Transport Asset Management Plan

Asset Performance Report 2015

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Hertfordshire

Contents.

Executive Summary

The Asset Performance Report (APR) is the annual review of transport asset management including updates on performance; policy, strategy development and other relevant issues.

As an annual review, much of the material in the APR is a matter of factual updates and statistics rather than Policy or service changes. Chapters 1 and 2 give an overview of asset management nationally and locally while Chapters 3 to 8 focus on particular asset groups.

Items impacting on Policies and strategies (new or updated) include:

- DfT Incentive Funding: Identification of service areas requiring improvement to enable successful bidding.
- Local Initiatives: Development of specific areas of work to ensure more efficient or effective working as outlined in National Guidance associated with Highways Asset Management.
- Cross Asset Optimisation: Discussion of ongoing work looking at the potential impacts of shifting priority between asset groups (carriageways and footways in the first instance).

Introduction

The national focus on Asset Management (AM) for the delivery of efficiencies continues to be at the centre of government thinking. The DfT has introduced the incentive element to highway maintenance funding to encourage continuing progress as well as publishing further tools such as 'HMAT' which allows the wider economic benefits of highway maintenance to be evaluated consistently for the first time.

CIPFA/LASAAC, the body responsible for local authority accounting codes nationally, has made the formal decision that highway assets in local authority accounts will move to the same AM-based approach as used for HM Treasury's 'Whole of Government Accounts' over the next few years.

The highway service in HCC has continued to evolve with planning well advanced for the second generation of framework contracts, which will come into effect later this year building on the experience gained so far. To continue to embed AM within the organisation, we have continued to deliver the 'asset management concepts' with more than 120 people have undertaken the training; including some from neighbouring authorities.

With technical recruitment still posing a challenge, the highway service has introduced both graduate and apprentice programmes to attract, train and develop the next generation of staff.

Although there are still many challenges ahead, HCC is well placed to continue to benefit from its strong position in the field of highway asset management to lead further improvements and efficiencies.

Rob Smith

Deputy Director, Environment (Highways)

January 2016

1. Asset Management State of the Nation

1.1 National Initiatives

1.1.1 DfT Incentive Funding.

From 2016/17, an increasing proportion of the Department for Transport's capital allocation for local highways highway maintenance will be tied to a local authority's performance in a number of key areas, such as asset management and efficiency.

A paper was taken to Highways Cabinet Panel on 8 September 2015 to inform about the "Incentive" element of the revised DfT Highway Maintenance capital funding formula and its implications.

The Panel endorsed the identified actions to ensure that future funding was not compromised.

The table below, extracted from the report, summarises the Key Actions against the areas where we are targeting an improved score.

Asset management questions		**Current Score**	**Key Action**	**Target score**
1	Asset Management Policy and Strategy	3	Fully compliant; no key actions required	3
2	Communications	2	Ensure appropriate communications strategy	3
3	Performance Management Framework	3	Fully compliant; no key actions required	3
4	Asset Data Management	2	Complete Asset Information Strategy	3
5	Lifecycle Planning	2	Document current methods report performance for some assets	3
6	Leadership and Commitment	3	Fully compliant; no key actions required	3
7	Competencies and Training	2	Document competency framework for staff	3
8	Risk Management	1	Complete & implement Risk framework and resilience strategy Ensure Risk strategy is regularly reviewed and develop specific plans for critical assets	2 3
Resilience questions		**Current Score**	**Key Action**	**Target score**
9	Resilient Network	1	Complete & Implement resilience strategy Ensure documented annual review of resilient network	2 3

10	Implemented Potholes Review	2	Align existing performance measures against pothole review	3
11	Implemented the Drainage Guidance	1	Document response to drainage guidance and drainage inventory approach Align existing performance measures against drainage guidance	2 3
Customer questions				
12	Satisfaction	1	Ensure reporting of NHT surveys and used where appropriate to inform decisions As above but including trends, benchmarking etc.	2 3
13	Feedback	3	Fully compliant; no key actions required	3
14	Information	3	Fully compliant; no key actions required	3
Benchmarking and efficiency questions				
15	Benchmarking	1	Develop plan from benchmarking data Measure progress against above	2 3
16	Efficiency Monitoring	2	Produce report of historical NHT data including trends/benchmarking etc.	3
Operational service delivery questions				
17	Periodic Review of Operational Service Delivery	2	Define regime to measure progress against HMEP Peer Review report	3
18	Supply Chain Collaboration	2	Ensure supply chain efficiency savings are measured and monitored	3
19	Lean Reviews	2	Ensure efficiency savings and outcomes are measured and regularly monitored	3
Operational service delivery questions cont'd		**Current Score**	**Key Action**	**Target score**
20	Works Programming	3	Fully compliant; no key actions required	3
21	Collaborative Working	2	Develop and regularly monitor performance measures to measure efficiency gains from shared arrangements	3
22	Procuring External Highway Maintenance Services	2	Develop new procurement strategy to measure effectiveness of procurement arrangements, define a good practice approach and deliver continual improvement	3
Overall score		**45**		**66**

Where two target scores are shown in the above table it indicates that there are several actions with different levels of impact. In most cases these actions will be delivered concurrently in order to ensure that the higher score is achieved.

1.1.2 HM Treasury National Infrastructure Plan & National Infrastructure Commission

The latest update to the UK's National Infrastructure Plan in December 2014 covered a range of elements related to Local Transport. Since the release of the plan, confirmation of the establishment of a National Infrastructure Commission has also been issued. The Commission is an independent body that aims to enable long term strategic decision making to build effective and efficient infrastructure for the UK. The transport related elements of the initial terms of reference are focussed on infrastructure in the North and in London. However, the evolution of the Commission will be monitored to assess any impacts on Hertfordshire.

1.1.3 Approved Codes of Practice Review

A review of the existing Codes of Practice for highways, lighting and structures is underway with the expectation that a new code, called "Well-managed Highway Infrastructure," will combine all of these in one document by Summer 2016.

UKRLG has decided to build on the risk-based approach already articulated within its current Codes of lighting, structures and highway maintenance. This means the new Code will not outline any minimum or default standards but will include case studies, educational information and illustrate good practice in particular circumstances. Each authority can implement the Code in accordance with local needs, priorities and affordability.

We intend to review our own approach against the new Code once it is made available.

1.2 Local Initiatives

1.2.1 Information Management

Ensuring we maintain up-to-date and reliable asset data is important when making decisions about service delivery, such as future maintenance treatment requirements. The vehicle use, date of construction or resurfacing, and type of material used, are basic pieces of data that assist in future maintenance strategies.

To ensure that we have a robust set of data to draw on, there are some key initiatives underway to develop and document our asset data, processes and review requirements.

1.2.2 Resilience

A project is underway to identify a Resilient Network, where priority will be given to improving resilience to extreme weather events. This could include identifying and increasing the priority of drainage repairs on high priority sections of the main road network.

Identification of a Resilient Network can also assist with the design of maintenance and improvement schemes, for example identifying a cost benefit of reduced lane closures, derived from utilising a longer lasting surfacing material to extend the time between repairs, or reviewing and, if appropriate, removing items such as street furniture, signs and vegetation to reduce both routine maintenance costs and the associated disruption.

1.2.3 Scheme / Works Integration

An ongoing package of initiatives to improve the interface between routine maintenance and long term structural maintenance is underway. One element of this package is the definition of Intervention Strategies which will be used to guide repair requirements on individual sections of the carriageway network where we already have major repairs planned in the near future.

Currently British and European Standards allow a vast array of road construction materials to be used. Based upon National best practice and the experience of materials used in Hertfordshire we are developing a “Materials Toolkit”, to enable a consistent approach to materials choice for all maintenance works.

This research will also incorporate analysis of “alternative” treatments such as rejuvenation and recycling of asphalt.

The Materials Toolkit will be used to update the design guide used for developers in Hertfordshire, Roads in Herts.

1.2.4 Highway Infrastructure Asset Management Plan (HIAMP)

A review of the previous TAMP is continuing. This is a large body of work that will include:

- An improvement plan to incorporate recommendations arising from the DfT Self-Assessment for local highway maintenance funding.
- Reviewing the interfaces between asset maintenance, network management and customer inputs.
- Updating Policy and Strategy for main asset types.
- Reviewing the lifecycle planning for main asset types.
- Using a targeted approach to complete the embedment of an updated Highway Infrastructure Asset Management Policy and Strategy that reflects our desired coordinated whole service approach to asset management.

1.2.5 Risk Management

We have been developing a consistent application of a risk management approach within the Highways service. This will be complementary to the existing corporate approach to risk management and this work will also help ensure that our approach is documented so that we can present it as evidence to the DfT.

1.2.6 Skid Resistance

Throughout 2015, we have continued to develop processes associated with the Skid Resistance Strategy in order to implement it fully. This includes development of a sophisticated model to categorise the entire carriageway network against the requirements outlined in the Strategy. We are currently developing the methodology for prioritisation of sites that require further investigation for possible remedial works.

There is also a future desire to carry out research into our choice of materials and cost effective treatments for skid resistance.

1.2.7 Footway Hierarchy

Further analysis of proposed footway hierarchy changes has been undertaken and recommendations made to fully implement this. We are currently working through the detail to implement this and begin using it for prioritisation of safety inspections and maintenance scheme development.

1.3 Cross Asset Optimisation

1.3.1 Background

Carriageway performance at HCC has been modelled for over a decade using dTIMS software to predict future condition and plan forward works programmes. This is done through the collection of detailed annual condition data on the carriageway.

The outcome of performance modelling for an asset class is to either optimise the asset condition for given budget constraint, or determine the resources needed to meet a desired level of service. It can also provide the answer to 'what if' type scenarios *e.g. 'what would happen to asset condition if we were to increase/decrease the annual budget by 20% for the next 5 years?'*

Cross asset optimisation takes this a step further; to not only optimise the condition of each asset class for a given budget constraint, but to take an overall budget and determine the investment distribution across all asset classes to maximise asset condition of all assets. Cross asset optimisation also helps to answer the question *'what would happen to condition if we were to move a proportion of our expenditure from one asset class to another?'*

1.3.2 Update

The carriageway performance model is well understood and has been used to make defendable justifications for past maintenance budget changes. We have modelled scenarios for different budget constraints and have a range of condition outcomes for varying investment scenarios.

Varying condition information has been collected on the footway asset for a number of years. In the last 18-24 months we have collected consistent data across the majority of the network. When the full network is complete this will give us a set of

condition data for the footway network to expand our analysis of footways, taking into account industry models provided through the HMEP efficiency programme.

Further work will also be undertaken with the other HMEP models, particularly a soon to be released model that allows for the wider benefits of road maintenance. This includes user and social costs, as well as financial, to allow for a customer-oriented approach.

This is a large topic and will be a focus of the Asset Information Strategy which is due to be developed in early 2016.

2. Highway Infrastructure Overview

2.1 Summary of Highway Inventory

Table 1 – Overview of HCC's Highway Infrastructure Inventory (APR 2014).

