Asset Management in Highways

Developing our Approach to Asset Management in Highways

2018/19 – 2020/21

Version	Author	Date	Comment
0.1	Alan Casson	15th December 2017	Draft for DivMT Review
1.0	Alan Casson	19th December 2017	Approved by DivMT
1.1	Alan Casson	27th December 2017	Draft for ETCC Review
1.2	Alan Casson	16th January 2018	Revised Draft for ETCC

Contents

The Purpose of this Document

This document, ***Developing Our Approach to Asset Management in Highways,*** is the third in a group of three related, published documents about the management of highway assets in Kent.

The first, ***Our Approach to Asset Management in Highways***, outlines how asset management principles can enable us to meet with our statutory obligations and in doing so, support the County Council's vision of "improving lives by ensuring every pound spent in Kent is delivering better outcomes for Kent's residents, communities and businesses". This first document will be reviewed and published at intervals of no more than five years or when there are significant changes to the County Council's vision or policies.

The second document, ***Implementing Our Approach to Asset Management in Highways***, outlines how we will embed asset management principles in the way that we deliver highway services and measure our success to ensure continuous improvement and a focus on the County Council's Strategic Outcomes. This document will be reviewed and published at intervals of no more than three years or when there are significant policy or vision changes.

This third document, ***Developing our Approach to Asset Management in Highways***, outlines the current condition of highway assets and forecasts future condition and levels of service. It also includes areas that we want to develop in future to further enhance service delivery and ensure continuous improvement.

This document will be reviewed and published annually.

Introduction

The highway network is the most valuable asset we own with a gross replacement cost estimated at £25bn.

Asset	Quantity	Estimated Value[i] (The cost of a like for like replacement)
Roads and Footways	→ 5,400 miles (8,700km) of roads; → 3,900 miles (6,300km) of footways → Associated lines & crash barriers	£10.4bn
Drainage	→ 250,000 roadside drains; → 8,500 soakaways → 250 ponds and lagoons;	
Structures	→ 1595 bridges and viaducts → 568 culverts → 537 other structures	£1.3bn
Street Lighting	→ 125,359 street lights → 22,906 lit signs → 5,159 lit bollards	£157.9m
Intelligent Traffic Systems	→ 712 traffic lights → 127 CCTV cameras → 351 interactive warning signs	£42.5m
Soft Landscape	→ 500,000 trees → 8,604,000 m^2 roadside verges → 54,000 m^2 urban hedges	-
Street Furniture	→ Non-illuminated signs → Pedestrian barriers → Salt bins	£61.4m
Land	→ 75km^2	£13.0bn
Total Estimated Value		**£24.96bn**

Few of our assets are in 'as new' condition but we are committed to their effective management, not only now but also for future generations.

Kent County Council's corporate strategy ***Increasing Opportunities, Improving Outcomes*** sets out the vision;

Our focus is on improving lives by ensuring every pound spent in Kent is delivering better outcomes for Kent's residents, communities and businesses.

[i] Figures from the 2016/17 Whole of Government Accounts Valuation

and it is committed to achieving this vision through three strategic outcomes which provide a focus for everything we do.

- Children and young people in Kent get the best start in life.
- Kent communities feel the benefits of economic growth by being in work, healthy and enjoying a good quality of life.
- Older and vulnerable residents are safe and supported with choices to live independently.

Although a complex and challenging task, the effective management of our highway infrastructure plays a vital role in delivering these strategic outcomes. How we are going to manage this challenge is set out in the documents ***Our Approach to Asset Management in Highways*** and ***Implementing Our Approach to Asset Management in Highways.***

How we are doing in tackling the task can be found in this document which includes:

- a summary of the current condition of each asset group;
- forecasts of future condition for a range funding levels (This has been done through lifecycle modelling for those assets with suitable data.);
- forecasts of levels of service for a range of funding levels; and
- summary improvement plans for the management of each asset group.

The modelling assumes normal deterioration rates and no allowance as been made for any significant damage caused by severe weather. There has also been no allowance made for significant single projects requiring large investment.

Although we have carried out modelling for a 10-year period we recognise things change. We will therefore review this modelling annually in-line with available budgets.

Part 1: Overview

Overview

We have always ***managed our highway assets*** by looking for and implementing the best ways to maintain them. We are now developing a more structured ***Asset Management*** approach to these activities to ensure we are deriving more value for the residents of Kent by broadening our focus to select strategies that consider the whole lifecycle of assets. This will improve the long-term value for Kent and support the Councils objectives by allowing informed, evidence based decision making.

The extent to which we have so far implemented asset management principles varies across our asset groups. For some, such as roads and footways, we have comprehensive data, a detailed understanding of the asset lifecycle and the tools needed to model different maintenance strategies and investment scenarios. In these instances, we have been able to begin developing a more sophisticated approach to asset management. In other cases, such as drainage, the information we hold is more limited and although we have a good understanding of the asset lifecycle, we do not have the means to complete detailed modelling of different performance or service levels. In these situations, a more simplistic but equally valid approach is being adopted.

Although the complexity of our approach to asset management varies across the asset groups, the same principles have been applied in all eight areas of the highway service. The table below summarises the approach we have adopted to forecasting future budget needs or performance outcomes for each of the areas.

Asset Group	Modelling carried out on. . .	Annual Cost	
		Current Funding	Steady State
Roads	Maintenance needs	£13,000k	£45,000k
Drainage	Level of Service	£5,115k	£6,820k
Safety Barriers	Maintenance needs	£450k	£1,968
Bridges, Tunnels & Highway Structures	Maintenance needs	£1,781k	£6,000k
Footways	Maintenance needs	£1,000k	£4,800k
Street Lighting	Steel Column renewal	£1,600k	£2,200k
Intelligent Traffic Systems	Asset renewal	£500k	£2,800k
Soft Landscape	Level of Service	£3,200k	£4,200k
Road Markings, Studs, Lines & Signs	Level of Service	£1,030k	£3,500k
Total		£27,676k	£77,288k

The figures above relate to capital funding for Road and Footway assets groups, revenue funding for the Soft Landscape asset group and a combination of revenue and capital for all remaining groups.

Asset Condition Outcomes and Levels of Service

When determining asset condition outcomes or levels of service, we have considered two options in the context of our statutory obligations, the County Council's Strategic Objectives, customer expectations and available resource. The minimum level of service that fulfils our statutory duties. Asset condition is allowed to decline with interventions such as maintenance and asset renewals undertaken on a reactive basis if and only if they are necessary to fulfil our legal obligations. This is an extremely inefficient approach and will cost the authority considerably more over the life of our assets and therefore cannot be recommended.

Current Resource Levels

Condition outcomes and a level of service and investment that exceeds our statutory minimum duties. Interventions such as maintenance and asset renewals are where possible undertaken on a planned, optimised basis, though a percentage of spend is on reacting to asset failure that has not been prevented by asset management.

Steady State

Condition outcomes and a level of service and investment that fulfils our statutory obligations and preserves the overall condition of the asset in its current state. The majority of interventions such as maintenance and asset renewals are undertaken on a planned, prioritised basis with a view to keeping the same proportions of the asset group in a very good, good, poor and very poor condition. This approach reduces significantly the amount of resource spent on reacting to asset failure. Any investment less than this would mean that a steady state condition or existing service level could not be achieved.

The accuracy with which we can assess the cost and impact of providing each level of service varies depending on the quality of information and tools available to us.

Part 2: Condition and Forecasts by Asset Group

Roads

This asset group has excellent condition data and there is a good understanding of how the asset deteriorates. There are also several technologies available to model the impact of different levels of investment.

The condition data we have on this asset has been collected over many years, by specialist survey contractors using nationally recognised surveys. Originally the primary driver for this data collection was to develop evidence based maintenance programmes but due to its comprehensive nature, it can also be used for lifecycle planning with Kent specific deterioration rates.

Routine Road Maintenance

The figures used below relate to proactive, planned capital investment in our road network, predominantly in the form of road asset renewal or life extension specialist treatments such as micro asphalt or surface dressing. They do not include any allowance for the funds the County Council spends each year to reactively repair road defects. Whilst surface defects will always occur, and we have experienced a number of weather emergencies in the last decade which have worsened the condition of our network, surface defects are primarily a symptom of a lack of planned investment in the network. The less resource invested in planned maintenance, the more surface defects will occur. Reactive repairs are, on average, twice as expensive per square metre as planned resurfacing.

During the last few years we have spent an average of £6.8m a year reactively repairing road defects. The total for the period 2013/14 to 2016/17 was £27.4m using a combination of revenue and capital funding. It is very difficult to accurately model the relationship between road condition, the number and cost of surface defects that will occur. Investment less than that modelled to achieve a steady state condition would result in an increase in defects, increasing the pressure on revenue and capital funds and in turn reducing the amount of capital funding that can be spent on planned maintenance.

