Asset Management in Highways

Implementing our Approach to Asset Management in Highways

2017/18

Contents

Foreword

Our local highway network is the most valuable asset we own in Kent and it plays a vital part in delivering Our Vision in Kent County Council's Strategic Statement *Increasing Opportunities, Improving Outcomes* which sets out our ambitions towards 2020. Our roads enable safe and reliable journeys and in doing so support social and economic prosperity. They also facilitate the transport of services essential to health and wellbeing, including emergency services, medical services, food transportation etc.

Like most local authorities we are facing significant challenges in maintaining a safe and reliable highway network during a time of 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 recently 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.

Whilst we accept that the country's 4,300 miles of motorways and trunk roads – managed by Highways England - fulfil an important strategic, national and local role and that they are more expensive to maintain that local roads, we do feel that funding for local roads – maintained by local authorities – has fallen behind. Highways England has been allocated £15bn of capital investment for the six years to 2020/21. That compares to around £6bn of capital funding for around 180,000 miles of local roads in England excluding London over the same period. Kent alone has 5,400 miles of roads, including 622 miles of A-roads.

The Government has changed the rules for funding local road maintenance. An increasing proportion of this funding is dependent on local authorities being able to show that they use asset management techniques in highway maintenance. As a forward thinking authority, we are already doing much of that and are committed to further embedding asset management principles into our day-to-day management of our roads. This includes understanding their lifecycle cost so that we can make informed investment decisions, maximise efficiency and value-for-money, and ensure that we have well-managed highway infrastructure that is fit for purpose, not only now but for future generations.

Asset management alone will not address the challenges ahead. Local roads in England carry around two thirds of all traffic. They are vital for the well-being of local communities, economic growth, jobs and housing. The country needs to reconsider the balance between local road maintenance spend and motorway/trunk road investment if we are to avoid a significant deterioration in local road condition in the next decade.

Leader, Kent County Council

Executive Summary

Introduction

Our highway network is the most valuable asset we own and we are committed to its effective management not only now but also, for future generations.

The County Council has a number of statutory obligations that are relevant to highway asset management. The Highways Act 1980 requires us to maintain the highway in a safe condition and appropriately functioning state. The Traffic Management Act 2004 obliges us to facilitate and secure the efficient movement of traffic on our highway network. The Climate Change Act 2008 compels us to reduce greenhouse gas emissions and prepare to adapt to longer term climate change.

Asset management has been widely accepted by central and local government as a way of using knowledge and forward planning to manage the highway network efficiently and effectively.

Our Approach to Asset Management in Highways is a brief statement that 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 document, **Implementing Our Approach to Asset Management in Highways**, describes how we will embed asset management principles in the way that we deliver highway services and measure our success to ensure continuous improvement of our approach and a focus on the County Council's Strategic Outcomes.

Understanding The Assets We Manage

The highway network is made up of a diverse range of assets with an estimated value[1] in excess of £19.5bn. Understanding our highway assets is central to effective asset management and informed decision making. We continually collect information about our assets with priority given to high risk assets and the data required to fully support our approach to asset management. The content and means of storing this data is regularly reviewed and monitored to ensure accuracy and reliability.

[1] The cost of a like for like replacement at 2016/17 prices

Developing Maintenance Plans

A four step approach is taken to developing maintenance plans for each asset group.

- First, lifecycle planning provides an understanding of whole life cost and the potential impact and cost of different maintenance strategies.
- Second, an amalgamation of our statutory obligations, strategic objectives and public expectations enable us to define our required level of service.
- Third, an assessment of the current service level against the required level of service determines where performance achieves, exceeds or fails to meet the required standard.
- Four, once we know where we are and where we want to be, a maintenance strategy can be developed.

We have to work within the constraints of our budget so it is important to identify the most efficient and affordable way of delivering services. When considering different maintenance strategies it is important to think about the future and keep costs to a minimum for the whole life of the asset. Moreover when the required level of service is not financially viable it is important to understand, document and manage the associated risks effectively and prioritise on this basis.

Forward Works Programming

Forward works programmes provide an effective and efficient way of delivering maintenance, repairs and improvements. They enable prioritisation and optimisation of schemes to meet available budgets.

We publish a lot of information about our programmes of work on our website so that members of the public can see where and when we plan to do works.

Measuring Success

It is important that we record and demonstrate that the intended benefits of Our Approach to Asset Management are being delivered. By routinely monitoring outcomes and reporting on their delivery we can ensure that we remain focused on the needs of Kent's residents, businesses, visitors and community, meeting with our legal obligations and responding to changes and financial challenges.

Clear performance measures and targets ensure that we are continuously improving the way we work and provide an opportunity to identify areas for further development. Equally, drawing a comparison between our own services and the services provided by others presents alternative ways of working at all levels and can inform the progression of our approach.

Preparing For The Future

The Climate Change Act places obligations on the County Council and others to reduce greenhouse gas emissions and prepare to adapt to longer term climate change. The effects of climate change on our highway assets have been particularly evident in recent years and our longer term approach will need to consider how investment priorities and lifecycle costs may be affected.

Critical Infrastructure refers to routes and assets where failure would result in a significant impact to the local, and potentially the national, economy. There are many potential risks and threats to the function of critical infrastructure and we need to ensure that they are managed effectively to maximise resilience now and in the future.

The Cities and Local Government Devolution Act provides the legislative basis for the current devolution agenda. Should highway services form part of future devolution discussions it will be imperative that service delivery mechanisms which support and enable effective asset management underpin the implementation of any changes.

Highway maintenance and asset management has been included as a Kent-wide priority in KCC's consultation paper on its next Local Transport Plan covering the next fifteen years. It explains that implementing an asset management approach will enable Kent to maximise funding from Government thereby helping Kent to deliver its wider Growth without Gridlock objectives.

What Our Approach To Asset Management In Highways Means For Each Of Our Asset Groups

The extent to which we have already implemented asset management principles varies across our asset groups. For some asset groups we have the information and tools to begin developing a more sophisticated approach to asset management. In other cases this is not the case and 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 three principals have been applied in all eight areas of the highway service:

Condition Assessments and Inspections

All of our asset groups are subject to condition assessments and inspections. The information collected is used to identify the maintenance and improvement works needed to meet the required service standard and to estimate maintenance backlogs and future investment needs.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure our road network is resilient and can support the communities and economy of Kent. We have to work within an overall budget and therefore we need to prioritise investment effectively. The methodology used to prioritise sites varies between the asset groups however in all cases; highway safety is our primary concern.

Levels of Service

When determining levels of service we consider a number of options in the context of our statutory obligations, the County Councils Strategic Objectives, customer expectations and the available budget. They are:

Asset/Service Level Enhancement

An approach that fulfils our statutory obligations and enables the overall condition of the asset group to be enhanced.

Steady State

A level of service and investment that fulfils our statutory obligations and preserves the overall condition of the asset in its current state. Any investment less than this would mean that a steady state condition or existing service level could not be achieved.

Service Level Reduction

A level of service that fulfils our statutory duties and facilitates a more controlled, optimised approach service delivery.

Statutory Minimum

The minimum level of service that fulfils our statutory duties.

It is widely accepted nationally that investment in local roads throughout the country has been insufficient for decades, and the rate at which local highway assets are deteriorating exceeds the level of investment. For example, the backlog of investment in our roads is estimated to be £584m and our footway backlog is £83m. In the current financial climate and given pressures on other County Council services, it is therefore important that we make maximum use of asset management techniques and lifecycle planning.

The cost of delivering the outcomes described above for each asset group is:

Asset Group	Cost to Deliver the Level of Service			
	Asset/Service Enhancement	Steady State	Service Level Reduction	Statutory Minimum
Roads	£52,300k	£39,500k	-	-
Footways	£6,100k	£5,500k	-	-
Drainage	£8,525k	£6,820k	£5,115k	-
Structures	-	£2,672k	£1,781k	£1,336k
Street Lighting	£5,375k	£4,300k	£3,225k	-
Intelligent Traffic Systems	£3,125k	£2,500k	£1,875k	-
Soft Landscape	£5,000k	£4,200k	£3,200k	£2,200k
Barriers, Signs, Lines & Road Studs	-	£3,500k	£2,775k	£2,100k

Introduction

Our highway network is the most valuable asset we own. It enables safe and reliable journeys and in doing so supports social and economic prosperity. It is also essential for emergency services to execute their work; policing, fire, and emergency response provision all require an effective highway network. The highway network is also critical to the NHS - Emergency medical response as well as transporting patients, medical supplies, equipment and blood etc. These services are a key part of a functioning society and cannot exist without well-maintained highway assets. We are committed to good management of our highway network not only now but also, for future generations.

As the Highway Authority, the County Council has legal obligations to keep adopted highway routes available and safe for the passage of the travelling public. Our statutory duties are outlined in a number of pieces of legislation including the following:

The Highways Act 1980 outlines our duty of care to maintain the highway in a safe condition and protect the rights of the travelling public to use the highway.

The Traffic Management Act 2004 conveys a network management duty whereby we are required to facilitate and secure the efficient movement of traffic on the highway network.

The New Roads & Street Works Act 1991 requires us co-ordinate road works and to make best use of the existing network.

The Road Traffic Act 1991 describes our statutory responsibility to promote road safety and take measures to prevent collisions.

The Construction (Design and Management) Regulations 2015 details our duties to ensure that the work we do is designed and built competently and that risks to the work force and road users are properly considered and effectively managed. This places particular controls on how and when works are carried out.

Asset management has been widely accepted by central and local government as a way of using knowledge and forward planning to manage the highway network efficiently and effectively. We already take a largely asset management based approach to maintaining our highway assets but there are still aspects that we want to develop to further enhance service delivery.

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".

Successful implementation of Our Approach to Asset Management in Highways will deliver the following benefits to Kent:

A service that is shaped by the needs of Kent's residents, communities, visitors, businesses and public/emergency/health services now and in the future.

The people of Kent will:

- → understand our levels of service and investment decisions.
- → be assured that the highway network is sustainable and able to meet the needs of future generations.

A service that makes best use of the available resources, maximising efficiency to meet with our legal obligations

The people of Kent will:

- → feel safe and be confident about their personal safety when using the highway network.
- → be confident that the journeys they make will be reliable and timely.
- → be satisfied that we are maximising the number of assets we repair each year.

A service that is resilient and able to respond to changes and financial challenges

The people of Kent will:

- → see that we are ready to deal with unforeseen events effectively.

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.

Background

The County Council is responsible for the maintenance of 5,400 miles of roads and associated assets and with an estimated value in excess of £19.5bn, our highway network is our most valuable asset. Despite significant investment over the years, our highway assets are continuing to deteriorate. An ever increasing number of repairs, renewals and improvements are required and the countywide maintenance backlog for our roads alone is estimated to be £584m.

Funding of highway maintenance

Funding of highway maintenance comes from two sources, the County Council's revenue budget and capital grant funding from the Department for Transport (DfT). In recent years, significant financial pressures have been masked by the availability of one-off funding steams such as grants for severe weather recovery and pothole repair campaigns. This funding has meant the full impact of reduced revenue support from central government, DfT base budget cuts and the subsequent need for KCC-led savings initiatives has not fully resonated at a time when demands on the highways network are at an all-time high.

As overall funding continues to be reduced it is vital that we invest the budget we have in the most effective way we can for the benefit of our customers now and in the future. In recent years our approach to delivering highway maintenance has evolved dramatically as we have sought innovation and efficiency, undertaken intelligent commissioning and procurement exercises and built productive and positive working relationships with partner organisations. Now changes to the way in which DfT funding is awarded has brought about a requirement to demonstrate that our approach to delivering highway maintenance services is underpinned by sound asset management principles.

The Incentive Fund

Changes to DfT rules for funding highway maintenance have been introduced through its Incentive Fund to encourage local authorities to embed the use of asset management techniques into their management of highway maintenance and decision making around funding and priorities. The main aim of the asset management approach being encouraged by DfT is to clearly link investment decisions with an understanding of what that means in terms of outcomes.

In 2016 a phased implementation of the Incentive Fund commenced. Local authorities are now required to complete annual self-assessment questionnaire which culminates in an overall score of 1 to 3. The completed questionnaire is submitted to DfT and the score achieved determines the level of funding received. By 2020/21, a little over 15% of the County Council's capital maintenance grant will be dependent on the County Council being able to demonstrate that we are practicing good asset management.

Funding model summary for English Local Authorities

Year	Needs formula	Incentive formula	Challenge Fund	Total
2015/16	£901m	£0m	£75m	£976m
%	92.3%	0.0%	7.7%	100%
2016/17	£826m	£50m	£100m	£976m
%	84.6%	5.1%	10.2%	100%
2017/18	£801m	£75m	£100m	£976m
%	82.1%	7.7%	10.2%	100%
2018/19	£725m	£151m	£100m	£976m
%	74.3%	15.5%	10.2%	100%
2019/20	£725m	£151m	£100m	£976m
%	74.3%	15.5%	10.2%	100%
2020/21	£725m	£151m	£100m	£976m
%	74.3%	15.5%	10.2%	100%
Total	**£4.7bn**	**£578m**	**£575m**	**£5.8bn**

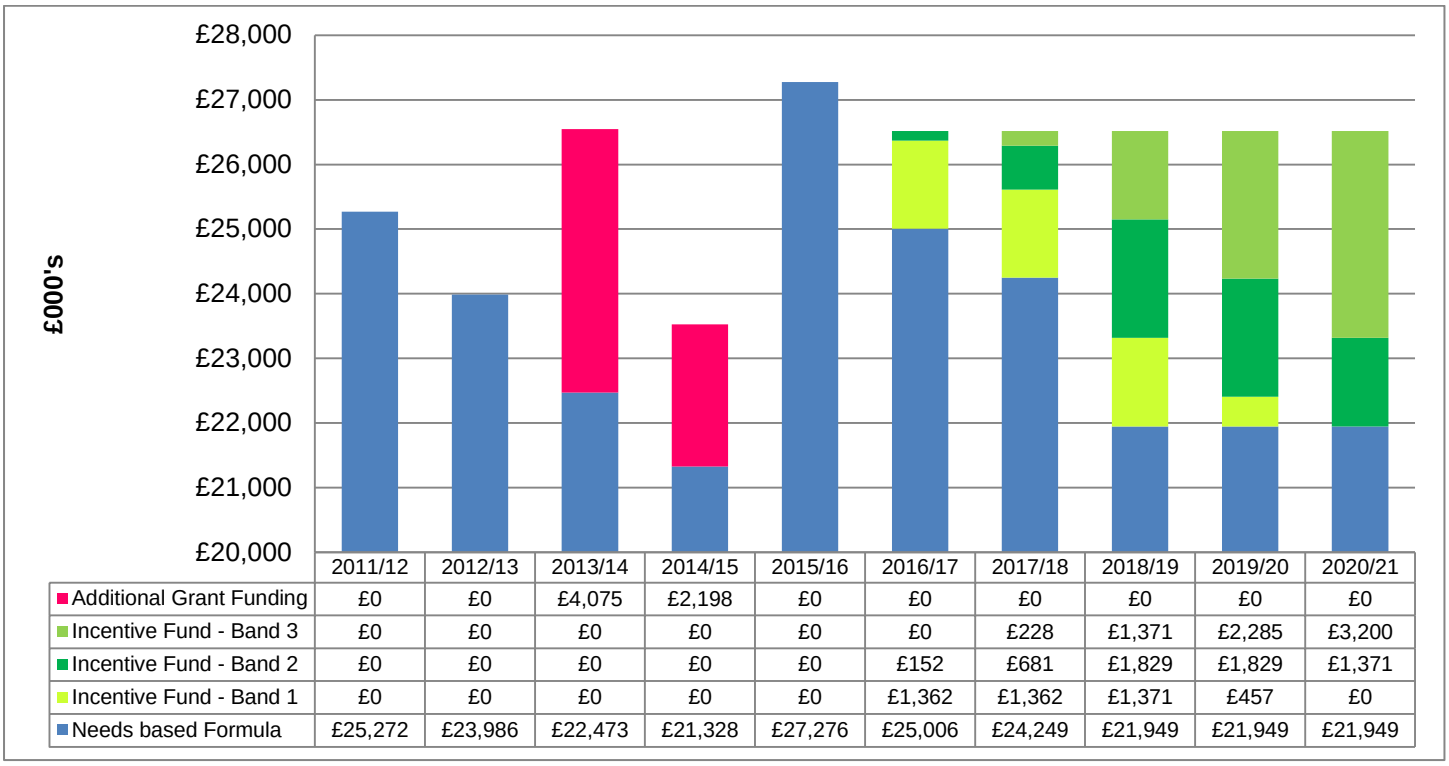
Reaching Band 3

Good asset management practice has been utilised across the County Council's highway services to varying degrees for many years. To meet with the requirements of the DfT and qualify for the Incentive Fund allocation it its entirety this needs to be developed further.

During a dry run of the Incentive Fund questionnaire in July 2015, we assessed service delivery in relation to 22 questions covering asset management, resilience, customers, operational delivery, benchmarking and efficiency. Whilst we scored highly in some areas including customer service and resilience, DfT guidance stated that if an Authority scores a Level 1 in any or all of the three questions relating to Asset Management Policy and Strategy, Communications or Lifecycle Planning they will automatically be placed in Band 1 overall.

In January 2016, Kent assessed itself as a Band 1 authority, principally because of a new requirement to introduce lifecycle planning for roads. If Kent cannot evidence that it has fully adopted the use of asset management methodology and in doing so has progressed to Band 3, it will receive £13m less in Capital funding over the next four years. This is illustrated in the graph and table below.

A breakdown of KCC's DfT Capital Funding since 2011/12



	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Additional Grant Funding	£0	£0	£4,075	£2,198	£0	£0	£0	£0	£0	£0
Incentive Fund - Band 3	£0	£0	£0	£0	£0	£0	£228	£1,371	£2,285	£3,200
Incentive Fund - Band 2	£0	£0	£0	£0	£0	£152	£681	£1,829	£1,829	£1,371
Incentive Fund - Band 1	£0	£0	£0	£0	£0	£1,362	£1,362	£1,371	£457	£0
Needs based Formula	£25,272	£23,986	£22,473	£21,328	£27,276	£25,006	£24,249	£21,949	£21,949	£21,949

In January 2016 the County Council's Environment & Transport Cabinet Committee resolved to support further embedding of asset management principles in our approach to delivering highway maintenance. Throughout 2016 policy, strategy, communications and lifecycle planning for roads and footways were developed to meet with the requirements of Band 2. This work was supported by a Member Task and Finish Group which convened on the 31st March and met regularly throughout the year, and as resulted in the production of *Our Approach to Asset Management in Highways* and this document, *Implementing Our Approach to Asset Management in Highways*. Adopting the latter will enable the County Council to evidence Band 2 when we complete our Incentive Fund questionnaire for 2017/18.

In 2017 work will continue to further develop our approach to asset management in accordance with the requirements of Band 3 prior to the completion of the 2018/19 self-assessment submission. Particular areas of focus will include lifecycle planning for other major asset groups, the development of a performance management framework to support the implementation of asset management, the development of an asset management competence framework and the continued development of this document.

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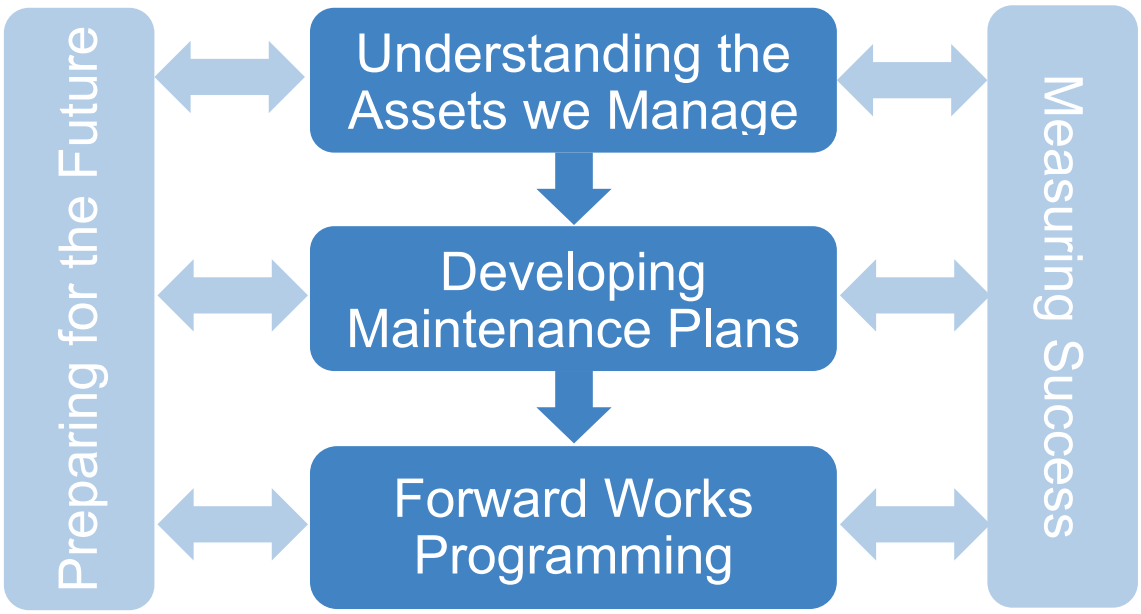
Part 1: Implementing Asset Management Principles in Highways



Understanding The Assets We Manage

Highway Assets in Kent

The highway network is made up of a diverse range of assets. Our highway assets are divided into key asset groups as follows:

Asset Group	Quantity	Estimated Value[2] (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	£9.9bn
Drainage	→ 250,000 roadside drains; → 8,500 soakaways → 250 ponds and lagoons;	
Structures	→ 1595 bridges and viaducts → 568 culverts → 537 other structures	£1.4bn
Street Lighting	→ 120,500 street lights → 20,000 lit signs → 4,600 lit bollards	£154m
Intelligent Traffic Systems	→ 696 traffic lights → 138 CCTV cameras → 351 interactive warning signs	£51m
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	£58m
Land	→ 75km^2	£8.2bn
Total Estimated Value		**£19.763bn**

[2] At 2016/17 prices

Asset Information

Understanding our assets is central to effective asset management and informed decision making. The information we need can be broken down into three categories:

Inventory and Condition Information

This data describes the full extent of an asset and can include location, age, size, construction and details of previous maintenance. Examples of how we collect this data include digitalisation of historic records, data collection exercises and as part of routine maintenance works.

Inventory and condition information helps us to plan maintenance activities and communicate with the people of Kent. It also helps us to understand the cost of replacing our assets with equivalent new assets. For example replacing a two year old Cosmopolis street light lantern with a new LED lantern; this cost is known as the “Gross Replacement Cost” (GRC).

Performance Information

This is the data we use to determine whether or not our assets are doing what we need them to do to keep the highway safe, reliable and meeting the needs of Kent’s residents, businesses, visitors and local communities. Examples of how we collect this data include condition surveys, routine inspections and testing, customer enquiries, third party claims, crash records, traffic flows and energy bills.