Highway Infrastructure Inventory Overview*	
Carriageways – All classes A, B, C and U	Linear - 5,107 km Area – 32.7 million m^2
Footways and Cycleways	Linear – 5,452 km Area – 10.4 million m^2
Drainage – gully information is being updated annually through the cyclical works programme.	170,000 gullies
Structures	1,700 Structures operated & maintained
Street Lighting	114,000 Lamp columns 2,000 feeder pillars 6,000 illuminated bollards 13,700 lit signs
ITS (Intelligent Transport Systems)	575 Traffic Signals 850 Crossings 970 Information systems
Street Furniture	175,000 non illuminated signs 259 km safety fencing

2.2 Highway Infrastructure Valuation Summary

2.2.1 Valuation summary

Valuations for all assets vary over each year due to several influencing factors;

- Rates
- Condition
- Inflation
- Asset information
- Inventory

This list shows the complexity in deriving asset values. Small unit rate changes aggregated across millions of square meters will impact the total asset value. Focus is given to getting better asset value data, and gathering robust inventory information using Confirm ensures all data is in one place and able to be reproduced. There is a continual drive for better asset information, improved condition surveys and use of

*All information presented in this table is approximate. Further details are provided in individual sections

information to guide the service and make efficiencies. AM utilises informed decision making which only comes from robust inventory and asset information.

Table 2 – Gross Replacement Costs (GRC) Values for HCC Highway Infrastructure Assets 2011/12 – 2014/15

GRC Valuation (£M)	2011/12	2013/14	2014/15
Carriageway	£4,963	£5,167	£6,336
Footways & Cycleways	£723	£732	£865
Structures	£864	£884	£977
Lighting	£126	£135	£139
Traffic Management	£57	£59	£61
Street Furniture	£125	£128	£128
Sub Total (Excl Land)	**£6,858**	**£7,104**	**£8,506**
Land	-	£14,818	£17,919
Total	**-**	**£21,922**	**26,425**

Table 3 – Depreciated Replacement Costs (DRC) Values for HCC Highway Infrastructure Assets 2011/12 – 2014/15

DRC Valuation (£M)	2011/12	2013/14	2014/15
Carriageway	£4,642	£4,623	£5,860
Footways & Cycleways	£447	£449	£814
Structures	£560	£572	£739
Lighting	£36	£39	£35
Traffic Management	£35	£34	£19
Street Furniture	£64	£64	£64
Land	N/A	N/A	*N/A*
Total	**£5,783**	**£5,780**	**£7,531**

2.3 Highway Annual Programme Overview

Scheme programmes continually progress throughout the year. Some scheme types are seasonal, fitting into a working window, due to weather requirements. Others are less weather dependent and can be undertaken throughout the year, although adverse weather can still disrupt these. Longer daylight hours and generally better weather means summer is preferred. Programmes are let to allow for mobilisation and lead in; time used to finalise site details, designs, apply for necessary permits, traffic orders and order/mobilise materials as required.

Table 4 – Overview of the Delivered Highway Programmes

Programme Headline	Programme Detail	Out-turn schedule
Carriageway	Surface Treatment	Seasonal work during the summer months. Preparation works in advance, throughout the year.
	Surfacing	Throughout the year
Footway/cycleway	Surface Treatment	Seasonal work during the summer months with preliminary works in advance as necessary
	Surfacing	Throughout the year
Drainage	Schemes	Design year 1, build year 2
Structures	Maintenance.	Throughout the year
	Upgrade.	Throughout the year
Lighting	Replacement	Throughout the year
ITS	Refurbishment.	Throughout the year
	Replacement.	Throughout the year

2.3.1 Carriageways, Footways and Cycleways:

Surface treatments are cost effective preventative maintenance that seal the surface. These are undertaken from spring through to late summer/ early autumn and prepare such assets for the winter weather. The large scale and volume of sites covered results in these projects being managed as countywide work streams. In some cases preliminary patching precedes the surface treatment works, preparing for the main project (application of the surface treatment).

Surfacing works are less weather dependant and can be programmed throughout the year although works can be delayed by inclement weather.

2.3.2 Drainage and Structures

This work has significant design aspects and requires longer lead times to allow for investigation and design. Many of these schemes are programmed over two years (investigation, design and development in year one and construction in year two).

2.3.3 Lighting and Intelligent Transport Systems (ITS)

Lighting and ITS schemes (including traffic signals and similar) need specialist design and construction and both are part of the contractor directed service (Ringway in a service management role). Improvement schemes may be delivered with other contractors, often with lighting or ITS improvements as part of a wider project.

2.4 Budget Overview – Highway Infrastructure

Table 5 –Expenditure Overview for all Highway Infrastructure Assets 2011/12 – 2014/15

Programme Detail	2011/12	2012/13	2013/14	2014/15
Carriageway Surfacing & Surface Treatment	£13,566k	£11,710k	£20,602k	£14,810k
Footway Surfacing & Surface Treatment	£1,681k	£2,204k	£2,500k	£2,500k
Drainage Schemes	£1,080k	£610k	£1,842k	£1,027k
Structures Routine Maintenance Schemes	£860k	£838k	£780k	£743k
Structures Capital Maintenance Schemes	£1,633k	£1,440k	£1,440k	£1,425
Street Lighting Replacement	£1,338k	£600k	£2,080k	£1,900k
ITS Refurbishment	£545k	£605k	£682k	£749k
ITS Replacement and upgrade	£1,832k	£2,800k	£1,162	£1,304

On the whole, funding proportions are kept relatively constant for asset types across years (see Figure 2). This gives consistent expenditure trends which can be tracked against condition. There are several investment peaks in particular years which represents additional funding for specific projects.

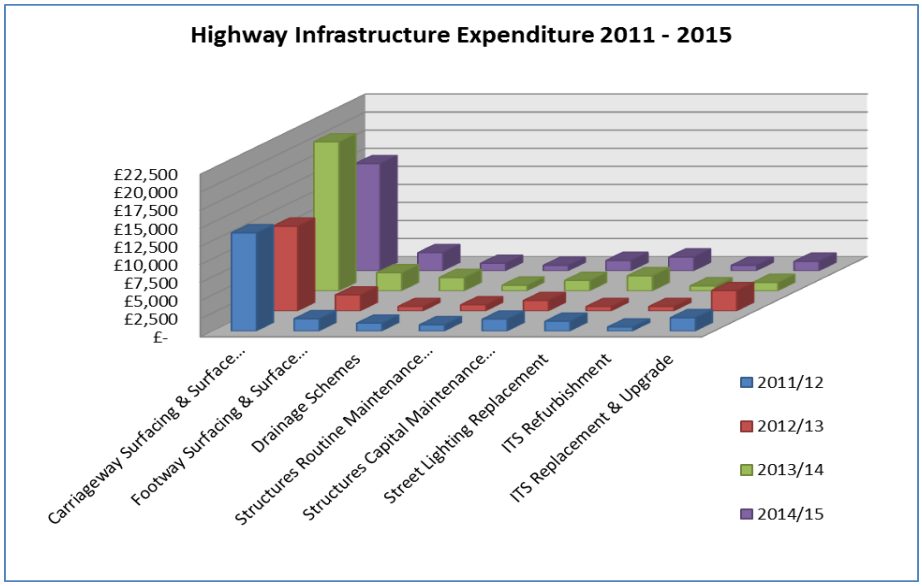

Figure 2 – Highway Infrastructure Expenditure 2011 - 2015

3. Carriageways

3.1 Inventory

We have approximately 32.7 million m^2 of carriageway – the equivalent to covering about 4,500 football pitches. This equates to over 5,100kms in total section length distributed as shown in Figure 3.

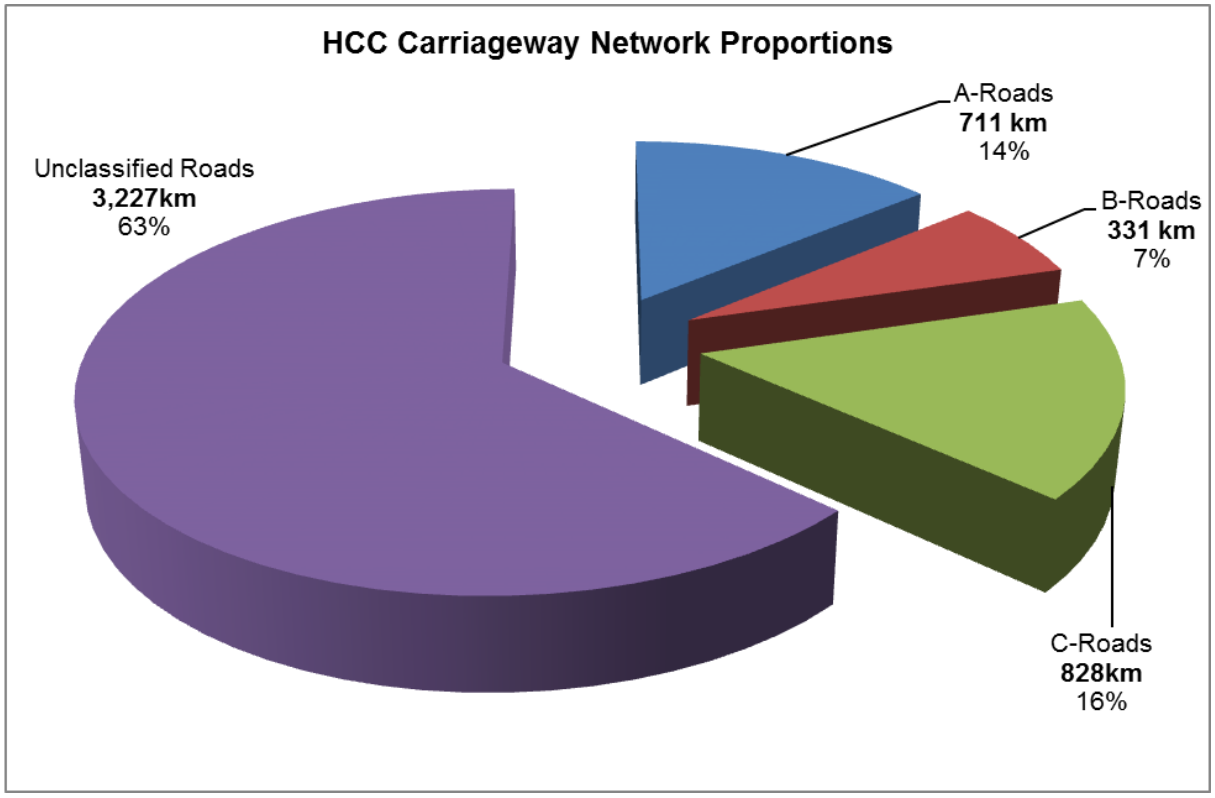

Figure 3 – Overview of carriageway network

The carriageway asset is continually growing via the adoption of roads from new developments, occasional de-trunking and new road construction are also added.

Improvements are ongoing to develop the inventory held on the Asset Management database system (Confirm), with a continual need to update the inventory and manage the data. HCC has good basic carriageway dimension information (lengths and widths). In addition most roads have further limited information about surface type and construction. There is very limited data held relating to age and maintenance treatments across sections.

