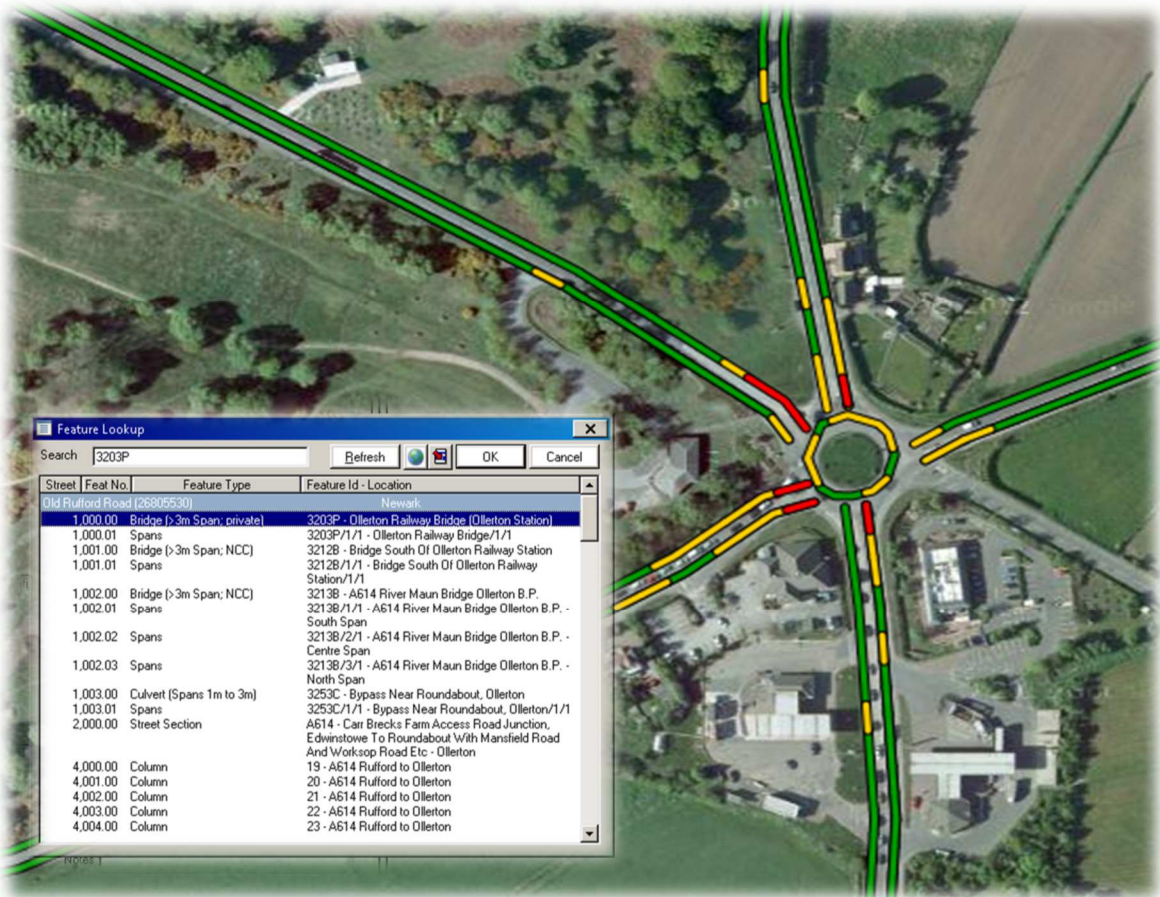


HIGHWAY INFRASTRUCTURE ASSET MANAGEMENT PLAN



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1. Executive Summary

The Highway Infrastructure Asset Management Plan

In May 2013, the UK Roads Liaison Group produced the Highway Infrastructure Asset Management Guidance Document. This set out 14 recommendations that all local Highway Authorities should employ to demonstrate they are following Asset Management principles in all aspects of Highway Maintenance Management.

The Highway Infrastructure Asset Management Guidance Document identifies the requirement for the production of a Highway Infrastructure Asset Management Plan (HIAMP) in order for Authorities to embed the required principles in their working practices.

During development of the framework for Nottinghamshire's HIAMP, it was decided to link the plan directly to the 14 recommendations in the UK Roads Liaison Group guidance document as these were seen as the cornerstone to good asset management practice.

One key element was the principle of Policy, Strategy & Plan, whereby the HIAMP follows a clear line of sight from the local and national policies that shape the future direction of the County Council, via the strategies employed to meet these policies and what this means for specific assets and their corresponding performance data.

- **Policy** - Local policies such as NCC's Strategy Plan, Service Plan, the Local Transport Plan, and the Highway Network Management Plan plus national legislation and policies such as The Highways Act 1980 and the Well-Managed Highway Infrastructure: A Code of Practice document.
- **Strategy** - This forms the major part of the document and demonstrates the steps being taken in Nottinghamshire to meet the 14 recommendations in the Highway Infrastructure Asset Management Guidance Document produced by the UK Roads Liaison Group. The HIAMP is structured so that the recommendations are the Chapter headings, with an extract from the guidance document, followed by 'The Nottinghamshire Approach' which outlines how these are met.
- **Plan** - Chapters 18 to 22 contain the Asset Management Plans for specific assets, namely: Carriageways, Footways & Cycleways, Structures, Highway Lighting & Traffic Management Systems and Drainage. These final chapters show in greater detail how the County Council manages these assets to not only meet the 14 recommendations in the HMEP guidance, but also to make best use of the resources available to provide a safe and efficient working highway network for those who travel within or through the county.

The document is bespoke to Nottinghamshire rather than a generic template with Nottinghamshire's own figures inserted. In this way, the County Council have ensured that the development work it has undertaken thus far in the adoption of asset management principles is recognised and helps outline the way forward in bridging the gap between current and desired practice.

This document has been updated following the publication of the Well-Managed Highway Infrastructure: A Code of Practice document creates a code which advocates a 'Risk-Based' approach to the maintenance management of highway assets. The HIAMP is written with these principles in mind and addresses the issues of network hierarchy and inspection frequency to build in the principles of this new code.

Future Funding Models - Background

Spring 2015 saw the culmination of over five years development work by the Department for Transport to create a new set of funding models for highways maintenance across the country. A history of these developments is listed below:

- During summer 2010, consultation took place on changes to Department for Transport Block Funding Formula.
- In May 2013, the UK Roads Liaison Group produced the **Highway Infrastructure Asset Management Guidance Document**. www.ukroadsliaisongroup.org
- At the same time, a summary document was published called **Highways - Maintaining a vital asset. What should Councillors know about asset management?**
- In January 2014, the DfT consultation document **Gearing up for efficient highway delivery and funding** was produced, setting out ideas on how funding could be distributed from 2015 onwards to maximize benefits.
- In April 2014, the DfT Pothole Fund was announced. The 2014 Budget made £200 million available for the fund, of which £168 million was allocated to local highway authorities in England. This included guidance and a bid application form for Councils to submit for a share of this money. Whilst the fund was for pothole repairs, and indeed each authority had to publish a 'Pothole Pledge' on their respective public websites, the questions in the application form were heavily leaning towards the adoption of '**Asset Management Principles**' in highway maintenance. Nottinghamshire's allocation was £2.78m
- In the spring of 2015, the new funding models for local authority highway maintenance were announced. It consisted of three key elements:
 - The Incentive Fund.
 - A revised 'Needs-Based' Funding Formula.
 - The Challenge Fund.

The Incentive Fund

The purpose of the incentive funding is to promote the adoption of good practice across all local authorities to ensure value for money.

Time is being given to allow highway authorities to adopt efficiency measures, to gain buy-in from their senior leaders and to make the necessary transformational changes to the full adoption of '**Asset Management Principles**'.

In year one, each local authority receives all of its funding. However, for each subsequent year there will be an expectation that continuous improvement in efficiencies of delivery will take place. This level of improvement will be reflected in the funding awarded through the size of the funding received.

Local highway authorities are categorised based upon where they are on the efficiency curve:

- **Band 1: Early stage authority** - Has a basic understanding of key areas and is in the process of taking it forward.
- **Band 2: Mid stage authority** - Can demonstrate that outputs have been produced that support the implementation of key areas that will lead towards improvement.
- **Band 3: Final stage authority** - Can demonstrate that outcomes have been achieved in key areas as part of a continuous improvement process.

A local authority's category is based on the responses to a self-assessment exercise on efficiency. This is collected annually via the Single Data List Item 129-000 in relation to highway data. Each local authority return requires a Section 151 Officer declaration to confirm it is accurate.

The self-assessment questionnaire has 22 questions in total, divided into five categories:

- **Asset Management**
- **Resilience**
- **Customer**
- **Benchmarking & Efficiency**
- **Operational Delivery**

A local authority's Band is based on its score in this self-assessment questionnaire:

- **Band 1:** Does not reach Level 2 or Level 3 in at least 15 of the 22 questions.
- **Band 2:** Must reach Level 2 or Level 3 in at least 15 of the 22 questions.
- **Band 3:** Must reach Level 3 in at least 18 of the 22 questions.

The figures associated with Incentive Fund allocations are detailed in the table below:

Year	2015 / 16	2016 / 17	2017 / 18	2018 / 19	2019 / 20	2020 / 21
Band 1	100%	90%	60%	30%	10%	0%
Band 2	100%	100%	90%	70%	50%	30%
Band 3	100%	100%	100%	100%	100%	100%

The DfT Incentive Fund places the need for a robust HIAMP at the heart of its self-assessment methodology. For Nottinghamshire to progress to Band 3, and hence retain its full level of funding until at least 2021, it is important that the HIAMP is fit for purpose, not only at the time of its publication, but for the foreseeable future and is able to adapt to the constantly changing landscape of highway maintenance.

It is an essential requirement of the Incentive Fund that all highway authorities must have reviewed their HIAMP within the last 2 years and outline the steps they are taking and the strategies they will employ to demonstrate their commitment to the adoption of asset management principles in all highway maintenance activities. In Nottinghamshire, the HIAMP is the document used to achieve this. The publication of the previous iteration of this HIAMP helped to place Nottinghamshire County Council into Band 2 when the first full self-assessment exercise was completed at the end of November 2015. The target is to move into

Band 3 as soon as is practicable to maintain the full funding allocation, and the review of this document will assist this process.

	£0,000k					
Year	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Block Allocation*	£14,921	£13,679	£13,265	£12,006	£12,006	£12,006
Band 1*	N/A	£745	£745	£750	£250	£0
Band 2*	N/A	£828	£1,118	£1,750	£1,250	£750
Band 3*	N/A	£828	£1,242	£2,501	£2,501	£2,501

(* Allocation values from DfT' s initial consultation)

Difference in allocation based on 2015/16	Band 2 Result	N/A	-£414	-£538	-£1,165	-£1,665	-£2,165
	Band 3 Result			-£414	-£414	-£414	-£414

Needs-Based Funding and the Challenge Fund

From 2015/16 to 2020/21 the needs-based funding formula is calculated as follows:

There will be a total of £4.7 billion across the six-year period. This excludes the funding for the Incentive element and the Challenge Fund; the total funding available over this period amounts to just under £6 billion nationally.

As a result of the consultation on highways maintenance funding, the DfT has allocated a proportion of the total funding to four elements in varying proportions, derived from the Whole of Government Accounts.

The table below left shows the percentage split from 2015/16 to 2017/18. The anticipated allocation for 2018/ onwards is shown in the table on the right:

2015/16 to 2017/18		2018/19 onwards	
Roads	82.42%	Roads	75%
Split evenly between:		Split evenly between:	
A roads	27.47%	A roads	25%
B & C roads	27.47%	B & C roads	25%
Unclassified roads	27.47%	Unclassified roads	25%
Bridges	15.38%	Bridges	14%
Lighting	2.2%	Lighting	2%
Cycleways & Footways	0%	Cycleways & Footways	9%

Part of the government's 2014 Autumn Statement assigned a proportion of the highways maintenance budget to a Local Highways Maintenance Challenge Fund. The purpose of the Fund is to enable local highway authorities in England to bid for major maintenance projects that are otherwise difficult to fund through the normal needs element allocations they receive.

In March 2017, there was a second round of Challenge Fund Bidding, which was ahead of the original proposal, but allowed Nottinghamshire to submit a successful bid for the A38/A617 corridor in the Mansfield and Ashfield districts on the MARR route.

2. Foreword

In May 2013 the UK Roads Liaison Group, as part of the Highways Maintenance Efficiency Programme, published a guidance document titled 'Highway Infrastructure Asset Management'. This document was developed with the support of, amongst others, the Department for Transport. It set out, in short, a set of 14 recommendations which local authorities should put in place in order to apply the principles of Asset Management to their highway maintenance.

In January 2014, The Department for Transport began a consultation on a new six-year national funding model for highways capital maintenance. The framework of this model which will run from 2015/16 to 2020/21 means that all local highway authorities must work towards the adoption of these same Asset Management Principles in order to maintain a workable level of funding. The DfT has recognised that these methods provide the best way of getting serviceable longevity from the highway network at minimum cost and have built a model to encourage their usage.

In Nottinghamshire, the County Council found itself in a good starting place as far as the application of these principles and the associated 14 recommendations were concerned. Much of the framework, systems, methods, knowledge and experience discussed in the guidance were already in place and this Highway Infrastructure Highway Asset Management Plan pulled all these elements together in a single document.

In recent years, Nottinghamshire has moved away from the 'worst-first' treatment method which, coupled with nationally years of reduced investment, an increase in climatic impact and the importance of maintaining the network in a safe and serviceable condition had led to a maintenance backlog for carriageways (the largest asset group) of approximately £319 million (2014 figures).

We will continue to build a forward maintenance programme with a far greater emphasis on preventative treatment, balanced with an element of 'worst-first' as some roads and footways still need to be 'brought back to life' to enable their effective future maintenance to begin.

Nottinghamshire is a vibrant, diverse and dynamic county with a highway network that is a rich mixture of all road types from motorways to cul de sacs. The County Council will continue to enhance the application of Asset Management Principles to maintain the network in a condition which is safe, resilient and free-flowing for all road users, to ensure it remains a well-connected place to live, work and visit.



Cllr John Cottee
Chairman of Communities and Place Committee
Nottinghamshire County Council

3. Introduction

Highway Infrastructure Asset Management Plan for Nottinghamshire.

As time goes by roads that are currently in good condition will deteriorate, just like any physical asset such as a house or a vehicle. To keep on top of the deterioration of Nottinghamshire's asset the County Council must invest continually in maintenance. Whilst the County Council is unlikely to ever be in the position where it has enough money to maintain every road that forms part of the maintenance backlog in a single year, it is prudent to make the best use of the resources it has to get the best investment results for its stakeholders.

How the Authority invests is critical to achieving the best outcome for its customers. Is the highway so poor that it might fail completely, or can it be repaired to extend its life before having to do a full replacement? A good analogy would be to ask whether you should sand and re-paint window frames regularly, or wait until they rot and replace the whole window.

In a climate where budgets and resources are tightening, Nottinghamshire County Council is facing significant challenges in deciding how to manage its assets effectively. The adoption of Asset Management Principles can deliver a systematic approach to this by planning well into the future and making informed decisions based on sound engineering.

The definition of Highway Asset Management is:

'A systematic approach to meeting the strategic need for the management and maintenance of highway infrastructure assets through long term planning and optimal allocation of resources in order to manage risk and meet the performance requirements of the authority in the most efficient and sustainable manner.'

From the Highway Infrastructure Asset Management Guidance Document - Section 4.1.2

Adopting these principles will enable the Authority to identify the best allocation of resources for the management, operation, preservation and enhancement of the highway infrastructure to meet the needs of current and future customers. Asset management therefore supports business decisions and provides longer term financial benefits.

Historically, Nottinghamshire has largely followed a 'worst-first', short-term approach to structural highway maintenance, with an element of preventative maintenance through surface dressing. The Council identified the worst condition roads through technical surveys, local engineering knowledge and political input to develop a one year programme of road resurfacing and reconstruction. This is easily understood by the public and elected members who see a road in poor condition and will see it as the Council's duty to repair it. However, nationally years of underinvestment, an increase in climatic impact and a largely 'worst-first' strategy, coupled with the importance of maintaining Nottinghamshire's network in a safe and serviceable condition has led to an estimated maintenance backlog of approximately £319m (2014 figures).