Most commentators accept that capital investment in local roads throughout the country has been insufficient for decades and this has been further exacerbated in recent years by reduced revenue funding from central government as the Government seeks to reduce public spending. We believe that the current balance between routine and capital road maintenance spend in Kent is appropriate. It will always be necessary to carry out routine reactive maintenance to address surface defects, particularly in respect of roads that have failed structurally. In many cases, however, where roads are otherwise structurally sound, it is possible to carry out targeted patch repairs to prevent failure and add life to the asset. Often this

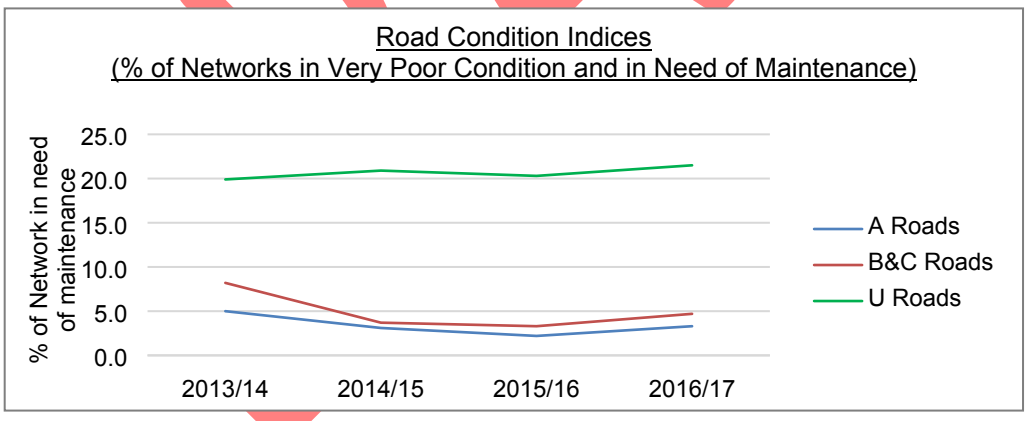
represents exceptional value for money and is more cost effective than resurfacing the whole road.

Current Condition

Following completion of the 2016/17 road condition surveys, the percentage of our road network considered to be of very poor condition is: 3.3% of A roads, 4.7% of B and C roads and 21.5% of unclassified roads.

	Year			
Road Class	**2013/14**	**2014/15**	**2015/16**	**2016/17**
A Roads	5.0%	3.1%	2.2%	3.3%
B&C Roads	8.2%	3.7%	3.3%	4.7%
U Roads	19.9%	20.9%	20.3%	21.5%
All Roads	14.2%	13.3%	12.4%	13.8%

The improvement in condition of classified roads between 2013/14, 2014/15 and 2015/16 reflects the increased investment in 2012/13, 2013/14 and 2014/15 of £22.0m, £20.3m and £22.6m respectively. The budgets for 2015/16 and 2016/17 were lower at £16m and £13m. The lag between investment and recorded changes in condition is due to the survey regime. For example, maintenance undertaken during year 1 will be surveyed in either year 2 or year 3 and the full effect of the work will not appear in the results until the end of year 3. This demonstrates a clear correlation between planned capital investment in and condition of our roads.



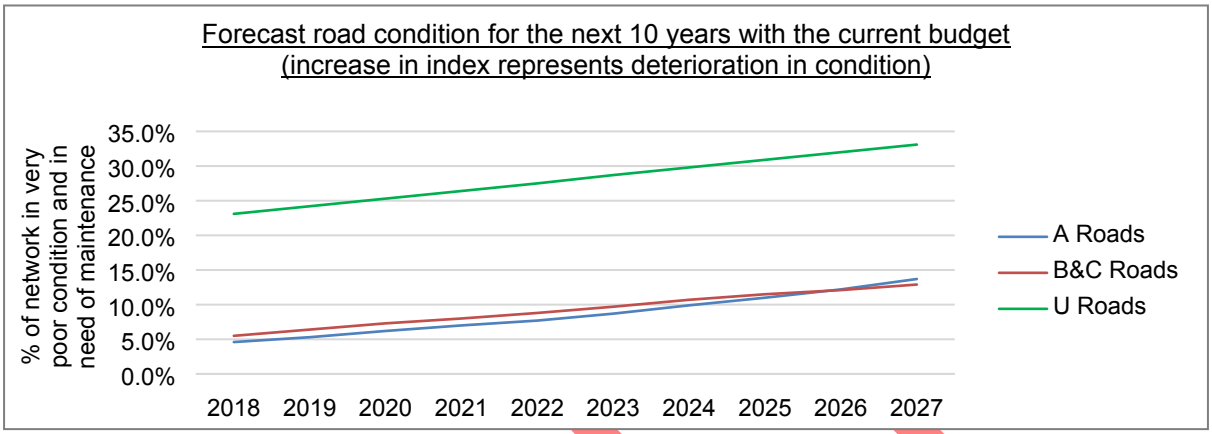
It is estimated that the current condition of the road network equates to a maintenance backlog in the region of £630m, an increase of £46m from last year.

Condition Forecasts

Current Budget

The current annual budget for planned road asset management is around £13m. We have modelled the effect on road condition if this current level of Government funding remains unchanged.

Road Class	Year									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
A Roads	4.6%	5.3%	6.2%	7.0%	7.7%	8.7%	9.9%	11.0%	12.2%	13.7%
B&C Roads	5.5%	6.4%	7.3%	8.0%	8.8%	9.7%	10.7%	11.5%	12.1%	12.9%
U Roads	23.1%	24.2%	25.3%	26.4%	27.5%	28.7%	29.8%	30.9%	32.0%	33.1%



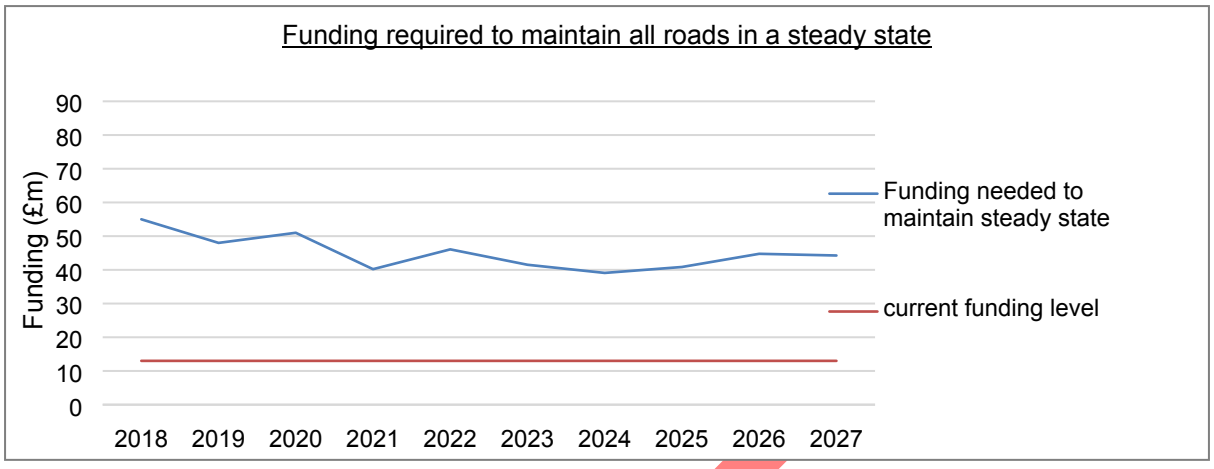
We estimate that in this scenario the backlog will increase from £630m now to around £1bn by 2027.

This level of deterioration is significant and it is questionable whether the authority could continue to fulfil its Highways Act duties in later years of the forecast period if this occurred and the quantum of road surface defects correspondingly rose. That is because, even if investment in planned maintenance was maintained at current levels, it is reasonable to conclude that there will be a significant rise in road surface failures requiring the Authority to carry out considerably more reactive repairs to keep the network in a safe condition. Unless, that extra expenditure on reactive repairs was funded from additional funding, it is likely that funding for planned maintenance would need to be diverted to meet this additional cost. If that were to occur, the modelled deterioration above would accelerate, as we would spend less on planned maintenance, leading to a rapid spiral effect of asset deterioration and increased reactive repairs.

Steady State Condition

To keep our roads at their current condition level and maintain the backlog at £630m over the next ten years, the modelling has estimated the total cost to be £450m. This equates to an average annual capital investment of £45m[ii]. A breakdown by year is shown in the graph below.

[ii] 17/18 prices



Future Improvements to Enable Us to Improve the Management of our Roads

- Further development of the modelling to improve confidence in forecasting.
- Explore the effects of various treatment strategies on whole life costs.
- Develop modelling to forecast future surface defect quantities and cost based on different investment scenarios.
- Explore possible correlation between overall road condition and accident rates.

Drainage

Given its significant effect on other asset groups, customer service and road safety, management of this asset group is something that should have a high priority.

Although we have a good understanding of the lifecycle of drainage assets the data we have for this asset group is more limited than that for roads or footways. We therefore do not currently have the means to complete detailed modelling of different funding scenarios. In this case we have taken a more simplistic but equally valid approach to forecasting levels of service, rather than condition, that will result from a number of funding levels. These forecasts have been based on past experience and engineering judgement.