Minor changes to the asset management database are underway and processes have been developed to record more detailed inventory information, based on

treatment type, material characteristics and location as part of the contractual requirements for our contractors. This information is vital as better information will improve the deterioration modelling which in turn enables better informed decision making about the investment in the network.

The condition and age profile will be used together to determine the right treatment at the right time for each road section. Optimisation work is used to determine which sections get treated within the limited resource available.

3.2 Carriageway Maintenance Strategy

3.2.1 Overarching Strategy

The strategy is to maintain the asset as effectively and efficiently as possible by targeting the available resources to where they will give the greatest overall long-term benefit. In implementing the strategy account is taken of:

- The agreed Objectives (currently to keep the network in steady-state);
- The Benefits to customers and road-users (busier roads, which benefit more people, typically have a higher priority); and
- The potential Costs and Risks to the authority from different actions.

The strategy is primarily delivered through the Category 1, 2 and 4 programmes:

- Category 1 - Safety Focus: Reactive service to keep the network in a safe condition and ensure HCC discharges its legal duties in a robust and efficient way. Typically involves fixing potholes and similar defects, and as such is inherently expensive and inefficient. Ideally, the amount of Cat 1 work will be reduced to a minimum by promoting planned, proactive work through Cat 2 & 4 programmes.
- Category 2 - Serviceability Focus: Planned preventative maintenance and planned repairs to keep the network serviceable and prevent Cat 1 defects forming and defer the need for Cat 4 work. Generally localised works such as patching and joint sealing to fix specific localised defects or areas of deterioration.
- Category 4 - Efficiency Focus: Mix of planned preventative maintenance and planned renewals to keep the network serviceable, prevent Cat 1 defects and deliver best value by focusing on long term benefits and whole life costs of

options to deliver optimised programmes of work as efficiently as possible. These are scheme-type works and, where appropriate, developed and delivered as work streams in order to get the greatest economies of scale.

The creation of the Whole Client Service (WCS) has led to an AM driven service. The Cat 1 & 2 and Cat 4 strategies and delivery are under a single group. Cat 1 & 2 delivery is with Ringway as part of the contractor-led service. This puts the day-to-day direction of these services in the same team which will help to support the key Cat 2 objective of reducing demand for Cat 1 works.

3.2.2 Carriageway Targets

Carriageway condition targets are based on maintaining steady-state, relative to the 2010/11 condition baseline (when targets were last reviewed) as shown in Table 6. The 2014/15 data shows that performance is ahead of target for U roads but behind currently for A, B&C roads. However, single-year variances must be treated with caution as condition returns can vary by up to a few percentage points from year to year and trends monitored over a longer period give a more reliable view (see Section 3.3 for more detail).

Table 6 – Carriageway Target Data

PI Description	Historic Data			Target
	2012/13	2013/14	2014/15	2015/16
A Road Condition	6%	4%	4%	8%
B&C Road Condition	17%	14%	8%	11%
U Road Condition	11%	17%	19%	17%

3.3 Condition Monitoring and Results

3.3.1 Condition Monitoring

Annual machine surveys on A, B & C roads and visual surveys on U roads are used to determine the condition of carriageway assets and plan future maintenance works. This also provides data required for producing Performance Indicators (PI's).

Official National Indicators (NI), which replaced Best Value Performance Indicators (BVPI), only show the proportion of poor roads and don't reflect the whole network condition. So although they are national standards and useful for benchmarking, they do not reflect or take account of preventative maintenance done on the network.

The National Indicator (NI) graph in Section 3.4 shows an overview of the trend of the proportion of poor roads within Hertfordshire.

Table 7 – Survey Types

Survey Type	Survey Scope	Coverage	Frequency	Output
Surface **C**ondition **A**ssessment for the **N**ational **N**etwork **R**oads (**SCANNER**)	A roads	100%	Annual (Sept – Dec)	Surface Defects, Roughness, Rutting, Spatial geometry
	B, & C roads	100% in one direction		
Coarse **V**isual **I**nspection Survey (**CVI**)	U roads	100%	Annual (Sept – Dec)	Surface Defects, Rutting
Safety Inspections	Varies	Varies	Ongoing	Surface Defects, Rutting – above a given tolerance
Sideways Force **C**oefficient **R**outine **I**nvestigation **M**achine (**SCRIM**)	A roads	100% in one direction	May - Sept	Measure of wet skid resistance of the road surface
	Busy B & C Roads	Varies		
Falling **W**eight **D**eflectometer (**FWD**)	Varies	Varies	Oct - Apr	Structural information
Core Data Logs	Varies	Varies	Oct - Apr	Structural information

The following surveys are currently used to collect carriageway condition data which contribute to the delivery of the service:

- SCANNER: This machine automatically captures condition data whilst driving around the network at normal traffic speeds. The data is used to run the optimisation model which determines the treatment required for each road section.
- CVI: These surveys are currently used on unclassified roads and are used in much the same way as SCANNER but are done visually by trained surveyors.
- Safety Inspections: These are undertaken on a routine basis dependent upon the carriageway classification. Further detail is provided within the Service Inspection Manual, the technical document used by HCC inspectors.
- SCRIM: Measures the skid resistance (frictional resistance to braking vehicles) of a surface. This is very seasonal with a short working window to attain data.

- FWD: This provides structural information of the road construction. Similar roads are perceived to deteriorate in the same manner, so this information provides a match between similar roads when modelling how surfacing deteriorates over time.
- Core Data Logs: Drilled out cores of carriageway are used in much the same way as the FWD to provide information on the build-up of a carriageway which can be compared to others.

Savings made to date have arisen from using the condition information to drive an optimisation model that provides engineers with a works programme. Good data also supports the Whole of Government Accounts (WGA) financial returns and helps benchmark the service.

3.3.2 Condition Results

Road Condition Indicators (RDCs, formerly BVPI's) are reported to National Government annually as part of the single data set. Table 8 summarises the results for the following RDCs:

- 130-01: principal road (A road) condition
- 130-02: non-principal classified roads (B&C road) condition.
- U/C Roads: unclassified road (U/C road) condition.
- 130-03: skidding resistance data, (not compulsory reporting data).

Table 8 – Road Condition Indicators

RDC	RDC Detail	% Road Surveyed			% Maintenance should be considered		
		2012/13	2013/14	2014/15	2012/13	2013/14	2014/15
130-01	Principal roads LA maintained A roads	94%	92%	91%	6%	4%	4%
130-02	Non-principal roads LA maintained B & C roads	92%	B – 82% C – 90%	B – 94% C – 92%	12%	14%	8%
U/C Roads	Unclassified roads LA maintained U/C roads	99%	99%	99%	11%	17%	19%
130-03	Skidding resistance data	-	Principal – 96%	Principal – 96%	-	-	-

			B, C & U – 13%	B, C & U – 13%			

Road condition is a key area of public interest which has prompted HCC to make ***"Reducing the backlog of road and footway maintenance by giving priority within the council's limited resources"*** an objective in the 2013-17 Corporate Plan.

The BVPI's are shown in Figure 4. Trends are tracked and monitored and indicate historical trends of the network condition. A higher value denotes a poorer condition and is representative of 'red roads' i.e. the percentage of roads in the classification that require maintenance. These figures are gathered nationally and benchmarking can be made between like authorities.

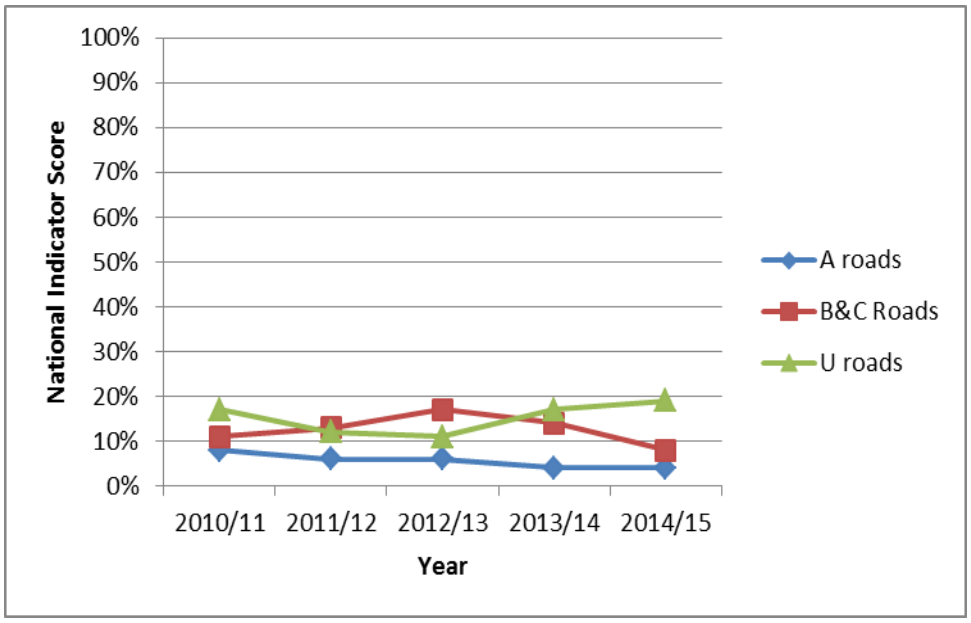

Figure 4, Historic Road Condition Trends.

3.4 Asset Performance

It has been a HCC aspiration to maintain steady state of road condition for all road categories across the network. Achieving this is complex and requires a balance of expenditure to manage expected levels of deterioration. This trend has been monitored and reported against the NI's 103-01 and 130-02.

The A and U road networks have been held in relatively steady condition state over the last few years, whilst the B and C road categories have been in declining condition.

Continuing assessments will be made over the coming months and years to ascertain if additional funding is required to deliver the desired objective – steady state condition for all road classes.

