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HIGHWAY INFRASTRUCTURE ASSET MANAGEMENT PLAN

2016

CONTENTS

Page No.

1 – Executive summary 4

- What is highway infrastructure asset management?
- What has the Council done to date?
- Why make the changes?
- Overarching approach
- The changes – what will be seen?

2 – Introduction 6

- Links to policy/strategy
- Why is asset management important?
- Purpose
- Link to national documents
- Hierarchical diagram of documents illustrating relationship to corporate strategies
- Approval process

3 – Asset descriptions 9

- Breakdown of type/quantity/stats
- Assets covered/not covered by the HIAMP and the owners

4 – Finance 11

- Introduction
- Valuation
- Historical expenditure

5 – Local network hierarchy 15

- Introduction
- Local network hierarchy
- Prioritisation of maintenance
- Resilient network
- Winter
- Safety Inspections
- Reactive maintenance interventions
- Enhanced maintenance standards

6 – Asset data (storage and management) 22

- Asset Inventory and condition
- Data storage
- Pavement management
- Structures database
- Lighting database
- Public rights of way database
- Better information management

7 – Community and customer requirement and communication 25

- Introduction
- NHT data
- Internal data
- Stakeholder expectations
- Keeping the public informed

8 – Lifecycle planning 30

- What is lifecycle planning
- Objectives
- Software modelling

9 – Levels of service (general definitions) 33

- Introduction
- What are levels of service
- Why use levels of service
- Development of levels of service and interface with HIAMP
- Legislative requirements
- The Council's objectives
- Stakeholder expectations
- Councillor controlled budgets

10 – Performance management and benchmarking 37

- Introduction
- Performance management framework
- Benchmarking
- Future Highways Research Club
- Innovation and new techniques

11 – Asset management planning process 41

- Introduction
- Planned roadworks
- Reporting to Cabinet
- Improvement plan
- Statutory undertakers

12 – Future demands 43

- Introduction
- Asset growth
- Potential future cost saving options

13 – Risks to the adoption of an asset management approach 51

Appendices 54

1. Carriageways, footways and cycleways 55
2. Structures 66
3. Street lighting and other illuminated assets, 86
4. Intelligent transport systems 103
5. Public rights of way 111
6. Environment 124

Annexes

A. Links to national documents 132

Section 1 - Executive Summary

1.1 What is highway infrastructure asset management?

In this context, highway infrastructure asset management is the co-ordinated activity of Suffolk Highways (the Council's highways service) to realise value from all highway-related assets. Realisation of value will normally involve a balancing of costs, risks, opportunities and realisable benefits. It is more than doing things to assets; it is about using assets to deliver the organisation's objectives. It is about taking the most cost effective actions at the optimal time to minimise overall costs over the lifetime of the asset.

1.2 What has the Council done to date?

In 2006, the Council prepared a Transport Asset Management Plan (TAMP) which went some way towards an asset management approach. In 2011, this was updated. In 2015, due to a realisation that available funding would not support the current approach and encouragement from the Department of Transport, the Council decided to adopt the accepted most efficient form of asset management and published on its website:

- A *Highway Infrastructure Asset Management Policy*,
- A *Highway Infrastructure Asset Management Strategy*,

and agreed to produce a Highway Infrastructure Asset Management Plan (HIAMP), which would go to public consultation in 2016.

1.3 Why make the changes?

Highway infrastructure asset management is recognised as being the most cost efficient means of managing a highway network. Central government has been encouraging this approach for some time and now links an element of funding to local highway authorities taking this approach. The Council has partially used this approach for some time but is now taking this opportunity to fully implement this approach, taking on board best practice that has developed over the last 10 years. This is the most cost effective way forward.

1.4 Overarching approach

Suffolk Highways will move from its current approach – which is primarily a reactive maintenance service - to a wholly asset management-led approach over the next twelve months.

1.5 The changes – what will be seen?

Highway infrastructure asset management involves a highway maintenance approach that treats parts of the highway at the most appropriate time. This will often mean that roads are treated with a less expensive preventative treatment when they appear to be in reasonable condition, to avoid them getting into a poor condition. Roads which are in very poor condition will not necessarily be treated first, so particular sections of road that are in a poor condition may be left unrepaired for longer. Preventative treatments can be a tenth of the cost of more comprehensive reactive repairs. Roads will always be maintained in a safe condition e.g. potholes will be repaired.

Over time, the use of the highway changes and elements of highway infrastructure that were previously required may become obsolete. When working in an area, Suffolk Highways will look at each element of highway infrastructure to determine – through any formal risk assessment processes where available - whether it is still required. If no longer required, the element of superfluous highway infrastructure will be removed. This will generally be at the end of its useful life, when other work is going on in the area, or earlier if there is an appropriate business case for earlier removal. For example, this will include some road restraint systems (such as vehicle safety fences and pedestrian guardrail) and traffic signs. There is no point in using valuable resources to maintain assets that are of no benefit to the public when that same resource could be more usefully deployed elsewhere to maintain an asset that does provide benefit.

There are certain asset materials that provide the same function but have greatly varying maintenance costs such as footway surface materials – bituminous, precast concrete slabs and paviours. The latter two are much more liable to damage and more expensive to repair, so the presumption under the proposals will be to replace these at the end of their economic life with flexible bituminous materials except, perhaps, in conservation and shopping areas. Cost effective minor repairs of concrete slabs and paviours in all locations will continue.

The aim is also to improve liaison with the statutory undertakers to ensure that, wherever and whenever practical, they do not excavate roads that have just undergone major maintenance works.

Even using this most efficient form of highway maintenance, there is currently not enough money provided by Central Government to carry out everything that is required. Therefore, difficult decisions will need to be taken. Suffolk Highways will prioritise routes connecting communities and business areas at the expense of roads that serve only houses or farms. Self-help will be encouraged and communities wishing to investigate this further should contact Suffolk Highways via the Customer Service Centre (customer.service@suffolk.gov.uk or 0345 606 6067).

Suffolk Highways will improve the information available to the public on its webpages within the County Council's website, such that the following will be provided:

- a detailed programme for the year;
- Information about longer term projects
- information from customer surveys;
- information on the performance of Suffolk Highways;
- details of any significant changes proposed to the service.

Section 2 - Introduction

2.1 Links to policy / strategy

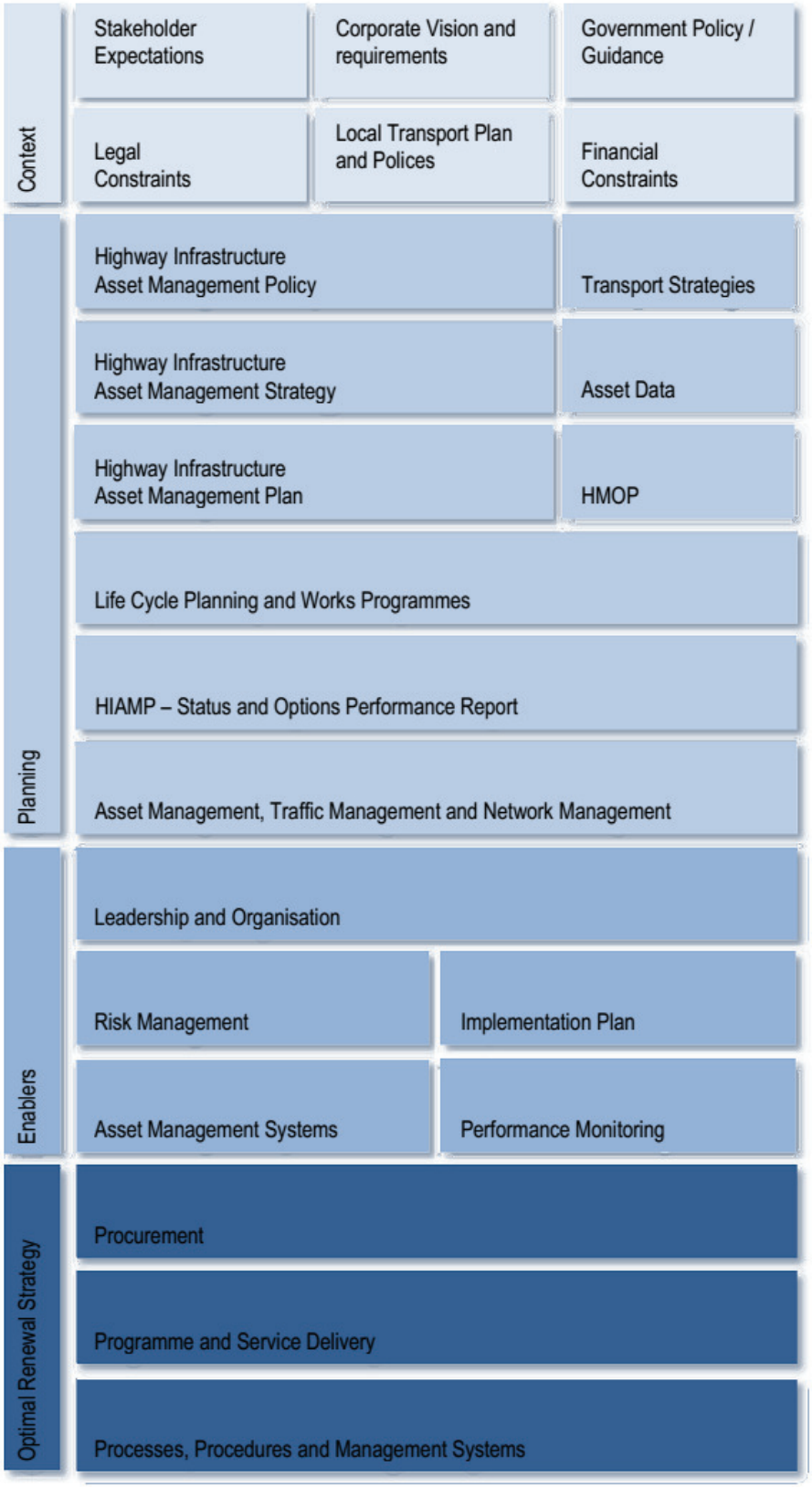

Figure 2.1 Asset Management Framework

Figure 2.1 shows the structured relationship between the plans, policies, strategies and guidance that inter-relate to highway infrastructure and therefore to asset management.

The benefits of taking a structured approach to asset management are that it provides:

- A comprehensive understanding of extent and condition of the highway infrastructure assets;
- A clear methodology for linking goals, aspirations and objectives with levels of service;
- A sound approach for predicting the levels of funding required to deliver the desired levels of service at minimum cost over the assets whole life;
- A mechanism for assessing the impact of funding constraints;
- Understanding and managing risks;
- A consistent approach which facilitates managing service user expectation;
- An opportunity to maximise funding and ensure that secured funding is used efficiently and effectively;
- A route to minimising lifecycle costs and reducing expensive reactive repair costs;
- Alignment and co-ordination of existing initiatives, including competency development;
- Greater engagement of the workforce, including leadership, communications and cross-disciplinary teamwork.

2.2 Why is asset management important?

Assets, and value realised from them, are the basis for any organisation delivering what it aims to do. Whether public or private sector, and whether the assets are physical, financial, human or 'intangible', it is good asset management that maximises value-for-money and satisfaction of stakeholders' expectations. It involves the co-ordinated and optimised planning, asset selection, acquisition/development, utilisation, care (maintenance) and ultimate disposal or renewal of the appropriate assets and asset systems. Insights into the integration and optimisation of asset management have developed since the 1990s, to identify a range of essential business processes, alignment activities and system integration features that yield very significant performance benefits.

2.3 Purpose

The purpose of the Highway Infrastructure Asset Management Plan (HIAMP) is to define the framework for a holistic asset management approach for the Council's highway infrastructure assets to provide a mechanism through which informed decisions on investment strategies can be made and the optimum whole life costs for each asset developed.

2.4 Links to national documents

For details, see Annex A

2.5 Approval process

The suite of highway infrastructure asset management documents shapes how the Council approaches asset management, ensuring that the approach supports the Council's documented priorities.

The Cabinet is responsible for establishing the Council's plans, policies and strategies, particularly those that involve significant expenditure or savings or have a significant effect on communities to ensure that these key decisions support the Council's priorities.

With that confirmed policy framework in place, Suffolk Highways is able to deploy all of its resources in a structured way, avoiding the temptation or opportunity for uncontrolled personal or political intervention. The existence of such a policy framework thus enables a local highway service to better demonstrate integrity.

On 10 November 2015, Cabinet formally adopted the Highway Infrastructure Asset Management Policy and Strategy documents. The adoption of this Highway Infrastructure Asset Management Plan is a further step towards providing a robust policy framework in which Suffolk Highways can operate efficiently and effectively.

Section 3 - Asset descriptions

3.1 Introduction

The official records of the overall status and extent of Suffolk's public highway assets are managed within the County Council's Resource Management Directorate.

3.2 Asset breakdown (type/quantity/stats) – April 2016

Asset Group	Element	Quantity	Percentage
Carriageways	A-roads B-roads C-roads Unclassified roads	642km 733km 1,858km 3,355km	9.8 11.1 28.2 50.9
Footways		Approx. 4,000km	100
Road markings		3,100km	100
Signs		102,000 (number)	100
Intelligent transport systems (ITS)	Signalised junctions Signalised crossings Electronic signs	122 190 109	
Lighting	Lighting columns (>= 6m)	56,598	
Structures (significant structures that are actively managed and form part of the Structures Asset Group)	Bridges: • A-roads • B-roads • C-roads • U-roads Culvert: • A-roads • B-roads • C-roads • U-roads Retaining wall: • A-roads • B-roads • C-roads • U-roads	 • 169 • 162 • 298 • 27 • 62 • 62 • 151 • 151 • 20 • 36 • 56 • 50	
Public rights of way (PROW)	Footpaths (FP) Bridleway (BR) Restricted bridleway (RB) Byway open to all traffic (BOAT)	8730 (4680 km) 998 (630 km) 290 (155 km) 345 (260 km)	

Figure 3.1 – Asset Inventory (April 2016)

3.3 Assets not covered by this plan

This HIAMP covers the management of the Council's key highway infrastructure assets but does not cover the following 'transport' related assets. Some of these transport assets are the responsibility of other authorities or agencies, whilst others are Council assets that are currently managed outside of Suffolk Highways' Highway Infrastructure Asset Management Plan.

Asset	Responsibility
Trunk roads, A14 & A12 north of Lowestoft and south of Ipswich	Highways England
Park and ride sites	County Council's Passenger Transport Service
Street name plates	District councils
Bus shelters	Parish councils
Pay and display parking payment machines	District councils
Picnic sites	District councils

Figure 3.2 – Assets not covered by this plan

Section 4 - Finance

4.1 Introduction

Funds for maintaining highway assets are allocated from both the Department for Transport's capital allocations and the Government's revenue grant, supplemented by the County Council from its various income sources and reserves as it sees fit. There are financial rules that apply to capital and revenue funds which can restrict which budgets can be used to fund particular works types.

To be effective in its approach to asset management, the Council must understand the levels of funding required to deliver existing levels of service, the effect on levels of service when funding levels are changed and use this knowledge to allocate funding between asset categories. Financial information will be used to inform future investment strategies, balanced with the views of stakeholders, the management of risk and the use of whole life cost principles.

4.2 Valuation

In July 2016, the Council valued its highway infrastructure assets at £12billion (including £4.5billion land) in its 'Whole of Government Accounts', using the principles detailed in the Chartered Institute of Public Finance and Accountancy (CIPFA) transport infrastructure assets code of practice. A breakdown of the value associated with each asset group is detailed in Figure 4.1.

Asset	Gross Replacement Cost (GRC) £m	Depreciated Replacement Cost (DRC) £m	Comments
Carriageways	6,181,713	5,370.332	
Footways & cycleways	720,700	664,281	
Structures	509,303	247,521	
Street lighting	75,841	21,686	Assume average 40-year life
Traffic management (including signals and intelligent transport systems)	26,052	13,602	Assume average 15-year life
Street furniture	53,135	26,567	Assume average 25year life
Land	4,503,430	NA	
Total	12,070,174		

Figure 4.1 The Council's Highway Asset Values

From 2016/17, the aforementioned code of practice will be adopted recognising that current value rather than historic value is a more appropriate measurement base for local authority assets. Transport Infrastructure assets will therefore be measured on a depreciated replacement cost basis from 2016/17.

Gross replacement cost (GRC) – this is the cost of replacing the asset with its modern equivalent asset (MEA) to provide the same service and performance, but using modern materials and technology.

Depreciated replacement cost (DRC) – this is a method of depreciation that provides for the current cost of replacing an asset with its modern equivalent asset, less deductions for all physical deterioration and all relevant forms of obsolescence and optimisation.

4.3 Historical expenditure

The table and graphs below summarise the historical investment on highway assets from April 2009 to March 2015. See figures 4.2 to 4.5 inclusive.

4.3.1 Capital

Capital	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Carriageways	£ 17,684,979	£ 16,368,000	£ 18,116,730	£ 15,811,427	£ 18,258,112	£ 24,319,208
Footways & drainage	£ 1,000,000	£ 1,500,000	£ 2,115,946	£ 2,016,493	£ 1,922,019	£ 3,597,617
Structures	£ 1,800,000	£ 1,750,000	£ 1,851,453	£ 1,751,165	£ 2,669,471	£ 2,566,671
Street lighting	£ 500,000	£ 800,000	£ 793,480	£ 874,521	£ 747,452	£ 1,818,059
ITS	£ - -	£ -	£ -	£ -	£ -	£ 32,083
Other	£ 300,000	£ 300,000	£ 317,391	£ 318,394	£ 266,946	£ 267,362
Total	£ 21,284,979	£ 20,718,000	£ 23,195,000	£ 20,772,000	£ 23,864,000	£ 32,601,000

Figure 4.2 – Capital investment in highway service (2011 / 12 to 2016 / 17)

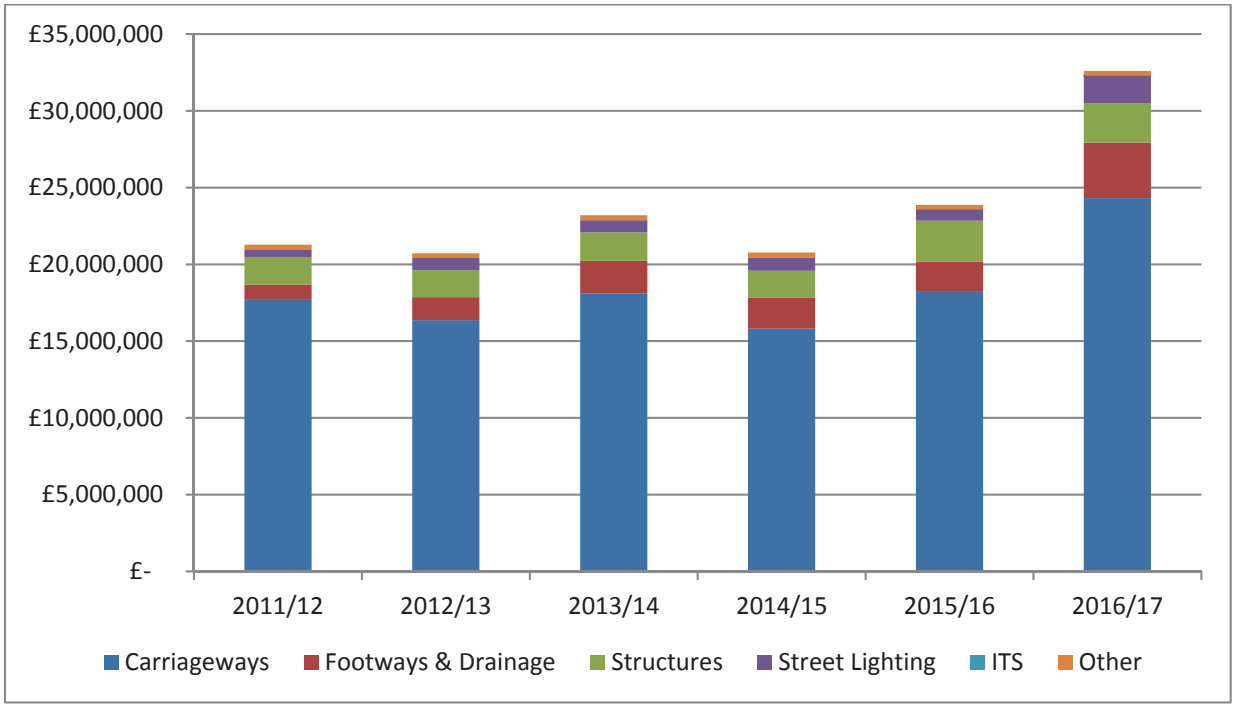

Figure 4.3 – Graph of capital investment in highway service (2011/12 to 2016/17)

4.3.2 Revenue

Revenue	2012/13	2013/14	2014/15	2015/16	2016/17
Structural maintenance	£ 4,367,854	£ 3,921,897	£ 3,907,502	£ 3,899,154	£ 3,203,721
Environment, safety & routine	£ 4,313,652	£ 4,195,541	£ 4,109,760	£ 4,079,847	£ 3,480,480
Winter	£ 2,203,459	£ 2,231,369	£ 2,223,782	£ 2,292,998	£ 1,938,386
Street lighting maintenance	£ 2,383,843	£ 2,098,550	£ 1,295,088	£ 1,278,584	£ 1,251,336
Street lighting energy	£ 1,853,765	£ 1,912,602	£ 2,122,123	£ 2,022,488	£ 2,120,379
ITS maintenance	£ 519,402	£ 543,256	£ 476,525	£ 554,758	£ 406,523
ITS energy	£ 138,806	£ 149,565	£ 140,840	£ 152,162	£ 153,994
Structures	£ 461,681	£ 446,274	£ 434,167	£ 433,239	£ 387,677
Condition surveys	£ 288,961	£ 212,511	£ 201,464	£ 200,770	£ 699,973
Total	£ 5,646,458	£ 5,362,758	£ 4,670,207	£ 4,642,001	£ 5,019,882

Figure 4.4 – Table of revenue investment in highway service (2011/12 to 2016/17)

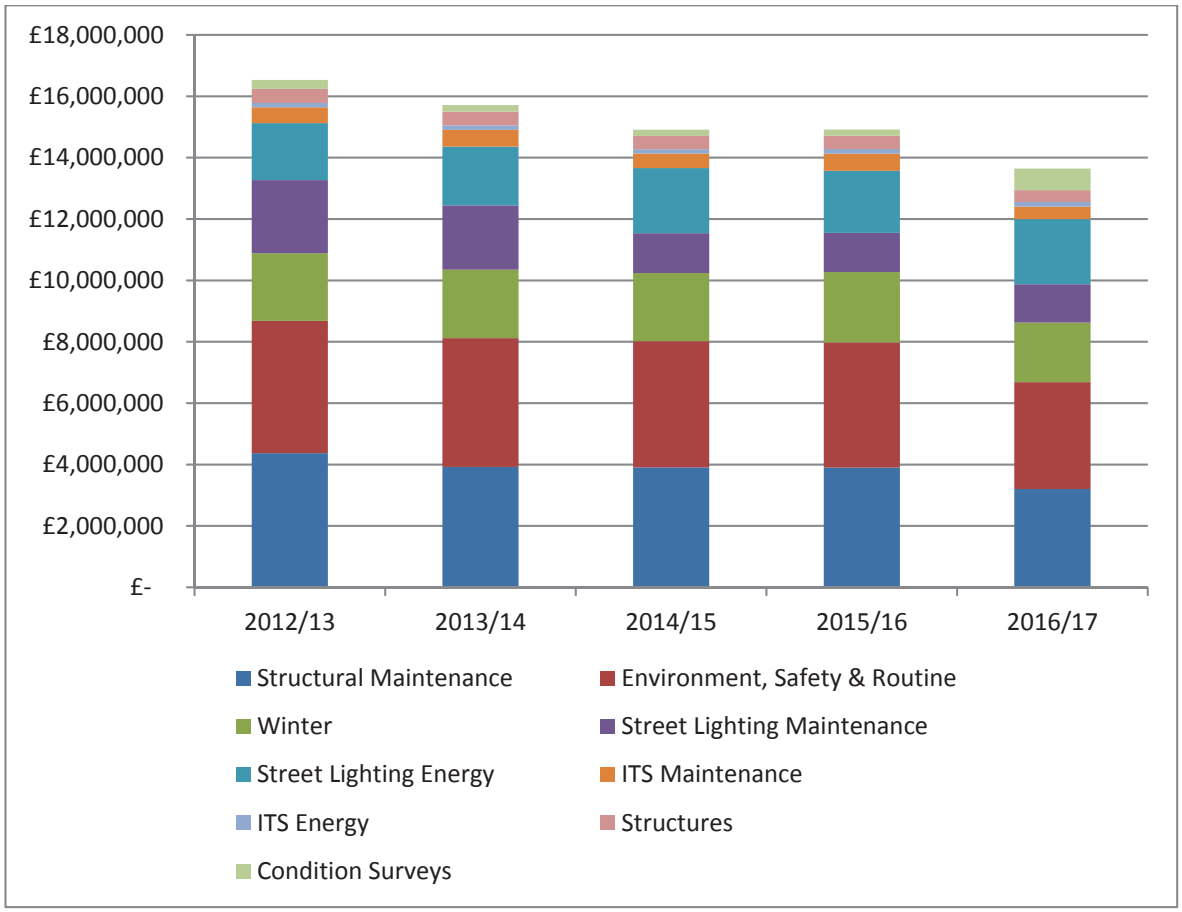

Figure 4.5 – Graph of revenue investment in highway service (2011/12 to 2016/17)

Section 5 - Local network hierarchy

5.1 Introduction

The national system of roads classification is intended to direct motorists towards the most suitable routes for reaching their destination. It does this by identifying roads that are best suited for traffic. In the UK, roads excluding motorways fall into the following four categories:

- A-roads;
- B-roads;
- Classified unnumbered – known unofficially as C-roads;
- Unclassified – U-roads.

Further details on road classification can be found in the January 2012 *'Guidance on Road Classification and the Primary Route Network'* issued on the Government's website.

5.2 Local network hierarchy

The national system of road classification does not necessarily reflect the local needs, priorities and actual use of each road in Suffolk

There may be aspects of roads of relevance to their maintenance that are determined by a number of factors. Such factors will include: importance (e.g. a road leading to a major hospital), environment (e.g. rural, urban, busy shopping street, residential street etc.) and usage (e.g. traffic flows, bus routes and the like). It is important that the maintenance strategy reflects these factors and prioritises roads accordingly.

The Council developed its local network hierarchy adopting the framework set out in the *Well-Maintained Highways Code of Practice for Maintenance Management*. This document was superseded in October 2016 by a risk-based '*Well-Managed Highway Infrastructure*' document that embraces the codes of practices for highways, street lighting and structures. The change in Code of Practice will not require alteration of the Council's network hierarchy.

The network is monitored for changes in usage, traffic flows and environment and to ensure that it remains reflective of emerging best practice and guidance. Any changes to the road network (e.g. the opening of a new bypass) will be reflected in the hierarchy immediately.

5.3 Prioritisation of Maintenance

The national system of road classification does not necessarily reflect the needs, priorities and actual use of each road in the network - the factors of local importance, environment and usage identified above will influence this. It is important that the maintenance strategy reflects these factors and prioritises roads accordingly.

Factors to Consider – Carriageways		
CATEGORY	**TYPE OF ROAD GENERAL DESCRIPTION**	**DESCRIPTION**
Motorway	Limited access - motorway regulations apply	Routes for fast-moving, long distance traffic. Fully grade separated and restrictions on use.
Strategic route	Trunk and some principal 'A' class roads between primary destinations	Routes for fast-moving, long distance traffic with little frontage access or pedestrian traffic. Speed limits are usually in excess of 40 mph and there are few junctions. Pedestrian crossings are either segregated or controlled and parked vehicles are generally prohibited.
Main distributor	Major urban network and inter-primary links. Short to medium distance traffic	Routes between strategic routes and linking urban centres to the strategic network with limited frontage access. In urban areas, speed limits are usually 40 mph or less, parking is restricted at peak times and there are positive measures for pedestrian safety.
Secondary distributor	B and C class roads and some unclassified urban routes carrying bus, HGV and local traffic with frontage access and frequent junctions	In built-up areas, these roads have 20 or 30 mph speed limits and very high levels of pedestrian activity with some crossing facilities including zebra crossings. On-street parking is generally unrestricted except for safety reasons. In rural areas, these roads link the larger villages, bus routes and HGV generators to the strategic and main distributor network.
Link road	Roads linking between the main and secondary distributor network with frontage access and frequent junctions	In urban areas, these are residential or industrial interconnecting roads with 20 or 30 mph speed limits, random pedestrian movements and uncontrolled parking. In rural areas, these roads link the smaller villages to the distributor roads. They are of varying width and not always capable of carrying two-way traffic.
Local access road	Roads serving limited numbers of properties carrying only access traffic	In rural areas, these roads serve small settlements and provide access to individual properties and land. They are often only single lane width and unsuitable for HGVs. In urban areas, they are often residential loop roads or cul-de-sac.
Minor road	Little used roads serving very limited numbers of properties.	Locally defined roads.

Figure 5.1 Carriageway Hierarchy

This broader approach is implemented in Suffolk by assigning roads within a defined hierarchy. This hierarchy of roads is used in the prioritisation of maintenance and, although not the single arbiter, is a key link between maintenance strategy and implementation. Sections 8.7 and 8.8 of *Well-Maintained Highways* contains guidance on the development of a carriageway hierarchy, although it is accepted in that document that there will be significant variations from the guidance to suit local circumstances.

The hierarchy as implemented in Suffolk is based upon this guidance. In considering the relationship between bus routes and hierarchy, account has been taken of bus services that are hourly or more frequent. In addition, the 'resilient network' (i.e. the part of the overall highway network that is given maintenance priority, as suggested by the Transport Resilience Review report of 2014 – see Section 5.4 below) is classed as all strategic routes in Suffolk (as clarified in Figure 5.1 below) and maintained accordingly.

The hierarchy as implemented in Suffolk is based upon this guidance. In considering the relationship between bus routes and hierarchy, account has been taken of bus services that are hourly or more frequent. In addition, roads which form part of Suffolk's resilient network will be reviewed and where appropriate reclassified their relative importance and maintained accordingly.

Footway maintenance standards, in common with carriageway maintenance standards may not necessarily be reflected by road classification. Pedestrian usage may mean that the footway is more important than the categorisation of the road suggests. Local factors such as the proximity of schools and shops are also important in this context. Therefore, a separate footway hierarchy has been developed to assist with the prioritisation of the maintenance of footways. The footway hierarchy within Suffolk has been developed in accordance with the guidelines as presented in section 8.9 of *Well-Maintained Highways.*

Category No.	Category Name	Brief Description
1(a)	Prestige Walking Zones	Very busy towns and cities with high public space and street scene contribution.
1	Primary Walking Routes	Busy urban shopping and business areas, and main pedestrian routes.
2	Secondary Walking Routes	Medium usage routes through local areas feeding into primary routes, local shopping centres etc.
3	Link Footways	Linking local access footways through urban areas and busy rural footways.
4	Local Access Footways	Footways associated with low usage, short estate roads to the main routes and *cul- de-sacs*.

Figure 5.2 – Footway hierarchy

There are other variations such as the winter gritting routes are not based solely on carriageway maintenance categories, but takes account of bus routes, schools, hospitals etc. The winter gritting routes are available in a map based format which can be accessed on the national Roadworks.org, a link to which can be found on the Council's website https://suffolk.roadworks.org/

5.4 Resilient network

In 2014, the Department for Transport (DfT) undertook a review of the resilience of the UK transport network to extreme weather events. This followed a period of extreme weather in 2013/14, which saw high winds and heavy rainfall.

The DfT recommended *"that Local Highway Authorities identify a 'resilient network' to which they will give priority, in order to maintain economic activity and access to key services during extreme weather".*

This recommendation aligns with our wider strategies, including the Suffolk resilience severe weather response plan, winter service plan, local flood risk management strategy and climate action plan. The latter details UK climate projections to 2080 to which may have a significant impact on the local road network.

The identification of the resilient network will enable appropriate investment and maintenance to be planned and prioritised. This will ensure that these strategic routes are usable, as far as is reasonably practical, by the public, local business and critical emergency services during severe weather.

In addition, during times of extreme weather, Suffolk Highways first response will be to direct resources to this network ensuring it is clear from fallen trees, tackling flooding events and clearing snow

.

Suffolk's resilient network is available on the Council's website, using the link below. The network will be reviewed in 2017 and then at least bi-annually

https://www.suffolk.gov.uk/roads-and-transport/highway-maintenance/highway-asset-management/

5.5 Winter

The Council has a legal duty under Section 41 of the Highways Act 1980 to ensure that, as far as is reasonably practicable, safe passage along a highway is not endangered by snow or ice. The winter service is part of the overall highway maintenance service and therefore has a finite resource and this has to be taken into consideration when defining the level of service.

Details of the service can be found in the *Winter Service Plan* on the Council's website www.suffolk.gov.uk/gritting.

The plan defines which parts of the network are treated and under what circumstances. Figures 5.3 and 5.4 illustrate the arrangements for the 2016/2017 season.