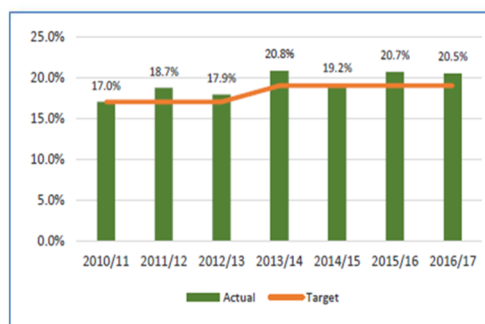
The current approach assumes that over 20% of the unclassified network and nearly 10% of the classified network will remain in need of repair. The Council is effectively maintaining its current position. The backlog of sites requiring maintenance will only reduce very gradually, if funding levels are not significantly increased.



A Roads



B & C Roads



Unclassified Roads

The County Council proposes to increase the life span of its roads and reduce the percentage of roads in need of repair by balancing the 'worst-first' approach with a parallel programme of preventative maintenance. This approach will form the basis of its Highways Infrastructure Asset Management Plan.

The County Council continues to develop a future maintenance programme consisting of a list of candidate sites (or Candidate List) of both major resurfacing and preventative maintenance. To maximise the maintenance benefits, it is possible to create a multi-year programme though the ability to be prescriptive diminishes the further into the future you go. Therefore, a prioritised Candidate List rather than a defined programme has been developed which is banded based on likely short, medium and longer-term maintenance objectives.

As the Authority continues to develop a more comprehensive and refined picture of its asset condition, it will use a process known as 'Deterioration Modelling' to predict the relative condition of the highway network over the coming years. This will help the County Council to decide where it should be channelling its resources at the optimum time to treat the roads in the most cost-effective way, providing the greatest benefit. The key question is how the Council will decide which roads should have preventative maintenance treatment and on which ones to undertake major resurfacing works. It's a matter of picking the right point on the 'Deterioration Curve', and the right treatment at the right time. Whilst the 'candidate list' for

future years remains 'indicative', it will still be utilised annually to create the in-year programme.

This approach needs to be communicated clearly and prescriptively through the correct channels to ensure engagement at a strategic level. Asset Management principles and methodology will only be successful if key decision makers are on board and can visualise the long-term benefits and savings to be made from this approach, based upon sound engineering and accurate costing. Whilst the process focuses on road condition, the same process holds true for all asset types including street lighting, structures, major signs, safety fencing, trees etc.

This document does not cover the management of Public Rights of Way. This is dealt with in the Rights of Way Improvement Plan, details of which can be found at the following link:

[Nottinghamshire Rights of Way Improvement Plan](#)

Nottinghamshire's Highway Infrastructure Asset Management Plan delivers better value for money through adoption of a sensible and forward-thinking maintenance plan. This results in customers seeing more miles of road maintained each year and have greater visibility as to the relative status of their roads' deterioration. The council continues to deliver more on the ground and help to meet its corporate and strategic transport objectives by doing so.

This document follows the approach of Policy, Strategy and Plan whereby it takes its lead from national and local policies and then outlines the strategy which Nottinghamshire will adopt to fulfil these policies. The sections at the back of the document explains the asset management plans for specific highway assets.



4. Asset Management Framework

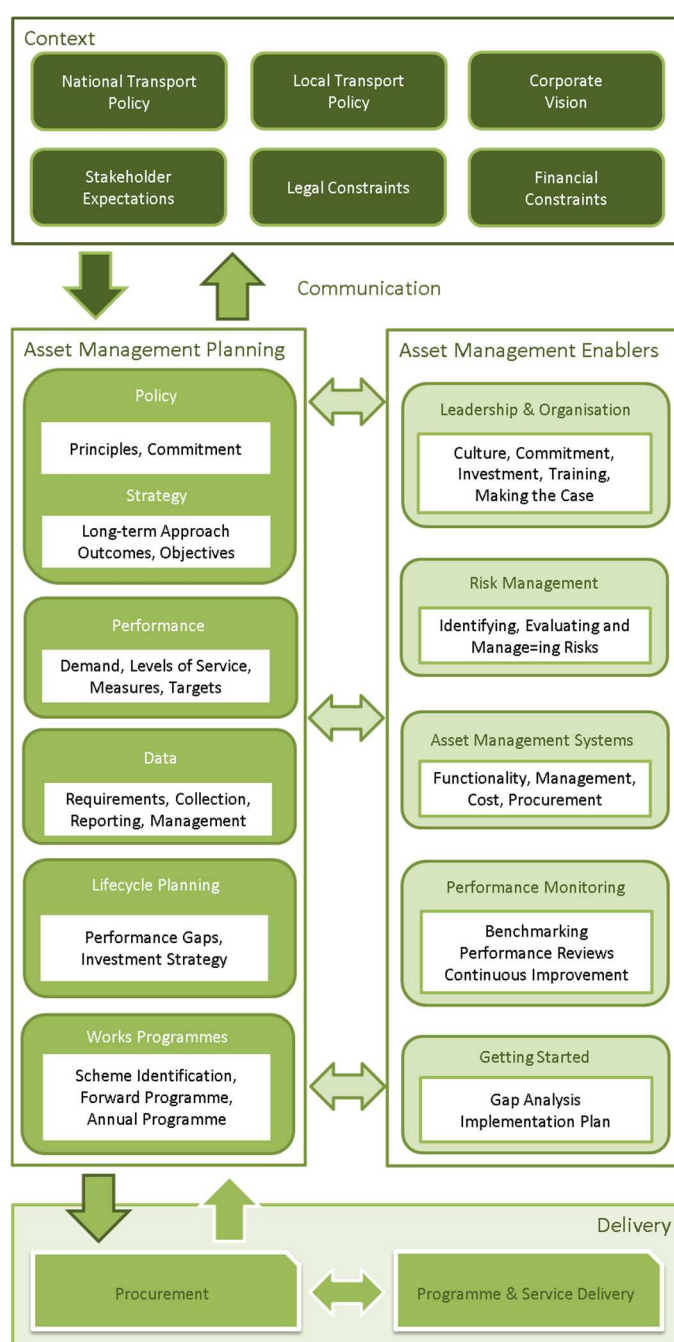
An Asset Management Framework should be developed and endorsed by senior decision makers. All activities outlined in the Framework should be documented.

This sets out the activities and processes necessary to develop, document, implement and continually improve asset management.

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4.1 - The Nottinghamshire Approach

The table below shows the communication links which need to be established between the policy makers, planners, enablers and deliverers of Asset Management at Nottinghamshire County Council.



4.1.1 - Context: Policy, vision, expectations and constraints.

The direction of Nottinghamshire's Highway Asset Management Strategy is determined by a number of factors – national codes of practice / policies, legal and financial parameters. National Transport Policy sets targets for local authority achievement and the County Council will continue to keep abreast of these via direct communication with the Department for Transport and updates from www.gov.uk

The corporate vision for all services within Nottinghamshire, including highways can be found in the [Strategic Plan 2014-2018](#).

The County Council is also driven by policies in Nottinghamshire's [Third Local Transport Plan](#).

Performance expectations are placed upon the highway network by all stakeholders which include the travelling public, businesses and the emergency services who rely on its efficiency and availability to carry out their own travel requirements.

The [Highways Act 1980](#) places duties and bestows powers upon Nottinghamshire County Council as the local highway authority. Chief among these is the duty to maintain the highway in a safe and serviceable condition.

[Well Managed Highway Infrastructure – A Code of Practice](#). Published in October 2016, the code is designed to promote the adoption of an integrated asset management approach to highway infrastructure based on the establishment of local levels of service through risk-based assessment. It also includes guidance on some additional topics.

The Code is produced as a single document to emphasise the integrated approach to highway network infrastructure assets. Overarching matters are dealt with in Part A and additional asset specific elements in Parts B, C and D.

Delivery of a safe and well-maintained highway network relies on good evidence and sound engineering judgement. The intention of this Code is that Authorities will develop their own levels of service and the Code therefore provides guidance for authorities to consider when developing their approach in accordance with local needs, priorities and affordability.

Changing from reliance on specific guidance and recommendations in the previous Codes to a risk-based approach determined by each Highway Authority involves appropriate analysis, development and approval, gained through authorities' executive processes. Some authorities are able to implement a full risk-based approach immediately. Others may require more time and may choose to continue with existing practices for an interim period, in which case the previous Codes remain valid until a risk-based approach has been implemented or a period of two years from the date of publication of the Code. Therefore, the absolute deadline for implementation is October 2018.

Nottinghamshire's implementation is contained within the Highway Infrastructure Management Plan which is a 'signposting' document that highlights where the authorities existing documentation, working practices, methods and procedures align with the new Code of Practice.

The [Prudential Code](#) is a professional code of practice to support local authorities in taking capital investment decisions. Local Authorities determine their own programmes for capital investment in fixed assets that are central to the delivery of quality local public services in accordance with the Prudential Code.

Local Authorities are required by regulation to have regard to the Prudential Code when carrying out their duties in England and Wales under Part 1 of the Local Government Act 2003, in Scotland under Part 7 of the Local Government in Scotland Act 2003 and in Northern Ireland under Part 1 of the Local Government Finance Act (Northern Ireland) 2011.

[Whole of Government Accounts](#) (WGA) consolidates the audited accounts of around 4,000 organisations across the public sector in order to produce a comprehensive, accounts-based picture of the financial position of the UK public sector. WGA is based on International Financial Reporting Standards (IFRS), the system of accounts used internationally by the private sector.

There will never be an inexhaustible supply of funding for highway maintenance and as such the County Council has to ensure that it is spending funds effectively to get the most output for the minimum cost. Asset Management has never been more important than it is now in order to provide the most beneficial highway network for the user.

4.1.2 - Asset Management Planning

National and local policies and strategies inform the way highway maintenance activities should be carried out. This, however, is only part of the picture and there are numerous elements involved in Asset Management Planning.

The County Council will demonstrate through this document, what the historic, current and future demand on the highway network is likely to be, set out levels of service and performance targets and how these will be measured.

The County Council will continue to expand its asset register to include as much information as possible, both physical and non-physical to ensure it is a future-proof database. This will involve, as it does now, drawing on data in hard copy formats and transferring it into digital spatial data.

Other data, such as customer enquiries, condition survey information and maintenance records will also be held within HAMS and these are gathered by either call centre staff, Highway Inspectors, external survey suppliers or directly via the County Council's public website and social media.

The County Council will develop an investment strategy for highway maintenance which is led by the principles of Asset Management. This will take the form of lifecycle planning for all the major assets based upon historical data, current / future usage and design specifications, allied to anticipated index-linked cost estimates. This data is analysed through Horizons software to produce a long term strategic approach.

Historically, Nottinghamshire generally followed the 'worst-first' principle of highway maintenance, meaning that assets were repaired or replaced when they were already at the end of their serviceable life. This has evolved towards a more proactive approach in recent

times, leading to an increased investment in preventative treatments such as surface dressing and micro-asphalt surfacing to slow down the rate of deterioration.

This evolution will continue and intensify in the coming years as future programming over longer periods becomes more reliable. Programming is based upon predicting the deterioration rates of numerous assets and carrying out the right treatment at the right time to ensure maximum benefit for minimum outlay.

The County Council will ensure the processes and practices outlined above are informed from national and local policy and strategy

4.1.3 - Asset Management Enablers

Leadership has a strong influence on the culture and behaviour of all organisations. The principles of Asset Management require buy-in at the highest levels within the County Council in order for them to be effectively applied. Securing this buy-in from senior decision makers and elected members will pay dividends in the long term as the purpose, objectives and responsibilities for the implementation and delivery of asset management is clearly established and supported.

Risk Management is a key approach to effective Asset Management. The identification, evaluation and management will shape the County Council's strategy. Detail on Risk Management and how it will be applied in Nottinghamshire is in Chapter 15.

The County Council will ensure that the systems and processes employed in Asset Management are, and will remain through targeted development and investment, fit for purpose both now and in the future. The functionality, management, cost and procurement of such systems will fall within existing County Council, National and European frameworks and the County Council will ensure full accreditation and calibration is maintained for data validity and auditing purposes.

Nottinghamshire has a robust framework in place for performance monitoring. The County Council not only submit data to the DfT under the WGA procedure but will also subscribe to such organisations as the Midlands Service Improvement Group ([MSIG](#)) which shares ideas and good practice with similar local authorities and the Midlands Highway Alliance ([MHA](#)) which is a unique venture, delivering the regional procurement and implementation of highways maintenance, professional services and capital works through framework agreements.

The County Council also subscribe to the National Highways & Transportation Survey ([NHT](#)) which gathers data on customer satisfaction nationwide and gives an indication of how well the service provision is viewed by the general public. With this information, the County Council can adapt appropriate processes and methods to actively communicate its successes and points for improvement to a wider audience.

The fundamental activity required to take Asset Management forward is to understand the current position, what the performance targets should be based upon national and local benchmarking and to plan its progress towards this. This is known as 'Gap Analysis' and it provides the platform from which the County Council will implement its continuous

improvement. The County Council is confident that Nottinghamshire is beginning from a solid foundation and much of the development work already done in recent years has been based upon Asset Management principles, but it will not be complacent as future funding and the safety and usability of the highway network will depend upon this work continuing.

4.1.4 - Delivery

The County Council continues to develop a future maintenance programme consisting of a list of candidate sites (or Candidate List) which is utilised to extensively develop the annual maintenance programme for endorsement by committee.

This forms part of an annual cycle, which starts in the previous year, using network condition data and the Annual Engineering Inspection (AEI) to develop an early programme from July onwards, consisting of sites where maintenance should be considered. These sites are further reviewed for feasibility and deliverability, to define a programme that is endorsed by committee in the autumn to allow a more detailed feasibility design to be undertaken. Final approval for the resulting following years programme is given in March ready for the start of the next financial year.

This allows the operational arm (deliverer) to feed into the process at an early stage, plus it allows for better planning of works on the ground and organising the supply chain of services and materials.

The County Council and its Highway Services Contractor, Via East Midlands Ltd, have procurement frameworks in place such as the Eastern Shires Purchasing Organisation (Technical Surveys - [ESPO](#)) and the Midland Highways Alliance ([MHA](#)) for services and materials.

Works on site are delivered either by the County Council's highway & fleet management services provider, Via East Midlands Ltd, or its major resurfacing and civil engineering partner, Tarmac. Design works are also supplied by Via East Midlands with support from AECOM.