3.5 Valuation

Valuation of Total GRC† (Gross Replacement Cost) as at 30 June 2015 is **£6,336M**, broken down as follows:

Table 9 - Carriageway GRC

Road Class		Calculated Area (m^2)	Carriageway GRC (£'000s)
Urban	A	2,678,730	519,082
	B	1,379,040	267,229
	C	2,343,250	454,073
	U/C	16,880,640	3,271,113
Rural	A	3,549,040	687,729
	B	1,035,150	200,590
	C	2,430,480	470,976
	U/C	2,398,400	464,760
TOTALS		**32,694,730**	**6,335,552**

† GRC for carriageways is inclusive of other linear assets like kerbing and drainage which are rolled up and reported as part of the carriageway asset

A roads = **£1,206,811 M** C roads = **£925,049 M**

B roads = **£467,819 M** U roads = **£3,735,872 M**

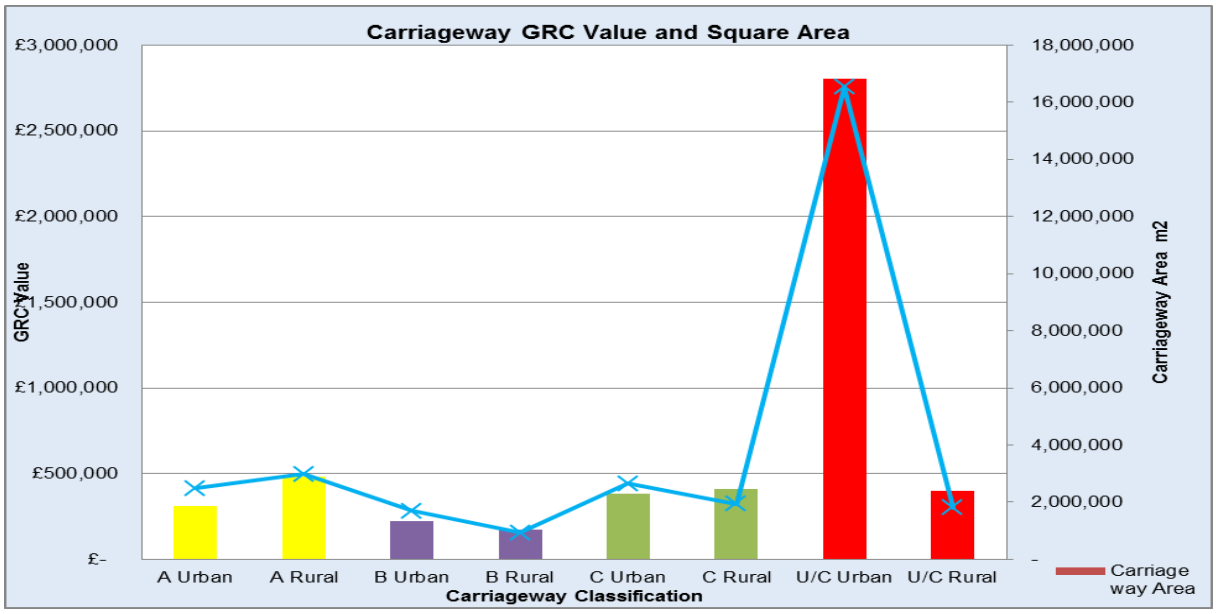

Figure 5 – Carriageway GRC

3.6 Lifecycle Planning

Lifecycle planning is a key AM tool using condition and performance data to gauge asset deterioration over time. For carriageways, data is gathered through the surveys and historical trends are compiled to establish how the asset performs and what factors influence longevity and treatment lives. Using this and considering cost and function over the asset life, it is possible to determine optimum treatment intervention points. We use several models for predicting trends through empirical condition and inventory data; these are used to support strategic maintenance planning decisions.

3.7 Budget and Delivery

Table 10 -Programme Delivered 2014/15

Treatment Type	Treatment Code	Area (m^2)	Cost
A Road Surface Dressing	ASD	581,606	£1,858,000
A Road Surface Inlay	ASI	147,559	£5,000,000
Total A Roads		**729,165**	**£6,858,000**

Local Road Surface Dressing	CSD	641,537	£2,357,000
Local Road Micro Asphalt	CMA/CSH	528,269	£3,658,000
Local Road Surface Inlay	CSI	300,000	£1,937,000
Local Road Recycling/Recon.	CRY	*N/A*	*N/A*
Total Local Roads		**1,469,806**	**£7,952,000**
Total All Roads		**2,198,791**	**£14,810,000**

Table 11 - Programme Planned 2015/16

Treatment Type	Treatment Code	Area (m2)	Cost
A Road Surface Dressing	ASD	389,142	£1,787,000
A Road Surface Inlay	ASI	177,264	£5,376,000
Total A Roads		**566,406**	**£7,163,000**
Local Road Surface Dressing	CSD	507,074	£1,683,000
Local Road Micro Asphalt	CMA/CSH	953,107	£7,571,000
Local Road Surface Inlay	CSI	356,747	£5,838,000
Local Road Recycling/Recon.	CRY	*N/A*	*N/A*
Total Local Roads		**1,816,928**	**£15,092,000**
Total All Roads		**2,383,334**	**£22,255,000**

Table 12 – Proposed Programme 2016/17 (estimated)

Treatment Type	Treatment Code	Length (Km)	Area (m2)	Cost
A Road Surface Dressing	ASD	19,520	135,230	756,384
A Road Surface Inlay	ASI		161,597	4,340,000
Total A Roads			**296,827**	**5,096,384**
Local Road Surface Dressing	CSD	147,450	583,985	1,841,676
Local Road Micro Asphalt	CMA/CSH	74.8	464,578.	3,968,618
Local Road Surface Inlay	CSI		350,000	8,650,000

Local Road Recycling/Recon.	CRY		0	0
Total Local Roads			**1,398,563**	**14,460,294**
Total All Roads			**1,695,390**	**19,556,678**

3.8 Key Issues and Improvement Actions

- The current method for selecting sites is the deterioration model. Ongoing development of this tool requires accurate data to determine which sections would benefit most from treatment. Work is constantly being done to update the inventory with the treatment date and type. Adding this information into the AM database will provide empirical information on deterioration and expected service lives of treatments on given road types and traffic flows. This will be used to further refine the model in an iterative development process. Alternative materials and delivery processes will continue to be sought to further increase efficiencies and value and/or reduce waste and the carbon footprint.
- Supply chain discussions are held to gather expertise in the latest maintenance innovations.
- Design and materials for improvement schemes need to take future maintenance into account. A whole-life cost approach is preferable to a short term view and we will be developing a strategy and guidance to provide design engineers with information to assist in designing with this in mind.
- Poor drainage can contribute to and accelerate carriageway deterioration – hence there is a key link and need to provide a clear strategy/ approach to the design and maintenance of drainage for the preservation of carriageways.

4. Footways and Cycleways

4.1 Inventory

We have over 10 million m^2 of surfaced footways and cycleways. This equates to over 5,300kms of total section length distributed as shown in Figure 5.

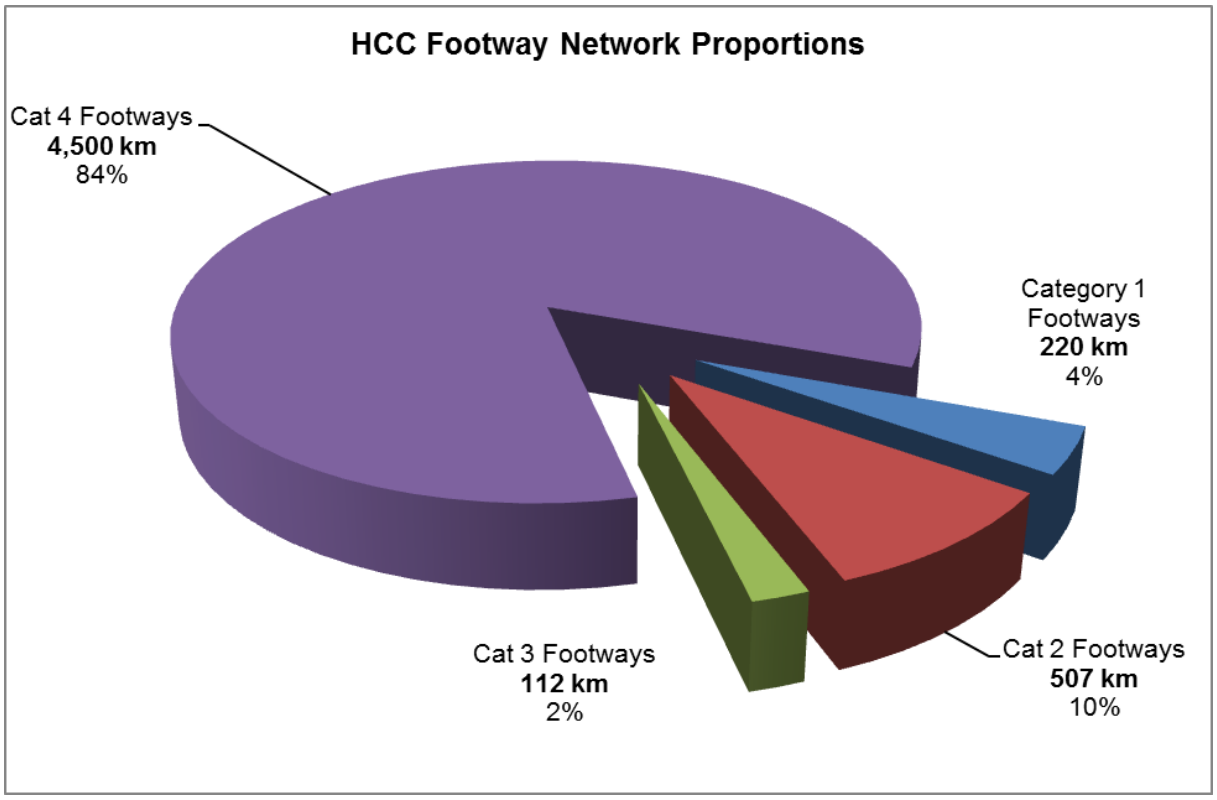

Figure 5 - Overview of footway network

HCC operates and maintains all the above surfaced paths. This asset inventory is growing through the adoption of new developments and the creation and extension of existing features across the county. There is a continual need to ensure the Confirm inventory is up to date with accurate information.

The footway inventory is generally quite good, with a lot of available data. Basic footway dimensions have been historically collected and are held within Confirm. Previously surface material had not been updated; however the Footway Network Survey (FNS) has made this data available and has been added to the inventory. As with carriageways, more detail about the surface material and its characteristics is being collected as surface treatments or resurfacing works are carried out.

Age profiles of footways and cycleways have not been recorded in the past and we have had to relate their condition to expected age. However, for works carried out in future this data will now be recorded.

4.2 Footway and Cycleway Maintenance Strategy.

The strategy is to maintain the asset as effectively and efficiently as possible by targeting resources to where they will give the greatest overall long-term benefit. Implementation of the strategy takes account of:

- Benefits to customers and pedestrians (busier footways, which will benefit more people, typically have a higher priority); and
- Potential Costs and Risks to the authority from different courses of action.

The strategy is primarily delivered through the Cat 1, 2 and 4 programmes, each of which has its own role to play:

- Cat 1 - Safety Focus: Reactive service to keep the network in a safe condition and ensure HCC discharges its legal duties in a robust and efficient way. It is reactive work, typically involves fixing potholes, trips and similar defects and as such is inherently expensive and inefficient. Ideally, the amount of Cat 1 work will be reduced to the minimum necessary by promoting planned, proactive work through Cat 2 and 4 programmes.
- Cat 2 - Serviceability Focus: Mix of planned preventative maintenance and repairs to keep the network serviceable and prevent Cat 1 defects forming and defer the need for Cat 4 works. Generally localised works such as patching and joint sealing to deal with specific localised defects or areas of deterioration.
- Cat 4 - Efficiency Focus: Mix of planned preventative maintenance and planned renewals to keep the network serviceable, prevent Cat 1 defects forming and deliver best value by focusing on long term benefits and whole-life costs of options in order to deliver optimised programmes of work as efficiently as possible. The works are scheme-type and, where appropriate, are developed and delivered as work streams in order to get the greatest economies of scale.

The creation of the WCS has led to an Asset Management driven service. The Cat 1 & 2 and Cat 4 strategies and delivery are under a single group. Cat 1 & 2 delivery is with Ringway as part of the contractor-led service. This puts the day-to-day direction

of these services in the same team which will help to support the key Cat 2 objective of reducing demand for Cat 1 works.