Current Levels of Service

The current levels of service are:

Service Area	Level of Service
Drainage Cleansing	Incidents of flooding that pose an immediate high risk to highway safety or risk of internal property flooding will be responded to within 2 hours of the initial report
	Roadside drains at known hotspots will be cleaned on a cyclic basis once every six months
	Main road roadside drains will be cleaned on a cyclic basis once every 12 months
	Will carry out targeted cleansing of all other drainage assets where there is a risk either to highway safety or of internal property flooding, within 2 hrs to 90 days, depending on the severity of the risk.
Ironwork Repairs	Damaged drain covers that pose a risk to the safety of highway users will be repaired or replaced within 2 hours – 90 days of notification, depending on the severity of the risk.
Pumping Stations	Pumping stations will be serviced once every 12 months
	Identified maintenance of the pumping stations will be prioritised based on risk to highway safety and of internal property flooding.
Drainage Investigations	Drainage problems that pose a risk to highway safety or of internal property flooding will be investigated within 2 hours – 90 days of notification, depending on the severity of the risk.
Drainage repairs and improvements	Repairs and improvements will be prioritised based on the risk to highway safety and of the risk of internal property flooding. They will be delivered on the basis of highest risk first.

Options for Level of Service

When determining our levels of service two options were considered:

→ The level of service with the current budget.
→ The level of service with a reduced budget.

The impact of each of these two options has been assessed with respect to each service provided and the following outcomes:

→ Reduced incidents of highway flooding requiring an immediate or urgent response.
→ Improved customer satisfaction and confidence in service provision.
→ A robust defence against increased claims for damage and personal injury.
→ Roads and footways that are protected from the adverse effects of standing water.
→ Reduced disruption caused by road flooding.
→ Greater resilience against increasingly frequent intense rainfall events.

In each instance the following scale has been applied:

Very Unlikely	Unlikely	Likely	Very Likely	Not Applicable

The Level of Service with the Current Budget

The likelihood that we will…	Drainage Cleansing	Ironwork Repairs	Pumping Stations	Investigations	Repairs and Improvements
…reduce incidents of highway flooding requiring an immediate or urgent response	**Unlikely**	**Not Applicable**	**Likely**	**Likely**	**Likely**
…improve customer satisfaction and confidence in service provision	**Likely**	**Likely**	**Likely**	**Likely**	**Likely**
…have a robust defence against increased claims for damage and personal injury	**Likely**	**Likely**	**Likely**	**Likely**	**Likely**
…effectively protect roads and footways from the adverse effects of standing water	**Unlikely**	**Not Applicable**	**Not Applicable**	**Likely**	**Likely**
…reduce disruption caused by road flooding	**Unlikely**	**Not Applicable**	**Not Applicable**	**Likely**	**Likely**
…have greater resilience against increasingly frequent intense rainfall events.	**Unlikely**	**Not Applicable**	**Likely**	**Likely**	**Likely**

The current budget for retaining this level of service is £5.1m

The Level of Service with a Reduced Budget

We have estimated that a 25% reduction in the annual budget, to £3.8m will result in the level of service shown below.

The likelihood that we will…	Drainage Cleansing	Ironwork Repairs	Pumping Stations	Investigations	Repairs and Improvements
…reduce incidents of highway flooding requiring an immediate or urgent response	**Very Unlikely**	**Not Applicable**	**Unlikely**	**Very Unlikely**	**Very Unlikely**
…improve customer satisfaction and confidence in service provision	**Very Unlikely**	**Unlikely**	**Very Unlikely**	**Very Unlikely**	**Very Unlikely**
…have a robust defence against increased claims for damage and personal injury	**Very Unlikely**	**Very Unlikely**	**Unlikely**	**Unlikely**	**Unlikely**
…effectively protect roads and footways from the adverse effects of standing water	**Very Unlikely**	**Not Applicable**	**Not Applicable**	**Very Unlikely**	**Very Unlikely**
…reduce disruption caused by road flooding	**Unlikely**	**Not Applicable**	**Not Applicable**	**Unlikely**	**Unlikely**
…have greater resilience against increasingly frequent intense rainfall events.	**Very Unlikely**	**Not Applicable**	**Very Unlikely**	**Very Unlikely**	**Very Unlikely**

The above tables illustrate that the current budget is not sufficient to achieve the desired outcomes above and therefore it follows that any reduction in funding from current levels will result in a significant negative impact on service delivery.

Future Improvements to Enable Us to Improve the Management of Our Drainage Asset.

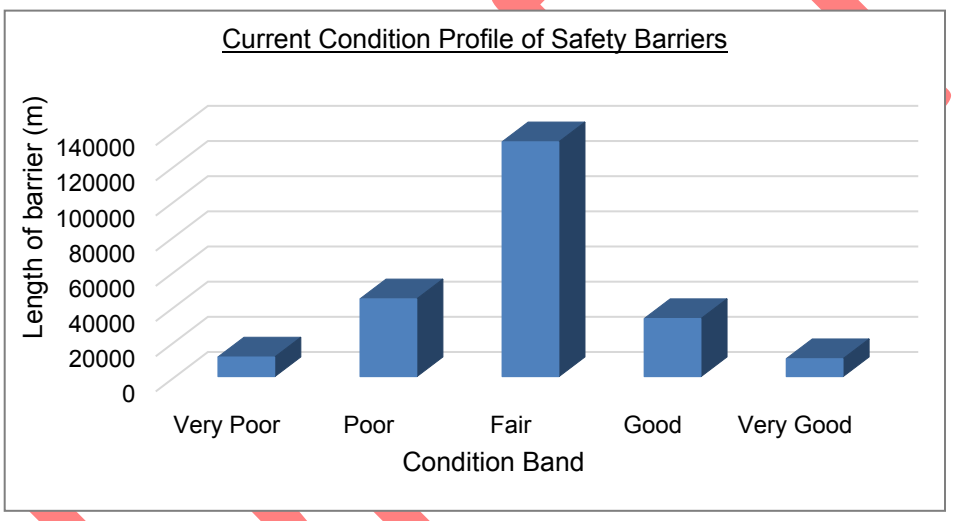
- Implementation of computer based modelling techniques to asses a variety of cleansing and maintenance strategies.

Safety Barriers

Safety barriers fulfil a critical role and their failure to perform as designed has serious implications for highway safety.

Principal inspections of safety barriers on A and B roads are undertaken every five years, by a specialist Contractor. This information is collated and the barriers graded from one (very poor) to five (very good) for priority repair. The grading information has been used in conjunction with the HMEP Ancillary Assets Toolkit to forecast future replacement needs for this asset group. These initial forecasts include; the replacement/upgrade of barriers, based on an expected life of 25 years; retensioning of all tensioned barriers on a two year cycle, based on a current annual cost of £120k; and a current annual budget of £450k for damage repair.

Current Condition Profile of the Asset



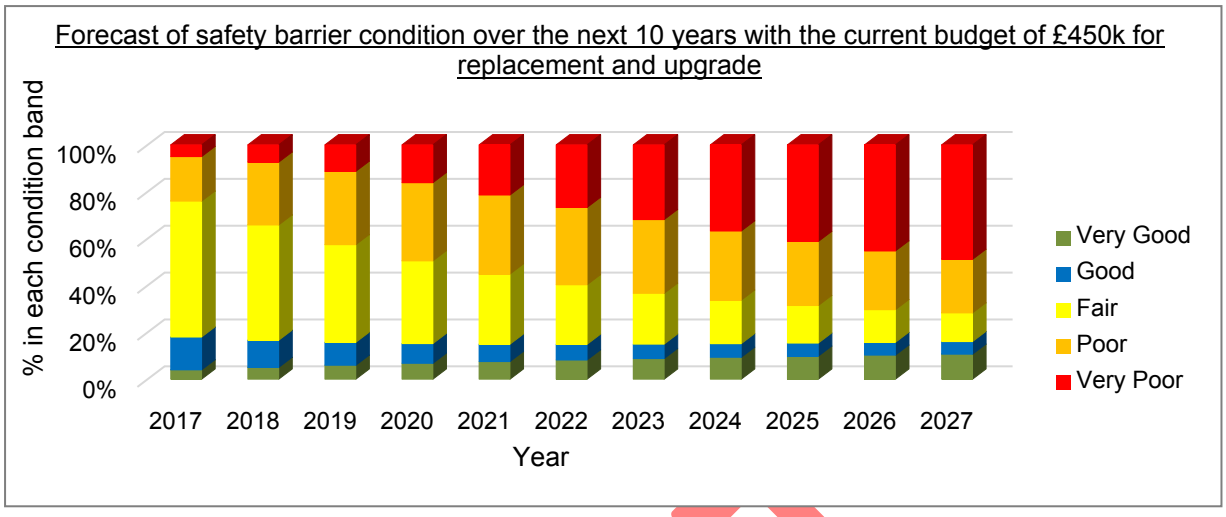
	Total Length of asset (m)	Very Poor	Poor	Fair	Good	Very Good
Length of asset in each condition band	232,290	11,190	44,263	133,594	33,024	10,219

We have estimated that the current backlog for replacing or upgrading safety barriers that are considered to be in a very poor condition is around £1.6m.