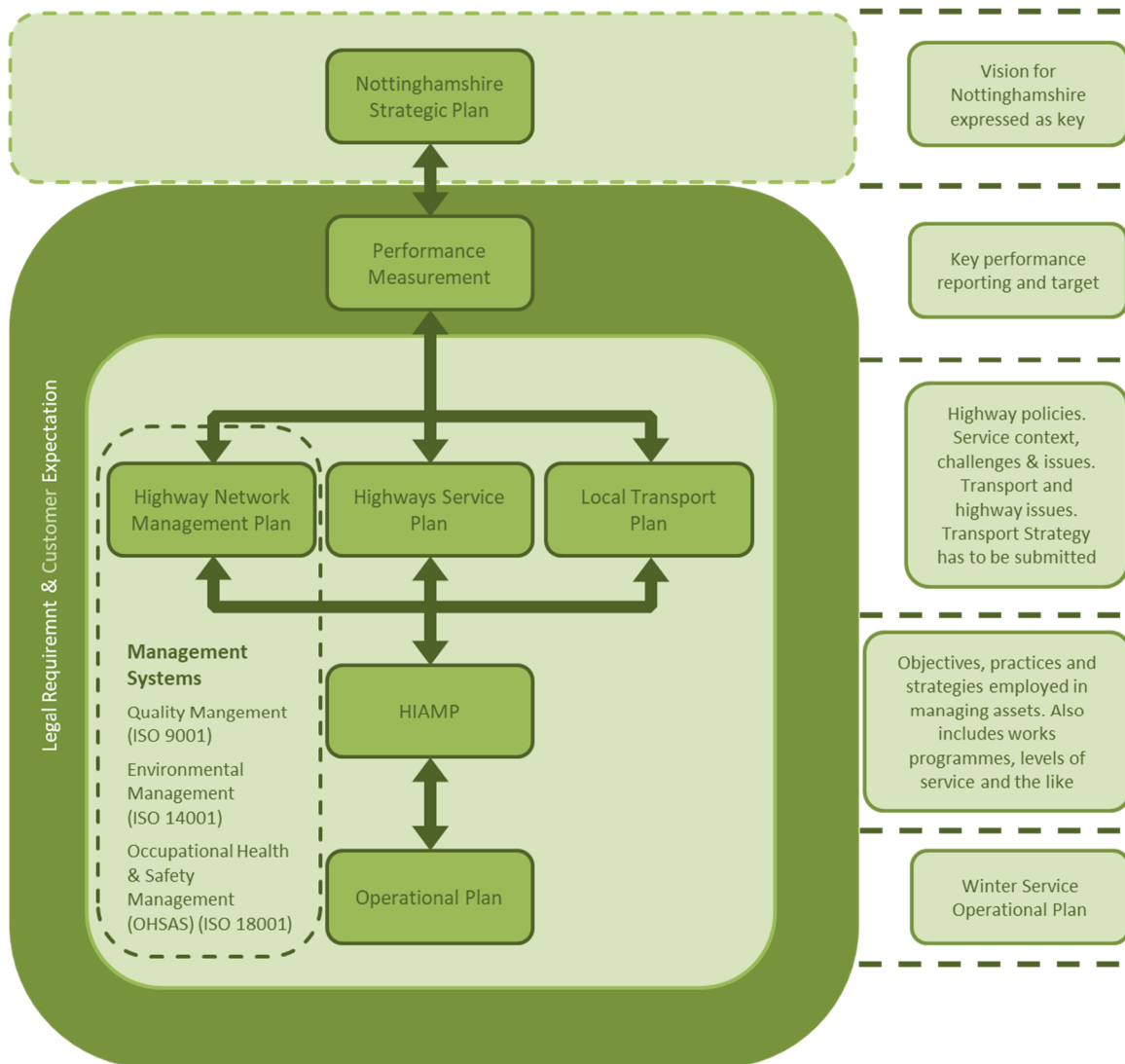
Via East Midlands Ltd is a joint-venture company (Nottinghamshire County Council and Cornwall Council) formed in July 2016. It is entirely owned by the public sector. Via provide highways, fleet management and maintenance functions to the residents of Nottinghamshire in partnership with Nottinghamshire County Council. This includes network and asset management, the maintenance of roads, footways, signs, lines, lighting and signals, salting and snow clearance, the delivery of highway improvement services and the management of activities needed to support the county's highway network of over 4,100 kilometres of roads and its 94,000 streetlights.

in partnership with



Nottinghamshire County Council - Highway Infrastructure Asset Management Plan

The chart below shows the links between the various policy documents and plans against the Authority's key developmental areas and management systems.



5. Communications

Relevant information associated with asset management should be actively communicated through engagement with relevant stakeholders in setting requirements, making decisions and reporting performance.

Engaging with stakeholders to understand their needs and expectations provides the information needed to determine and review the service provided by highway infrastructure assets and hence the asset management activities. The highway network is often of significant interest to the public and the media. This interest is likely to continue with robust public expectations of how the network should function. In addition, weather conditions and possible resulting damage to the highway network often provide the focus for significant national and local media coverage.

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The trend towards transparency in the public sector is resulting in increased availability of a wide range of information in the public domain. Authorities should provide clarity and transparency in how they make decisions in the identification, assessment, programming and delivery of asset management activities, including maintenance works, and how the public are involved in making decisions for the service provided by the network.

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5.1 - The Nottinghamshire Approach

5.1.1 - Elected Members

To ensure elected members support the principles of Asset Management, the Authority will guarantee clear and accurate information is made available to help with the decision making process and to demonstrate the cost benefits of lifecycle planning and an Asset Management approach.

Nottinghamshire has developed a prioritised candidate list of potential sites that form the basis of a multi-year works programme. This programme effectively remains live and subject to changes and evolution dependent upon factors within and outside of the local authority environment. These changes may be engineering or non-engineering based but the severity of their likely effect can be reduced by early intervention and forward planning.

An annual 'snapshot' of this programme is passed to committee for consideration and approval. The benefit of an 'organic' programme means all parties are able to analyse and feed into this programme, such that views can be considered where appropriate, at an early stage in the development process.

Annual reports are produced for elected member's consideration detailing predicted network condition changes based upon the anticipated funding availability. This is a 'scenario' based method whereby the Authority can demonstrate, using sound engineering data, what the future

condition of the county's network is based upon and the level of funding required to achieve the agreed performance targets.

5.1.2 - Public Website

The County Council aims to publish a Candidate List that consist of a 'needs based' list of schemes that are to be considered for maintenance over future years. The Candidate List will be published on the Authority's public website so that all stakeholders can see an indication of future maintenance plans. The Authority anticipates this will help those who do not share detailed engineering knowledge to be able to understand the maintenance decisions made and the reasons for them, and no stakeholders are excluded from the process.

The 'In-year' maintenance programme is already routinely published on the Authority's public website with works separated into quartiles for the current financial year. This work will continue and is integrated with the work on the Candidate List.

Along with the maintenance activities, the Authority also publishes information on the work undertaken with regard to funding bids and documents such as the [Highway Network Management Plan](#), the [Highway Inspection & Risk Manual](#) and this [Highway Infrastructure Asset Management Plan](#).

Legislation known as the '[Inspire' Regulations 2009](#) means that local authorities should work towards making spatial data available to view in a public forum. This means non-sensitive data such as the locations of highways assets should be made available on the public website. In Nottinghamshire, this work is already well underway with the ability to raise enquiries or defects on fixed and non-fixed assets such as road gullies, street lights or potholes via the website.

With the current proliferation of smart phones and the rise of social media, the County Council are developing the capability for stakeholders to interact with the local authority on highway related matters, and other services using a variety of platforms.



5.1.3 - National Highways & Transportation Survey (NHT)

Nottinghamshire will continue to contribute to the annual NHT Survey for the purposes of both benchmarking alongside similar authorities and gauging the level of stakeholder satisfaction with the Authority's services.



5.1.4 - Asset Valuation

This information is provided to the Department for Transport on an annual basis and provides both the Gross Replacement Cost of the authority's assets (what it would cost to rebuild from scratch) and the Depreciated Replacement Cost (what it would cost to return the assets to new from their current condition)

This data not only gives the government a detailed overview of the country as a whole but it is also a useful benchmarking measure between the County Council and neighbouring or similar sized authorities.

5.1.5 - Stakeholder Liaison

The County Council is a custodian of Nottinghamshire's street data for the National Street Gazetteer, alongside the respective District & Borough Councils who manage their own inputs to the Local Land & Property Gazetteer. This national database, managed by GeoPlace on behalf of national government, provides accurate street data for use by the emergency services and delivery firms.

Full utilisation of this system provides stakeholders with a method for engagement with the network and the opportunity to validate the accuracy of associated information.

Many aspects of the maintenance process are highly technical and may be difficult to explain, but it is important that legal duties and obligations are understood. Users' concerns may tend to focus on the short term more visible deficiencies in the network rather than the underlying less apparent problems. Consultation can be expensive both in time and resources. Despite these difficulties, the involvement of users and the community in informed consultation on the highway maintenance service is likely to be beneficial in the longer term in building understanding and support.

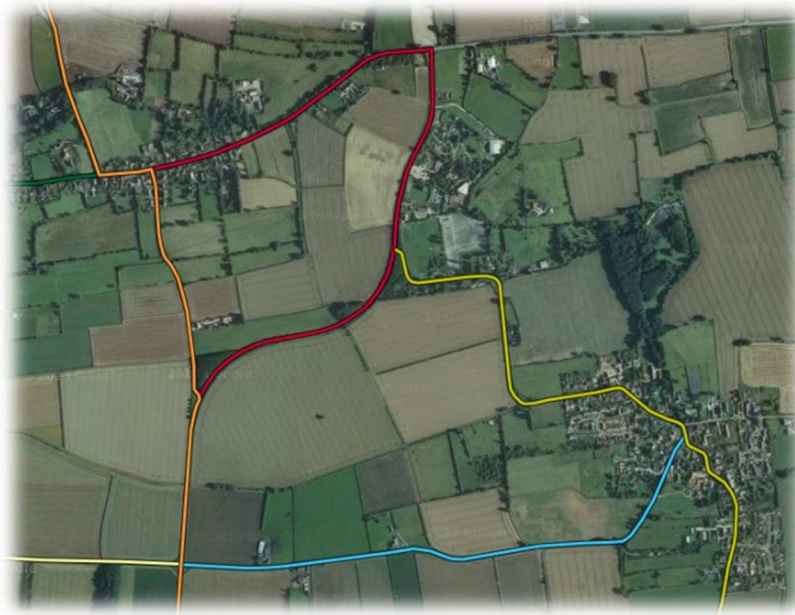
The Authority will continue to support and engage with stakeholders as above through existing communication strands.

5.1.6 - Network Hierarchy Re-Evaluation

The emphasis on the needs of users and consultation implies that authorities should be open to input from local stakeholders where appropriate, but this requires careful management.

The most useful vehicle for the management of these pressures is the local road hierarchy. This is the framework around which levels of service and priorities are based and can provide the focus for consultations and community involvement on the scope for local or neighbourhood discretion, which will inevitably be greater for the less strategic parts of the network.

In keeping with Horizons asset management philosophy, user and community involvement should be a high priority and ongoing aspect of highway maintenance. The nature and scale of involvement will depend on the scale and impact of the works, and in most cases for maintenance works the key issue will be the provision of information. It is important, for the Authority to continue to learn the lessons from completed schemes (what went well, where improvement can be made) so future scheme can be implemented more efficiently.



6. Asset Management Policy and Strategy

An asset management policy and a strategy should be developed and published. These should align with the corporate vision and demonstrate the contribution asset management makes towards achieving this vision.

The asset management policy sets out the commitment by senior decision makers to highway infrastructure asset management. The asset management strategy sets out the long-term objectives for the highway asset and how they are met, including statutory obligations, stakeholder needs and the overall performance of highway infrastructure within the context of any constraints such as funding.

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6.1 - The Nottinghamshire Approach

6.1.1 – Policy

Nottinghamshire's HIAMP is set around the clear principles of Policy, Strategy & Plan, whereby the HIAMP follows a clear line of sight from the existing local and national policies that shape the future direction of the County Council, via the strategies it will employ to meet these policies and what this means for specific assets and their corresponding performance data.

1. **The County Council recognises that Nottinghamshire's highway network and its associated infrastructure plays a crucial part in supporting the local authority's Strategic Plan 2014-18**

Priority One - Supporting safe and thriving communities: we will maintain roads in a serviceable condition and seek to change behaviour through engineering measures, awareness raising and enforcement.

Priority Two - Protecting the environment: By maintaining the condition of roads and footways we will deliver a road and transport infrastructure that seeks to meet the needs of the county's residents, visitors and businesses.

2. **Nottinghamshire County Council is committed to the continued implementation of Asset Management principles in the maintenance of the county's highway network, delivering the greatest amount of community and business benefit with the funds available. These principles are directly linked to the 14 recommendations in the Highway Maintenance Efficiency Programme (HMEP) and promoted by the DfT in its Capital Maintenance Funding Programme 2015 - 2021.**
3. **The County Council's Asset Management Strategy and Plan will set out how Highway Infrastructure Asset Management will be delivered in Nottinghamshire. This strategy will consider current and predicted future financial scenarios and will determine how funding and resources should be utilised to maximise the benefit to Nottinghamshire stakeholders.**

4. The County Council's Asset Management Strategy will also seek to support the three key transport goals set out in the authority's Third Local Transport Plan.

Provide a reliable, resilient transport system which supports a thriving economy and growth whilst encouraging sustainable and healthy travel.

- Adopting an effective Asset Management Strategy will provide robust support to an ever-developing transport system within Nottinghamshire. It will provide long term maintenance planning to help with co-ordination of expenditure, resources and third-party network access whilst being flexible enough to respond to dynamic changes in the needs of businesses and the local economy. Asset Management will promote sustainable travel through efficient maintenance of cycling and walking routes, and their interaction with the network as a whole.

Improve access to key services, particularly enabling employment and training opportunities.

- One of the key features of a robust Asset Management Strategy is the priority given to the maintenance of a 'resilient network' which involves ensuring key transport corridors are kept safe and free flowing at all times. One element of this consideration is the maintenance of access routes to key services such as health facilities, schools, businesses, retail and community centres.

Minimise the impacts of transport on people's lives, maximise opportunities to improve the environment and help tackle carbon emissions.

- The County Council's Asset Management Strategy will seek to ensure a free flowing resilient transport network which is available 24/7, thereby reducing carbon emissions from stationary traffic and encouraging healthier transport choices. The use of sustainable materials in maintenance will be promoted to reduce the authority's carbon footprint, minimising waste and landfill costs. The effects of climate change will be factored into the Asset Management Strategy to further safeguard Nottinghamshire's highway network for future generations.

6.1.2 - Strategy

This document is the Highway Infrastructure Asset Management Strategy for Nottinghamshire County Council. In line with the authority's Asset Management Policy and closely tied to the recommendations in the HMEP guidance document (2013) it shows the steps the Authority will take to effectively manage the highway assets in the coming years.

6.1.3 - Plan

Chapters 18 to 22 of this document contain the County Council's Asset Management Plan for specific Highway Asset categories. This is where the Authority sets out its performance targets and the methods it will employ to achieve them.

The core objectives of these plans are:

- **Customer Service** - Consultation, levels of service, information, etc.
- **Network Safety** - Complying with statutory obligations; Meeting users' needs for safety.
- **Network Serviceability** - Ensuring availability; Achieving integrity; Maintaining reliability.
- **Enhancing condition** – Improving the overall condition of the network.
- **Network Sustainability** - Minimising cost over time; Maximising value to the community; Maximising environmental contribution.



7. Performance Management Framework

A performance management framework should be developed that is clear and accessible to stakeholders as appropriate and supports the asset management strategy.

Authorities should establish levels of service with their stakeholders, senior decision makers and the public. Performance measures and targets should be set to enable monitoring of delivery of the strategy and of performance and to identify the cost of meeting the strategy in the short, medium and long term.

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Current and future demand for the service and funding for its delivery are identified as part of the asset management planning process. It needs to be recognised, however, that the levels of funding required may not always be available. Where funding is limited, authorities should review their levels of service to confirm that they are affordable. In these cases, maintaining statutory requirements should be a priority. A link should be established from corporate objectives to levels of service, performance measures and targets, and the cost of delivering these needs to be determined.

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7.1 - The Nottinghamshire Approach

7.1.1 - Levels of Service & Performance Indicators

The County Council monitors its service levels through a range of performance indicators which are routinely reported to senior management for review. These are shown in Appendix 01 - Service Levels & Performance Indicators, as part of a Performance Management Framework. These indicators are managed through the Authority's performance management system with the associated data being produced from the Asset Management Systems (See Section 15) and external sources such as NHT and APSE. Performance Management data is reported to Committee on a quarterly basis with an annual review that focuses on the overall performance and a trend review. This review allows senior stakeholders to be fully part of the decision-making process and input into future strategy. Further information on Performance Monitoring is contained in Section 16 and Appendix 01.

8. Asset Data Management

The quality, currency, appropriateness and completeness of all data supporting asset management should be regularly reviewed. An asset register should be maintained that stores, manages and reports all relevant asset data.

Asset data describes what highway infrastructure assets an authority has, where they are and how they perform. It is used to support the requirements of the asset management strategy and in determination of the approach to deliver the strategy, including performance management, lifecycle planning, forward programming and risk management.