This data helps us to understand where we need to carry out maintenance activities, where our assets are going to need replacing now or in the future and where we need to think about changing, adding or removing assets . It also helps us to understand the cost of replacing an asset with its modern equivalent less deductions for all physical deteriorations. For example replacing a two year old Cosmopolis street light with a new LED lantern minus the cost of two years deterioration; this cost is known as the “Depreciated Replacement Cost” (DRC).

Financial Information

This is the data we use to assess cost. For example how much it will cost to maintain or replace an asset or how much it will cost to deliver a certain level of service. Our schedule of rates for different maintenance activities is one example this kind of data.

Collection of Asset Information

We continually collect information about our new, replacement and improved assets. It is important that the data we collect is accurate, reliable and useful but data collection can be expensive. We therefore prioritise information associated with high risk assets and information that will support our approach to asset management.

The quality, appropriateness and completeness of our asset data are reviewed regularly by our Asset Managers to ensure that if fully supports our approach to asset management.

Storage of Asset Information

All asset data collected should be stored in an appropriate asset management system in a format that is cost effective, reliable and that enables it to be readily captured, transferred, accessed and

used. Effective asset management relies on systems that can be used to support decision making at all levels.

Our asset inventory, condition and defect data is currently stored and interpreted in a number of ways.

Asset Group	Systems Used
Roads and Footways	Horizons, Kent Gateway and Works and Asset Management System (WAMS)
Drainage	Works and Asset Management System (WAMS)
Bridges, Tunnels & Highway Structures	Works and Asset Management System (WAMS) together with a specialist database with details of inspection records.
Street Lighting	Works and Asset Management System (WAMS)
Intelligent Traffic Systems	Information Management for Traffic Control (IMTRAC)
Soft Landscape	Works and Asset Management System (WAMS)
Safety Barriers	Works and Asset Management System (WAMS)
Signs, Unlit Lines & Road Studs	We do not record details of this asset but do undertake regular inspections and respond to customer requests to carry out ad-hoc visits to specific locations.

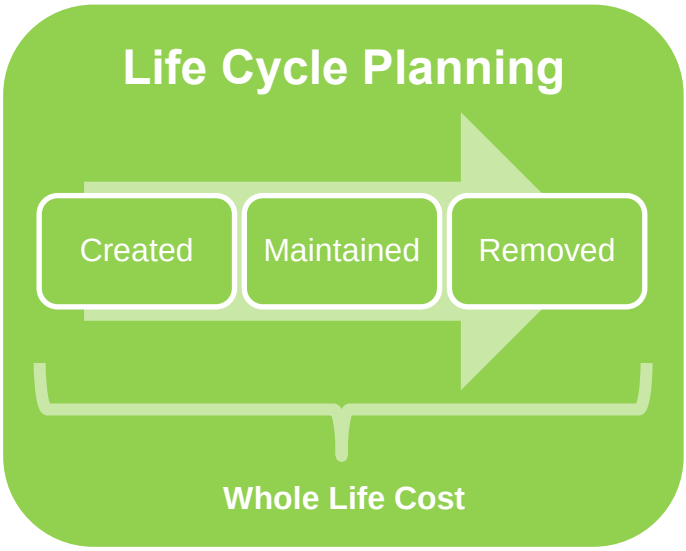
The systems that we use are regularly reviewed and monitored by Asset Managers. This enables us to ensure that they are providing reliable information in a format that can be used to inform the delivery of our highway maintenance, renewals and improvements effectively.

Developing Maintenance Plans

We have a four step approach to developing maintenance plans for each asset group:

Life Cycle Planning

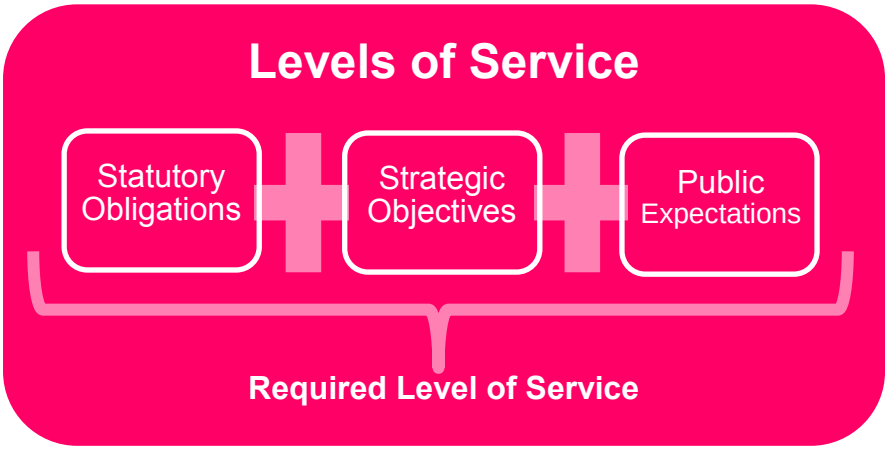
Firstly we need to understand the "life cycle" of our assets.



All of our assets are created, maintained and eventually replaced or removed. We need to understand what is involved at each stage, when it needs to happen and how much it will cost. If we understand the life cycle of our assets we can calculate the whole life cost i.e. how much the asset will cost to create, maintain throughout its life span and finally decommission. We can also predict the impact of different maintenance strategies and determine whether or not we can afford them.

For example, we have found that cutting urban grass verges eight times per year is more cost effective than a lower frequency which would require different equipment, more operator time to carry out cuts and generate longer grass cuttings that can blow onto pavements, clog drains and in some cases require costly manual removal.

Levels of Service



Secondly we need to determine the levels of service that are required.

Levels of service explain to Kent's residents, businesses, visitors and communities what they can expect from our assets. For example, the people of Kent should feel safe and be confident about their personal safety when using the highway.

To determine our required levels of service we have to think about a range of different things:

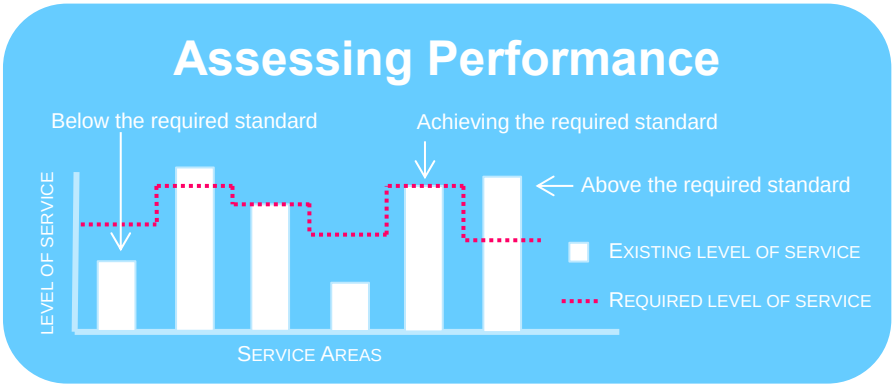
- → The County Council's statutory obligations: these are the things that we must do because they are a legal requirement. For example we have duties to maintain the highway in a safe condition and secure the efficient movement of traffic on our road network.
- → The County Council's Strategic Statement: this is the vision and outcomes that the County Council want to achieve as an organisation. For example putting the customer at the heart of everything we do.

→ Public expectations: the views of the County's residents, businesses, visitors and communities are very important to us; these are the things that we are not obliged to do but that are wanted by the people of Kent.

Assessing Performance

Thirdly we need to understand whether or not we are already delivering our required levels of service.

We can do this by measuring performance at three different levels:



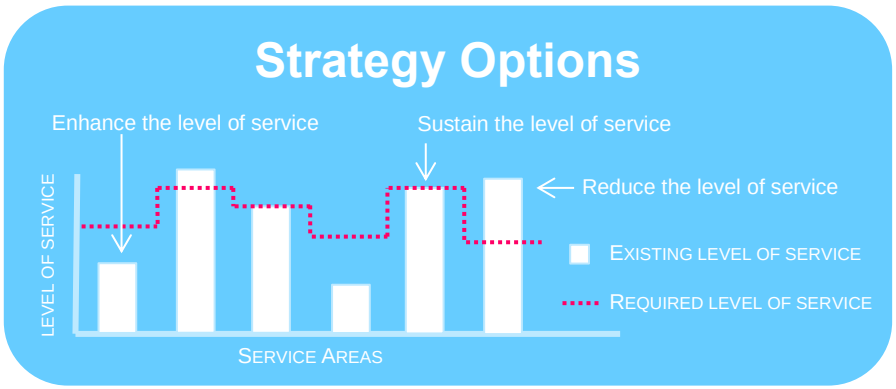
Type of Performance Measure	What are we measuring?	Example
Strategic Performance	A snapshot of overall performance which tells us whether or not we are delivering the intended benefits to the County's residents, businesses, visitors and communities.	**We want to**: Deliver services that are shaped by the needs of the County's residents, businesses, visitors and communities. **Strategic Performance Measure**: We report key measures to Cabinet and use surveys such as our annual satisfaction tracker and complaints monitoring to ask a sample of our customers whether or not they are satisfied with the services we are providing.
Asset Performance	More detailed information that tells us which asset groups are succeeding or failing to deliver the intended benefits to the County's residents, businesses, visitors and communities	**We want to**: Deliver services that are shaped by the needs of the County's residents, businesses, visitors and communities. **Asset Performance Measure**: We use monthly data to understand if our assets are performing in accordance with our asset management plans. For example our Customer 100 survey to ask a sample of our customers whether or not they are satisfied with the service provided by each asset group or customer enquiry demand about pothole or flooding problems.

Operational Performance	Operational information that tells us why a specific asset group is succeeding or failing to deliver the intended service standards/ benefits to the County's residents, businesses, visitors and communities.	**We want to**: Deliver services that are shaped by the needs of the County's residents, businesses, visitors and communities. **Operational Performance Measure**: We use monthly measures to ensure we are delivering our published service standards such as "the average time taken to fix a pothole".

Defining a Maintenance Strategy

Finally, once we know where we are and where we want to be we need to decide on our maintenance strategy.

We can adopt one of the following strategies:



- → **Reduce the level of service**: If the level of service exceeds the required standard or is unaffordable it should be reduced. For example the frequency of maintenance might be reduced or the intervention level might be increased.
- → **Sustain the current level of service**: If the level of service meets the required standard and is affordable it should be sustained.
- → **Enhance the level of service**: If the level of service is below the required standard, investment to enhance the level of service should be found. For example the frequency of maintenance might be increased or the intervention level might be reduced.

We have to work within the constraints of our budget, particularly during the difficult financial times that this country is currently experiencing, so it is also important to identify the most efficient and affordable way of delivering services.

- → **Minimising whole life cost**: When considering different maintenance strategies it is important to think about the future and keep costs to a minimum for the whole life of the asset. For example repairing potholes might be cheaper than surface dressing a road in the short term but not if a consequence of this strategy is that the road deteriorates faster and needs to be reconstructed and resurfaced in five years' time.

When the required levels of service are not financially viable it is important that we know the risks and prioritise:

- → **Managing risk**: We need to understand and document the risks associated with different maintenance strategies and manage them effectively. For example, increasing the

intervention level for a road pothole from 50mm to 100mm will save money but may increase the safety risk to an unacceptable level.

→ **Enhance priority areas of the service**: Where it is not financially viable to enhance the level of service across all assets, key areas of the service should be prioritised. For example the frequency of maintenance on main roads might be increased whilst the current frequency is maintained or reduced on minor roads.

Our maintenance plans will be reviewed annually, summarised in **Our Service Levels** and reported to Members before the start of each financial year.

We publish information about how and when we do maintenance on the KCC website. Members of the public can see how we look after our assets, the levels of service they can expect and when the work will be carried out.

Forward Works Programming

Forward works programmes provide an effective and efficient way of delivering maintenance, repairs and improvements. They enable prioritisation and optimisation of schemes to meet available budgets.

Developing a works programme is a five stage process:

Identification

Potential schemes may be identified from a range of sources including inspections, surveys, local knowledge, customer enquiries, complaints and wider transport or corporate objectives. These schemes are collated into an initial works programme for each asset group.

Prioritisation

All schemes are prioritised to identify those that are highest risk and need to be done in the short term and those that can be done in the future. When prioritising assets the following things need to be considered:

- → The safety of road users.
- → The impact on the movement of traffic if the asset fails.
- → The cost of bringing forward or delaying works.
- → The lifecycle cost of our highway asset.
- → The impact on future use of the highway.
- → The environmental impact.
- → The impact on the community including damage to property or impacts on local businesses.

Selection

The lists of schemes of each asset group need to be combined, costed and listed in priority order. The “cut off” point then needs to be determined by totalling up the cost to the point where the budget is fully utilised.

Programming & Optimisation

Selected schemes can be optimised within the forward works programme. This is done by coordinating or combining works to minimise both cost and disruption.

Delivery

Finally, an annual works programme is confirmed and delivered from the available annual budget.

We publish a lot of information about our programmes of work on the KCC website so that members of the public can see where and when we plan to do works.

Measuring Success

We are implementing our approach to asset management to deliver the following benefits to Kent:

- → A service that is shaped by the needs of Kent's residents, communities, visitors and businesses now and in the future.
- → A service that makes best use of the available resources, maximising efficiency to meet with our legal obligations.
- → A service that is resilient and able to respond to changes and financial challenges.

It is important that we record and demonstrate that these benefits are being delivered. We can do so at a number of levels and in a number of ways:

Monitoring Outcomes

We need to ensure that our approach is being implemented as planned and is delivering the intended outcomes. For example, if our maintenance strategy for roads is to ensure that 85% of our main roads are in good or very good condition, we need to carry out condition assessments to determine whether or not this is being achieved.

By routinely monitoring outcomes and reporting on their delivery we can ensure that we remain focused on the needs of Kent's residents, businesses, visitors and communities, meeting with our legal obligations and responding to changes and financial challenges. Delivery of outcomes will be reviewed and reported on an annual basis.

Performance Measures and Targets

We use a range of metrics and targets to monitor our performance against our levels of service and determine how well we are delivering the intended benefits to Kent. Examples of these measures and targets include national indicators such as the Bridge Condition Index which measure the overall condition of our assets, the percentage of residents satisfied with street lighting repairs and the number of damage and personal injury claims upheld against the County Council.

By reviewing performance we can ensure that we are continuously improving the way we work. We routinely review the performance of the service, identify areas where performance is not where we would like it to be and understand why this is the case. Having recognised opportunities for improvement, options to address any issues are identified and implemented. Performance is reported on a regular basis to key decision makers, elected representatives and members of the public.

Benchmarking

By comparing our service with the services provided by others, we can identify better ways of working at all levels. For example we might compare the outcomes we are achieving using asset management with the outcomes other Councils are achieving. Equally we might compare two or our own services, for example local residents might be more satisfied with the street lighting service than they are with the drainage service. By comparing the two, lessons can be learnt and improvements can be implemented.

Preparing for the future

An Expanding Highway Network

The highway network increases in size year on year and so to do the number of assets we maintain.

Although we are not obliged to adopt new roads, the Highways Act 1980 gives the County Council the power to adopt highways by Agreement. In doing so, we support economic growth and are able to ensure that the roads and other highway assets constructed are installed to an acceptable standard that will benefit the residents, businesses, local communities and public/emergency/health services. When a new section of highway is adopted, a commuted sum is paid to the County Council to fund future maintenance.

In some instances developers choose not to enter into an Agreement with the County Council and these streets remain under private ownership. Equally, if the developer fails to construct the adoptable highway assets to the required standard it will not be adopted.

Climate Change

The Climate Change Act 2008 places obligations on the County Council and others to reduce greenhouse gas emissions and prepare to adapt to longer term climate change. The same Act established an independent statutory body, the Committee on Climate Change to provide advice to the UK. The Committee's latest risk assessment concludes, as expected, that the trend of overall land warming leading to warmer summers and wetter windier winters will continue, and that this will likely affect transport infrastructure including our roads, drains and structures going forward. The effects of climate change on Kent's highway assets have already been seen during several wet and windy weather events in recent years. Our longer term approach to highway asset management will also need to consider what effect climate change may have on investment priorities and lifecycle costs of our highway assets. For example, one of the reasons why road surfaces deteriorate is that ultra-violet light and heat damages bitumen on the surface leading to oxidisation and a loss of strength. As such, we have already started thinking about what that may mean for roads surface material specification and road lifecycle cost estimates going forward.

Critical Infrastructure

Critical Infrastructure refers to routes and assets where failure would result in a significant impact to the local, and potentially the national, economy, and affect the ability of public/emergency/health services to carry out their responsibilities. Critical infrastructure assets form a crucial part of the highway network and can be divided into two types. Firstly, the critical infrastructure that we maintain, for example strategic routes such as the Thanet Way. Secondly, the critical infrastructure that others maintain but that is reliant on highway assets, for example Ramsgate Port is heavily reliant on access via the Ramsgate Tunnel. There are many potential risks and threats to the function of critical infrastructure, such as climate change, including impacts from flooding, rising temperature, changing sea levels, high winds and drought.

We need to ensure the adequate management of critical assets, including appropriate investment to ensure that they are sufficiently resilient to cope with potential threats.

It is important that critical assets are identified and that current performance and the impact of failure are understood. We need to ensure that this knowledge informs our maintenance priorities and investment decisions. Examples of where we take this approach include our Primary Winter Maintenance Routes which are made up of the County's key link roads and the prioritisation of drainage cleansing on Strategic and Locally Important Routes.

Devolution

The Cities and Local Government Devolution Act received royal assent in January 2016 and provides the legislative basis for the current devolution agenda. The position taken by Kent Council Leaders, namely that there was little appetite for either a directly elected Mayor or a Combined Authority, laces greater emphasis on the need for Kent authorities to collectively show that existing two-tier arrangements can work as well, in terms of improvement in delivery of services at lower cost, as alternative governance arrangements such as combined authorities or unitary councils. This has been critical to the devolution debate in Kent and the position taken by the County Council.

At the same time work has been ongoing on the development of a Kent and Medway devolution bid, work has been ongoing within the three sub-county partnerships about improved joint working and devolution arrangements including what might be devolved, decentralized or co-commissioned. Should highway services form part of future devolution discussions it will be imperative that service delivery mechanisms which support and enable effective asset management underpin the implementation of any changes.

Local Transport Plan 4: Delivering Growth without Gridlock 2016–2031

Highway maintenance and asset management has been included as a Kent-wide priority in KCC's consultation paper on its next Local Transport Plan (LTP4) covering the next fifteen years. It explains that implementing an Asset Management approach will enable Kent to maximise funding from Government thereby helping Kent to deliver its wider Growth without Gridlock objectives

Kent is producing an Active Travel Strategy as a sister document to LTP4. Maintenance and asset management of existing footway and cycle infrastructure is a central feature of this Strategy and outlines the importance of maintaining highways assets that enable alternative methods of travel to motor vehicles.

Part 2: What Our Approach To Asset Management In Highways Means For Each Of Our Asset Groups

Overview

The extent to which we have already implemented asset management principles varies across our asset groups. For some asset groups 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 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 Asset

It is important to understand the type, quantity and value (at today's prices) of the assets we maintain as well as their purpose. For example, roads are our largest and most valuable asset. Our roads enable Kent's residents, businesses and visitors to complete journeys safely and efficiently thereby improving their outcomes and opportunities. By comparison, our bridges, tunnels and highway structures make up a much smaller asset group with a much smaller financial value however they form essential links that connect our roads and footways and are therefore intrinsic to our roads asset fulfilling its purpose.

By understanding the type, quantity, value and purpose of each asset group we can identify key interdependencies and make informed decision about the extent to which we need to develop our approach to asset management in respect to that asset group.

Condition Assessments and Inspections

All of our asset groups are subject to condition assessments and inspections. The information collected is used to identify the maintenance and improvement works needed to meet the required service standard and to estimate maintenance backlogs and future investment needs with varying degrees of accuracy.

The frequency and complexity of condition assessments and inspections is determined by the quantity, value and most importantly the criticality of the asset. For example, our road network is our largest highway asset and consequently we invest significant resources into understanding its condition but we do not take a "one size fits all" approach. We do mechanical condition surveys on our main and visual surveys on our minor roads. Similarly, higher risk areas such as high speed roads and main roads are inspected by our team of Highway Inspectors more often than minor roads because the risk to safety should a defect occur is greater. This principle applies to all of our asset groups with priority given to understanding the condition of our highest risk assets

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure our road network is resilient and can support economic growth and local communities in Kent. However, we have to work within an overall budget and therefore, during a

time of diminishing resources and increasing customer expectations, we need to prioritise investment effectively.

The methodology used to prioritise investment varies between the asset groups but in all cases, the approach to deciding where to spend our money is largely risk based. Consideration is also given to the extent of the work required, whether or not the existing arrangement is meeting the needs of highway users, the impact on other highway assets and the practicalities of future maintenance. Finally, having assessed the investment needs for each asset group individually, they need to be considered in the context of the needs of other asset groups. This is how we currently allocate our Capital Maintenance Grant.

Significant Factors Affecting Maintenance

The number of highway assets in Kent is increasing year on year and we need to be mindful of the significant factors that affect those assets, how we maintain them and how they perform to meet the needs of road users in both the short and longer term. These factors very between the asset groups and include the materials that are used to construct them, the environment within which they are sited, the actions of third parties and the consequences of climate change.

Levels of Service

When determining levels of service we consider up to four options in the context of our statutory obligations, the County Council's Strategic Objectives, customer expectations and the available budget:

Asset/Service Level Enhancement

An approach that fulfils our statutory obligations and enables the overall condition of the asset group to be enhanced. Interventions such as maintenance, asset renewals and improvements are undertaken on a planned, prioritised basis with a view to increasing the proportion of the asset group in a very good or good condition.

Steady State

A level of service and investment that fulfils our statutory obligations and preserves the overall condition of the asset in its current state. 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. Any investment less than this would mean that a steady state condition or existing service level could not be achieved.

Service Level Reduction

A level of service that fulfils our statutory duties and facilitates a more controlled approach. Interventions such as maintenance and asset renewals are undertaken on a planned, optimised basis.

Statutory Minimum

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 more over the lifecycle of our assets and therefore cannot be recommended.

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. For example, in the case of roads and footways we have excellent condition data, a good understanding of deterioration and the technology to model the impact of differing levels of investment. For drainage, we do not have the same level of information or the modelling capabilities so a more simplistic approach based on past experience and engineering judgement has had to be made.