4.3 Condition Monitoring and Results

4.3.1 Condition Monitoring

The Footway Network Survey FNS was adopted in 2011 as the format to collect footway condition data. It was developed at a national level as a quick network level survey tool to enable authorities to determine which footways require further consideration for possible treatment.

The concept has been ideal for efficiently surveying large sections of footways. Traditional surveys collected data relating to individual defects/defect types along the footway section and were time consuming and resulted in either a very coarse or overly detailed results (depending on survey used). FNS provides a balance and uses an assessment rating instead of a defect type.

Alternatives to the standard FNS have been developed as it was felt that the basic form did not provide enough detail for scheme development. HCC have developed a model and the additional data captured during the inspection is used for analysis and to keep the inventory up to date. Furthermore, the collection of the 'additional data' enables the creation of a robust deterioration model based on empirical information. This is the long term objective of condition monitoring and will help provide value for money in the future.

Table 13 - FNS

Survey Type	Survey Scope	Coverage	Frequency	Output
Footway Network Survey	All footways	100%	Network to be covered every 2 years.	Condition banding together with the major cause of defect onsite. Asset inventory information provided for update

4.3.2 Condition Results

As the new FNS method implemented across the network is done by inspectors there is some subjectivity to the results. This has been minimised by using a recognised FNS surveying trainer to provide expert on site guidance to our surveyors.

The survey results provide a consistent benchmark for site comparisons and aiding scheme selection (they do not yet give a robust means of reporting overall condition). The standard FNS surveys tend to over report the amount of footway in the poorer condition bands giving an overly-pessimistic view of network condition. Therefore, during 2014 we implemented changes to the methodology of the survey with the objective of developing a condition measure that reasonably reflects the condition of the footway network as the public might perceive it. This information can be used in regular reporting and to help in activities such as cross asset optimisation.

4.4 Asset Performance

A model has previously been created that reports a desired treatment against each footway section based upon condition and other defect factors recorded during the FNS. This is currently being refined based on the new FNS survey methodology to recommend possible sites for treatment from 2016/17 onwards (subject to officer investigation). The results can then be calibrated against onsite inspections and a robust network programme can be formulated using this method. In line with the footway and cycleway strategy outlined above, this work would be supplemented by discussions with Ringway on issues emerging from the Cat 1 and 2 routes that need consideration for inclusion in the Cat 4 programmes.

Reporting asset performance is a key part of the longer term desired outcomes for the development of the footway survey. This will help to support both performance management and investment decisions.

4.5 Lifecycle Planning

The lifecycle planning model uses the condition information collated within the FNS. Each footway is modelled for in year treatment selection and estimated cost of works. All sites that are identified within this model are verified for suitability and extent by the project manager.

4.6 Valuation

Valuation of Total GRC (Gross Replacement Cost) as of 30 June 2015 is £865M and is broken down approximately as follows:

Class 1 = £47,586M **Class 3 = £14,694M**

Class 2 = £97,963M **Class 4 = £705,166M**

Table 14 – Footway GRC

Footway Class		Calculated Area (m^2)	Footway GRC (£'000s)
Urban	1	567,840	£47,237
	2	1,159,760	£96,477
	3	170,240	£14,162
	4	8,075,570	£671,785
Rural	1	4,200	£349
	2	17,860	£1,486
	3	6,400	£532
	4	401,440	£33,381
TOTAL		**10,403,310**	**£865,409.**

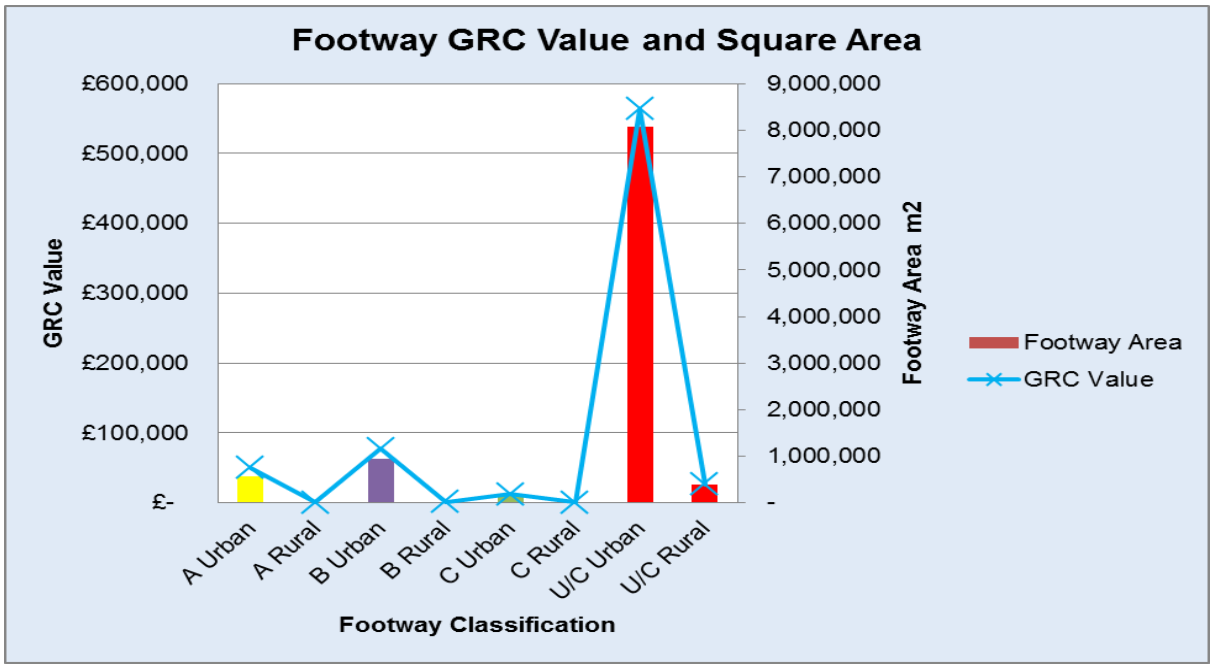

Figure 6- Footway GRC

4.7 Budget and Delivery

Table 15- Programme Delivery 2014/15

Scheme Type	Area (m^2)	Cost (£000's)
Surface treatment (micro asphalt)	tbc	tbc
Resurfacing & Reconstruction	64,939	£2,006
Total		

Table 16- Programme Delivery 2015/16 (estimated).

Scheme Type	Area (m^2)	Cost (£000's)
Surface treatment (micro asphalt)	793,810	£6,226,
Resurfacing & Reconstruction	46,346	£2,013
Total		**£8,239**

Table 17- Proposed Delivery 2016/17 (estimated).

Scheme Type	Area (m^2)	Cost (£000's)
Surface treatment (micro asphalt)	121,692	1,259,
Resurfacing & Reconstruction	61,455	2,616
Total		**£3,875**

4.8 Key Issues and Improvement Actions

- Footway Condition Survey

  The FNS is an ongoing survey undertaken throughout the year. Progress and results to date have shown that the recognised condition scoring provides an output biased towards the lower categories of condition. We have developed a new methodology for our survey and the results are now being used to model the footway asset as detailed in the following paragraphs.

- Footway Lifecycle Planning Model

  The simple network level lifecycle planning model has already evolved into a footway section model. Further work and analysis will be undertaken in conjunction with the footway survey. The footway condition information has two main functions, primarily to provide the modelling tool with condition information that can be used to determine treatment requirements and to provide a benchmark against other authorities.

  Once the rule set for the survey has been established, a lifecycle planning model can utilise the condition information and translate this data into treatment requirements for each footway section. This process will be improved upon year on year as the model develops through feedback provided by the project managers who review the output against the onsite pre-works inspection.

- Footway Deterioration Model

  Leading on from the lifecycle planning model a deterioration model will be developed over the coming years. This model will provide an optimised programme of works.

  The additional benefits of this model is that it will provide a condition forecast based on budget expenditure. This can be used to understand what investment level is needed to maintain the footway network at the current service level. Different expenditures can be applied to the model to provide expected condition and performance levels. Expenditure can linked to service levels and this can provide a clear resultant for the capital budget.

- Innovation

  HCC is always looking to investigate the use of new materials. Recycled materials may prove sustainable through the construction of underlying layers. Alternative materials and methods of work will be discussed with the contractor to determine if there are any financial savings to be made or if there are any environmental gains using alternative material or treatments. In addition value for money products that extend the life of the footway surface will also be discussed with the contractors. Alternative materials having lower whole life costs will also be investigated if deemed applicable to the network.

- Hierarchy Review

  In 2013/14 a new formally adopted HCC hierarchy for footways was agreed.

Table 18 – HCC Footway Hierarchy

Hierarchy	Hierarchy Name	Pedestrians Per Day (PPD)	Other Criteria
1	Primary	> 5,000	
2	Main	1,000 to 5,000	
3	Moderate	250 to 1,000	or Residential Care Homes or Nursing Homes or Multiple-unit Supported Living
4	Standard	<250	
5	Rural (Low use)	<100	and Rural Location

From Table 18 it is seen that the new hierarchy is risk based factored against pedestrian footfall. This approach enables each footway to be classified based on surrounding infrastructure and the expected footfall rather than just the route hierarchy.

The time consuming task of applying the new footway categories across the network was carried out and consultation has been carried out with members. The implementation of a change over to the new regime of safety inspections and to assist with decision making for maintenance schemes is due to commence in 2016/17.

5. Drainage

5.1 Inventory

The HCC highway drainage system is an evolved asset comprised of several distinct asset sub-groups:

- Carriageway and footway gullies (drainage system inlets);
- Inspection and access chambers (manholes and catchpits);
- Sustainable Drainage Systems (SuDS) such as soakaways and storm cells etc.;
- Highway drains (buried pipework);
- Outfall structures (drainage system outlets to watercourses);
- Roadside grips (shallow unlined ditch inlet channels cut in verges); and
- Road-side ditches (in many cases owned by adjacent landowners).

These assets work in combination to remove surface water from the highway and transport it into a water course, utility storm system or SuDS filtration systems. Their functionality is key to their performance and ability in undertaking their function.

5.2 Maintenance Strategy

The new WCS provides an opportunity to manage scheme bids through a holistic management process. As detailed above all service streams provide an integrated service delivery approach and this is reflected within scheme appraisal.

5.2.1 Work categories

The drainage asset is maintained through several service streams;

- **Cat 1 Emergency/Urgent Works**; placing flood warning signs, cleaning up and jetting pipes from flood events and minor reactive repairs.
- **Cat 2 Reactive Maintenance**; minor repairs and/or adhoc clearance of non-functioning drainage assets such as grips, ditches and pipe drains etc. Investigation and escalation of more significant issues to the Cat 4 programme.
- **Cat 4 IWP Drainage Schemes**; more significant drainage repairs or major improvement works identified through Cat 2 and 5 activities.

- **Cat 5 Cyclical Routine Maintenance**; cyclic cleansing / emptying of road-side gullies and similar drainage assets.