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8.1 - The Nottinghamshire Approach

8.1.1 – Highway Asset Management System - ‘Confirm’ from Pitney Bowes

Nottinghamshire and its Highway Contractor will continue to use the Confirm system as its main Highway Asset Management system for the foreseeable future as it provides the authority with a robust tool for holding and reporting on Asset Data. Confirm is a modular piece of software which allows users to develop the system to their requirements. Via East Midlands holds a full Enterprise license for Confirm and as such is able to fully utilise the package as well as benefitting from the in-built efficiencies this allows.

Section 15 details the Asset Management systems used for highway management and covers HAMS, GIS and PMS visualisation.



8.1.2 – Data Management Strategy

The highway network is surveyed routinely using a variety of different methods. Asset data is collected and verified through these methods and new details are identified as part of an ongoing process. For new asset sets that have not previously been collated, a specific means of surveying is identified and implemented accordingly. This method allows the quality and integrity of the data to be regularly reviewed and any inaccuracies amended ensuring the overall data quality. This data is further reviewed by maintenance operations that identify assets changes at a component level which are not necessarily easily seen.

The table below has been reproduced from the *Code of Practice on Transport Infrastructure Assets* (24) and adopts a three-layer approach for selecting and grouping assets. This approach is the one currently recommended for authorities undertaking their returns for Whole of Government Accounts.

✓ = Data Available, ✖ = Data NOT Available, **Part** = Some Data Available (Ongoing work to complete) **No** = Data not collected by NCC but by other authorities such as District Council

Level 1	Level 2	NCC Status	Level 3	NCC Status
Asset type	Asset group		Components that level 2 implicitly covers	
Carriageway	<ul style="list-style-type: none"> Area (square metre) based elements Flexible pavements Flexible composite pavements Rigid concrete pavements Rigid composite pavements 	<ul style="list-style-type: none"> ✓ ✓ ✓ ✓ ✖ 	<ul style="list-style-type: none"> Pavement layers Other surface types, e.g. paved Central reservation, roundabout, lay-by, traffic island, etc Earthworks (embankments and cuttings, retaining walls height <1.35) Traffic calming Fords and causeways 	<ul style="list-style-type: none"> ✖ ✖ ✓ ✖ Part ✖
	Linear elements		<ul style="list-style-type: none"> Kerbs Line markings Road studs Road drainage elements (gullies, drains, etc, but not large structures) Boundary fences and hedges Hard strip/shoulder verges/vegetation 	<ul style="list-style-type: none"> ✖ ✖ ✖ Part Part ✖

Level 1	Level 2	NCC Status	Level 3	NCC Status
Asset type	Asset group		Components that level 2 implicitly covers	
Footways and cycle tracks (attached to the road or segregated)	<ul style="list-style-type: none"> Footways Pedestrian areas Footpaths Cycle tracks 	✓ ✓ ✓ x	<ul style="list-style-type: none"> Pavement layers Other surface types, e.g. block paving, unbound materials 	x ✓
Structures	<ul style="list-style-type: none"> Bridges (span >1.5m) Cantilever road sign Chamber/cellar/vault Culverts (span >0.9m) High mast lighting columns (height >20m) Retaining walls (height >1.35m) Sign/signal gantries and cantilever road signs Structural earthworks, e.g. strengthened/reinforced soils (all structures with an effective retained height of 1.5m or more) Subway: pipe Tunnel (enclosed length of 150m or more) Underpass/subway: pedestrian (span of 1.5m or more) Underpass: vehicular Special structure 	✓ ✓ ✓ ✓ ✓ ✓ ✓ x ✓ ✓ ✓ ✓ x	<ul style="list-style-type: none"> All elements identified on the CSS inspection pro forma Smaller water-carrying structures are considered as road drainage 	✓ x
Highway lighting	<ul style="list-style-type: none"> Lighting columns Lighting unit attached to wall/wooden pole Heritage columns Illuminated bollards Illuminated traffic signs 	✓ ✓ ✓ ✓ Part	<ul style="list-style-type: none"> Column and foundations Bracket Luminaires Control equipment, cables 	✓ ✓ ✓ ✓ ✓

			<ul style="list-style-type: none"> Control gear, switching, internal wiring cabling (within ownership) 	
Level 1	Level 2	NCC Status	Level 3	NCC Status
Asset type	Asset group		Components that level 2 implicitly covers	
Street furniture	<ul style="list-style-type: none"> Transport Highway Street Scene/amenity 	✓ Part ✗	<ul style="list-style-type: none"> Traffic signs (non-illuminated) Safety fences Pedestrian barriers Street name plates Bins Bollards Bus shelters Grit bins Cattle grids Gates Trees/tree protection, etc Seating Verge marker posts Weather stations 	Part Part ✗ No No ✗ ✓ ✓ ✗ ✗ ✓ ✗ ✗ ✓
Traffic Management Systems	<ul style="list-style-type: none"> Traffic signals Pedestrian signals Zebra crossings 	✓ ✓ ✓	<ul style="list-style-type: none"> Different product types 	✓
	<ul style="list-style-type: none"> In-station 		<ul style="list-style-type: none"> Complete installation 	
	<ul style="list-style-type: none"> Information systems Safety cameras 	✗ ✓	<ul style="list-style-type: none"> Variable message signs Vehicle activated signs Real time passenger information 	✓ ✓ ✓
Land	<ul style="list-style-type: none"> Freehold land Rights land 	✓ ✓	<ul style="list-style-type: none"> Features on the land are not taken into account in the valuation 	Noted

8.1.3 - Asset Maintenance

Via East Midlands uses Confirm to create and manage its highway inspection regime. It has a whole county access approach which provides flexibility for Inspectorate, allowing Inspectors to work outside of their defined areas when the need arises. Inspections are carried out on a monthly, three-monthly, six-monthly or annual basis dependent upon the hierarchy of the network, in accordance with the County Council's [Highway Inspection & Risk Manual](#).

The inspection regime is made up of three key elements:

- **Inspection Route:** This refers to monthly and three-monthly inspections, generally on classified roads and unclassified distributor roads. These are designed as a single inspection route along a single numbered road.
- **Inspection Area:** This is reserved for all annual inspections and bi-annual link footway inspections.
- **Enquiry Area:** These are specific geographical areas where enquiries such as those from the general public either via Customer Services or the website, are allocated to particular Inspectors or other relevant action officers. In general, the Enquiry Areas broadly match the Inspection Areas but some sections of an Inspection route may be in different enquiry areas.

Inspections are fully managed through Confirm and defects and ordered works are maintained from creation to closure.

8.1.4 - Pavement Management

Nottinghamshire's Technical Survey Strategy is detailed in section 10.1.2. The data collected through these annual surveys is processed through the Pavement Management module of Confirm and a base condition programme can be determined from this data. More detailed analysis of this data is carried out using Horizons (see Chapter 15).

8.1.5 - Street Gazetteer

The Street Gazetteer module holds a complete record of the network in Nottinghamshire, from the Unique Street Reference Number (USRN) and naming convention, through to links with the hierarchy.

8.1.6 - Performance Management

Performance Management data can be reported via the use of the reporting tools contained in Confirm. To assist this, bespoke dashboards can be created to monitor performance through the interrogation and display of live data. All the data stored in Confirm can be reported on and hence this results in a very robust performance management tool. This supports the Authority's approach to Performance Management through the provision and reporting of performance data for national and local indicators.

8.1.7 - Street works

The Street works module of Confirm manages road space allocation for utility works, works by others on the highway and the Authority's promoted maintenance and improvement works.

8.1.8 - Works Management

Jobs raised through Enquiries and Inspections are managed through this module with ties to the Contract Management module for the associated schedule of rates.

8.1.9 - Contract Management

Contracts are managed through this module with associated works areas, rates, bills of quantities and overall contract costs.

8.1.10 - Customer Service

The Customer Service module links with the authority's Customer Service Centre (CSC) who utilise 'FirmStep' to manage the service enquiries received.



9. Life Cycle Planning

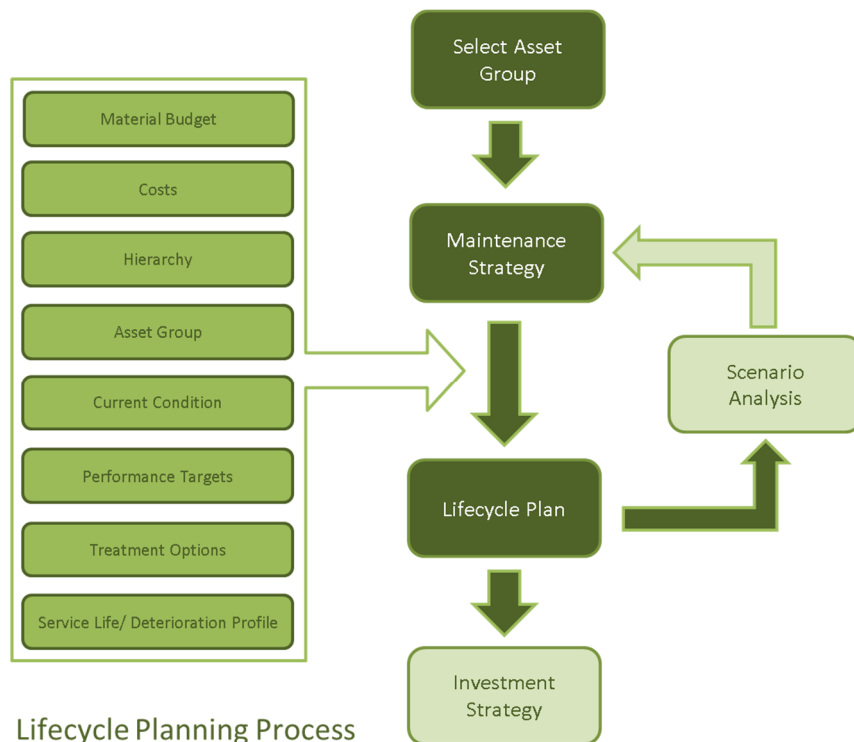
Lifecycle planning principles should be used to review the level of funding, support investment decisions and substantiate the need for appropriate and sustainable long-term investment.

Lifecycle planning comprises 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.

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Development and use of lifecycle plans will demonstrate how funding and performance requirements are achieved through appropriate intervention and investment strategies, with the objective of minimising expenditure while providing the required performance.

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Lifecycle Planning Process

9.1 - The Nottinghamshire Approach

9.1.1 - Scenario Modelling & Associated Costing

Asset Management Systems allow the modelling of deterioration around varying parameters. Whilst capturing the overall network condition and future deterioration they also allow modelling based on funding levels and condition. Varying funding levels can be modelled to predict the likely impact on condition and hence the associated measures. Condition levels can be set based on the network hierarchy to ascertain the necessary funding model required to maintain the condition or performance level. This modelling is available for a number of

asset types allowing for a more predictive means to manage the asset and project future funding requirements.

9.1.2 - Asset Creation / Inventory Capture

The HAMS database currently contains asset inventory on Nottinghamshire's carriageways, footways, trees, lighting columns, illuminated signs and structures, including those elements that are highway maintainable at public expense.

Work is continuing to capture non-illuminated signs, road gullies, grips, piped drainage, linear drainage, surface water chambers, ditches, safety fencing, grassed areas and grit bins.

9.1.3 - Routine Maintenance Overview

Nottinghamshire's highway inspection regime ensures that all the county's roads and footways are inspected at various frequencies dependent upon their hierarchy and in accordance with the authority's [Highway Inspection & Risk Manual](#). These inspections occur either monthly, quarterly, bi-annually or annually with annual inspections as a minimum for all roads.

Works ordered as a result of these inspections are determined based upon the category of the defect and its associated response time plus other information such as indicative forward works programmes and major utility works. Reactive repairs are carried out effectively, to potentially prolong asset life where possible.



Nottinghamshire has introduced 'Highway Assistants' who are operatives that support and accompany Highway Inspectors on their daily duties. The role of the Assistant is to help with the repair or 'make safe' of Category 1 defects at the first visit, as far as is practicable. This reduces the need for multiple visits and allows operational staff to better plan their maintenance activities around lower category defects.

9.1.4 - Renewal or Replacement

With effective forward works planning and deterioration profiling, the County Council will aim to carry out both proactive treatments (such as surface dressing or micro-asphalting) and major renewal or replacement (resurfacing) at the right time for the right cost, ensuring the Authority gets the maximum benefit for the cost outlay. This is determined by design life and calculated deterioration.

9.1.5 - Decommissioning

It is rare for assets to be decommissioned. This usually only occurs when roads are 'stopped up' because of major highway improvements or realignments. As a result of this, it is possible that sections of highway may fall into disuse, or be returned to the landowner of the subsoil beneath the highway. Some drainage assets may be decommissioned if they are replaced by larger projects because of increased flooding. Other assets such as signs or street lighting

columns may be deemed to be decommissioned when they have in fact been relocated as a result of improvement works.

The importance of maintaining an up to date asset inventory is recognised, taking into account the changes which do occur through planned activities and one-off events.

9.1.6 - Service Life / Performance Level

The type of asset in question will determine the method of measuring its level of performance and its service life.

Highway gullies, for example, have three elements: the ironwork above, the structure below and its ability to drain water effectively (silting, blocked pipework etc). Each of these elements can be measured in varying ways and each element will have different expectations as to its service life and its whole life costing.

With regard to carriageways and footways, the performance levels are determined by Road Condition Indices which are gathered using a mixture of SCANNER and CVI (Coarse Visual Inspection) surveys. This data, coupled with deterioration profiling will enable the Authority to predict the condition of its roads and footways along a timeline, thus allowing the targeting of works resulting in the right treatment, for the right cost, at the right time.

9.1.7 - Deterioration Modelling

Horizons takes condition data from roads of the same class, hierarchy and similar HGV usage over several years, monitors the change in condition over this period and uses this information to predict the future status of defects. This is how a Candidate List based upon the predicted condition of the county's roads is produced.

Using carriageways as an example, the Authority will take condition data over many years for roads in a specific grouping based upon classification, hierarchy and traffic usage. This will produce a 'curve' (in graphical format) showing the deterioration over a period. Marrying many curves together will produce a 'trend line', which is effectively an average rate of deterioration for all assets in this grouping. This trend can then be applied to newly resurfaced carriageways to make accurate predictions about their lifespan and maintenance costs.



9.1.8 - Whole Life Costing

Specifically tied in with Lifecycle Planning and a reviewed network hierarchy, this depends on a comprehensive understanding of the condition of sites across the whole network and the nature of treatment required (if any) plus associated costs and estimated lifespan. By dividing the requirements of sites on the network into three distinct treatment bandings (four if you include 'up to standard' or 'as new' – no work required) the County Council builds up a database of 'maintenance needs' at a network level.

The condition bands are described as:

- As new or up to standard – No works required.

- Surface treatment required – Non-invasive.
- Resurfacing required – Semi invasive (40mm).
- Reconstruction required – Highly invasive (100mm+).

From this, the authority is able to determine the estimated cost of these treatments, coupled with the expected lifespan before secondary, tertiary and even longer-term treatments are required. By matching these condition bands and treatment costs against the relative positions in the revised network hierarchy, it is possible to model maintenance funding allocations to target those parts of the network where the need is greatest both from a 'worst-first' and an 'Asset Management' perspective.

In the case of footways and cycleways the same principal applies, although the condition bands and treatment options vary. For example, footways are generally maintained using a surface preventative treatment or are replaced. Along with historic Footway Network Survey (FNS) data, these are now identified for further survey as part of the inspection regime which produces an overview of the condition of footways and cycleways across the county based upon the following bands:

- As new – No work required.

- Aesthetically Impaired – Surface treatment required – Non-invasive.
- Functionally Impaired – Overlay required – Semi invasive (20mm).
- Structurally Unsound – Reconstruction required – Highly invasive (60mm+)

Street lighting tends to operate with a specified lifespan for the products and elements involved although some do extend beyond their expected replacement cycle. The cost of these lifecycles is reasonably constant and as such is easier to predict with a higher level of certainty.

With other assets such as road gullies, it may be more difficult to predict an entire lifespan as assets such as these are rarely decommissioned and some are in place for decades, only being replaced upon sudden failure due to single events (flooding, accidents etc) It may therefore be better to predict a cost over a rolling cycle such as ten or twenty years.