Our Levels of Service Summarised

The cost of delivering these outcomes for each asset group is detailed below:

Asset Group	Cost to Deliver the Level of Service			
	Asset/Service Enhancement	Steady State	Service Level Reduction	Statutory Minimum
Roads	£52,300k	£39,500k	-	-
Footways	£6,100k	£5,500k	-	-
Drainage	£8,525k	£6,820k	£5,115k	-
Bridges, Tunnels & Highway Structures	-	£2,672k	£1,781k	£1,336k
Street Lighting	£5,375k	£4,300k	£3,225k	-
Intelligent Traffic Systems	£3,125k	£2,500k	£1,875k	-
Soft Landscape	£5,000k	£4,200k	£3,200k	£2,200k
Barriers, Unlit Signs, Lines & Road Studs	-	£3,500k	£2,775k	£2,100k

Roads

The Road Asset

The road asset is made up of:

	Maintenance Hierarchy					Road Classification				
	MS	**OS**	**LI**	**M**	**Total**	**A**	**B**	**C**	**U**	**Total**
km	431	784	1,252	6,200	8,667	995	449	1,886	5,337	8,667
miles	269	490	782	3,875	5,416	622	280	1,179	3,335	5,416

- → Major Strategic (MS) – routes, or parts of routes, linking major urban centres where these are not linked by trunk roads.
- → Other Strategic (OS) – routes or part of routes, between other urban centres or centres of industry/commerce.
- → Locally Important (LI) – routes or part of routes, of local importance in distribution of goods or people.
- → Minor Roads (M) – all other routes, including estate roads and rural lanes.

The primary objectives of our road assets are:

- → Enable Kent's people, businesses and visitors to complete vehicular and cycle journeys safely and efficiently, thereby contributing to improving outcomes and opportunities for Kent's people and businesses,
- → Transfer vehicle weights from the road surface through to underlying ground without deformation of the road surface, to maintain road safety and minimise nuisance, and
- → Maintain their structural integrity and maximise their lifespan, to provide maximum value for money from investment.

The number of roads in Kent is currently increasing each year due to new housing and business developments.

The majority of our roads are of bituminous construction of varying age and specification. However, we also have 299 miles of roads that have concrete construction or have covered concrete. This equates to 5.5% of our road network. 116 miles (39%) is concrete and the remaining 183 km (61%) is made up of covered concrete. The majority of our concrete roads are unclassified roads in residential areas – 276 miles. Only 23 miles of our classified road network of 2,063 miles are concrete – around 1%.

Condition Assessments and Inspections

Our road network is our largest highway asset and consequently we invest significant resource into understanding its condition, maintenance backlogs and likely future deterioration. We check our roads on a regular basis, using both mechanical and visual means. There are two types of checks, condition surveys and safety inspections.

- → Our condition surveys conform to national standards and are processed by accredited systems. The surveys establish key characteristics of the network including the quality of the journey, tyre grooves in the road, the depth of the road's layers and skid resistance.
- → Our team of Highway Inspectors carry out visual checks to make sure the highway assets are in a safe condition. This includes checking for defects in the road surface that present a safety concern. We carry out this kind of check at least once every twelve months.
- → Reactive inspections are carried out in response to enquiries and generate ad-hoc and emergency works, for example repairing potholes and other surface failures.

Prioritisation of Investment

We have a statutory duty to ensure that our roads are safe, and we also want to ensure that our road network is resilient and can support economic growth and communities, so far as this is possible during a time of diminishing resource, growing backlogs, worsening asset condition and increasing customer expectation.

Data collected from the above processes is used to assess the condition of the entire network and to model and cost suggested maintenance schemes. We also use this data to calculate the percentage of the network requiring maintenance and estimate the backlog of maintenance. Furthermore, we have good data on road deterioration and can use that to estimate future deterioration and maintenance backlogs based on different investment options.

With the limited and decreasing funds KCC has available for highway maintenance and repair, it has to carefully prioritise the works it does to ensure the most benefit to Kent's road network. To do this it considers the condition of roads, alongside factors such as the cost of the works, the amount/type of traffic it carries, its importance to Kent's economy and any safety hazards that may be present. The data is then analysed and this gives us a ranking output such as worst first priority and economic ranking priory. KCC's asset management tool also recommends which treatment would be best suited to the road depending on the current condition. KCC also seeks where possible to address some local needs through liaison with its District Highway Managers.

The approach that KCC takes when deciding where to invest its finite resource is to use the most appropriate surfacing treatment for the condition and class of road, within the resource available. Budgets are not allocated on a district or regional basis.

Other Significant Factors affecting Road Maintenance

Concrete Roads

The maintenance of concrete roads presents significant challenges for local authorities. Many concrete roads in Kent were constructed in the 1950s and 1960s. They have stood the test of time, lasting 50 or 60 years, and have therefore provided great value for money. Whilst many are visually poor, they are structurally sound and not unsafe. Historically, we have often over-laid concrete roads with bituminous material in order to improve their visual appearance. That is unsustainable and is not effective asset management. Going forward, we will limit overlaying concrete roads to those sites where this is needed for structural or grip reasons.

Ageing concrete roads are very expensive to maintain/replace. They deteriorate unpredictably due to their ability to mask underlying foundation deterioration for a time by spanning voids or soft spots. Poor utility reinstatements can also shorten the life of concrete roads. Future deterioration can be reduced by introducing a regime of sealing the joints between concrete sections, but this is not something that has historically been resourced.

Full reconstruction of concrete roads is a very expensive procedure compared to replacing the top layers of bituminous roads. More and more industrial estates are starting to fail in Kent, due to large vehicles.

Specialist materials

A variety of specialist materials such as surface treatments, high friction surfacing and non-black asphalts have been laid on Kent's roads for a number of years. Surface treatments such as surface dressing and micro surfacing provide excellent value for money and represent very effective asset management. They are used to extend the life of road surfaces that have not yet deteriorated to the point where the surface would need to be completely replaced. They do this by sealing the surface to prevent potholes forming and add texture, and can extend the life of these roads by up to ten years, at a fraction of the cost of traditional resurfacing.

Other forms of specialist materials such as high friction surfacing and non-black asphalts are expensive when first laid and to maintain later. For example, high friction surfacing, designed primarily to prevent skidding and loss of control in wet conditions, is expensive and can sometimes last only five years. Non-black asphalts are more expensive than standard asphalts. In addition, as potholes occur later these are repaired using black asphalts as it is not economical to obtain non-black asphalts in small amounts.

Notwithstanding the cost of high friction surfacing and non-black asphalt and the challenges of maintaining them later, it is clear that they are required in some circumstances to address safety issues on our network. However, going forward, this will need to be balanced against the lifecycle cost of the asset, and alternative designs and materials considered, as the continued use of these materials on the scale that has been used in recent years is unsustainable in asset management terms. As such we will be considering whether evidenced safety issues can be satisfactorily addressed by a different design/solution such as changing the speed limit, introducing new road markings, changing kerb alignment etc., or using different, more cost-effective materials with greater grip properties.

Road Noise

Road noise is typically caused by roughness-induced vibration or air squeezing between road surface and tyre, and this will vary between different materials and resurfacing techniques. Because of their properties, surface treatments tend to be noisier than other materials such as hot-rolled asphalt, and stone mastic asphalt in particular.

Whilst the County Council recognises the distress that road noise can sometimes cause, it is not a factor that the County Council can afford to consider when deciding which material to use to maintain a road. That is because it is important that we choose the right materials for the condition of the road and to maximise value for money. In most cases, road noise following the

application of a surface treatment will subside over time once the material has had an opportunity to bed in.

The Geology of Kent

Every year in Kent, the County Council has to deal with a number of major failures in carriageways and footways. These failures are often caused by underlying geological features such as landslips, deneholes, sink holes and other subsidence, and this can result in unfunded pressures for the County Council. Kent's geological make-up varies throughout and therefore failures cannot be measured or predicted.

Carriageway failures can also be caused by damaged utility apparatus such as fresh water and sewage lines. To reduce the financial impact to the County Council, all major failures are now managed in a consistent manner so that utility companies are held to account in the event that their assets are found to be the cause, though this can be a costly and time-consuming process.

Other Highway Assets

Whilst the condition and lifecycle cost of our roads is principally affected by factors such as the level of maintenance investment, traffic volumes and weather, the level of investment in and condition of other highway asset groups can also have an effect. For example, if investment in the maintenance and cleansing of highway drainage assets is not sufficient to prevent ponding of water on road surfaces, that may lead to the road surface deteriorating more quickly. Similarly, if our weed spraying and verge cutting regimes are not sufficient to prevent growth in or over road surfaces that may lead to premature failure of the road surface. In both cases, this would lead to a shorter lifecycle and the surface needing to be replaced sooner, increasing the lifecycle cost of these road assets. As such, road condition is not just about the level of resource allocated for resurfacing roads, particularly if this is to the detriment of other asset groups.

Utility Works

Utility companies have statutory rights to lay, maintain and improve their apparatus within our highway network, in order to provide water, sewerage, gas, electricity, and telecommunications services to Kent's residents, visitors, businesses and public services. The County Council's role as highway authority is to ensure that these works are coordinated and managed in a way that minimises inconvenience and disruption. Kent also carries out a substantial programme of inspections each year to ensure that our roads are properly reinstated after works have been completed, in line with national guidance, in order to minimise damage to our network. We check around half of all utility works, with around 97% passing these inspections. We also have an ongoing testing programme looking at the thickness and quality of material used in reinstatements. The pass rate for the tests in Kent has risen steadily to in excess of 80%, compared to a national pass rate of around 60%.

Notwithstanding what we are doing to minimise damage to our network caused by utility works, any works which involve cutting into an unbroken and otherwise sound road surface, even if carried out to a high standard, will affect a road's structural integrity. This will accelerate its deterioration and shorten its lifecycle, resulting in the need for premature maintenance which increases the pressure on highway budgets. It should also be recognised that many of the

highway maintenance issues linked to utility works relate to reinstatements carried out many years ago.

Levels of Service

Considerations

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives.

The County Council has statutory obligations to:

- → Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980). This includes taking reasonable steps to manage the risks posed by road surface defects.
- → Facilitate and secure the efficient movement of traffic on our highway network (Traffic Management Act 2004). This includes taking reasonable steps to manage the asset in a way that minimises failures and therefore disruption.
- → Prepare to adapt to longer term climate change (Climate Change Act 2008). This includes preparing for more frequent and more intense rainfall events in years to come, and for the effects of increased UV exposure.

The County Council also has a five year strategic statement called "Increasing Opportunities, Improving Outcomes" and this sets out the following 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

Maintenance Backlog

Most commentators will accept that investment in local roads throughout the country has been insufficient for decades. The rate at which local roads are deteriorating exceeds the rate of investment, and this is a constant theme of published industry and Government reports. A recent industry report estimated the cost of bringing local roads in England and Wales up to scratch at £11.8bn. The backlog of road maintenance in Kent, which is one of the largest road networks in England, is currently estimated to be around £584m.

Options

Historically, our approach to managing the condition of our road assets has been based on an assessment of the backlog of maintenance, essentially an estimate of the value of identified resurfacing schemes that have been identified as a result of our condition surveys. The principle limitation of that approach is that it only provides a snapshot in time; it does not enable local authorities to consider the effect of funding decisions on the lifecycle cost of roads. For example, a reduction in funding in one year may have the effect of increasing the total cost of road maintenance over the lifecycle of a road.

As a result of changes made to the way in which the Department for Transport allocates Capital funding for highway maintenance, an increasing share of this funding is based on local authorities'

ability to evidence that they use asset management principles to manage highway maintenance and make investment decisions that are based on clearly linking investment to outcomes and service levels. For that reason, Kent has introduced lifecycle planning for roads this year, and this has improved the accuracy of modelling data and our estimate of backlog.

As mentioned earlier, our road assets are by far the largest highway asset by value and size and so it is important that investment decisions are made based on a robust understanding of what we will be getting in return in terms of future condition of the asset and lifecycle cost. When determining our outcomes/levels of service, we have considered two broad options:

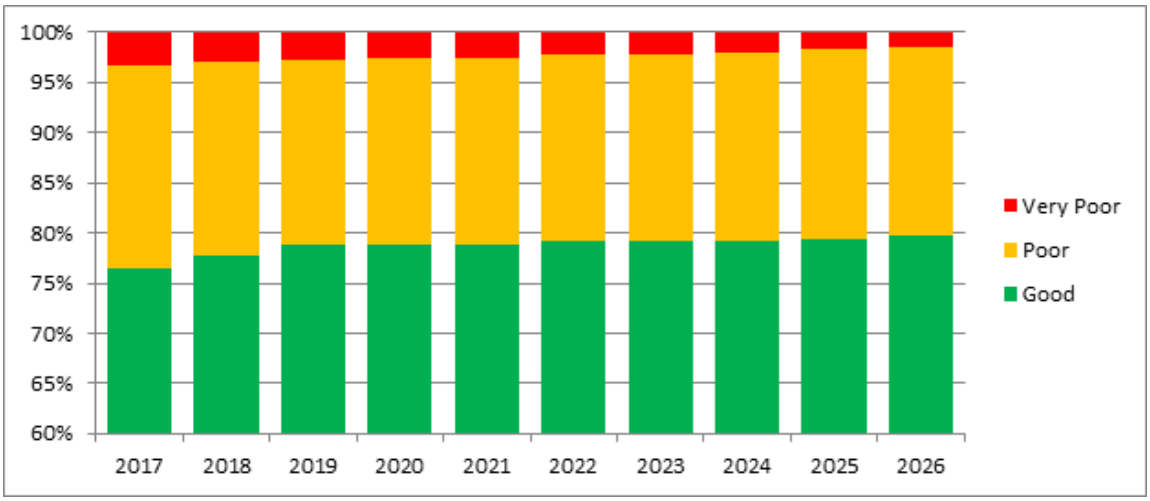
- → Enhance the condition of the road network, essentially what it will cost to improve the overall condition of the asset.
- → Sustain the current condition of the road network, essentially a 'steady state' scenario. Any investment less than this would mean that a steady state condition could not be achieved.

Using data from our condition surveys and lifecycle and deterioration modelling, we have modelled these outcomes and associated investment levels – see below tables.

Enhance the Condition of our Road Network

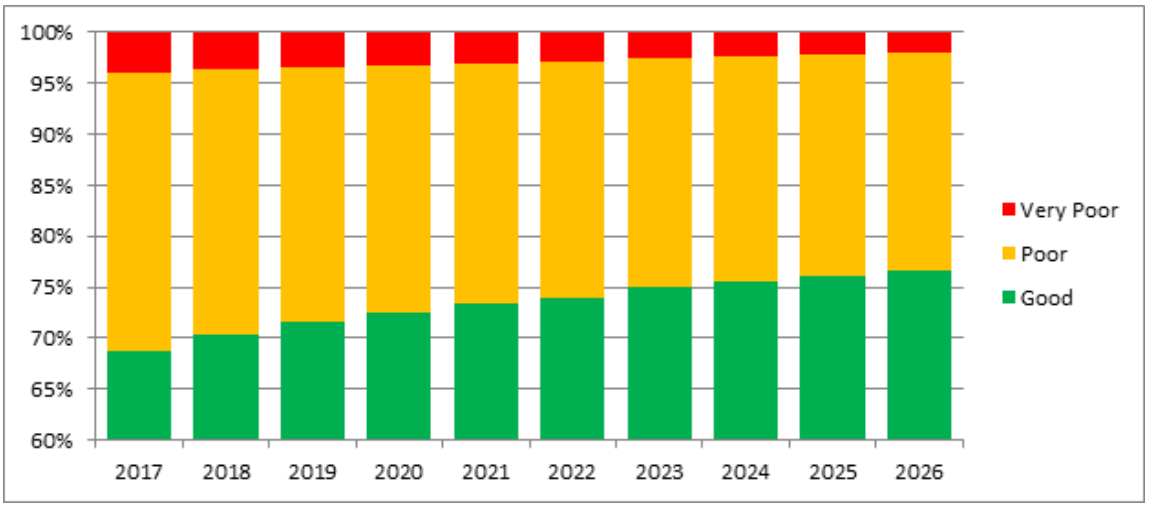
The percentage of our road network considered to be of very poor condition is: 3% of A roads, 4% of B and C roads and 21% of unclassified roads. We have modelled the cost of improving the overall condition of our road network, by improving the percentage of A roads classed as being very poor to 1% in the next ten years, improving B & C roads to 2%, and unclassified roads from 16%. The estimated annual cost of this scenario is £52.3m[3]. The scenario would mean that our maintenance backlog would decrease from £584m now to £392m plus inflation in 2026. It is important to note that 'very poor' or 'poor' does not mean 'unsafe' as we regularly inspect our roads to identify any safety critical defects for repair.

Asset Enhancement - A Roads

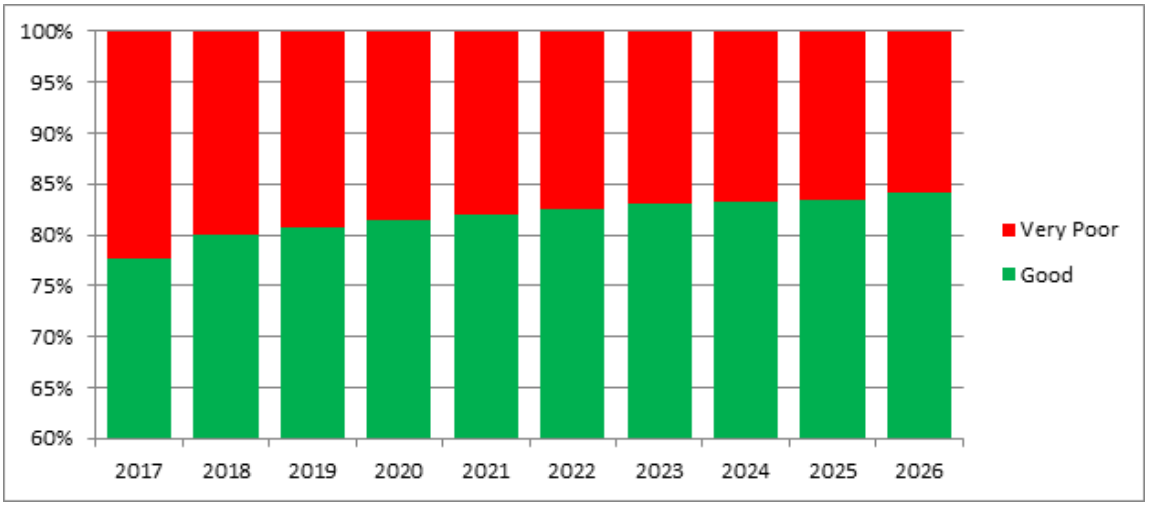


[3] At today's prices.

Asset Enhancement - B&C Roads



Asset Enhancement - Unclassified Roads

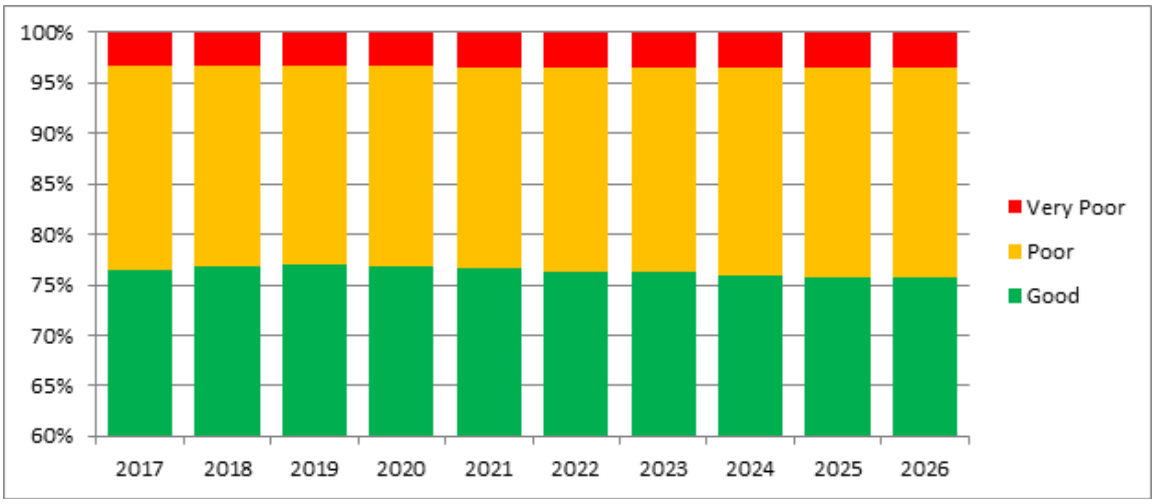


Maintaining our Roads at Steady State Condition

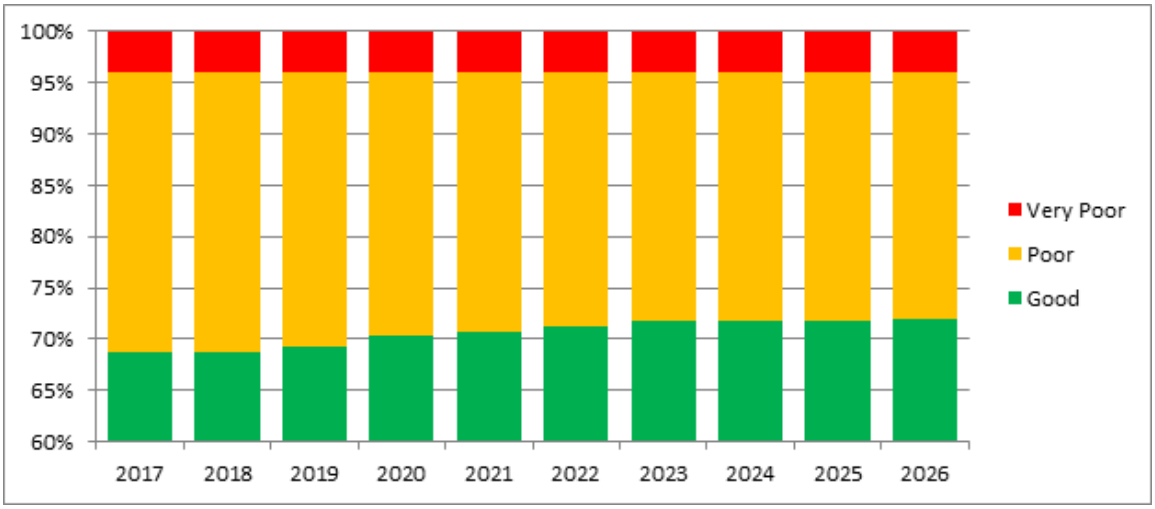
To keep our roads at their current condition level over the next ten years, an annual capital investment of £39.5m[4] is required. This will result in the backlog figure remaining at £584m plus inflation in ten years' time.