Priority 1	• All A roads • All B roads • Roads to: 24 Hour Fire Stations / Accident and Emergency Hospitals/ Main Bus & Rail Stations – at least to limit of Public Highway.# • All roads where the traffic flow exceeds 4000 v/day. • Locations at high risk from the occurrence of major civil emergencies where practicable. • Consideration is given to roads with a traffic flow that falls between 4000v/day to 2000v/day where there are additional risk factors including but not exclusively: ❖ 5 day a week bus services where practicable. ❖ extended gradients in excess of 5%(1:20) where practicable. ❖ high peak hour flows ❖ automated railway level crossings on passenger lines where visibility is limited. ❖ access to main high schools, where practicable. ❖ centres of employment where large numbers of employees are bussed in, where practicable.	Salted Network length @ 1st September 2016 Approx. 1259 miles / 2015 km

Figure 5.3 Priority 1 Gritting route criteria 2015/2016

Priority 2	• Other bus routes where the service level is 5 days a week in the school term, and a PSV licensed vehicle is used where practicable. • Cohesive network serving all main centres of population in the rural areas. • All other routes carrying in excess of 2000v/day. • Routes added at the Area Managers' discretion where the following are additional risk factors considered but not necessarily fully implemented related to practicalities: ❖ high peak hour flows ❖ access to other schools ❖ gradients in excess of 5%(1:20)	Salted Network length @ 1st September 2016 Approx. 843 miles / 1349 km
Misc.	• Local discretion dependent on conditions and resources available. • Other bus routes • A second route to rural centres of population • Access to livestock farms where alerted by DEFRA/NFU/ Farmer	
In all cases links are treated in full to the next safe turning point for the gritting vehicle.		
When P1 or P2 routes are closed the diversion route is to be treated.		
#Additional lengths are treated by agreement, at these locations where this does not impair operational completion of P1 lengths within treatment time.		

Figure 5.4 - Priority 2 and Miscellaneous Gritting Route Criteria 2015/2016

5.6 Safety inspections

Safety inspections are visual inspections carried out on foot or from a slow-moving vehicle to identify defects requiring early remedial work for risk management purposes. The frequencies of these inspections, together with which defects are recorded is covered in the Council's Highway Maintenance Operational Plan in the section on risk management. Safety inspections and further visual inspections are used to aid the formulation of works programmes, such as carriageway or footway repairs or the renewal of road markings.

5.7 Reactive maintenance interventions

Achievement of the Council's Highway Infrastructure Asset Management Strategy objectives is reliant on the efficient application of affordable reactive maintenance standards. The interventions have been developed taking into account the need to carry out routine maintenance work in a planned and efficient way, balanced with the need to maintain high levels of highway user safety. These interventions support the right first time principles outlined in the Highway Maintenance Efficiency Programme document - *Prevention and a Better Cure*. Details regarding standards and response times (reactive maintenance and emergencies) can be found in the current SCC Highway Maintenance Operations Plan (also referred to as the 'HMOP').

5.8 Enhanced maintenance standards.

Enhanced standards of maintenance will be allowed (but will not be assumed) due to resilient network, conservation area and prestige walking areas status at the time of putting plans together. All other areas will be treated to normal standards. This will apply to all asset types not simply carriageways, footways and cycleways.

Section 6 - Asset data

6.1 Asset inventory and condition

The main purpose for holding inventory and condition data is to provide the Council with data on location and condition data which helps inform investment decisions.

The Council has completed a gap analysis review of both inventory and condition data held for its major highway infrastructure assets and has a documented data collection plan to capture missing data. It also has an audit-approved process for the ongoing management of asset data to ensure the relevant databases are maintained.

6.2 Data storage

The Council currently uses "Symology *Insight*" as its primary system for its asset inventory / condition data storage system and other functions such as Invoice payment. It is a module-based software solution enabling expansion as required and is accredited by the UK Pavement Management System (UKPMS).

6.2.1 *Insight* Deterioration Modelling

In addition to standard survey types, *Insight* allows for user-defined surveys and interpretation to support condition evaluation. There is a limited ability to change algorithms (i.e. the processes by which outcomes are established) as they are linked to the UKPMS requirements for reporting national statistics. However, as more data is entered, the more accurate the condition projection modelling becomes.

6.2.2 Other asset databases

Other systems currently in use include:

1. Mayrise (street lighting and ITS database) – key information is electronically replicated in *Insight* to ensure cross-asset co-ordination is possible. ITS data is being transferred to *Insight* during 2016/2017
2. PRoWS – *Oracle*-based system for data requirements of the public rights of way service. This is being transferred to *Insight* during 2016/2017.
3. Bridges access database - this is currently being scoped for transfer to *Insight* for implementation in 2016/2017
4. Mapinfo – data on assets in Ipswich held in digital map formats.
5. Microsoft Excel – spreadsheet files stored on internal servers for various ad hoc asset data.

It is the Council's aim to populate its Symology *Insight* database with relevant highways infrastructure asset data; unless it can be proved that the system does not have the functionality or practical ease of use required for a particular asset. Placing key data sets onto its Symology *Insight* database will allow for improved co-ordination of works, reducing overall costs and thus making best use of limited funding.

6.3 Pavement management

Suffolk Highways has all the software required to operate the *Insight* 'Pavement Management System' (PMS) that can derive a programme based on good asset management principles such that decisions can cost effectively be made to derive minimum whole life costs. Suffolk Highways has a limited number of staff who could run this PMS module. Prior training or recruitment would be required before the CIPFA/WGA reports can be run in-house with a high level of confidence. A short-term solution is to use Symology's 'bureau service' to derive carriageway programmes of work and CIPFA data.

The *Insight* PMS incorporates automatic facilities to evaluate condition indicators and, where necessary, select treatments. Selection criteria can be changed but the system is based on set criteria. However, multiple parameters are used providing flexibility to allow for both national UKPMS standards and individual local requirements. The "decision support" element of *Insight* enables the user to formulate "optimum strategic maintenance plans" for pavements. Self-learning concepts are incorporated to ensure that rules and techniques are automatically reviewed and optimised in the light of experience.

6.4 Structures database

The Suffolk Highways Structures Team utilises a Microsoft Access database that no longer carries software support and thus needs replacement. As part of the improvement plan, the Structures Team has determined that the Symology *Insight* structures module is adequate for its purposes. A transition plan is being developed with the Council's Information Technology Team with the aim of being able to fully utilise this structures module in time for the CIPFA return in June 2017.

6.5 Lighting database

The Suffolk Highways Street Lighting Team currently uses Mayrise as its primary asset database. This is planned to remain the case, but with automated transfer of limited key data to the *Insight* database to facilitate improved co-ordination. The development of the interface is currently ongoing and should be completed before the end of March 2017.

6.6 Public rights of way database

The Public Rights of Way Team currently uses an *Oracle*-based system for its data management. Data held is limited and is planned to be transferred to the *Insight* database before the end of March 2017.

6.7 Better Information Management (BIM)

BIM is the management of information about an asset. It is often referred to by slightly different titles such as Building Information Management, however Better Information Management is the most appropriate term for Suffolk Highways.

The availability of appropriate and reliable information about assets is integral for effective asset management and, when used appropriately, can support decision-making, planning and delivery of works throughout the asset life. Suffolk Highways will, over time, work to incorporate BIM principles in its approach to asset management, thus ensuring that available resources are targeted in an informed way.

Section 7 – Community and customer requirement and communication

7.1 Introduction

This section contains information about community and customer requirements and how they have been identified. It also outlines how ongoing customer communications will take place in relation to highway maintenance activities.

7.2 NHT data

The National Highways and Transport (NHT) public satisfaction survey is a postal survey. A record 100 authorities across England and Wales took part in 2015, generating over 76,000 responses, giving an average response rate of 20.5%. The survey asks how important, if at all, members of the public regard different aspects of highway and transport services and how satisfied or dissatisfied they are with each one.

The Council has participated in the NHT survey since its inception. The data collected has been analysed and communicated within the highways service in various ways but, generally, actions have been left to individual officers to determine.

In future, Suffolk Highways will assess all of the data provided. Many of the results are an integral part of a new outcome-based 'performance management framework' which is aligned to the County Council's corporate and Local Transport Plan objectives, as set out in the Highway Infrastructure Asset Management Policy. Suffolk Highways will determine any corrective actions required as a result of the NHT survey and such actions will become part of its annual service plan. Responsibility for the delivery of this annual service plan currently rests with the Assistant Director Operational Highways.

The overall condition of Suffolk's roads is the public's main concern. The 2015 results for KBI23 'Condition of Highway' indicated that satisfaction had increased to 41% (as shown in Figure 7.1 below). This increase in satisfaction corresponded with an improvement in actual carriageway condition (DfT road conditions in England 2014).

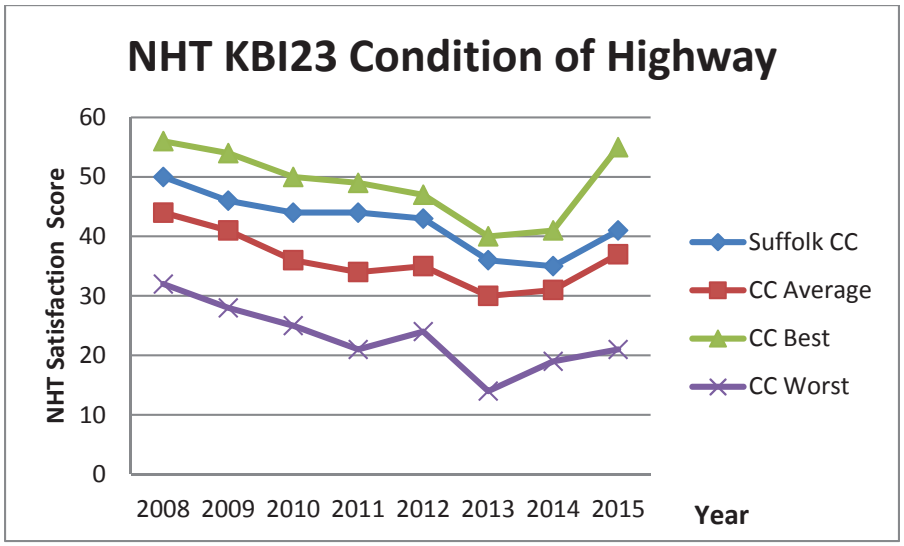

Figure 7.1 NHT scores relating to Condition of Highway.

The Council will continue to use NHT survey information to evidence how perceptions of its highways and transport services change over time. Consideration to the results and perceptions will be used to shape the asset management approach to the Council's highway infrastructure assets to effect changes to meet the expectations of stakeholders, subject to the resources available.

7.3 Internal data

Data regarding the public's concerns is also collected indirectly through the "Report It" online highways reporting web tool, which exports records to *Insight* (for highways related information but not for street lighting). In addition, data should be exportable to *Mayrise* (street lighting) databases by 2017. From these databases, information can be numerically analysed to establish areas of concern and trends. Asset managers will look at this data regularly to identify any new trends and to confirm if remedial actions are resulting in improved figures or otherwise.

7.4 Stakeholder expectations

There are many stakeholders who interact and are impacted by the highway service and it is difficult to satisfy all individuals. Therefore, an approach is required that considers the needs of the majority.

All known stakeholder groups have been mapped below in Figure 7.2 to provide a 'Power/Interest Matrix'. The grid contains four elements which:

- Align strategy – to consider the needs and expectations of the majority;
- Satisfy – where interest is low but decisions can be made that affect service operation;
- Inform and assist – where individual issues arise and can be addressed locally i.e. specific problem with a particular asset;
- Inform – where general enquiries are received.

Stakeholders that are impacted by the service include:

- General public (individuals)
- General public (as a collective)
- SCC Councillors (individual)
- SCC Councillors (as a group)
- District / borough / ward councillors
- Assistant Director Operational Highways (Resource Management)
- Interest groups i.e. Campaign for Dark Skies
- Police and emergency services
- SCC asset manager

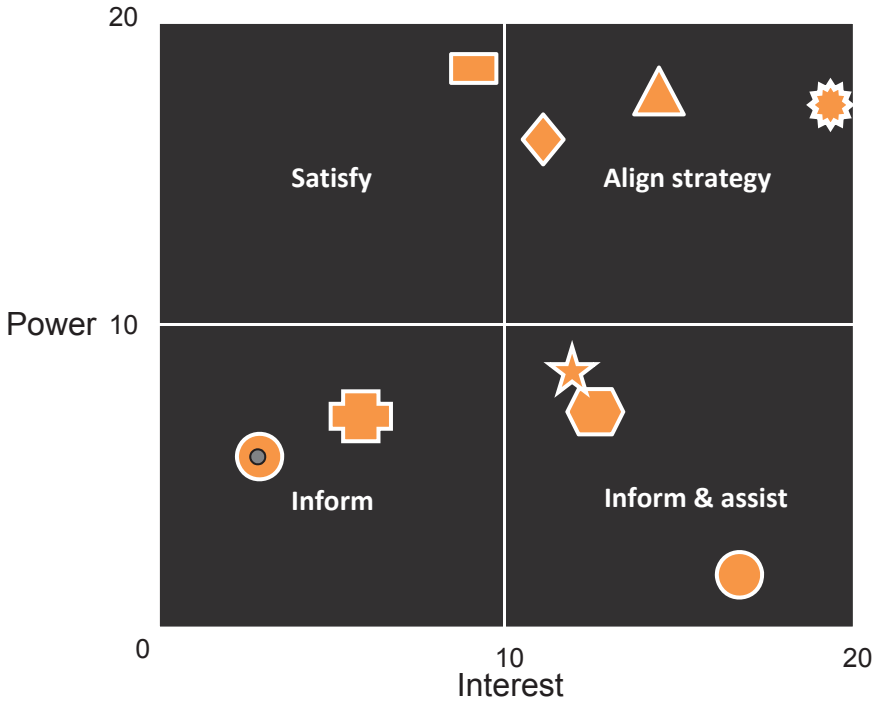

Figure 7.2 stakeholder power / interest matrix

7.5 Keeping the public informed

Suffolk Highways can keep the public informed of its approach to highway infrastructure asset management through the use of a number of channels:

1. **Website** – this is the primary source of information, with access to policy, strategy, plan' programmes of work and documents such as the Highway Maintenance Operational Plan (HMOP), together with map-based information on schemes and road closures together. In addition, there is the ability to make comments on projects, policy, strategy and plans with the reassurance that a reply will be forthcoming if an email address is provided;
2. **Customer Service Centre (or 'Contact Centre')** – in order to better monitor the full extent of public contact, all forms of communication with Suffolk Highways is steered towards the Customer Service Centre. Customer service agents have access to all forms of highways service information and are briefed on numerous subject areas including asset management and relevant scheme details. The principle is that the Customer Service Centre is always regarded as the primary point of contact in order to handle as many queries as possible at this point. However, there will be the occasional need to refer detailed enquiries to Suffolk Highways personnel;
3. **Twitter** – used as a method of getting out information that is likely to be of interest to a large audience such as details about gritting during the winter;
4. **Correspondence to individuals and organisations** – advisory letters and formal notices will be sent to affected properties, which front the works, in advance of works on the highway network where passage to and from private property is likely to be temporarily impaired. The intention is that letters or emails from individuals will be responded to within 20 working days (on the basis that many enquiries are

of a detailed nature and require some form of investigation before a meaningful response can be sent);

5. **Media interaction** – issues relating to changes in policy, strategy, plans and new projects/programmes of work will often be accompanied by press notices. If these are considered to be of public interest, these issues will be picked up by the media. Individuals will be made available to provide details and undertake interviews or provide supplementary information as required.
6. **Newsletters** – newsletters are now sent at opportune times to all councillors (i.e. county, district, borough, town and parish) and to Suffolk Highways staff. These newsletters are composed according to the recipient audience but are irrespectively placed on the website for wider access and consideration.
7. **Scheme-specific communications** – letter drops to affected properties, combined with legal notices and large signs for motorists, inform the public of forthcoming works.

7.5.1 Public consultation

Public consultation is undertaken when it is deemed the public can influence the outcome of an issue. In the case of asset management, Central Government has linked the use of an asset management approach to funding allocation, as well as checking that such an approach is used to get the optimum level of investment into maintenance of the local highway infrastructure. In response, the Council has adopted an asset management approach, but is keen that the public is given the opportunity to influence the detail that is contained in this Highway Infrastructure Asset Management Plan.

7.5.2 Report It

The award-winning online highways reporting tool 'Report It' can be found on the County Council's website, and is a tool that interacts with maps to help the public report issues. All submissions receive a reply either back to the member of public through email or, if no email address is provided, a short summary reply can be found on the map-based 'Report It' page that details all issues identified within last 30 days and Suffolk Highways' responses.

Figure 7.3 shows the various categories of highway infrastructure against which customer enquiries can be reported. The table shows the snapshot of information reported in this way but it does not show the entire spectrum of customer contacts as there is often direct contact with County Council representatives. All such direct contacts need to be redirected to the Customer Service Centre so that they may be logged on the 'Customer Relationship Management' (CRM) system for enquiry tracking. The CRM can then refer the matter onwards to Suffolk Highways for consideration and, where deemed appropriate, action on the ground. Irrespectively, there should be a customer response.

Insight Customer Service Reports year to 27 October 2015						
Descriptor	Description	Number of Reports	Overarching categories	Number of Reports	Percentage of total	Rank
POTH	Pothole	14				
PVDF	Pavement Defects	1911				
RDDF	Road Defects	5765	Cway defects	7690	35.3%	1
FALL	Fallen Trees/Branch	45				
GRCT	Grass Cutting	611				
OHTH	Overhanging Tree	2599				
WEED	Weeds on Highway	362	Soft Estate	3617	16.6%	2
SIOB	Sign Obscurred / Damage	1160	Signs, lines			
RMMF	Road Markings	751	and street			
RONP	Road Name Plate	3	furniture	1914	8.8%	3
BLDH	Blocked Drain Hway	1164				
DITC	Ditch	10				
GRWT	Groundwater	44				
OVER	Overflow Drain	34				
PMFL	Pavement Flooded	95				
RDFL	Road Flooded	517				
RIVR	River	5	drainage	1869	8.6%	4
LORR	Lorries	9				
TCLM	Traffic Calming	278				
OBHI	Obstruction	468				
PARK	Parking	924				
SPEN	Speeding Enforcement	5	Traffic &			
ZCON	Config Changes	29	enforcement	1713	7.9%	5=
RWKS	Roadworks	1628	Roadworks	1628	7.5%	5=
CYCL	Cyclelane / Tracks	97				
JNCP	Junction Problems	269				
MAIN	Maintainable Roads	364				
SMRD	Sunk / Rattling Cover	388				
BMMD	Broken missing cover	27	Other Cway			
MUDH	Debris / Mud on Hway	499	issues	1644	7.6%	7
EMER	Emergency	563	Emergency	563	2.6%	8
SAFC	Safety Concerns	535	Safety	535	2.5%	9
PDGM	Safety Fence	194	Safety Fence	194	0.9%	10
GRIT	Gritting & Salting	106				
SBFL	Salt Bin Refill	77	Winter	183	0.8%	11
ZGAR	GazeteerAmmend Req	11				
ZINS	Safety Inspections	19				
ZSWR	Streetworks	5				
ZUSR	User Account	30				
	Blank	6				
LEAD	Leader	1				
UNDR	Unknown	19				
CMHT	Cabinet Member Hway	19	Miscellaneous	110	0.5%	12
PEDX	Pedestrian Crossing	65	Pedestrian Crossing	65	0.3%	13
BRID	Bridge	38	Bridge	38	0.2%	14
RNDK	Dropped Kerb	10	Dropped Kerb	10	0.05%	15
	Totals	21773		21773	100.00%	

Figure 7.3 Example analysis of data from *Insight* Report It module.

Section 8 - Lifecycle planning

8.1 What is lifecycle planning?

The Department for Transport through its Highway Maintenance Efficiency Programme (HMEP) published a document entitled *'Asset Management Guidance'* in May 2013 that defines lifecycle planning as comprising the approach to the maintenance of an asset from construction to disposal. It is the prediction of future performance of an asset, or a group of assets, based on investment scenarios and maintenance strategies. The lifecycle plan is the documented output from this process.

8.2 Objectives

Lifecycle planning will enable Suffolk Highways to:

- Identify long term investment for highway infrastructure assets and develop an appropriate maintenance strategy;
- Predict future performance of highway infrastructure assets for different levels of investment and different maintenance strategies;
- Determine the level of investment required to achieve the required performance;
- Determine the performance that will be achieved for available funding and/or future investment;
- Support decision-making, the case for investing in maintenance activities and demonstrate the impact of different funding scenarios;
- Minimise costs over the lifecycle while maintaining the required performance.

Lifecycle planning is being developed consistently by Suffolk Highways across the county's highway infrastructure assets to enable informed decisions on how investment is best targeted to maintain the highway network.

Suffolk Highways will inform the County Council on a regular basis the funding required to maintain the highway network at various levels, together with the consequences of not investing at those levels. Allocations for particular asset types are likely to vary to take account of peaks of requirements. The aim is to invest at the appropriate time to minimise whole life costs.

8.3 Software Modelling

Suffolk Highways is developing its asset management approach and, as such, will initially use available tools to determine its lifecycle plans for each of its major assets. These methods are likely to alter over time as best practice is identified. Initial tools are likely to include the use of *Insight* and the Department for Transport's HMEP lifecycle planning tools. Likely outputs include comparisons between strategies (as in figure 8.1) and condition data for particular investment strategies (as in figure 8.2).

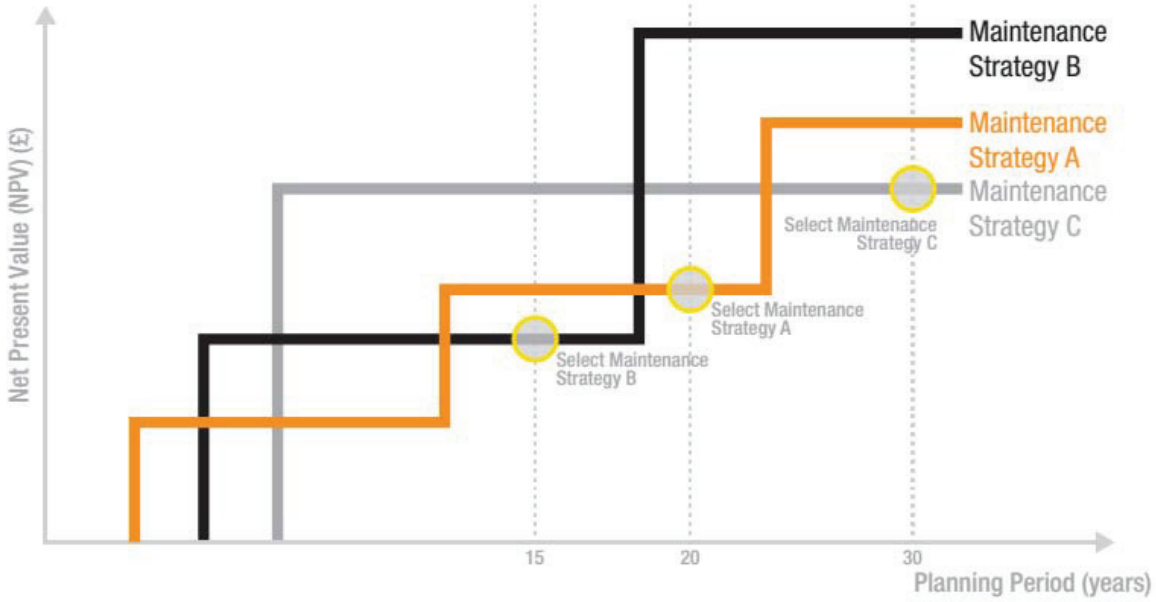

Figure 8.1 – Indicative comparison of different maintenance strategies

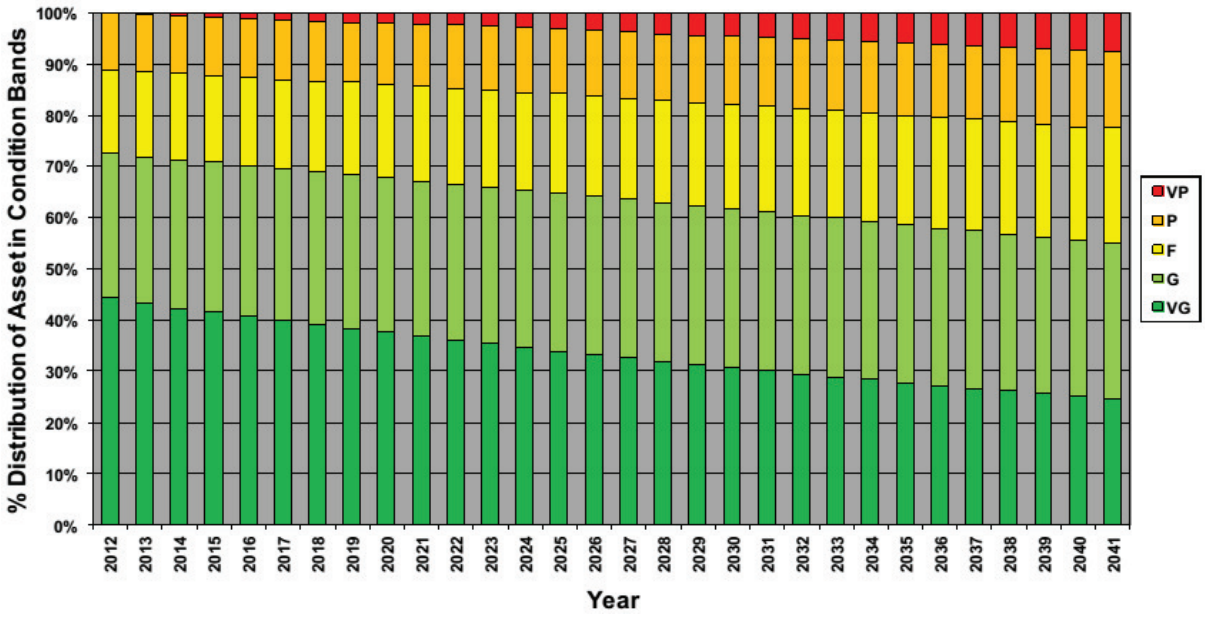

Figure 8.2 – Condition data under a particular investment strategy indicating a slow decline in condition

Suffolk Highways will use the *Insight* 'pavement management system' (PMS) to derive programmes, based on good asset management principles such that informed decisions can be made to derive minimum whole life costs. The *Insight* system models the deterioration of some highway infrastructure assets using embedded UKPMS and other recognised algorithms. This modelling enable the future condition of infrastructure assets to be projected based on different investment strategies and maintenance treatments.

The *Insight PMS* incorporates automatic facilities to evaluate condition indicators and, where necessary, select treatments. Selection criteria can be changed to allow for both national UKPMS standard models and those developed for local requirements. Self-learning concepts are incorporated to ensure that rules and techniques are automatically reviewed and optimised in the light of experience.

The “decision support” element of *Insight* enables the user to formulate “optimum strategic maintenance plans”.

By modelling different investment scenarios and maintenance treatments, Suffolk Highways is able demonstrate whether the long-term condition of the county’s highway infrastructure assets with improve or deteriorate.

The results can be used to inform levels of service and the levels of budget that are required to improve the overall condition of the assets, maintain them in their current condition or manage a controlled decline in their condition.

Section 9 - Levels of service

9.1 Introduction

The introduction of meaningful (measurable and quantifiable) 'levels of service' that can demonstrate prudent long-term management of the asset and meet user aspirations is a key element in the adoption of the asset management approach. This section explains levels of service and describes how this is used within the HIAMP process to develop a set of 'service options' for each asset group.

With reference to the County Surveyors Society framework diagram (figure 9.1), levels of service cover both the physical condition (measured and perceived) of the asset and the non-condition based performance or external demand (what the asset is expected to deliver) placed on the asset.

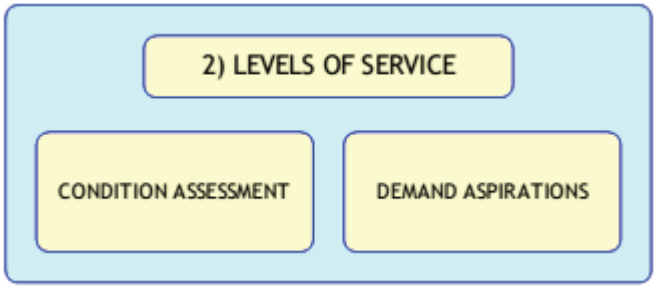

Figure 9.1 - Levels of Service Framework

9.2 What are levels of service?

Levels of service are a set of broad statements that describe the performance of highway infrastructure assets in terms that stakeholders can understand. They should relate to outcomes and cover key aspects of asset performance such as safety, serviceability and sustainability. They consider the performance of the whole network rather than that of individual assets.

Levels of service are derived from a mixture of drivers and can include statutory (minimum), existing, requested, optimum and attainable service levels. After service options have been identified, these are fed back into the asset's lifecycle plans and indicative work packages formulated to "cost-up" the different levels of service.
These service options are then evaluated against set criteria such as cost, benefit (i.e. favourable/unfavourable impact) and risk before presenting them for review and approval.

Once a service option has been confirmed for each asset group, forward works programmes that deliver the selected levels of service are developed and performance measures put in place to check the asset's actual performance against that which is desired.

Future asset performance will be measured against one or more relevant level of service indicator groupings from the following list of Local Transport Plan priority objectives:

- A prosperous and vibrant economy;
- Creating the greenest county;
- Safe, healthy and inclusive communities;
- Learning and skills for the future

9.3 Why use levels of service

Initially the levels of service developed in this HIAMP will be used for:

- Identifying the total costs and benefits of the services offered through the use of service options and option appraisal techniques. This is to be able to assess the costs of delivering differing levels of service and to make more informed choices between the options available;
- Assisting with service prioritisation across the range of highway infrastructure assets so as to be seen to directly influence how priorities are assessed, how funding needs are identified, how funding is distributed and how the effectiveness of that spend is subsequently assessed;
- Creating service standards as yardsticks for performance measurement to provide a means of assessing the benefit of using asset management planning. This will mean stating some targets on an annual basis for what it is specifically expected that this HIAMP can achieve and monitoring whether these are delivered;
- Enabling customers to understand the suitability and affordability of the highways maintenance service. This requires the provision of better information from consultation with customers, incorporating not only questions of preference (i.e. what is important or how satisfied they are) but also about what they would potentially be prepared to pay more for or sacrifice in order to pay for a higher level of service in another area;
- Informing customers of the proposed type and level of service to be offered through the provision of more detailed information to customers about the level of service they can expect and perhaps, in some instances, to outline what they cannot reasonably expect unless they are prepared to contribute more.

9.4 Development of levels of service and interface with the HIAMP

Before levels of service can be developed for each asset group, it is necessary to understand what factors or requirements can affect delivery of the highway maintenance service.

The performance of each infrastructure asset in the highway contributes to meeting stakeholder expectations. The key requirements to be considered when developing levels of service are;

- Legislative requirements;
- Best practice guidelines;
- County Council objectives;
- Stakeholder expectations.

9.5 Legislative requirements

The role of the local highway authority as asset manager is governed by an extensive range of legislation. In relation to highway maintenance, much is based on statutory powers and duties contained in legislation and precedents developed over time as a result of claims and legal proceedings. Even without specific powers and duties, local highway authorities have a general duty of care to users and the community to maintain the highway in a condition fit for its purpose.

Legislative requirements include duties and powers:

- Duties: tasks the authority must carry out by law;
- Powers: tasks the authority may exercise by law if it so determines;
- Where the authority elects to exercise its powers, these generally incur a duty - e.g. the Council's power to erect road signs creates a duty to maintain them.

These considerations directly affect the levels of service that the Council provides by establishing the statutory (or minimum) level of service that must be provided.

9.6 Council objectives

The creation of levels of service at Suffolk Highways must be aligned with the Council's strategic and corporate goals that currently direct the highway maintenance service. It is important that any proposed levels of service are consistent with the following corporate mission statement and objectives:

Suffolk County Council mission statement:
We will make a positive difference for Suffolk. We are committed to working together, striving to improve and securing the best possible services.

Corporate priorities:

- Raise educational attainment and skill levels;
- Support the Local Enterprise Partnerships (LEPs) to increase economic growth;
- Maintain roads and develop Suffolk's infrastructure;
- Support those most vulnerable in our communities;
- Empower local communities.

Through 'leadership events' delivered quarterly since September 2015 in support of the Highways Transformation Programme, asset managers are aware that the mission statement and corporate priorities represent the high level outcomes that Suffolk Highways aspires to meet. In turn, these must be distilled downwards to all Suffolk Highways personnel so that they are taken into account in the day-to-day delivery of the service – and thereby provide a key part of the 'golden thread' by which all activity is connected

Whilst the key corporate priority for Suffolk Highways is to 'maintain roads and develop Suffolk's infrastructure', the HIAMP is connected to all five corporate objectives, as set out in the Highway Infrastructure Asset Management Policy approved by the Council's Cabinet on 10th November 2015. The document also provided clarity that a further part of the 'golden thread' was that the next layer down for prioritisation comprised the four

priority objectives set out in the Council's Local Transport Plan (as set out in sub-section 9.2 above).