Age Profile Forecasts

Current Budget

The current annual budget for replacement and upgrading is £450k.

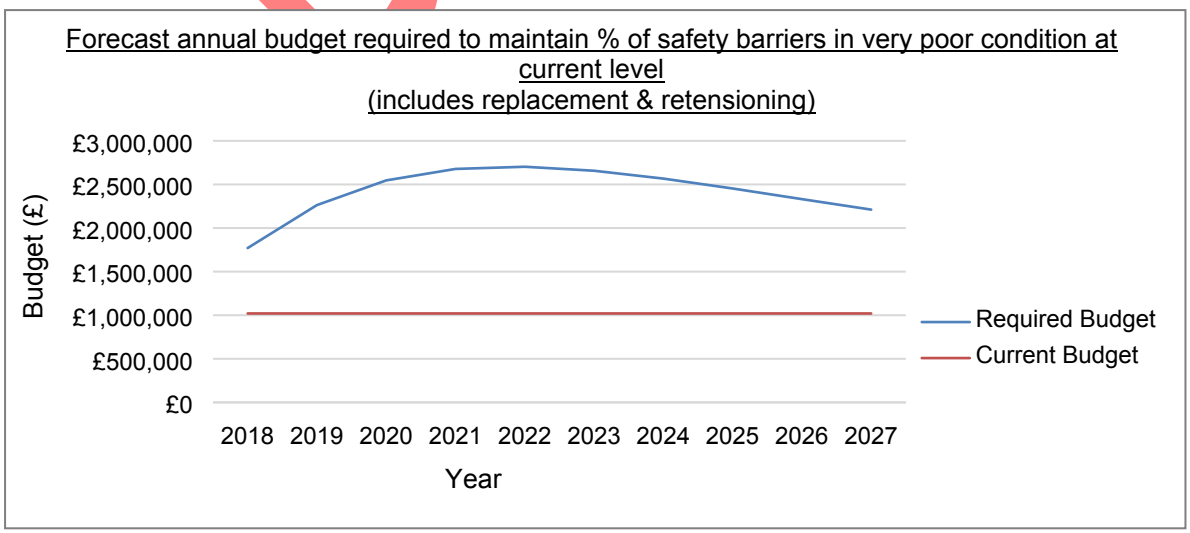


	Length (m) in each condition band if the replacement/upgrade budget remains at the current level										
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Very Good	9292	11671	13813	15740	17475	19037	20442	21706	22845	23869	24791
Good	32521	26946	22724	19560	17222	15525	14324	13503	12973	12663	12517
Fair	134727	114286	96818	82000	69513	59054	50348	43144	37215	32367	28427
Poor	44135	62254	72660	77492	78393	76617	73104	68553	63471	58220	53049
Very Poor	11615	17133	26275	37498	49687	62057	74072	85384	95786	105171	113506

We have estimated that the replacement/upgrade backlog by 2027 will be £15.4m if the annual budget remains at the current level.

Forecast Budget Required to Maintain Current Age Profile

The modelling forecasts an annual average replacement/upgrade budget of £2.4m would be needed to maintain the percentage of safety barriers in very poor condition at the current level.



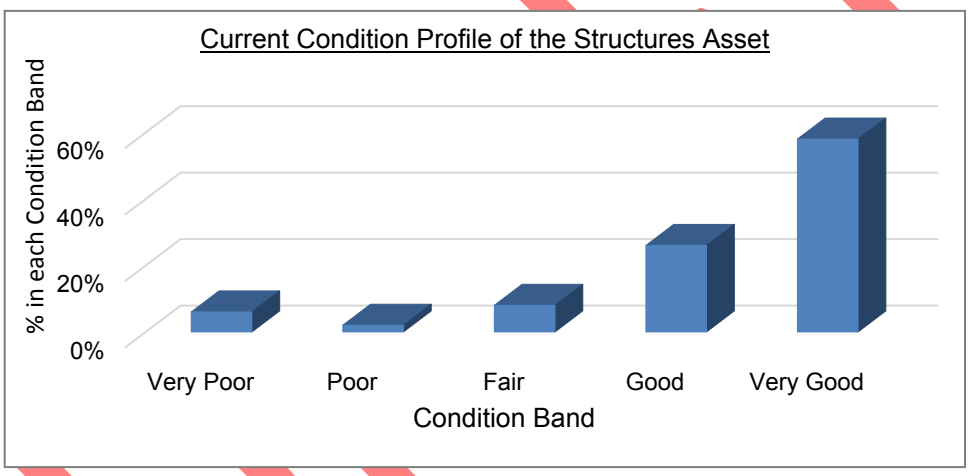
Future Improvements to Enable Us to Improve the Management of Our Safety Barrier Asset

- The next planned detailed inspection will utilise advancements in collection hardware/software to improve the quality of the asset inventory data.
- The information collected will be tailored to meet the need for the asset management of the safety barrier systems with both serviceability and specification condition grades recorded.
- A data asset management system with a GIS interface will be utilised to improve the management of this asset.

Bridges, Tunnels and Highway Structures

There is an extensive inventory database and well established, nationally recognised inspection regimes for structures. This has resulted in a wealth of information on this asset group which is currently held on a bespoke database. A recent review of data collection and management within this asset group concluded that while the data collection regimes were fit for purpose the data management systems no longer were. As a result, work currently being undertaken has established what is now required from a structures management system and this is being implemented. Although underway, implementation of the new structures management system is not complete and as an interim measure the following forecasts of asset condition have been determined using the HMEP ancillary assets toolkit populated with Kent specific data.

Current Condition Profile of the Asset

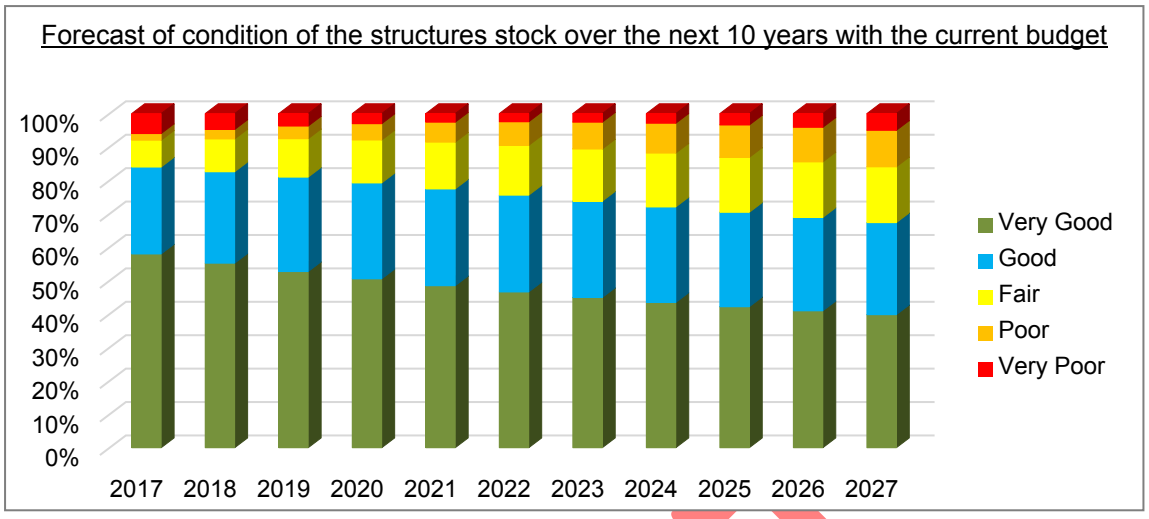


	Very Poor	Poor	Fair	Good	Very Good
% in each Condition Band	6%	2%	8%	26%	58%

Age Profile Forecasts

Current Budget

The current annual average budget for structures maintenance is £1.8m



Year	% in each condition band if the budget remains at the current level										
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Very Good	58%	55%	53%	51%	48%	47%	45%	43%	42%	41%	40%
Good	26%	27%	28%	29%	29%	29%	29%	29%	28%	28%	28%
Fair	8%	10%	11%	13%	14%	15%	16%	16%	16%	17%	17%
Poor	2%	3%	4%	5%	6%	7%	8%	9%	10%	10%	11%
Very Poor	6%	5%	4%	3%	3%	2%	3%	3%	3%	4%	5%

Forecast Budget Required to Maintain Current Overall Condition Profile

Using these modelling forecasts, it has been estimated that the annual average budget needed to maintain the current overall condition profile would be in the order of £6m.

Future Improvements to Enable Us to Improve the Management of Our Structures Asset

- Fully implement the new structures management system to enable more robust lifecycle modelling, particularly for different treatment strategies.