9.1.9 - Scenario Modelling

This involves the predicted outcome of taking a variety of options to the maintenance of the highway network. By running such reports through Horizons 'Analysis' the Authority is able to predict the future condition of the network, and indeed individual streets, based upon the anticipated budget availability over a given number of years. Conversely, the Authority can predict the likely cost of maintaining the network to an agreed level of serviceability. The most likely scenario will be to use its maintenance strategy to maximise the serviceability of the network based upon the predicted budget availability.



10. Works Programming

A prioritised forward works programme for a rolling period of three to five years should be developed and updated regularly.

Delivery of the works programme is the tangible outcome of the asset management planning process. The process to develop a works programme for maintenance and renewal of highway infrastructure assets comprises the identification, prioritisation, optimisation, programming and delivery of individual schemes.

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10.1 – The Nottinghamshire Approach

10.1.1 - Reactive maintenance - Highway Inspection Regime

The Highway Inspection Regime is detailed in the [Highway Inspection & Risk Manual](#). This document is intended as a procedural guide for all employees involved in the inspection of Nottinghamshire's highway network. It covers highway safety and service inspections for a number of assets (a service inspection is an enhanced safety inspection), with additional information recorded on overall condition, this includes a judgement on the potential inclusion of sites in the Candidate List. This guide is not intended to cover inspections of public rights of way (generally rural footpaths and bridleways) as shown on the definitive map record, detailed street lighting, or full tree inspections. This is dealt with in the Rights of Way Improvement Plan, details of which can be found at the following link: [Nottinghamshire Rights of Way Improvement Plan](#)

The aim of inspecting the highway is to identify and take action to remove those hazards causing potential danger to highway users. Additionally, the process will support the development of programmes, to maintain the asset and keep the highway in a serviceable condition. This is in line with the Authority's overall aim of network safety, serviceability, and sustainability.

Highway Safety and Service Inspections are undertaken to identify defects that are creating or likely to create a danger or serious inconvenience to users of the network or the wider community. Such defects should include those that will require urgent attention (within a maximum of 24 hours) as well as those where the reduced level of severity is such that longer periods of response would be acceptable, or confirm that no response is needed.

Nottinghamshire County Council has set its own standards for the frequency of its highway safety and service inspections. These have been approved by Elected Members and take into account national guidelines and are built on Nottinghamshire's Highway Network Hierarchy, recognising the patterns of use of the network rather than classification. The Authority's current standards are shown in the County Council's [Highway Inspection & Risk Manual](#).

Each part of the network is assigned a hierarchy which relates to its importance to transportation and usage. This hierarchy is stored in the Highway Asset Management System

and records are kept of hierarchy changes. Footway hierarchies may differ from carriageway hierarchies and hence, they can have potentially diverse inspection frequencies.

The Authority will ensure that the routes include the existing highway network and newly adopted highways, where appropriate, are added to the inspection routes.

Each inspection must be recorded against the relevant Street Section in Highway Asset Management System. As well as any defects found, an assessment of the overall condition of the carriageway and footway must be recorded as part of the annual service inspection, but can also be highlighted through a safety inspection. This information is considered to identify potential preventative maintenance and renewal schemes. When recording inspections using a handheld device it will automatically time and date stamp the inspection. If no defects are present this must be recorded as part of the inspection. The inspection data should show the name of the officer who carried out the inspection (inspections must not be carried out in another person's name).

All inspections shall be properly recorded into the Highway Asset Management System and retained by the Authority for future reference.

10.1.2 - Technical Survey Strategy.

SCANNER Survey – The Authority will continue to carry out SCANNER surveys on its classified road network at the following frequencies:

- 'A' roads - 100% in one direction, alternating each year. One direction one year, the opposite direction in the following year
(2014/15 network = 442km)
- 'B' & 'C' roads - Also 100% in one direction, alternating each year
(2014/15 network = 1049km)

CVI Survey – The Authority will continue to use CVI surveys for its unclassified network. The seven districts within Nottinghamshire are split into three separate areas and one of these areas is surveyed each year with all three areas completed over a three-year period.

- Area 1: Newark & Rushcliffe (2012/13 Network Length = 1031km)
- Area 2: Ashfield, Broxtowe & Gedling (2013/14 Network Length = 847km)
- Area 3: Bassetlaw & Mansfield (2014/15 Network Length = 765km)

SCRIM Survey – The Authority will continue to survey one third of its 'A' road network in both directions each year, plus one third of its 'B' road network in both directions each year.

10.1.3 - Forward Works Planning.

Using the 'Horizons Analysis' software from 'Yotta', the Authority has created a Candidate List or 'needs' list based upon projected asset condition (Deterioration Modelling) against costs and agreed levels of asset performance. To maximise the benefits, it is possible to create a multi-year programme though the ability to be prescriptive diminishes the further into

the future you go. Therefore, a candidate list rather than a defined programme has been developed which is banded based on likely short, medium and longer-term maintenance objectives. This is not a rolling programme as it is recognised that annual deterioration can manifest in different ways and these are assessed as part of an Annual Engineering Inspection (AEI), with an 'in year' programme developed based on current condition each year.

The Candidate List is developed using condition data derived from the Network Technical Surveys but also feedback from the Highway Inspectorate who are the 'eyes and ears' on the ground, being aware of local community concerns and utilising engineering judgement on whether a street section is in need of future capital investment or whether it can be maintained through standard reactive maintenance techniques.



The maintenance programme is indicative and based upon the predicted condition of the network over time. The Authority will also look to make this information available either via the public website or regular bulletins or both.

The benefits of this are threefold:

Firstly, by using the predicted condition of the highway network the Authority can plan a more efficient works programme, balancing the needs of 'worst-first' with a greater emphasis on preventative maintenance treatments which can reduce the demands of a 'worst-first' programme over time. The Authority is able to predict when the optimum point on the deterioration curve is reached where the allocated treatment at that point provides the greatest cost benefit. *'The right treatment, at the right time, for the right price.'*

Secondly, having an indicative Candidate List in place, helps with co-ordination activities both within and outside the authority. The Authority is able to better plan the timing and extent of utility works as well as fully co-ordinating its own internal multi-disciplinary functions such as street lighting and structures works. Making the information available to Highway Inspectors via electronic tablets, helps them make informed treatment decisions dependent upon if and where specific sites sit within the maintenance plans.

Thirdly, this approach allows for greater transparency in helping the public, elected members and other stakeholders to understand what the County Council's future maintenance plans are and how we've come to such decisions, which should remain objective and based upon sound engineering criteria. It will allow for a larger amount of self-service and can help, particularly in the case of elected members, district / parish councillors etc to field enquiries about particular locations.

11. Leadership & Commitment

Senior decision makers should demonstrate leadership and commitment to enable the implementation of asset management.

Leadership has a strong influence on the culture and behaviour of all organisations. Clear direction and priorities will ensure that both significant and apparently relatively minor decisions taken across an organisation all support a consistent approach to delivering asset management. Time and effort spent on leadership and organisational development will pay dividends in the long-term as the purpose, objectives and responsibilities for asset management will be clearly established and supported.

Demonstrating the benefits that investment in highway infrastructure assets can achieve is required to support decision making and prioritise investment of capital funds and other valuable resources. Many authorities have been successful in making the case for additional investment in the maintenance of their highway infrastructure by adopting asset management principles. HIAMGD - Page XIII

11.1 - The Nottinghamshire Approach

Ensuring the support of senior decision makers is key to the effective application of Highways Asset Management. Engagement is continuous between all parties involved in the delivery of highway maintenance at all levels within the County Council and a sound system of communication in both directions is in place. Reports are presented to the Authority's committee responsible for the service covering performance management, works programming, and budget setting.

Strategic direction and asset policy are set out in this document and demonstrate the steps the Authority will take to meet them.

Alongside the Highway Infrastructure Asset Management Guidance Document, the UK Roads Liaison Group (UKRLG) produced an abbreviated document called [Highways - Maintaining a vital asset \(What should councillors know about asset management?\)](#) Strong leadership and commitment from elected councillors and their chief officers is vital in maintaining the highway. This leaflet explains how asset management can help councils to improve highway maintenance, by ensuring best use of available funds and demonstrating need for investment.

The County Council will ensure, through regular communication (committees, regular update bulletins and website publishing) that the investment case for Asset Management is clearly stated and based upon predicted funding and asset condition.

12. The Case for Asset Management

The case for implementing the Asset Management Framework should be made by clearly explaining the funding required and the wider benefits to be achieved.

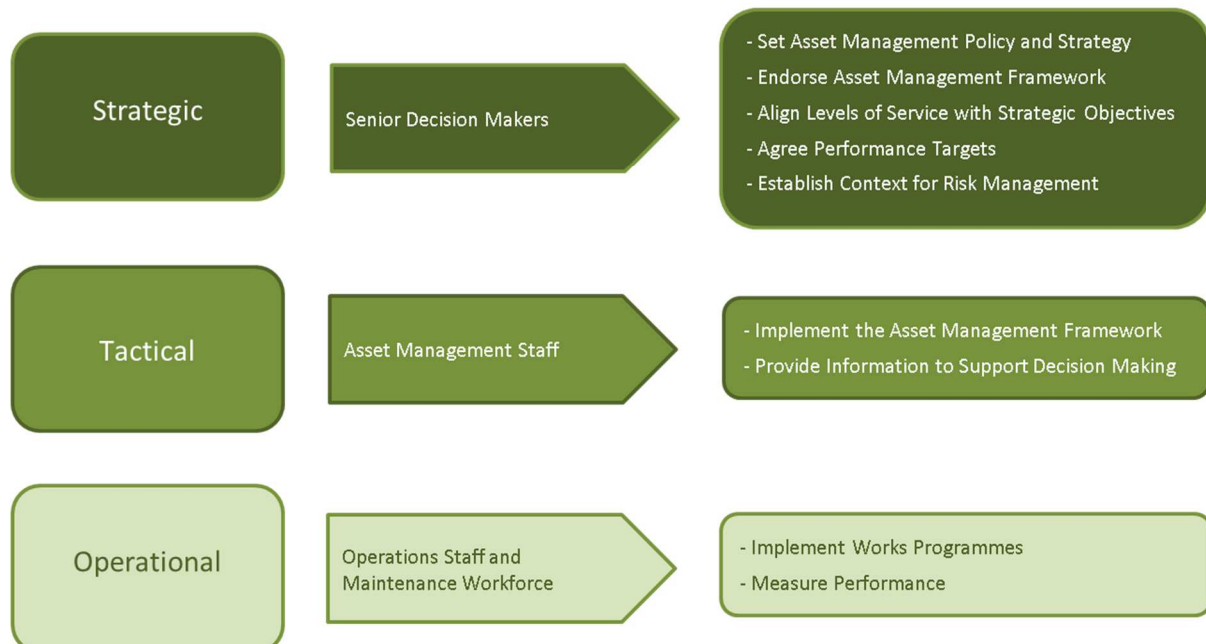
Asset management has been widely accepted by central and local government as a means to deliver a more efficient and effective approach to management of highway infrastructure assets through longer term planning, ensuring that standards are defined and achievable for available budgets. It also supports making the case for funding and better communication with stakeholders, facilitating a greater understanding of the contribution highway infrastructure assets make to economic growth and the needs of local communities.

The demand for a more efficient approach to the management of highway infrastructure assets has come to prominence in the light of the fiscal challenges faced by both central and local government as well as the devolved administrations.

Although the principles of asset management have been accepted, highway authorities throughout the UK have adopted a wide-ranging approach to its implementation. Many authorities have successfully adopted asset management but others are still at an early stage of implementation. Where asset management has been successfully adopted, demonstration of leadership and commitment from senior decision makers in supporting an asset management approach has been fundamental.

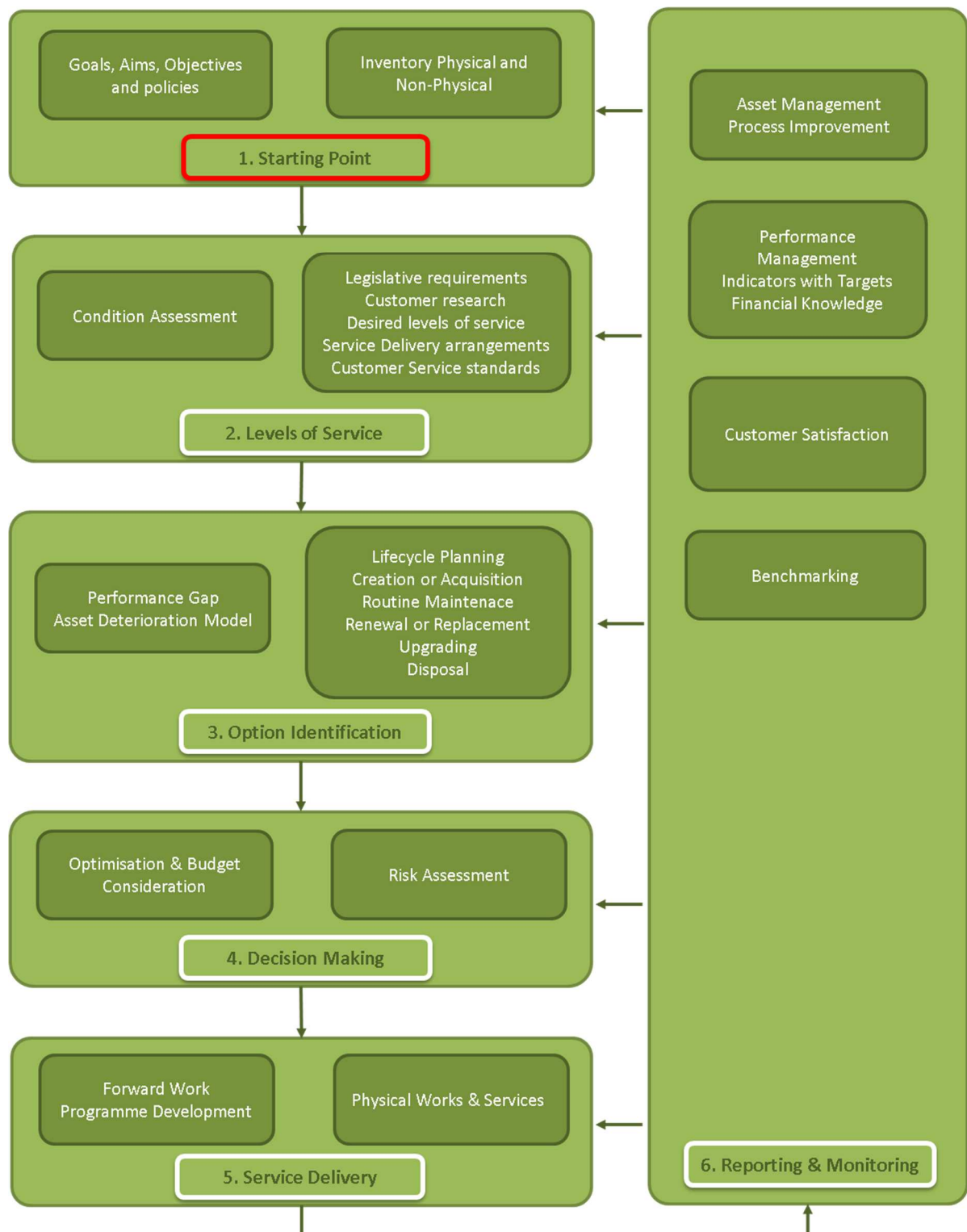
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Organisational Hierarchy



12.1 - The Nottinghamshire Strategy

The Asset Management Process is set out in the diagram below. This approach will also be utilised by Nottinghamshire when undertaking the completion of lifecycle plans for individual assets.



12.1.1 - Department for Transport Block Funding 'Needs' Formula

Prior to 2015/16, the highways maintenance funding formula comprises four main elements:

- De-trunked road length;
- Network road length;
- Number of bridges greater than 1.5m in length; and the number of bridges requiring major maintenance or strengthening; and
- Street lighting columns over 40 years old

From 2015/16 to 2020/21 the funding formula has been amended by the Department for Transport as follows:

It was announced in 2015/16, that there would be a total of £4.7 billion across the six-year period, and excludes the funding for the Incentive element and the Challenge Fund; the total funding available over the period amounted to just under £6 billion.