5.2.2 Cat 5 service - Cyclical Routine Maintenance

Emptying and cleaning Hertfordshire's 167,824 gullies is undertaken on an 18 month cycle with vulnerable gullies (6,152) and those gullies on high speed roads (7,122) cleaned on a 6 and 12 month cycle respectively. However, silt levels of cleaned gullies are recorded against each asset item to enable improvements to the cyclical maintenance scheduling. Profiling of silt levels provides a record of asset performance and translates into the ability to target hot spot areas, therefore utilising resource to maximum benefit.

5.2.3 Holistic Management of the delivered Service

Holistic management – Cat 1 and 2 Service: The new contract structure has helped enable the holistic management of whole service delivery by combining both functions within the Ringway contractor directed service. The Cat 1 and 2 service is now being used to inform the Cat 5 service and will provide further information to identify hot spot areas. The new Cat 5 service is in its infancy and once implemented over a sustained period of time in its new capacity the resultant impact should see a reduction in unplanned reactive works.

Understanding hotspots and site requirements in relation to maintenance will be informed through the advanced targeted Cat 5 service. Optimisation of resources will enable maximum benefit and reduce the need for unplanned reactive maintenance.

The Cat 2 service will also integrate with the Cat 4 service (IWP Drainage Schemes). Cat 2 will perform investigation or preliminary works and function in two ways; either re-establishing functionality therefore negating the need for scheme works or provide an investigative resource to determine the scope of a proposed drainage scheme.

As with all drainage work streams a review of the Cat 4 process is being undertaken. A process has been developed as outlined above to provide guidance for issues emerging through Cat 1 and 2 to be escalated for consideration for inclusion in the Cat 4 programme where necessary. This process has been rolled out and forms a template for similar processes on other asset groups.

The holistic management of the drainage service will help to drive efficiency as targeted maintenance will be risk-based using detailed information obtained through the Cat 5 service. The aim will be to reduce the incidence of unplanned reactive maintenance – Cat 1 – by the implementation of advanced targeted maintenance although other factors, climate change in particular, may tend to act against this by creating more extreme weather events requiring urgent, unplanned responses.

The Cat 2 service acts as a sense check for issues being escalated to Cat 4 and ensures maintenance works are conducted prior to being passed across for scheme appraisal.

5.2.4 Scheme Prioritisation

Cat 4 IWP Schemes: The Drainage Scheme Check List is to be used as the bid form for proposed drainage schemes when local engineers promote identified drainage problems for a significant scheme through the IWP. Each proposal ensures that the Cat 2 route has been exhausted and preliminary cause investigation has been undertaken and reported.

This method of data capture creates a foundation for all bids where cyclical and enhanced maintenance has been undertaken and the issue has not been resolved. All bids will follow the same process to ensure compliancy and consistency.

Each bid form will be processed and ranked. A separate risk based ranking process is used for prioritisation. This ranked list of drainage schemes creates an optimised bank of projects that are added to the FWP project set.

The bid form process streamlines the IWP ranking system as initial investigation works are conducted under Cat 2 and become a level platform for ranking purposes.

The bid process has a further application; identification of third party issues which may result in additional investigation. Where an existing drainage system has been damaged by a third party (such as utility works) we have an established system for recovering our costs, both of the investigation and any rectification works required.

5.2.5 Identification and management of hot spot areas

A proposed procedure for the management of ‘problem sites’ is included below. The identification of a drainage issue triggers a chain of events to determine cause and appropriate action.

These issues can be highlighted through several channels and a robust process is required for the management of issues and their operational management.

As an overview of the process there are several main categories that the process focuses on to determine cause and associative action.

- The first stage is to establish ownership as this will drive stakeholder involvement and determine the duty of care responsibilities. The processes below assume HCC asset ownership and management.
- Maintain current asset through the Cat 2/5 service and determine if further maintenance is required with a revised Cat 5 service.
- Damaged assets are to be assessed for cause i.e. third party. Investigation into damage will determine the cause and if deemed appropriate remedial work costs will be recharged.
- For sites where the Cat 2/5 maintenance service has proved ineffective and there are no signs of significant damage an IWP scheme maybe required/warranted through the bid form process.

For low ranking sites that are not considered a priority for an IWP scheme, an opportunity for intervention through Cat 3 (Highway Locality Budget) may be suggested to the local member. It is accepted that drainage issues which are too low-priority for both Cat 3 and Cat 4 programmes will just need to be allowed to continue to occur from time to time since such issues are likely to be both low risk and low impact.

In cases where there is a significant impact but investigation shows no available or affordable solution, alternative mitigation measures such as warning signs may be considered.

5.3 Valuation

The drainage asset valuation is included in the carriageway linear items valuation and forms part of the carriageway GRC. Drainage asset inventory is not a readily available data set so general assumptions have been made based upon carriageway classification and modern equivalent design to value the drainage assets.

5.4 Budget and Delivery

Table 19 - Programme Delivered 2014/15

Reference	No. Schemes	Total Expenditure
Investigation	28	**£1,300,000**
Quick Win	0	
Minor Works	6	
Major Schemes	15	
3rd Party	3	
Total	**52**	

Table 20 - Programme Planned 2015/16

Reference	No. Schemes	Total Expenditure
Investigation	16	**£1,200,000**
Quick Win	1	
Minor Works	2	
Major Schemes	20	
3rd Party	4	
Total	**43**	

Table 21 - Programme Proposed 2016/17

Reference	No. Schemes	Total Expenditure
		£2,000,000

5.5 Key Issues and Improvement Actions

5.5.1 Inventory Improvements

We have a database of carriageway and footway gullies but we have very little information on the other assets, such as soakaways, which would be counted in their thousands across the County. This will leave HCC vulnerable and at risk of flooding as we cannot organise a cyclical cleaning or inspection regime, which would identify locations at risk. Also lack of regular maintenance will lead to premature failure of

soakaways and boreholes with cost implication of replacing them. Another driving force of gathering the asset data is any flooding events that may have an impact on the strategic routes with possible road closures and congestion.

5.5.2 Sustainable Drainage Systems (SuDS) and SuDS Approval Body (SAB)

HCC as Lead Local Flood Authority (LLFA) now have a role in the promotion of sustainable drainage following the implementation of Schedule 3 of the Flood and Water Management Act 2010 (F&WMA 2010).

From 15 April 2015, HCC in its role as Lead Local Flood Authority are a statutory consultee in planning for all major development in relation to the management of surface water drainage. HCC approve the surface water drainage proposals for new development before construction can commence.

Local guidance on SuDS plans and an interim adoption policy has been developed and adopted by the authority to facilitate discussions with other authorities, agencies and developers and actively manage the local implementation.

5.5.3 HCC interim SuDS policies

Locally we will need to understand how we will coordinate the SAB role with the planning function of district authorities and we will need to carry out some work internally to understand the issues relating to SuDS adoption and the authority's highway function.

6. Intelligent Transport Systems

6.1 Inventory

The Intelligent Transport System (ITS) inventory is made up of a wide range of electronic equipment, summarised as follows:

Table 22 – ITS Assets

Asset Type	Quantity
Signal Controlled Pedestrian Crossings	690
Traffic Signals	576
Safety & Speed Camera Equipment	219
Real Time Passenger Information (RTPI)	318
School Crossings	157
Vehicle Activated Signs (VAS)	141
CCTV	115
Variable Message Signs (VMS)	93
ANPR Camera	83
Other	1
UTMC common database	1
RTPI central server	1
Total	**2,395**

6.2 ITS Strategy

ITS is used to facilitate the efficient movement of vehicles and ease congestion around the HCC network. There are many individual Road Management Transport Control Systems across the network undertaking a multitude of different functions.

The original ITS Strategy 08/09 to 10/11 was presented to Members in November 2007. The current Strategy and the 10 year ITS Deployment Plan runs to 2020 and is a supporting strategy to the LTP available on HertsDirect:

http://www.hertsdirect.org/services/transtreets/ltplive/supporting/intelligent/

The Deployment Plan is no longer being funded until the Strategy has been re-reviewed to ensure it meets our current aspirations

The individual systems have been reviewed and integration of these systems has been investigated through the following Work Packages as shown in Table 23.

Table 23 – ITS Work Packages

Work Package	Work Package Detail
Package 1	Traffic Signal Monitoring and Control
Package 2	Interurban Monitoring
Package 3	Urban Monitoring
Package 4	Real Time Passenger Information
Package 5	Traffic and Travel Information (Urban and Inter-Urban)
Package 6	Integrated Transport Control Centre (ITCC)
Package 7	Communications Rationalisation
Package 8	UTMC Common Database

To date Packages 6 and 7 have been completed and investigations are ongoing with other work packages which are being used to inform the ITS Strategy Review.

An initial review of the current Strategy has been undertaken and a project list of around 20 activities is awaiting prioritisation, e.g. to identify a Priority Route Network from which other priorities can be set and a proper ITS Strategy re-write can be commissioned.

Commissioning will include Scope, Project Plan, Solutions, Delivery and Owners

An ITS Strategy review group will consider the content of the revised ITS Strategy.

6.3 Valuation

The reported financial valuation information for the ITS asset group as reported in Summer 2014 was:

Total GRC (Gross Replacement Cost) **£59,670m**, broken down as follows:

Table 24 - ITS GRC

Asset Type	Quantity	GRC
Signal Controlled Pedestrian Crossings	690	29,955,000
Traffic Signals	576	20,160,000
Safety & Speed Camera Equipment	219	2,190,000
Real Time Passenger Information (RTPI)	318	1,965,000
School Crossings	157	628,000
Vehicle Activated Signs (VAS)	141	705,000
CCTV	115	575,000
Variable Message Signs (VMS)	93	1,674,000
ANPR Camera	83	498,000
Other	1	612,000
UTMC common database	1	340,000
RTPI central server	1	368,000
Total	**2,395**	**£59,670,000**

7. Street Lighting

7.1 Inventory

HCC is a large highway authority which is reflected in the value of the street lighting stock; being fifth on the list of highway authorities in terms of number of lighting units.

Table 25 – Street Lighting Assets

Street Lighting Assets	Number of units
Street Lights (columns)	113,643
Subway Lights	3,905
Rechargeable Street Lights	1,488
High Masts	114
Feeder Pillars	1,946
Illuminated Signs	13,598
Illuminated Bollards	5,802
Centre Island Beacons	336
Belisha Beacons	408
Amber Flashing Units	600
Illuminated Bus Shelters	96
TOTAL	**141,936**

7.2 Street Lighting Strategy

7.2.1 Background

The March 2015 Highways & Waste Management Panel noted the following:

- Progress to date for the Phase 1 implementation and Phase 2 planned implementation of the central management system (CMS) controlled Light Emitting Diode (LED) lighting.
- The detail provided and progress to date to undertake pilots on the A-roads involving part night lighting and additional dimming and trimming.

The July 2015 Highways Cabinet Panel endorsed the following:

- The proposal to allow Members the flexibility to use their HLB to fund additional street lighting on remote footpaths.

The September 2015 Highways Cabinet Panel endorsed the following:

- The proposal to introduce central management system (CMS) controlled Light Emitting Diode (LED) lighting for all those lighting systems currently in part night lighting on remote footpaths and outlying settlements (Phase 3 - replacement of 8,673 existing lanterns at an estimated cost of £3.5m).
- The proposal to undertake pilots as part of Phases 1 and 2 of the LED project involving part night lighting and additional dimming and trimming.
- Phase 3 proposals are aimed at Hertfordshire County Council owned assets. Town and Parish Councils and Third Parties (e.g. Housing Associations) would be approached to offer conversion of the assets they owned on the highway to LED and CMS technology, at their cost.