Footways

As with roads, this asset group has a comprehensive set of condition data from surveys covering a number of years. However, there are fewer sets of complete network data than for roads due to the survey regime.

Although based on a nationally recognised survey, which produces an estimate of the condition of the asset, the current outputs do not lend themselves to being used in lifecycle planning as the survey involves the surveyor assessing the defects and recording the condition band this places a section of footway in, rather than recording the defects themselves. It has been possible to estimate future asset condition under a number of budget regimes by using a series of recorded assumptions.

Reacting to Surface Defects

The figures used below only relate to proactive, planned capital investment in our footway network. They do not include any allowance for the funds the County Council spends each year to reactively repair footway surface defects.

During the last few years we have spent an average of £1.4m a year reactively repairing footway defects. The total for the period 2013/14 to 2016/17 was £5.5m using a combination of revenue and capital funding. It is very difficult to accurately model the relationship between footway condition, the number and cost of surface defects that will occur. Investment less than that modelled to achieve a steady state condition would result in an increase in surface defect numbers, increasing the pressure on revenue and capital funds and in turn reducing the amount of capital funding that can be spent on planned maintenance.

Current Condition

Following completion of the 2016/17 footway condition survey, the percentage of our footway network considered to be in a poor condition is 33.1% an increase from 32.7% calculated in 2015/16.

Condition	Year	
	2015/16	2016/17
Poor	32.7%	33.1%
Good	67.3%	66.9%

It is estimated that the current maintenance backlog for footways is in the region of £84m.

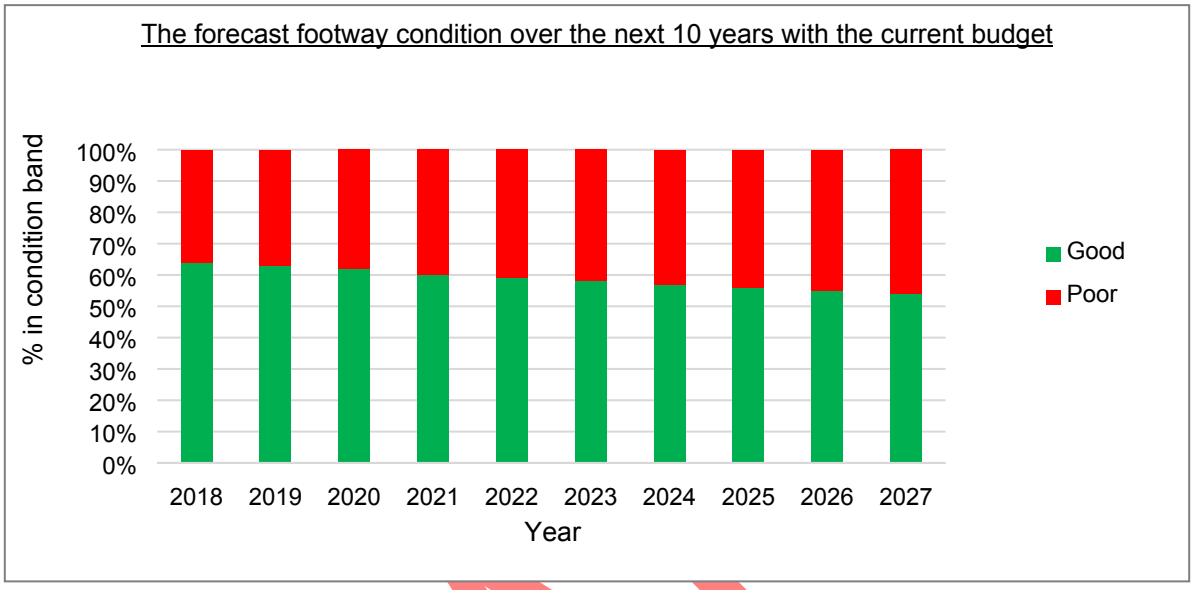
Condition Forecasts

Current Budget

We have modelled the effect on footway condition if the current levels of Government funding remain unchanged.

Condition	Year									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Poor	36%	37%	38%	40%	41%	42%	43%	44%	45%	46%
Good	64%	63%	62%	60%	59%	58%	57%	56%	55%	54%

Figures rounded to nearest whole percentage number

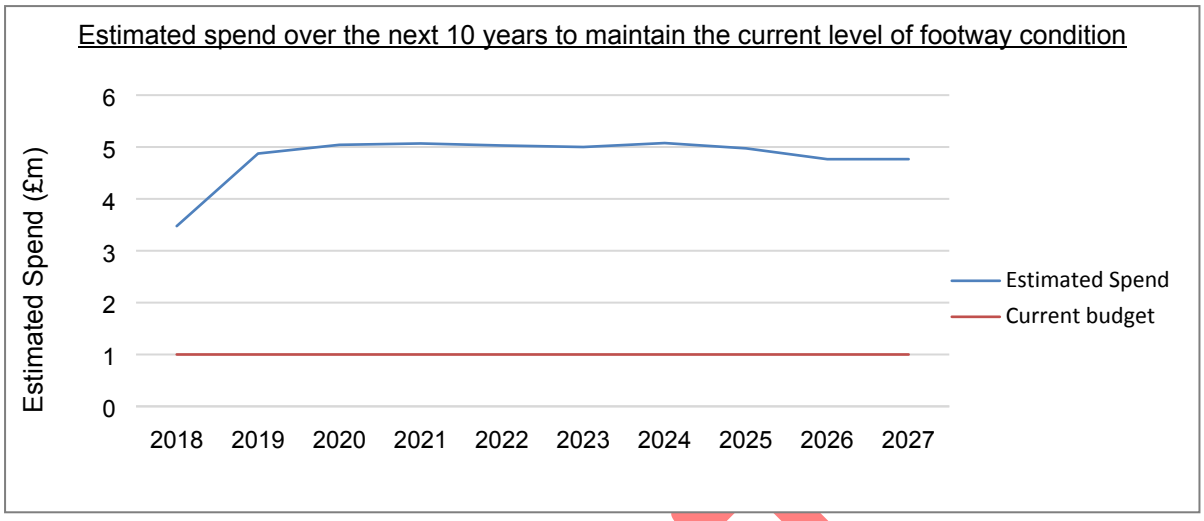


We estimate that in this scenario the backlog will increase from £84m now to around £116m by 2027.

This level of asset deterioration is significant. Whilst the authority could likely continue to address safety critical defects, we will have a considerably more uneven footway network towards the end of this forecast period. An Equality Impact Initial Screening exercise has identified that this is likely to have an adverse impact on certain specified groups protected under the Equality Act, namely the elderly and disabled.

Steady State Condition

We have modelled a scenario where the footways are maintained at their current condition level over the next ten years and calculated that an average annual capital investment of £4.8m, at today's prices, would be required. This scenario will result in the backlog figure remaining at £84m, plus inflation, in ten years' time. Any investment less than this would mean that a steady state condition could not be achieved.



Future Improvements to Enable Us to Improve the Management of Our Footways Asset

- The footway asset group has recently been extended to include “off-road cycleways”. These pavements are those cycleways that whilst being appropriately constructed for the purpose, do not adjoin a carriageway section. The condition assessment for these sections of our network need to be developed.
- The type of data collected for this asset will be reviewed to improve our confidence in the modelling.
- Use of condition data to enable scheme modelling.

Street Lighting

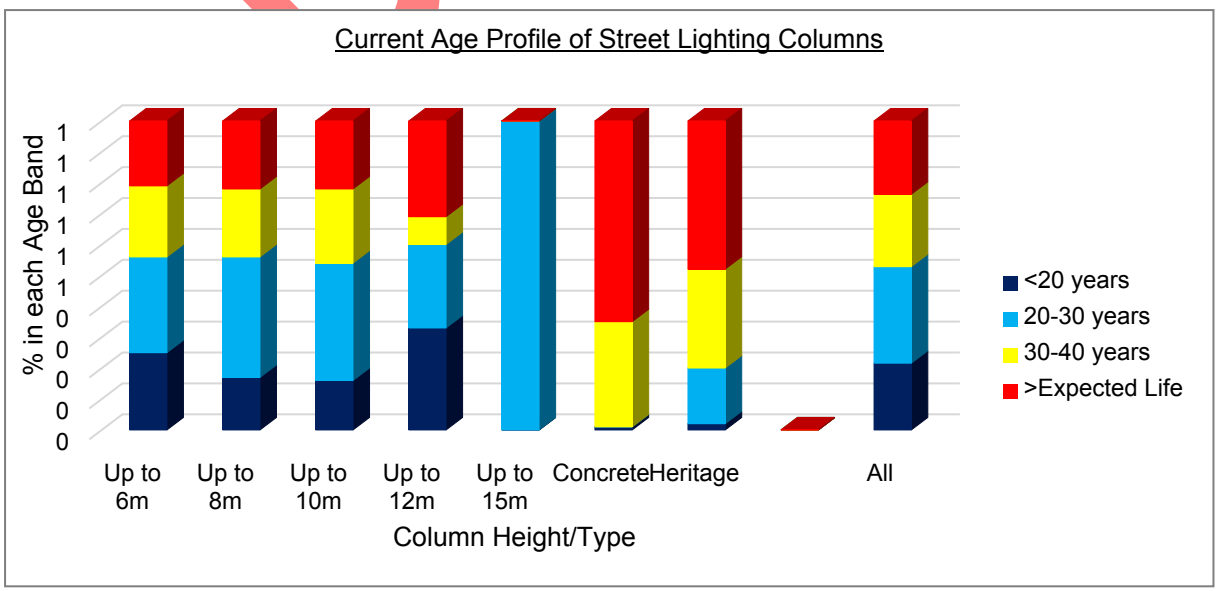
Kent has an extensive database of its Street Lighting asset and this has been used in conjunction with the HMEP Ancillary Assets Toolkit to forecast future replacement needs. The initial forecasts cover the replacement of the seven types of column as they reach the end of their expected life. Initially only these groups have been used as they cover 75% of the total asset by number, are the highest value and are less likely to need replacement following unforecastable damage, such as vehicle impact.

