annual replacement investment commencing at **£1,400,000** and rising to **£1,702,000** in year 5 would be required. Following this an annual investment commencing at approximately **£179,000** for year 6 and rising to **£218,000** in year 10 would be required. The total 10 year investment for this scenario would be **£8,726,000.**



3.8.4 Backlog Removal within 10 years

If a 10 year strategy were to be taken for removal of the backlog it would require an annual investment of approximately **£750,000** for the first year rising to **£912,000** in year 5. The total 10 year investment for this scenario would be **£9,439,000.**



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.

3.9 Possible Energy Saving Benefits

As part of this investment option strategy investigation has been made into the possible energy saving benefits of replacing the existing lantern types with modern energy efficient (MEE) lanterns or LED lanterns. Using a street lighting energy evaluation tool developed in association with the Wales street lighting group through the County Surveyor Society Wales asset management project it has been possible to assess the energy savings associated with different replacement strategies.

Based on changing the existing SOX lanterns for modern white light SON lanterns this will achieve some carbon reduction and savings in energy costs. However by replacing the lanterns with LED units whilst replacing the aged columns a major saving in energy costs and carbon reduction is achievable.

Using the column replacement options reported above the outturn energy savings assuming an increase in energy costs of 5% per annum are estimated in Table 3.4.

Table 6.2 details the year on year energy saving benefits of the explored options.

Any decision as to the introduction of energy saving lanterns should be confirmed following the undertaking of a full study of the costs, benefits and impacts of such.

Table 3.4 Energy Saving Benefits using new LED Lanterns			
Description of Energy Saving Options Evaluated	**Total Energy Cost (only) over 10 yrs**	**Energy Cost Saving over 10 years**	**Reduction in Carbon (t)**
Option 0 : Baseline - (do nothing differently)	£6,838,000		0
Option 1a: upgrade lanterns to MEE at specific locations - approx 100 units p.a. present spend levels	£6,534,000	£17,000	978
Option 1b: upgrade lanterns to MEE at specific locations - approx 1,000 units p.a. backlog removal over 5 years	£6,591,000	£304,000	793
Option 1c: upgrade lanterns to MEE at specific locations - approx 600 units p.a. backlog removal over 10 years	£6,820,000	£246,000	55
Option 2a: upgrade lanterns to LED at specific locations - approx 100 units p.a. present spend levels	£6,656,000	£182,000	1,316
Option 2b: upgrade lanterns to LED at specific locations - approx 1,000 units p.a. backlog removal over 5 years	£5,984,000	£854,000	6,186
Option 2c: upgrade lanterns to LED at specific locations - approx 600 units p.a. backlog removal over 10 years	£6,303,000	£535,000	3,877

4 Road Structures

4.1 Structures 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	60
	Steel Composite (concrete or timber)	7
	Reinforced Concrete	14
Footbridges	All	8
Culverts	All	62
Slipways	Structural Earthwork	16
	Masonry / Stone	4
	Brick	2
Retaining Walls	Records unavailable at this time	N/A
Sea Walls	Records unavailable at this time	N/A
Total Road Structures		**173**

4.2 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.

4.3 Routine Maintenance Needs

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 3.2 ANNUAL ROAD STRUCTURES MAINTENANCE NEED COSTS:

	Priority 1	Priority 2	Priority 3	Priority 4
Road Bridges	£40,000	£23,120	£44,592	£118,833
Footbridges	£0	£1,110	£0	£5,120
Slipways	£0	£0	£0	£5,000
Culverts and Subways	£5,000	£1,600	£2,200	£3,900
TOTALS	**£45,000**	**£25,230**	**£46,792**	**£132,853**

The total annual investment required in order to maintain the road structures stock (excluding sea walls and retaining walls) is estimated at **£250,000**, of which a sum of £200,000 could be classified as on-going 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.

4.4 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 65 structures that currently require works at an estimated cost of **£1,970,000**

Table 3.3 below identifies the number of each structure type that require works and the total estimated cost of undertaking all of the works required.

TABLE 3.3 STRUCTURE STRENGTHENING NEEDS:			
Structure Type	Work Type	Number of Structures	Estimated Cost
Road Bridges	Structure Strengthening Works	6	£1,050,000
	Parapet Upgrade Works	13	£245,000
Pedestrian Bridges	Structure Strengthening Works	2	£100,000
	Parapet Upgrade Works	9	£195,000
	Support Upgrade Works	0	£0
Culverts and Subways	Structure Strengthening Works	13	£160,000
	Parapet Upgrade Works	21	£220,000
Total	**ALL**	**65**	**£1,970,000**

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

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

In order to remove the backlog over a 5 year period and allowing for 5% annual inflation the following renewal investment scenarios are suggested:

Year	Renewals Investment	No of schemes
1	£540,000	4
2	£347,000	20

3	£419,000	11
4	£429,000	5
5	£426,000	24

In order to remove the backlog over a 10 year period and allowing for 5% annual inflation the following renewal investment scenarios are suggested:

Year	Renewals Investment	No of schemes
1	£40,000.00	3
2	£525,000.00	1
3	£188,000.00	6
4	£186,000.00	14
5	£207,000.00	3
6	£205,000.00	7
7	£403,000.00	1
8	£212,000.00	8
9	£237,000.00	16
10	£249,000.00	5

Table 6.1 includes an additional on-going capital investment for regular maintenance works of £200,000 plus inflation, which has not been included in the above figures.