[4] At today's prices

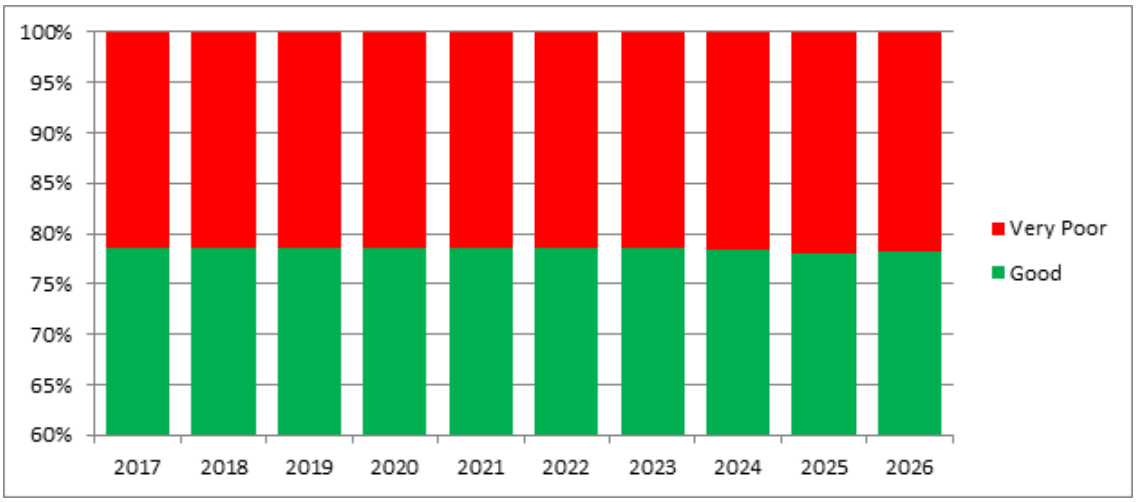
Steady State Condition - A Roads



Steady State Condition - B & C Roads



Steady State Condition - Unclassified Roads



Routine Road Maintenance

The figures mentioned above relate to proactive, planned capital investment in our road network, predominantly in the form of road resurfacing or preventative surface 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 potholes and other road defects. Whilst potholes will always occur, and we have experienced a number of weather emergencies in recent years which have worsened the condition of our network, potholes and other road defects are primarily a symptom of a lack of planned investment in the network. The less resource invested in planned maintenance, the more potholes will occur. Potholes repairs are, on average, twice as expensive per square metre as planned resurfacing.

During the last few years, the amount we have spent repairing potholes and other road defects is £21.5m (for 2013/14, 2014/15 & 2015/16) using a combination of revenue and capital funding. It is very difficult to accurately model the relationship between road condition (as modelled in the above graphs) and the number and cost of potholes and other defects that will occur. Investment less than that modelled to achieve a steady state condition would reduce in an increase in pothole numbers, increasing the pressure on revenue and capital funds.

Whilst most commentators will accept that capital investment in local roads throughout the country has been insufficient for decades and that this has been further exacerbated by reduced revenue funding from central government in recent years 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 potholes and other 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 back into the asset. Often this represents exceptional value for money and is more cost effective than resurfacing the whole road.

Footways

The Footway Asset

The footway asset is made up of:

	High Usage	Other	Total
km	475	5,830	6,305
miles	295	3,622	3,917

The primary objectives of our footway assets are:

- → Enable Kent's people, businesses and visitors to travel the County on foot safely and efficiently, thereby contributing to improving outcomes and opportunities for Kent's people and businesses,
- → Withstand normal footway usage by foot or by vehicle (via appropriately constructed vehicle crossings) through to underlying ground without deformation of the surface, to maintain safety and minimise nuisance.
- → Maintain their structural integrity and maximise their lifespan, to provide maximum value for money from investment.

The number of footways in Kent is currently increasing each year due to new housing and business developments.

The majority of our footways are of bituminous construction of varying age and specification. However we also have footways that have block paving, slabs and concrete surfaces. The split of our network of these surface types is:-

- → Bituminous – 86.3 %
- → Modular Slabs – 7.8 %
- → Modular Block Paving – 3.6 %
- → Concrete – 2.3 %

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 they do not adjoin a carriageway section. The condition assessment and inspection criteria for these sections of our network are currently being developed. The footway asset group does not include Public Rights of Way, which are managed separately.

Condition Assessments and Inspections

Our footway network is a substantial highway asset and consequently we invest significant resource into understanding its condition, and likely future deterioration. We inspect our footways on a regular basis. We have introduced a regime to survey their condition, along similar lines to the way we do for roads.

To confidently deliver efficient asset management, enabling timely intervention and accurate data, Kent County Council carry out annual Footway Maintenance Surveys (FMS) which have been

developed over the last three years. The data collection methodology conforms to national standards and the data is processed by accredited systems.

The first complete footway condition survey was completed over two years – 2013/14 and 2014/15. We subsequently refined the survey process and criteria for the next complete County survey which started during the summer of 2015 and will be completed in 2016 for data delivery in March 2017.

In conjunction with this survey Kent County Council also carry out safety inspections.

- → Our team of Highway Inspectors carry out visual checks to make sure the highway assets are in a safe condition. This includes checking for defects in the footway surface that present a safety concern. We carry out this kind of check at various frequencies dependant on the nature of the section of footway concerned. These frequencies could be either monthly, quarterly or annually.
- → Reactive inspections are carried out in response to enquiries from the public or other stakeholders and generate ad-hoc and emergency works, for example repairing footway potholes and other surface failures.

Prioritisation of Investment

We have a statutory duty to ensure that our footways are safe, and we also want to ensure that our network is resilient and can support economic growth and communities, so far as this is possible during a time of diminishing resource, growing backlogs, worsening asset condition and increasing customer expectation.

We also are facing an increasing need to ensure that our footway network is maintained to protect from insurance claims resulting from injuries or damage caused by incidents on our network as well as maintaining the confidence and positive perceptions of the travelling public using our asset.

Data collected from the above processes is used to assess the condition of the entire network and to model and cost suggested maintenance schemes. We also use this data to calculate the percentage of the network requiring maintenance and estimate the backlog of maintenance.

With the limited and decreasing funds KCC has available for highway maintenance and repair, it has to carefully prioritise the works it does to ensure the most benefit to Kent's footway network. To do this it considers the condition of footways from the survey data. The type of treatment required will depend of the type of defects that are present. We also prioritise based on usage.

Schemes identified in this way are assessed and verified by our engineers. KCC also seeks where possible to address some local needs through liaison with its District Highway Managers. Budgets are not allocated on a district or regional basis.

Other Significant Factors affecting Footway Maintenance

Specialist materials

A variety of specialist materials such as slurry seal have been laid on Kent's footways for a number of years. Some provide excellent value for money and represent very effective asset

management. Slurry seal is used to extend the life of a footway that has not yet deteriorated to the point where the surface would need to be completely replaced. It does this by sealing the surface to prevent potholes forming and add texture, and can extend the life of these footways by up to ten years, at a fraction of the cost of traditional resurfacing. This treatment is generally only able to be used on footways with a bituminous surface.

Other specialist materials, such as concrete imprint and coloured asphalts, are expensive to install and maintain. Moving forward, it is important that the lifecycle of footways and their future maintenance is considered when decisions around the use of these materials are made.

Conservation

The way in which we maintain our footway assets can also be affected by conservation areas. All conservation areas that we are required to work within are looked at on a case-by-case basis, balancing our duties under the Highways Act 1980, available resource, the nature of the work involved, and the nature and character of the area. We look to engage with the relevant District Authority to discuss options with their conservation teams and where possible find a mutually agreeable solution to the work required.

This approach, whilst respectful of conservation restrictions, can be time consuming, however usually a mutually acceptable solution can be agreed. Any such agreement must represent a fair and appropriate balance between our duties under the Highways Act, the costs of the works required, and the nature of the conservation being sought.

The Geology of Kent

Every year in Kent, the County Council has to deal with a number of major failures in footways. These failures are often caused by underlying geological features such as landslips, deneholes, sink holes and other subsidence, and this can result in unfunded pressures for the County Council. Kent's geology makeup varies throughout and therefore failures cannot be measured or predicted.

Footway failures can also be caused by damaged utility apparatus such as fresh water and sewage lines. To reduce the financial impact to the County Council, all major failures are now managed in a consistent manner so that utility companies are held to account in the event that their assets are found to be the cause, though this can be an expensive and time-consuming process.

Parking

Our substantial footway network is increasingly becoming a concern in maintenance terms, principally because of parking and vehicle over-run issues. This particularly affects older residential urban areas that were not designed to accommodate the quantity of vehicles per household that is now typical. The narrow nature of many of these locations does lead to residents parking either wholly or partly on the footway.

It should be noted that footways generally deteriorate at a slower rate than roads, primarily because vehicles are not normally travelling on footways. The consequences of poor maintenance are less pronounced than that for roads. The principle risk on footways is from trip hazards, particularly in high footfall locations. However, where vehicles do regularly park on or traverse over

our footways, even small defects can escalate quickly. This both increases the replacement costs and shortens the lifecycle of the asset.

Other Highway Assets

The level of investment in and the condition of other highway asset groups can also have an effect. For example, if our weed spraying and verge cutting regimes are not sufficient to prevent growth in or over footway surfaces, or maintenance and coppicing of tree lined streets is not sufficient it may lead to premature failure of the footway surface by being undermined by root damage.

Levels of Service

Considerations

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives.

The County Council has statutory obligations to:

- → Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980). This includes taking reasonable steps to manage the risks posed by surface defects.
- → This includes taking reasonable steps to manage the asset in a way that minimises failures and therefore disruption.
- → Prepare to adapt to longer term climate change (Climate Change Act 2008). This includes preparing for more frequent and more intense rainfall events in years to come, and for the effects of increased UV exposure.

The County Council also has a five year strategic statement called "Increasing Opportunities, Improving Outcomes" and this sets out the following 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

Maintenance Backlog

In general terms, investment in planned footway maintenance has fallen behind that for roads. That is principally because we have not previously had sufficient condition data to inform investment decisions, but also because road maintenance has understandably been prioritised, given that the safety implications of not maintaining roads is much more significant than that for footways. However, as explained above, we re-introduced footway condition surveys a few years ago, and now better understand the condition of this asset group. Furthermore, we have introduced lifecycle planning for footways this year, and this has improved the accuracy of modelling data and our estimate of backlog, though this will need to be refined in the coming years. The backlog of footway maintenance in Kent is currently estimated to be around £83m, at today's prices.

Options

Our footways are a significant highway asset by value and so it is important that investment decisions are made based on a robust understanding of what we will be getting in return in terms

of future condition of the asset and lifecycle cost. When determining our outcomes/levels of service, we have considered two broad options:

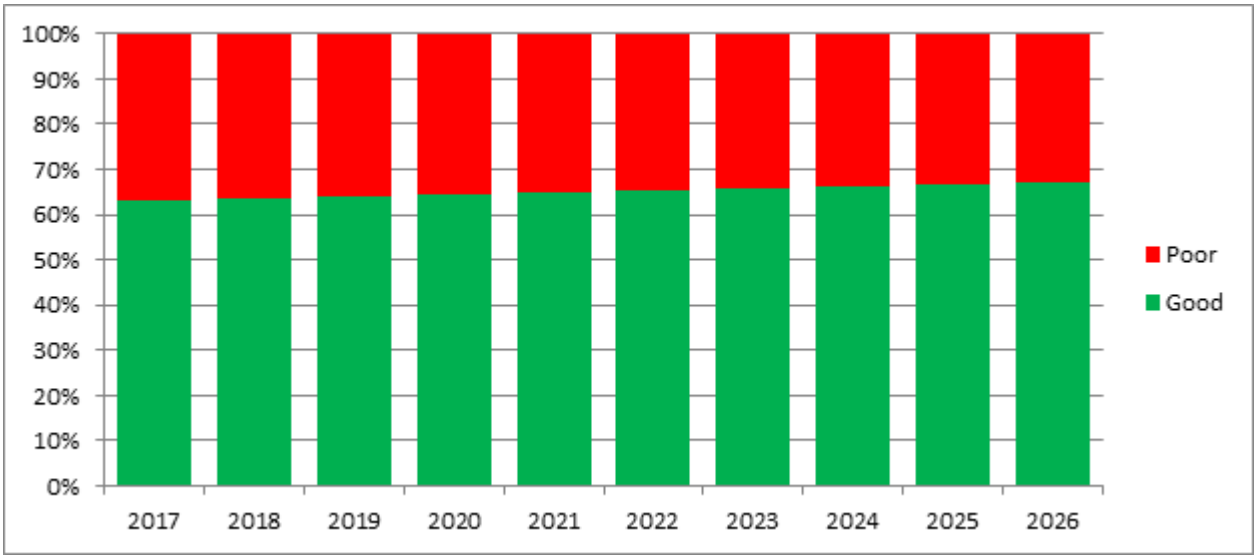
- → Enhance the condition of the footway network, essentially what it will cost to improve the overall condition of the asset.
- → Sustain the current condition of the footway network, essentially a 'steady state' scenario. Any investment less than this would mean that a steady state condition could not be achieved.

Using data from our condition surveys and lifecycle and deterioration modelling, we have modelled these outcomes and associated investment levels – see below tables.

Enhance the Condition of our Footway Network

The percentage of our footway network considered to be of poor condition is 37%. We have modelled the effect of improving this to 32% in the next ten years. The estimate annual cost of this scenario is £6.1m[5]. The scenario would mean that our maintenance backlog would decrease from £83m now to £77m plus inflation in 2026. It is important to note that 'poor' does not mean 'unsafe' as we regularly inspect our footways to identify any safety critical defects for repair.

Asset Enhancement – Whole Footway Network

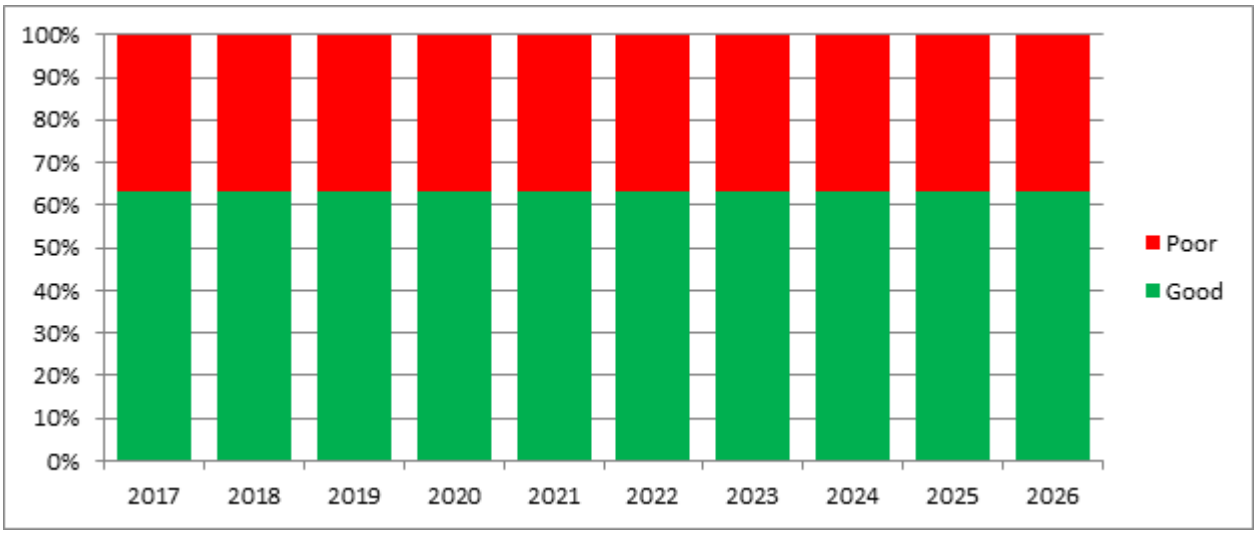


Maintaining our Footways at Steady State Condition

To keep our footways at their current condition level over the next ten years, an annual capital investment of £5.5m at today's prices is required. This will result in the backlog figure remaining at £83m plus inflation in ten years' time. Any investment less than this would mean that a steady state condition could not be achieved.

[5] At today's prices.

Steady State Condition – Whole Footway Network



Reacting to Potholes

The figures mentioned above 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 potholes and other footway defects. During the last few years, the amount we have spent reactively repairing these defects is £4.5m (for 2013/14, 2014/15 & 2015/16) using a combination of revenue and capital funding.

Drainage

The Drainage Asset

The drainage asset is made up of:

Asset	Quantity*
Roadside drains	250,000
Ponds and Lagoons	250
Pumping Stations	15
Soakaways	8,500

* Based on available asset data

The primary objectives of the highway drainage system are:

- → Removal of highway surface water (from our roads) to maintain road safety and minimise nuisance,
- → Effective sub-surface drainage to prevent damage to the structural integrity of the highway and maximise its lifespan, and,
- → Minimise the impact of highway surface water on the adjacent environment including properties

The number of drainage assets in Kent is currently increasing each year due to new housing and business developments.

Condition Assessments and Inspections

There are two types of checks, planned inspections and reactive inspections.

Planned inspections include highway safety inspections and condition checks carried out as part of our cyclical maintenance regime:

- → Our team of Highway Inspectors carry out visual checks to make sure that highway assets are in a safe condition. This includes checking that drain covers are not broken or missing. We carry out this kind of check at least once every twelve months.
- → Our drainage cleansing crews look at the condition of the drains on main roads and test each one by filling it with water and checking that it is able to flow away. We carry out these kinds of checks at least once every twelve months.
- → Our pumping stations are serviced annually to check they are working properly and ensure that any faults or damage are repaired quickly.

We do not undertake planned inspections on our other drainage assets (underground pipes, culverts, soakaways, ponds, lagoon and ditches). These are all checked on a reactive basis.

Reactive inspections are carried out in response to enquiries and generate ad hoc and emergency works, for example cleaning blocked drains that are causing the road to flood and repairing collapsed road drains. They may also result in us serving notice under the Highways Act 1980 requesting the landowner maintain their ditch or prevent water flowing from their land onto the

highway. Where this is not completed in the required time we may undertake the work and seek to recover the costs from the landowner.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support communities and the economy of Kent. However, we have to work within an overall budget.

Firstly we need to prioritise where to invest our budget.

We take a risk based approach to deciding where to invest our money and the information we have about drainage assets helps us to do this. Some of the things we consider include the following:

- → What is the risk to road users if the road floods?
  - Is the road a high speed road, a main road, an estate road or a country lane?
  - Is the road used by high volumes of traffic?
  - Does the road layout affect the risk for example; is the flooding on a blind bend?
  - Does the speed of traffic affect the risk?
- → How much disruption is caused if the road floods?
  - Is the road a high speed road, a main road, an estate road or a country lane?
  - Is the road used by high volumes of traffic?
  - Are there suitable alternative routes available to road users?
  - Is access to critical infrastructure such as powers stations or hospitals affected?
- → How are homes and businesses affected by the flooding?
  - Are buildings internally flooded?
  - Are businesses prevented from operating?

Investment is prioritised where the risk is highest.

Secondly we need to consider how to invest our budget.

By knowing what condition our assets are in we can determine how much work is needed to restore them and whether or not it is more cost effective to replace them completely. For example if a pipe has been damaged by tree roots we could invest £300 cutting the roots out of the pipe. However, if the pipe is old and damaged, that £300 would be better spent disconnecting the damaged, root filled pipe and installing a new one.

It is also important to understand whether or not our assets are doing their job effectively and the practicalities of maintenance in both the short and longer term. If an asset is in the wrong place or is the wrong size there is no point simply patching it up or replacing it like for like. We also endeavour to undertake the right repairs at the right time in the life cycle of our drainage assets. For example if a soakaway has failed we could invest £30,000 replacing the soakaway with a new chamber that is the same size. However, if the drainage system has not been working because it needs more capacity, it would be better to spend £40,000 installing a larger chamber.

Finally we need to consider our investment in the wider context of the highways service.

Having assessed each site, we are able to collate a prioritised list of works. This is compared with the lists for other asset groups when we consider allocating our capital budget.

We do not normally undertake works to mitigate nuisance factors. We prioritise works at locations where highway surface water presents a risk to highway safety or a risk of internal flooding to inhabited areas of property.

Other Significant Factors affecting Drainage Maintenance

Damaged and Ageing Infrastructure

Much of the County's drainage infrastructure was installed when the roads were originally constructed, some of which date back to late 1800s/early 1900s. Over the years, settlement of the soil, ingress of tree roots and roadworks by third parties has caused widespread damage. Years of underinvestment have exacerbated this problem.

Limited Capacity

In recent years prolonged and heavy rainfall events appear to have become a more frequent occurrence. Development and changes in land use have resulted in increased volumes of surface water being discharged into the drainage system which is designed to cope with moderate to heavy rainfall. In many places the sewers are now running at capacity.

Where capacity is insufficient the only options are to divert the highway drainage elsewhere or install an entirely new, larger, system. This requires significant investment and in the past, cost had tended to make this kind of scheme unaffordable. Instead, the impact of flooding has been managed by installing permanent warning signs and increasing the height of kerbs and re-profiling the road to divert water away from properties.

Reliance on Third Party Infrastructure

In many places the highway is drained into public sewers which are owned and maintained by the Sewerage Authority or privately owned third party assets such as ditches or ponds. In these instances, the County Council's influence over maintenance regimes and improvements is limited.

Land Drainage

Water being discharged from adjacent land onto the road is also becoming an increasingly common cause of highway flooding. A more stringent enforcement process utilising our Highways Act powers has been developed. However, to date, the vast majority of cases have been resolved via constructive discussion with the land owner.

Reductions in other services

A frequent cause of highway flooding is debris obstructing drainage covers, particularly during autumn and winter. The need for financial savings have necessitated reductions in services such as street sweeping, delivered by District and Borough Councils, and soft landscaping services, which have resulted in increased debris collecting on the highway and finding its way to the roadside drains.

Levels of Service

Considerations

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives.

The County Council has statutory obligations to:

- → Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980) this includes taking reasonable steps to manage the risks posed by surface water on the highway.
- → Facilitate and secure the efficient movement of traffic on our highway network (Traffic Management Act 2004) this includes taking reasonable steps to minimise the disruption caused by flooding.
- → Prepare to adapt to longer term climate change (Climate Change Act 2008) this includes preparing for more frequent and more intense rainfall events in years to come.

The County Council also has a five year strategic statement called "Increasing Opportunities, Improving Outcomes" and this sets out the following 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.

We monitor customer enquiry volumes and satisfaction on a monthly and annual basis. The 2015 Tracker Survey Indicated that customer satisfaction with the Drainage Survey was as follows:

	2014	**2015**
Enquiries Received	10,103	6,611

	% Satisfied - 2014	**% Satisfied - 2015**
Residents	71	66
County Members	19	30
Parish Councils	8	14

Current Levels of Service

The current levels of service for Drainage are as follows:

Drainage Cleansing

- → We will respond to incidents of flooding that pose an immediate high risk to highway safety or a risk of internal property flooding within two hours of the initial report.
- → We will clean roadside drains at known hotspots on a cyclical basis once every six months.
- → We will clean roadside drains on main roads on a cyclical basis once every twelve months.
- → We will carry out targeted cleansing of all other drainage assets where there is a risk to highway safety or a risk of internal property flooding within two hours – ninety days (depending on the severity of risk).

Ironwork Repairs

→ We will repair and replace damaged drain covers that pose a risk to the safety of highway users within two hours – ninety days (depending on the severity of risk).

Pumping Station Servicing and Repairs

→ We will service our pumping stations and prioritise maintenance on the basis of the risk to highway safety and the risk of internal property flooding once every twelve months.

Drainage Investigations

→ We will investigate highway drainage problems that pose a risk to highway safety or a risk of internal property flooding within two hours – ninety days (depending on the severity of risk).