The Effect of Ageing Infrastructure on Street Lighting Maintenance

A robust structural testing programme resulted in the provision of additional capital funding for the replacement of life expired steel street lights in the three years 2013 to 2016. This enabled Kent to make sure that this type of street light now poses a low risk of failure. However, the on-going programme of testing will identify further steel assets which will require replacing. Based on the industry average it is anticipated that every year a minimum of 2,000 steel street lights will need replacing following their programmed structural re-test. The cost of replacing these is estimated at £2.2m per year (2016 rates).

The focus on steel assets in has been to the detriment of concrete street lights which have received no funding in the last three years. If a concrete column were to suddenly fail, this would pose a significant danger to road users. In addition, the lanterns cannot be replaced on these columns, which in turn means they cannot be converted to LED under our conversion project resulting in loss of energy savings. There are approximately 3,500 concrete street lights all of which are coming to the end of their life and require replacing. The cost of replacing these is estimated at £3.85m (2016 rates) and a separate capital bid has been made for extra funds to undertake this work. Part of this funding has now been approved and orders are underway to commence some concrete column replacements.

Current Age Profile of the Asset



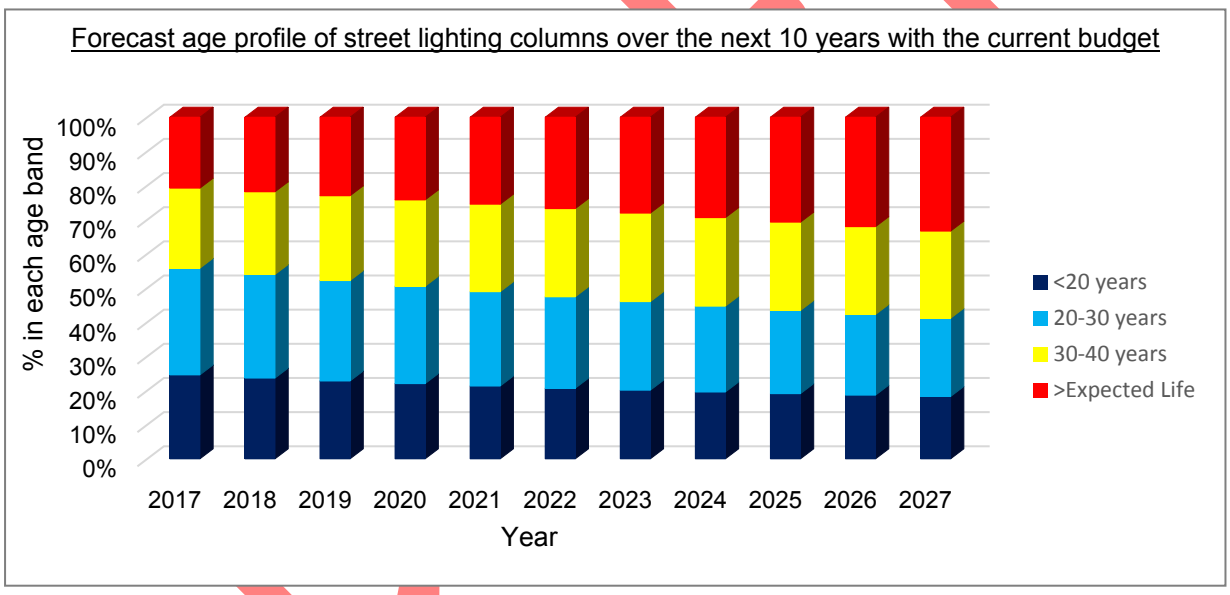
Column Height/Type	Total No. of assets	<20 years	20-30 years	30-40 years	>Expected Life
Up to 6m	79,740	19,935	24,719	18,340	16,746
Up to 8m	13,121	2,231	5,117	2,886	2,887
Up to 10m	16,374	2,620	6,222	3,930	3,602
Up to 12m	1,733	572	468	156	537
Up to 15m	6	0	6	0	0
Concrete	5,388	54	0	1,834	3,500
Heritage	1,387	28	250	444	665

We have estimated that the current backlog in replacing street lighting columns that have reached their expected life is around £27m (excluding the concrete columns referred to above).

Age Profile Forecasts

Current Budget

The current annual budget for column renewals is £1.6m.



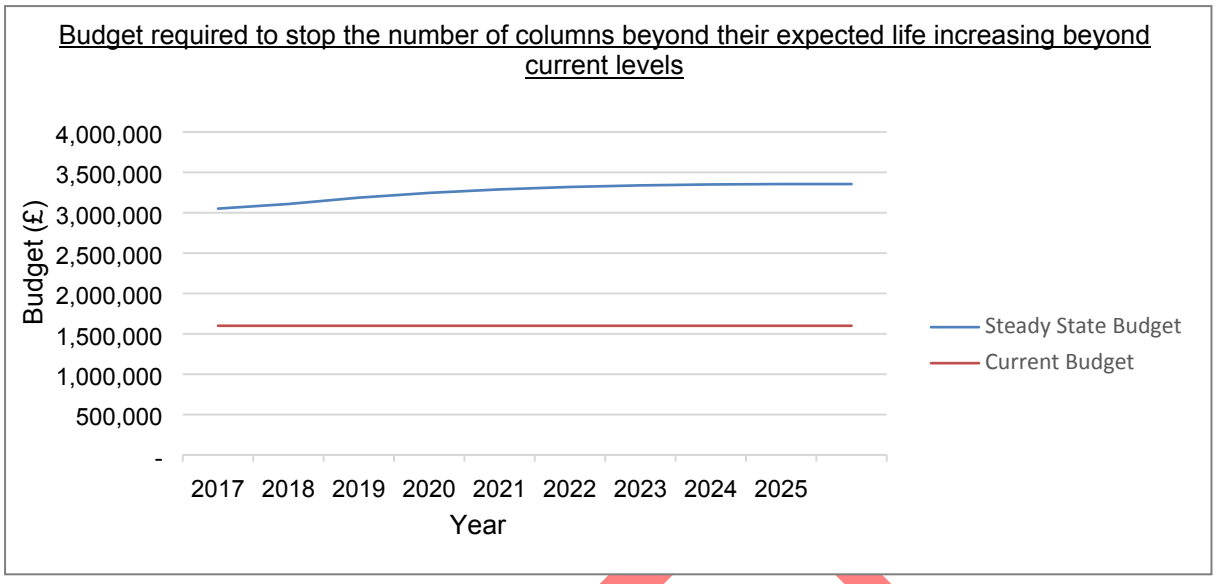
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
<20 years	28940	27839	26834	25925	25093	24340	23657	23034	22466	21952	21484
20-30 years	36777	35704	34620	33560	32524	31517	30536	29592	28687	27817	26988
30-40 years	27595	28512	29232	29771	30154	30393	30510	30519	30432	30264	30028
>40 years	24437	25694	27063	28493	29978	31499	33046	34604	36164	37716	39249

The forecast number of assets in each age band over the next 10 years with the current budget.

We have estimated that the renewal backlog by 2027, if the annual budget remains at the current level, will be £44.2m (excluding concrete columns)

Forecast Budget Required to Maintain Current Age Profile

The modelling shows an annual average renewals budget of around £3.3m is needed to maintain the current age profile of the lighting columns.