Following a consultation on highways maintenance funding, the Department has allocated a proportion of the total funding to four elements in varying proportions, derived from the Whole of Government Accounts:

Roads	75%
Split evenly between:	
A roads	25%
B & C roads	25%
Unclassified roads	25%
Bridges	14%
Lighting	2%
Cycleways & Footways	9%

In order for the Department for Transport to specify what the data requirements would be for Cycleways & Footways, there was no specific allocation for these until 2018 / 19 onwards. Therefore, from 2015 / 16 to 2017 / 18 the formula was as follows:

Roads	82.42%
Split evenly between:	
A roads	27.47%
B & C roads	27.47%
Unclassified roads	27.47%
Bridges	15.38%
Lighting	2.2%
Cycleways & Footways	0%

The allocation for each authority is calculated in broadly the same way for the roads, bridges and lighting elements. That is:

- Local authority total for each element divided by England total for each element multiplied by total allocation in £ for each element; and
- The allocations for each of the elements are then added together to get the total allocation for each authority, and rounded to the nearest £1,000.

A-road totals have been calculated as:

Principal Motorway *multiplied by 3 plus* Principal rural 'A' roads *plus* Principal urban 'A' roads *plus* Dual Principal rural 'A' roads *plus* Dual Principal urban 'A' roads.

B & C road totals have been calculated as:

'Rural B' roads *plus* 'Urban B' roads *plus* 'Rural C' roads *plus* 'Urban C' roads.

Unclassified road totals have been calculated as:

'Rural U' roads *plus* 'Urban U' roads.

Bridges

These were sourced from local authorities in a previous data collection exercise and relate to the number of publicly maintainable highways bridges that highway authorities owned as at 1st April 2014. This figure should include all structures over 1.5 metres in span, whether carrying carriageway or footway (but not including public rights of way, nor structures belonging to other owners, such as Network Rail).

Lighting

These were sourced from local authorities in a previous data collection exercise and relate to the total number of street lighting columns owned by authorities as at 1st April 2014.

12.1.2 - Department for Transport Incentive Fund

The incentive funding element is about obtaining consistent adoption of good practice across all local authorities to ensure value for money.

Time is being given to allow highway authorities to adopt efficiency measures, to gain buy-in from their senior leaders and to make the necessary transformational changes to the full adoption of Asset Management Principles.

Initially, each local authority receives all of its efficiency funding, both the 'needs' and 'incentive' elements of their initial award. However, for each subsequent year there is an expectation that continuous improvement is taking place by each highway authority. This level of improvement is reflected in the funding awarded through the size of the incentive received.

Local highway authorities are categorised based upon where they are on the efficiency curve as follows:

- Band 1: Early stage authority
- Band 2: Mid stage authority
- Band 3: Final stage authority

A local authority's category is based on the responses to a self-assessment exercise on efficiency. This is collected annually via the Single Data List Item 129-000 in relation to highway data. Each local authority return will require a Section 151 Officer declaration to confirm that it is accurate.

The exact proportion of an authority's incentive funding would be based upon the allocation table below:

Year	2015 / 16	2016 / 17	2017 / 18	2018 / 19	2019 / 20	2020 / 21
Band 1	100%	90%	60%	30%	10%	0%
Band 2	100%	100%	90%	70%	50%	30%
Band 3	100%	100%	100%	100%	100%	100%

Nottinghamshire undertook a review (Summer 2015) of the 22 questions in the self-assessment questionnaire, based on the anticipated position for November 2015 and at that time it was predicted that the Authority would achieve Level 2 on the majority of questions including three cornerstone questions. The two questions relating to Risk and Resilience are at Level 1 and the Authority recognises the need for the development of such plans, however, as this is an area that is also contained in the Well Managed Highway Infrastructure: A Code of Practice (ACoP) review, any plan production is tied to this. At that time, Nottinghamshire bordered on level three in several areas, however, it attained Band 2 for the year 2016/17.

For the year 2017/18, there was an improvement in many areas with Level 3 being attained in half the questions, however, with the implications of the ACoP changes, the two questions relating to Risk and Resilience and changes to Lifecycle planning the Authority remained at Band 2 for the year.

With the creation of Via East Midlands in 2016 and the embedment of practices and procedures relating to the contract between the Authority and Via EM, many of the questions relating to robust performance management, procurement chain and management of the service could be answered with clear evidence of attaining Level 3 from management of the contract. This combined with the developments associated with the changes for the ACoP led to a Network Hierarchy Review, which resulted in a review of the whole Inspection Regime and the development of a risk management approach which was introduced across all service areas as part of a whole service review. The result of all these changes and development was the Authority attaining Band 3 for 2018/19.

12.1.3 - Department for Transport Challenge Fund

Part of the government's 2014 Autumn Statement assigned a proportion of the highways maintenance budget to a Local Highways Maintenance Challenge Fund. The purpose of the Fund is to enable local highway authorities in England to bid for major maintenance projects that are otherwise difficult to fund through the normal needs element allocations they receive. It was recognised that much of England's highway infrastructure is not new. Each highway asset has a definitive lifespan after which it decays and loses functionality. Some of this country's existing highway assets may now be moving to more costly stages of their natural life-cycle with some components already reaching the end of their serviceable life. In addition to the natural ageing process of highway infrastructure, the life-cycle of the asset has in many places deteriorated at a faster rate than perhaps originally envisaged, as a result of its original under-investment, as well as recent severe weather events which has compounded the issue.

An ageing asset can indicate the need for more funding as older infrastructure is costlier to maintain than new. In short, many areas of England may now be entering an era where a growing proportion of its public highway is nearing the end of its first full life-cycle and needs to be addressed.

The Challenge Fund is designed to help maintain existing local highways infrastructure. The types of project that are eligible for funding include:

- Major maintenance, strengthening or renewal of bridges, tunnels, retaining walls or other structures.
- Major maintenance or renewal of carriageways (roads).
- Major maintenance or renewal of footways or cycleways.
- Major maintenance or renewal of drainage assets.
- Upgrade of street lighting.
- A scheme which primarily covers one of the above categories but also includes some enhancement to the network to provide better access to housing and/or employment.

The total value of the Fund was announced as £575 million split over six financial years from 2015/16 to 2020/21. It was envisaged that the Fund would be split into two Tranches as follows:

Tranche 1		Tranche 2	
2015 / 16	£75 million	2018 / 19	£100 million
2016 / 17	£100 million	2019 / 20	£100 million
2017 / 18	£100 million	2020 / 21	£100 million
Total	£275 million	Total	£300 million

Nottinghamshire's Challenge Fund bid for 2015 was a programme to enhance strategic links in Nottinghamshire where there was high customer demand and strong links to the local community, services and businesses. Utilising a 'whole street' approach, the programme covered carriageway & footway treatments, including associated assets and lighting column/lantern replacement and drainage improvements, where applicable.

The County Council's bid for Tranche 1 covered the whole county and was specifically targeted at unclassified distributor roads based on asset management principles and customer demand. At the time of the bid the classified road network was performing well (around 1.5% of A roads and 4.0% of B & C roads requiring maintenance) so the bid was concentrated around the next tier of hierarchy which was the unclassified 'distributor roads'. The sites identified were those with local community value and had high amenity, facility and/or business (including HGV) access requirements. Unfortunately, the Authority was unsuccessful with this bid.

In 2017/18, in a change to the original proposal, the Department for Transport asked for submissions for a second phase of the Challenge Fund. The bid produced by the Authority focused on the A38 and A617 corridor being part of the Mansfield & Ashfield Regeneration Route. The bid was identified and substantiated using asset management principles and was a result of close working between Via EM and their partnership contractor Tarmac Ltd. It consisted of resurfacing of the whole identified section, with structural improvements to the surface at known points of failure using bespoke material designs specific for the location. As part of the bid, a full drainage survey was included to identifying all the associated assets, and combine cleansing and improvements as required. The bid was linked to developments along this corridor and Section 278 changes. The Authority was successful with this £6.0m bid and work took place from late Autumn 2017/18, with the majority of the work towards the end of the financial year.

13. Competencies and Training

The appropriate competency required for asset management should be identified, and training should be provided where necessary.

Authorities should identify the competencies necessary to meet their requirements for asset management. Where these competencies are not available in the organisation training of staff may be required. Recruitment, mentoring or collaboration with other authorities may also be considered.

To maintain competency regular training should be considered for staff undertaking roles in asset management, such as the Highway Asset Manager. This will ensure the authority has the continuing ability to efficiently and effectively prepare, implement and review their approach to asset management. Investment in development of staff will support the overall improvement in the implementation and delivery of asset management supporting the subsequent business benefits.

Long term asset management involves many different people over time. As people change and as the approach evolves it will be necessary to ensure an orderly transfer of knowledge. This can best be achieved where those involved in asset management have clear roles and where due consideration is given to succession planning and the smooth hand-over of responsibilities. HIAMGD - Page 72

13.1 - The Nottinghamshire Approach

Nottinghamshire will continue to ensure suitable competency across staff from all levels, from senior decision makers to frontline operatives.

This will take the form of on-site & off-site training in the use of specific software packages such as Yotta's 'Horizons' and Pitney Bowes' 'Confirm' as well as training and mentoring in Microsoft Office packages such as Excel, Word, Publisher and PowerPoint. There is a mixture of tailored training such as HMEP online toolkits and day to day learning through frequent usage. Details of the training associated with Asset Management are shown in the table at the end of this section.

It is also important, alongside the sharing of good practice between authorities, that the Authority shares knowledge within its own organisation in the form of mentoring and day to day working together. The principles of Asset Management are communicated to relevant staff, including senior officials and engineers by one to one desktop study, in presentations and in open forums and workshops. HIAMP meetings/workshops are planned to raise awareness and communicate developments.

Asset Management is a principle and as such it relies on knowledge, experience & skills from a wide range of individuals and organisations to operate effectively. It will not function without the 'buy in' from senior decision makers / elected members and as such they should be made fully aware of the benefits to be had from the proper application of these principles. The Authority will ensure that knowledge is allowed to feed in from both ends of the local authority spectrum. The Institute of Asset Management's Competency framework identifies key roles and their required competencies. This framework has been utilised to create the following matrix:

ASSET MANAGEMENT COMPETENCY FRAMEWORK		
Post Title/Level	Required Competencies	Resources
Service Director/ Managing Director	An overall awareness.	HMEP Toolkits HAM Policy & HIAMP
Head of Service / Divisional Manager	Knowledge of corporate policy & strategy.	HMEP Toolkits HAM Policy & HIAMP
Team Manager/ Service Manager	Knowledge of national & corporate policy, strategy & plan.	HMEP Toolkits HAM Policy & HIAMP
Team Manager Highway Assets & Development	Detailed knowledge of national & corporate policy, strategy & plan. Detailed knowledge of HAMS (PMS), Horizons - Explorer & Analysis.	HMEP Toolkits HAM Policy & HIAMP HAMS Training Horizons Training (Explorer & Analysis)
Highway Asset Manager	Knowledge of national & corporate policy, strategy & plan. Detailed knowledge of HAMS (PMS), Horizons - Explorer & Analysis and detailed understanding of condition modelling.	HMEP Toolkits HAM Policy & HIAMP HAMS Training Horizons Training (Explorer & Analysis)
Asset Management Officer	Detailed knowledge of HAMS (PMS), Horizons - Explorer & Analysis and detailed understanding of condition modelling.	HMEP Toolkits HAM Policy & HIAMP HAMS Training Horizons Training (Explorer & Analysis) including further Analysis Tools (Excel, Access etc)
Team Manager: Highway Design - Maintenance	Knowledge of corporate policy, strategy & plan. Horizons - Explorer and knowledge of condition modelling.	HMEP Toolkits HAM Policy & HIAMP Horizons Training (Explorer)
Principal Project Engineer	Knowledge of corporate policy, strategy & plan. Horizons - Explorer and knowledge of condition modelling.	HMEP Toolkits HAM Policy & HIAMP Horizons Training (Explorer)
Project Engineer	Horizons - Explorer and knowledge of condition modelling.	HMEP Toolkits HAM Policy & HIAMP Horizons Training (Explorer)
Casualty Reduction Officer/ Safety Auditor	Horizons - Explorer and knowledge of condition modelling.	HMEP Toolkits HAM Policy & HIAMP Horizons Training (Explorer)

14. Risk Management

The management of current and future risks associated with assets should be embedded within the approach to asset management. Strategic, tactical and operational risks should be included as should appropriate mitigation measures.

Highway authorities are required to manage a variety of risks at all levels within their organisations. The likelihood and consequences of these risks can be used to inform and support the approach to asset management and inform key decisions on performance, investment and implementation of works programmes.

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14.1 - The Nottinghamshire Approach

14.1.1 - Definition

Risk can be defined as an uncertain event which, should it occur, will have negative effect on the performance of the asset or the asset directly. The level of Risk can be defined as the likelihood of an event occurring, and the magnitude of its impact on the asset which would result from the occurrence. The Highway Asset is subject to many risks:

- **Safety** – of staff engaged in works on the highway, or in the much wider remit of highway user safety
- **Risk to Reputation** – both of the Highways Authority itself and those who rely on the asset in the course of their businesses
- **Loss or damage to the asset** – ranging from total destruction in an instant due to an extreme event to the steady deterioration of the asset due to wear and tear.
- **Service reductions or complete failure** – to lose some parts of the Network would potentially directly threaten lives
- **Environmental** – threats both to and from the environment
- **Financial and Contractual Risks** – for the Highway Authority and stakeholders
- **And most importantly - combinations of the above!**

Management of these risks is fundamental to effective asset management.



14.1.2 - Management of Risk in Nottinghamshire

The level of risk to an asset is generally reflected by its place in the network hierarchy, however this can be over-ridden by specific local needs. The asset team is made aware of these needs by close liaison with the staff engaged in the service and feedback from Highway Users.

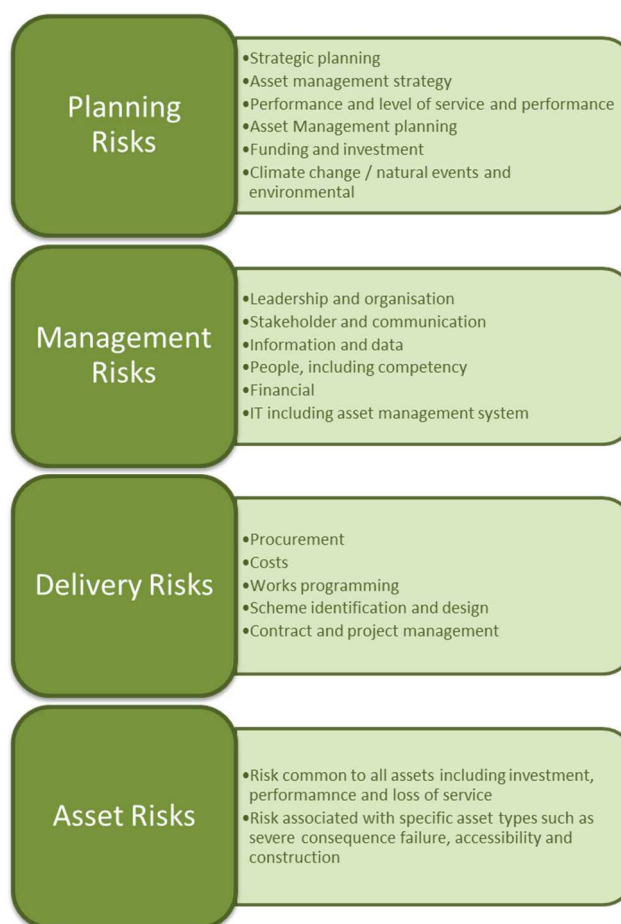
Risks are evaluated along with available asset condition data and schemes are prioritised in line with available funding resulting in a list of candidate sites. Subsequent site investigation works also help to ascertain if project risks, such as tar being found in the construction layers, are clarified as early as possible to allow effective re-evaluation.

For reactive maintenance work the procedures on Risk Management are included in the [Highway Inspection & Risk Manual](#) along with guidance on appropriate defect treatments and response times.