Drainage repairs and improvements

→ We will prioritise repairs and improvements on the basis of the risk to highway safety and the risk of internal property flooding and deliver them on the basis of the highest risk first

Options

When determining our levels of service we can consider three options:

→ Sustain the existing level of service.
→ Reduce the level of service.
→ Enhance the level of service.

The impact of each of these three 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

Option:	**Sustain** the existing level of service			**Budget:**	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**

Option:	**Enhance** the existing level of service			**Budget:**	Current Budget + 25%
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	**Likely**	**Not Applicable**	**Likely**	**Very Likely**	**Very Likely**
…improve customer satisfaction and confidence in service provision	**Very Likely**	**Likely**	**Likely**	**Very Likely**	**Very Likely**
…have a robust defence against increased claims for damage and personal injury	**Very Likely**	**Likely**	**Likely**	**Very Likely**	**Very Likely**
…effectively protect roads and footways from the adverse effects of standing water	**Very Likely**	**Not Applicable**	**Not Applicable**	**Very Likely**	**Very Likely**
…reduce disruption caused by road flooding	**Very Likely**	**Not Applicable**	**Not Applicable**	**Very Likely**	**Very Likely**
…have greater resilience against increasingly frequent intense rainfall events.	**Likely**	**Not Applicable**	**Likely**	**Very Likely**	**Very Likely**

Option:	**Reduce** the existing level of service			**Budget:**	Current Budget – 25%
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**

Bridges, Tunnels & Highway Structures

The Bridges, Tunnels & Highway Structures Asset

The bridges, tunnels and highway structures asset is made up of:

Asset	Quantity*
Bridges	1,494
Viaducts	6
Footbridges	95
Culverts	568
Gantries	7
Retaining Walls	313
Tunnels	2
Subways	38
Special Structures	177

* Based on available asset data

Bridges and other highway structures form essential links in the highway network; their purpose is to connect roads and footways to facilitate safe and efficient travel around the County.

The number of highway structures in Kent is currently increasing each year due to new housing and business developments.

Condition Assessments and Inspections

There are two types of checks, planned inspections and reactive inspections.

Planned inspections are carried out as part of our cyclical maintenance regime:

- → General Inspections: Visual inspection of the asset based on a two year rolling programme.
- → Principal Inspections: Very detailed inspection of the asset based on a twelve year rolling programme.
- → Underwater Inspections: Annual inspection of those bridges which are sensitive to scour action.
- → Trackside Inspections: Biennial inspection of our structures that cross Network Rail lines.
- → Boat Inspections: Biennial inspection of our structures that require access via a boat. These inspections are done alternately with Trackside Inspections.

The result of these inspections is captured in our database and this data is analysed to determine the condition of each individual asset and the overall condition of the asset stock. This information is used to identify the maintenance and repair works required for each individual structure and creates the forward programme.

Reactive inspections are carried out in response to enquiries and generate ad hoc and emergency works, for example repairs to brickwork and parapets.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support communities and the economy of Kent. However, we have to work within an overall budget.

Firstly we need to prioritise where to invest our budget.

We take a risk based approach to deciding where to invest our money and the information we have about bridges, tunnels and highway structures helps us to do this. Some of the things we consider include the following:

- → Where is the defect?
  - Is a "critical element" (a part of the asset that is vital to its structural integrity) affected?
- → What is the risk to road users?
  - Does the structure carry/support a high speed road, main road, minor road or footway?
  - Does the structure span a high speed road, main road, minor road or footway?
  - Does the structure carry high volumes of traffic?
  - Are there suitable alternative routes if the structure fails?
- → What is the risk to third party assets?
  - Does the structure support or span a railway, river, watercourse or other third party asset?
  - Is access to critical infrastructure such as powers stations or hospitals affected?

Investment is prioritised where the risk is highest.

Secondly we need to consider how to invest our budget.

By knowing what condition our assets are in we can determine how much work is needed to restore them and whether or not it is more cost effective to replace them completely. In many cases we can protect our bridges, tunnels and highway structures and maximise their lifespan by cleaning them, painting them and waterproofing them. This work requires a commitment to repeat investment but can save more significant costs in the longer term. Nevertheless, in some instances the asset has been damaged beyond repair or simply reached the end of its useful life. In these instances renewal is the only option.

It is also important to understand whether or not our assets are doing their job effectively and the practicalities of maintenance in both the short and longer term. If an asset is in the wrong place or is the wrong size there is no point simply patching it up or replacing it like for like. For example, if a culvert has failed we could invest £50,000 replacing it with a new pipe of the same size. However if there is a need for greater capacity, it would be better to spend £65,000 installing a larger one.

Finally we need to consider our investment in the wider context of the highways service.

Having assessed each site, we are able to collate a prioritised list of works. This is compared with the lists for other asset groups when we consider allocating our capital budget.

We do not normally undertake works to mitigate nuisance factors or improve aesthetics nor do we carry out works on privately owned or third party assets. We prioritise works at locations where the condition of the bridge, tunnel or highway structure presents a risk to safety.

Other Significant Factors Affecting Bridge, Tunnel and Highway Maintenance

Access

In order to maintain many of our bridges and highway structures we need to access the assets via private land. In many cases this can be arranged via a simple discussion with the land owner, however in some instances gaining access is more challenging. Access may be dependent on naturally occurring factors such as tide times, river levels or weather conditions. Equally, access may be dependent on the closure of a railway line or a section of a motorway which is subject to the consent of a third party.

Levels of Service

Considerations

When determining the levels of service that we will deliver it is vital that we consider the following:

The County Council has statutory obligations to:

- → Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980). This includes taking reasonable steps to ensure that our bridges, tunnels and highway structures are in a safe and useable condition.
- → Facilitate and secure the efficient movement of traffic on our highway network (Traffic Management Act 2004). This includes ensuring that our bridges, tunnels and structures are able to reasonably accommodate the movement of traffic and provide suitable links between our roads and footway.
- → Prepare to adapt to longer term climate change (Climate Change Act 2008). This includes preparing for more frequent and extreme events in years to come.

The County Council also has a five year strategic statement called “Increasing Opportunities, Improving Outcomes” and this sets out the following 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.

Current Levels of Service

The current levels of service for Bridges, Tunnels and Highway Structures are as follows:

Inspections

- → We will carry out a visual inspection of all of our bridges, tunnels and structures on a cyclic basis in accordance with the Code of Practice “Well Managed Structures”.

Asset Operation

- → We will monitor our tunnels 24 hours per day, 365 days per year.
- → We will open Sandwich Toll bridge within one hour of any request.

Maintenance

- → We will clean the drainage on highway structures once every two years.
- → Minor maintenance including painting, vegetation clearance and small repairs will be prioritised on the basis of the risk to highway safety Repairs and improvements.

Renewals and Improvements

- → We will prioritise renewals and improvements on the basis of the risk to highway safety deliver them on the basis of the highest risk first.

Options

When determining our levels of service we can consider three options:

- → Reduce the level of service.
- → Sustain the existing level of service.
- → Enhance the level of service.

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

- → Effectively operated and managed bridges, tunnels and structures to ensure highway safety is maintained.
- → Improved customer satisfaction and confidence in service provision.
- → A robust defence against claims for damage and personal injury.
- → Proactive maintenance regimes protecting our assets from the adverse effects of weather, erosion and ingress of vegetation.
- → Reduced disruption caused by asset failures and the implementation of structural weight limits.
- → Greater resilience against increasingly frequent extreme weather events.

In each instance the following scale has been applied:

Very Unlikely	Unlikely	Likely	Very Likely	Not Applicable

Option:	**Sustain** the existing level of service	**Budget:**	Current Budget

The likelihood that we will…	Inspections	Asset Operation	Maintenance	Renewals and Improvements
…effectively operate and manage bridges, tunnels and structures to ensure highway safety is maintained	**Not Applicable**	**Very Likely**	**Unlikely**	**Unlikely**
…improve customer satisfaction and confidence in service provision	**Unlikely**	**Very Likely**	**Unlikely**	**Unlikely**
…have a robust defence against increased claims for damage and personal injury	**Very Unlikely**	**Not Applicable**	**Unlikely**	**Unlikely**
…have proactive maintenance regimes protecting our bridges, tunnels and structures	**Very Unlikely**	**Not Applicable**	**Unlikely**	**Unlikely**
…reduce disruption caused by asset failures and the implementation of weight limits	**Not Applicable**	**Not Applicable**	**Unlikely**	**Unlikely**
…have greater resilience against increasingly frequent extreme weather events	**Not Applicable**	**Not Applicable**	**Unlikely**	**Unlikely**

Option:	**Enhance** the existing level of service	**Budget:**	Current Budget + 50%

The likelihood that we will…	Inspections	Tunnel Monitoring	Maintenance	Renewals and Improvements
…effectively operated and managed bridges, tunnels and structures to ensure highway safety is maintained	**Not Applicable**	**Very Likely**	**Likely**	**Likely**
…improve customer satisfaction and confidence in service provision	**Likely**	**Very Likely**	**Likely**	**Likely**
…have a robust defence against increased claims for damage and personal injury	**Likely**	**Not Applicable**	**Likely**	**Likely**
…have proactive maintenance regimes protecting our bridges, tunnels and structures	**Likely**	**Not Applicable**	**Likely**	**Likely**
…reduce disruption caused by asset failures and the implementation of weight limits	**Not Applicable**	**Not Applicable**	**Likely**	**Likely**
…have greater resilience against increasingly frequent extreme weather events	**Not Applicable**	**Not Applicable**	**Likely**	**Likely**

Option:	**Reduce** the existing level of service	**Budget:**	Current Budget – 25%

The likelihood that we will…	Inspections	Tunnel Monitoring	Maintenance	Renewals and Improvements
…effectively operated and managed bridges, tunnels and structures to ensure highway safety is maintained	**Not Applicable**	**Likely**	**Very Unlikely**	**Very Unlikely**
…improve customer satisfaction and confidence in service provision	**Very Unlikely**	**Likely**	**Very Unlikely**	**Very Unlikely**
…have a robust defence against increased claims for damage and personal injury	**Very Unlikely**	**Not Applicable**	**Very Unlikely**	**Very Unlikely**
…have proactive maintenance regimes protecting our bridges, tunnels and structures	**Very Unlikely**	**Not Applicable**	**Very Unlikely**	**Very Unlikely**
…reduce disruption caused by asset failures and the implementation of weight limits	**Not Applicable**	**Not Applicable**	**Very Unlikely**	**Very Unlikely**
…have greater resilience against increasingly frequent extreme weather events	**Not Applicable**	**Not Applicable**	**Very Unlikely**	**Very Unlikely**

Street Lighting

The Street Lighting Asset

The street lighting asset is made up of:

Asset	Quantity
Street Lights	120,552
Lit Signs	17,692
Belisha Beacons	600
Centre Island Beacons	1,480
Lit Bollards	4,578
School Warning Signs	285

Street lighting assets form a highly visible and vital part of the streetscape. Whilst there is no legal requirement to provide street lighting, it is considered important in enabling the safe use of the highway for road users and pedestrians and also helps to promote strong and safe communities.

Each year we adopt more street lighting assets due to new housing and business developments. To ensure we keep control of energy consumption and carbon emissions we constantly assess our asset and look to remove surplus lights where they are no longer required. We also look to apply adaptive lighting which defines the operation of lighting at different levels during periods of darkness. This may include adjusting lighting class based upon highway use at certain times of the night (dimming), trimming or part night lighting. Our objective is to provide the most efficient lighting solution possible to promote the concept of 'right light in the right place at the right time'.

Condition Assessments and Inspections

Where street lighting is provided, the County Council must take reasonable action to ensure that lighting assets do not pose a risk to the highway user. There are two types of checks: planned inspections and reactive inspections.

Planned inspections include structural and electrical testing and night patrols:

- → Structural testing is carried out by specialist contractors at no more than twelve yearly intervals. Testing is programmed on the basis of the previous structural test result.
- → Electrical testing is carried out by specialist contractors every six years.
- → Night patrols are visual checks to see that street lighting assets on main routes are operational and safe. They are carried out on a monthly basis.

The results of these inspections are captured in our asset management system and this data is analysed to determine the condition of the asset stock. This information is used to identify the maintenance and repair works required for each individual asset.

Reactive inspections are carried out in response to enquiries and emergencies and generate ad hoc works, for example lantern bollard replacements. Every time the asset is visited under these circumstances, a visual survey is carried out and information about its condition is reported back.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support communities and economy of Kent. However, we have to work within an overall budget.

When we are deciding where to spend our money, we think about the risk to road users and residents and if there is still a requirement for the asset:

- → If the asset fails will it create a hazard to road users or residents?
- → If the asset fails will it cause a lot of disruption?
- → Is the existing asset energy efficient?
- → Is the existing asset still needed?
- → Does the existing lit sign or bollard still need to be lit?

We do not normally undertake works to mitigate nuisance factors. We prioritise works at locations where there is a risk to safety.

We use the information we have about our street lighting assets to help us answer these questions and decide where we need to spend our money.

We decide how much money to spend by thinking about where the risk to road users and residents is the highest.

Some of the things we think about include the following:

- → The type of road, for example, whether it is a high speed road, a main road, an estate road or a country lane.
- → The amount of traffic that uses the road at night time for example is it a main route in and out of a town or is it a minor road only used by a handful of drivers each night?
- → The impact if the road is closed, for example, the road might only be used by a handful of people but it may be the only route to get to their homes.
- → Road safety statistics.
- → Requirements of the Traffic Signs Regulations and General Directions (TSRGD) 2016.

By knowing what condition our assets are in we can determine how much work is needed to restore them and whether or not it is more cost effective to replace them completely.

It is important that we do the right work at the right time. The results of structural testing are utilised to plan the replacement of those columns most at risk of failing. We refer to the Institution of Lighting Professional's 'Technical Report 22: Managing a Vital Asset' for guidance on the timescales for the replacement of columns following structural testing.

Finally we need to think about the ongoing and future maintenance of the asset. A bespoke style of street light will be no good if future maintenance and planned inspections are not practicable. We therefore try to standardise on materials used and encourage third parties, such as

developers, to use our approved materials. Approved materials now include a suite of LED luminaires which will reduce future maintenance and energy costs.

We assess each site using a risk based approach and have a prioritised list of improvements. This is compared with the lists for other asset groups when we consider allocations for improvements.

Other Significant Factors affecting Street Lighting Maintenance

Ageing Infrastructure

A robust structural testing programme has resulted in the provision of additional capital funding for the replacement of life expired steel street lights in the last three years (2013 to 2016). This has 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 1,200 steel street lights will need replacing following their programmed structural re-test. The cost of replacing these is estimated at £1.32m per year (2016 rates).

The focus on steel assets has been to the detriment of concrete street lights which have received no funding in the last three years. There are currently approximately 5,300 concrete street lights which are coming to the end of their life and require replacing. If a concrete street light were to suddenly fail, this would pose a significant danger to road users. The cost of replacing these is estimated at £5.83m (2016 rates).

Energy and Carbon Emissions

The cost of energy is the subject of concern for all lighting authorities. Whilst increases in the cost of energy have steadied in recent years, the future is not predictable. In addition, the introduction of the CRC Energy Efficiency Scheme has added to the financial pressure surrounding street lighting.

The County Council has taken measures to reduce the impact of these by introducing LED technology. By 2019, all County owned street lights will be converted to LED thus significantly reducing energy costs and carbon emissions. The project incorporates a central management system which enables actual energy consumption to be monitored and the County Council will no longer pay energy based on unmetered supply calculations. This project covers the conversion of lanterns only, and the structural testing and replacement programme will need to continue.

Non-recoverable damage by third parties.

Damage by third parties is very common place and recovery of costs is an increasing challenge. Damage to a street light as a result of a RTC frequently results is significant damage to the vehicle involved which means there is often the opportunity to recharge the cost of replacement. However, this is not the case for lit signs and bollards. The street lighting team spends in excess of £200,000 per year on replacing these assets that have been damaged by third parties.

Adoption of assets

Whilst the County Council owns the majority of street lights in Kent there are approximately 10,000 additional street lights which are owned by District, Parish and Town Councils. These assets are typically in a poor condition, not having benefitted from a planned inspection regime or

replacement programme. There is increasing appetite from the District, Parishes and Town Councils for the County Council to adopt these lights which, if progressed, will add to the financial pressure to ensure that the assets are in an appropriate condition.

In addition, the asset base is added to each year by approximately 2-3% through new developments and improvements to the existing road network.

Levels of Service

Considerations

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives.

The County Council has statutory obligations to:

- → Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980).
- → Facilitate and secure the efficient movement of traffic on our highway network (Traffic Management Act 2004) this includes taking reasonable steps to secure the expeditious movement of traffic on the authority's road network.

The County Council does not have a statutory obligation to provide lighting, however, where it is provided the Council is under a duty of care to ensure that it is maintained in accordance with good industry practice:

- → An electrical test must be carried out every six years.
- → A programme of structural testing should be carried out.

The County Council also has a five year strategic statement called "Increasing Opportunities, Improving Outcomes" and this sets out the following 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.

Current Levels of Service

The current levels of service for Street Lighting are as follows:

Reactive Maintenance:

- → We will respond and attend site within two hours in an emergency situation.
- → We will attend site within seven days of reports of faulty street lighting assets.
- → We will carry out minor replacement works, e.g. replace a lantern, within 28 days.
- → Faults with the distribution network are reported to UK Power Networks and are subject to Ofgem's 'Guaranteed Standards of Performance'.

The total annual cost of delivering these levels of service in 2016 is £3m revenue (this excludes energy and carbon emissions costs).

Replacement and Refurbishment:

- → Capital refurbishment of street lighting assets will be identified and programmed by the street lighting team based on age and condition information.
- → Life expired assets will be replaced based on safety critical grounds.

Options

When determining our levels of service we can consider three options:

- → Sustain the existing level of service
- → Reduce the level of service.
- → Enhance the level of service.

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

- → Improve customer satisfaction and confidence in service provision.
- → Greater resilience against obsolescence of equipment.
- → Reduce the backlog of life expired assets.

In each instance the following scale has been applied:

Very Unlikely	Unlikely	Likely	Very Likely	Not Applicable

Option:	**Sustain** the existing level of service		**Budget:**	Current Budget
The likelihood that we will…	Routine Maintenance	Minor repairs	Replacement	
…improve customer satisfaction and confidence in service provision	**Likely**	**Likely**	**Likely**	
…have greater resilience against obsolescence	**Not Applicable**	**Not Applicable**	**Likely**	
…reduce the backlog of life expired assets	**Not Applicable**	**Not Applicable**	**Very Unlikely**	

Option:	**Enhance** the existing level of service		**Budget:**	Current Budget + 25%
The likelihood that we will…	Routine Maintenance	Minor repairs	Replacement	
…improve customer satisfaction and confidence in service provision	**Very Likely**	**Very Likely**	**Likely**	
…have greater resilience against obsolescence	**Not Applicable**	**Not Applicable**	**Likely**	
…reduce the backlog of life expired assets	**Not Applicable**	**Not Applicable**	**Very Unlikely**	

Option:	**Reduce** the existing level of service		**Budget:**	Current Budget – 25%
The likelihood that we will…	Routine Maintenance	Minor repairs	Replacement	
…improve customer satisfaction and confidence in service provision	**Very Unlikely**	**Very Unlikely**	**Unlikely**	
…have greater resilience against obsolescence	**Not Applicable**	**Not Applicable**	**Very Unlikely**	
…reduce the backlog of life expired assets	**Not Applicable**	**Not Applicable**	**Very Unlikely**	

Intelligent Traffic Systems (ITS)

The ITS Asset

The ITS asset is made up of:

Asset	Quantity
Traffic signal junctions	325 sets (including wig-wags)
Traffic signal crossings	371 sets (pelican, puffin, toucan & pegasus)
CCTV cameras	138
Roadside message signs	104
Bus real time information signs	57
Interactive warning signs	351
Access control systems	1

The purpose of ITS assets is to monitor, manage and control vehicle movements on the highway network.

The number of ITS assets in Kent is currently increasing each year due to new housing and business developments as well as third party requests for safety reasons.

Condition Assessments and Inspections

There are two types of checks, planned inspections and reactive inspections.

Planned inspections include highway safety inspections and condition checks carried out as part of our cyclical maintenance regime:

- → Our teams carry out visual checks to make sure the ITS assets are in a safe condition. This includes checking that interactive warning signs are facing the correct direction and pedestrian crossing push buttons are working. We carry out this kind of check at least once every four months.
- → Our term maintenance contractor carries out an electrical safety test of all ITS assets once every twelve months.

Reactive inspections are carried out in response to enquiries and generate ad hoc and emergency works, for example replacement of traffic lights damaged by third parties during a road traffic crash or modifications to signal timing plans.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support communities and economy of Kent. However, we have to work within an overall budget.

When we are deciding where to spend our money, we think about the risk that system failures pose to road users and residents:

- → What do we need to do to make sure that the ITS equipment does not fail?
- → If it fails, does it create a hazard to road users?
- → If it fails, does it cause congestion/disruption?

We use the information we have collected about our ITS assets to help us answer these questions and decide where we need to spend our money.

Some of the things we think about include the following:

- → The type of road, for example, whether it is a high speed road, a main road, an estate road or a country lane and the risk presented by the volume of conflicting traffic movements.
- → The amount of traffic that uses the road, for example is it a main route in and out of a town or is it a minor road only used by a handful of drivers each day?
- → The impact if the road is closed, for example, the road might only be used by a handful of people but it may also be the only route to get to their homes.
- → The number of pedestrians affected, for example, if the traffic signal crossings fail is there an alternative safe route?

By knowing what condition are assets are in we can determine how much work is needed to restore them and whether or not it is more cost effective to replace them completely.

For example, a damaged traffic signal pole near a pavement presents an immediate risk to pedestrians. Within four hours of becoming aware of the problem we will make the site safe and put barriers around the area with signs to warn people of the hazard. Within seven calendar days we will replace the damaged pole and return the site to safe operation for drivers and pedestrians.

It is important to understand whether or not our assets are doing their job effectively. If an asset is in the wrong place or is the not providing a useful function there is no point simply patching it up or replacing it like for like. We also endeavour to undertake the right repairs at the right time in the life cycle of our ITS assets.

We regularly manage issues through our fault management system. These range from significant congestion problems affecting busy roads to faulty interactive warning signs that fail to remind drivers of excessive speed.

Whilst we know we need to react and fix dangerous situations quickly, this is not a cost effective way of working as we have to send engineers specifically to these locations and more time is spent travelling rather than fixing. We can clearly get more done for our budget if we plan the work that needs to be done.

We assess each site using a risk based approach and have a prioritised list of improvements. This is compared with the lists for other asset groups when we allocating budgets for improvements.

Other Significant Factors affecting ITS Maintenance

Ageing Infrastructure

As technology progresses older equipment becomes obsolete and no longer supported by the manufacturer. Components can be repaired which will prolong the effective life of the asset. As sites are refurbished any re-usable equipment is made available for use in routine maintenance.

Limited Capacity

With the increase in population there are additional demands on the network. Often changes are made to existing assets which do impact on the efficiency and capacity of the junctions.