This has subsequently been further developed into an outcome-based performance management framework that has been in operation since 1st April 2016. This framework is split into four sections (to reflect the four Local Transport Plan objectives) and contains a significant number of the NHT survey public satisfaction indicators referred to in sub-section 7.2 above. Service options therefore must be mindful of these performance management framework outcome measures. This is explored further in Section 10.

9.7 Stakeholder expectations

This sub-section on stakeholder expectations covers the current consultation and interaction with both the customers (users) of Suffolk's local highway network (not limited to residents) and the elected members who are ultimately responsible for the management of the highway network on behalf of the county's Council tax contributors. The NHT survey is and will remain the main source of customer satisfaction survey information for Suffolk Highways. It will consider this data to appropriately adapt the ongoing asset management strategy, including prioritisation for maintenance and operational improvements.

The data that can be accrued from public interaction with the Customer Service Centre provides an additional source of customer feedback. Problems identified on the highway network are either reported to a customer service agent via the telephone, through the online highways reporting tool, 'Report It', or by email. Direct email contact to Suffolk Highways (unless specifically requested) will increasingly be redirected to the Customer Service Centre to ensure that each contact is recorded for progress monitoring. For contact relating to defect reporting, customers are asked to provide detailed information, including the location of the problem. Due to the general inaccuracy of details provided, each customer contact tends to require follow-up on-site inspection to ascertain the urgency of any rectification work.

9.8 Councillor controlled budgets

Each of the Council's 75 County Councillors have an annual allocation taken from the Department for Transport's 'Integrated Transport' capital budget. Councillors must use this 'Local Highway Budget' to fund/support capital improvements to Suffolk's highway and transport infrastructure.

In addition, each County Councillor has an annual 'Locality Budget' which can be used to support highway improvements.

Historically, Suffolk Highways has not consistently recorded the true cost for works funded from these allocations and similarly any impact on budgets for their on-going maintenance.

As Suffolk Highways migrates to a wholly integrated team (comprising council and contractor staff), a more consistent and comprehensive approach will be implemented ensuring that costs and impacts are captures and assessed.

Section 10 - Performance management and benchmarking

10.1 Introduction

It is through performance management that improvement can be driven. It is Suffolk Highways' aim to continually improve such that it is positively contributing to the Council's mission and corporate objectives, as set out in sub-section 9.6.

10.2 Performance management framework

Suffolk Highways' performance management framework (Figure 11.1) has been developed so that it contains outcome-based performance measures that reflect the priority objectives contained in the Council's Local Transport Plan 2011 – 2031, set against the most relevant of the 5 corporate objectives for the local highway maintenance and improvement service:

- A prosperous and vibrant economy
- Creating the greenest county
- Safe, healthy and inclusive communities
- Learning and skills for the future

Maintain roads and develop Suffolk's infrastructure			
LTP priority objectives	A prosperous and vibrant economy	Creating the greenest county	Safe, healthy and inclusive communities	Learning and skills for the future
	Outcomes	*Outcomes*	*Outcomes*	*Outcomes*
Operational Measures	*1. Asset condition*	1. Energy consumption	1. Safe network	1. Inclusion
	2. Customer satisfaction	2. Fuel consumption	2. Robust asset assessment	2. Communication
	3. Forward schedule of works	3. Preventative maintenance	3. Modal shift encouragement	3. Future-proofing
	4. Congestion minimisation	4. Sustainability trends	4. Inclusivity	4. Innovation
		5. Recycling levels	5. Accessibility	5. Knowledge sharing
Financial measures	Level of funding			
	Spend vs budget			
	Reactive vs capital spend			
	Third party claims			
	Income			
Strategic measures	Customer satisfaction			
	General outcomes (condition data, casualty statistics, congestion data)			
	Failure demand			
Contractor specific measures	Accidents in workforce			
	Absence/ sickness levels			
	Staff retention levels			
	Overtime			
Contextual info	Severe weather events			
	Major events affecting the highway			

Figure 11.1 Suffolk Highways' Performance Management Framework

Outcomes against each priority have been identified which link to a number of indicators, many of which have been used by the Council and are based on historical national reporting requirements. A number of these indicators are used by other authorities (particularly those derived from the NHT survey), allowing for the benchmarking of performance to take place. Where national indicators do not exist, local indicators have been created to complete Suffolk Highways' performance management framework (PMF).

This PMF is a proxy measure of Suffolk Highways' asset management performance. For example, public opinion about the state of any one of Suffolk's highway infrastructure assets will reflect the way in which Suffolk Highways has maintained that asset. The public opinion on that asset will be the 'outcome' of the asset management approach taken. In order to change that opinion, something must be changed at an operational (day-to-day) level. To that end, Suffolk Highways has a corresponding set of performance measures that consider outputs which are assessed at an operational (rather than strategic) level.

Performance is monitored at regular intervals with quarterly review reports on the PMF presented to the 'Suffolk Highways Operations Board'. These reports will be provided by Suffolk Highways internal teams demonstrating performance and how this relates to current resource levels. The Operations Board will provide direction when required to the asset and operational teams to ensure that performance levels are in line with expectations. Similarly, the Operations Board can develop new performance measures to enable the direction of the service to meet with stakeholder and business expectations.

10.3 Benchmarking

Suffolk Highways recognises the advantages of sharing information to support continuous improvement. Benchmarking allows comparisons to be made with similar authorities, the sharing of best practice and performance information and provides a basis to develop local and national best practice.

Suffolk Highways involvement in benchmarking activities is under continuous review to ensure that such activities continue to provide the required benefits and value for money. Suffolk Highways currently utilises four primary sources of benchmarking:

- NHT public satisfaction survey
- DfT - road condition indicator comparisons against other shire authorities
- East of England Highway Alliance benchmarking club
- Direct Management Group – benchmarking highway performance

10.4 Future Highways Research Club

The Council is a founding member of the 'Future Highways Research Club', which was formed in February 2013. Through discussion, consideration and analysis of the activities of 12 local highway authorities, Cranfield University researchers have created a number of software solutions to enable Future Highways Research Club members to apply locally.

One such solution enables a value for money assessment to be undertaken of the existing highways service. The service is assessed against a number of measures that allow detailed consideration of the normal parameters of economy, efficiency and effectiveness – but also allows that consideration to extend to the additional parameters of 'strategic value' and 'stakeholder value'.

This assessment process yields a value for money score which can be compared against other Future Highways Research Club members. However, of greater importance is the ability to assess what the impact on this benchmarking value for money score would be if changes were to be made to the nature, style and scope of the local highway service. This ability to model future scenarios enables a better decision to be taken about the direction in which the service should be steered. Part of this future scenario testing is by taking a further parameter into account – that of 'achievability' (i.e. is the suggested change actually achievable?). The value for money analysis tool is shown in Figure 11.2.

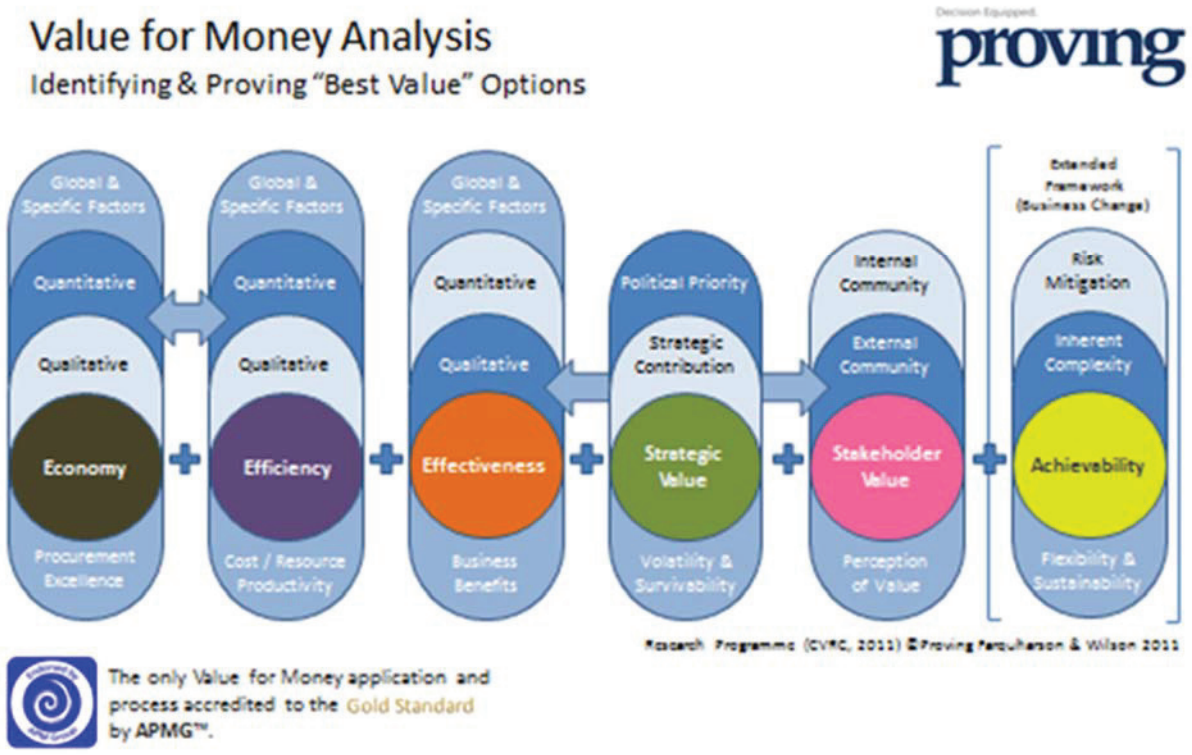

Figure 11.2 FHRC Value for Money Analysis

A consistent set of baseline changes have been identified by Future Highways Research Club members and these are being applied to Suffolk Highways as part of the Highways Transformation Programme. The value for money analysis tool will be used to identify the baseline position (i.e. before the Highways Transformation Programme started) as well as assess future scenarios. This will identify opportunities for further change to Suffolk Highways service delivery approach, including its approach to asset management.

10.5 Innovation and new techniques

Suffolk Highways are constantly looking for innovation and new techniques to improve efficiency and asset life.

Kier has set up a £1m innovation fund for part-funding the adoption of innovative techniques to improve overall efficiency of the service. The fund can be accessed when sound business cases for investment in innovation and new techniques are received and approved by the Suffolk Highways Strategic Board. This would culminate in the sharing of the financial benefits between the Council and Kier once the initial investment has been returned following implementation by Suffolk Highways.

Improvement projects will all be managed by specified project managers who will be appointed by and report to the Suffolk Highways Operations Board.

All Suffolk Highways staff are encouraged to highlight opportunities for the service and share these ideas on the Suffolk Highways innovations register.

Section 11 - Asset management planning process

11.1 Introduction

The asset management planning process is heavily influenced by a number of practical considerations such as:

- Timing of budget allocation;
- Top slicing of budgets for non-asset management-led functions;
- Timescales associated with conducting asset condition assessments and data processing;
- Design and cost estimates for programmes of work;
- Identifying and committing resources to deliver identified work programmes.

To enable the planning and development of forward and future work programmes, considered assumptions are made on the expected performance of highway assets, as well as investment levels over these periods.

To allow the process to provide for changes associated with unforeseen changes to asset condition and investment levels and to consider stakeholder priorities, future work programmes can change. It is, however, possible to provide works programmes for a twelve-month period which remain largely unchanged by these factors.

11.2 Planned roadworks

During 2017/18, Suffolk Highways will publish on the Council's website a forward works programme for maintenance and infrastructure improvement, consisting of a firm twelve-month programme and details of longer term works.
In 2017/18, the work programmes will be provided in tabular form, allowing works of a particular type or works planned for a particular geographical area to be searched.

To complement this, Suffolk Highways is developing the use of a map-based planning tool which will display work programmes on the Council's website. This information will be displayed in the mapping layers used by the 'Report It' tool to allow customers to access the Council's planned works programmes when reporting issues.

11.3 Reporting to Scrutiny

From 2017/18 onwards, an annual report will be presented to the Council's Scrutiny Committee. This report will summarise the performance of Suffolk Highways, including content from the Suffolk Highways performance management framework. As well as providing an update on the latest condition and performance of the Council's highway assets, this report will include results from the annual NHT public satisfaction survey and will thus, most likely, fall in December. The report will also provide information on assumed funding levels for future works programmes and a summary of risks associated with these expected investment levels.

The report will provide a transparent mechanism through which Suffolk Highways can demonstrate the delivery of an efficient and effective service which supports the Council's

corporate and asset management objectives. It will need to clarify how Suffolk Highways is providing value for money and meeting the needs of its stakeholders.

11.4 Improvement plan

The manner in which the Council's highway assets are managed will change and evolve over time. It is necessary that the asset management approach is adaptive to these changes and creates or employs best practice from across the highway sector.
Suffolk Highways will develop and manage an asset management improvement plan which will act as a driver for enhancing its asset management approach and deliver associated efficiencies through the way that highway maintenance activities are undertaken.

Some actions will be necessary to maximise the asset management approach and will have impacts on the Suffolk Highways business processes and its culture. The tangible benefits of some of these actions will take considerable time to implement before the benefits can be suitably evidenced and realised. Asset management is a long-term strategy.

11.5 Statutory undertakers

'Statutory undertakers' are organisations that have a legal right to place and maintain their assets within the highway network. Works by statutory undertakers can affect the life expectancy of highway assets and this reduction in lifespan can be even further exacerbated by sub-standard reinstatements.

To manage the effects of statutory undertakers works, Suffolk Highways will co-ordinate programmes of work with the Council's Network Assurance Team to maximise the potential for statutory undertakers to complete programmed works prior to Suffolk Highways own substantive maintenance treatments. This will reduce the possibility of invasive work by the statutory undertakers within areas of recently completed highway repairs and improvements.

Suffolk Highways will issue, where appropriate, notices under section 58 of the New Roads and Street Works Act 1991, preventing statutory undertakers from undertaking planned maintenance activities in a road following substantive treatments. Suffolk Highways will also seek a voluntary agreement with the statutory undertakers to achieve the same outcome with reduced administration.

The Network Assurance Team proactively inspects a random sample inspection of around 10% of statutory undertakers' reinstatement. A fee is recoverable from the relevant undertaker and the inspection is to ensure that the work complies with national standards. Should the need arise or if there is a concern that any reinstatement is sub-standard, the Network Assurance Team will undertake further inspections of particular reinstatements (including 'coring'), will recover its costs from the statutory undertaker and, if necessary, ensure that the reinstatement is carried out again to the right specification and standard.

Section 12 - Future demands
(Impact / consideration of growth agenda and general development-related activity)

12.1 Introduction

Future usage and demands on the highway network are constantly changing with the introduction of new homes and commercial development opportunities throughout Suffolk.

These changing factors need to be understood and included within the HIAMP as it evolves, ensuring the HIAMP remains supportive to the local economy whilst considering what effect these changes may have on the future condition of highway assets and how these can be managed.

The factors affecting highway assets are:

- Asset growth;
- Traffic growth;
- Population growth;
- Legislation changes;
- Changes in technology;
- Climate change – environmental conditions

12.2 Asset growth

12.2.1 Introduction

Travel is an important but time-consuming part of everyone's daily life. Availability, speed of travel and cost can all influence choice of employment, places of education, shopping and leisure pursuits. Congestion can also have a major impact on that choice, on the profitability of businesses and also the consequences on health as a result of air pollution.

The Council monitors traffic and accessibility to services primarily to aid with the monitoring and future development of the Local Transport Plan.

Traffic trend data is derived using a number of methods from physical traffic counters installed at strategic sites to emerging technologies where sample mobile phone GPS data can be used and calibrated with physical traffic counts to provide countywide road usage information.

12.2.2 Traffic volumes

In 2014, traffic levels on Suffolk's roads increased by 4.3% on 2013, marginally exceeding the previous all-time peak of 2007 (as shown in Figure 12.1).

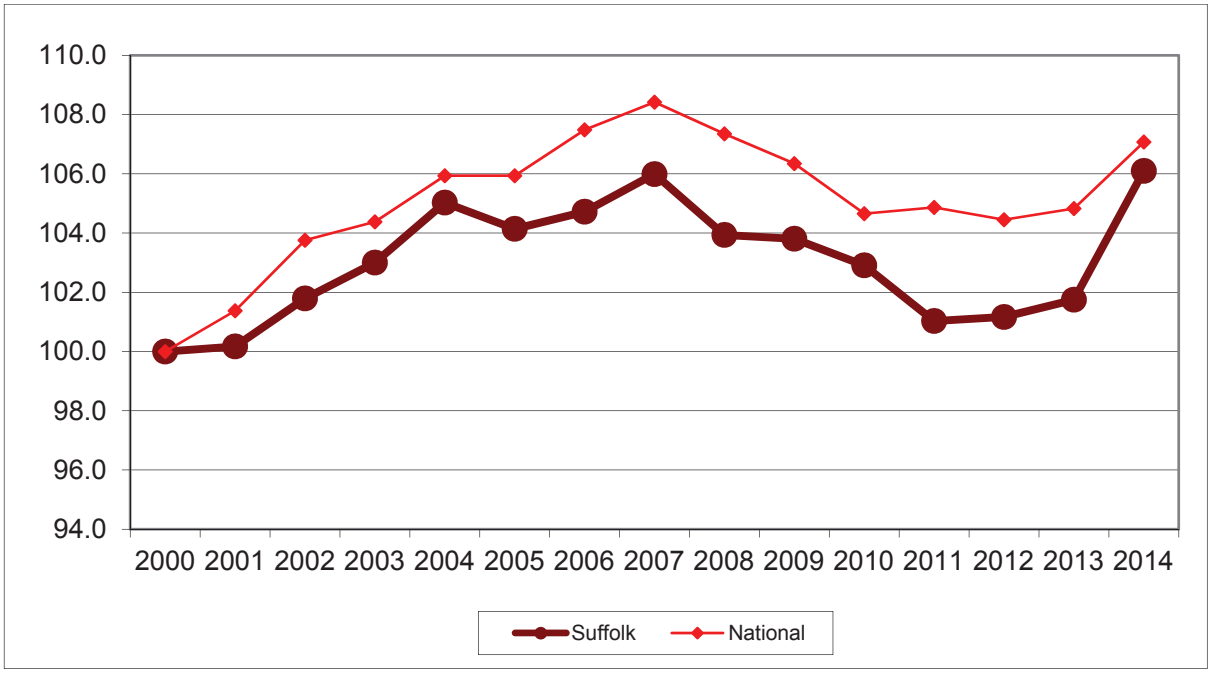

Figure 12.1 – Normalised traffic volumes in Suffolk and nationally (DfT figures)

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/402990/road-traffic-estimates-quarter-4-2014.zip)

12.2.3 - Forecast traffic growth

The Department for Transport publishes forecast growth scenarios for traffic in English regions. The East of England is expected to see substantial growth to 2035. The highest increase is for light goods vehicles with a 65% increase. This represents a medium growth scenario (see Figure 12.2).

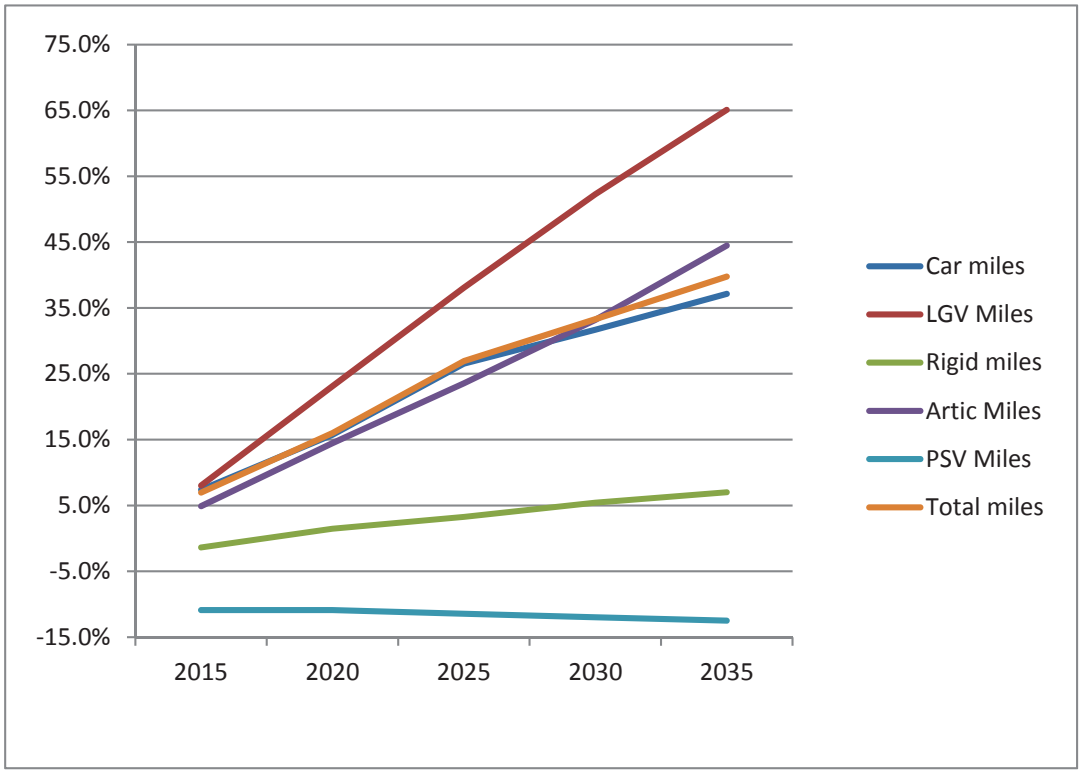

Figure 12.2- DfT Scenario 1 growth for the East of England

12.2.4 - Average speed on Suffolk's roads

The average speed on Suffolk's roads in 2014 has risen by 2.6% increase, the first such increase in over a decade, following a steady decline of over 6% from 2000 to 2013 (see figure 12.3).

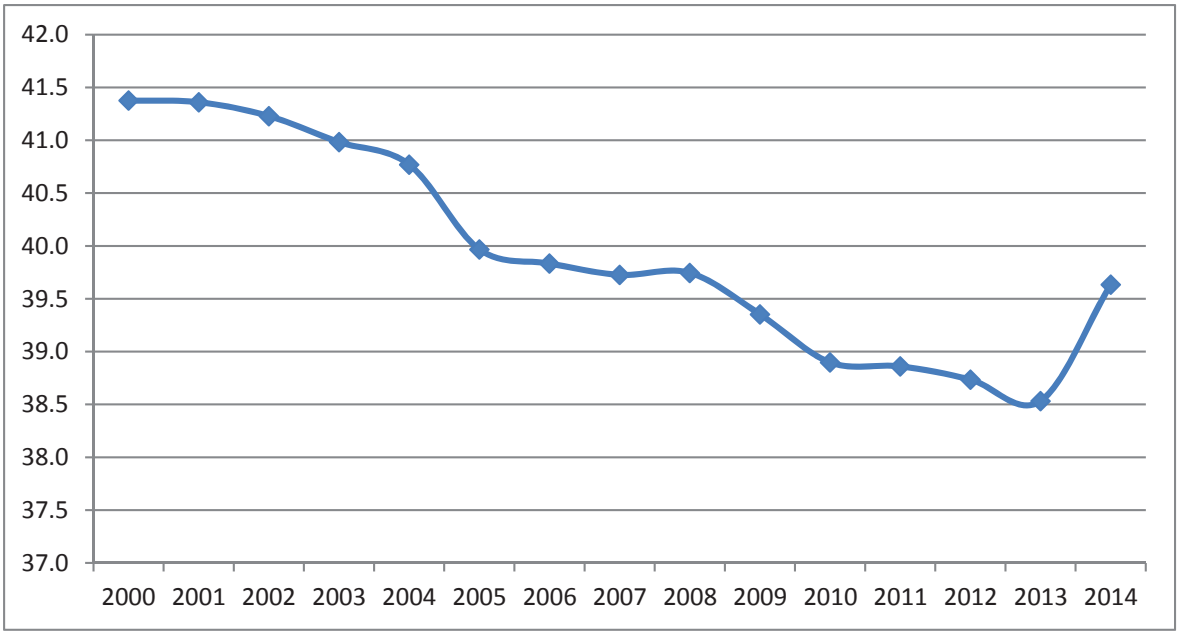

Figure 12.3 - Average traffic speed in Suffolk (average of 2000 baseline sites)

12.2.5 - Road accidents

Road traffic collisions have showed an overall decline since 2006. However, there has been an increase from 2013-2014, despite the 2014 level being the second lowest on record.

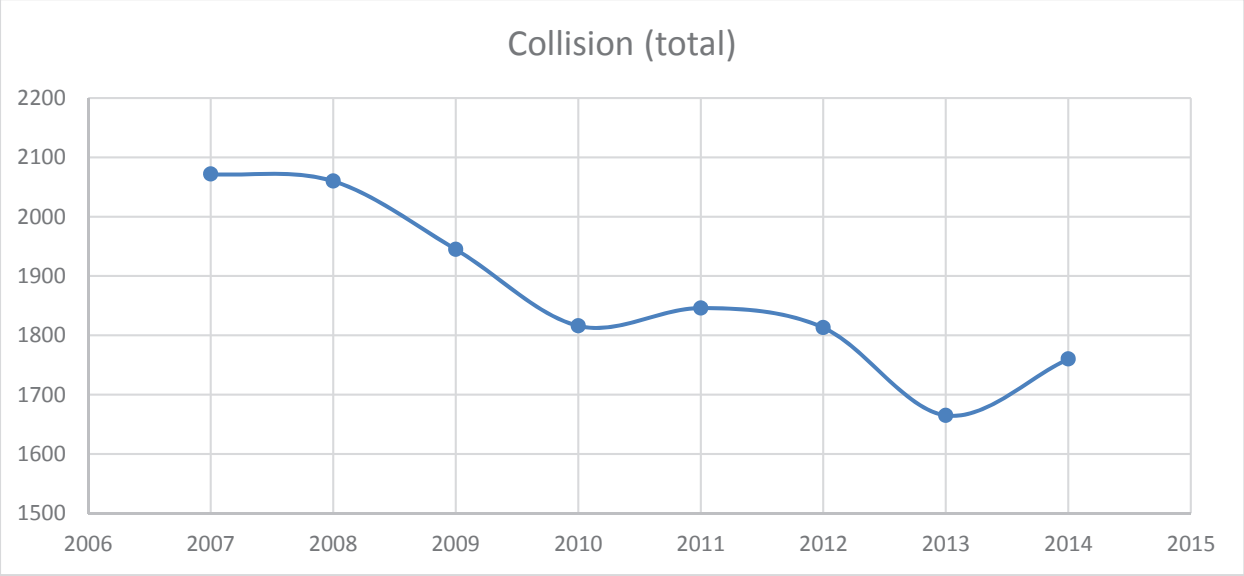

Figure 12.4 – Vehicle Collision numbers

12.2.6 - Travel to work trends

As part of Local Transport Plan monitoring, the council has conducted an online travel to work survey since 2005 with the survey going to employees at the council and borough/district councils and other major organisations in Suffolk.

The survey shows that, from 2005 through to 2013, the percentage travelling to work by sustainable means has increased from 27.8% to 36.7% in 2014. Most sustainable modes increase steadily from 2005 through to 2014 with:

- Walking to work increasing from 7.3% to 11.9%;
- Home working has increased more than 6 fold, from 0.3% in 2005 to a peak of 1.9% in 2011, declining to 1.3% in 2014;
- Train travel has seen a steady three-fold increase from 1.3% in 2005 to 4.3% in 2014;
- Bus usage reached its peak in 2007 at 9.2% and now stands at 4.4%;
- Park and ride usage steady growth (0.3% in 2005 to 1.4% in 2010) has levelled off at 1.3% in 2014, with a drop in 2011 following the closure of the Ipswich (Bury Road) park and ride site.

12.2.7 - Traffic congestion

The Department for Transport provides local authorities with *Traffic Master* data for the calculation of the national congestion indicator. Figure 12.5 shows road congestion across Suffolk in the morning peak of 8am to 9am, as derived from this data.

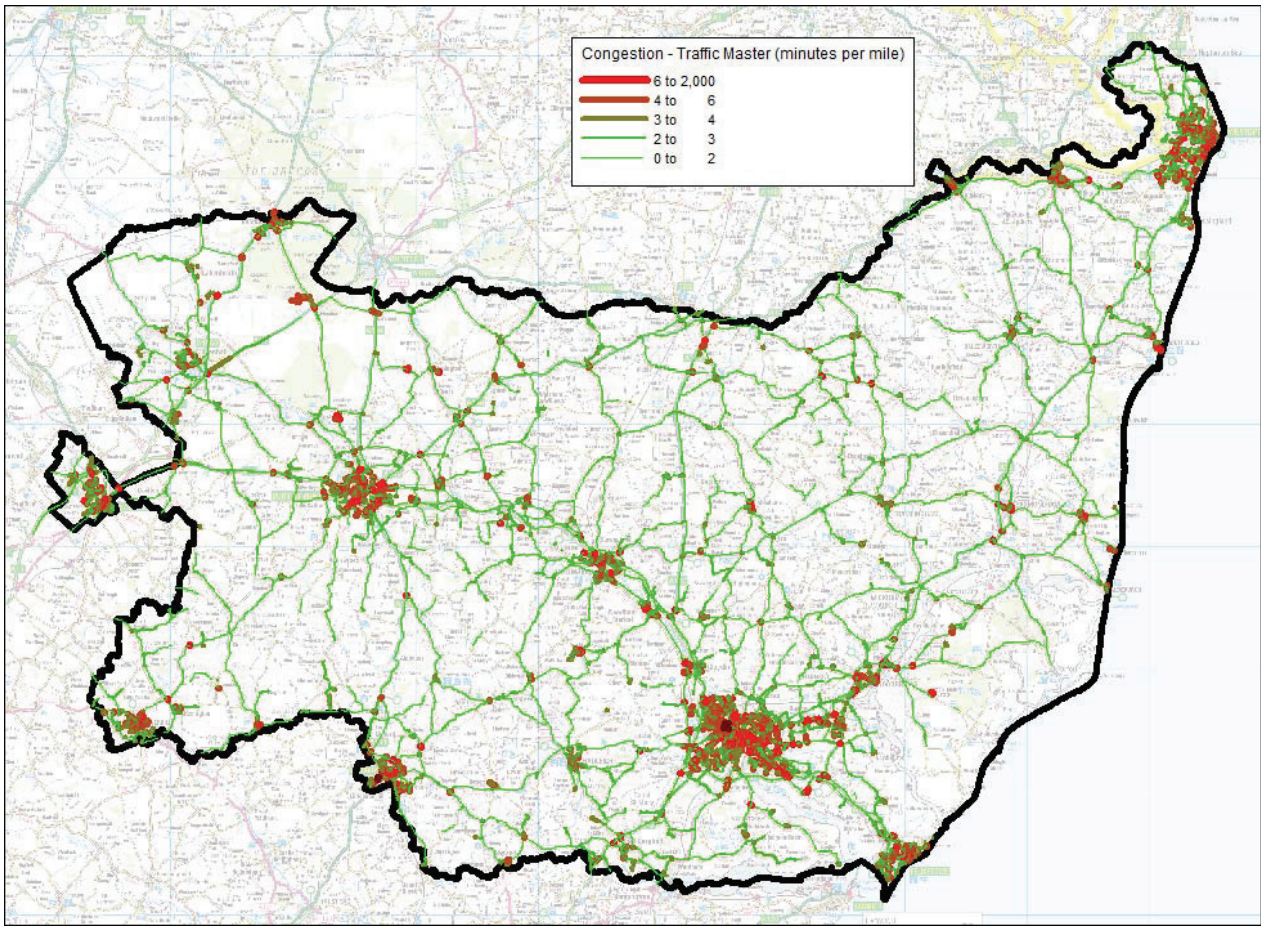

Figure 12.5 – Traffic Master - road congestion maps 2013-14 . © Crown Copyright. All rights reserved. Suffolk County Council Licence No. 100023395Source: Traffic Master GPS data

In Figure 12.5, the road sections coloured red are the most congested, highlighting the congestion problems in most of the major towns, with road traffic moving at less than 10 mph or 6 minutes per mile during the morning peak.