The October 2015 Highways Cabinet Panel noted the following:

The update to the pilots as part of Phase 2 of the LED project involving part night lighting and additional dimming and trimming.

7.3 Strategy and Service Development

As part of the future roll out of CMS controlled LED lighting, the business case for Phase 3 was approved by Cabinet in January 2016 as an 'invest to save' project within the 2016/17 budget setting cycle.

The business case assumed that the project will commence in spring 2016 with implementation integrated within the LED Phase 2 project to maximise efficiency, avoiding demobilisation and mobilisation costs and the like.

Further to comments from the March 2015 and September 2015 Panels 13 locations in total were selected as representative sites for pilots on the Phase 1 A-Roads and Phase 2 B, C and U roads and footpaths.

The part night lighting pilots best suited to the rural and semi-rural environments and the dimming and trimming pilot for the more urban environments.

The pilots will include an interactive trial whereby the dimming of lights is undertaken in front of an invited panel of observers. Engagement with Hertfordshire Police and the County Council's Road Safety Engineering Team on the pilots will continue to ensure that any dimming on roads is safe and operational and would not cause drivers to have any visual effects and to monitor highway safety and crime trends.

The communication strategy will include for a general media release and informing local residents of the trials without being too specific about where and exactly when, so as not to pre-empt feedback with full details sent to local members. Local resident and member surveys will then be undertaken seeking their views of the lighting levels trialled within the dimming and trimming pilot once they are able to observe them.

The trials are planned to start in late November 2015 through to late February 2016, in order to capture the longer nights and they will be monitored, both on site and remotely, for 12 months. Subject to the outcome of the pilots, a coherent, consistent variable strategy for operating levels and periods will be further developed with details presented to future Panels.

7.4 CMS and LED Phase 2 Project Implementation

Phase 1 of the LED and Central CMS project (A - Roads) was substantially completed by the end of July 2015 with the projected outturn to be within budget of £6.477m. 12,547 units out of 12,610 have been installed, with the remainder that have technical difficulties (e.g. power supply issues) being dealt with through the mop-up operation.

Phase 2 of the LED Central CMS project (21,385 LED lighting units incorporating CMS on B, C and Unclassified (Residential) - roads and footways that are in full night lighting) started in late August 2015 in Stevenage and started in late November 2015 in Watford with overall completion by spring 2017.

Faults on B, C and Unclassified (Residential) - roads and footways that are in full night lighting will be upgraded to an LED light. This does mean that some faulty lights may not be fixed within 20 working days; simply because it’s more efficient and makes financial sense to batch the repair and upgrades together. Similarly, where it is cost efficient to do so, it is intended to upgrade full night lighting lamps that are faulty to LED’s ahead of the standard rollout programme. Scouting of lighting columns on B, C and Unclassified (Residential) - roads and footways that are in full night lighting will continue until the CMS and LED is fully operational in each district at which point, lighting will be monitored remotely.

The July 2014 Highways & Waste Management Panel endorsed the ad-hoc replacement with CMS and LED. Ringway have replaced around 2,141 lanterns on lighting columns and signs to date with LED lighting units incorporating CMS.

7.5 Part Night Lighting

The September 2014 Monitoring of Recommendations Topic Group noted the update of the Part Night Lighting (PNL) project regarding continued economic and environmental benefits.

The PNL policy balances the objectives for and financial costs against the objectives of maintaining a safe highway from both a traffic accident and crime perspective. The PNL policy also balances the objectives of sustainability in terms of reducing the County Councils carbon footprint and carbon emissions, light pollution and future demand on energy requirements.

The economic case has shown a full payback was achieved in April 2015 with total savings of around £1 million per annum.

Overall, accident trends continue to decrease in Hertfordshire, but as PNL is only relatively new to Hertfordshire, we do not have 5 years of data to make hard comparisons and will continue to monitor the Personal Injury Collision data.

Overall, crime trends continue to decrease in Hertfordshire and there is little to no evidence to suggest PNL has exacerbated crime levels at night.

In addition, there has been a very low number of lights on remote footpaths converted back to all night operation. The aforementioned aspects are subject to continuous monitoring.

See the following web links for the full reports referred to above:

https://cmis.hertsdirect.org/hertfordshire/Calendarofcouncilmeetings/tabid/70/ctl/ViewMeetingPublic/mid/397/Meeting/28/Committee/20/SelectedTab/Documents/Default.aspx

https://cmis.hertsdirect.org/hertfordshire/Calendarofcouncilmeetings/tabid/70/ctl/ViewMeetingPublic/mid/397/Meeting/434/Committee/49/SelectedTab/Documents/Default.aspx

https://cmis.hertsdirect.org/hertfordshire/Calendarofcouncilmeetings/tabid/70/ctl/ViewMeetingPublic/mid/397/Meeting/435/Committee/49/SelectedTab/Documents/Default.aspx

https://cmis.hertsdirect.org/hertfordshire/Calendarofcouncilmeetings/tabid/70/ctl/ViewMeetingPublic/mid/397/Meeting/436/Committee/49/SelectedTab/Documents/Default.aspx

7.6 Lifecycle Planning

The HMEP suite of tools includes a lifecycle planning toolkit for Ancillary Assets which has been reviewed by the HCC Asset Management Team. The toolkit is in the final stages of development and HCC will make an assessment of tactical and operational relevance once the toolkit is finalised.

It is hoped the toolkit will provide robust, realistic analysis of the works projects to optimise the budget spent. A review of the current spend profile against an optimised lifecycle plan will be developed over the coming 12 months in 2016/17.

7.7 Asset Condition

An ongoing programme of non-destructive structural testing is being undertaken to street lamp columns of 10 years or older. Since 13/14 to present date, around 85,000 tests have been undertaken (74% of street lighting columns). A 3 to 5 year testing strategy is currently being developed. When the information becomes available detail will be included within the APR update.

Once the whole asset stock has been surveyed a condition report will be commissioned to risk manage the street lamp column assets. Currently where a high risk of failure of a lighting column is highlighted in the condition inspection report, replacement will be programmed on a risk based nature. The replacement programme for these high risk columns is being managed as a parallel exercise to the condition survey. The strategy for continual management of the street lighting columns will be risk based and rooted upon the non-destructive condition information.

7.8 Budgets and Programme Delivery

Table 26 summarises the completed street lighting programme for the 2013/14 financial year.

Table 26 - Street Lighting Programme Delivered 2013/2014

Street Lighting Schemes	Number of units	Cost
Replacement Street Lighting	1,264	£1,830,000
Replacement High Masts	32	£250,000
Sign Lighting / De-Illumination	203	£144,000
Cable Replacement	0	0
Replacement Subway Fittings	0	0
TOTAL	**1,499**	**£2,224,000**

Table 27 summarises the street lighting programme planned for completion for the 2014/2015 financial year.

Table 27 - Street Lighting Programme Delivered 2014/2015

Street Lighting Schemes	Number of units	Cost
Replacement Street Lighting	891	£1,366,000
Replacement High Masts	32	£220,000
Sign Lighting / De-Illumination	153	£110,000
Cable Replacement	13	£54,000
Replacement Subway Fittings	8	£50,000
TOTAL	**1,097**	**£1,800,000**

Table 28 - Street Lighting Programme Planned 2015/2016

Street Lighting Schemes	Number of units	Cost
Replacement Street Lighting	597	£940,000
Replacement High Masts	0	£0
Sign Lighting / De-Illumination	30	£21,000
Cable Replacement	5	£18,000
Replacement Subway Fittings	4	£21,000
TOTAL	**636**	**£1,000,000**

Table 29 - Street Lighting Programme Proposed 2016/2017

Street Lighting Schemes	Number of units	Cost
Replacement Street Lighting	1,100	£1,375,000
Replacement High Masts	30	£405,000
Sign Lighting / De-Illumination	200	£200,000
Cable Replacement	15	£300,000
Replacement Subway Fittings	10	£50,000
TOTAL	**1,355**	**£2,330,000**

8. Structures

8.1 Inventory

HCC is a large highway authority which is reflected in the value of the bridge stock; being seventh on the list of highway authorities in terms of numbers of structures.

HCC's bridge stock is typical of similar Counties. Post war expansion saw a large increase in the number of reinforced concrete bridges many of which are now more than half way through their anticipated life. An ageing bridge stock presents a number of challenges; increased risk of deterioration or structural failure, increase in routine and major maintenance, and additional pressure on limited budgets.

HCC has a large highway structures stock valued at £977m. It accounts for approximately 12.5% of the value of the entire highway asset. There are 2,600 highway structures in Hertfordshire, of which 1,700 are owned and maintained by HCC. The others are owned and maintained by Network Rail, Canals and Rivers Trust and the District and Borough Councils.

HCC's structures are broken down into the following structure types:

Table 30 - Breakdown of HCC structures

HCC Structures by Type	
River Bridge	331
Road Bridge	118
Rail Bridge	24
Footbridge	140
Viaduct (multi-span)	10
Subway	328
Culvert	444
Culvert (<0.9m)	176
Retaining Wall	110
Earth Embankments	4
Tunnel	12
High Mast‡	114
Other	4
Total	**1815**
Total excluding High Masts[1]	**1,701**

‡ High masts are managed as part of the Street Lighting Service

8.2 Structures Strategy

Bridges schemes are promoted two ways:

- **Inspection records:** Schemes correcting poor condition.
- **Asset Management:** Targeted maintenance interventions to maximise the life and value from the DfT's **Structures Asset Management Planning Toolkit (SAMPT).** The toolkit is summarised below.

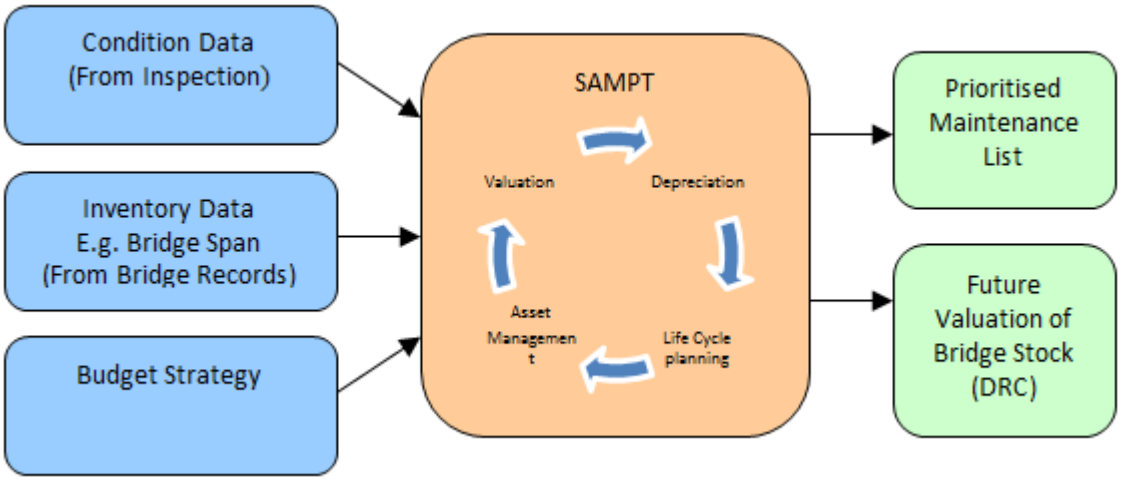

Figure 7 – The Structures Asset Management Planning Toolkit

The SAMPT's valuation is used in Hertfordshire's accounts in line with Whole Government Accounting (WGA) Principles.