Where there is a significant impact on the network there is limited possibilities to mitigate them by changing the method of operation. However, with multiple developments in a small area, consideration should be made to effects on the whole transportation system with the possibility of greater contributions to increase capacity.

Reliance on Third Party Infrastructure

The asset can have equipment which is installed within assets that are maintained separately from the ITS team, such as detector loops in the road surface. When these assets fail, alternatives are considered but there are cases where this is not possible.

External Factors

There are short notice demands made of the ITS team from external third parties which can potentially divert valuable resources and disrupt their long term maintenance plan. When considering third party requests for equipment such as interactive warning signs, these will be assessed based on their safety benefits and likely whole lifecycle costs. This may result in some proposals being rejected and alternative physical mitigation or engineering solutions promoted.

Specialist materials

Consideration will be given to minimising the use of any specialist equipment or materials such as high friction surfacing which is expensive and costly to maintain. During the design and approval stage the location, quantity and type of traffic signal detection equipment will be scrutinised to minimise the long term maintenance liabilities, some of which may affect other asset groups.

Levels of Service

Considerations

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives.

The County Council has statutory obligations to:

- → Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980).
- → Facilitate and secure the efficient movement of traffic on our highway network (Traffic Management Act 2004). This includes taking reasonable steps to secure the expeditious movement of traffic on the authority's road network.
- → A complete site inspection of each installation must be carried out at least every twelve months as per TD 24/97 Inspection and Maintenance of Traffic Signals and Associated Equipment.
- → An Earth Loop Impedance test at every site at least every twelve months as part of the Electricity at Work Regulation 1989.

The County Council also has a five year strategic statement called “Increasing Opportunities, Improving Outcomes” and this sets out the following 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.

We monitor customer enquiry volumes and satisfaction on a monthly and annual basis, although enquiry volumes are much lower for ITS than many other assets. The annual Tracker Survey does not contain any specific ITS related questions but does ask for any congestion “hotspots” to be identified, which forms part of the strategically important site assessment.

Current Levels of Service

The current levels of service for ITS are as follows:

Routine Maintenance

- → We will respond and attend site within two hours of a traffic light fault on strategically important sites and complete the repair within four hours of attendance.
- → We will respond and attend site within four hours of a fault report for all other traffic signals or other ITS assets and complete the repair within four hours of attendance.
- → We will attend site within 48 hours of reports of minor, non-urgent repairs.
- → There is also the possibility of urgent attendance at any faulty traffic signals within two hours, at the discretion of the ITS team with an additional cost.
- → We will carry out an annual inspection, clean and safety test with two supplementary inspections during this period.
- → We will maintain and operate other traffic management and control systems from the Highway Management Centre, including:
    - Urban Traffic Control & SCOOT*
    - Communications lines
    - CCTV equipment
    - Bus Real Time Information
    - Kent Traffic & Travel website
    - Journey time monitoring equipment (ANPR and Bluetooth)

* - SCOOT is ‘Split Cycle Offset Optimisation Technique’, a system we use for managing and controlling traffic signals in urban areas. It co-ordinates junctions to make the most efficient use of the road space by adjusting signal timings based on live traffic data collected using vehicle detection equipment on the approaches.

Non-Routine Maintenance

- → We will attend site within seven calendar days for the replacement of signal poles or cabling and ducting repairs. This will occur after the site is attended on routine maintenance.
- → Detectors repaired within thirty calendar days after the initial attendance on routine maintenance.
- → We will attend site to bag up signals if requested. ten days’ notice is required to guarantee attendance. Less than ten days’ notice will not be guaranteed.
- → Modifications to signals will be attended within sixty days of receipt of the request.

→ We will repair other damaged ITS assets used by the Highway Management Centre such as CCTV, electronic bus information signs and communication equipment.

The total annual cost of delivering these levels of service is £500,000 of revenue funding.

Replacement and Refurbishment

→ Capital refurbishment of signals will be identified and programmed by the ITS team based on age, fault history and equipment type.
→ Life expired assets will be replaced based on safety critical grounds.

The total annual allocation for obsolete and life expired equipment renewal is £500,000 of capital funding.

Options

When determining our levels of service we can consider three options:

→ Sustain the existing level of service.
→ Reduce the level of service.
→ Enhance the level of service.

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

→ Reduced incidents of traffic light failure requiring an immediate or urgent response.
→ Increased levels of road safety and inclusion for vulnerable groups.
→ Improved customer satisfaction and confidence in service provision.
→ Greater uptime of systems.
→ Better resilience against obsolescence of equipment.

In each instance the following scale has been applied:

Very Unlikely	Unlikely	Likely	Very Likely	Not Applicable

Option:	**Sustain** the existing level of service		**Budget:**	Current Budget
The likelihood that we will…	Routine Maintenance	Non Routine Maintenance	Refurbishment	Investigations
…reduce incidents of traffic light failure requiring an immediate or urgent response	**Unlikely**	**Not Applicable**	**Not Applicable**	**Unlikely**
…improve customer satisfaction and confidence in service provision	**Likely**	**Likely**	**Likely**	**Likely**
…increase up time of systems	**Likely**	**Likely**	**Likely**	**Likely**
…have greater resilience against obsolescence	**Unlikely**	**Unlikely**	**Unlikely**	**Likely**
…meet contractual targets for maintenance	**Likely**	**Likely**	**Not Applicable**	**Not Applicable**
…reduce the backlog of life expired assets	**Not Applicable**	**Not Applicable**	**Unlikely**	**Not Applicable**

Option:	**Enhance** the existing level of service		**Budget:**	Current Budget + 25%
The likelihood that we will…	Routine Maintenance	Non Routine Maintenance	Refurbishment	Investigations
… reduce incidents of traffic light failure requiring an immediate or urgent response	**Likely**	**Not Applicable**	**Not Applicable**	**Very Likely**
…improve customer satisfaction and confidence in service provision	**Very Likely**	**Likely**	**Likely**	**Very Likely**
… increase up time of systems	**Very Likely**	**Likely**	**Very Likely**	**Very Likely**
… have greater resilience against obsolescence	**Very Likely**	**Likely**	**Very Likely**	**Very Likely**
…meet contractual targets for maintenance	**Very Likely**	**Very Likely**	**Not Applicable**	**Not Applicable**
…reduce the backlog of life expired assets	**Not Applicable**	**Not Applicable**	**Likely**	**Not Applicable**

Option:	**Reduce** the existing level of service		**Budget:**	Current Budget – 25%
The likelihood that we will…	Routine Maintenance	Non Routine Maintenance	Refurbishment	Investigations
reduce incidents of traffic light failure requiring an immediate or urgent response	**Very Unlikely**	**Not Applicable**	**Not Applicable**	**Very Unlikely**
…improve customer satisfaction and confidence in service provision	**Very Unlikely**	**Unlikely**	**Very Unlikely**	**Very Unlikely**
… increase up time of systems	**Very Unlikely**	**Very Unlikely**	**Unlikely**	**Unlikely**
… have greater resilience against obsolescence	**Very Unlikely**	**Unlikely**	**Very Unlikely**	**Very Unlikely**
…meet contractual targets for maintenance	**Very Unlikely**	**Unlikely**	**Not Applicable**	**Not Applicable**
…reduce the backlog of life expired assets	**Not Applicable**	**Not Applicable**	**Very Unlikely**	**Not Applicable**

Soft Landscape

The Soft Landscape Asset

The Soft Landscape asset is made up of:

Asset	Quantity*
Highway Trees	55,000 individual urban trees within the highway boundary 450,000* within tree belts, woodland fringes and tree groups in rural and urban areas also within the highway boundary
Urban Grass Verges	3,840,000m^2
Rural Roadside Verges	4,764km
Visibility splays (grass)	763,000m^2
Shrubs	347,000m^2
Hedges (KCC owned)	54,000m^2 urban hedges 102km* rural hedges
Hard surfaces requiring weed spraying	4,500km of roads + associated footways
High Speed Roads	Central reservations: 269,000m^2 Grass verges: 130km Hedges: 15.5km

* Based on available asset data

Soft landscaping assets are important for amenity and nature conservation.

Trees play an important role in the landscape and help make Kent's roads and footways a more attractive place. In addition to their visual role, trees can remove a range of atmospheric pollutants, provide shelter and shade, reduce glare, stabilise banks, reduce perception of noise and contribute to ecological diversity. Kent does not plant trees to reduce noise or for screening purposes.

Grass verges, shrubs and hedges soften the hard look of roads and are planted in some places to discourage parking at inappropriate locations.

There are a large number of trees, hedges and shrubs located on private land adjacent to our 8,700km of public highway. These are privately owned and we work with the local community to encourage land owners to maintain them appropriately. If necessary, we have powers under the Highways Act to notify landowners of their responsibilities. If they do not carry out necessary maintenance work we may exercise powers to carry out the works and recover costs from the landowner.

The number of soft landscape assets in Kent is currently increasing each year due to new housing and business developments.

Condition Assessments and Inspections

There are two types of checks or inspections, planned and reactive:

Planned inspections include general highway safety inspections and five yearly safety inspections:

- → Our team of Highway Inspectors carry out driven and walked highway inspections. They have a basic understanding of arboriculture and check for trees that are clearly leaning towards the highway and may cause a hazard, identify visible loose branches and encroachment onto roads and footways, obstructions and trip hazards. They also inspect grass, shrubs and hedges for encroachment and obstruction which may affect visibility and safe use of the highway network. The frequency of inspections is dictated by road category ranging from annual for minor roads to monthly for major roads.
- → Planned inspections of trees in the highway take place on a five year cycle and are carried out by qualified arboriculturists. KCC tree assets are recorded in our Highway Database and the Inspector will update the asset details including the tree condition at each inspection. When we carry out planned tree inspections we also take note of private trees within falling distance of the highway. This is a ground level, basic visual inspection undertaken from the confines of the highway boundary only and therefore limited in its scope.

If immediate hazards are identified in private trees (within falling distance of the highway) that pose an imminent danger to the highway user, and our discretionary enforcement powers are not considered appropriate for this purpose, we raise emergency works as soon as reasonably practicable to remove the hazard in accordance with our duty to assert and protect the rights of the public to the use and enjoyment for any highway to which KCC are the highway authority (Section 130 of the Highways Act 1980).

We do not undertake planned inspections on our other soft landscape assets (grass, hedges and shrubs) as they are subject to planned maintenance activity which is then subject to a sample quality control inspection.

Reactive inspections of trees, grass verges, shrubs and hedges are carried out in response to customer enquiries. They may generate ad-hoc or emergency works or result in us serving notice under Section 154 of the Highways Act 1980 requesting the landowner to trim/deal with a vegetation issue. Where this is not completed in the stated time we will undertake the work and seek to recover the costs from the landowner.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support communities and economy of Kent. However, we have to work within an overall budget.

When we are deciding where to spend our money, we think about the risks posed to road users and residents, the impact on the surrounding environment and the age and condition of the asset:

- → Is the tree or vegetation creating a hazard to road users or residents?
- → Is the tree or vegetation having an adverse effect on the surrounding environment?

→ Is the tree or vegetation damaged, diseased or dying?

We use the information we have about our soft landscaping assets to help us answer these questions and help us decide where we need to spend our money. Trees are the highest risk assets within the soft landscaping group of assets. Some trees are given a higher priority because of their size, age, history or legal status. We do not normally undertake pruning or felling of heathy, well-formed trees to mitigate nuisance factors or their natural characteristics such as shedding of leaves, seeds or fruit or because they cast shade or block light.

Some of the things we think about include the following:

→ The type of road, for example, whether it is a high speed road, a main road, an estate road or a country lane and the risk presented by the volume of conflicting traffic movements.
→ The amount of traffic that uses the road, for example is it a main route in and out of a town or is it a minor road only used by a handful of drivers each day?
→ The impact if the road is closed, for example, the road might only be used by a handful of people but it may also be the only route to get to their homes.
→ The number of pedestrians affected, for example, if a tree falls down is there an alternative safe route?

By knowing what condition our assets are in we can determine how much work is needed to restore them and whether or not it is more cost effective to replace them completely. For example, a damaged tree near a pavement may present an immediate risk to pedestrians. Within four hours of becoming aware of the problem we will make the site safe and put barriers around the area with signs to warn people of the hazard. Within seven calendar days we clear any remaining debris and make safe.

It is important to understand whether or not our assets are doing their job effectively. If an asset is in the wrong place or is the not providing the required amenity outputs, change or replacement is considered. We also endeavour to undertake the right maintenance at the right time in the life cycle of our soft landscape assets to maximise safe useful life expectancy.

We regularly manage issues through our fault management system. These range from safety critical problems affecting busy roads to nuisance and quality of life complaints.

Whilst we know we need to react and fix dangerous situations quickly, this is not a cost effective way of working as we have to send landscape officers specifically to these locations and more time is spent travelling rather than fixing. We can clearly get more done for our budget if we plan the work that needs to be done.

We assess each site using a risk based approach and have a prioritised list of improvements. This is compared with the lists for other asset groups when we consider allocations for improvements.

Other Significant Factors affecting Soft Landscape Maintenance

Soft Landscape assets are natural living organisms in their own right. As such, they grow and are subject to disease or even death. Where this occurs on a large scale there can be unforeseen

impacts on maintenance budgets. A good example of this is Ash dieback (Chalara fraxinea) which affects tree populations.

Another key driver moving forward will be climate change. Global warming affecting native species and their ability to grow and thrive in the local environment. Imbalance in this regard also has the potential impact on landscape safe useful life expectancy and life cycle planning when planting new schemes. The above factors need to be balanced with available funding when planning future services.

Levels of Service

The table below provide an overview of the history of soft landscape maintenance frequencies. The notable reductions since 2009/10 are a result of ongoing financial pressures.

Item No	Service provision	Historical Service Levels (2009/2010)	Current Provision (2016/17)	Proposed Provision (2017/18)
1	Urban Grass Cutting	10-16	8	5/6
2	Shrub Bed Maintenance	2-12	1	1
3	Urban Hedges	2	1	1
4	Weed spraying (Hard Surfaces)	2-3	1	1
5	Rural Swathe Cutting	2-3	1	1
6	Visibility cuts	3	3	3
7	Rural Hedge Cutting	1-2	1-3	1-3
8	High Speed Roads (HSR)	2	1	1
9	Bus Routes	Ad-Hoc Safety Critical Work only		
10	Tree Maintenance	Ad-Hoc Safety Critical Work only		

Maintenance frequencies are reviewed periodically in accordance with available funding. We are aware that both the current frequencies and proposed fall short of what is required to prevent both medium and long term asset deterioration. In this example the long term deterioration of landscape assets can impact on surrounding assets. Established weed growth and tree roots in hard surfaces can cause hundreds of thousands of pounds worth of damage in subsequent repairs to ensure a safe highway. Moreover, unmaintained overhanging vegetation can block street lighting, visibility at junctions; obstruct the safe passage of vehicles and pedestrians. Such issues have the potential to become legal claims from third parties.

Options

The condition of the soft landscape infrastructure and its ability to negatively impact adjoining assets is directly associated with the level of maintenance carried out. Our experience of the

asset impacts since 2009/10 has enabled us to predict with some accuracy the effects of maintenance frequencies going forward. For the purpose of this exercise four costed scenarios have been identified to inform future impacts on the asset and associated decision making.

Asset/Service Level Enhancement

Good quality outputs maintaining the asset proactively to ensure above average amenity value and increased levels of customer satisfaction. This option will have a positive effect on the quality of life of Kent residents, property prices and economic investment. The condition of the asset will cease to deteriorate and improve slowly over the long term. A migration to this level of service will limit the volume of "bring to standard" capital investment work required.

Steady State

Maintenance levels that meet the minimum requirements of the asset, preventing any further decline from the point of implementation. This option provides a higher level of service than that currently provided. Average outputs ensuring acceptable levels of amenity value and customer satisfaction. This option will improve the quality of life of Kent residents. The condition of the asset will cease to deteriorate. A migration to this level of service will limit the volume of "bring to standard" capital investment work required.

A Reduced Service

This is effectively the current service level. A very basic maintenance provision with low quality outputs which provides low levels of customer satisfaction and limited resilience to meet excessive fluctuations in seasonal growth (e.g. 2016 service). The continued use of this option will have a negative effect on the quality of life of Kent residents, property prices and economic investment. The condition of the asset will continue to deteriorate requiring increased levels of "bring to standard" capital investment at some point in the future.

A statutory minimum service

This level of service was considered by Members (4th July 2016 Corporate Board) to accommodate MTFP savings of £1m. This option was not progressed due to the significant negative impacts it would have.

This is effectively the lowest level of service that could be provided dealing with highways safety issues only. Town centre areas would be maintained at a reduced level to match the current approach to rural areas. Accordingly, there would be no visual difference between the two areas from an amenity perspective. Very low quality outputs and very high levels of customer dissatisfaction would be expected. There would be no resilience to meet excessive fluctuations in seasonal growth. A further reduction in services to this level will have a significant negative impact on the quality of life of Kent residents, property prices and economic investment. The condition of the asset will deteriorate at a progressive rate. Significant levels of "bring to standard" capital investment will be required in the future. A significant increase in claims would arise.

Estimated Maintenance Visits Per Annum For Programmed Work By Asset Type

Item No.	Service Provision	Service Enhancement	Steady state Service	Reduced Service	Statutory Minimum
1.	Urban Grass Cutting	10/12	8	6	1/3
2.	Shrub Bed Maintenance	¾	2	1	0
3.	Urban Hedges	¾	2	1	0
4.	Weed Spraying (Hard surface)	¾	2	1	0
5.	Rural Swathe Cutting	3	2	1	1
6.	Visibility cuts	3	3	3	3
7.	Rural Hedge Cutting	¾	2/3	1/3	1/3
8.	High Speed Road (HSR)	3/2	2	1	1
9.	Bus Routes	Safety & amenity		Safety critical only	
10.	Tree Maintenance	Safety, amenity & nuisance		Safety critical only	

Safety Barriers

The Safety Barrier Asset

The safety barrier asset is made up of:

Asset	Quantity*
Steel safety barriers	350 km
Wire cable safety barrier	5 km
Terminal sections	2500 no.

* Based on available asset data

Safety barriers are an important element in maintaining the safety of Kent's highway network for road users. Objects on or next to the road can present a significant hazard to the road user and there is a clear need to ensure that they are reasonably protected. Example of such objects would be structures, large signs, lamp posts, or where there is a large difference in level near to the road edge.

The main purpose of pedestrian guardrails is to improve safety by trying to prevent pedestrians from crossing the road at an inappropriate place or from straying into the road inadvertently. Guard railing can also be used to keep pedestrians away from the swept path of large vehicles such as buses and heavy goods vehicles.

Condition Assessments and Inspections

There are two types of checks, planned inspections and reactive inspections.

Planned inspections include general highway safety inspections and are carried out as part of our cyclical maintenance regime:

- → Our team of Highway Inspectors carry out visual checks to make sure the highway assets are in a safe condition. This includes visually checking that barrier components are not broken or missing. We carry out this kind of check at least once every twelve months.
- → Our Highway Structures team carry out cyclic inspections of highway structures and inspect safety barrier which is adjacent to the structure for the purpose of the protection of that structure.
- → Our Contractor undertakes five yearly principal inspections of the safety barriers on A and B roads. This information is collated and barriers graded from one to five for priority repair.
- → Pedestrian guardrails are visually inspected as part of the highway inspection and this is carried out at least once every twelve months.

Reactive inspections are carried out in response to enquiries and generate ad hoc and emergency works orders for repair. These enquiries may be initiated by colleagues within partner organisations such the Police or District Councils and also from members of the general public.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support communities and the economy of Kent. However, we have to work within an overall budget.

When we are deciding where to spend our money, we think about the risks posed to the road users and residents:

- → If the safety barrier fails does it create a hazard to road users?
- → If the barrier is breached is there likely to be a secondary event i.e. a river, another road or railway?
- → If the pedestrian guardrail fails are pedestrians more likely to cross the road in an inappropriate place?
- → If the pedestrian guardrail fails are pedestrians more likely to stray into the road?
- → If the pedestrian guardrail fails are pedestrian likely to trip or fall within the highway?

We decide how much money to spend by thinking about where the risk to road users and residents is the highest.

Some of the things we think about include the following:

- → The type of road, for example, whether it is a high speed road, a main road, an estate road or a country lane.
- → The amount of traffic that uses the road, for example is it a main route in and out of a town or is it a minor road only used by a handful of drivers each day?
- → The existing collision history of the road.
- → The impact if the road is closed, for example, the road might only be used by a handful of people but it may be the only route to get to their homes.
- → Is the site a high pedestrian trip generator such as school or public building?

By knowing what condition our assets are in we can determine how much work is needed to restore them and whether or not it is more cost effective to replace them completely.

It is important to understand whether or not our assets are doing their job effectively. If an asset is in the wrong place or is the wrong size there is no point simply patching it up or replacing it like for like. We also endeavour to undertake the right repairs at the right time in the life cycle of our safety barrier assets.

We assess each site using a risk based approach and have a prioritised list of improvements. This is compared with the lists for other asset groups when we bid for our improvements budget.

Other Significant Factors affecting Safety Barrier Maintenance

Proportion of asset at end of life

Safety barrier and guard railing has not been asset managed for some time and as a result a significant proportion of the asset is considered to be at the end of its life (twenty years). Although sections are replaced after crash damage, condition surveys carried out on the A and B road network suggests that some of the asset could be in excess of 45 years of age.

RTC damage and non-recoverable costs

Damage by third parties accounts for the majority of reactive repairs. It is becoming increasingly difficult to recover costs from third parties especially as in most cases safety barrier keeps errant vehicles on the carriageway and drivers are able to leave the site without police involvement.

Backlog of repairs

A lack of maintenance investment in this asset has resulted in over 12% of the asset needing total replacement within two years.

Vegetation and inspection

Reductions in service levels for vegetation clearance has resulted in less safety barrier defects being identified as part of driven inspection as barriers are significantly covered.

High Speed Roads

The most critical safety barriers are on the high speed road network. This network is difficult to access without creation of local congestion and can be costly. Kent operate an annual High Speed Road programme as a series of planned closures to undertake works on this part of the network, however each closure offer limited time to undertake any significant repairs.

Removal of pedestrian guardrail

In the 1960s and 1970s pedestrian guardrail was used extensively as urban highways were developed and expanded. There was no guidance at the time on where it should be used but this has left a legacy of over-use of this asset. The DfT recognised this in 2009 and published its document on pedestrian guardrailing LTN 2/09 which provided an assessment framework to look to reduce guardrailing on the highway network. KCC undertook a full assessment of town centre guardrailing across the county but local concerns about residual safety meant that the majority of local Joint Transportation Boards decided against implementing any removal of pedestrian guardrail.

In order to support both the amenity value of the highway network particularly in town centres and the desire to balance pedestrian and vehicular traffic through shared spaces and well-designed streets, LTN 2/09 should be fully implemented.