Congestion and air pollution are heavily linked with air quality management areas (AQMAs), defined as locations where levels of NO_2 are greater than 40$\mu g/m^3$ in residential areas. The current areas designated as AQMAs are:

- Ipswich - Norwich Road / Chevalier Street;
- Ipswich - Crown Street / St. Margaret's Street;
- Ipswich - St Helen's Street / Grimwade Street;
- Ipswich - Stoke Bridge/Star Lane/Fore Street / Duke Street roundabout;
- Ipswich - Bramford Road / Chevallier Street (proposed);
- Woodbridge - Lime Kiln Quay Road/ Melton Hill;
- Sudbury - Cross Street;
- Newmarket – High Street/ Station Road;
- Felixstowe – Dooley public house
- Great Barton – outside the post office

12.2.8 Population growth

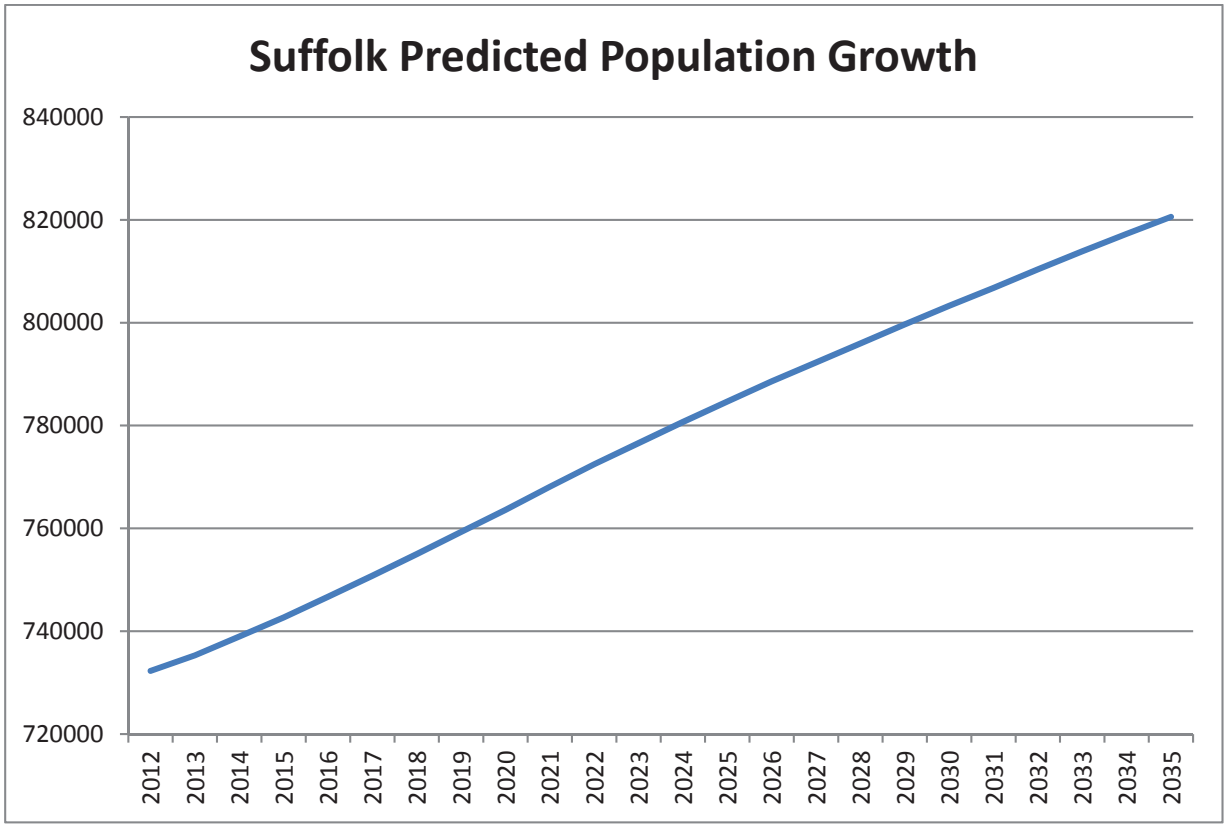

Figure 12.6 - Predicted Population Growth in Suffolk 2012-2035 (ONS)

Suffolk's population is expected to see significant growth (as depicted in Figures 12.6 and 12.7), based on estimates provided by the Office for National Statistics (ONS). This growth will put increased pressure on highway and transport infrastructure which will need to be managed to be able to cope with the demand.

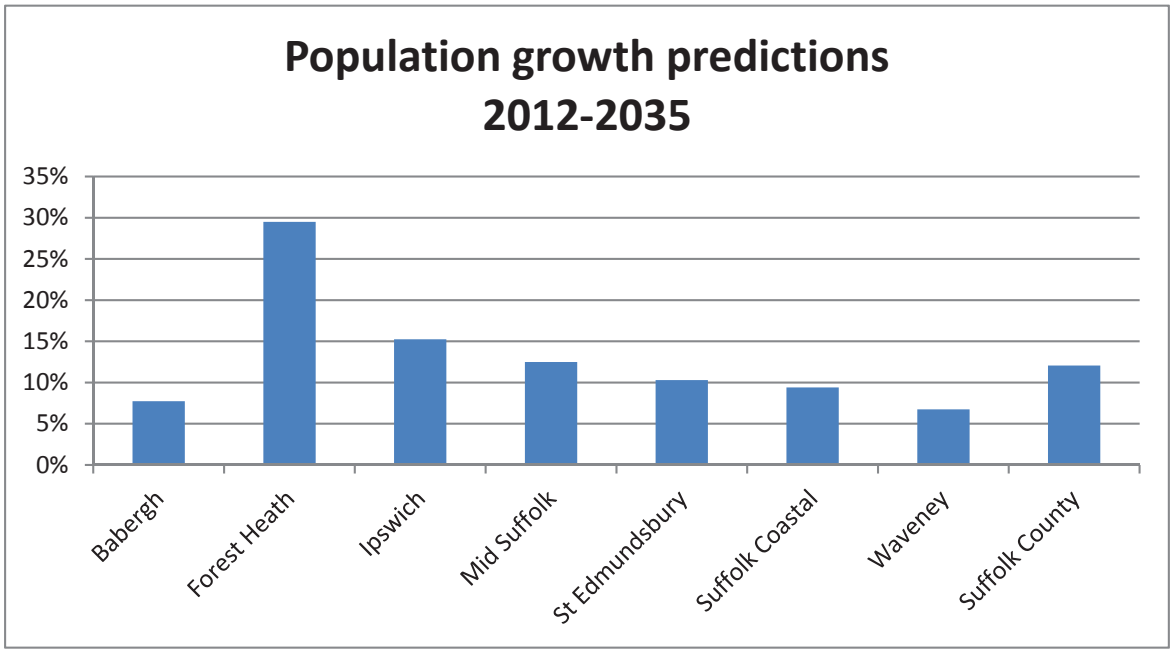

Figure 12.7 - District population growth 2012-2035 (ONS)

12.2.9 - Local Transport Plan

The Council has produced three Local Transport Plans since 2001 to help guide the future of transport in Suffolk. Suffolk's latest Local Transport Plan has a long-term strategy covering the period 2011 through to 2031.

The plan aims to support Suffolk's economy as it recovers from the economic recession – with a strategic focus on reducing the level of disruption and congestion to improve access to jobs and markets. Key aspects to delivering the vision will be maintenance of the network - improvements to walking, cycling and public transport; and improved levels of accessibility to key services. The Local Transport Plan builds upon individual district assessments of envisaged growth both residentially and commercially. In particular:

- Growth of ICT and ICT based businesses;
- Expansion of the Port of Felixstowe;
- The "Energy Coast", including offshore wind and renewable energy focused around Lowestoft and the development of Sizewell C nuclear power station;
- Construction of SnOasis;
- Development of University Campus Suffolk (UCS) as a research centre;
- Development and growth of biotech in West Suffolk and around UCS;
- Growth of equine related organisations around Newmarket.

Within the 20-year delivery period of the plans are a number of strategically important transport improvement schemes (a number of which have already been completed including):

- Dualling of the A11 between Barton Mills and Thetford (complete);
- The Ipswich major scheme, 'Ipswich - Transport fit for the 21st Century', otherwise known as 'Travel Ipswich' (complete);

- The Beccles rail loop allowing increased frequency of trains between Ipswich and Lowestoft (complete);
- The Beccles southern relief road;
- The Lowestoft northern spine road to help remove through traffic from the town (complete);
- Ipswich rail chord to improve freight connections from Felixstowe (complete);
- Copdock A14/A12 junction improvements.

12.3 Potential future cost saving options

Population growth is likely to lead to traffic growth and highway asset growth. Contributions from developers will not cover the costs of maintaining these additional assets indefinitely, so either additional funds will be required, or savings will need to be made. Good asset management will improve economy, efficiency and effectiveness, but the question of how to make further savings remains. The Future Highways Research Club's work (sub-section 10.4 above) has identified a number of possible options to help respond to this, although it is recognised that some are not without difficulty:

1. Removing highway assets from day-to-day/cyclic maintenance e.g. removing safety fence and pedestrian guard rail that is no longer required by the current nature of the highway
2. Decommissioning highway – e.g. transferring responsibility for roads that are not of general public benefit to those that it directly serves such as those leading to single properties such as farms;
3. Restricting future developments to using materials on roads that are proposed to be "adopted" as future public highway that provide best whole life costs -commuted sums do not cover whole life maintenance costs for less optimal solutions;
4. Combining service provision with other local highway authorities (known as 'shared services'), possibly through the current devolution process being promoted by central government. This tends to be easier when large county council networks abut or envelope smaller city or metropolitan areas;
5. Using innovative techniques to increase use of reusable and recycled materials.

Section 13 – Risks to the adoption of an asset management approach

The high level risks for the HIAMP currently envisaged and actions to be taken if risks occur can be seen in Figure 13.1 below.

Item	Plan assumption	Risk	Action if risk occurs
1	The HIAMP is based on operating with reliable IT hardware, highway management and pavement management systems.	Failure of systems will impact on ability to identify work at the correct intervention, will prevent works ordering and the effective management of customer service requests.	Adoption of actions as outlined in Suffolk Highways' business continuity plans.
2	The HIAMP relies upon a non-exceptional winter.	Exceptional adverse winter weather will lead to higher levels of defects requiring reactive repair than have been anticipated.	Predictions and budget disaggregation will be revised and updated in the event of an abnormal winter.
3	No significant 'drought' event occurs that impacts the network.	Drought events lead to higher levels of deterioration in parts of the network founded on 'fen soils' that are susceptible to cyclic shrinkage and swelling.	Predictions and budget disaggregation will be revised and updated in the event of prolonged drought events.
4	No significant flood damage occurs on the network.	Flooding will lead to higher levels of defects requiring reactive repair than have been planned for. Significant events could lead to the failure of key assets.	Predictions and budget disaggregation will be revised and updated in the event of significant flood damage.
5	Some staff don't adopt the data-led asset management approach	There is a dilution of the benefits achieved.	Strong leadership, appropriate training and systems will mitigate. Any signs of non-compliance by staff will be quickly dealt within through training, informal or, if necessary, formal disciplinary action.

Item	Plan assumption	Risk	Action if risk occurs
6	Deterioration rates and levels of defects are based on current data which for some assets (e.g. footways) is limited.	Assets deteriorate more rapidly than has been predicted resulting in insufficient levels of investment.	Levels of planned and reactive maintenance to be revised accordingly.
7	Resources will be available to implement improvement actions.	Pressures on resources mean that HIAMP improvement actions cannot be supported resulting in failure to achieve required efficiencies.	Target dates for improvement actions will be realistic and, if appropriate, revised and reported formally within the annual performance report.
8	Available budgets will as a minimum be similar to 2015/16 levels plus inflation.	External pressures may mean that funding reductions are applied to highway services.	Service standards will be revised to affordable levels.
9	Construction inflation will remain at a similar level to the last 5 years.	Construction inflation will increase the cost of works and an adverse rise will impact on the cost of work that needs to be delivered to meet the required service standards.	Service standards will be reviewed and revised to affordable levels. Suffolk Highways will also review its various supply chain management, procurement arrangements and practices
10	Any increase in assets will be matched by sufficient additional highway maintenance funding being provided.	Increase in new development results in increased assets to maintain.	Commuted sums obtained where appropriate. Budgets and predictions will be revised and the annual plan will be updated.
11	Political pressure leads to schemes not required by asset management approach being proposed	Inappropriate scheme choice will lead to a serious dilution of the benefits of an asset management approach being obtained.	Those applying pressure will be reminded that a Cabinet-endorsed asset management approach has been adopted by the approval of the HIAM Policy, Strategy and Plan documents.

Item	Plan assumption	Risk	Action if risk occurs
12	Public reaction to revised asset management approach is negative.	Negative public opinion could dissuade the Cabinet that this is the right course of action	Mitigation through public consultation of the HIAMP with a communications strategy that explains why the new approach is to be adopted and what is different, whilst providing future works detail.

Figure 13.1 – High level risks and actions should risks arise

Appendices

Appendix 1 – Carriageways, Footways and Cycleways

1 Situation as at 1 April 2016

This asset group consists of all carriageway, footway and cycleway assets in Suffolk with the exception of trunk roads (managed by Highways England) and private roads.

These assets are maintained by Suffolk Highways based on outcomes measured through a 'Performance Management Framework'. The extent to which these outcomes are achieved is influenced by the extent of operational performance measures (OPMs) delivery.

Suffolk Highways holds inventory and condition data on these assets in its '*Insight*' database from Symology. A gap analysis review recommended that some data, mainly in the area of footways and cycleways, be collected to enable the principles of asset management to be applied more effectively.

2 Asset Condition

Carriageways, footways and cycleways are categorised into various homogeneous groups based on use and location. This is defined within the Highway Maintenance Operational Plan (HMOP).

3 Maintenance Strategy

3.1 Introduction

Using *Insight* software, Suffolk Highways will develop a rolling three-year indicative works programme based upon the predicted future condition of Suffolk's road, footway and cycleway networks. The software will enable Suffolk Highways to undertake a proactive approach using more preventative treatments. The multi-year programme will focus on delivering the right treatment at the right time for the greatest long-term benefit.

3.2 Programme development

Works programme development has historically been undertaken on an annual basis. As Suffolk Highways improves processes to support asset management, there will be a move towards longer term rolling works programmes that will give greater certainty of funding need.

In order for Suffolk Highways to follow current best practice, a data driven approach will be incorporated into the works identification process with the production of a three-year programme. By fully utilising condition, inventory and other factors, defective sections of infrastructure will be located and engineering knowledge applied to produce the works programme annually.

Prospective works will consider the potential impact on the asset's condition and the benefit that a treatment will provide over the coming years in the asset's life, along with a projected future date for the next treatment intervention.

An indicative future works programme will not only help Suffolk Highways better plan and integrate its own internal works but will also aid with integrating its works with outside bodies such as statutory undertakers. Works can be designed to coincide where possible, reducing disruption and ensuring works are undertaken in a sensible order to reduce the chances of newly laid surfaces being re-excavated soon after completion.

3.3 Reactive maintenance

The highway is routinely inspected as part of the planned inspection regime detailed in the Highway Maintenance Operational Plan (HMOP).

Any defects identified as part of an inspection or following a customer report will be prioritised using the risk-based approach detailed in the HMOP and an appropriate response time allocated for its repair.

As future works programmes are prepared, Suffolk Highways highway inspections will ensure that repairs, where possible, are co-ordinated with these works programmes to promote planned maintenance over costly reactive repairs which do not enhance the overall condition of the asset.

a. Scheduled routine maintenance

Suffolk Highways provides a winter service as part of its maintenance service, across a proportion of its carriageway, footway and cycleway network.
The main winter period is from 1 October to 30 April in each year.

A *Winter Service Plan* - https://www.suffolk.gov.uk/gritting is published for each winter season detailing the level of service that Suffolk Highways will provide.

4 Inventory

In accordance with the reporting requirements of CIPFA (Chartered Institute of Public Finance & Accountancy), the quantities of each highway asset in 2016 are shown below (Figure A1.3) and consist of:

Asset Group	Element	Quantity (km)	Percentage
Carriageways	A	642	9.8
	B	733	11.1
	C	1858	28.2
	U	3355	50.9
	Total	6588	100
Footways	Total	4000 (estimated)	-
Cycleways	On-road, shared (f/way & cycleway), segregated	Data being collated	-

Figure A1.3 Highway asset statistics

5 Levels of service

There are five levels of service that can be applied to the carriageway, footway and cycleway assets:

a. Statutory minimum - meeting statutory or legislative requirements only;
b. Existing - continuance of current funding levels;
c. Requested - based on customer expectation and political aspirations;
d. Optimum - assesses constraints and desires to identify an economically optimal service;
e. Attainable - applies resource and budget constraints to the optimal service.

Suffolk Highways will assess and review the level of service that it will provide for each asset, considering the associated impact and risk for each. Contrasting levels of service can be assigned to groups of assets within each asset group. Levels of service may change if budgets dictate.

The description, costs of and implications of the varying levels of service can be seen in Figure A1.4

Level of service	Cost (2015/16 budget)	Benefit / Implications
Statutory minimum	£850k per annum (revenue) (increasing exponentially in future years)	Most works would be of a reactive nature and are primarily attendance to make safe where there is danger to public safety. No planned maintenance works will be undertaken. A statutory defence to third party claims can be made, however the frequency of Killed and Serious Injury (KSI) accidents would likely increase. Significant and rapid deterioration of the assets would increase expensive reactive costs for repairs to an unsustainable level in a relatively short period of time. Major investment across the entire asset groups would be required to bring the condition of the assets back to a serviceable level. High levels of public dissatisfaction.
Existing	£12.5m (capital) & £4.5m (revenue) per annum	Balance of reactive and planned preventative maintenance work programmes.

Level of service	Cost (2015/16 budget)	Benefit / Implications
		Managed decline in asset condition over many years. Public satisfaction levels maintained. Reduction in KSI accidents.
Requested	£12.5m (capital) & £4.5m (revenue increasing) per annum	Balance of reactive planned preventative maintenance work programmes and issues interpolated from comments received from the public and other stakeholders. Potential increase in rate of decline of asset condition as targeted preventative work programmes interrupted to deliver public and stakeholder priorities. Greatest public and stakeholder satisfaction.
Optimum	Estimated at £25m (capital) £4.5m decreasing (revenue) per annum	Significant and sustained increase in investment for planned preventative treatments will improve the overall asset condition. Improved asset condition will reduce expensive reactive works and see a significant reduction in identified and reported defects. Improvement in public and stakeholder satisfaction.
Attainable	£15m (capital) £4.5m decreasing (revenue) per annum	Stabilisation of asset condition possible with improved processes and better integration of asset management principles. Targeted investment will minimise whole life costs enabling available investment to treat greater number of assets. Improved asset condition will reduce expensive reactive works and see a significant reduction in identified and reported defects. Sustained improvement in public and stakeholder satisfaction.

Figure A1.4 Levels of Service – Descriptions, costs and implications

6 Stakeholder expectations

There are many stakeholders who interact and are impacted by the condition of carriageways, footways and cycleways and it is difficult to satisfy all individuals. Therefore, an approach is required that meets the needs of the majority.

Stakeholders can measure the carriageway, footway and cycleway maintenance service in different ways. The Performance Management Framework contains numerous measures scattered across the Suffolk Highways priority areas relating to carriageways, footways and cycleways.

From public interactions and feedback, the performance measures the public are particularly interested in is the condition of carriageways, footways and cycleways and that potholes (when they appear) are fixed at the first attempt with little or no disruption. Details can be found in sections 10, 11 and 12 dealing with each of the assets separately.

7 Lifecycle Plans

Lifecycle planning considers a number of investment/treatment scenarios to work out, from an holistic approach, which maintenance strategy is most cost effective over the life of the asset. It should be noted that this does not identify the performance of individual sections of road, for example, but groups similar types of road together.

Below are examples of two maintenance strategies for the busier road for comparison. The first strategy is for a hot rolled asphalt (HRA) only strategy, the second hot rolled asphalt with subsequent surface dressing treatments.

Treatment	years	£/m^2
HRA	0	£17.00
HRA	14	£17.00
Repeat Lifecycle	28	-
Total Cost		£34.00
Cost/m^2/year		£1.21

Treatment	years	£/m^2
HRA	0	£17.00
Surface Dressing	14	£3.50
Surface Dressing	21	£3.50
Repeat Lifecycle	29	-
Total Cost		£24.00
Cost/m^2/year		£0.83

The above, simplified example, helps to demonstrate the economic case for the second maintenance strategy and the use of surface dressing, illustrating a saving in the region of 30%.

In reality, treatment lives will vary and we can also factor in other attributable costs such as the relative cost our reactive maintenance service (pot hole repairs) and the cost of any insurance claims that we are not able to defend. Even with these factors considered, the strategy of using surface dressing in a roads lifecycle is sound.

There will always be circumstances that will require deviation from these preferred options, but they will require substantiation by the promoting asset manager. As data on performance improves and new materials are introduced, this will be reflected in updated versions of the carriageway lifecycle plan approach.

8 Network needs

In order to assess the needs of the network in terms of carriageway works, a number of exercises will be carried out annually to ensure the right approach is being followed and that expected outcomes are delivered. Firstly, simple whole life cost calculations will be carried out on condition data to provide justification for annual budget bids. In addition, computer programmes (e.g. HMEP pavement lifecycle planning toolkit) will be used to provide long-term views on the likely resources required to provide one of the following levels of service:

1. Budget Constrained (see Figure A1.6)
2. Performance managed - e.g. maintain at existing condition levels or improve or decline over time (see Figure A1.7)

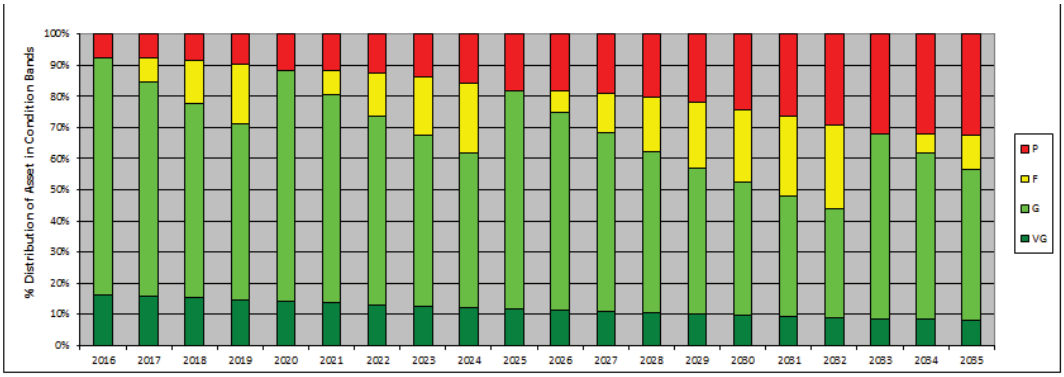

Figure A1.6 – Graph illustrating Asset Condition for a budget constrained maintenance strategy

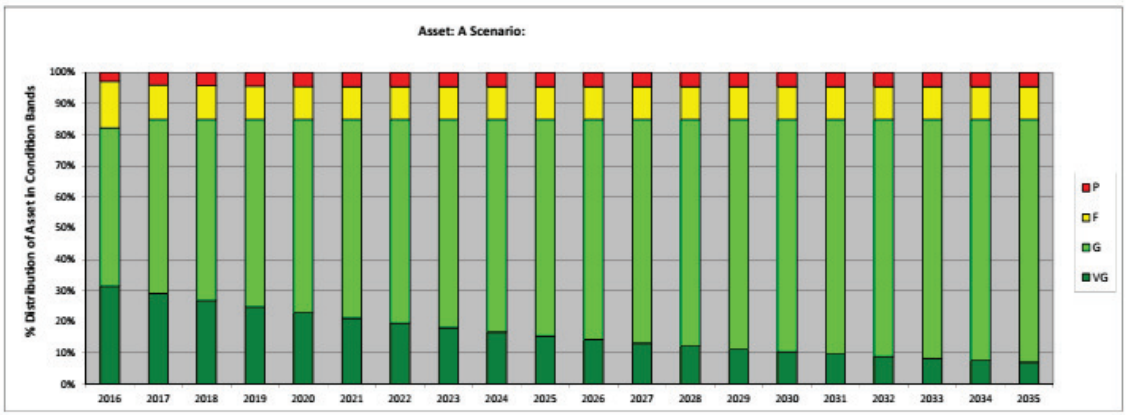

Figure A1.7 – Graph illustrating Asset Condition for a steady state maintenance strategy

Graphs will be produced which visually indicate performance and expenditure required. These will be used both to inform the Council and Central Government investment decisions.

9 Prioritisation of carriageway, footway and cycleway works

In recent years, there has not been enough money to treat all the carriageway, footways and cycleways that require it. If this continues going forward, funds will be allocated on a risk basis. Priority will be given to those roads which serve the most people or have a

high economic or social impact on Suffolk residents and businesses, to give maximum impact for any monies spent on the network e.g. the A road network. Conversely, the lowest priority will be given to cul-de-sac on both the urban and rural unclassified road networks.

10 Carriageways

a. Introduction

Carriageways as an asset group has more resources allocated to it than any other asset group. Information on this asset group has been collected for some time and accordingly more detail is currently (2016) known about this asset than both footways and cycleways.

b. Carriageway length by road category

Figure A1.1 shows the length of road in kilometres by each road hierarchy category

Hierarchy	Urban	Rural	Total
2	86.98	189.64	276.61
3a	363.97	446.29	810.27
3b	586.70	801.76	1,388.46
4a	921.37	1,961.26	2,882.64
4b	913.12	301.62	1,214.74
Total	**2,872.14**	**3,700.58**	**6,572.72**

Figure A1.1 – Road length (kilometres) by road hierarchy category

c. Carriageway condition by road category

Figure A1.2 below shows the condition of the County's carriageways by road classification as of April 2016.

Road category/condition	VG	G	F	P
A	34%	54%	10%	2%
B	17%	62%	15%	6%
C	12%	67%	15%	6%
U	6%	8%	57%	29%

Figure A1.2 – Carriageway condition by road category (April 2016). VG = very good, G = good, F= fair, P = poor

Since 2010/11, national indicators confirm that the condition of Suffolk's A, B and C classification roads have improved and our strategy will seek to continue this (see figure A1.3).

The condition of unclassified roads have similarly improved since 2010/11, albeit not to the same degree (see figure A1.2). Suffolk Highways' strategy therefore, will be to place greater emphasis on the inclusion of unclassified roads in the maintenance works programme as budgets allow, whilst ensuring the condition of the classified network is not compromised.

Suffolk Highways will continue to commission technical carriageway surveys each year ensuring that the frequency and coverage are appropriate to support a data-led approach to scheme identification to ensure investment is made on the right treatments to the right parts of the network at the optimal time.

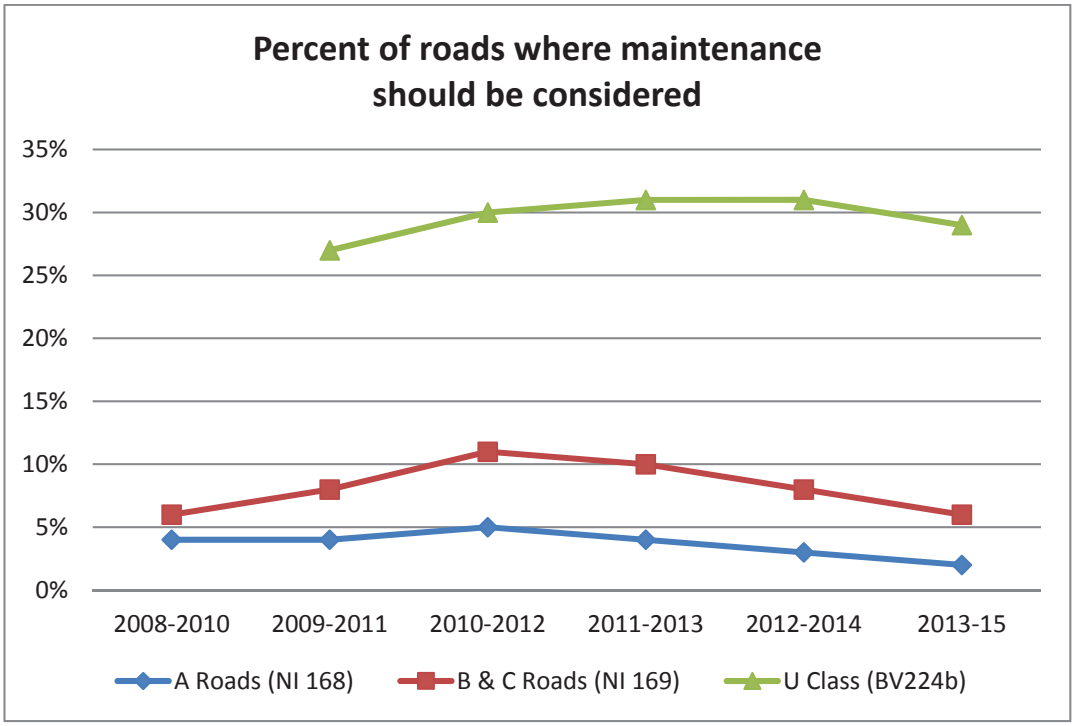

Figure A1.3 – Percentage of Roads where Maintenance should be considered

d. Inventory

In accordance with the reporting requirements of CIPFA (Chartered Institute of Public Finance & Accountancy), the quantities of each highway asset in 2015 are shown in Figure A1.4 and consist of:

Asset Group	Element	Quantity (km)	Percentage
Carriageways	A	642	9.8
	B	733	11.2
	C	1857	28.2
	U	3341	50.8
	Total	6573	100

Figure A1.4 Length of roads (km) by National road classification as held in Insight database

e. Stakeholder expectations

Published Government and NHT public satisfaction survey statistics indicate that the condition of Suffolk's carriageway assets has improved over the last couple of years, but feedback from the public is indicating that this needs to improve further.

From public interactions and feedback, the performance measures the public are particularly interested in is the condition of carriageways and that potholes (when they appear) are fixed at the first attempt with little or no disruption.

This is demonstrated in the NHT Survey where members of the public answer key questions relating to highways services in their respective localities including:

- Condition of highways KPI 23 – SCC currently at national average
- Condition of road surfaces HM01 – SCC above national average
- Condition of cycleways WC10 – SCC above national average
- Repair to damaged roads/carriageways HM06 – SCC below national average
- Quality of repair to roads/pavements – HM07– SCC above national average

Results over the past 5 years compared to the national average are shown in Figure A1.5.

Indicator	Description	2011	2012	2013	2014	2015	Difference (2014-15)	National average (2015)
KPI 23	Condition of highways	44	43	36	37.4	41.3	+3.9	At
HM01	Condition of road surfaces	41.3	42.3	35.8	35.8	41.3	+1.9	Above
HMO7	Speed of repair to damaged roads/carriageways	33.6	33.8	28.6	28.2	31.3	+2.9	Above
HM08	Quality of repair to roads/pavements	41.7	40.3	37.9	36.7	40.4	+2.1	

Figure A1.5 Changes in NHT scores relating to carriageways from 2011 to 2015

f. Maintenance approach

Lifecycle plans aim to create generic treatments which minimise the costs over the whole life of the asset. Lifecycle plans have been created for carriageways which has led to a number of generic preferred solutions.

Asphalt carriageways

- Urban – Inlaid 40mm hot rolled asphalt surfacing followed by surface dressing twice (more for lower category roads) and repeat;
- Urban – Inlaid 100mm hot rolled asphalt surfacing and/or structural patching followed by surface dressing twice (more for lower category roads) and repeat;
- Rural - 40mm hot rolled asphalt surfacing (laid over existing road structure where possible) followed by surface dressing twice (more for lower category roads) and repeat;
- Rural - 100mm hot rolled asphalt surfacing (laid over existing road structure where possible) and/or structural patching followed by surface dressing twice (more for lower category roads) and repeat;
- Urban/rural (high stress/low traffic volumes) – Micro-surfacing

Concrete carriageways

- Urban/rural – Joint repairs between concrete bays;
- Urban/rural – Re-texturing surface course and joint repairs between concrete bays (if appropriate)

Thin asphalt covered carriageways

- Urban/rural – Joint repairs between concrete bays and overlay with suitable asphalt material (dependent on depth/usage);
- Urban/rural – re-texturing surface course and re-new deteriorating slab joints (if appropriate)

There will always be circumstances that will require deviation from these preferred options, but they will require substantiation by the promoting asset manager. As data on performance improves and new materials are introduced, this will be reflected in updated versions of the carriageway lifecycle plan approach.

Future maintenance options include the use of asphalt rejuvenators which can extend the life of existing carriageways. An asphalt rejuvenator product was used on a section of the A12 and Suffolk Highways, through its Materials, Specification and Innovations (MSI) group, is monitoring its performance with a view to adopting this into its maintenance approach.

Further investigation work into performance of asphalt rejuvenators in the eastern region has been commissioned by the East of England Highway Alliance, in partnership with Norfolk Partnership Laboratory. A report is expected in 2017 which will be considered by members of the MSI group.

Appendix 2 – HIGHWAY STRUCTURES

1. Introduction

Bridges and other highway structures are fundamental to the transport infrastructure because they form essential links in the highway network. Under the Highways Act 1980, there is a statutory obligation on highway authorities to maintain the public highway, including the structures that support it. As outlined in the draft code of practice (Well-Managed Highway Infrastructure) produced by the UK Roads Liaison Group, the obligation embraces the two essential functions of 'Safe for Use' and 'Fit for Purpose':

- 'Safe for Use' requires a highway structure to be managed in such a way that it does not pose an unacceptable risk to public safety.
- 'Fit for Purpose' requires a highway structure to be managed in such a way that it remains available for use by traffic permitted for the route.

The duty to maintain is undertaken within a context of limited maintenance budgets, increasing financial scrutiny, and a need to demonstrate that maintenance needs have been identified and prioritised in an objective manner to ensure that the funding available is targeted to achieve maximum benefit.