All processes and treatments are embedded into the Highway Asset Management System and tablet technology utilised by Officers and Operatives.

Operational works procedures are covered by systems accredited to the internationally recognised quality system ISO 9001 and the Health and Safety system OHSAS 18001.

The chart below shows the four main risk categories and the separate risk elements within, which can contribute and need to be managed effectively.



14.1.3 - Resilient Network

In July 2014, the Department for Transport published the 'Transport Resilience Review - A review of the resilience of the transport network to extreme weather events'. The review made many recommendations, two of which were specifically related to highways asset management:

- **Recommendation 31:**

Local Highway Authorities should follow asset management principles in managing their assets, and informing spending decisions.

- **Recommendation 32:**

The DfT should proceed with its proposal to consult on using part of the capital maintenance monies to encourage the development and adoption of Asset Management Plans. However, in order to allow adoption of plans by more authorities, this should be delayed at least until financial year 2016/17.

These recommendations provide the intrinsic link between the Incentive Fund and the adoption of asset management principles. The fact that these recommendations were contained in a government review about climate change, extreme weather events and network resilience means that all local authorities must put plans in place to manage such events and provide a transport network which is robust enough to cope when the worst happens.

[Well Managed Highway Infrastructure – A Code of Practice](#) was first published in October 2016. Produced by the UK Roads Liaison Group and backed by the Department for Transport, this document provides guidance on how authorities can implement a risk-based approach to highway maintenance management. The Code is designed to promote the adoption of an integrated asset management approach to highway infrastructure based on the establishment of local levels of service through risk-based assessment.

Nottinghamshire already has emergency planning in place for operational response and also protection of the vulnerable and less-abled people in times of crisis.

Allied to this is a comprehensive understanding by the Flood Risk Management Team of known and potential flooding hotspots based upon recent historical events and shared data from other organisations such as the Environment Agency and Internal Drainage Boards.

The County Council is identifying 'Critical Assets' such as bridges, junctions and routes that form the backbone of the revised network hierarchy developed as part of the ACoP review.

15. Asset Management Systems

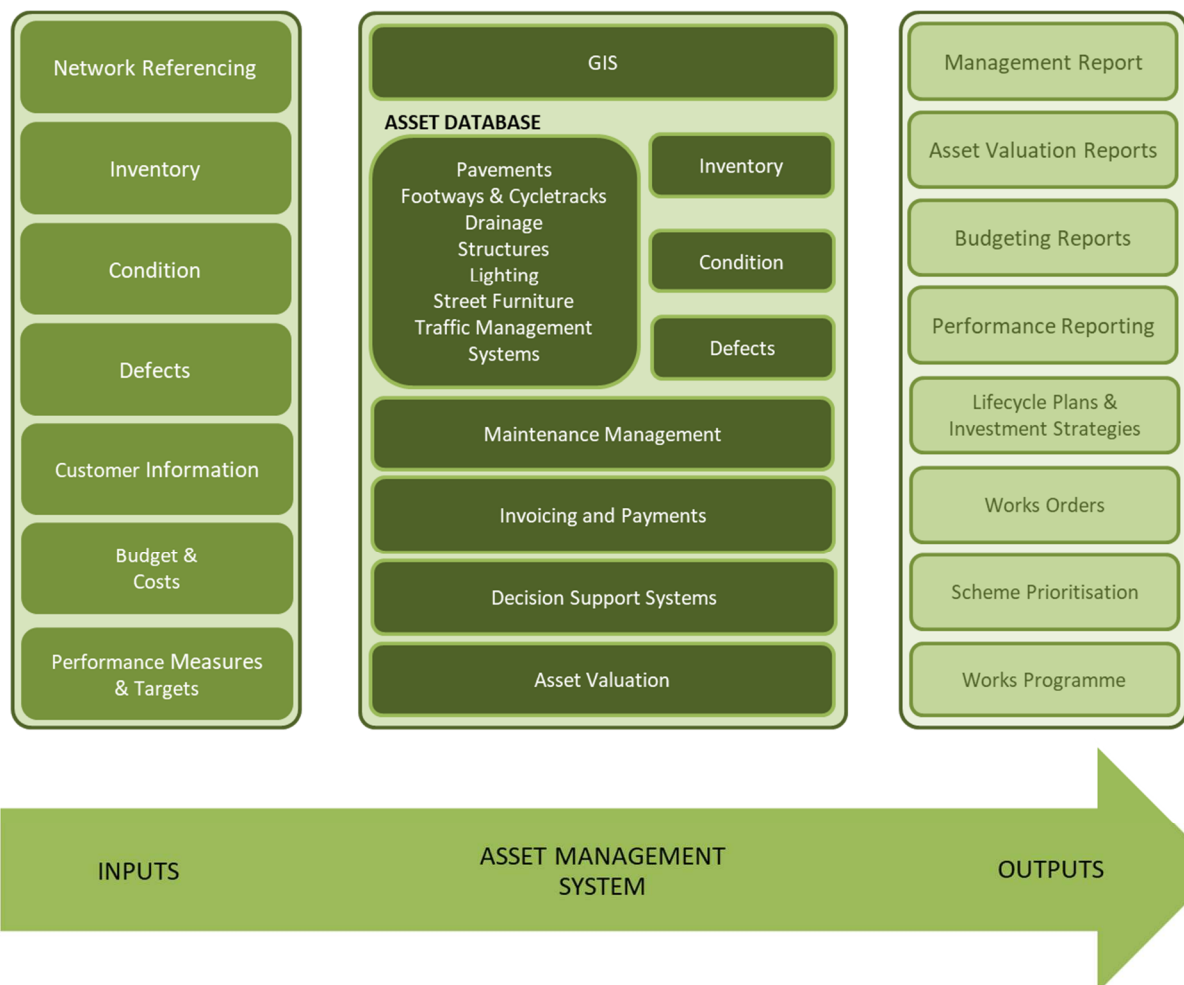
Asset management systems should be sustainable and able to support the information required to enable asset management. Systems should be accessible to relevant staff and, where appropriate, support the provision of information for stakeholders.

Good asset management needs to be supported by robust processes for implementation and management as well as good quality, repeatable and reliable data. An asset management system will support decision making through managing information and data to support asset management as well as to record and monitor its implementation.

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15.1 - The Nottinghamshire Approach

Nottinghamshire will continue to utilise software applications to manage the Highway Asset. These systems and applications are detailed in this section to all the inputs and outputs to be achieved as per the diagram below.



15.1.1 – Highway Asset Management System - ‘Confirm’ from Pitney Bowes

The Authority will continue to use the Confirm system for the foreseeable future as it provides the authority with a robust tool for reporting the performance of its systems and working practices. Confirm is a modular piece of software which allows users to develop the system to their requirements. Nottinghamshire holds a full Enterprise license for Confirm and as such is able to fully utilise the package as well as benefitting from the in-built efficiencies this allows. This system is continually upgraded to provide greater functionality and to maintain compliance with other protocols, as these become available from the provider.



Asset Register - Spatial and non-spatial data on highway assets and their associated attributes is stored within the Confirm database.

Customer / Stakeholder Enquiries - The Authority’s Customer Services Centre feeds information on enquiries / complaints from the general public and others into Confirm which provides IT with information which, when aligned with engineering data from technical surveys, can enhance the overall picture of Nottinghamshire’s highway network.

Street	Feat No.	Feature Type	Feature Id - Location
Fox Road (33000936)			
2.000.00	Street Section	From Radcliffe Road to Hound Road	
4.000.00	Column	1 - o/s 1 - opp TBH entrance	
4.000.07	Column	TEST PLOT IPAD - Test plot	
4.001.00	Column	2	
4.002.00	Column	3 - o/s 16	
4.003.00	Column	4 - o/s 15	
4.004.00	Column	5 - o/s 19a	
4.005.00	Column	6 - o/s 27/29	
4.006.00	Column	7 - o/s 35a/37	
6.000.00	Trees - 1 Highway (Single)	RUSH-07249 - FRONT OF 29	
6.001.00	Trees - 1 Highway (Single)	RUSH-07249 - OPPOSITE 27	
6.002.00	Trees - 1 Highway (Single)	RUSH-07250	
6.003.00	Trees - 1 Highway (Single)	RUSH-07251	
6.004.00	Trees - 1 Highway (Single)	RUSH-07252 - FRONT OF 15	
6.005.00	Trees - 1 Highway (Single)	RUSH-07253	
6.006.00	Trees - 1 Highway (Single)	RUSH-07254	
6.007.00	Trees - 1 Highway (Single)	RUSH-07255	
6.008.00	Trees - 1 Highway (Single)	RUSH-07256	
6.009.00	Trees - 1 Highway (Single)	RUSH-07257 - FRONT OF	TBH
6.010.00	Trees - 1 Highway (Single)	RUSH-07258 - FRONT OF	TBH
6.011.00	Trees - 1 Highway (Single)	RUSH-07259 - FRONT OF	TBH
6.012.00	Trees - 1 Highway (Single)	RUSH-07260	

Pavement Management Data - Confirm stores, processes and analyses data from technical condition surveys such as SCANNER.

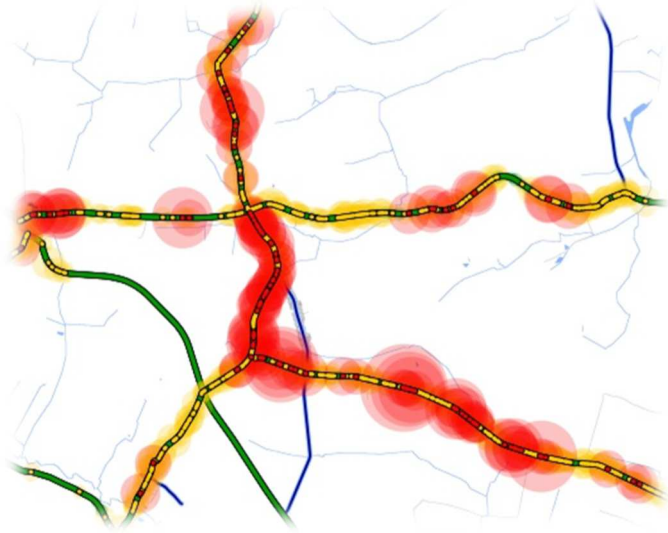
Highway Inspections - These will continue to be managed along with the whole highway inspection regime using Confirm.

Asset Valuation – The Authority will continue to use Confirm for the provision of data to the Department for Transport for the Whole of Government Accounts including Depreciated Replacements Costs and Gross Replacement Costs.

15.1.2 – Pavement Management System - ‘Horizons’ from Yotta

‘Horizons’ is a visualised PMS software product from Yotta. Its greatest attribute is its ability to take vast amounts of complicated road and footway condition data and display it in a visualised format using maps, graphs, pie-charts and video. This enables IT to present the information to a wider audience, both engineering and non-engineering.

Horizons uses the ‘Red, Amber, Green’ format to display data on the Road Condition Index (RCI) which is a value given to each sub-section of road based upon a formula which pulls together the severity of each individual defect.



15.1.3 – MapInfo

MapInfo is a software programme from Pitney Bowes, designed to interact with Confirm and is primarily used for plotting spatial asset data onto base maps. The co-ordinate data from MapInfo is transferrable between various platforms including Horizons and Microsoft Office programmes such as Excel.

The Authority uses MapInfo to plot not only asset locations but also some attributes such as public highway extents, flooding and administration areas.



15.1.4 – Control Systems and Asset Register

Traffic

Urban Traffic Control (UTC) system: for traffic signals in co-ordinated networks (e.g. Mansfield town centre) enabling continuous communication with and control of sites remotely, monitoring of faults and signal operation.

Remote Monitoring System (RMS): for stand-alone traffic signal installations via phone lines or GSM allowing remote dial up to monitor operation of sites. System will also dial up the in-station at Trent Bridge House when faults occur.

IMTRAC: the system for logging and managing all traffic signal faults with relevant service contractors. All faults are prioritised with set attendance and rectification targets.

Traffic Control Systems Asset Register: this system collates the asset data from the associated Traffic Control systems above into a single register.



16. Performance Monitoring

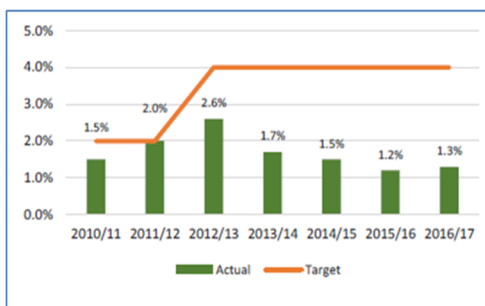
The performance of the Asset Management Framework should be monitored and reported. It should be reviewed regularly by senior decision makers and when appropriate, improvement actions should be taken.

A well-developed approach to performance monitoring will provide authorities with the ability to continuously improve their asset management knowledge, processes and systems to support effective delivery of asset management and to build on lessons learnt to enable them to continuously improve.

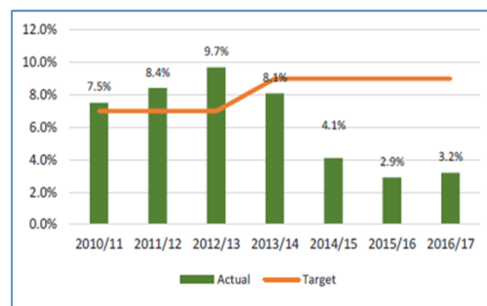
HIAMGD - Page XIII

16.1 - The Nottinghamshire Approach

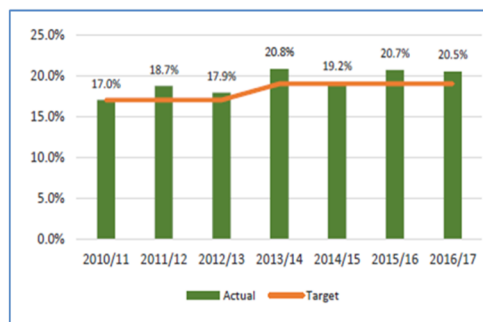
Nottinghamshire County Council monitors its service levels through a range of performance indicators which are routinely reported to senior management for review. These indicators are managed through the Authority's performance management system with the associated data being produced from the Asset Management Systems and external sources such as NHT (APSE). Performance Management is embedded in the contract with Via East Midlands and Appendix 1 contains a list of the indicators currently being measured, monitored and managed. Indicators monitor conditional aspects, response and timing, quality and service, providing a means to measure short and long-term performance.



A Roads



B & C Roads



Unclassified Roads

17. Benchmarking

Local and national benchmarking should be used to compare performance of the Asset Management Framework and to share information that supports continuous improvement.

Benchmarking is a systematic process of collecting information and data to enable comparisons with the aim of improving performance, both absolutely and relatively to others. It provides a structure to search for better practice in similar authorities that can then be integrated into an asset management approach.

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Selection of the benchmarking network is important in providing useful information. Its significance will be improved if partners have similar characteristics.

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17.1 - The Nottinghamshire Approach

17.1.1 - Midland Service Improvement Group

Nottinghamshire is fully engaged with MSIG which is a benchmarking group made up of individual authorities sharing innovation and good practice. Members exchange objective and subjective data on all areas of Asset Management from stakeholder satisfaction through to national road condition data.

17.1.2 - National Highways & Transportation Survey

The County Council annually supplies data to the NHT which serves to provide details on levels of customer satisfaction with local authority services and practices. This helps the Authority to target and publish information clearly and effectively to ensure members of the public and other highways stakeholders are as fully informed as possible about the current performance of the services.

17.1.3 - Department for Transport submissions

The Authority's annual submissions of condition data to the DfT gives it a clear indication of how the County Council's road network is performing relative to other authorities. This data is used to identify key areas for improvement.

The following table shows the performance of the county's road network for the period 2007 - 2017. This data is the Authority's annual performance submission to the Department for Transport. The table shows data for 'A' roads (Single Data List 130-01, formerly NI168) 'B' & 'C' roads (SDL 130-01, formerly NI169) and Unclassified Roads (BVPI - Best Value Performance Indicator 224b)

Nottinghamshire County Council - Highway Infrastructure Asset Management Plan

The table below shows the percentage of roads that require structural maintenance both countywide and at district level in each year.