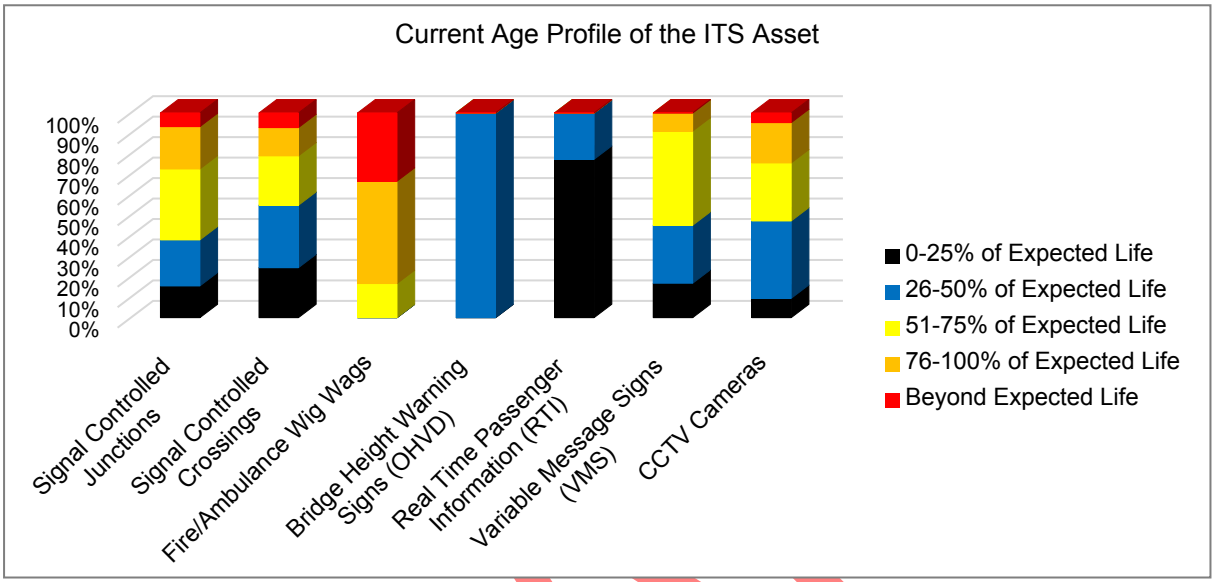
Future Improvements to Enable Us to Improve the Management of our Street Lighting Asset

- Increasing our knowledge of column asset age to improve replacement needs from lifecycle planning
- Incorporate other asset sub-groups when running lifecycle planning modelling

Intelligent Traffic Systems

We have excellent inventory and condition data on this asset group that has been built up over many years. The HMEP Ancillary Assets Toolkit has been used to model expected asset renewal needs and outcomes for the next ten years.

Current Age Profile of the ITS Asset



	Total No. of Assets	Condition Band (% of Expected Life)				
		0-25	26-50	51-75	76-100	>100
Signal Controlled Junctions	329	51	74	114	68	22
Signal Controlled Crossings	377	92	115	91	52	27
Fire/Ambulance WigWags	6	0	0	1	3	2
Bridge Height Warning Signs	2	0	2	0	0	0
Real Time Passenger Information Signs	53	41	12	0	0	0
Variable Message Signs	113	19	32	52	10	0
CCTV Cameras	127	12	48	36	25	6

This current condition represents a renewal backlog of £3.65m.

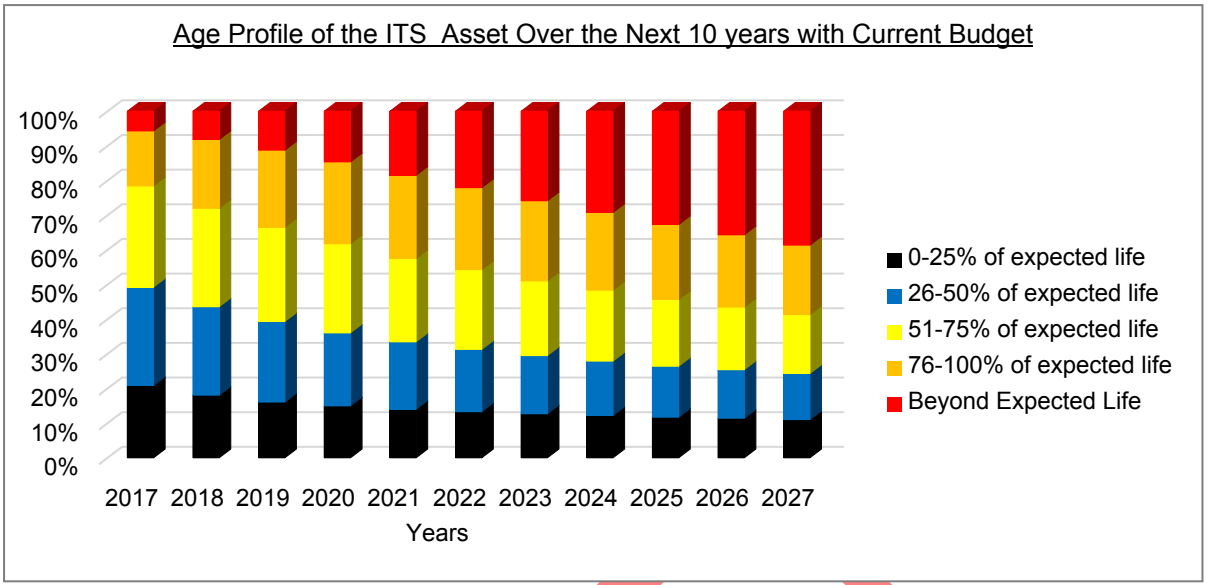
Age Profile Forecasting

The above information has been used in conjunction with the HMEP Ancillary Assets toolkit to model the budget requirements and age profile of the asset resulting from two scenarios;

- The condition over the next 10 years based on the current budget
- The budget required to keep asset at a steady state over the next 10 years

Current Budget

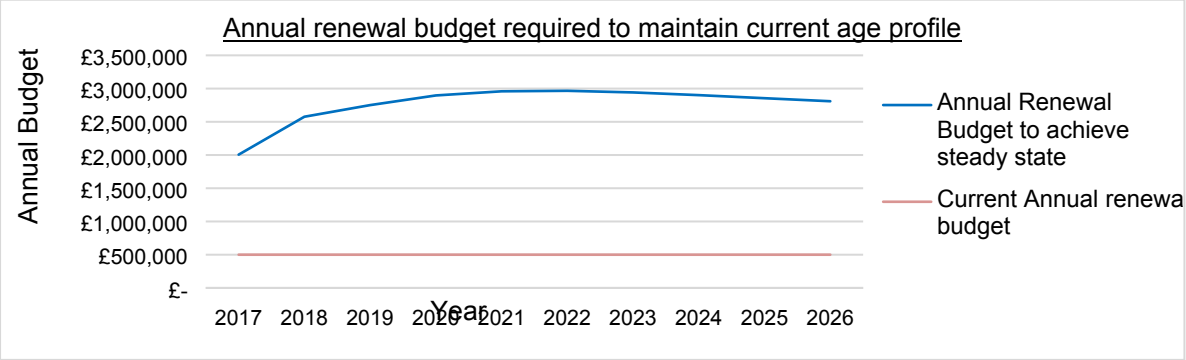
The age profile of the ITS asset has been modelled for the next ten years, using the current annual renewal budget of £500,000. It is estimated that this will result in a renewal backlog of around £25.9m by 2027.



	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
0-25% of expected life	210	182	162	151	141	134	128	123	118	115	111
26-50% of expected life	286	257	234	212	196	181	169	158	148	141	134
51-75% of expected life	294	286	274	259	242	232	217	206	194	182	171
76-100% of expected life	160	200	224	238	242	238	233	226	218	210	202
Beyond Expected Life	57	82	113	147	186	222	260	294	329	359	389

Steady State

We have modelled the budget profile that would be needed to maintain current number of the ITS assets beyond their expected life for the next ten years. It is estimated that over ten years the cost would be £27.7m, which equates to an annual average renewal budget of £2.8m.



Future Improvements to Enable Us to Improve the Management of Our ITS Asset

- Continue to move to a more flexible and modular signal design as technology allows, which will further enable partial site refurbishments and individual component changes to be made to extend asset life.

- Consider adjacent third party developments when determining the site refurbishment list, as we can use third party funding to invest in such asset works and offset our liability.

Soft Landscape

We have collected extensive data on our soft landscape asset but due to the nature of the asset and type of maintenance involved we consider a forecast of service levels for different funding levels to be more appropriate than the lifecycle planning approach taken for other asset groups.

Levels of Service

The history of service levels for this asset is set out in in the document, ***Implementing Our Approach to Asset Management in Highways***.

Annual maintenance frequencies are reviewed periodically in accordance with available funding and the table below summarises the forecast levels of service for three levels of funding.

Service Provision	Steady State Service (£4.2m)	Current Budget Reduced Service (£3.2m)	Statutory Minimum Service (£2.2m)
Urban Grass Cutting	8	6	1-3
Shrub Bed Maintenance	2	1	0
Urban Hedges	2	1	0
Weed Spraying (Hard surface)	2	1	0
Rural Swathe Cutting	2	1	1
Visibility cuts	3	3	3
Rural Hedge Cutting	1 - 2	1	every other year
High Speed Road (HSR)	2	1	1
Bus Routes	Safety & amenity	Safety critical only	
Tree Maintenance	Safety, amenity & nuisance	Safety critical only	

As shown above, we are aware that the current maintenance frequencies fall short of what is required to prevent both medium and long term asset deterioration.