8.3 Condition Monitoring and Results

To record condition each bridge receives a General Inspection every two years, with a more detailed Principal Inspection carried out every 6-10 years.

Table 31 summarises the number of high importance elements and the number of parapets showing signs of failure.

Table 31 – Number of structures with significant defects

Structure Type	Number with failed elements of high importance	Number with parapets showing signs of failure
River Bridge	27	11
Road Bridge	14	3
Rail Bridge	5	0
Footbridge	21	9
Viaduct	6	1
Subway/underpass	13	5
Culvert	60	32
Retaining wall	9	0

Table 32 summarises the condition of the each structure type.

Table 32 – Condition of structures stock together

	Number	Condition Band				
		Very Good	Good	Fair	Poor	Very Poor
Bridges	623	316	132	163	12	0
Retaining Walls	114	59	21	31	3	0
Culverts (>0.9m)	445	237	88	111	7	2
Sign/Signal Gantries	8	5	2	0	1	0
High Mast Lighting	114	30	0	0	84	0
Tunnels and Vehicular U/P	12	7	4	1	0	0
Other	332	195	79	58	0	0
Full stock	**1648**	**849**	**326**	**364**	**107**	**2**

8.4 Asset Performance

Condition data is generates a Bridge Condition Indicator Score (BCI) for every structure. The BCI's are combined to calculate an overall Bridge Stock Condition Score (BSCI). $BCI_{AVERAGE}$ scores include all elements of the bridge. $BCI_{CRITICAL}$ score considers only load carrying elements.

Hertfordshire's $BSCI_{AVERAGE}$ score is 89.44, $BSCI_{CRITICAL}$ score is 81.13.

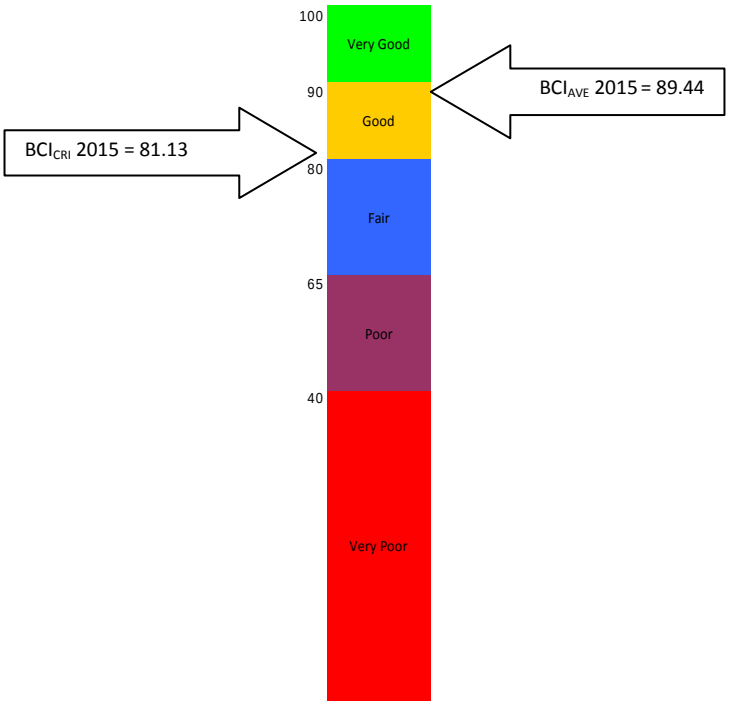

Figure 8: Hertfordshire BCI (Stock) Condition Banding

The $BSCI_{AVERAGE}$ is unchanged. The $BSCI_{CRITICAL}$ has dropped by 1%.

Table 33: Change in Condition score

	2012-2013	2013-2014	2014-2015	2015-2016
$BSCI_{AVERAGE}$	90	90	89	89
$BSCI_{CRITICAL}$	87	84	80	81

8.5 Lifecycle Planning

The introduction of the Structures Asset Management Planning Toolkit (SAMPT) has enabled HCC to develop a basis for life cycle planning. HCC has developed this programme further and uses the base information for determining estimated service lives and deterioration rates for each element.

The toolkit has been used to look at future predicted condition information based on different capital expenditure. The complexities of the structural model are being further refined, to better inform the life cycle planning and maintenance prioritisation of the structure stock.

8.6 Valuation

The GRC represents the theoretical cost to rebuild HCC's bridge stock from scratch with a modern equivalent asset. The DRC represents the current value of the structure, in its current deteriorated condition.

It is noted that the 15/16 valuation is significantly higher than in previous years, and the depreciation significantly less as a percentage. These variations are due to changes to the nationally agreed valuation rates, and to the methodology for calculation of depreciation

Table 34: Overview of Bridge Stock Valuation 2015/16

Asset Group	Number of Assets	GRC Value	DRC Value	DRC/GRC %
Bridges	623	£657,665,000	£485,141,000	74%
Retaining Walls	112	£20,821,000	£12,602,000	61%
Culverts	445	£98,597,915	£82,354,000	84%
Sign Gantries	8	£727,000	£6,790,000	93%
High Masts	114	£3,324,000	£2,201,000	66%
Tunnels & Underpasses	12	£59,738,000	£45,469,000	76%
Other	332	£135,795,000	£110,630,000	82%
Total	**1,648**	**£976,668,000**	**£739,0773,000**	**76%**

8.7 Budget and Delivery

HCC's capital bridge budget in 2015-16 was £2.25m and the following schemes were delivered:

Table 35 IWP Scheme Delivery 2015-2016

IWP Reference	Name – Location	Type of work	Value
IWP Schemes Delivery			
BRG14003	Hailey Interchange – Hertford	Bearing Shelf repair works	£200,000
BRG13007	Weston Road - Stevenage	Detailed design, Concrete Repairs and Joint Replacement works	£525,000

BRG10035a	Napsbury Lane – St. Albans	Detailed design, Concrete Repairs and Joint Replacement works	£665,000
BRG14004	Rush Green - Hertford	Concrete Repairs and Joint Replacement works	£620,000
IWP Schemes Future Delivery and preparation			
BRG13004	Kingsmead Viaduct - Hertford	Detailed Design and Drainage Works	£250,000
BRG14001	Green Lanes – Letchworth Garden City	Footbridge Detailed Design and Replacement Works	£365,000
BRG14005	Brickendon Lane Retaining Wall – Hertford	Feasibility design of retaining wall replacement	£115,000
BRG15001	Gunnelswood Road - Stevenage	Detailed design and expansion joint replacement Works	£190,000
BRG15008	Coutlands Drive – Watford	Detailed design and expansion joint replacement Works	£65,000
BRG15009	Baas Lane – Broxbourne	Detailed design and expansion joint replacement Works	£110,000
BRG15011	Hazelend Road – Bishop Stortford	Detailed design and expansion joint replacement Works	£120,000
BRG15012	Mardley Hill Railway Bridge – Woolmer Green	Feasibility design - Brickwork Repair Work	£185,000
BRG15013	Six Hills Railway – Stevenage	Detailed design and expansion joint replacement Works	£125,000
BRG15014	Stortford Road - Standon	Detailed design and expansion joint replacement Works	£70,000
BRG16002	Glaxo Footbridge - Ware	Detailed Design and Footbridge refurbishment work	£70,000
BRG16003	Kingswood Footbridge - Roydon	Detailed Design and Footbridge refurbishment work	£80,000
BRG16004	Rickmansworth Park Footbridge - Rickmansworth	Detailed Design and Footbridge Refurbishment / Replacement work	£300,000
BRG16005	Tippendell Footbridge – St Albans	Detailed Design and Footbridge refurbishment work	£50,000
BRG16006	Nazing River Bridge - Broxbourne	Capacity Assessment and Bridge Strengthening work	£400,000

BRG16007	Travellers Lane – Hatfield	Detailed design and expansion joint replacement Works	£75,000
BRG16008	Church Lane - Wormely	Detailed design and expansion joint replacement Works	£75,000
BRG16009	Park Road - Ware	Detailed design and expansion joint replacement Works	£75,000
BRG16010	Broxbournebury Footbridge	Detailed design and expansion joint replacement Works	£20,000
BRG16011	Fishery Road – Hemel Hempstead	Detailed design and expansion joint replacement Works	£75,000
BRG16012	Hoddesdon Interchange Bridges - Hoddesdon	Detailed design, Concrete Repairs and Joint Replacement works	£500,000
BRG16013	School Lane Bridge – Great Offley	Half Joint Inspection, Detailed design and expansion joint replacement Works	£120,000
BRG16014	Lilley Bottom Bridge- Lilley	Half Joint Inspection, Detailed design and expansion joint replacement Works	£120,000
BRG16015	Broxbourne Station Bridge - Broxbourne	Provision of funding for Bridge Strengthening – Network Rail	£330,000
BRG16016	Reactive Joint Replacement Scheme #2	Detailed design and expansion joint replacement Works	£50,000
BRG16017	Reactive Joint Replacement Scheme #1	Detailed design and expansion joint replacement Works	£50,000
BRG16018	Reactive Parapet Replacement Scheme #1	Detailed design and Parapet replacement Works	£250,000
Varies	Varies	Programme and Asset management	£200,000
Total			**£4,435,000.00**

The current forward works programme is planned to deliver an increased £4.5m capital spend.

Table 36: IWP Scheme Delivery 2016-2017

Bridges Capital Programme	Total Costs
Highway bridge refurbishment	£1,050,000
Footbridge refurbishment / Replacement	£865,000
Waterproofing and Joint replacement	£1,390,000
Parapet repairs and strengthening	£980,000
Bridge capacity assessments	£35,000
Programme and Asset Management	£200,000
Total	**£4,495,000.00**

8.8 Key Issues and Improvement Actions

The Hertfordshire Bridge Team continues to be a national leader in bridge asset management and have presented at the Surveyor Bridges Conference and the national conference of the Institute for Asset Management. We have successfully implemented the DfT's toolkit for bridges, and have been advising other authorities on how the toolkit works and how to overcome the challenges associated with it, as well as working with DfT and HAMFIG to develop an improved version. We work with ADEPT and the Bridge Owners Forum to share our knowledge and further improve our asset management performance, and are collaborating with the Centre for Smart Infrastructure and Construction at Cambridge University.

The Hertfordshire Bridge Team bridges continues to support other areas of the service providing structural expertise where required. In particular, through Development Management, the Bridge Team is facilitating two new road-over-rail bridges. We are also supporting the endeavours of HCC and London Underground Limited to build the Croxley Rail Link.