2. Pre-HIAMP situation

Highway structures were managed through three different Suffolk Highways groups, namely:

- Structures Team – significant highway structures;
- Public rights of way (PROW) team – all structures carrying the PROW network;
- Area highways teams – remaining small bridges, culverts and retaining walls.

The area and PROW teams were able to call on the expert support of the Structures Team when required, but did not have the structural expertise to deal with all issues. Data on structures was held in a bespoke access database only accessible by Structures Team members, even though it held data on structures managed by other teams. Due to resource levels allocated, the Structures Team was managing a gradual deterioration in the overall condition of the structure stock.

3. The asset inventory

3.1 Data held

Generally, there is a very good level of data electronically held for structures maintained by Suffolk Highways, actively managed by the Structures Team including:

- Reference (code, bridge number and name);
- Location (grid reference, parish);
- Road carried/obstacle crossed;
- Structural form;
- Primary and secondary deck materials & description;
- Span data;
- Width;
- Design or assessment details;

- Photographs;
- Owner;
- Construction date;
- If the structure is listed (i.e. a scheduled ancient monument) or of 'historic value';
- Safety data;
- Bridge condition indicator (BCI) condition data;
- Orientation;
- Inspection details (i.e. when last inspected, inspection frequency).

There is a lesser level of detail electronically held on all other structures maintained by Suffolk Highways. This data is currently held in a bespoke access database, but there are plans to transfer this to Suffolk Highways' *Insight* asset database before the end of March 2017. This will, over the medium term, aid the asset management approach for structures.

Other electronic and hard copy information for structures is also held including drawings and specifications, health and safety files, assessment reports and certification, design calculations and certification, and correspondence, all stored against the structure number. The amount of information held for each structure varies considerably.

3.2 Summary inventory details for actively managed structures

The asset inventory data for the Structures Asset Group (Figure A3.1) outlines the situation as of April 2016.

	Class of highway carried							
	A Road	**B Road**	**C Road**	**U Road**	**Byway**	**Restricted byway**	**Bridleway**	**Footway**
Bridge	169	162	298	279				
Culvert	62	62	151	151				
Retaining wall	20	36	56	50				
Significant PRoW structure					10	5	15	301

Fig A3.1 – Structures Asset Inventory

There were, in April 2016, 6126 structures on the Suffolk County Council structures register. 2864 of these structures are associated with the carriageway/footway/cycleway network, the remaining 3262 are associated with the public rights of way (PRoW) network.
The Structures Team will actively manage

- Bridges/pipes/culverts with a span greater than 900mm (smaller water carrying structures are considered as drainage assets);
- Retaining walls with a retained height greater than 1.35m

except those noted in Appendix 5, as managed by the PRoW Team (generally wooden structures of 5m span or less). Smaller structures will not be actively managed in the same way and will receive attention only when identified by highway safety inspections or members of the public as in need of attention.

4. Asset condition and maintenance regime.

4.1 Inspection, testing, and monitoring of highway structures

An inspection, testing and monitoring regime is required to mitigate risks to public safety, and provide sufficient data for effective management of the assets. Design Manual for Roads and Bridges (DMRB) code BD63/07 *Inspection of Highway Structures* and Well-Managed Highway Infrastructure provide guidance on inspection requirements. In general terms, highway structures are inspected in six ways:

- General inspections (GIs) – In accordance with BD63/37 a biennial GI is undertaken on every structure on the carriageway/cycleway/footway network. A GI involves a visual inspection of all readily accessible parts of a structure (without the need for special access or traffic management arrangements) and adjacent features that may have a bearing on the structure (e.g. river beds and banks). GI findings are recorded and stored in the format of BCI data (See sub-section 4.2). A risk-based approach is taken on the frequency of GIs undertaken on the 'significant bridges' on the PRoW network. This takes into consideration the span, material and classification of the path, and varies between 2 and 6 years;
- Principal inspections (PIs) – a PI provides more comprehensive and detailed information than a GI. PIs require a detailed 'touching distance' inspection of all surfaces, and may include additional materials and condition testing and special access or traffic management arrangements.

  PIs are undertaken every 6-10 years, the frequency being determined on a risk-based approach depending on the characteristics of each structure. PI findings are recorded in a formal report, together with BCI data.

  Due to the large number of structures and the resources/finance that would be required to undertake a 'full PI' on of all these structures, the PIs are further sub-divided into high, medium, and low level PIs. The level is determined on a risk-based review of each structure, where span, type of highway carried/crossed, and material/form are taken into consideration. High-level PIs require a 'touching distance' inspection of all surfaces, and may include additional materials and condition testing and special access or traffic management arrangements. Medium level PIs are similar to high level PIs but do not require special access or traffic management arrangements, and the report produced is slightly less comprehensive in its detail. Low level PIs are similar to a GI, but also include some additional inspector comments on key issues and some additional photographs. High and medium level PI findings are recorded in a formal report, together with BCI data. Low level PIs findings are recorded as BCI data plus associated photographs and inspector comments. Of the 1218 structures at April 2016 that are subject to PIs, 197 are high level, 354 are medium level, and 667 are low level;
- Special inspections (SIs) – where only partial inspection has been possible during a GI or PI and there are remains a concern over parts of the structure that have not been inspected, a further SI might be undertaken. These inspections might

include: confined space entry, CCTV survey, boat access, scaffold/ platform access, team access etc.;

- Emergency inspections – these usually arise as a result of a road traffic accident or as a result of severe weather incidents (e.g. wind or high river flows), when a quick response is required to check for structural damage and to make sure the structure remains safe to use by the public;
- Monitoring inspections (MIs) – These inspections are initiated as an interim measure where there is a concern regarding the condition or strength of certain elements of a structure. MIs are usually instigated following a BD 79 review (See Section 4.3). Monitoring inspections are, as of 1 April 2016, undertaken on 86 structures at frequencies ranging from 1 to 12 months, depending on the nature of the defects/weaknesses and associated risks with each structure;
- Highway safety inspections - other, less significant structures on the carriageway/cycleway/footway network that fall outside the definition of the 'Structures Asset Group' as listed in Figure 3.1 in sub-section 3.2 of the main HIAMP document (i.e. pipes/culverts with a diameter of 900mm or less, which effectively are highway infrastructure elements for the Drainage Asset Group), and small retaining walls with a retained height of less than 1.35m are only subject to routine highway safety inspections as outlined in section 4 of the Highway Maintenance Operational Plan (HMOP) and reactive maintenance undertaken where required.

  In the interests of public safety, outside party and privately owned structures that carry the highway are also subject to cursory routine inspections similar to highway safety inspections, but are not managed or maintained by Suffolk County Council.

In addition to determining and recording the condition of structures within GIs, PIs and SIs, inspecting engineers also recommend and record outline details of any maintenance work required, and any further inspection or testing works considered necessary.

4.2 Bridge condition indicators (BCI)

The County Surveyors' Society (CSS) guidance document '*Bridge Conditions Indicators'* provides a standardised framework for identifying and recording the condition of all elements of a highway structure. This guidance is commonly used by highway authorities and has been adopted by Suffolk Highways. The reporting system breaks down structures into a standardised set of elements, and uses a standardised method of reporting the condition of each element by means of defect severity and extent. The system also differentiates between primary and secondary elements i.e. those that have the greatest importance in terms of load carrying capacity, durability and public safety (e.g. deck and abutment elements), from less important elements such as surfacing and revetment elements.

This condition information is used to calculate bridge condition indicators (BCI). The BCI for each construction form and span is determined from parameters that are gathered during the inspection. These parameters are then combined and modified according to the size of element and its importance in the structure to produce two indicators:

- The average bridge condition indicator (BCI_{Ave}), which considers all elements, and provides an overview of the average structure condition;
- The critical bridge condition indicator (BCI_{Crit}), which only considers the primary load bearing elements, and provides an indication of the condition of the load bearing element that is in worst condition.

The indicators for each structure are then combined to produce an index for the entire asset group. There is an average bridge stock condition indicator ($BSCI_{Ave}$), which covers all elements of each structure, and a critical bridge stock condition indicator ($BSCI_{Crit}$) that only considers the primary elements of each structure.

For simplicity, the BSCI scores are banded into broad condition descriptions which are as indicated in Figure A2.1. (It is important to note that the descriptions and comments shown in the table are only generalisations, and may not reflect the true nature of every set of assets).

BSCI Score	Condition description	Average Stock Condition	Critical Stock Condition	Additional comments
100 - 95	Very Good	The structure stock is in a **very good** condition. Very few structures may be in a moderate to severe condition.	Very few critical load bearing elements may be in a moderate to severe condition. Represents **very low risk** to public safety.	If it is a relatively new stock of structures, then an appropriate maintenance funding level needs to be identified through asset management and best value. If it is a mature stock, then continuing with the same level of funding is likely to sustain a high condition score and an effective preventative maintenance regime.
94 – 90	Good	The structure stock is in a **good** condition. A few structures may be in a severe condition.	A few critical load bearing elements may be in a severe condition. Represents **low risk** to public safety.	Historical maintenance funding levels have been at an appropriate level to maintain a good stock condition. These levels of funding should be continued to ensure condition is maintained and resources are concentrated on preventative maintenance activities.
89 – 80	Fair	The structure stock is in a **fair** condition. Some structures may be in a severe condition.	Some critical load bearing elements may be in a severe condition. Some structures may represent a **moderate risk** to public safety unless mitigation measures are in place.	Historical maintenance work may be under funded and structures may not be managed in accordance with best value principles, implementation of asset management is essential. Potential for rapid decrease in condition if sufficient maintenance funding is not provided. Moderate to significant backlog of maintenance work.
79 – 65	Poor	The structure stock is in a **poor** condition. A significant number of structures may be in a severe condition.	A significant number of critical load bearing elements may be in a severe condition. Some structures may represent a **significant risk** to public safety unless mitigation measures are in place.	Historical maintenance work under funded and structures may not be managed in accordance with best value principles, and asset management. It is essential to implement asset management practices to ensure work is adequately funded and prioritised and risks assessed and managed. Significant to large backlog of maintenance work, essential work dominates spending.

64 – 40	Very Poor	The structure stock is in a **very poor** condition. Many structures may be in a severe condition.	Many critical load bearing elements may be unserviceable or close to it and are in dangerous condition. Some structures represent a **high risk** to public safety unless mitigation measures are in place.	Historical maintenance work significantly underfunded and a large to very large maintenance backlog. Asset management regime is essential. Reactive approach to maintenance that has been unable to contain deterioration. A significant number of structures likely to be closed, have temporary measures in place, or other risk mitigation measures. Essential work dominates spending.
39 - 0	Severe	The structure stock is in a **severe** condition. Many structures may be in unserviceable or close to it.	Majority of critical load bearing elements unserviceable or close to it and are in dangerous condition. Some structures represent a **very high risk** to public safety unless mitigation measures are in place.	Historical maintenance work grossly underfunded and a very large maintenance backlog. Reactive approach to maintenance that has been unable to prevent deterioration, only essential maintenance work performed, Asset Management is essential. Many structures likely to be closed, have temporary measures in place, or other risk mitigation measures. All spend likely to be on essential maintenance.

Figure A2.1 Bridge Stock Condition Indicator Definition

4.3 Structures work bank

The structures work bank is an inventory of all outstanding work items required on the network together with the estimated cost for doing the work. Details recorded include defect severity and extent, estimated costs and recommendation as to when work should be carried out.

4.4 Structural assessments and sub-standard structures

The purpose of a structural assessment is to determine the ability or capacity of the structure to carry loads which are imposed upon it, (or might be reasonably expected to be imposed upon it in the foreseeable future) with an adequate level of safety. Assessments are usually undertaken using increasingly sophisticated methods of analysis, starting with simple and cost effective conservative techniques, increasing to more sophisticated and costly methods where necessary, with associated materials testing and site specific loading criteria.

A process of structural review (following the recommendations of the DMRB code BD 101/11 *'Structural Review and Assessment of Highway Structures'*) should be implemented, whereby changes in use, loading, or condition are considered to determine if the existing structural assessment is still valid – if not, re-assessment is required.

Sub-standard structures can be broadly split into two categories:

- Those that have failed a structural assessment;
- Those that are in such poor condition that their ability to sustain full assessment loading with an acceptable level of confidence is questionable.

The definition of sub-standard structures does not apply to structures with sub-standard non-primary load carrying elements that are not directly affected by carriageway loading (e.g. sub-standard parapets, or bridge supports at risk from collision). DMRB code BD 79/13 '*The Management of Sub-Standard Highway Structures'* provides guidance on a risk-based approach to the management of sub-standard structures.

There are a number of options for managing sub-standard structures, and all take a risk-based approach:

- If the risks are unacceptable, the road may have to be closed, a structural weight restriction placed on the bridge, or other interim measures implemented, such as propping, traffic management, or monitoring pending strengthening works;
- Alternatively, if the risk to the public is considered to be acceptably low, this is substantiated and recorded in the risk assessment, which is then subject to periodic review.

In some cases, implementing a permanent structural weight restriction might be considered to be acceptable (e.g. when the cost of strengthening or reconstruction are disproportionately high and the need to carry full highway loading is deemed to be low, or when there are suitable alternative routes for larger vehicles). In other cases, structural weight restrictions are used as an interim measure.

Any arrangements for managing a sub-standard structure need to be regularly reviewed to ensure that the arrangements are still appropriate. BD 79/13 recommends that this is done biennially.

4.5 Sub-standard structures and how they are managed

A programme of structural assessments has been undertaken on the County's Structures Asset Group to check the capability of structures to carry 11.5T axle loads and up to 44T gross vehicle weight, as permitted by the current *Authorised Weight Regulations*. A process of structural review (following the recommendations of the DMRB code BD 101/11 '*Structural Review and Assessment of Highway Structures'*) is used, whereby changes in use, loading, or condition are considered to determine if the structural assessment is still valid. Structural reviews are undertaken on all structures that require a high or medium level PIs, and when any significant deterioration or defect is found during any other inspection.

Management of sub-standard structures is undertaken largely in accordance with the guidance in DMRB code BD 79/13 '*The Management of Sub-Standard Highway Structures'*. As of April 2016, 43 sub-standard structures have had a BD79 review and decisions have been taken on how these structures are to be managed. The intention is that BD 79 reviews are re-visited every three years, to ensure that any interim arrangements are still appropriate. There are currently 86 structures where interim measures have been implemented. These are summarised in Figure A2.2.

Type of Interim Measure	**Number**		
	A Road	**B Road**	**C or U Road**
Monitoring inspections only.	12	7	39
Monitoring inspections and structural weight restriction.	0	1[#]	21[#]
Monitoring inspections and temporary over-bridging.	0	1	0
Monitoring inspections and traffic management.	1	0	4
Total	13	9	64

Figure A2.2 Structures on which interim measures have been implemented

[#] 7 of the highway bridges currently subject to a structural weight restriction are owned by Network Rail and 1 is owned by the Environment Agency.

- There are, as of April 2016, a backlog of 105 structures that require a BD79 review to be completed to determine and formally record how they are to be managed. Whilst there is a backlog of reviews required, the level of risk is considered to be low, as interim measures are already in place on some of the structures and many of the weak elements are not located directly under the carriageway.

4.6 How new assets are managed

New assets are predominately created as a result of:

- New structures being constructed by outside parties that are then adopted by the highway authority;
- New structures constructed by the highway authority, usually as part of a new highway scheme.

There is a process in place whereby all new structures are required to follow a technical approval process. This process follows the guidance contained in BD 2/12 '*Technical Approval of Highway Structures'*, and enables new structures to be 'registered' and the database updated. The technical approval process ensures that any new assets meet the requirements of the County Council and are designed and detailed with durability and whole life costing taken into account.

4.7 How asset changes are managed

When significant changes are made to assets as a result of major maintenance, strengthening or replacement the BD 2/12 technical approval process is followed. This enables the structures inventory and condition details to be updated. As with new structures, the technical approval process ensures that proposals meet the requirements of the County Council and are designed and detailed with durability and whole life costing taken into account.

4.8 BCI data as of April 2016 (See sub-section 4.2)

The range of BCI_{Ave} and BCI_{Crit} values for all structures in the County's Structures Asset Group as of April 2016 is summarised in figure A2.3.

	Carriageway/footway cycleway network				PROW network			
Condition description (BCI Range)	**BCI_{Ave}**		**BCI_{Crit}**		**BCI_{Ave}**		**BCI_{Crit}**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Very good (100-95)	112	7	338	21	22	7	38	12
Good (94-90)	240	15	58	4	34	10	2	1
Fair (89-80)	617	38	303	18	103	31	39	12
Poor (79-65)	582	35	445	27	117	36	124	38
Very poor (64-40)	87	5	353	21	50	15	63	19
Severe (39-0)	6	<0.5	147	9	2	1	62	19

Fig A2.3 – Bridge Stock Condition Indicators for all structures in Suffolk

The current $BSCI_{Ave}$ and $BSCI_{Crit}$ values for the County's Structures Asset Group are as shown in Figure A2.4:

	$BSCI_{Ave}$	**$BSCI_{Crit}$**
Carriageway/footway/cycleway network	83.01	71.65
PROW network	76.75	61.35

Figure A2.4 – Bridge stock Condition Indicator scores by asset group for Suffolk structures

The history of $BSCI_{Ave}$ and $BSCI_{Crit}$ is shown in Figure A2.5.

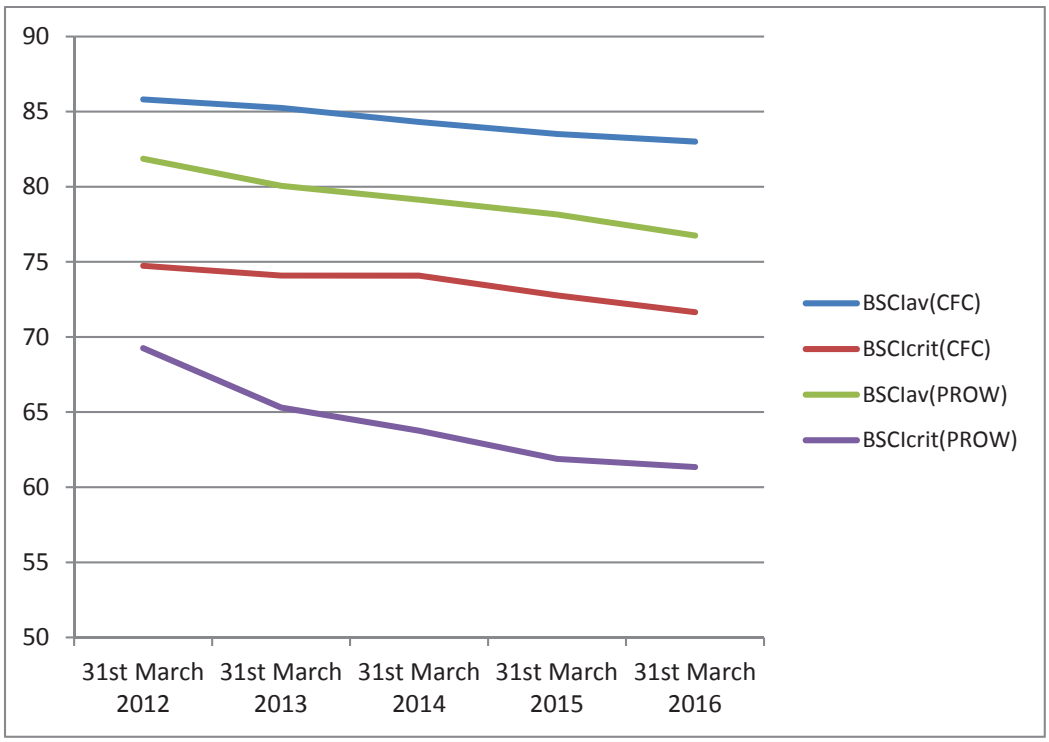

Fig A2.5 Bridge Stock Condition Indicator trends 2012 to 2016

Due to financial constraints over recent years, the asset management strategy has been to manage the gradual deterioration of the Structures Asset Group, whilst ensuring they remain "Safe for Use", and that the availability of the most important parts of the network is maintained at an acceptable level i.e. structures remain "Fit for Purpose".

4.9 Maintenance prioritisation

Objective and consistent processes need to be in place to ensure that maintenance needs are identified and prioritised effectively. This enables the available funding to be appropriately targeted to areas which contribute to effective management of maintenance needs. The process of prioritisation is also referred to as '*value management*' within Well-Managed Highway Infrastructure, and some broad guidance is given in this code on prioritisation criteria that should be considered.

Well-Managed Highway Infrastructure indicates that care needs to be taken to ensure that the value management regime is not a complex or overly involved process. It also indicates that a full value management process is only appropriate to major works, and that simplified processes should be used to deal with smaller scale moderate and minor maintenance. The output of a value management process should be a prioritised list of maintenance needs taken from the Structures Work Bank.

Well-Managed Highway Infrastructure also indicates that the list of prioritised maintenance needs then has to be further developed through a value engineering process, whereby options are appraised and schemes developed to identify the most cost effective maintenance solutions. Again, Well-Managed Highway Infrastructure indicates that a full value engineering process is only appropriate for larger schemes, and that more simplified processes should be adopted for moderate and minor works. Where there is only one practical maintenance solution, option appraisal is not required. Whole life costing should be used to assess maintenance options during the value engineering process.

Effective prioritisation processes require reliable and comprehensive asset inventory and condition information. Whilst formal and objective prioritisation processes will provide a useful and objective starting point, they still need to be overseen and interpreted/adjusted by engineers to ensure that all factors have been taken into account and appropriate judgements made. Some of the judgements made will be subjective in nature, and might include consideration of network disruption, coordination with other works, environmental/ecological constraints, local and political considerations etc.

In the event that there is not enough money to deliver all the maintenance required, some structures on low priority routes (for which alternative routes are available) may ultimately need to be closed to traffic.

4.10 Maintenance activities

The forward programme of maintenance and strengthening works broadly comprises the following types of activities:

- Cyclic maintenance
  Vegetation clearance is the only cyclic maintenance that is undertaken throughout the period April – October. This controls vegetation growth that can cause damage to structures, and is co-ordinated with the programme of inspections to ensure that as much of the structure is visible / accessible when inspections are programmed to be undertaken;
- Minor planned reactive and proactive maintenance
  These works are identified by inspectors undertaking GIs. The works are grouped together into commissioning 'work-packs' covering a number of different structures, which Suffolk Highways then details, plans, and implements. This type of work typically comprises minor guardrail & parapet repairs, removal of saplings and vegetation, minor masonry, timber, and concrete repairs, replacing missing or damaged components and fixings, minor scour repair works etc. and is typically completed within 4 - 6 months of being identified;

- Emergency reactive maintenance and repairs
  These works are typically to repair accident damage or as a result of significant and sudden deterioration in the condition of a structure. The works can vary significantly in nature, from replacing damaged guardrails or masonry, to reconstruction following failure of an element of a structure. This work is treated as a priority as it is usually required to ensure the safety of the public, with timescales ranging from 24hrs for minor accident repair, to several months for major repairs or reconstruction following an incident. Temporary/interim measures (barriers or traffic management) are often put in place very quickly prior to the works being undertaken;
- Planned intermediate reactive and proactive maintenance
  Works are identified during inspections; the works required are then developed, specified, designed and implemented by Suffolk Highways. The works usually relate to individual structures, and typically comprise concrete and masonry repairs, painting, repairs to scour damage, major repairs to parapets and barriers, tree removal etc. and are typically completed within 6 - 12 months of being identified;
- Planned component renewal
  Works are identified during inspections, which indicate that certain components have reached (or are about to reach) the end of their serviceable life. The works required are then developed, specified, designed and implemented by Suffolk Highways. The works usually relate to individual structures, and typically comprise replacement of joints, bearings, barriers, parapets, waterproofing etc., and are typically completed within 6-12 months of being identified;
- Programmed strengthening, upgrading and reconstruction works
  These works are usually the result of a BD79 review of a sub-standard structure. The reason for being sub-standard can either be due to inadequate load capacity or the poor condition or primary elements. These works relate to individual structures and range from complete reconstruction, re-decking, strengthening, or upgrading of parapets or barriers and are typically programmed 6 – 24 months in advance. However, some larger more complex schemes can have even longer lead-in times;
- Other ‘ad-hoc’ projects
  Other projects such as road/rail incursion risk mitigation measures or low height signing are also undertaken as required.

5. Levels of service.

Levels of service describe the quality and performance of service in easily understood terms, and should relate to outcomes that cover the key aspects of the service. The levels of service for specific service areas should be consistent with corporate and overall asset management goals and objectives. As a minimum, the levels of service must meet the local highways authority’s statutory duties.

The Council’s HIAM Strategy has linked levels of service to its corporate and Local Transport Plan priorities. The levels of service for Suffolk’s highway infrastructure have been broadly framed as follows:

- Safe and serviceable in relation to use;

- Provides accessibility to and from communities for people, goods and services;
- Promotes the development and maintenance of sustainable communities;
- Contributes to wider sustainable economic growth;
- Appropriately maintained to conserve its usefulness, value and integrity for current and future users;
- Maintain sustainably to minimise our effect on the environment.

which fall into statutory, existing, requested, optimum or attainable levels of service.

The intention is for appropriate, specific, and measureable levels of service to be developed for each service area that are aligned with the factors outlined in the six bullet points above.

Levels of service are used to inform the asset management process including prioritisation of maintenance works, and lifecycle planning processes.

In accordance with the guidance contained in the Well-Managed Highway Infrastructure, 'condition', 'availability' and 'reliability' will be defined and measured as indicated in Figure A2.6:

	Structures on carriageway/footway/cycleway network			Significant bridges on the PRoW network	
	Condition	Availability	Reliability	Condition	Availability*
Level of service reference	**Description and performance indicator**	**Description and performance indicator (all to be measured by the type and number of restrictions in place)**	**Description and performance indicator (all to be measured by the number of high, medium & low level risk[$] sub-standard structures on the network.)**	**Description and performance indicator**	**Description and performance indicator**
1 (Statutory)	Manage the ongoing decline in the condition, but maintain a minimum $BSCI_{Crit}$ value of 65 (i.e. do not allow the overall condition of critical elements to drop into the very poor band of condition)	No structural weight restrictions <7.5T on the resilient network and no unacceptable[#] structural weight restrictions on other parts of the network.	Some high level of risk sub-standard structures on the resilient network.	Manage the ongoing decline in the condition, but maintain a minimum $BSCI_{Crit}$ value of 55	<4% of structures closed to public at any time.
2 (Existing)	Maintain the current overall condition as measured by the $BSCI_{Ave}$ and $BSCI_{Crit}$ indicators – Currently, 83.01 and 71.65 respectively.	No structural weight restrictions <18T on the resilient network and no unacceptable[#] structural weight restrictions on other parts of the network.	Only low and medium level of risk sub-standard structures on the resilient network, and some high level of risk sub-standard structures on the remaining network.	Maintain the current overall condition as measured by the $BSCI_{Ave}$ and $BSCI_{Crit}$ indicators – currently 76.75 and 61.35 respectively.	<3% of structures closed to public at any time.
3 (Requested)	As existing, plus improve the condition of the structures on the Resilient Network, such that no structure has a BCICrit < 'a Requested Value' that is greater than existing but less than 90	No unacceptable[#] structural weight restrictions or traffic management restrictions on structures on the resilient network.	Only low and medium level of risk sub-standard structures on the network.	Improve the BSCICrit > 'a Requested Value' that is greater than existing but less than 90	<3% of structures closed to public at any time and any 'Requested' and agreed bridges to remain available for use.
4 (Optimum)	As existing plus improve the condition of the structures on the Resilient Network, such that no	No unacceptable[#] structural weight restrictions or traffic management restrictions on any structures on the network.	Only low level of risk sub-standard structures on the network.	Improve the $BSCI_{Crit}$ >90 (i.e. good condition).	<1% of structures closed to public at any time.

	structure has a BCI_{Crit} <90 (i.e. Good condition)				

Figure A2.6 Proposed definitions for measuring level of service actually provided

[#] Unacceptable situations are those where the restriction causes significant disruption or limits access required to businesses and properties – This does not include situations where there is a readily available alternative route or where demand for HGV use is considered to be negligible.
[$] The level of risk (low, medium or high) will be determined during the BD 79 review process by consideration of the likelihood and consequences of failure.
* The intention is that any PRoW structure that has to be closed to the public due to safety concerns should be repaired/replaced and reopened within 12 months.

6. Lifecycle planning.

Lifecycle planning is the process of developing a long-term strategy for managing an asset (or group of similar assets) with the aim of providing the required performance whilst minimising the whole life costs i.e. identifying the best type and time for maintenance interventions to minimise whole life costs. Lifecycle plans are used to identify maintenance cycles and intervention thresholds.

Whole life costs are the costs of all items/activities that need to be considered in a whole lifecycle cost analysis, including operation, and maintenance costs. Comparison of whole life costs for alternative solutions have to be made over a specified period of time. To be effective, lifecycle planning requires consideration of an extensive range of key parameters:

- Expected deterioration mechanisms and rates of deterioration;
- Service lives of asset components/elements;
- The required level of asset condition/performance;
- The impact of maintenance activities on asset condition/performance and future deterioration;
- Statutory requirements in relation to asset condition/performance;
- The expected costs of maintenance and renewal activities;
- Any service disruption and impact on public/communities/businesses as a result of undertaking or not undertaking works.

Integrating and balancing the above considerations into a lifecycle planning analysis for complex assets such as highway structures is a very challenging process that requires significant resources, data, and the development of robust and objective systems and procedures.

Lifecycle planning for highway structures has the potential to become a complex and involved activity and, as such, should only be applied in appropriate situations and to an appropriate level of detail. The approach can either be applied generically to groups of structures, or applied to individual structures.

It is our intention to start lifecycle planning for a small number of significant structures on the resilient network initially, and to slowly increase the number of structures for which lifecycle planning is utilised, as resources allow.

7. Risk management

Risk management underlies many of the processes associated with asset management. For structures asset management this includes considering risks when:

- Determining inspection programmes and policies;
- Managing sub-standard structures;
- Developing levels of service and performance indicators;
- Prioritising maintenance works and developing a forward programme of works;
- Developing lifecycle planning processes;
- Carrying out day-to-day management.

The risk-based approach to these issues needs to take account of likelihood and consequences, and the approach taken should be documented and subject to periodic review. The advice contained in the UKRLG Highway Infrastructure Asset Management Guidance and Well-Managed Highway Infrastructure makes reference to risk management principles. Risk management principles are used to inform the decision-making process for the management of highway structures.

8. Proposed developments

It is essential that collection and recording of inspection data (defects, severity, extent, causes, interpretation of testing, maintenance required) is undertaken to a high and consistent standard, because this information provides the raw data upon which good asset management relies. The inspection role is therefore critical, and this has been recognised by the industry by the recent introduction of an "Inspector Competency Training Scheme". The Suffolk Highways Structures Team proposes to adopt this scheme to ensure that inspectors have the knowledge, experience, and skills required to provide high quality information. Inspectors will be required to demonstrate competency in accordance with this scheme by 2018.

Additional resources are being secured to address the backlog of BD 79 reviews that are required. The aim is to complete the outstanding reviews by March 2018, to ensure that all structures that are weight restricted or have interim measures in place have been subject to a BD 79 review that records the reasons why these steps have been taken.

The existing BD79 review process will be developed by March 2018 to incorporate an objective method of measuring the level of risk associated with any sub-standard structure and any interim measures implemented. This risk score will be used in the prioritisation of works and as a performance indicator in relation to a reliability level of service.

To enable the monetary value of the work bank to more accurately reflect the total value of outstanding work items required, the following changes are proposed by the end of December 2016:

- All works items will be recorded at GIs (i.e. not just those that are considered to be 'affordable');
- An approximate monetary value will also be recorded for any bridge strengthening/reconstruction schemes identified as being necessary as part of the BD 79 sub-standard structures review process. (This approximate value will be developed / updated as schemes progress through the design process.)

The intention is for appropriate, specific and measureable levels of service to be developed for the structures service area by March 2018.

In the short term, Suffolk Highways will transfer asset data from its bespoke Access database to *Insight* and, over the longer term, will work with Symology to improve the functionality of the structures module of *Insight*.

Whilst the existing asset inventory information that is held on the Structures Asset Group is extensive, some additional data needs to be collected to enable valuations to be made:

- Average critical headroom;
- Distance of elements from spray zone;
- Whether in a rural, urban or marine environment;
- Is the structure on/over a salted route;
- Traffic flow category.

This additional data will initially be collected using a relatively crude 'desk-top' approach and the data will then be confirmed / refined during GI visits over the next two years.

Subject to funding, it is proposed that a more rigorous and measurable approach is taken in relation to providing the safe for use and fit for purpose levels of service, and that this approach will also take account of the need to provide a higher levels of service for structures on the resilient network.

In addition to these levels of service, a structures work bank performance indicator (i.e. a measure of the level of investment required to address all outstanding maintenance needs) will also be monitored for all structures in the Structures Asset Group.

All of the above levels of service/performance indicators will be reported on an annual basis. At the end of the first year of implementing/measuring these new levels of service, and in conjunction with the overall asset management strategy approach and an understanding of the financial constraints placed on the service, the proposed levels of service to be provided in the following year will be determined.