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 6.2 as Other Assets.

5.1 Assets Included

- Drainage
- Traffic signals
- Verge

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

5.2 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.

5.3 Estimated Annual Routine Investment Requirements

Table 5.1 Estimated Routine Maintenance Investment – Other Assets	
Drainage	£230,000
Traffic signals	£10,000
Verge	£75,000
Road Markings	£100,000
Trees	£25,000
Safety Barriers	£5,000
Pedestrian Guard Rail	£5,000
Traffic Signs	£40,000
Kerbing	£10,000

Table 6.2 details the annual cost of undertaking this work with an allowance for a 5% annual inflation.

6 Option Summary

6.1 Chosen Options for Renewals Investment

The tables below detail the estimated costs for the 4 chosen options.

1. Maintain Current Investment

2. Maintain Current Condition (Steady state)
3. Reduce backlog over a 5 year period and then maintain condition
4. Reduce backlog over a 10 year period

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

Table 6.1 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	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Total 10 years
Carriageways											
Maintain Current Funding	£2,865,000	£820,000	£861,000	£905,000	£950,000	£997,000	£1,047,000	£1,099,000	£1,154,000	£1,212,000	**£11,910,000**
Maintain Condition	£1,976,000	£2,075,000	£2,179,000	£2,288,000	£2,402,000	£2,522,000	£2,649,000	£2,781,000	£2,920,000	£3,066,000	**£24,858,000**
Reduce backlog over 5 years	£4,584,000	£4,814,000	£5,054,000	£5,307,000	£5,572,000	£2,400,000	£2,520,000	£2,646,000	£2,778,000	£2,917,000	**£38,592,000**
Reduce backlog over 10 years	£3,319,000	£3,485,000	£3,660,000	£3,843,000	£4,035,000	£4,236,000	£4,448,000	£4,671,000	£4,904,000	£5,149,000	**£41,750,000**
Footways											
Maintain Current Funding	£200,000	£210,000	£221,000	£232,000	£244,000	£256,000	£269,000	£282,000	£296,000	£311,000	**£2,521,000**
Maintain Condition	£543,000	£571,000	£599,000	£629,000	£661,000	£694,000	£728,000	£765,000	£803,000	£843,000	**£6,836,000**
Reduce backlog over 5 years	£911,000	£957,000	£1,005,000	£1,055,000	£1,108,000	£690,000	£724,000	£760,000	£798,000	£838,000	**£8,846,000**
Reduce backlog over 10 years	£734,000	£771,000	£810,000	£850,000	£893,000	£937,000	£984,000	£1,033,000	£1,085,000	£1,139,000	**£9,236,000**
Street Lighting											
Maintain Current Funding	£200,000	£210,000	£221,000	£232,000	£244,000	£256,000	£269,000	£282,000	£296,000	£311,000	**£2,521,000**
Maintain Condition	£500,000	£525,000	£552,000	£579,000	£608,000	£281,000	£295,000	£310,000	£326,000	£342,000	**£4,318,000**
Reduce backlog over 5 years MEE	£1,400,000	£1,470,000	£1,544,000	£1,621,000	£1,702,000	£179,000	£188,000	£197,000	£207,000	£218,000	**£8,726,000**
Reduce backlog over 10 years MEE	£750,000	£788,000	£827,000	£869,000	£912,000	£958,000	£1,006,000	£1,056,000	£1,109,000	£1,164,000	**£9,439,000**
Reduce backlog over 5 years LED	£1,450,000	£1,523,000	£1,599,000	£1,679,000	£1,763,000	£192,000	£202,000	£212,000	£222,000	£233,000	**£9,075,000**
Reduce backlog over 10 years LED	£780,000	£819,000	£860,000	£903,000	£949,000	£996,000	£1,046,000	£1,098,000	£1,153,000	£1,211,000	**£9,815,000**
Structures											
Maintain Current Funding	£35,000	£37,000	£39,000	£41,000	£43,000	£45,000	£47,000	£50,000	£52,000	£55,000	**£444,000**
Maintain Condition	£200,000	£210,000	£221,000	£232,000	£244,000	£256,000	£269,000	£282,000	£296,000	£311,000	**£2,521,000**
Reduce backlog over 5 years	£740,000	£557,000	£640,000	£660,000	£669,000	£256,000	£269,000	£282,000	£296,000	£311,000	**£4,680,000**
Reduce backlog over 10 years	£240,000	£735,000	£408,000	£417,000	£450,000	£460,000	£671,000	£493,000	£532,000	£559,000	**£4,965,000**
Contingencies Capital Works	£100,000	£105,000	£111,000	£116,000	£122,000	£128,000	£135,000	£141,000	£148,000	£156,000	**£1,262,000**