Future Improvements to Enable Us to Improve the Management of Our Soft Landscape Asset

- Further develop and fine tune the current data held on this asset to ensure the maintenance programmes continue to be fit for purpose and procurement of services is cost efficient.

Road Markings and Studs, Pedestrian Guardrail and Unlit Signs

We have very little data on these assets and due to their low value, expected life span and the generally reactive nature of their maintenance, we consider a forecast of expected outcomes from different funding levels to be more appropriate for these asset groups than lifecycle planning.

Current Levels of Funding and Service

The current level of funding on these assets is;

Asset	Total Funding	Capital/Planned Funding	Revenue/Reactive Funding
Road Markings & Studs	£510k	£200k	£310k
Pedestrian Guardrail	£105k	-	£105k
Unlit Signs	£415k	£0k	£415k

This allows the delivery of the following levels of service;

Asset	Description	Response time
Road Markings	Safety critical road marking is identified as being more than 50% faded through inspection or enquiry.	Make safe within two hours. Permanent refresh within seven to 28 days.
	Non-safety critical road marking is identified as being more that 50% faded through inspection or enquiry	Refresh within 28 to ninety days.
	The requirement for new road marking is identified as part of the scheme or casualty reduction measure.	Install within ninety days.
Road Studs	Safety critical road stud (stick on or milled) is identified as missing through inspection or enquiry at a high risk site such as a junction or high speed road.	Make safe within two hours. Permanent repair within 28 days.
	Non safety critical road stud (stick on or milled) is identified as missing through an inspection or enquiry at a lower risk site such as edge of carriageway.	Replace within 28 to ninety days.
	Intelligent road stud is identified as missing through an inspection or enquiry – highly likely to be a safety critical site.	Make safe within two hours and replace within 28 to ninety days.
	Requirement for new road stud is identified as part of the scheme or casualty reduction measure.	Install within 90 ninety days.
Pedestrian Guardrail	Damage which causes either obstruction to traffic /pedestrians or may result in a pedestrian trip or fall from height	Emergency two hour attendance to make safe. Repair within 28 days for standard panels, repair within ninety days for special panels

	End of life	Attend within seven days of notification. Repair within 28 days for standard panels, repair within ninety days for special panels
	Improvement to appearance in the public realm	Attend within seven days of notification. Non safety critical repair to be prioritised for action as appropriate.
	Provision of new pedestrian guardrail as part of a new scheme or as a casualty reduction measure	Install within ninety days.
Unlit Signs	Damage which causes an obstruction to traffic or pedestrians.	Emergency two hour attendance to make safe. Repair within 28 days
	Unserviceable regulatory, mandatory or warning signs. Standard from stock.	Attend within seven days of notification. Repair within 28 days
	Unserviceable regulatory, mandatory or warning signs. Non-stock.	Attend within 7/28 days of notification. Repair within ninety days.
	Reflectorised type regulatory, mandatory or warning sign with poor reflective performance	Attend within seven days of notification. Repair within ninety days.

Forecast Levels of Service Outcomes with the Current Budget

Service	**Road Markings and Studs**	**Pedestrian Guardrail**	**Unlit Signs**
Damage repair.	**Likely**	**Likely**	**Unlikely**
End of life replacement.	**Likely**	**Unlikely**	**Unlikely**
Improvement to appearance of the public realm.	**Highly Unlikely**	**Unlikely**	**Unlikely**
Provision of new assets.	**Unlikely**	**Unlikely**	**Unlikely**
Deliver cost efficiencies in managing the asset.	**Unlikely**	**Unlikely**	**Unlikely**
Upgrade to use new technology.	**Unlikely**	**Unlikely**	**Unlikely**
Increase public satisfaction with the asset.	**Unlikely**	**Unlikely**	**Unlikely**

Forecast Levels of Service Outcomes with a Reduced Budget

Service	Road Markings and Studs	Pedestrian Guardrail	Unlit Signs
Damage repair.	**Likely**	**Likely**	**Highly Unlikely**
End of life replacement.	**Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Improvement to appearance of the public realm.	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Provision of new assets.	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Deliver cost efficiencies in managing the asset.	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Upgrade to use new technology.	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

The above tables illustrate that the current budget is not sufficient to achieve the desired outcomes above and therefore it follows that any reduction in funding from current levels will result in a significant negative impact on service delivery.

Part 3: Summary and The Future

Context

In February 2017, Kent County Council published two key documents. The first, ***Our Approach to Asset Management in Highways***, outlines how asset management principles can enable us to meet with our statutory obligations and in doing so, support the County Council's vision of "improving lives by ensuring every pound spent in Kent is delivering better outcomes for Kent's residents, communities and businesses".

The second, ***Implementing Our Approach to Asset Management in Highways***, outlines in more detail how we will embed asset management principles in the way that we deliver highway services and measure our success to ensure continuous improvement and a focus on the County Council's Strategic Outcomes. Over the last year, we have implemented a range of measures to improve our knowledge of our highways asset and carry out lifecycle cost analyses, in order to make informed decisions about how we maintain our highway assets.

This third document, ***Developing Our Approach to Asset Management in Highways***, uses more robust data, processes and modelling, and outlines the current condition of highway assets and forecasts future condition and levels of service. It also includes areas that we want to develop in future to further enhance service delivery and ensure continuous improvement. Publishing this document will help enable Kent to evidence a Band 3 rating for Incentive Fund purposes and avoid a further reduction in government funding allocated to Kent.

Current Condition and Forecast Deterioration

In ***Implementing Our Approach to Asset Management in Highways*** we explained that most local authorities are facing significant challenges in maintaining a safe and reliable highway network during a time of ageing assets, diminishing resource, deteriorating condition and increasing public expectation. The rate at which local roads in England are deteriorating far exceeds the rate of investment from central government, and this is a constant theme of published reports. A respected industry report estimated that the cost of bringing local roads in England and Wales up to scratch is around £12bn.

Most commentators will accept that capital investment in existing local roads throughout the country has been insufficient for decades. That has been further exacerbated by reduced funding from central government in recent years as the Government seeks to reduce public spending.

The position in Kent is similar to most other authorities. Our forecast for most highway asset groups based on current levels of funding continuing is grave. In most asset groups, it is clear from detailed modelling and analysis that our highway assets will continue to deteriorate, in some cases very significantly.

Whilst all highway asset groups have their respective challenges going forward, this report include two important but difficult conclusions about our largest and most valuable asset groups – roads and footways. Our road assets are in poor condition and will deteriorate significantly if current funding levels are maintained. If that occurs on the scale modelled over ten years, towards the end of that period it will become increasingly challenging to fulfil our Highways Act duties to maintain a safe network. Our footway assets are also in poor condition and will deteriorate significantly over the next ten years. If that happens as modelled, we will have significantly more uneven footway network towards the end of the forecast period. That will disproportionately affect vulnerable groups protected by the Equality Act, namely the elderly and disabled.

Future Workstreams

It has been mooted that the Department for Transport may make some changes to the Incentive Fund mechanism. We await any announcement but it is possible they may introduce a higher level, Band 4, of demonstrating asset management competence. We have also heard a suggestion that there will be additional questions, and it is conceivable that a greater percentage of Government capital grant funding will in future be dependent on our Incentive Fund rating.

Even if none of these changes occur, it is important to note that a considerable amount of asset management-related work will need to be carried out in 2018 and beyond to cement our Band 3 rating, and as part of our future implementation and adoption of Well-managed Highways Infrastructure, a new Code of Practice concerning highway maintenance. These workstreams will include regularly reviewing, developing and improving the plans, frameworks and strategies that Kent has put in place. It also includes refining and improving our data collection and management to improve our ability to carry out lifecycle planning; for example, we need to commission and implement a new structures database, we need to improve and optimise drainage asset data and gully cleansing and we need to commission a new contract or contracts covering our road and footway asset condition surveys and strategic asset management functionality.

Given the scale of maintenance backlogs and modelled deterioration across most asset groups, and that it is unlikely in the current European, national or local context that funding levels will increase by the magnitude needed, it is important that we examine what more we can do to reduce lifecycle costs and improve future maintainability. This clearly is important in terms of existing highway assets when they are renewed or life-extended, but also in relation to new assets, whether they are installed by KCC and others or added to our inventory through adoption. These new highway assets bring significant other benefits to KCC and the people and businesses of Kent, but moving forward we need to consider how we get the balance right between those benefits and our ability to maintain these assets over their lifecycle.

It is therefore intended that, during 2018, officers examine a number of key areas relating to new assets being installed on our network to minimise lifecycle costs and improve future maintainability. These might include, but not be limited to, the following:

- consider the possibility of reviewing the Kent Design Guide to include more focus on reducing lifecycle costs and improving future maintainability;
- consider the possibility of creating technical guidance notes for each asset group and introducing a technical approval process; and
- require future improvement projects to demonstrate that different lifecycle options have been considered and balanced against other drivers.