There is currently no rigorous formal lifecycle planning process in place. However, some of the factors that need to be taken into account in a formal lifecycle planning process (as outlined in section 6 above) are considered when determining the forward programme of work as part of the process of using engineering judgement to determine the most appropriate maintenance strategy, such as:

- Expected deterioration mechanisms and rates;
- Residual service life of elements and components;
- The impact of maintenance activities on asset condition/performance and future deterioration;
- Statutory requirements in relation to asset condition/performance;
- The expected costs of maintenance and renewal activities;
- The risks to public safety or those carrying out work;
- Any service disruption as a result of undertaking or not undertaking works;
- Any impacts on the public/communities/businesses due to undertaking or not under-taking works.

Instigating rigorous lifecycle planning processes for each and every individual structure is not considered to be an appropriate measure at this time, as the costs associated with implementing this strategy will outweigh the benefits. It is proposed to initially introduce in 2017 more rigorous and objective lifecycle planning processes for the more significant

structures on the resilient network, before considering expanding this approach to other structures on the network.

Appendix 3 - Street lighting signs, bollards and other illuminated assets

1. Situation as of 1st April 2016

This asset grouping comprises all street lights, illuminated signs, illuminated bollards and other illuminated assets that are owned by the County Council as the local highway authority, complete with stand-alone electrical control points.

The illuminated assets are maintained by Suffolk Highways, based on outcomes set out in its performance management framework (and separately supported by operational performance indicators).

A Part-Night Lighting Policy (see Appendix 3A) is in place whereby street lighting, mainly found in residential areas, is switched off between midnight and 5:30am subject to exemption criteria. Street lights above 6 metres, generally on traffic routes, operate all night and can be dimmed as road use decreases through the night.

A central management system (CMS) has been installed to all County Council-owned street lighting to control the part-night switching, identify lights that are not working and provide data regarding energy consumed and power factor.

The CMS interfaces with Suffolk Highways' street lighting *Mayrise Asset Management System* (MAMS) to store the street lighting asset inventory and record associated inspections, defects and works history.

2. Inventory

In accordance with the requirements of CIPFA (Chartered Institute of Public Finance and Accountancy), the quantities of each illuminated asset as of July 2015 are shown in Figures A3.1& A3.2.

The ancillary items owned by SCC and used in conjunction with the main assets are private cables and control pillars that provide the electrical supply to a number of illuminated assets. The three types of electrical supply used within Suffolk comprise:

- Distribution network operator (DNO) – the network belongs to the DNO, responsible for maintaining the electrical supply and restoring supply where a fault occurs. In Suffolk, the DNO is UK Power Networks. Guaranteed Standards of Performance (GSOP) are in place to provide timescales for emergency attendance and rectification of electrical supply (Appendix 3B);
- Independent distribution network operator (IDNO) – IDNOs develop, operate and maintain local electricity distribution networks that are directly connected to the DNO's infrastructure. Currently, there are seven licensed IDNOs and two of these are active in Suffolk. The IDNOs are also responsible for maintaining the electrical supply and restoring where a fault occurs. Service level agreements (SLAs) are in place to provide timescales for emergency attendance and rectification of electrical supply (Appendix 3C);

- Private cable network – the electrical supply cable is owned and maintained by the County Council with an isolation point, located either within another asset or a control pillar, to the DNO / IDNO network. Timescales for emergency attendance and rectification of electrical supply are linked to KPIs in the Highway Services Contract.

Asset Type	Quantity
Columns up to 6.0 metres	40,367
Columns up to 8.0 metres	8,874
Columns up to 10.0 metres	4,673
Columns up to 12.0 metres	915
Subway units	370
Heritage columns	132
Feeder pillar small	306
Feeder pillar medium	961
Feeder pillar large	29
Illuminated bollards - road signs	2,550
Illuminated bollards - footpath	44
Pole-mounted street lights	1,359
Wall-mounted street lights	842
Zebra globe with road lantern combined	319
Zebra globe – stand-alone	35
School crossing wig wags	64
Horse crossing wig wags	14
Telensa base stations	47
Private cables	11,830
All illuminated signs	6,691
Control boxes	217
Radiation monitors	10
White ladies	35
Architectural lighting	185
TOTAL	**80,869**

Figure A3.1 – Asset Inventory

Not included in the CIPFA figures were an additional 39 bus stop lighting units.

There are an additional 12,110 illuminated assets maintained on behalf of 94 other local councils within the county, with the inventory stored in the MAMS. As a result of implementing part-night lighting (PNL) through a central management system, these other local authorities have had the option to upgrade their highway assets that can then be transferred to the Council to own and maintain.

Since the inception of PNL during 2012, over a hundred units have transferred, with the largest unit owner (St. Edmundsbury Borough Council) planning to transfer 1500 street lights during 2016. However, from a strategic asset management perspective, such

transfer will ideally cease or be heavily limited as this merely equates to the accumulation of additional financial liabilities for which there is currently no scope for additional maintenance funding from the Department for Transport or cost offsetting from directly attributable commuted sums.

Where new housing or industrial estates are constructed through agreements under Section 38 or 278 of the Highways Act 1980 or Section 106 of the Town and Country Planning Act 1990, a developer can request that any highway lighting installed, that complies with the Council's current specification, is adopted. Within the last 5 years, 762 units have been adopted and currently, a further 1200 have been designed and are awaiting installation.

From April 2016, Suffolk Highways will be offering a design and installation service to deliver efficiencies associated with inspections for adoptions, and to generate revenue. Again, though, from a strategic asset management perspective, adoption of these units is a further accumulation of future financial liabilities so the focus should be on resisting taking on such lighting, encouraging either the relevant parish council to act as the local lighting authority or for the establishment of a management company to maintain the lights in perpetuity.

3. Asset condition

Figure A3.2, shows the structural condition of the County Council-owned street lighting columns as of 1st April 2016.

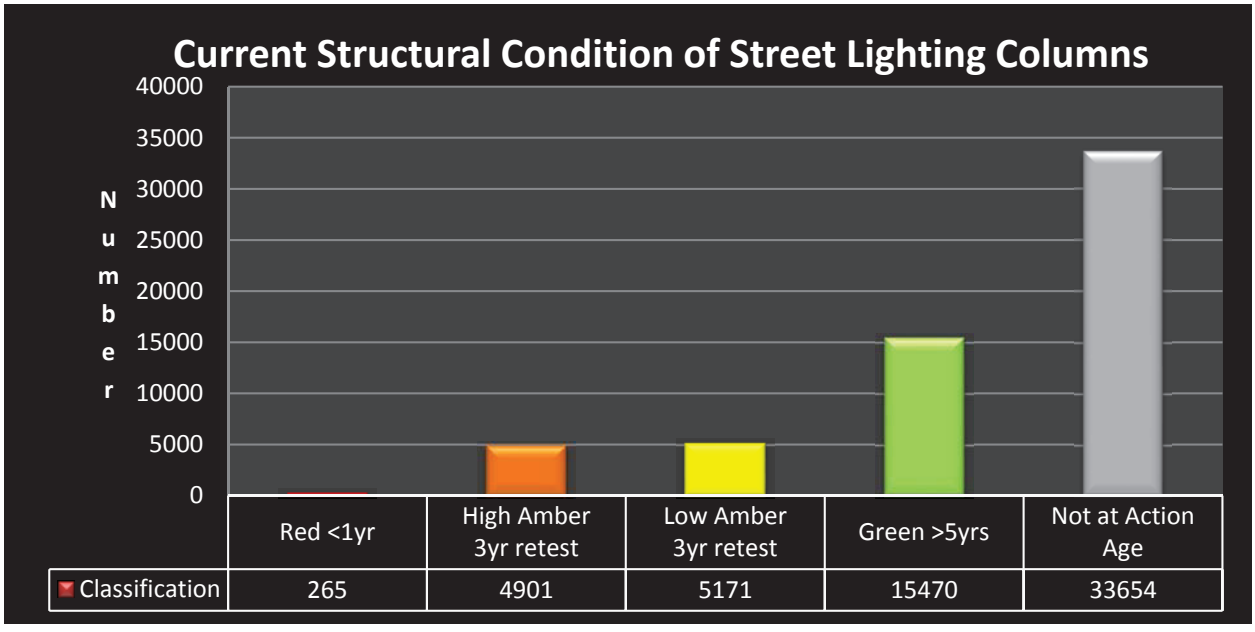

Figure A3.2 – Structural Condition of street lighting columns as of 1 April 2016

4. Maintenance regime

During each maintenance visit to an illuminated asset, a visual condition inspection is carried out and reported directly into the MAMS from the operative's hand-held personal digital assistant (PDA). Individual asset reports are categorised in accordance with the Institute of Lighting Professionals' Technical Report 22 (2007) *Managing a Vital Asset: Lighting Supports*:

- 0 - No sign of damage (good)
- 1 - Minor deterioration (fair)
- 2 - Concrete spalling / visual corrosion of metalwork (poor)
- 3 - Major deterioration (bad)

Structural testing of street lighting columns is carried out annually with results known prior to the start of the following financial year. The illuminated assets to test are selected from various criteria that include:

- Last test date;
- Scheduled next test date;
- Column age;
- Column material;
- Column location i.e. coastal / on salting routes or other known factors that form part of the TR22 suggested datasets;
- Industry guidance in relation to concerns relating to particular column type
- Suffolk Highways' local knowledge.

Structural testing is carried out using a specialist contractor for columns of steel and aluminium construction. The testing method includes a visual inspection supported by an ultra-sonic test probe that offers a full internal examination inclusive of the underground root section. The testing meets legal requirements, is in accordance with TR22 and uses web-based software to enable the Suffolk Highways lighting engineers to analyse the data.

Columns with construction of cast iron, concrete and other materials can also be tested utilising a specialist contractor that assesses structural safety (material) and position stability (anchoring) through application of a gradually increasing force that corresponds to a natural load associated with on-site wind speeds and in accordance with BS EN40.

Using a red / amber / green (RAG) reporting method, there are four categories of risk relating to failure with potential to collapse:

- Red – high risk for action immediately. Replacement recommended within 12 weeks. Where the situation cannot wait, the column is made safe and reduced in height ('stumped') to remove risk until permanent works can be carried out;
- High amber – medium to high risk. Dependent on the defect, often a 3-year retest is recommended;
- Low amber – medium to low risk. Minor remedial works can often be undertaken to remove the risk and the column subsequently re-tested to re-categorise;
- Green – acceptable. Test again within 5 years.

The retest dates for high amber and low amber are extended from the TR22 guidance, (where high amber = 3-year warranty / low amber = 3-year warranty with minor treatment recommended prior to a retest) due to improved technology used to perform this task that increases associated column life expectancy warranties.

Currently, illuminated signs, and signs for horse crossings, pedestrian crossings and school crossings are not structurally tested as there is a lower risk associated with these assets. A visual inspection is, however, carried out during each maintenance visit.

Upon each maintenance visit to an asset, the lantern glazing unit and base compartment are cleaned to maintain light distribution and safe operation of electrical equipment.
In accordance with the requirements of IET Wiring Regulations BS7671, an electrical test is undertaken to each asset every 6 years. 1/6th of the asset is tested annually, thereby ensuring each asset is tested within the 6-year cycle.

Figure A3.3 shows the material composition of each street lighting column excluding all other assets.

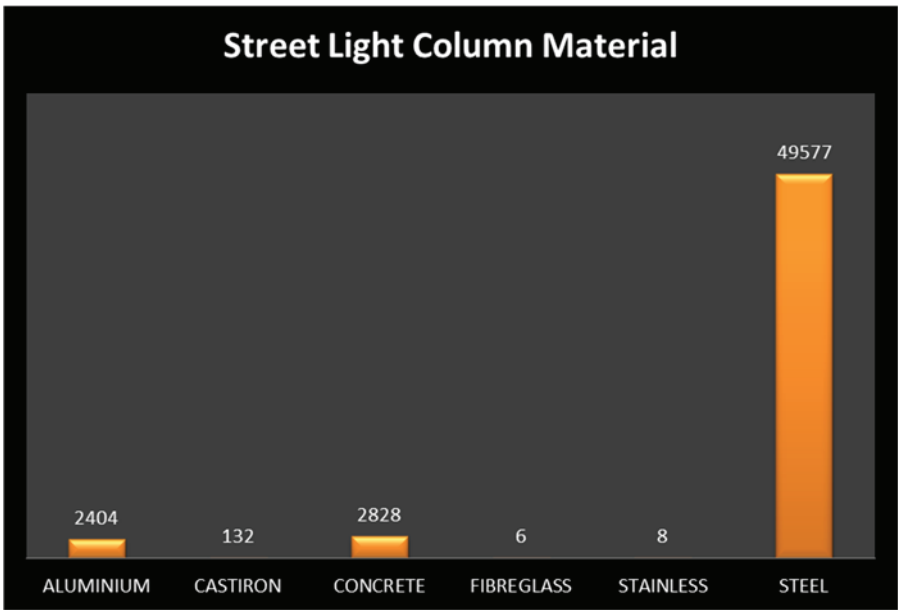

Figure A3.3 Street Lighting Column material

Although there are nearly 3000 concrete units, structural testing carried out within the last 5 years to columns of this material has provided current warranties. The fields populated in the MAMS include:

- Unit owner;
- Parish name;
- Road name;
- Unit location;
- Unit number;
- Unit type;
- Bracket arrangement;
- Access method;
- Number of luminaires;

- Lantern type (where known);
- Lamp type;
- Switch regime (control type, charge codes);
- Control gear type;
- OS grid references;
- Electrical supply type;
- Commission date;
- Installation date;
- Work history;
- Electrical test data;
- Structural test data;
- Visual inspection data;
- Lighting class in accordance with British Standards for Section 38 Works;
- Mapping showing asset location and type.

At each visit to any asset, Suffolk Highways assesses and updates the inventory with particular attention made to nine data fields:

- Unit location (i.e. outside property number etc.);
- Unit position (i.e. rear of footpath / verge etc.);
- Service owner (DNO/IDNO/private / Council-owned);
- Column type;
- Bracket;
- Control code;
- Lantern type;
- Lamp type (including control gear type);
- Gear location (integral /remote).

Within the first two weeks of a calendar month, up to 10% of assets attended during the preceding month are audited, using a hoist vehicle, to verify changes to data have occurred and are correct.

Data is also entered into the MAMS via the CMS.

5. Levels of service

There are four levels of service that could be applied to the illuminated assets:

- Statutory minimum as required by law;
- Existing levels of service provided;
- Expected levels as defined by service users and stakeholders;
- Optimum service to deliver industry best-practice.

5.1 Level 1 - Statutory

The Council is not required in law to provide street lighting. However, under the Highways Act 1980, Section 97 –

(1) …."every local highway authority may provide lighting for the purposes of any highway or proposed highway for which they are or will be the highway authority, and may for that purpose –

(a) Contract with any persons for the supply of gas, electricity or other means of lighting; and

(b) Construct and maintain such lamps, posts and other works as they consider necessary"

However, Suffolk Highways is required to maintain any street lighting it does provide in a safe condition. To achieve this level of service, most works would be of a reactive nature and are primarily attended to make safe where there is danger to public safety i.e. following vehicular impact or act of vandalism.

Planned works would consist of electrical tests every six years to comply with current editions of the Health and Safety at Work etc. Act 1974 and the Electricity at Work Regulations 1989 and in accordance with the IET Wiring Regulations (BS7671) and associated guidance notes. All results are entered into the Council's MAMS.

5.2 Level 2 - Existing

The existing levels of service includes:

- Utilisation of the central management system (CMS) to identify faults, power factor, supply faults;
- Bi-monthly 'scouting' of all Illuminated assets not controlled by the CMS, including signs and bollards, and assets owned by other local authorities within Suffolk not controlled by the CMS;
- Mobile working through personal digital assistants (PDA);
- Part-night lighting implemented in accordance with existing lighting policy (Appendix 3A).
- Dependent upon column material, approximately 10,000 structural tests carried out annually prior to end of financial year to identify structural failures and drive replacement programme during following financial year;
- Basic on-line reporting to compliment the CMS, enabling stakeholders to report faults;
- Three main operational performance measures (OPMs) specifically relating to lighting outcomes:
    - 98.5% units in lighting inclusive of maintaining asset power factor, node communications and day-lit assets;
    - 100% accuracy of inventory;
    - 99% fault rectification of street lights within 10 days from first notification.
- Secondary KPIs include:
    - Fault rectification of illuminated signs and bollards – 5 days;
    - Emergency attendance - within 1 hour of report;
    - Private cable faults (single - 28 days / multiple – 24 hours);
    - Graffiti removal (general – 28 days / explicit – 24 hours);
    - Leaning columns (where not an emergency) – 28 days.

5.3 Level 3 - Requested

Requested levels of service are considered as being as existing plus issues interpolated from comments received from the general public, Councillors and other interested stakeholders. The enquiries relate mainly to:

- Report faults
- Request status of non-operational assets in excess of 10 days from first report;
- Identify who owns an asset (where not SCC owned);
- Request lights left on during hours when part night lighting is implemented;
- Request additional / improved street lighting;
- Request shielding of assets causing light trespass onto homeowner's property.

'Lights not working' is the main reason the public, are contacting the Council's Contact Centre. These generally fall within 2 categories:

- Where repair is outside the 10-day target time;
- Where the unit is owned by a third party outside the control of SCC. As of April 2016, there are 123 other organisations that own illuminated assets within Suffolk and their respective management of the asset can impact on the Council's reputation.

No comments were received regarding the expected length of time (10 days) to repair a fault.

There are many reasons why a fault cannot be repaired within 10 days, mainly:

- Non-standard traffic management required for which noticing periods must comply with the Traffic Management Act (2004);
- Works required by third parties i.e. the DNO;
- Obstacles preventing repair i.e. scaffolding, parked cars;
- Further works required i.e. lantern replacement and quotation to unit owner required.

5.4 Level 4 – Optimum

Achieving an optimum level of service would build on existing arrangements and represent the aspirations of all stakeholders. These measures could include:

- Managing the structural condition of all illuminated assets;
- Implementing bulk lamp replacement to minimise faults, when CMS dictates;
- Implementation of CMS to all SCC-owned assets;
- Work with 'other' unit owners to install CMS to monitor their lights;
- Continuing migration of online reporting to mirror highways' 'Report it!' system.

The costs, benefits and implications associated with these four levels of service are shown below in Figure A3.4

Service Option	Approximate Cost (excluding capital / energy costs and annual fees)	Benefits / Implications
Level 1 - Statutory minimum	£265k per annum	• Increased number of inoperative streetlights • High levels of public dis-satisfaction • Many units failing structural testing may be 'stumped' resulting in high level of customer contact • Contractual claims • High costs associated with control gear failure as 'burn-to-extinction' lamp strategy. • Lower cost initially but substantial increase when strategy revised
Level 2 - Existing levels of service	£ 900k per annum	• Statutory minimum met • Routine maintenance ensures asset maintained in safe condition • Reactive works reduced • No columns 'stumped' for prolonged periods as replaced within KPI requirement • Columns remain in situ that have structurally failed
Level 3 - Expected levels	£ 950k per annum (Note that an additional £800k for energy costs would be required to compensate all-night lighting)	• Greater public / stakeholder satisfaction • Reactive works reduced • Reduce number of reported faults
Level 4 - Optimum service	£ 2,055k per annum (over an 8-year period)	• Greater public / stakeholder satisfaction • Reduce public / stakeholder interactions • Column condition identified and managed, lowering risk of collapse • Enable achievement of Performance Management Framework measures and OPMs • Provide monitoring of all illuminated assets

Figure A3.4 Levels of service

6. Lifecycle Plans

Illuminated assets can be divided into various categories for asset management purposes. The four main components within the MAMS are identified as column, lantern, lamp and power supply and have different requirements but, generally, the needs of each lantern are similar as are the needs of each lamp type. The main consideration in terms of capital investment is column type and material.

As an indicator, Figure A3.5 shows the current age profile of the lighting asset. The units were identified by using the following parameters:

- Lighting columns only (no illuminated signs, wall/pole lights);
- Only illuminated assets owned by SCC;
- Only units maintained by Suffolk Highways

The optimum condition indicator would be for all installed assets to have an in-date test certificate providing a guarantee against collapse and therefore reducing risk accordingly. To prolong the life of new units currently being installed, columns currently have suitable protective system to provide a 50-year design life.

Over the last 2 years, all steel columns in excess of 20 years old (general identified action age) have been tested, with structural guarantees of 3 and 5 years achieved; those units requiring replacement within 12 months have been addressed. Assets requiring replacement within the next 5 years have been identified through these testing results. Results will be further interrogated to identify whether the threshold can be raised to 25 or 30 years accordingly.

Traditionally, column replacements in Suffolk have been reactive, but this is synonymous amongst local authorities; budgets have been allocated based upon previous year's levels and seek only to address asset failures arising from structural testing. Greater asset management is achieved by interrogating the structural testing results to provide a 5-year forecast to address any defect reports and not be concerned at age of individual assets.

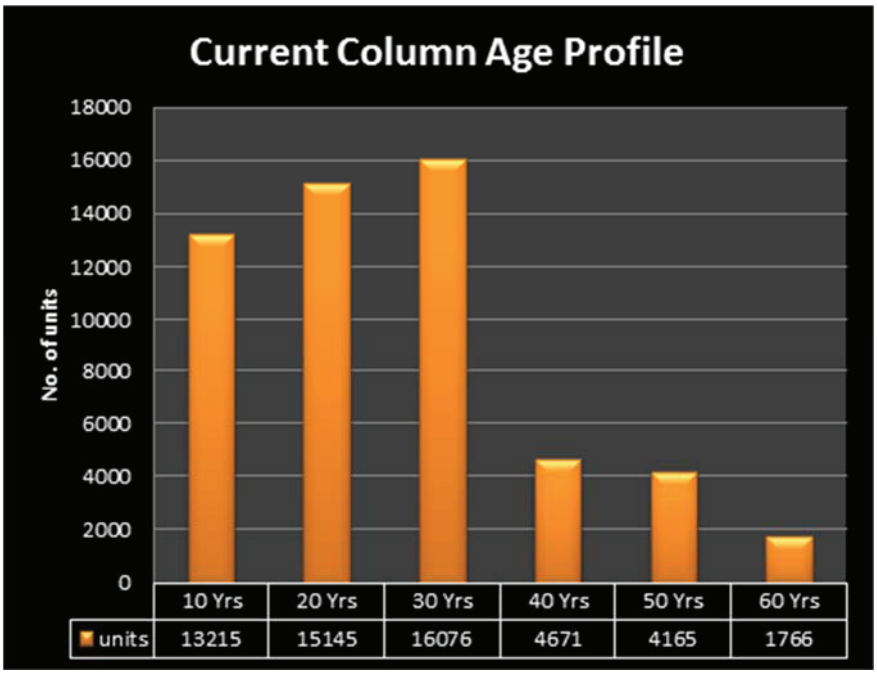

Figure A3.5 – Column Age Numbers

Figure A3.6 compares SCC structural testing defects that did not receive the 5-year (green) warranty with results achieved nationally.

Test Result Achieved	National Average	SCC Result
Red	2.82 %	1.27 %
High amber	10.48 %	**19.15 %**
Low amber	21.27 %	**28.87 %**

Figure A3.6 Suffolk / national average lighting column structural defect proportions

This suggests that, potentially, a substantial number of columns within Suffolk are nearing the end of their serviceable life and additional funding is needed.

Detailed analysis of the results has shown that different types of lighting columns have different structural problems. Testing of steel lighting columns has shown considerable variance of lighting column condition in any one location. The main cause of failure is internal corrosion in the root portion, even though this section is often galvanised prior to installation, and current practice is to replace only those steel columns which fail the test. Columns currently installed have a glass flake root treatment to prolong the life of the asset.

Maintenance Strategy	Interval	Statutory / Optional / Contractual
Bulk lamp change	Lamp type dependent but generally: • On columns - SON / CPO, 6 years; • On columns – SOX, 4 years; • Illuminated signs – annually; • Illuminated bollards - annually.	Optional (balance versus number of faults)

Maintenance Strategy	Interval	Statutory / Optional / Contractual
Cleaning luminaire and base compartment – all assets	Excluding bollards, all assets in conjunction with other routine works. Bollards twice annually (February/March & October/November).	Adopted in conjunction with other routine works
Electrical Test	Every 6 years	Statutory
Structural Test	5-Year cycle as defined by: • last test date; • last test re-test date; • column age; • column material; • column location i.e. coastal / on salting routes or other known factors that form part of the TR22 suggested datasets; • industry guidance in relation to concerns relating to particular column type; • Suffolk Highways local knowledge.	Ordered annually
Painting	When visually required for columns currently painted	Reactive
Power Factor	When unit is identified by CMS as out of tolerance	Adopted
Fault Repairs	When fault logged by CMS, night inspections or other stakeholders	Adopted

Figure A3.7 Potential Street lighting lifecycle strategies

To prolong the life of the illuminated assets, Suffolk Highways is challenged to maintain the asset such as to achieve an improving trend for the measures within its Performance Management Framework and to achieve the current operational performance management targets. Maintenance strategies, with expected intervals, that Suffolk Highways can adopt includes items such as Figure A3.7.

In addition to the planned maintenance, an Invest-to-save project in 2015/16 included over 10,000 LED street lighting units installed on traffic routes, where units currently operate all night and 1,500 sign lights converted to LED with integral CMS (based upon retro-fit of a particular product) and replacement of subway fluorescent lamps to an LED equivalent. This is linked to the Local Transport Plan Priority *'Creating the Greenest County'* and will result in an anticipated reduction in electricity equivalent in excess of 1500 tonnes of CO_2 per year.

As part of the current street lighting strategy, new technology and products are evaluated to actively reduce the environmental impact of street lighting by piloting and adopting new methods. Advances in LED technology, coupled with the lower and variable lighting levels permissible by the revised British Standards BS 5489 and EN 13201, means it is now feasible to reduce energy usage by tailoring lighting to specific locations.

To maintain a steady state, equipment is selected that will achieve a long life, subject to environmental conditions to renew an asset to its original capacity. Figure A3.8 details expected planned replacement periods and include:

Planned Replacement	Description	Expected Frequency
Lanterns	LED warranties currently 15-25 years	Once every 25 years
Columns	Replaced when identified as defective through structural testing programme	Once every 50 years
Sign post	Replaced when identified as defective through visual assessment	Once every 50 years

Figure A3.8 - Asset Life Expectancies

Prior to replacing an asset, a decision is made on whether the asset is still required or can be decommissioned. Figure A3.9 details the drivers for decommissioning assets:

Disposal Activity	Reason
Complete asset removal	• Environment has changed and original reason for asset no longer relevant; • Industry regulations changed; • Lighting design met with fewer units.
Re-location of asset	• To meet lighting design and where asset has residual life remaining; • Where third party requires access to property.
De-illumination of asset	• Industry regulations changed, sign no longer requires illumination.

Figure A3.9 – Decommissioning Criteria

To develop a sustainable strategy, four options will be considered for the next 5-10 years:

- Do nothing - this option will be sustainable for only a short period, with columns at the end of their design life increasing whilst the units in the 0-10 years category reducing significantly; the effect of this strategy is to build up an issue in future years;
- Continue with current level of budget - the 2015/16 budget was £700k per annum and assumes 800 column changes per annum where budget is primarily only used for column replacements. The effect of this strategy is that columns in the 0-10 age group reduce whilst quantities in the other bandings increase. This implies the stock will continue to age and risk of column collapse will increase;
- Maintain Current Condition Profile - the budget would need to be adjusted annually depending upon how many units require replacement. To achieve this strategy, it is anticipated the oldest units would be replaced and the average age is then maintained. This is not good asset management as no account is being taken of actual condition;

- Optimum level to address structural testing concerns. This strategy will replace columns as they come to the end of their life and reduce risk accordingly.

For any of the above options to proceed, any budget allocation needs to be utilised cost effectively to achieve the stated objectives and ultimately reduce revenue whilst maintaining the asset in a safe condition.

Additional sources of funding will be continually kept under review to ensure opportunities which would benefit Suffolk Highways lighting service are exploited at the appropriate time.

Figure A3.10 sets out funding sources as of April 2016.

Funding Source	Description
Invest to save	Using funding from within the Council where savings can be made through a reduction in maintenance and energy. Replacement of columns and posts does not however meet these criteria.
Prudential borrowing (often used to support invest to save above)	The Local Government Act 2003 introduced new powers allowing local authorities to borrow to invest in capital works and assets so long as the cost of that borrowing was affordable and in line with principles set out in a professional prudential code, endorsed by the Chartered Institute of Public Finance and Accountancy.
Salix	100% interest-free capital to the public sector to improve their energy efficiency and reduce their carbon emissions. Repayment of loan is through savings generated and a maximum of 5 year return on investment is required.
Green Investment Bank	Funding package repaid from energy savings typically over a 5-15 year period.

Figure A3.10 - Alternative funding sources

7. Proposed Future Improvements

During the lifecycle planning process, performance gaps have been identified as shown below in Table 13, and an action plan developed to address these omissions.

Future improvement	Timescale
Sign post structural testing	October – December 2016
TR22 Data	Technical Report currently under revision and implementation of improvement actions upon distribution of revised document
Private cable locations	Completion by end of March 2017
Online customer reporting tool for street lighting	Completion by end of December 2016

Figure A3.22 – Performance gaps to be rectified

Additional street lighting benefits currently being pursued include:

- Identification of 'other' asset owners and signposting public to respective contact details with no SCC interaction;
- Identifying faults that will take in excess of 10 days, due to third party involvement, compliance with Traffic Management Act (2004), items outside the control of Suffolk Highways and automating correspondence with the stakeholder(s) who reported the fault;
- Installing low energy LED lanterns to control light distribution in all replacement and installation activities;
- Continuation of de-commissioning illuminated assets no longer required;
- Variable lighting to be implemented in a two-stage approach based on data derived from a selection of traffic flows across the county. Trials are ongoing to join up traffic counters to the CMS to provide dynamic lighting based upon road use.

APPENDIX 3A

Part-Night Policy

It is recommended that the Cabinet adopts the following policy for the implementation of part-night lighting and dimming delivered through the application of an Intelligent Lighting System.

- All units of 6 metres in height and below to be switched off between the hours of midnight and 5:30am with the following criteria requiring closer examination of whether lights should be kept on or for a longer period:
    a) Lights at major junctions/roundabouts;
    b) In town centres where there is CCTV, high security businesses like banks, and/or areas of high night time pedestrian usage for example near nightclubs and train stations, outside community facilities like the British Legion or leisure centres;
    c) Areas where street lights are needed to reduce road accidents;
    d) Areas where there could be an increase in crime through reduced lighting, like pubs and specific residential areas;
    e) Remote alleys linking residential streets;
    f) Near, pedestrian crossings, footbridges, subways;
    g) In public car parks;
    h) At bus stops;
    i) At level crossings, speed humps and traffic lights;
    j) Where there is sheltered housing for the elderly.

- Consideration for part-night lighting to be given to units over 6 metres where safety of pedestrians and road users will not be compromised;
- Future works to units out of scope for part-night lighting to have the capability for dimming installed as standard;
- The Intelligent Lighting System to be deployed throughout the whole County to realise maintenance efficiencies.

Appendix 3B

UKPN Guaranteed Standards of Performance (GSOP)

Unmetered connections	Standard	Payment*
Attend an emergency	2 hours	£65 one-off
Repair High Priority fault repair (traffic light)	2 calendar days	£15 per day
Repair High Priority fault repair (non-traffic light)	10 days	£15 per day
Repair Multi-unit fault repair	20 days	£15 per day
Repair Single-unit fault repair	25 days	£15 per day
Quote for new works (1–100 units)	25 days	£15 per day
Commence and complete new works, non-adopted highway (1–100 units)	Agreed date	£15 per day
Commence and complete new works, existing adopted highway (1–100 units)	35 days	£15 per day

Appendix 3C

Example IDNO SLA Extract (GSOP)

Service	**Fault Repairs – street lighting or street furniture**	
Type of Connection	**Timescale**	**Failure Payment**
Works to remove immediate danger to the public or property	Attend on site within 2 hours	£50
High-priority fault repair to traffic lights	Restore supplies within 2 calendar days	£10 per working day late
High-priority fault repair not involving traffic lights	Restore supplies within 10 working days	£10 per working day late
Multiple-unit fault repair to street lights	Restore supplies within 20 working days	£10 per working day late
Single-unit fault repair to street lights or street furniture	Restore supplies within 25 working days	£10 per working day late

Appendix 4 – Intelligent Transport Systems

1. Situation as of 1st November 2015

Over the last 10 years, capital funding allocations for traffic signal upgrades and replacements has varied significantly from year to year. Low direct funding has generally coincided with traffic signal works being incorporated within major schemes, such as the £32M South Lowestoft Relief Road and Associated Measures Project (2006-8) and, more recently, the £25M Travel Ipswich project, the latter resulted in the replacement or upgrading of some 70 signal installations. In between, there were a couple of years of heavy investment in converting far-sided equipment to near-sided.

In recent years, there has been a small revenue funding allocation to cover ad hoc maintenance works that are additional to those covered by routine maintenance.