Levels of Service

Barrier type	Description	Response time
Safety Barrier	Crash damage	Make safe within two hours of notification. Permanent repair within six months.
	Cyclic Re-tensioning	A and B roads Programmed annually on a two yearly cycle.
	End of life replacement	Programmed annually on a priority risk assessment basis.
	Specialist general condition inspections	A and B road safety barriers are condition inspected on a five yearly cycle.
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 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.

Total annual cost of delivering the current level of service for safety barriers is £1m of capital funding and £100k of revenue funding. There is no dedicated budget for pedestrian guardrail repairs, however in 2015/2016 a total of £600k of was spent on this activity using general reactive revenue funds.

Options

When determining our levels of service we can consider three options:

- → Sustain the existing level of service.
- → Reduce the level of service.
- → Enhance the level of service.

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

→ Reduce road casualties on A and B roads.
→ Reduce casualties on other roads.
→ Have a robust defence against increased claims for damage and personal injury.
→ Protection of other highway assets i.e. structures, signs etc.
→ Deliver greater cost efficiencies in managing the asset.
→ Upgrade the asset to use improved technology and minimise future maintenance costs.
→ Increase public satisfaction of asset.

In each instance the following scale has been applied:

Very Unlikely	Unlikely	Likely	Very Likely	Not Applicable

Barriers

Option:	Sustain the existing level of service	**Budget:**	Current Budget

The likelihood that we will…	**Crash damage**	**Cyclic re-tensioning**	**End of life replacement**	**Specialist general condition inspections**
Reduce road casualties on A and B roads	**Likely**	**Likely**	**Unlikely**	**Likely**
Reduce road casualties on other roads	**Likely**	**Unlikely**	**Unlikely**	**Unlikely**
Have a robust defence against increased claims for damage and personal injury	**Likely**	**Unlikely**	**Unlikely**	**Unlikely**
Protection of other highway assets i.e. structures, signs etc.	**Likely**	**Likely**	**Unlikely**	**Unlikely**
Deliver greater cost efficiencies in managing the asset	**Unlikely**	**Unlikely**	**Highly unlikely**	**Unlikely**
Upgrade the asset to use improved technology and minimise future maintenance costs	**Highly Unlikely**	**Highly unlikely**	**Highly unlikely**	**Highly unlikely**
Increase public satisfaction of asset	**Likely**	**Highly Unlikely**	**Unlikely**	**Highly Unlikely**

Option:	**Enhance** the existing level of service	**Budget:**	Current Budget + 25%

The likelihood that we will…	**Crash damage**	**Cyclic re-tensioning**	**End of life replacement**	**Specialist general condition inspections**
Reduce road casualties on A and B roads	**Likely**	**Likely**	**Likely**	**Likely**
Reduce road casualties	**Likely**	**Likely**	**Likely**	**Likely**
Have a robust defence against increased claims for damage and personal injury	**Very Likely**	**Likely**	**Likely**	**Very Likely**
Protection of other highway assets i.e. structures, signs etc.	**Likely**	**Likely**	**Likely**	**Likely**
Deliver greater cost efficiencies in managing the asset	**Likely**	**Likely**	**Unlikely**	**Unlikely**
Upgrade the asset to use improved technology and minimise future maintenance costs	**Unlikely**	**Unlikely**	**Unlikely**	**Unlikely**
Increase public satisfaction of asset	**Likely**	**Unlikely**	**Unlikely**	**Unlikely**

Option:	**Reduce** the existing level of service	**Budget:**	Current Budget – 25%

The likelihood that we will…	**Crash damage**	**Cyclic re-tensioning**	**End of life replacement**	**Specialist general condition inspections**
Reduce road casualties on A and B roads	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Reduce road casualties	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Have a robust defence against increased claims for damage and personal injury	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Unlikely**
Protection of other highway assets i.e. structures, signs etc.	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Unlikely**
Deliver greater cost efficiencies in managing the asset	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Unlikely**
Upgrade the asset to use improved technology and minimise future maintenance costs	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Unlikely**
Increase public satisfaction of asset	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

Pedestrian Guardrail

Option:	Sustain the existing level of service	**Budget:**	Current Budget

The likelihood that we will…	**Damage**	**End of life replacement**	**Improvement to appearance in public realm**	**Provision of new pedestrian guardrail**
Reduce road casualties on A and B roads	**Likely**	**Likely**	**Not applicable**	**Unlikely**
Reduce road casualties on other roads	**Likely**	**Unlikely**	**Not applicable**	**Unlikely**
Have a robust defence against increased claims for damage and personal injury	**Likely**	**Unlikely**	**Not applicable**	**Unlikely**
Protection of other highway assets i.e. structures, signs etc.	**Not applicable**	**Not applicable**	**Not applicable**	**Not applicable**
Deliver greater cost efficiencies in managing the asset	**Unlikely**	**Unlikely**	**Highly unlikely**	**Unlikely**
Upgrade the asset to use improved technology and minimise future maintenance costs	**Highly Unlikely**	**Highly unlikely**	**Highly unlikely**	**Unlikely**
Increase public satisfaction of asset	**Unlikely**	**Unlikely**	**Unlikely**	**Unlikely**

Option:	**Enhance** the existing level of service	**Budget:**	Current Budget + 25%

The likelihood that we will…	**Damage**	**End of life replacement**	**Improvement to appearance in public realm**	**Provision of new pedestrian guardrail**
Reduce road casualties on A and B roads	**Likely**	**Likely**	**Not applicable**	**Likely**
Reduce road casualties	**Likely**	**Likely**	**Not applicable**	**Likely**
Have a robust defence against increased claims for damage and personal injury	**Likely**	**Likely**	**Not applicable**	**Likely**
Protection of other highway assets i.e. structures, signs etc.	**Not applicable**	**Not applicable**	**Not applicable**	**Not applicable**
Deliver greater cost efficiencies in managing the asset	**Likely**	**Likely**	**Likely**	**Likely**
Upgrade the asset to use improved technology and minimise future maintenance costs	**Unlikely**	**Unlikely**	**Unlikely**	**Likely**
Increase public satisfaction of asset	**Unlikely**	**Unlikely**	**Likely**	**Likely**

Option:	**Reduce** the existing level of service	**Budget:**	Current Budget – 25%

The likelihood that we will…	**Damage**	**End of life replacement**	**Improvement to appearance in public realm**	
Reduce road casualties on A and B roads	**Unlikely**	**Highly Unlikely**	**Not applicable**	**Highly Unlikely**
Reduce road casualties	**Unlikely**	**Highly Unlikely**	**Not applicable**	**Highly Unlikely**
Have a robust defence against increased claims for damage and personal injury	**Unlikely**	**Highly Unlikely**	**Not applicable**	**Highly Unlikely**
Protection of other highway assets i.e. structures, signs etc.	**Not applicable**	**Not applicable**	**Not applicable**	**Not applicable**
Deliver greater cost efficiencies in managing the asset	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Upgrade the asset to use improved technology and minimise future maintenance costs	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Increase public satisfaction of asset	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

Unlit Road Signs

The Unlit Sign Asset

The unlit sign asset is made up of:

Asset	Quantity*
Non illuminated signs	140,000*

* Based on available asset data

Traffic Signs are provided to convey messages to all types of road and footway users including equestrians, cyclists and pedestrians. The message must be clearly and at the right time for users travelling at the normal speed for the road, footway or cycle facility. They are therefore sited at appropriate distances for the speed of the road and the message it conveys and should be reflective or lit as required.

All signs shall be designed and installed in accordance with Traffic Signs Regulations and General Directions (TSRGD) 2016 and amendments thereof. Kent County Council has set up a Departmental working group to review the recent changes to TSRGD and how these changes can be implemented to improve effective and efficient management of the signs asset. In 2010 Kent County Council also produced a guidance document 'KCC Signs Technical Directive 2010' showing any adopted variances and to assist Engineers and Practitioners in achieving a consistent approach throughout the County.

Road signs are categorised into four types:

- → **Warning signs** draw the driver's attention to possible hazards on the road ahead.
- → **Regulatory signs** such as speed-limit signs inform drivers of the traffic restrictions and enforcement.
- → **Directions signs** show Destination information
- → **Other information signs** include signs for local facilities.

Partner agencies are also responsible for some signing on the Public Highway network. Kent County Council liaises closely with Highways England, District and Borough Councils to influence a consistent approach within the County.

Kent County Council is mindful that redundant signs and street furniture work against inclusive mobility in the street environment and can cause access problems for pedestrians. There is a committed to rationalising existing signing on the highway to reduce "clutter" where possible. Removal of unnecessary signing is carried out as part the assessment when reviewing plans for new developments to optimise what is required.

Condition Assessments and Inspections

There are two types of checks, planned inspections and reactive inspections.

Planned inspections include highway safety inspections and electrical testing both of which are carried out on a cyclic basis:

- → Our team of Highway Inspectors do visual checks to make sure the highway signs are in good working condition. This includes checking that signs are not broken, missing or faded; posts are in a sound stable condition. We carry out this kind of check at least once every twelve months, with major routes being checked monthly.

Reactive inspections are carried out in response to enquiries we receive and may generate ad-hoc or emergency works. For example the re-positioning of a twisted sign or replacement of a damaged post could be done as a result of information received from the public.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe. We also endeavour to make sure that our road network is resilient and can support the communities and economy of Kent. However, we have to work within an overall budget.

When we are deciding where to spend our money, we think about the risk to safety and the benefit the sign provides:

- → Is the sign in a safe condition?
- → Is the sign sufficiently visible to drivers?
- → Is the sign communicating the correct message effectively?
- → If the sign was not there, would road users be unaware of a potential danger?
- → If the sign was not there, would road users be unaware of a traffic restriction?
- → Will a new sign improve highway safety?

We decide what work is needed and when it should be done by thinking about where the risk to road users and residents is the highest.

Some of the things we think about include the following:

- → The type of road and the speed of the traffic that uses it, for example, whether it is a high speed road, a main road, an estate road or a country lane.
- → The amount of traffic that uses the road, for example is it a main route in and out of a town or is it a minor road only used by a handful of drivers each day?
- → The surrounding area, for example, is it a built up town centre or a rural area.

By inspecting our signs and knowing what condition they are in, we can determine how much work is needed.

It is important to understand whether or not our assets are doing their job effectively. If an asset is in the wrong place or is not providing correct, easily understood information, there is no point in simply replacing it like for like. It may be that the sign is no longer needed and therefore it can be removed complete to reduce the amount of sign clutter.

We assess each site using a risk based approach and prioritise repairs on the basis of safety.

Other Significant Factors affecting Unlit Sign Maintenance

Damaged and Ageing Asset

Although road signing is now designed with the environment in mind, the need to reduce unnecessary street clutter and weather resistant materials; the past has left the County with many ageing and deteriorating signs. Plastic coated sign were developed in the 1950s closely followed by posts and have been widely used across the County. Due to problems of internal rusting many today are in a poor or unknown condition. Budget pressures have historically aired towards other asset groups and signage has been proportionately funded relative to the cost of repairs. In many circumstances wholesale replacement is more cost effective than repairing the existing sign unit. Sign maintenance has now become a reactive process with little or no proactive approach in relation to preventative or cyclic maintenance.

Lack of detailed asset information of non-illuminated signs

Having a detailed asset database of non-illuminated signs would allow better planning and use of funding for this asset group. Details of sign type, size and reference number would enable efficient ordering of replacement signs and provide consistency across the County with any saving enabling cyclic maintenance to warning and regulatory signs to be carried out. Unfortunately asset collection would have a high initial cost which is difficult to justify against a reactive maintenance principle.

Passive Sign Assessment

The use of passive posts systems can have a very high initial cost associated with it. There can however be longer term cost benefits and safety improvements at specific identified locations where habitual incidents are linked to vehicles leaving the carriageway. Passive post systems are not always easily identified and therefore continuity can be problematic between initial installation and future maintenance.

Increased theft/ RTC damage and non-recoverable costs

Damage by third parties is very common place with the increasing problem of recovering costs related to damage. Tagging and street graffiti also requires an immediate response for some regulatory and warning signs. This increases the burden on existing highway budgets and restricts the potential to carry out cyclic and preventative maintenance such as cleaning.

Ownership of Sign Strategies

There has been a number of signing strategies across the County that deal with cross District and Agency issues (lorry management etc). There is a risk that ownership of these strategies is lost and their effectiveness diminishes over time. This in turn can then work against the Counties aspiration of LTP4, growth without gridlock.

Reductions in other services

With the reduction in rural verge maintenance rural signs can become significantly overgrown and fall into disrepair. Warning signs can become obscured causing increased risk of collisions.

External/political pressure

With the focus on safety critical repairs the Council can be under greater external and political pressure to respond to damaged non safety critical signing such as village gateways.

Levels of Service

Current levels of service for signing are as follows.

Description	Response time
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.
Obstruction to all non-illuminated signs causing an immediate hazard.	Remove within seven days of notification.
Obstruction to all non-illuminated signs causing nuisance.	Remove within 28 days of notification.

Levels of funding

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives. The County Council has statutory obligations to:

Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980). Variations in funding would have the below effect on asset management of signs.

Total annual cost of delivering the current level of service for unlit signs around £250k consisting of around £20k of capital funding and £230k of general reactive revenue funds.

Option:	Sustain existing level of service	**Budget:**	Current budget

The likelihood that we will…….	**Maintain Existing signs**	**De cluttering**	**New/enhanced signs**	**Maintain route management strategy**
Be able to maintain visibility of warning/regulatory signs in rural areas	**Unlikely**	**Not applicable**	**Unlikely**	**Not applicable**
Improve customer satisfaction and confidence in service provision	**Unlikely**	**Unlikely**	**Unlikely**	**Highly Unlikely**
Keep people safe	**Unlikely**	**Not applicable**	**Unlikely**	**Unlikely**
maintain journey times on the road network due to appropriate signing in place.	**Unlikely**	**Not applicable**	**Unlikely**	**Highly Unlikely**
Improve customer experience of the environment.	**Unlikely**	**Unlikely**	**Unlikely**	**Highly Unlikely**
Provide better pedestrian routes for the disabled	**Unlikely**	**Unlikely**	**Unlikely**	**Not applicable**

Option:	Reduce existing level of service	**Budget:**	Current budget – 25%

The likelihood that we will…….	**Maintain Existing signs**	**De cluttering**	**New/enhanced signs**	**Maintain route management strategy**
Be able to maintain visibility of warning/regulatory signs in rural areas	**Highly Unlikely**	**Not applicable**	**Highly Unlikely**	**Not applicable**
Improve customer satisfaction and confidence in service provision	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Keep people safe	**Highly Unlikely**	**Not applicable**	**Highly Unlikely**	**Highly Unlikely**
Improve journey times on the road network due to appropriate signing in place.	**Highly Unlikely**	**Not applicable**	**Highly Unlikely**	**Highly Unlikely**
Improve customer experience of the environment.	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Provide better pedestrian routes for the disabled	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Not applicable**

Option:	Increase existing level of service	**Budget:**	Current budget +25%

The likelihood that we will…….	**Maintain Existing signs**	**De cluttering**	**New/enhanced signs**	**Maintain route management strategy**
Be able to maintain visibility of warning/regulatory signs in rural areas	**Likely**	**Not applicable**	**Likely**	**Not applicable**
Improve customer satisfaction and confidence in service provision	**Unlikely**	**Likely**	**Likely**	**Unlikely**
Keep people safe	**Likely**	**Not applicable**	**Likely**	**Likely**
Improve journey times on the road network due to appropriate signing in place.	**Unlikely**	**Not applicable**	**Likely**	**Unlikely**
Improve customer experience of the environment.	**Unlikely**	**Likely**	**Unlikely**	**Unlikely**
Provide better pedestrian routes for the disabled	**Unlikely**	**Likely**	**Likely**	**Not applicable**

Road Markings & Studs

The Road Markings & Studs Asset

The Road Marking and Road Studs asset is made up of:

- → Centre line white Lane markings (Extrusion)
- → White edge lines (Extrusion)
- → Rib Edge Lining (Spray for refresh sites)
- → Pedestrian crossing and Junction Markings (Screed)
- → Yellow Box Junction Markings (Screed)
- → Lettering and Arrows Markings (Screed)
- → Road Studs (Milled, Stick on and intelligent)

Since August 2014 KCC have only used Milled Road Studs for all new and replacements where this is feasible.

All yellow parking restriction markings are the responsibility of the Borough and District Councils.

The primary objectives of Road Markings and Road Studs are:

- → Assist with the safe movement of traffic on the highway network.
- → Protect road users by guiding, warning, directing and informing them.
- → Define features on the highway such as junctions, road edges and traffic lanes.

Condition Assessments and Inspections

There are two types of checks; planned inspections and reactive inspections:

Planned inspections include highway safety inspections and condition checks carried out as part of our maintenance regime:

- → Our team of Highway Inspectors carry out visual checks to make sure the highway assets are in a safe condition. This includes checking that Road Markings are sufficiently visible during the day time. We carry out this kind of check at least once every six months.
- → Our team of Highway Stewards respond to issues highlighted to them from our customers. When they arrive on site they survey the surrounding area so that any other Road Markings that require refreshing can be collated for more efficient delivery. The Stewards can also assess the condition of Road Markings while they are on route to sites. The site visit includes reports from the Police and Teams investigating injury crashes.

Reactive inspections are carried out in response to enquiries and generate ad hoc and emergency works.

Prioritisation of Investment

All assets are important and we have a statutory duty to ensure that the highway is safe to use. We decide what work is needed and when it should be done by thinking about where the risk to road users and residents is the highest.

When deciding where to spend our money, we think about the risk associated with the condition of the asset so that they provide sufficient guidance, warning, direction and informing highway users.

We use the following questions as part of our risk assessment matrix to prioritise our response:

- → What do we need to do to make sure that the Road Markings and Studs are sufficiently visible before they should be considered for refreshing?
- → Review whether existing Road Markings and Studs should be replaced?
- → If the Road Markings or Studs are not reflective does it increase the hazard to drivers?

We decide what work is needed and when it should be done by thinking about where the risk to road users and residents is the highest.

Some of the things we think about include the following:

- → The type of road, for example, whether it is a high speed road, a main road, an estate road or a country lane.
- → The amount of traffic that uses the road, for example is it a main route in and out of a town or is it a minor road only used by a handful of drivers each day
- → High risk areas such as Pedestrian Crossings and Stop Lines.

By knowing what condition our assets are in we can determine how much work is needed.

It is important to understand whether or not our assets are doing their job effectively. If a line is in the wrong place for example, there is no point in simply refreshing it. We also endeavour to undertake the right repairs at the right time.

We assess each site using a risk based approach and have a prioritised list of improvements. This is compared with the lists for other asset groups when we consider allocating budgets for improvements.

Other Significant Factors affecting Road Markings and Studs Maintenance

Life Cycle of Asset

Thermoplastic marking where is constantly over-run can last as little as 18 months before it requires refreshing. This is a particular problem in busy town centres especially on transverse lining such as junctions and zebra crossing markings. Small patching and pot hole repairs often require relining and this leads to sections of road having varying condition of lining.

Traffic Management

High Speed roads are considered most risk as they carry the highest volumes of traffic at speeds in excess of 50mph. This network is difficult to access without creation of local congestion and can be costly. Kent operates an annual High Speed Road programme as a series of planned closures to undertake works on this part of the network. However, each closure offer limited time to undertake any significant lining works.

Strategic Approach

The asset is currently only maintained on a risk basis. There are no strategic plans in place to cyclically refresh the network. This means that lining works are difficult to programme and deliver effectively on an ad hoc basis.

New methods and materials are available on the market and opportunities to explore these are limited without a countywide strategy.

Heavy Good Routes

Road studs are more likely to be removed by the constant overrunning of heavy good vehicles. Routes with a high proportion of heavy goods vehicles are likely to require frequent replacement. Alternative forms of increasing carriageway visibility should always be considered before road studs at these locations especially in areas which are likely to be over-run.

Noise

Road studs in locations which are frequently over-run particularly by heavy and large goods vehicles can create a significant noise nuisance to residents. Placement of road studs within 30mph urban environments should be discouraged unless there is a clear safety need.

Levels of Service

Current levels of service for road marking and road studs are as follows.

Road Markings	Description	Response time
Road marking refresh – safety critical	Road marking is identified through inspection or enquiry as being more that 50% faded.	Make safe within two hours. Permanent refresh within seven to 28 days.
Road marking refresh – Non safety critical	Road marking is identified through inspection or enquiry as being more that 50% faded.	Refresh within 28 to ninety days.
New road markings	Requirement for new road marking is identified as part of the scheme or casualty reduction measure.	Install within ninety days.

Road Studs	Description	Response time
Road stud – Stick on or milled missing safety critical	Road stud 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.
Road stud – Stick on or milled missing - Non safety critical	Road stud 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.
Road Stud – Intelligent missing	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.
New Road Studs	Requirement for new road stud is identified as part of the scheme or casualty reduction measure.	Install within 90 ninety days.

Levels of funding

When determining the levels of service that we will deliver it is vital that we consider our statutory obligations and the County Council's strategic objectives. The County Council has statutory obligations to:

Maintain the adopted highway network in a safe condition and appropriately safe and functioning state (Highways Act 1980). Variations in funding would have the below effect on asset management of signs.

The key outcomes for Road markings and Road studs are:

- → Reduce Road casualties.
- → Ensure clear highway visibility in unlit areas.
- → Ensure clear highway visibility on high speed roads.
- → Support directional information at busy junctions and traffic systems.
- → Improve the street environment by having well maintained Road Markings and Road Studs

Total annual cost of delivering the current level of service for road markings and studs is around £825k consisting of around £100k of capital funding and £725k of general reactive revenue funds.