Table 6.2 Inverclyde Road Asset Investment Option Summary Table Revenue Investment allowing for 5% inflation p.a.											
Carriageways											
Routine Maintenance Costs	£500,000	£525,000	£552,000	£579,000	£608,000	£639,000	£671,000	£704,000	£739,000	£776,000	**£6,293,000**
RM costs 5 yr backlog removal	£500,000	£525,000	£552,000	£579,000	£608,000	£539,000	£566,000	£594,000	£623,000	£655,000	**£5,741,000**
RM costs 10 yr backlog removal	£500,000	£525,000	£552,000	£579,000	£608,000	£639,000	£671,000	£704,000	£739,000	£776,000	**£6,293,000**
Footways											
Routine Maintenance Costs	£20,000	£21,000	£23,000	£24,000	£25,000	£26,000	£27,000	£29,000	£30,000	£32,000	**£257,000**
RM costs 5 yr backlog removal	£20,000	£21,000	£23,000	£24,000	£25,000	£26,000	£27,000	£29,000	£30,000	£32,000	**£257,000**
RM costs 10 yr backlog removal	£20,000	£21,000	£23,000	£24,000	£25,000	£26,000	£27,000	£29,000	£30,000	£32,000	**£257,000**
Street Lighting											
Routine Maintenance Costs	£330,000	£347,000	£364,000	£383,000	£402,000	£422,000	£443,000	£465,000	£488,000	£512,000	**£4,156,000**
Energy Costs Baseline	£500,000	£525,000	£551,250	£578,813	£607,753	£638,141	£670,048	£703,550	£738,728	£775,664	**£6,288,946**
Maintain Condition MEE Energy	£500,000	£525,000	£551,000	£578,000	£606,000	£637,000	£668,000	£702,000	£737,000	£774,000	**£6,278,000**
Reduce backlog 5 years MEE Energy	£495,000	£513,000	£533,000	£552,000	£573,000	£602,000	£632,000	£663,000	£696,000	£731,000	**£5,990,000**
Reduce backlog 10 years MEE Energy	£496,000	£516,000	£536,000	£558,000	£580,000	£609,000	£639,000	£671,000	£705,000	£740,000	**£6,050,000**
Maintain Condition LED Energy	£497,000	£518,000	£540,000	£563,000	£587,000	£617,000	£647,000	£680,000	£714,000	£749,000	**£6,112,000**
Reduce backlog 5 years LED Energy	£484,000	£491,000	£498,000	£504,000	£509,000	£535,000	£561,000	£589,000	£619,000	£650,000	**£5,440,000**
Reduce backlog 10 years LED Energy	£490,000	£504,000	£518,000	£532,000	£546,000	£573,000	£602,000	£632,000	£664,000	£697,000	**£5,758,000**
Structures											
Routine Maintenance Costs	£50,000	£53,000	£56,000	£58,000	£61,000	£64,000	£68,000	£71,000	£74,000	£78,000	**£633,000**
Routine Maintenance Other Assets	£500,000	£525,000	£552,000	£579,000	£608,000	£639,000	£671,000	£704,000	£739,000	£776,000	**£6,293,000**

7 Recommendations

7.1 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.

7.2 The investment needed for carriageways looked at four options; 1. Maintain the Current Level of Investment; 2. Maintain the Steady State; 3. Reduce the backlog over a 5 year period; 4. Reduce the backlog over a 10 year period. It is recommended that option 3 in table 6.1 above offers the optimum solution in terms of the cost to reduce the backlog within an acceptable timescale.

7.3 The investment needed for footways looked at four options; 1. Maintain the Current Level of Investment; 2. Maintain the Steady State; 3. Reduce the backlog over a 5 year period; 4. Reduce the backlog over a 10 year period. It is recommended that option 3 in table 6.1 above offers the optimum solution in terms of the cost to reduce the backlog within an acceptable timescale.

7.4 The investment needed for lighting looked at four options; 1. Maintain the Current Level of Investment; 2. Maintain the Steady State; 3. Reduce the backlog over a 5 year period; 4. Reduce the backlog over a 10 year period. Inverclyde already has around 3,600 lighting columns that have exceeded their expected service life. This will increase to 4,768 over the next 5 years if investment remains at the present level. Reducing the backlog over a 5 year period will not only eliminate this backlog but will also provide the opportunity of installing energy efficient systems that will reduce electricity consumption and reduce the carbon footprint by an estimated 6,184t. It is therefore recommended that option 3 in table 6.1 above offers the optimum solution in terms of the cost to reduce the backlog, generate efficiency savings and reduce the carbon footprint within an acceptable timescale.

7.5 The investment needed for structures looked at four options; 1. Maintain the Current Level of Investment; 2. Maintain the Steady State; 3. Reduce the backlog over a 5 year period; 4. Reduce the backlog over a 10 year period. Due to the specific needs associated with structure replacements there will be funding peaks where there is a requirement to replace whole structures or undertake major rehabilitation works on a single bridge. It is recommended that option 3 in table 6.1 above offers the optimum solution in terms of the cost to reduce the backlog within an acceptable timescale.

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

7.7 The completion of the Road Asset Investment 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.