2. Inventory

The ITS inventory consists of the following assets at 1st November 2015:

- 122 signalised junctions;
- 43 pelican, 47 puffin and 100 toucan signalised crossings;
- Electronic signs: 68 vehicle activated (VAS), 41 solar VAS and 9 variable message (VMS);
- Bury car park system: 10 VMS and 7 detectors;
- Wig-wag systems: 3 horse crossings (Newmarket), 1 fire station (Bury St Edmunds) and 1 pedestrian (Thornham Walks);
- 6 weather stations;
- 140 permanent traffic counters;
- Servers and other IT equipment, housed in Suffolk County Council's data centre;
- Fibre optic communications networks in Ipswich, Lowestoft and Stowmarket.

Each asset type consists of a number of individual components. For example, a signalised junction will comprise: poles; controller cabinet; feeder pillar; controller; pedestrian push button units (pedestrian aspect); traffic signal heads (lamps/lens, backing boards); other attachments such as microwave vehicle detector (MVD); CCTV; on-crossing or kerb-side (pedestrian) detectors; 'on-highway' traffic detector loops, ducting, duct boxes, draw-pits, cabling, road studs and related road markings. All crossing points must have the correct configuration of tactile paving.

Data is currently stored in Suffolk Highways' *Mayrise* asset management system, giving grid reference locations for poles, controller cabinets and feeder pillars, together with detailed information on all components drawing energy such that an energy file might be produced for monthly unmetered energy billing. Suffolk Highways (through its supply chain) retains hard copies of all site information, drawings, signal timing data sheets (1:2500's), electrical test certificates and principal inspection reports at its Needham Market depot. A joint access 'drop box' is currently being constructed to make all held information more accessible for both parties.

Suffolk Highways is developing its *Insight* system to provide the platform for storing and analysing all its asset inventory data, including that required to calculate its valuation in accordance with CIPFA requirements. Over the course of 2016/17, it is intended to move all County Council ITS asset data from *Mayrise* to *Insight* to utilise the new capability within Insight, including its new energy billing module. The supply chain's systems and processes will then provide resilience and business continuity back-up in the unlikely event of any failures with *Insight*.

3. Asset condition

The general norm within the industry is to consider age as a proxy for condition, with 15 years being the recognised life expectancy of many ITS assets. Suffolk Highways utilises a more refined approach holistically using the following criteria to determine condition and need for replacement:

- Age (see figures 4.1 & 4.2);
- Fault frequency;
- Mode of operation – poor operational efficiency which may instigate an improvement project to upgrade to MOVA (microprocessor optimised vehicle actuation)/SCOOT (split cycle offset optimisation technique);
- Major component failure;
- Availability of spares (both from manufacturer and from cannibalised replaced installations;
- Opportunity – other works in the area to reduce disruption and traffic management costs;
- Health and safety – reduction in time for operatives to be working under traffic management at difficult sites by converting to NAL sockets and more reliable low voltage LED;
- Compatibility within SCOOT regions;
- Consistency – if one Installation in a group is near-sided then good practice that all are near-sided;
- Whether work is actually an upgrade rather than simply maintenance.
-

This approach ensures that assets remain in service for longer than the industry expected life with current average life at 18 years.

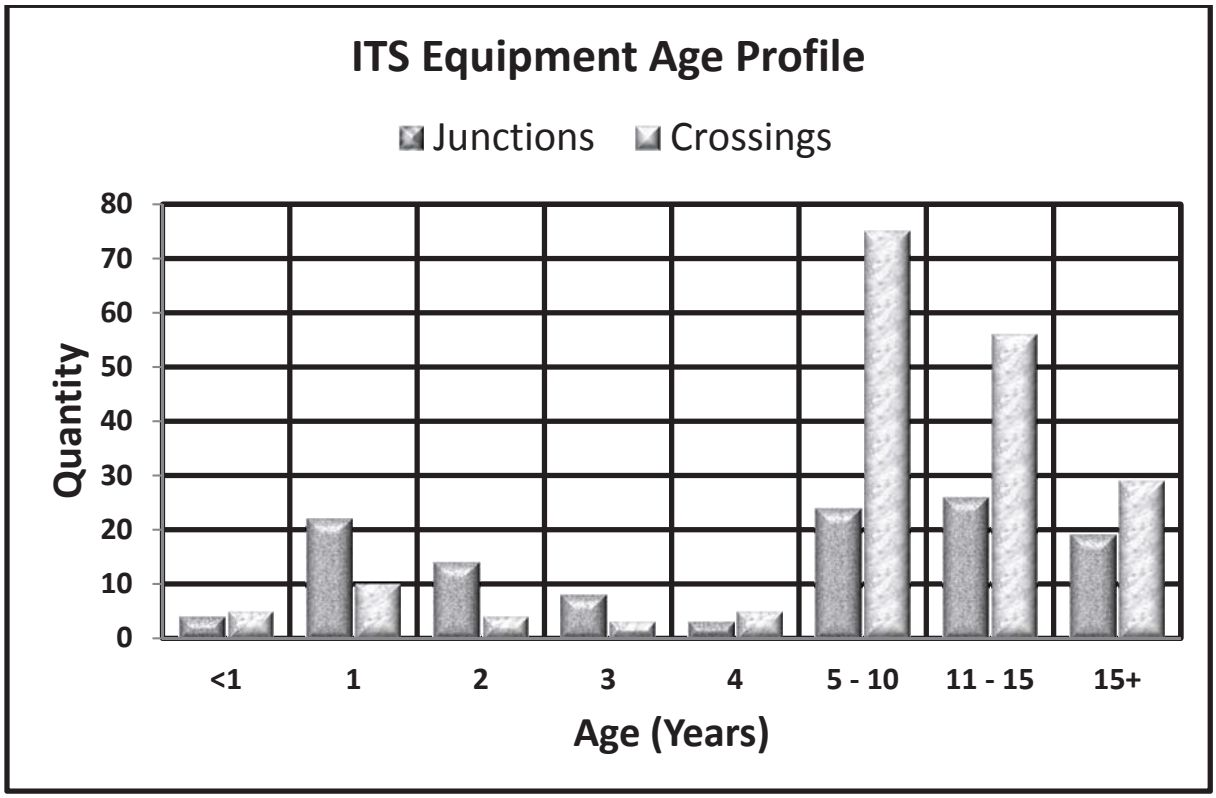

Figure 4.1 – Age profile for traffic signals

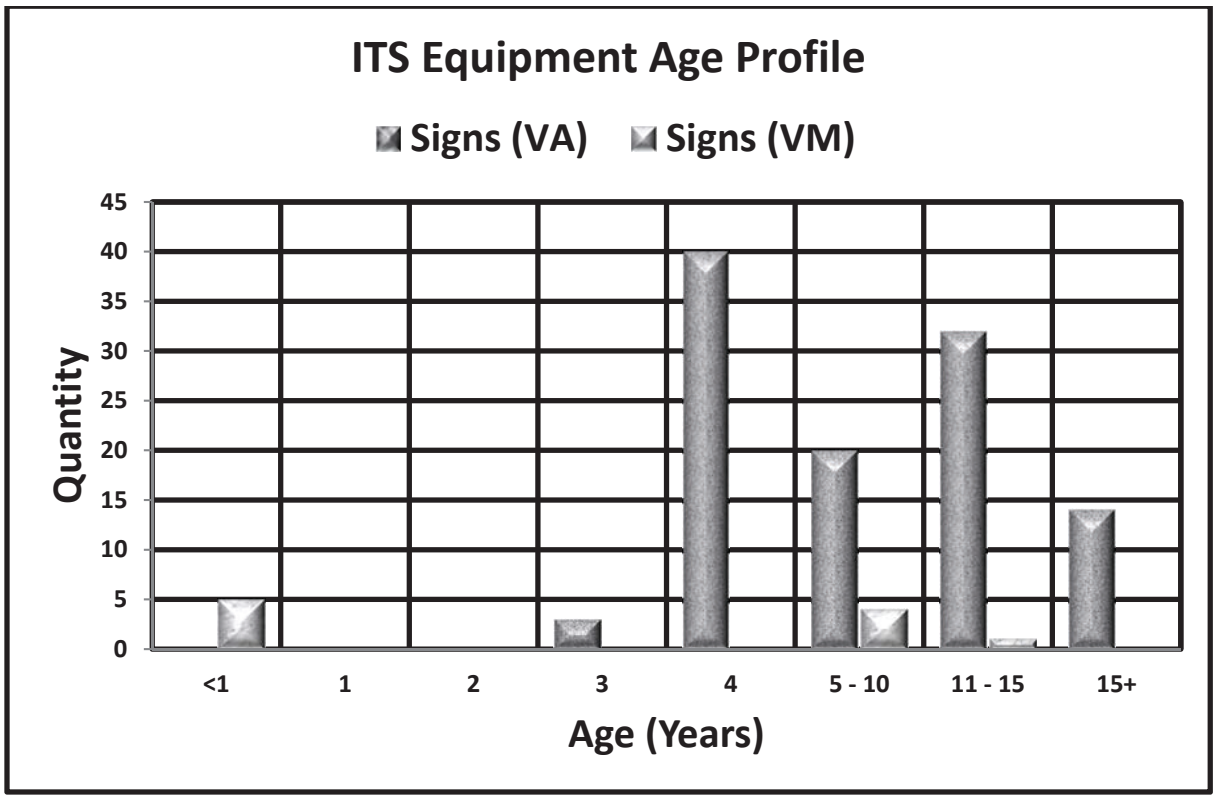

Figure 4.2 – Age profile for VAS / VMS

4. Maintenance regime

The ITS service assets are maintained by Dynniq (former name Peek Traffic Ltd/ Imtech) based in Needham Market) as the specialist sub-contractor to Suffolk Highways under the umbrella of Suffolk County Council's 2013 Highways Services Contract. Dynniq provides and maintains a 24/7 'front line' fault monitoring and reporting systems with overall responsibility for fault rectification, including the co-ordination of associated specialist suppliers (such as for VMS) and repairs to equipment damaged by road traffic collisions and acts of vandalism. All on-street equipment has an identity label and telephone number for the public to contact Dynniq direct to avoid unnecessary delay in effecting repairs (and thus re-establishing safe traffic control) via Suffolk Highways; the Council's website also directs the public to Dynniq for the same reason. Reported operational issues or general enquiries are referred to Suffolk Highways.

The fibre optic communications networks in Ipswich, Lowestoft and Stowmarket are maintained by EAData. Communications with equipment not on fibre are via either broadband (ADSL), Mobile data (O2 sim cards) or BT dial up analogue lines (PSTN) with the exception of the Bury car park VMS system which uses St. Edmundsbury District Council's wireless communications system.

4.1 Operational performance

The fault management system retains all fault data and is capable of producing reports on fault numbers, response/repair times and equipment failure history. All equipment, including poles, are inspected annually, 1/12 of the inventory per month, and any defects recorded as a fault (categorised accordingly); electrical testing is carried out every 6 years; bulk clean and change is carried out annually with tungsten halogen/filament lamps changed every 6 months; LEDS have a 7 year 'return to manufacturer warranty but expected life is 10+ years and will only be changed on failure. The contractor also updates the asset management system.

Primary operational performance indicators exist for faults and inspections, and secondary performance indicators exist for bulk changing and accuracy of the asset management system. There is a separate performance indicator related to the accuracy of the inventory.

Dynniq assesses and updates the inventory with particular attention made to agreed data fields on the occasion of visiting a site; within the first two weeks of a calendar month, Suffolk Highways will select a sample of assets attended during the preceding month (up to a maximum of 10%) and audit accordingly. Target performance is 100%.

It is essential that an accurate, detailed, inventory is maintained in order to create the energy file in accordance with UMSUG (unmetered supplies user group) regulations; with any recent site upgrading work inevitably including a conversion to low voltage LED a prompt inventory update has the benefit of quickly realising any energy and carbon reduction savings, as well as for asset management purposes.

4.2 Performance Management Framework

It is planned to publish the results from the Performance Management Framework (PMF) within twelve months of the HIAMP implementation. This has been designed to measure performance of Suffolk Highways over a wide range of issues in order to drive overall improvements in the service. The PMF has two specific measures relating to ITS assets both within the *"creating the Greenest County"* namely:

- Percentage of street lighting, traffic signals and lit signs converted to LED;
- Total energy usage

4.3 Asset Management Process

4.3.1 *Junctions and crossings*

For signalised junctions and crossings, controller age is used as the basis for age profiling, that being the most critical element of the installation and the most expensive individual component; for the various VAS and VMS, it is the sign age. The industry standard is to aim for an age maximum of 15 years but when determining the annual works programme we also take into account a number of other factors:

- Reliability – even if 15 years old, if a site has been running with no significant problems we will most likely chose to wait longer before replacing equipment subject to criteria below;
- Fault history – those sites having a higher than average equipment failures would be prioritised;
- Mode of operation – if operational efficiency is poor we would promote an improvement and upgrade to MOVA control or UTC (urban traffic control)/SCOOT with little regard to age;
- Major component failure;
- Availability of spares (both from manufacturer and from cannibalised replaced installations;
- Compatibility –any junction or crossing to be added into a SCOOT region or crossing to be associated with a junction must have equipment compatibility;
- Consistency – since 1998, the Department for Transport has advocated the use of near-sided pedestrian facilities with the intention that far-sided equipment would gradually be replaced; if installing a new site and an old far-sided installation is in the vicinity, it is good practice to have both as near-sided;
- Opportunity – traffic management costs can be disproportionately expensive compared to the value of the traffic signals work hence opportunities to use other parties' traffic management is explored;
- Health and safety – conversion to current specification (NAL sockets/ LV LED) results in significantly less time for operatives to be working in or adjacent to the carriageway.

Poles typically last 30 years and are invariable replaced as and when necessary as part of general upgrading or replacement works.

The current traffic signal specification is for low voltage LED with NAL sockets to facilitate easy change of poles; controller reliability is also improving and it is unlikely that there will be such technological changes and improvements (i.e. UTC, SCOOT and MOVA) as recently experienced.
In the light of technological improvements, the above criteria are reviewed regularly in order to ensure minimum whole life costs are achieved going forward.

The specification aligns with the Council's "Greenest County" aspiration of reducing energy consumption and carbon emissions and brings with it a modest reduction in revenue costs.

4.3.2 *VAS and VMS*
Electronic signs are relatively new assets in the whole ITS inventory. Mains supplied signs are deteriorating to a point where they can no longer be cost effectively maintained after 10 years. For solar powered signs, problems are being experienced with the solar panels and batteries after just 5 years.

New strategies on the use of such signs are being developed, particularly VAS for speed management (the majority of VASs maintained by Suffolk Highways). In order to avoid a plethora of signs across the County but recognising local concerns regarding speeding in villages, a programme of temporary VAS (TVAS) is being developed where portable signs are moved around on a rota. When equipment at existing permanent sites fails, the site is added into the TVAS programme thereby gradually reducing the number of fixed assets.

The car park VMS display units have a design life of 10 years and their replacement is planned accordingly (subject to reliability, opportunity etc.) similar to the criteria used for signals and junctions.

4.3.3 *Wig-wag systems*
Durability varies but old less reliable units are being replaced with the latest LED versions such that sites will be virtually maintenance-free. Due to the low numbers and simplicity of the controllers, the regime is to replace on failure.

4.3.4 *Servers and IT equipment*
Technological improvements are such that 5-year upgrade or replacement of servers must be planned for. The main driver is operational efficiency rather than age deterioration. Replacements are thus based on a business case

4.3.5 *Fibre optic communication*
All Suffolk Highways networks have been recently installed; the advice is to plan for a 10-year cycle for replacing switches only. Best practice within the industry will be assessed to develop an asset management approach as this asset gets closer to anticipated life expiry.

5. Levels of service

Four levels of service are considered:

- Statutory;

- Existing;
- Requested;
- Optimum

5.1 Statutory

Suffolk County Council is not required by law to provide ITS facilities, however, under the Highways Act 1980 *"every local highway authority may provide traffic signals, pedestrian crossings etc. for the purposes of any highway or proposed highway for which they are or will be the highway authority, and may for that purpose*

(a) Contract with any persons for the power for operation and
(b) Construct and maintain such signals, posts and other works as they consider necessary"

However, the Council, and it's appointed ITS service provider, is required to maintain any facilities it does provide in a safe condition.

To achieve this level of service, most works would be of a reactive nature and include attendance to make safe where there is danger to public safety i.e. following vehicular impact or act of vandalism.

Planned works would consist of electrical tests every six years to comply with current editions of the Health and Safety at Work Act 1974, Electricity at Work Regulations 1989 and in accordance with the IET Wiring Regulations (BS7671) and associated guidance notes. All results are entered into the Council's MAMS.

5.2 Existing

The ITS facilities are well maintained such that faults are attended within an hour and repaired or made safe immediately, with replacements being commissioned when assets get to the end of their life. Parts are cannibalised from replaced installations to ensure spare parts available for obsolete installations. The service endeavours to provide a minimum whole life cost solution, but variability in available funding means that less than optimal solutions can occur occasionally.

5.3 Requested

Most requests relate to operational efficiency e.g. changed timings to suit personal circumstances but usually to the detriment to other users and overall performance; for signals to be removed without due regard to why there were originally installed. As operational efficiency is part of the existing service, this is not a valid level of service at present.

5.4 Optimum

The main difference between existing and optimum is the availability of funding when required to ensure minimum whole life cost achieved. This is unlikely in the near future with resources being constrained with the likelihood that they will reduce going forward.

6. Lifecycle plans

Lifecycle plans are relatively easy to formulate for this asset class, but replacement strategies will actually be dictated more by reliability and opportunity than by lifecycle. This presents the best whole life cost option and therefore will be the strategy followed for the foreseeable future.

Appendix 5 – Public Rights of Way

1. Situation as of May 2016

The public rights of way (PRoW) network in Suffolk consists of over 10,000 individual routes covering some 5,300km (3500 miles) in length. Put into context, it is comparable with the paved highway network in the county.

Public rights of way are classified as highway and have legal status and protection through the Highways Act 1980 and other specific legislation. The legal record of public rights of way is the *Definitive Map and Statement*. This legal document is the control point for all public rights of way in Suffolk. The Definitive Map Team manages all legal changes to the existing documents, as well as investigating any requests for additional routes to be added or altered by way of a *Definitive Map Modification Order*. District and borough councils also have a role to play in this process by administering more routine changes to the network, such as diversion, through the *Public Path Order* process.

For the purposes of public rights of way maintenance, the county is divided into east and west, with teams currently based in Saxmundham and Bury St Edmunds respectively. Flexible working practices are in place and encouraged.

2. Asset Categories

The PRoW asset can be divided broadly into 3 main categories:

a. Status;
b. Surface type;
c. Structures and furniture.

2.1 Status

This is the official categorisation of all public rights of way and is included in the National Street Gazetteer (NSG). The status of all public rights of way in Suffolk, are listed below. Figure A5.1 shows the type, number of individual routes in each category and total length:

a. Footpath (FP) - pedestrian use only;
b. Bridleway (BR) - use by pedestrians, cyclists and equestrians only;
c. Restricted byway (RB) – all users up to, and including, none motorised vehicular traffic (e.g. horse drawn vehicles);
d. Byway open to all traffic (BOAT) - all traffic, including motorised vehicles.

Type	No of Individual Routes	Total Length - (Km)
FP	8,730	4,680
BR	998	630
RB	290	155
BOAT	345	260
Total	**10,363**	**5,725 Km**

Figure A5.1- PROW status lengths

Notes:

1. Cycle-tracks and some shared-use facilities are not official public rights of way. However, they may be included on the list of streets or NSG and are normally inspected and maintained using the same procedures applicable to other paved surfaced facilities such as adopted footways;
2. The width of public rights of way vary considerably. In some cases, it is recorded in the legal statement but, where no record is held, it may be taken as 'between natural boundaries', such as walls, hedges or ditches. The Rights Way Act 1990 only specifies the actual minimum and maximum width of field edge and cross-field paths on agricultural land. For these reasons, it is not possible to accurately calculate a total area of land covered by the rights of way network. However, if an average width of 2.5 metres is assumed, it is estimated to cover a surface area of some 14,312 m^2 (3,536 acres or 1,431 hectares).
3. For the purposes of determining priority and resources, public rights of way are divided into two categories (see section 6 below). Category 1 paths are the higher status, applying to all paths over (and including) bridleway status. Category 1 paths account for 68% of the PRoW network with Category 2 paths covering the remaining 32%. The status can be altered, should circumstances dictate.

2.2 Surface type

Depending on the location of the public rights of way, the surface type will vary from natural (grass or soil), to tarmac. Field-edge or cross-field paths will have a grass or soil surface, otherwise referred to as 'natural'.

Routes in urban areas are often surfaced with tarmac. Elsewhere, others may be surfaced with MoT Type 1, or other metalling, such as stone. The status of the route does not determine the surface type, so it's quite common to have a tarmac footpath in a village and a natural surface bridleway or higher status path going across cultivated farmland.
Some routes may have a combination of some, or all, surface types throughout their length. The breakdown of path surface types is given in Figure A5.2.

Type	Surface	Length (metres)	% of total network
FP	Natural	1,737,600	30
	Metalled	727,800	12.7
	Cross-field	711,600	12.4
	Field-edge	1,270,860	22
BR	Natural	363,000	6
	Metalled	183,000	3
	Cross-field	23,000	0.4
	Field-edge	81,000	1.4
RB	Natural	108,000	1.8
	Metalled	35,000	0.6
	Cross-field	5,000	0.08
	Field-edge	9,000	0.1
BOAT	Natural	100,000	1.7

	Metalled	77,000	1.3
	Cross-field	1,200	0.02
	Field-edge	21,000	0.3

Figure A5.2 – Surface types by route status

Notes

1. Although the Council, in its capacity as local highway authority, has responsibility for the protection and maintenance of all public rights of way in the County, this responsibility only extends to the surface of the route;
2. The freehold ownership of the land remains with the landowner, so no monetary value can actually be attributed to the land occupied by the public rights of way;
3. Under Section 263 of the Highways Act 1980, every highway maintainable at public expense, together with the materials and scrapings of it, vests in the local highway authority;
4. Metalled (paved) routes in urban areas account for around 17% of the total network. They are normally inspected and maintained in accordance with the Highways Management Operating Plan (HMOP). In return, Rights of Way Area Teams will undertake works on unsurfaced, un-classified roads recorded on the NSG. These works are on an 'as required' basis and not subject to any specific inspection times or standards.

Structures and other furniture

2.3 Signs

It is a statutory duty for the local highway authority to sign all public rights of way from the metalled highway. These signs normally consist of a wooden post with a plastic finger attached, denoting the status of the path and other information such as the path name or distance to a prominent location or feature. The sign can be angled to show the approximate direction of the path.

Away from the metalled road, waymarks are generally used to denote changes in the direction or status of a path. The waymark post is considerably shorter than the finger post and utilises small, circular coloured discs to indicate status and arrows to give direction.
The wooden sign and waymark posts are manufactured from pressure treated soft wood (PTSW) and as such, have a finite life expectancy of some 7-10 years. The plastic fingers have a much longer lifespan and can be recycled, to reduce waste.

2.4 Bridges

One of the most significant PRoW assets are the bridges that span everything from a ditch to a major watercourse such as The River Gipping or Stour. The vast majority of these structures are owned by the Council, with whom the responsibility for the repair, replacement and construction of new structures also rests.

A limited number are privately owned, or in the ownership of a public utility or organisation such as Anglian Water or the Environment Agency. However, the fact that

they carry a public right of way means that, in the first instance, it is the responsibility of the Council to ensure they are safe and fit for purpose.

A cyclic inspection programme is used by Suffolk Highways to examine the larger bridges. A similar process has been introduced to extend to all structures on public rights of way, ranging from a simple railway sleeper bridge upwards.

2.5 Other structures and furniture

A number of gates, stiles and similar structures are found on many public paths. These are normally for the control of stock and for this reason should be erected and maintained at the landowner's expense. Legalisation determines that the local highway authority may be liable for up to 25% of the ongoing maintenance costs:

- Steps are also installed to enable access up or down steep gradients;
- Boardwalks are constructed across wet or marshy ground, particularly in the east of the county;
- Other furniture that may be the responsibility of the Suffolk Highways Rights of Way Team includes various safety barriers and bollards designed to restrict or slow passage down in the interests of safety.

3. Data Collection and Management

Whilst the legal record of location and status of the PRoW network is well documented through the *Definitive Map*, it is only in recent years that significant progress has been made in acquiring accurate asset information. This work is still ongoing and whilst some information is actual and based on accumulated data, some is representative and extrapolated up from the information previously gathered.

Data collection is currently undertaken using a variety of methods. These range from reports by the public, through to ad hoc inspections by rights of way officers, and systematic annual surveys of a percentage of the network. As at May 2016, this was 3% per annum - 1.5% in May, and 1.5% in November. These surveys were originally a Central Government requirement through the *Best Value Performance Indicator* (BVPI) process. Although no longer a Central Government requirement, the information gathered in the surveys provides useful cumulative data as well as giving regular 'snapshots' of the condition of the network and a fairly accurate indication of the effectiveness of the management regime.

The current rights of way database is known as *PRoWS*. This is a bespoke, standalone data base that records the details of each individual route, all maintenance and protection activity undertaken on a route as a result of reports received and work identified. In addition, it includes details of land managers as well as members of the public reporting problems they have experienced when using the network.

Although *PRoWS* has been in service for a number of years, it does not link directly to any other database or mapping programme. For this reason, its functionality is limited and will not allow evolution to latest data capture techniques or methods. To overcome this, work is currently under way to support the transfer all rights of way data into the

Suffolk Highways *Insight* database. This should give much improved functionality and allow more efficient and contemporary data capture methods to be utilised. It would also allow direct linkage to mapping and customer service modules currently operated in *Insight*.

MapInfo is used to record and store mapping layers showing all the annual surface clearance schedules. Other *MapInfo* layers are used to record the location of all bridge assets. Routes affected by traffic regulation order are also recorded on *MapInfo* layers.

4. Asset Condition

4.1 Introduction

The asset condition for public rights of way has always been difficult to assess, measure and record due mainly to the extent and remoteness of the network and limits on resources. As can be seen from Figure A5.2, the surface of the majority of routes is either natural or cross-field. Any natural surface will consist of varying vegetation, grass and soil types that will result in usage that can be classified as 'easy' through to 'difficult'.

Similarly, cross-field routes running over agricultural land will vary enormously, depending on the time of year and farming cycle. A cross-field footpath in November could be difficult to use but once summer comes and the land is dry, its condition could be considerably improved.

Legislation, in the form of the Rights of Way Act 1990, was introduced to try and address the condition of routes crossing arable agricultural land by requiring land managers to ensure that paths disturbed by cultivation (where that is unavoidable) are reinstated within a certain timescale and that crops are not allowed to obstruct the passage of users. The legislation also requires field edge paths and BOATs that run across arable land to remain undisturbed.

The condition of other routes on non-arable land will again vary enormously, depending on soil types, drainage, weather and time of year.

The only realistic opportunity to measure and control the condition of public rights of way is with those surfaced paths that are normally found in urban areas. Unlike other public rights of way, these paths are subject to the routine inspection and maintenance regime detailed in the Suffolk Highways HMOP. These routes account for approximately 17% of the network.

Whilst the condition of the surface of public rights of way is difficult to manage effectively, other items such as signposts and bridges are more easily dealt with. These items of path furniture are predominantly constructed using pressure treated soft wood (PTSW) which has a finite life when exposed to weather and ground conditions.

Experience shows the 'life expectancy' of PTSW sign posts, waymarks and bridges to be anywhere between 8-15 years, depending on location, soil type and timber condition during initial pressure treatment. Other materials, such as hardwood or recycled plastic have been considered and would give considerably longer life cycles but the significantly

higher initial cost is prohibitive in the current financial climate (see Section 7 below on lifecycle planning).

4.2 Signposts

As signposting from the metalled road is a statutory requirement, a major signpost replacement programme was undertaken across the County commencing in 2004. Over the following 3 years, all roadside signposts were replaced with a larger post and more visual sign produced in plastic for longer life. Although the posts were still made of PTSW (for cost reasons), the exercise was successfully completed at a cost of £550k.

Ten years on from the initial replacement scheme, these posts are decaying at ground level and require replacement in ever increasing numbers. Whilst the original replacement programme was funded from a separate capital allocation, the current replacement programme has to be managed from existing revenue maintenance budgets.

Figure A5.3 shows replacement rates over the last 7 years. As would be expected, the rate is increasing significantly with time, as more posts succumb to decay and require replacement. As designed and hoped for, the plastic fingers can normally be recycled and re-used in new posts, thus helping to reduce costs. Plastic 'post saver' sleeves specifically designed to significantly increase post life are now being fitted. At a fitted cost of less than £2 each, these simple devices should help to reduce ongoing replacement costs in future years by prolonging the life of the posts.

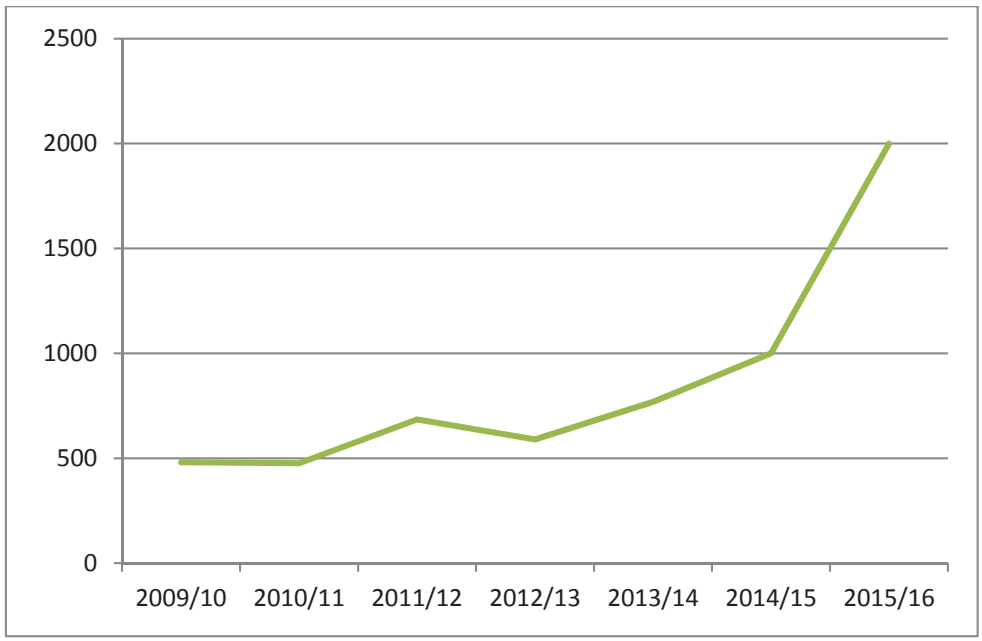

Figure A5.3 –Signpost replacements January 2009 - 2015

4.3 Bridges and boardwalks

The majority of these structures are also constructed from PTSW and, therefore, suffer from the same decay and short lifespan associated with signposts. Although some repairs are possible and undertaken during the life of a structure, the parts of the structure that normally rot are those that have direct contact with the ground. By the time these require replacement, it is normally more cost effective to replace the whole

structure as the work involved in dismantling and repairing is often costlier than straightforward replacement.

Not all structures are owned by the Council, although as the local highway authority, it has the responsibility to ensure they are safe for public use. Where a structure is, for example, a farm access bridge then the landowner will be consulted over the repairs and associated costs, particularly if the PRoW status is lower than that of the private use (e.g. footpath status only but private vehicular access is required). Other structures may be under the ownership of the Environment Agency or statutory undertakers/public utilities.

Of the 3262 PRoW bridges that are currently on the structures register, the majority are simple/small ditch or watercourse crossings. These are normally less than 5m in length, of PTSW construction and are inspected, managed, and maintained by the PRoW Teams.

There are, however, 342 more 'significant bridges' on the PRoW network, in terms of span, construction form, complexity, materials, height, obstacle crossed etc. For these reasons, these are inspected, managed and maintained by the Suffolk Highways Structures Team, and form part of the Structures Asset Group. Included in the figure of 342 are also a small number of bridges with a span less than 5m that are still considered to be structurally significant.

The number of 'significant bridges' on the PRoW network that form part of the Structures Asset Group is subject to continual review as part of the inspection programmes of the Structures and PRoW Teams to ensure that asset ownership rests with the party best placed to manage the asset.

Whilst the Structures Team is responsible for the inspection, management and maintenance of the 'significant bridges', they still form part of the PRoW network. As such, the PRoW Team is still closely involved in any works required to the bridges, remain the first point of contact for public enquiries, and take the lead with respect to discussions with adjacent land owners, and managing closures/diversions etc.

For significant structures on the PRoW network, the PRoW team will make the case for additional funding for repairs or replacements, if it is not available within the budget allocations for structures, and manage closure of the route and communications.

There are 3 main methods by which asset condition can be captured. Information gathered from each source will be recorded for use as required:

a. Planned – Best value surveys currently allow a random survey of 3% of the network annually (1.5% in May, 1.5% in Nov). This allows each path to be surveyed against a national standard (originally set out as 'Best Value Performance Indicator 178'). This standard includes an 'ease of use' figure, expressed as a % of the network. The ease of use figure, averaged over the last 5 years, is 64%.