Road Markings

Option:	Sustain existing level of service	**Budget:** Current budget

The likelihood that we will…….	**Road marking refresh – safety critical**	**Road marking refresh – Non safety critical**	**New road marking**
Reduce Road casualties	**Likely**	**Unlikely**	**Likely**
Ensure clear highway visibility in unlit areas	**Unlikely**	**Unlikely**	**Unlikely**
Ensure clear highway visibility on high speed roads	**Likely**	**Unlikely**	**Unlikely**
Support direction information at busy junctions and traffic systems	**Unlikely**	**Highly Unlikely**	**Unlikely**
Improve the street environment by having well maintained road markings and road studs	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

Option:	Reduce existing level of service	**Budget**: Current budget - 25%

The likelihood that we will…….	**Road marking refresh – safety critical**	**Road marking refresh – Non safety critical**	**New road marking**
Reduce Road casualties	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Ensure clear highway visibility in unlit areas	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Ensure clear highway visibility on high speed roads	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Support direction information at busy junctions and traffic systems	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Improve the street environment by having well maintained road markings and road studs	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

Option:	Increase existing level of service	**Budget:** Current budget + 25%

The likelihood that we will…….	**Road marking refresh – safety critical**	**Road marking refresh – Non safety critical**	**New road marking**
Reduce Road casualties	**Likely**	**Likely**	**Likely**
Ensure clear highway visibility in unlit areas	**Unlikely**	**Likely**	**Likely**
Ensure clear highway visibility on high speed roads	**Likely**	**Likely**	**Likely**
Support direction information at busy junctions and traffic systems	**Likely**	**Unlikely**	**Likely**
Improve the street environment by having well maintained road markings and road studs	**Unlikely**	**Unlikely**	**Unlikely**

Road Studs

Option:	Sustain existing level of service		**Budget:** Current budget	
The likelihood that we will…….	**Road stud – Stick on or milled missing safety critical**	**Road stud – Stick on or milled missing Non safety critical**	**Road Stud – Intelligent missing**	**New Road Studs**
Reduce Road casualties	**Likely**	**Unlikely**	**Likely**	**Likely**
Ensure clear highway visibility in unlit areas	**Unlikely**	**Unlikely**	**Likely**	**Unlikely**
Ensure clear highway visibility on high speed roads	**Likely**	**Unlikely**	**Likely**	**Unlikely**
Support direction information at busy junctions and traffic systems	**Unlikely**	**Highly Unlikely**	**Unlikely**	**Likely**
Improve the street environment by having well maintained road markings and road studs	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

Option:	Reduce existing level of service		**Budget:** Current budget - 25%	
The likelihood that we will…….	**Road stud – Stick on or milled missing safety critical**	**Road stud – Stick on or milled missing Non safety critical**	**Road Stud – Intelligent missing**	**New Road Studs**
Reduce Road casualties	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Ensure clear highway visibility in unlit areas	**Highly Unlikely**	**Highly Unlikely**	**Unlikely**	**Unlikely**
Ensure clear highway visibility on high speed roads	**Unlikely**	**Unlikely**	**Unlikely**	**Unlikely**
Support direction information at busy junctions and traffic systems	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**
Improve the street environment by having well maintained road markings and road studs	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Highly Unlikely**

Option:	Increase existing level of service		**Budget:** Current budget + 25%	
The likelihood that we will…….	**Road stud – Stick on or milled missing safety critical**	**Road stud – Stick on or milled missing Non safety critical**	**Road Stud – Intelligent missing**	**New Road Studs**
Reduce Road casualties	**Likely**	**Unlikely**	**Likely**	**Likely**
Ensure clear highway visibility in unlit areas	**Unlikely**	**Unlikely**	**Likely**	**Likely**
Ensure clear highway visibility on high speed roads	**Likely**	**Unlikely**	**Likely**	**Likely**
Support direction information at busy junctions and traffic systems	**Likely**	**Unlikely**	**Unlikely**	**Likely**
Improve the street environment by having well maintained road markings and road studs	**Unlikely**	**Highly Unlikely**	**Highly Unlikely**	**Unlikely**

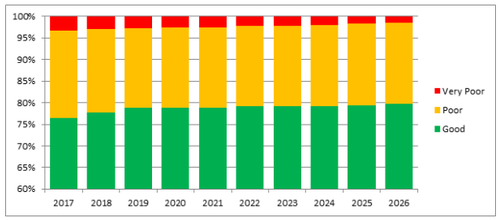
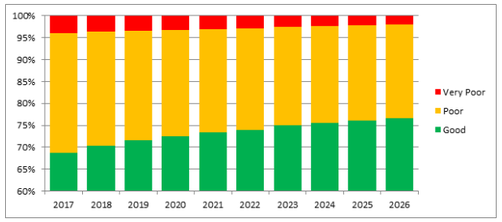
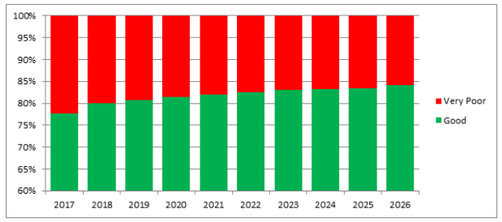
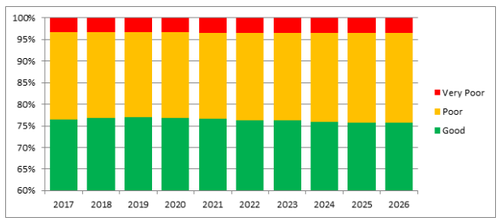
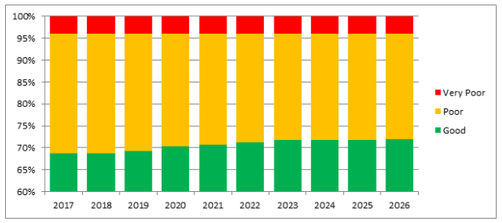
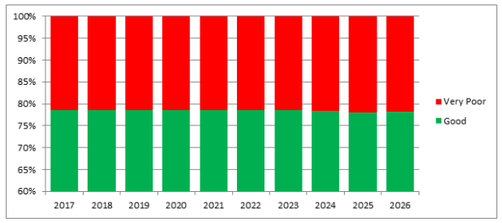
Appendix A: Our Levels of Service Summarised

Service Wide Summary[6789]

Asset Group	Asset/Service Level Enhancement			Steady State			Reduced Service			Statutory Minimum		
	Example	Impact	Annual Cost of Delivery	Example	Impact	Annual Cost of Delivery	Example	Impact	Annual Cost of Delivery	Impact	Risk	Annual Cost of Delivery
Roads			£52,300k			£39,500k	-		-	-		-
Footways			£6,100k			£5,500k	-		-	-		-
Drainage			£8,525k			£6,820k			£5,115k	-		-
Bridges, Tunnels & Highway Structures	-		-			£2,672k			£1,781k			£1,336k
Street Lighting			£5,375k			£4,300k			£3,225k	-		-
Intelligent Traffic Systems			£3,125k			£2,500k			£1,875k	-		-
Soft Landscape			£5,000k			£4,200k			£3,200k			£2,200k
Barriers, Unlit Signs, Lines & Road Studs	-		-	 		£3,500k	 		£2,775k	 		£2,100k

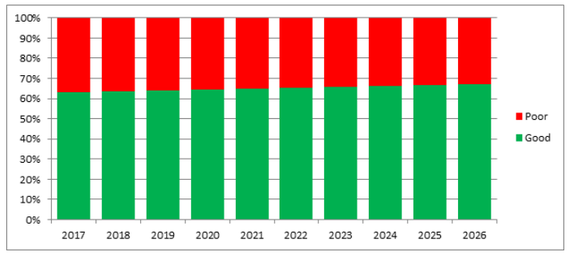
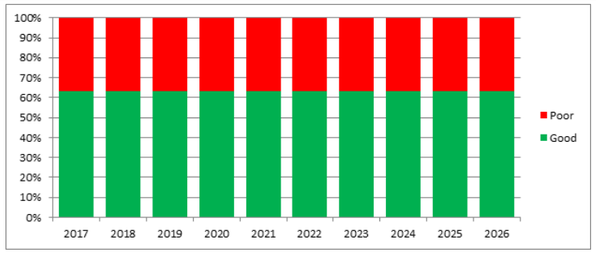
[6] Each asset group has modelled at least two outcome options, one group that has considered four options.
[7] All amounts mentioned on this and subsequent pages are at this year's prices, and will increase in line with industry price inflators going forward.
[8] The figures mentioned for road and footway maintenance does not include the annual cost of reactively repairing potholes and other surface defects. We have spent around £26m of revenue and capital funds on that activity over the last three years.
[9] The figures mentioned above relate to capital funding for Road and Footway asset groups, revenue funding for the Soft Landscape asset groups, and a combination of revenue and capital for all remaining asset groups.

Detailed Summary – Roads

Level of Service	Condition			Outcomes	Cost
	A Roads	B & C Roads	Unclassified Network		
ASSET ENHANCEMENT				Enhance the condition of our road network. Our maintenance backlog would decrease from £584m now to £392m plus inflation in 2026.	£52.3m
STEADY STATE				Maintaining our road network in a steady state condition. Our maintenance backlog figure would remain at £584m plus inflation in ten years' time. Any investment less than this would mean that a steady state condition could not be achieved.	£39.5m

ASSET ENHANCEMENT	STEADY STATE
	

Detailed Summary – Footways

Level of Service	Condition	Outcomes	Cost
ASSET ENHANCEMENT		Enhance the condition of our footway network. Our maintenance backlog would decrease from £83m now to £77m plus inflation in 2026.	£6.1m
STEADY STATE		Maintaining our footway network in a steady state condition. Our maintenance backlog figure would remain at £83m plus inflation in ten years' time. Any investment less than this would mean that a steady state condition could not be achieved.	£5.5m

ASSET ENHANCEMENT	STEADY STATE
	

Detailed Summary - Drainage

	Levels of Service		Outcomes		Cost
SERVICE ENHANCEMENT	Flooding that is safety critical or flooding properties internally is responded to in 2 hours Drains at known hotspots are cleaned twice a year Drains on main roads are cleaned every 12 months Drains on minor roads are inspected and cleaned on a targeted basis Missing or damaged drain covers are repaired or replaced Pumping stations are serviced annually and repaired as required All drainage problems posing a moderate to high risk to safety or a moderate to high risk of internal property flooding are investigated Repairs and improvements are prioritised on the basis of the risk to highway safety and the risk of internal property flooding	   	Reduced incidents of highway flooding requiring an immediate or urgent response Improved customer satisfaction and confidence in service provision Robust defence against increased claims for damage and personal injury Effectively protect roads and footways from the adverse effects of standing water Reduce disruption caused by carriageway flooding Have greater resilience against increasingly frequent intense rainfall events		£8,525k
STEADY STATE	Flooding that is safety critical or flooding properties internally is responded to in 2 hours Drains at known hotspots are cleaned twice a year Drains on main roads are cleaned every 12 months Drains on minor roads are inspected and cleaned on a targeted basis Missing or damaged drain covers are repaired or replaced Pumping stations are serviced annually and repaired as required All drainage problems posing a moderate to high risk to safety or a high risk of internal property flooding are investigated Repairs and improvements are prioritised on the basis of the risk to highway safety and the risk of internal property flooding	   	Reduced incidents of highway flooding requiring an immediate or urgent response Improved customer satisfaction and confidence in service provision Robust defence against increased claims for damage and personal injury Effectively protect roads and footways from the adverse effects of standing water Reduce disruption caused by carriageway flooding Have greater resilience against increasingly frequent intense rainfall events		£6,820k
SERVICE REDUCTION	Flooding that is safety critical or flooding properties internally is responded to in 2 hours Drains at known hotspots are cleaned annually Drains on main roads are cleaned every two years Drains on minor roads are inspected and cleaned if safety critical Missing or damaged drain covers are repaired or replaced Pumping stations are not routinely serviced and maintained on a targeted basis All drainage problems posing a high risk to safety are investigated Repairs and improvements are prioritised on the basis of the risk to highway safety only	   	Reduced incidents of highway flooding requiring an immediate or urgent response Improved customer satisfaction and confidence in service provision Robust defence against increased claims for damage and personal injury Effectively protect roads and footways from the adverse effects of standing water Reduce disruption caused by carriageway flooding Have greater resilience against increasingly frequent intense rainfall events		£5,115k

Detailed Summary - Bridges, Tunnels & Highway Structures

	Levels of Service		Outcomes		Cost
STEADY STATE	Visual inspection of all of our bridges, tunnels and structures are carried out on a cyclic basis once every 2 years in accordance with the National Code of Practice Detailed inspections of bridges, tunnels and structures are carried out on a cyclic basis at risk based frequencies in accordance with the National Code of Practice Our tunnels are monitored 24 hours per day, 365 days per year Sandwich Toll bridge is opened within an hour of any request in accordance with our legal obligations Drainage on highway structures is cleaned once every 2 years. Minor maintenance including painting, vegetation clearance and small repairs is carried out where there is a moderate to high risk to safety or a critical element of the highway structure Asset renewals and improvements are prioritised on the basis of the where there is a moderate to high risk to safety or a critical element of the highway structure		Effectively operated and managed structures to ensure highway safety is maintained Improved customer satisfaction and confidence in service provision Robust defence against increased claims for damage and personal injury Proactive maintenance regimes protecting our bridges, tunnels and structures Reduced disruption caused by asset failures and the implementation of weight limits Have greater resilience against increasingly frequent extreme weather events		£2,672k
SERVICE REDUCTION	Visual inspection of all of our bridges, tunnels and structures are carried out on a cyclic basis once every 2 years in accordance with the National Code of Practice Detailed inspections of bridges, tunnels and structures are carried out on a targeted basis and prioritised on the basis of current condition and the risk to safety. Our tunnels are monitored 24 hours per day, 365 days per year Sandwich Toll bridge is opened within an hour of any request in accordance with our legal obligations Drainage on highway structures is cleaned once every 2 years. Minor maintenance including painting, vegetation clearance and small repairs is carried out where there is a high risk to safety or a critical element of the highway structure Asset renewals and improvements are prioritised on the basis of the where there is a high risk to safety or a critical element of the highway structure		Effectively operated and managed structures to ensure highway safety is maintained Improved customer satisfaction and confidence in service provision Robust defence against increased claims for damage and personal injury Proactive maintenance regimes protecting our bridges, tunnels and structures Reduced disruption caused by asset failures and the implementation of weight limits Have greater resilience against increasingly frequent extreme weather events		£1,781k
STATUTORY MINIMUM	Visual inspection of all of our bridges, tunnels and structures are carried out on a cyclic basis once every 2 years in accordance with the National Code of Practice Detailed inspections of all our bridges, tunnels and structures are carried out on a targeted basis where there is deemed to be a risk to safety. Our tunnels are monitored 24 hours per day, 365 days per year Sandwich Toll bridge is opened within an hour of any request in accordance with our legal obligations Drainage on highway structures is cleaned on a targeted basis if safety critical. Minor maintenance including painting, vegetation clearance and small repairs is carried out where there is a very high or immediate risk to safety or a critical element of the highway structure Asset renewals and improvements are prioritised on the basis of the where there is a very high or immediate risk to safety or a critical element of the highway structure		Effectively operated and managed structures to ensure highway safety is maintained Improved customer satisfaction and confidence in service provision Robust defence against increased claims for damage and personal injury Proactive maintenance regimes protecting our bridges, tunnels and structures Reduced disruption caused by asset failures and the implementation of weight limits Have greater resilience against increasingly frequent extreme weather events		£1,336k

Detailed Summary - Street Lighting

	Levels of Service	Outcomes		Cost
SERVICE ENHANCEMENT	Emergency situations will be responded to and attended within 2 hours Reports of faulty street lighting assets will be attended within 7 days Minor replacement works, e.g. replace a lantern, will be carried out within 28 days. Faults with the distribution network will be reported to UK Power Networks Capital refurbishment of street lighting assets will be identified and programmed on the basis of age and condition information. Life expired assets will be replaced based on safety critical grounds.	Improved customer satisfaction and confidence in service provision		£5,375k
		Greater resilience against obsolescence		
		Reduced the backlog of life expired assets		
STEADY STATE	Emergency situations will be responded to and attended within 2 hours Reports of faulty street lighting assets will be attended within 7 days Minor replacement works, e.g. replace a lantern, will be carried out within 28 days. Faults with the distribution network will be reported to UK Power Networks Capital refurbishment of street lighting assets will be identified and programmed on the basis of age and condition information. Life expired assets will be replaced based on safety critical grounds.	Improved customer satisfaction and confidence in service provision		£4,300k
		Greater resilience against obsolescence		
		Reduced the backlog of life expired assets		
SERVICE REDUCTION	Emergency situations will be responded to and attended within 2 hours Reports of faulty street lighting assets will be attended within 7 days Minor replacement works, e.g. replace a lantern, will be carried out within 28 days. Faults with the distribution network will be reported to UK Power Networks Capital refurbishment of street lighting assets will be identified and programmed on the basis of age and condition information. Life expired assets will be replaced based on safety critical grounds.	Improved customer satisfaction and confidence in service provision		£3,225k
		Greater resilience against obsolescence		
		Reduced the backlog of life expired assets		

Detailed Summary - Intelligent Traffic Systems (ITS)

	Levels of Service	Outcomes		Cost
SERVICE ENHANCEMENT	Traffic light faults are attended and repaired with priority given to strategically important sites Other traffic management and control systems are controlled from our Highway Management Centre We attend sites for the replacement of signal poles or cabling and ducting repairs. This will after the site is attended on routine maintenance. Detectors are repaired after the initial attendance on routine maintenance. We attend site to bag up signals if requested. We repair other damaged ITS assets used by the Highway Management Centre such as CCTV, electronic bus information signs and communication equipment. Capital refurbishment of signals will be identified and programmed by the ITS team based on age, fault history and equipment type. Life expired assets will be replaced based on safety critical grounds.	Reduced incidents of traffic light failure requiring an immediate or urgent response		£3,125k
		Improved customer satisfaction and confidence in service provision		
		Increased up time of systems		
		Greater resilience against obsolescence		
		Contractual targets for maintenance routinely met		
		Reduced backlog of life expired assets		
STEADY STATE	Traffic light faults are attended and repaired with priority given to strategically important sites Other traffic management and control systems are controlled from our Highway Management Centre We attend sites for the replacement of signal poles or cabling and ducting repairs. This will after the site is attended on routine maintenance. Detectors are repaired after the initial attendance on routine maintenance. We attend site to bag up signals if requested. We repair other damaged ITS assets used by the Highway Management Centre such as CCTV, electronic bus information signs and communication equipment. Capital refurbishment of signals will be identified and programmed by the ITS team based on age, fault history and equipment type. Life expired assets will be replaced based on safety critical grounds.	Reduced incidents of traffic light failure requiring an immediate or urgent response		£2,500k
		Improved customer satisfaction and confidence in service provision		
		Increased up time of systems		
		Greater resilience against obsolescence		
		Contractual targets for maintenance routinely met		
		Reduced backlog of life expired assets		
SERVICE REDUCTION	Traffic light faults are attended and repaired with priority given to strategically important sites Other traffic management and control systems are controlled from our Highway Management Centre We attend sites for the replacement of signal poles or cabling and ducting repairs. This will after the site is attended on routine maintenance. Detectors are repaired after the initial attendance on routine maintenance. We attend site to bag up signals if requested. We repair other damaged ITS assets used by the Highway Management Centre such as CCTV, electronic bus information signs and communication equipment. Capital refurbishment of signals will be identified and programmed by the ITS team based on age, fault history and equipment type. Life expired assets will be replaced based on safety critical grounds.	Reduced incidents of traffic light failure requiring an immediate or urgent response		£1,875k
		Improved customer satisfaction and confidence in service provision		
		Increased up time of systems		
		Greater resilience against obsolescence		
		Contractual targets for maintenance routinely met		
		Reduced backlog of life expired assets		

Detailed Summary - Soft Landscape

	Levels of Service			Cost
	Service	**Maintenance Frequency**		
ASSET ENHANCEMENT	Urban Grass Cutting	10/12		£5m
	Urban Hedges and Shrub Bed Maintenance	3/4		
	Weed Spraying (Hard surface)	3/4		
	Rural Swathe Cutting	3		
	Visibility cuts	3		
	Rural Hedge Cutting	3/4		
	High Speed Road (HSR)	3/2		
	Bus Routes	Safety & Amenity		
	Tree Maintenance	Safety, Amenity & Nuisance		
STEADY STATE	Urban Grass Cutting	8		£4.2m
	Urban Hedges and Shrub Bed Maintenance	2		
	Weed Spraying (Hard surface)	2		
	Rural Swathe Cutting	2		
	Visibility cuts	3		
	Rural Hedge Cutting	2/3		
	High Speed Road (HSR)	2		
	Bus Routes	Safety & Amenity		
	Tree Maintenance	Safety, Amenity & Nuisance		
SERVICE REDUCTION	Urban Grass Cutting	6		£3.2m
	Urban Hedges and Shrub Bed Maintenance	1		
	Weed Spraying (Hard surface)	1		
	Rural Swathe Cutting	1		
	Visibility cuts	3		
	Rural Hedge Cutting	1/3		
	High Speed Road (HSR)	1		
	Bus Routes	Safety Critical Only		
	Tree Maintenance	Safety Critical Only		

STATUTORY MINIMUM	Urban Grass Cutting	1/3		£2.2m
	Urban Hedges and Shrub Bed Maintenance	0		
	Weed Spraying (Hard surface)	0		
	Rural Swathe Cutting	1		
	Visibility cuts	3		
	Rural Hedge Cutting	1/3		
	High Speed Road (HSR)	1		
	Bus Routes	Safety Critical Only		
	Tree Maintenance	Safety Critical Only		

Detailed Summary – Barriers, Unlit Signs, Lines & Road Studs

	Levels of Service	Outcomes		Cost
STEADY STATE	<u>Safety Barriers</u> Damage is made safe within 2 hours of notification and a permanent repair is completed on a programmed basis. Cyclic re-tensioning is undertaken on a programmed basis. End of life replacement is programmed annually and prioritised on the basis of risk. Specialist inspections are carried out on a cyclic basis and prioritized on the basis or road classification. <u>Pedestrian Guard Rail</u> Damage is made safe within 2 hours of notification and a permanent repair is completed on a programmed basis.	Improved road safety		£3,500k
		A robust defence against increased claims for damage and personal injury		
		Provision of protection to other highway assets		
		Assets upgraded to use improved technology and minimise future maintenance costs		
		Improved customer satisfaction and confidence in service provision		
		Improved pedestrian routes for the disabled		
		Efficient journey times on the road network due to appropriate signing in place.		
		Improved street scene Improved street scene		
CONTROLLED ASSET DETERIORATION	End of life replacement is programmed in response to incidents of failure and prioritised on the basis of risk. Non safety critical repairs are inspected and prioritised for action on the basis of risk. <u>Unlit Signs</u> Damaged signs are repaired on a reactive basis and prioritised on the basis of risk. Obstructions to signs are removed on a reactive basis and prioritised on the basis of risk. <u>Road Markings</u> Safety critical road markings more than 50% faded are made safe within 2 hours of notification and refreshed within 28 days.	Improved road safety		£2,775k
		A robust defence against increased claims for damage and personal injury		
		Provision of protection to other highway assets		
		Assets upgraded to use improved technology and minimise future maintenance costs		
		Improved customer satisfaction and confidence in service provision		
		Improved pedestrian routes for the disabled		
		Efficient journey times on the road network due to appropriate signing in place.		
		Improved street scene Improved street scene		
STATUTORY MINIMUM	Non safety critical road markings more than 50% faded are refreshed on a programmed basis. The installation of new road markings is prioritised on the basis of risk. <u>Road Studs</u> Road studs identified as missing at a high risk site such as a junction or high speed road are made safe within 2 hours Road studs identified as missing at a lower risk site such as edge of carriageway are replaced on a programmed basis Requirement for new road studs are identified as part of the scheme or casualty reduction measure and installed on a programmed basis.	Improved road safety		£2,100k
		A robust defence against increased claims for damage and personal injury		
		Provision of protection to other highway assets		
		Assets upgraded to use improved technology and minimise future maintenance costs		
		Improved customer satisfaction and confidence in service provision		
		Improved pedestrian routes for the disabled		
		Efficient journey times on the road network due to appropriate signing in place.		
		Improved street scene Improved street scene		