   Bridge Inspections are used to produce a 'bridge condition index' and determine maintenance levels of all structures across the County.

b. Reactive – reports on the condition of the network are gathered from a number of sources including the general public, Parish/district councils and user groups. These reports can be submitted through all forms of media but mainly by means of the customer reporting tool, *GBiz*. Other methods such as phone and electronic media are converted into *GBiz* reports to ensure a consistent and trackable reporting method that can be escalated, if necessary.

c. Ad-hoc - this takes into account any additional ad-hoc inspections and reports undertaken by staff, as and when time permits.

5. Inventory (asset types and values)

5.1 Introduction

The number of differing asset types of structure recorded on public rights of way across the County are shown in Figure A5.4. Total values are also attributed (see notes).

Asset type	No/Length	Installed unit cost (£)	Value (£)
Signpost	8500	50	425,000
Waymark	12,500	30	375,000
Bridges/culverts (up to 5m)	2,900	750	2,175,000
Boardwalks (avg. 1.5m wide)	5000m	50/m2	375,000
Stiles	1700	40	68,000
Gates	2250	90	202,500
Highway authority barrier	350	250	87,500
Surfaced path (tarmac) (avg. 1.5m wide)	1000 km	50/m2	75,000,000
		Total value (April 2106)	**£78,708,000**

Figure A5.4 – Asset types and value

Notes

1. Asset numbers are rounded up and the values taken as an average of the combined cost of materials and installation by specialist contractors with the skills and equipment to work on rights of way, often in remote locations.
2. The value of bridges/culverts is only attributed to those structures up to 8m in length. These are mainly PTSW structures, constructed by the County Council to standard specifications, dependent on the status of the route. The value of other significant structures (over 5 metres) will vary considerably and the value shown below in Figure A5.5 is an estimated average replacement cost.
3. Gates and stiles are installed on public rights of way for the control of stock and therefore, at the landowner's cost. The local highway authority is responsible for up to 25% of the ongoing maintenance costs.
4. For this reason, the installed unit cost for gates and stiles shown in Figure A5.4 is 25% of the total cost.

5. Asset types and values can also be attributed to those tarmac surfaced paths normally found in urban areas. The value is calculated as an average of the current square metre cost of a sealed footway surface.

5.2 Bridges

Bridges carrying public rights of way across watercourses and other ground features make up the largest asset category. These structures range from a concrete or brick culvert of 0.3m diameter, up to large, significant bridges across the major water courses in the County. Figure A5.5 gives a breakdown of these types, together with the minimum expected lifespan and total value.

Type (length)	Number	Lifespan (years)	Installed unit cost (£)	Value (£)
Culvert (brick or concrete)	**200**	**120**	**750**	**150,000**
Sleeper (up to 3m)	**1200**	**10 -15**	**250**	**300,000**
PTSW 3-5m	**850**	**12+**	**750**	**637,500**
PTSW 5-8m	**654**	**12+**	**4500**	**2,943,000**
Significant structure (over 5m) in various materials	**342**	**120**	**120,000**	**41,040,000**
Specialist (e.g. GRP geodetic)	**16**	**120**	**30,000**	**480,000**
			Total value	**£45,550,000**

Figure A5.5 – Bridge type breakdown

Notes

1. 8 metres is the maximum length for standard structures constructed from PTSW. Anything over 8m, specialist and other significant structures are normally constructed from materials other than PTSW (steel, brick, concrete etc.);
2. The lifespan for larger structures can vary significantly, with some structures existing for decades with others going back to previous centuries;
3. The inspection and maintenance regime for these larger structures is normally outside of the scope of rights of way officers and falls to the Structures Team.

6. Levels of service

Levels of service for public rights of way assets can, and do, vary in accordance with a number of factors. These factors will include health and safety, statutory requirement, financial and staff resources.

Public demand and expectation are always high and will, at times, outstrip the ability to deliver the level of service expected by the public (or desired by officers).

As would be expected, there is a direct correlation between the budget allocation for rights of way, levels of service and customer satisfaction.

To manage public expectation and provide a transparent response to performance issues raised by both the public and local Councils, the PRoW network has been organised into one of two categories.

a) Category 1 routes – Category1 routes are the higher status, applying to all paths over (but including) bridleway status, together with any footpaths deemed to be a priority for access within a parish. These account for some 68% of the network;

b) Category 2 routes are all those not included in Category 1. They are mainly paths in isolated or remote areas that see only occasional use. These cover the remaining 32% of the network.

Although the Category 1 and Category 2 prioritisation can be used by officers to determine and defend resource allocation, it does not mean that there is any restriction on the public using a lower priority path. It simply means, for example, that resources, such as grass cutting during the summer, will be allocated to Category 1 paths only, as this is where the greatest benefit for the resource can be gained. Category 2 paths would not be cut and would become impassable in some cases.

A summary of the levels of service for public rights of way is shown in Figure A5.6.

Levels of service	Cost	Summary
Statutory (minimum)	Less than existing budget	Under Section 41 of the Highways Act 1980 (duty to maintain highways maintainable at public expense), the highway authority for a highway maintainable at the public expense is under a duty to maintain the highway. There is a statutory requirement is to sign all routes from the metalled highway. With no statutory requirement to clear surface vegetation, surface condition would quickly deteriorate, resulting in much of the network becoming unusable within 2-3 years. The 'Best Value - Ease of Use' figure would drop below the average of 64% (taken as a 5-year average). The minimum acceptable level of service is that all routes are free from unlawful or permanent obstruction, with no path closed for a period longer than 12 months for maintenance works.
Existing	£427,000 (April 2016)	Majority of network available and in reasonable condition (Category 1 routes). Bridge stock, signing and way marking maintained at existing state of repair/replacement. 'Ease of Use' figure would remain in the region of 64%.
Requested	More than existing	Increase in cutting and maintenance to include Category 2 paths with more attention given to side/overhead clearance, particularly on equestrian routes. Greater emphasis on resolving ploughing and cropping offences across agricultural land.

Levels of service	Cost	Summary
Optimum	Significantly more than existing	All bridges and signing to be robustly maintained. Additional surface and side clearance cuts to be implemented on Category 1 paths, with at least 1 cut/annum on Category 2 paths. Surface improvement works to be increased. This level of investment should reduce complaints to a minimum and provide a safer, more accessible and inclusive network for all users

Figure A5.6 - Levels of service summary

7. Lifecycle planning

7.1 Introduction

Because the County Council, cannot inspect all of its public rights of way on a cyclic basis, lifecycle planning for public rights of way is less defined than for the rest of the highways network. Having said that, there are some areas where it is possible to plan more exactly and work in recent years has started to address the matter.

The 3 main areas where lifecycle planning can be effectively implemented, within the scope of current resources, are:

a. Signing (roadside);
b. Bridges;
c. Cyclic maintenance (surface clearance).

7.2 Signing (roadside)

Sub-sections 4.8 to 4.10 above refer to a programme to replace all roadside signs. Commenced in 2004, the following 3-year period, saw over 8,500 new fingerposts installed by contractors across the County. Although the initial installation costs were additional to the normal public rights of way budget, no additional money has been allocated for ongoing repair or replacement.

With the expected lifespan of PTSW in the ground being around 10 years, many posts have now reached the end of their useful life and the replacement of decayed and fallen posts has become a significant and ever increasing maintenance requirement.

The condition of PTSW varies significantly once it's below ground level and unseen. There is no structured inspection or replacement programme, so reports of fallen fingerposts are submitted by the general public or parish councils and these, together with any missing posts staff identify, are added to the routine workload of contactors and paid for out of the normal allocated revenue budget.

To significantly increase the lifecycle of the asset would require fingerposts to be manufactured in a different material such as oak. It is estimated that this would increase the cost of each unit by some 50% but would more than double life expectancy to 20+ years, compared with current PTSW materials. Another option would be manufacturing the post from recycled plastic. This would increase the initial unit cost by at least 4x but would give a virtually indefinite life span.

The reason this approach has not been implemented is the high initial outlay, which would require significant increases in budget to be made in the short term. This would however, be recouped in the longer term, as replacement through decay would be considerably reduced (there would still have to be an ongoing replacement programme for those subject to accidental or malicious damage).

As a cost effective compromise, bitumen encased plastic sleeves have been fitted to posts since 2014. The manufacturers claim is the sleeves double the life of the post so, at a cost of under £2.00 per post, this represents a very cost effective increase in the lifecycle of this item, if the advertising claims are borne out.

7.3 Bridges

The public rights of way bridge asset in Suffolk consists of 3262 structures (April 2016) of widely varying design and construction. At the lower end, these may be small concrete or brick culverts or reclaimed railway sleepers spanning small ditches or watercourses.

The largest number of bridges falls in the medium length category that ranges between 3-8m. These are constructed predominantly from PTSW and, as such, suffer from the relatively short lifespan associated with fingerposts. Again, manufacturing from different materials would substantially increase the life cycle, should the initial budget be available.
Unlike finger posts, there is a significant safety issue if a timber bridge is allowed to decay to the extent that it could collapse. To address this situation and help satisfy the County Council's obligation to provide a safe and usable network, a detailed and systematic programme of inspection was introduced in 2010.

However, it quickly became clear that a full survey of the asset was required first, as existing records were found to be inaccurate in terms of number of duplicate or missing records. In addition, the exact location of the structure that was often found to be inaccurate due to the limitations of mapping when the records were first compiled.

To help to produce a consistent and accurate record, the Suffolk Highways Structures Team's methods were adopted together with a (simplified) inspection to produce a bridge condition index (BCI) that can be used to determine future maintenance requirements.
This data should also help forecast budget requirements and identify potential replacements, before they become a safety liability.

7.4 Cyclic maintenance (surface clearance)

Whilst the PRoW network is extensive and well used, one issue that can be contentious is the annual surface clearance programme, involving the cutting of surface vegetation.

With a large proportion of the asset having a natural surface, it follows that during spring and summer months, vegetation will quickly grow to the extent that routes become difficult to use or impassable. To address this, contractors undertake annual surface clearance of some 1500 km of the network, cut twice each year during the spring/summer months.

This does not, however, include clearance of crop growing on cross-field paths. By law, this is the landowner's responsibility. Nor does it include side growth from hedges, this also being the landowner's responsibility.

Records show that the number of complaints from the public resulting from overgrown paths is directly proportional to the level of cutting carried out. For this reason, the maximum amount of maintenance budget is allocated to this task; however, there will always be a considerable gap between public demand and available budget.

A very competitive tender process, undertaken every 3 years, helps ensure that extremely good value for money is gained from the process. Prioritisation is still required to ensure a reasonable and justifiable allocation of resources and this means that cutting will only take place on higher priority Category 1 routes and then only on those deemed to have importance to the local community or network, as agreed with the parish councils.
The option for parish councils to increase the amount of cutting, at their own cost, is available. In addition, some of the larger landowners and estates will cut paths on their land at no cost to the County Council.

The County Council will use whole life costing techniques when making maintenance and investment decisions affecting public rights of way.

8. Community Involvement

The Rights of Way Improvement Plan identifies that the use of volunteers from the local community or user groups such as the Ramblers Association can assist the local highway authority fulfil some of the more minor (but none the less important) tasks on the network. This can include, condition surveys, inspections and way marking or clearance of scrub or overgrowth.

The Public Rights of Way Team will work closely with local communities and users to achieve best value and return on maintaining the network. The Rights of Way Improvement Plan has more detail on this.

Information regarding the use of volunteers to help maintain the public rights of way network is available from the Rights of Way offices or the **Customer Contact Centre - Telephone 0345 606 6171**

To ensure the safety of volunteers and the public, all works need to be managed and controlled. This includes a written procedure and risk assessment, together with an assessment of competency of the volunteer group leader. This becomes even more important where power tools or hand tools are being used on a public path.

Appendix 6 - Environment

1. Introduction

This chapter deals with the major environmental assets on the highway network, namely trees, grass verges, weeds, injurious weeds and nature reserves. The primary objective is to keep all vegetation in a condition to allow safe use of the highway. The aim is to manage the network to minimise safety issues to the public whilst maintaining the ambiance of Suffolk and reducing perceived nuisance. All trees within falling distance of the highway are termed highway trees and will be considered as part of this plan.

Suffolk Highways has undertaken a review of its operating model in relation to soft estate management, and has identified a number of opportunities which will deliver significant improvements to the quality and effectiveness of the overall service.

With the aim of becoming the greenest County, resource and carbon usage is obviously important. Suffolk Highways will set targets for optimising resource usage and minimising carbon requirements. Achieving these targets will require good planning and the adoption of best practice and/or innovation in service delivery.

2. Pre-HIAMP situation

The position prior to adoption of this plan is that there is little or no policy or strategy on which to base decisions on trees. There are annual programmes for grass cutting and dealing with injurious weeds backed up by policy and strategy.

The tree service is reactive, the grass cutting is planned and the weed service is partly planned (general weed spraying) and partly reactive (injurious weeds) - this approach minimises cost whilst being effective from a safety viewpoint.

3. Asset condition

Records on environmental assets are currently ad hoc and require formalising in the new approach. It is proposed to collect tree condition data on high risk trees on which to base decisions. Records currently held on verge grass cutting and weed spraying also will be considered for potential transfer to Suffolk's *Insight* database. No further asset condition data for environment assets is proposed.

4. Proposed approach

4.1 Trees

The Council is carrying out a county-wide canopy survey as part of its wider tree management duties. From this survey and other known criteria, trees will be risk-zoned according to road and footway category (see figure A6.2). Individual high risk trees will be identified (see figure A6.3).

All trees will be safety inspected by zone to frequencies that relate to the category of road / footway they are adjacent to (see figure A6.2). Risk assessment to the *Quantified Tree Risk Assessment* (QTRA) methodology will be carried out on all high risk trees by a qualified aboriculturalist, who will advise on any action required. The final decision on work will be taken within the relevant asset team.

Following a safety inspection or risk assessment, all data will be transferred to the Suffolk Highways *Insight* database for retention. Individual trees can be re-categorised by the relevant asset team upwards following safety inspections and upwards / downwards following risk assessments. Actions will be prioritised.

Tree safety management is, a matter of limiting the risk of harm from tree failure and while maintaining the benefits conferred by trees. The QTRA system applies established and accepted risk management principles to tree safety management.

The system moves the management of tree safety away from labelling trees as either 'safe' or 'unsafe' and thereby away from requiring definitive judgements from either tree inspectors or tree managers. Instead, QTRA quantifies the risk of significant harm from tree failure in a way that enables managers to balance safety with tree values and operate to pre-determined limits of tolerable or acceptable risk.

Thresholds	Description	Action
	Unacceptable Risks will not ordinarily be tolerated	Control the risk
1/1 000	Unacceptable (where imposed on others) Risks will not ordinarily be tolerated	Control the risk Review the risk
	Tolerable (by agreement) Risks may be tolerated if those exposed to the risk accept it, or the tree has exceptional value	Control the risk unless there is broad stakeholder agreement to tolerate it, or the tree has exceptional value Review the risk
1/10 000	Tolerable (where imposed on others) Risks are tolerable if ALARP	Assess costs and benefits of risk control Control the risk only where a significant benefit might be achieved at a reasonable cost Review the risk
1/1 000 000	Broadly Acceptable Risk is already ALARP	No action currently required Review the risk

Figure A6.1 QTRA Advisory Risk Thresholds

	Sites Covered	Safety Inspection Frequency (frequency tolerance +/- two months)
1	Road Types 2 & 3A and Footway Types 1 & 2 (including footways in busy urban centres)	15 Months
2	Road Type 3B and Footway Types	30 Months
3	Remaining roads & footways, cycleways & urban metalled public rights of way	54 months
4	All other public rights of way	NA
A drive by survey after storm conditions may be instructed to identify potentially hazardous trees		

Figure A6.2 – Tree Safety Inspection Criteria and Frequencies

Suffolk Highways will endeavour to use best practice when considering what work is required / ordered and undertaken.

It is Suffolk Highways' intention to endeavour to create relationships where practical with district councils to provide the specialist aboricultural advice.

Risk Category	Criteria	Risk Assessment Frequency (months)
High	• Resilient network • School • Medical facilities • Park, play area, picnic areas • Overhead utility facilities • Formal and informal recreation hotspots • High pedestrian usage - over 36/hour Problem tree species: • seriously diseased trees; • mature & veteran trees with significant die-back of large branches	18 (Tolerance on frequency +/- two months)
Medium/low	• Car parking areas • Bus stops • Public buildings • Residential OAP homes • Old, veteran and large diameter canopy trees • Unbalanced trees and mature and semi-mature trees with some die-back of branches • Other	When issues arise

Figure 4.3 - Individual Tree Risk Categories and Risk Assessment Frequency.

"Subject to the results of inspections, trees owned by the County Council are pruned or felled when their condition threatens public safety. However, to reflect the aspiration of Suffolk being regarded as 'The Greenest County', Suffolk Highways will resist felling or severe pruning of its own, or protected trees, purely because of minor or seasonal nuisances such as pollen, falling fruit or leaf fall. In respect of the latter, it is the responsibility of the local district/borough council (in its 'local cleansing authority' capacity) to clear fallen leaves.

Should an individual or group of individuals request work to a tree or group of trees say because of nuisance of the above or other kinds, this will only be allowed if the work can be justified by the attending officer (not affecting the health of a tree or a tree can be planted elsewhere) at the individual's or group of individuals' cost. In instances where the issue being addressed relates solely to public safety, the cost of Suffolk Highways carrying out the work will be met by the County Council. Specialist advice will be sought where necessary"

For any tree that must be removed from the highway due to being dead, diseased or vandalised every attempt will be made to plant a new tree in a location that requires the minimum amount of root protection/containment, accords with the Highways Act 1980 and has the potential to flourish in appropriate ground conditions. This would preferably be in wide highway verges away from all metalled highway surfaces or in non-highway locations (such as local amenity, landscaped areas). This approach shall also be followed for new tree provision in general. Trees planted within the highway boundary will be discouraged in new developments but placed in coppices within the development with any that are planted counting as replacement trees for those removed elsewhere. Third party highway tree owners will be warned of potential dangers to highway users when they come to the attention of Suffolk Highways. Formal notices may be served.

Prior to planned works, advice will be sought on trees in conservation areas and those subject to preservation orders as required by the Town and Country Planning Act 1990, as well as for rare species and veteran trees. All potential work identified by specialist aboriculturalist will need to be approved by the relevant asset team member prior to ordering and scheduling.

Tree safety inspectors will be trained to at least LANTRA level 1, whilst a qualified aboriculturalist will have at least a certificate or diploma in arboriculture and qualified to at least Level 3 according to the Arboricultural Association's 'Qualification and Credit Framework' (QCF).

4.2 Soft estate approach

The following potential improvements have been identified:

- Introduction of a clear approach to tree safety management;
- Consolidation and gap filling of soft estate asset records to reduce reliance upon subcontractors local / historic knowledge of the network;
- Improvements to visibility of subcontractor crews' whereabouts;
- Improvements to grass cutting performance;
- Reduction in reliance on trust and relationships;
- Consistency of quality of workmanship;
- Improved effectiveness of weed spraying;
- Proactive communications with stakeholders;
- Reduced time to respond to member and public enquiries

Having one data set for the soft estate will allow a true asset management approach, ensuring ability to issue clear orders to Suffolk Highways' supply chain, allow the encouragement of landowners to clear their own drainage ditches, cut hedges etc., ensure knowledge of areas for special maintenance are documented and appropriately maintained, promote local community involvement, allow improved data for elected members, whilst reducing costs

4.3 Grass

Grass cutting will be based on 2 visits a season on rural A and B roads and 1 visit a season for rural C and unclassified roads based around safety requirements and environmental protection to designated sites. In urban areas, 3 cuts/year are funded through the district councils, to allow for an extra amenity cut. Grass cutting for safety will be based on swathe cuts 1.2m wide with further cutting at junctions for visibility. Generally, the swathe will be adjacent to the carriageway but, in some locations, the swathe may be set back due to the presence of a footway.

Visibility splays will generally be cut back a distance of 3m from the give-way line. Splitter islands which are included within the visibility splay must receive a full cut. Strimming adjacent to street furniture will not generally be undertaken.

District councils or volunteers subject to approval are able to implement further cuts to verges at their own expense should they wish to do so.

4.4 Weeds

Weed treatments will be based upon 2 visits per season. Weeds will be treated with glyphosate translocated systemic herbicide applied by low pressure nozzle either from an ATV spraying at 4-5kph or by pedestrian using a CDA lance for narrow footways/restricted access. A third visit can be ordered as required.

Noxious weeds are removed from verges when identified. Where possible, this will be done in conjunction with local landowners to avoid future cross contamination. The method of treatment will vary depending on the species being treated.

4.5 Hedges

Hedges are generally the responsibility of the adjacent landowner. Hedge owners are warned of potential dangers when they come to our attention. Formal notices may be served. Any action taken will be in accordance with the requirements of the EC Nesting Birds Directive, Wildlife and Countryside Act 1981 and other relevant legislation. Hedge trimming is best carried out in late winter, but Suffolk Highways will only consider trimming a hedge for safety reasons between 1st April and 31st August following an ecological survey.

4.6 Roadside nature reserves

Designated roadside nature reserves will have bespoke cutting regime as agreed between Suffolk Highways and the Suffolk Wildlife Trust

5. Carbon and resource usage

Minimising carbon and resource usage requires:

a. Good planning
b. Good processes
c. All party collaborative approach
d. Travel minimisation
e. Use of less carbon hungry resources
f. Use of local materials
g. Use of local labour
h. Innovation
i. Continuous improvement
j. Appropriate culture
k. Staff suggestion scheme

The main building block to reducing carbon and resource usage (as well as other good asset management practices) is in developing an appropriate organisational culture, one that is collaborative, hearing and challenging. This is not something that happens overnight, but efforts have begun and the shoots of change can be seen. Effort will continue over the coming months and years in order that all involved in delivery of the service have an appropriate culture.

6. Maintenance regime and levels of service

Revenue maintenance funding has been decreasing for some time and there are no indicators this is likely to cease in the near future. There are many requirements for revenue funding whose priority may change from year to year. Should Suffolk Highways have restricted funding and be required to make difficult decisions, safety will be the first priority and should further restrictions be required, work will be restricted to those areas that give the maximum benefit to the maximum number of people i.e. work will occur in areas of highest risk. Possible levels of service are indicated in Figure A6.5.

Level of Service	Likely Costs	Covered
Statutory or minimum		Keep all highway trees and verges in a “safe” condition
Proposed		Keep all highway trees and verges in a “safe” condition contributing to wider landscape/biodiversity where it does not add cost to the service.
Optimum		Keep all highway trees and verges in a “safe” condition, managed within the wider landscape promoting biodiversity.

Figure A6.5 – Possible Levels of Service for Highway Tree and Verge Management

7. Inventory

In order to manage the highway tree stock, an inventory will need to be collected. An initial canopy survey is being carried out by the Council which will enable a desktop exercise to collect basic inventory for the Insight database to be established i.e. risk zones and individual high risk trees. Inventory information for high risk trees will be updated at every risk assessment.

Basic inventory of verges for grass cutting and weed treatment is held in paper format by Suffolk Highways. The feasibility of having this dataset installed onto *Insight* is to be investigated.

8. Stakeholder expectations / communications

Public facing communications will primarily be via the Suffolk Highways webpages. Customers will be directed to cutting programmes which will inform them of the planned works in their communities. Figure A8.1 illustrates the high level programme for the countywide service and will be supported by parish level programmes. All programmes will be reviewed and updated weekly to ensure up to date information for the public.

Programme information will be available on the Suffolk Highways webpages and will provide contemporary information for members and the public. In the unlikely event of a problem occurring, enquiries should be directed to the Customer Service Centre on 0345 606 6171.

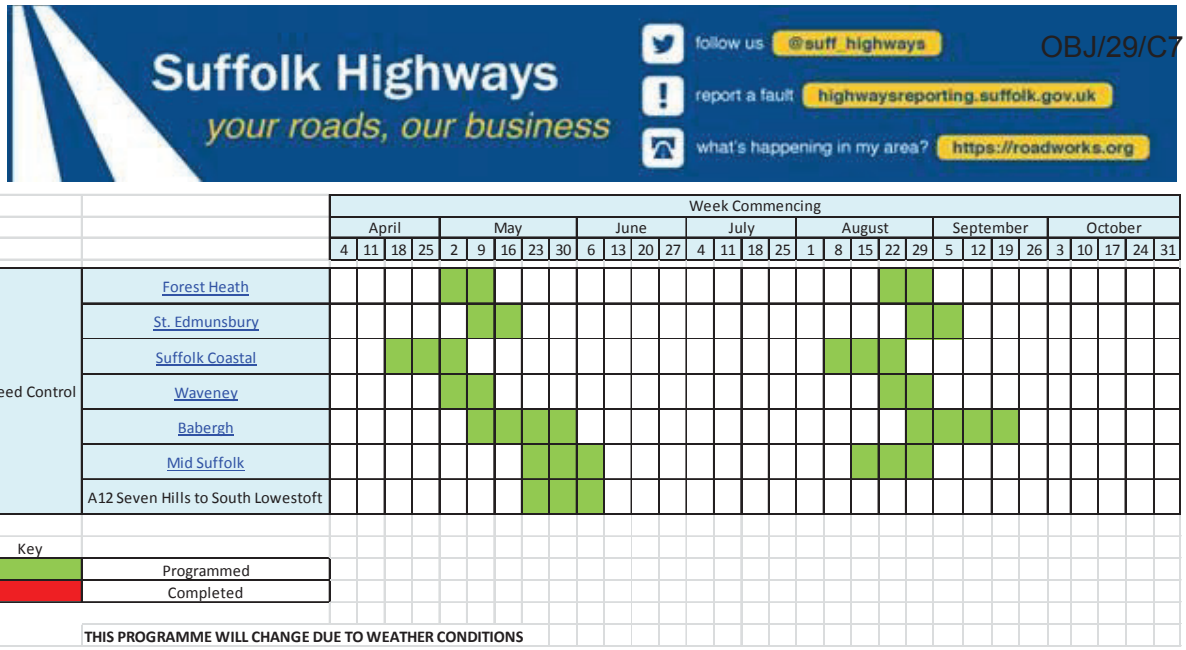

Figure A8.1 Programme indicating approximate timing of work by district

9. Lifecycle plans

Suffolk Highways does not envisage lifecycle planning for highway trees and verges at the current time

10. Prioritisation of works

Works will be categorised according to envisaged risk which will set timescales for that work to be completed. Suffolk Highways will work with its supply chain to plan the works within the set timescales to maximise efficiency, minimise costs and disruption to the public. Works will be co-ordinated with other works as practical.

Annex A - Links to national documents

Applicable to the Council's highway network as a whole:

- Highways Act 1980 – imposes duties upon the Council to maintain the highway at public expense and to protect the rights of the public to the use and enjoyment of the highways for which it is the local highway authority;
- Traffic Management Act 2004 – introduced a network management duty, which includes the co-ordination of all works within the highway, including the Council's own works. It also introduced duties associated with reducing congestion and requires the appointment of a 'Traffic Manager';
- New Roads and Street Works Act 1991- imposes duties on the Council to monitor, inspect and co-ordinate the works of others (especially statutory undertakers) within the highway;
- The Local Government Contract Act 1997 – introduced the concept of prudential borrowing;
- The Management of Health and Safety at Work Regulations, 1999 – imposes the duty to assess risks to health and safety for all employees and persons not in the Council's employment arising out of or in connection with carrying out SCC activities;
- Disability Discrimination Act 2005 – deals with the provision of measures to facilitate use of the highway by people with disabilities;
- The Highways (Road Humps) Regulations 1999 – provides the Council with the power to construct road humps subject to particular rules following certain consultations;
- Road Traffic Regulation Act 1984, as amended by the Road Traffic Regulation (Special Events) Act 1994 – covers traffic regulation orders;
- Flood and Water Management Act 2010 – introduces the principle of 'lead local flood authorities' and the duty to investigate flooding incidents;
- Environmental Act 1995 – requires SCC to review Air Quality;
- The Cycle Tracks Act 1984 – this defines cycle tracks, sets out the procedures for converting public rights of way into cycle tracks and confers certain powers upon the Highway Authority in association with cycle tracks, such as the power to erect suitable barriers;
- Equalities Act 2010 – broadening consideration of equality and diversity issues to those with 'protected characteristics' and introduced a 'public sector equality duty'.

Applicable to structures/bridges

- The Road Vehicles (Authorisation of Special Types) (General) Order 2003;
- The Road Vehicles (Authorised Weight) Regulations 1998;
- The Road Vehicles (Construction and Use) Regulations 1986;
  (NB The above three acts cover details associated with loadings from normal and abnormal vehicles);
- The Transport Act 1968 – clarification of responsibilities for structures carrying highways over railways and waterways;
- The Water Resources Act 1991 and Land Drainage Act 1991 deal with consents that are required before works can be carried out in watercourses and rivers;

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 - imposes duties regarding water quality, ecology and hydro-morphology.

Best practice guidelines/codes of practice

(a) Documents applicable to all the Council's highway assets:

- Well Managed Highway Infrastructure (2nd draft) 2015;
- The Design Manual for Roads and Bridges (DMRB);
- Highway Maintenance Efficiency Programme (HMEP) highway infrastructure asset management guidance documents;
- The UKRLG Guidance Document for Highway Infrastructure Asset Valuation.

(b) Documents applicable to particular SCC asset types:

(i) Structures:

- the Management of Highway Structures Code of Practice 2005;
- CSS Bridge Condition Indicators 2002 (Volumes 1, 2 and 3 with 2004 amendments);
- LoBEG Good Practice Guide for Lifecycle Planning of Highway Structures;
- LoBEG Publication, Asset Valuation for Highway Structures;
- LoBEG Good Practice Guide for Maintenance Prioritisation for Highway Structures.

(ii) Street lighting

- British Standard for Road Lighting BS 5489 contains guidance and recommendations to support BS EN 13201 and to enable designers of lighting systems to comply with that standard. It consists of two parts:
  - BS 5489-1 gives guidance and recommendations for the lighting of roads and public amenity areas;
  - BS 5489-2 gives guidance and recommendations for the lighting of tunnels.
- BS EN 13201 British & European Standard Road Lighting Performance Requirements consists of three parts:
  - BS EN 13201 part 2 – details performance requirements;
  - BS EN 13201 Part 3 – details calculation of performance;
  - BS EN 13201 Part 4 – details methods of measuring light performance;
- BS7671 IET Wiring Regulations 17th Edition. All electrical installations should comply with the requirements of this regulation. Within the regulations is a dedicated section relating to electrical highway apparatus;
- Electricity at Work Regulations 1989 stipulate the electrical safety requirements to be adhered to ensure safety to the general public, street lighting operatives and all associated stakeholders;
- BS EN 40 Street Lighting Column Design details the required parameters for the design and construction of street lighting columns within the highway;
- BS EN 60598-2-3: Luminaires for Road and Street Lighting detailing particular requirements for luminaires used within road and street lighting;
- Traffic Signs Regulations and General Directions 2015 prescribes all road signs that require illumination within the highway;

- Well-Lit Highways 2004 provided guidance to local authorities on lighting management to deliver 'Best Value'.

(c) Professional Lighting Guides / Technical Reports

- PLG02 The application of conflict areas on the highway;
- PLG03 Lighting for Subsidiary Roads: using white light sources to balance energy efficiency and visual amenity;
- PLG04 Guidance on undertaking environmental lighting impact assessments;
- PLG05 The brightness of illuminated advertisements;
- TR12: Lighting of Pedestrian Crossings;
- TR22: Managing a Vital Asset: Lighting Supports;
- TR23: Lighting of Cycle Tracks;
- TR25: Lighting for Traffic Calming Features;
- TR27: Code of Practice for Variable Lighting Levels for Highways;
- TR29: White Light.

Document Control

Change History

Amend

Version	Date	Amended by	Change
1.0	12.07.2016	-	Approved by Cabinet for consultation 12 July 2016
1.1	25.10.2016	Steve Ashley	Minor amendments as a result of Public Consultation and Revised Appendix 1, Correcting typographical errors plus enhanced sections 7 and 10f to expand on the possible use of rejuvenators and changes Appendix 6 para 4.1 relating to planting of highway trees.
1.2	16.11.2016	Steve Ashley	Minor amendments to Appendix 6 para 4.1 Trees re seasonal nuisance
1.3	14.12.2016	Steve Ashley	Lifecycle Plans, minor wording changes to paragraphs 1.5, 5.4, 6.7, 10.5, 11.2, 11.3, App1 para7, App 2 paras 10c &10f, App3 para 8, App 4 para 4.3.1, App 5 paras 2.1 & 4.3
1.3	21.12.2016	John Clements	Updating various data table to reflect latest data. Minor changes to para 5.4, 5.5, 6.7, 9.8, 10.4, 10.5, app 1 sections 7, 10 General formatting.

Approval

Role	Name	Signed	Date
Assistant Director Operational Highways	Mark Stevens	*Mark Stevens*	22.12.2016