Percentage of Carriageways requiring maintenance		2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
		% within Area	% within Area	% within Area	% within Area	% within Area	% within Area	% within Area	% within Area	% within Area	% within Area
A Roads	Countywide	1.5%	1.6%	1.5%	1.5%	1.9%	2.6%	1.7%	1.50%	1.20%	1.31%
	Ashfield	0.9%	1.1%	1.3%	1.2%	1.4%	1.4%	1.20%	1.19%	1.06%	1.17%
	Bassetlaw	1.0%	1.3%	1.0%	0.9%	1.9%	2.0%	1.00%	0.95%	0.78%	0.85%
	Broxtowe	3.6%	1.8%	2.3%	2.3%	3.2%	3.1%	2.90%	2.55%	2.23%	2.85%
	Mansfield	5.1%	3.0%	3.0%	3.2%	3.1%	8.0%	3.40%	2.88%	2.08%	2.20%
	Newark	1.4%	2.0%	1.1%	1.1%	1.3%	2.0%	1.30%	1.05%	0.67%	0.79%
	Gedling	1.0%	1.2%	2.5%	2.0%	1.7%	1.9%	2.20%	2.01%	1.71%	1.64%
	Rushcliffe	1.4%	2.2%	1.8%	1.9%	2.1%	2.0%	2.60%	2.01%	1.88%	2.13%
B & C Roads	Countywide	7.3%	8.4%	8.4%	7.5%	7.4%	9.7%	8.0%	4.06%	2.89%	3.22%
	Ashfield	8.0%	8.7%	7.6%	7.5%	7.2%	11.2%	10.08%	5.54%	4.12%	3.24%
	Bassetlaw	6.5%	8.8%	8.3%	6.6%	6.7%	12.3%	10.38%	4.29%	3.12%	3.40%
	Broxtowe	9.1%	9.8%	9.9%	8.6%	8.4%	12.8%	9.69%	4.57%	3.79%	3.57%
	Mansfield	2.5%	2.4%	3.5%	2.6%	2.8%	5.2%	5.08%	2.70%	1.75%	1.08%
	Newark	7.9%	9.6%	9.6%	8.0%	8.4%	8.8%	4.80%	3.88%	2.65%	3.50%
	Gedling	3.6%	4.6%	4.2%	4.4%	5.7%	6.5%	7.22%	2.80%	2.17%	2.29%
	Rushcliffe	7.7%	7.7%	9.0%	7.5%	7.0%	7.5%	6.50%	3.82%	2.58%	3.12%
Unclassified Roads	Countywide	15.7%	17.0%	19.5%	17.3%	18.7%	17.9%	20.8%	19.20%	20.70%	20.50%
	Ashfield	17.5%	17.5%	17.5%	7.2%	7.2%	7.2%	16.9%	17.30%	17.30%	14.70%
	Bassetlaw	15.6%	21.2%	21.2%	21.2%	24.8%	25.3%	25.3%	20.00%	19.80%	19.80%
	Broxtowe	14.3%	14.3%	14.3%	9.5%	9.5%	9.3%	15.1%	15.40%	15.40%	15.60%
	Mansfield	12.6%	14.3%	14.3%	15.0%	19.6%	19.9%	19.9%	13.30%	13.30%	13.30%
	Newark	18.3%	18.4%	27.2%	27.6%	27.6%	23.9%	23.7%	23.60%	27.30%	27.40%
	Gedling	15.3%	15.1%	15.1%	10.5%	11.3%	11.3%	22.5%	22.70%	22.70%	24.20%
	Rushcliffe	15.3%	15.3%	21.7%	21.7%	21.6%	19.1%	18.7%	18.70%	24.30%	24.30%
Overall Length of Carriageway Network Requiring Structural Maintenance	Countywide	11.5%	12.6%	14.1%	12.6%	13.4%	13.7%	14.4%	12.81%	13.36%	13.34%
	Ashfield	13.5%	13.7%	13.5%	6.6%	6.6%	7.5%	13.6%	12.83%	12.48%	10.57%
	Bassetlaw	10.3%	13.9%	13.7%	13.2%	15.3%	17.2%	16.5%	11.88%	11.40%	11.49%
	Broxtowe	12.2%	12.1%	12.2%	8.5%	8.6%	9.0%	12.8%	12.25%	12.10%	12.29%
	Mansfield	10.6%	11.6%	11.7%	12.2%	15.7%	16.8%	16.2%	10.84%	10.63%	10.59%
	Newark	13.3%	14.0%	19.0%	18.5%	18.7%	16.8%	15.1%	14.66%	16.20%	16.59%
	Gedling	9.7%	9.9%	9.6%	6.9%	7.6%	7.9%	14.3%	13.70%	13.50%	14.41%
	Rushcliffe	11.6%	11.7%	15.8%	15.3%	15.1%	13.8%	13.3%	12.31%	15.12%	15.33%

17.1.4 - Midlands Highways Alliance

Nottinghamshire's membership of the MHA helps it keep abreast of industry developments and to measure where the Authority is in terms of performance standards compared to its peers. It also allows for prudent procurement of goods and services and helps with achieving economies of scale for both. This is the first partnership of its kind in the UK which commenced in July 2007. The MHA delivers the regional procurement and implementation of highways maintenance, professional services and capital works through framework agreements.

17.1.5 - Highways Maintenance Efficiency Programme

The work of the HMEP has been at the cornerstone of all strands of highway maintenance activities. There are several guidance documents which give recommendations on the best way of delivering these services using Asset Management Principles. This document is itself founded on these recommendations which also tie-in very closely with the 2015-2021 DfT funding models (the Incentive Fund in particular) the new over-arching Approved Code of Practice and also the Whole of Government Accounting which calls for greater detail on asset inventory in future submissions. Ensuring that Nottinghamshire County Council has the HMEP guidance at the heart of the Authority's approach to highway maintenance now and in the future, will also ensure it is properly measured against all other local authorities for all development, programming and delivery operations.



17.1.6 – Asset Management Standards

The Authority recognises the need to attain and maintain a robust asset management approach and ensure this meets national industry standards. ISO 55000 is the international standard covering the management of physical assets. This BSI standard dovetails with Via East Midlands accreditations for quality management and health & safety and as such will be considered for future accreditation.

17.1.7 – APSE

Via East Midlands will continue to work with the Association for Public Service Excellence (APSE) as an effective means of benchmarking the company's performance in the delivery of highway maintenance management relative to other similar companies and highway authorities. This helps Via East Midlands identify where its strengths and weaknesses are and the company can continue to improve the quality of its services.

18. Asset Management Plan for: CARRIAGEWAYS

18.1 - Survey Strategy and Data Collection

Nottinghamshire County Council has developed a hierarchy / risk-based technical carriageway survey strategy in line with recommendations contained in the Code of Practice 'Well managed Highway Infrastructure'. This strategy considers asset management requirements as well as national reporting protocols.

18.1.1 - Survey Types

The condition data collection strategy utilises a range of survey types that are either digitally measured over short 10m sections and / or interpretive, based on a visual engineering observation of whole streets and routes either by high definition video or on-site survey. The network hierarchy has a large part to play in the selection of survey method and the subsequent maintenance strategy.

- **SCANNER** - These surveys use automated road condition survey machines to measure a range of road condition parameters including ride quality, rut depth, intensity of cracking, texture depth and edge condition. Measurements from SCANNER accredited machines are used to produce a national performance indicator (the SCANNER Road Condition Indicator) for reporting carriageway condition to the Department for Transport. Historically, the SCANNER survey produces the Government's Road Condition Indicator for the following:
 - **Single Data List Item 130-01** - Principal roads where maintenance should be considered.
 - **Single Data List Item 130-02** - Non-principal classified roads where maintenance should be considered.
- **Coarse Visual Inspection (CVI)** - This is a simple visual survey, usually carried out from a slow-moving vehicle, which previously allowed for around one third of the authority's unclassified road network to be assessed each year. A CVI survey is normally undertaken using the 'cross-sectional position' method, where the carriageway is assessed as a whole, and kerbs, footways and cycle-tracks are separately inspected for the left and the right of the carriageway. Historically, the CVI survey produces the Government's Road Condition Indicator for the following:
 - **BV224b** - Unclassified roads where maintenance should be considered.
- **Detailed Visual Inspection (DVI)** - This type of survey is more comprehensive than the CVI, with defects identified by a larger number of more detailed classifications. The DVI is a walked survey, and is typically targeted at lengths already identified as defective and potentially in need of treatment either by the CVI, the Annual Engineering Inspection (AEI) or from some other sources of information such as Highway Inspector's condition survey reports, enquiries or reactive maintenance records. The DVI records measured areas or lengths for a wider range of more closely defined defects (than for CVI), aggregated within short sub-sections, 20 metres in length by default. The defects collected for DVI are generally defined to a closer level of detail

than CVI. In order to ensure broad consistency between the two surveys a single CVI defect is normally equivalent to a number of DVI defects.

- **Annual Engineering inspection (AEI)** - Very similar to the DVI survey above but goes even further by prescribing specific treatment options over whole sections or routes to help identify the 'maintenance need', defined as: what treatment, if any, is required for the road in its current condition, whether that be preventative, patching, resurfacing or reconstruction. This type of survey is a key component in establishing lifecycle plans for both individual streets and at network level as it defines the estimated useful life of treatments and their relative costs.
- **SCRIM** - This type of survey was introduced in the early 1970s to provide a method of measuring the wet skidding resistance of the road network. The normal testing speed for the **S**ideways-force **C**oefficient **R**outine **I**nvestigation **M**achine is 50km/h and skidding resistance values for the nearside wheel track only (usually the location of the lowest skidding resistance) are generally recorded as the average for each 10m section. Historically, the SCRIM survey produces the Government's Road Condition Indicator for the following:
 - **Single Data List Item 130-03** - Principal road % with skid resistance at or below investigatory level.

18.2 - Maintenance Strategy

18.2.1 - Works Programming

Nottinghamshire operates a prioritised 'Candidate List' of potential sites based upon both their relative place in the network hierarchy and their current condition / treatment option.

Streets are initially grouped into their relative hierarchies. Streets or sections that are recorded as either 'as new' or 'up to standard', whilst still being recorded for lifecycle planning purposes, will not find themselves included on the Candidate List as this is primarily a prioritisation tool for scheme selection, whereas lifecycle planning looks at the useful life of treatments and the relative costs.

Broadly speaking, other than 'as new' or 'up to standard', streets will fall into one of three condition bands, each having its own suite of potential treatments:

Surface Deterioration (non-invasive)

This refers to those streets where the structural integrity remains, possibly even the 'shape' of the road and the ride quality are generally acceptable but the surface itself is beginning to deteriorate. Either it is 'polishing up' and becoming potentially slippery or it is 'ravelling' where the aggregate (stone chippings) is coming away (stripping) from the road surface. This triggers a range of lower cost preventative treatments where by timely intervention means the road can be halted from falling into the next condition category. The range of preventative treatments include:

- **Surface Dressing (with minimal pre-patching if required)** - Surface dressing is an extremely cost-effective way of maintaining a road. It restores skidding resistance and seals the road surface to prevent water ingress. Hot bitumen is sprayed onto the road and chippings are then applied and rolled in. The road is then swept to remove excessive chippings.
- **Micro-Asphalt** - Ideal for use where the existing surface is not suitable for surface dressing because of extensive patching requirements, rutting, failed repairs or extensive utilities work. It also provides an alternative where surface dressing would be considered unsuitable, such as in some populated urban areas. Micro-Asphalt reduces road noise and can regulate the surface sufficiently to improve ride quality.
- **Re-Texturing** - Generally used over smaller areas, this method involves the high-pressure firing of water or ball bearings at the road surface to remove excess bitumen and restore the surface texture, improving skid resistance.
- **High Friction Surfacing** - Also known colloquially as 'anti-skid' surfacing. This is the red or buff coloured surfacing usually seen at approaches to junctions, roundabouts, pedestrian crossings and other hazards to improve grip in braking zones.

Resurface (semi-invasive)

This is generally a semi-structural condition caused by a failure of the carriageway's surface layer, usually around 40mm deep. It can take the form of cracking either in the wheel tracks or across the whole surface or wholesale stripping away of the surface aggregates. Extensive pothole repairs or reactive patching may leave a road in need of a full surface course replacement or larger areas of patching. The major structure of the road remains intact and there would be no obvious signs of rutting or failures in the lower layers. Treatment options include:

- **Full resurfacing** - A full replacement of the surface course layer using a suitable material relative to the existing construction of the road and its level of use.
- **Patching** - If the surface course damage is restricted to isolated areas it may be cost effective to carry out large areas of patching rather than wholesale resurfacing. This often hinges upon the economies of scale but is an option if enough of the existing surface remains of an acceptable standard. In cases such as this, the site goes onto a 'watch list' as pre-cursor to surface dressing or micro-asphalting before either the edges of the patching begin to show signs of wear or the original untreated begin to deteriorate.



Reconstruction (highly-invasive)

These are the roads that are generally in the worst condition and have reached the end of their 'useful-life'. There will be signs of structural failure in at least the top two layers and possibly deeper still. Evidence would be 100mm deep potholes or severe rutting. Traditionally, a 'worst-first' approach to highway maintenance had authorities concentrating solely on roads in this category whilst not fully addressing those sites which could be prevented from falling into a similar condition and hence the cycle was repeated over numerous years. The most important aspect for roads in this condition category is that they are kept safe until a longer-term repair can be carried out. As it is, Nottinghamshire accepts that a certain number of these sites do need to be addressed every year and so the prioritisation of such sites becomes ever more paramount to ensure they are considered objectively.

18.3 – Future Programming & Life Cycle Planning

18.3.1 - Future Programming

Using the 'Horizons Analysis' software from Yotta, the Authority has created a Candidate List or 'needs' list based upon projected asset condition (Deterioration Modelling) against costs and agreed levels of asset performance. To maximise the benefits, it is possible to create a multi-year programme, though the ability to be prescriptive diminishes the further into the future you go. Therefore, a candidate list rather than a defined programme has been developed which is banded based on likely short, medium and longer-term maintenance objectives. This is not a rolling programme as it is recognised that annual deterioration can manifest in different ways and these are assessed as part of an Annual Engineering Inspection (AEI), with an 'in year' programme developed based on current condition each year.

This forms part of an annual cycle, which starts in the previous year, using network condition data and the AEI to develop an early programme from July onwards, consisting of sites where maintenance should be considered. These sites are further reviewed for feasibility and extent information, to define a programme that is endorsed by committee in the autumn to allow more detailed feasibility design to be undertaken. Final approval for the resulting following years programme is given in March ready for the start of the next financial year.

This approach is supported by condition data from several years of survey and used to carry out deterioration modelling on roads of similar hierarchy and usage, thereby predicting their likely condition in future years. This is a better method than prescribing specific treatments as it allows engineers to employ local knowledge when considering treatment types based upon unique site conditions and the overall transport dynamic of the local area.

The longer-term programming considers factors and assets other than simply road condition data and draws on proposed sites for footways, cycleways, structures and street lighting maintenance. This is moulded into a 'whole street' approach as far as possible where as much asset maintenance as is practicable can be undertaken together, within the same location, thereby reducing the need for repeated traffic management, particularly on critical junctions and primary routes.

The strategy is to maintain the road condition KPI at or below the target value, whilst increasing the level of preventative maintenance to roads which are at the earlier stages of deterioration through treatments such as surface dressing. This will see an increase in the overall annual surface dressing programme, whilst leaving certain roads toward the end of their serviceable life in a safe and stable condition. Catching roads before they substantially deteriorate will ultimately result in an improvement in overall road condition across the network through this redirection of funding.

18.3.2 - Life Cycle Planning

Lifecycle Planning depends on a comprehensive understanding of the condition of sites across the whole network and the nature of treatment required (if any) plus associated costs and estimated lifespan. By dividing the requirements of sites on the network into three distinct treatment bandings the County Council builds up a database of 'maintenance needs' at a network level.

- Surface treatment required – Non-invasive.
- Resurfacing required – Semi invasive (40mm).
- Reconstruction required – Highly invasive (100mm+).

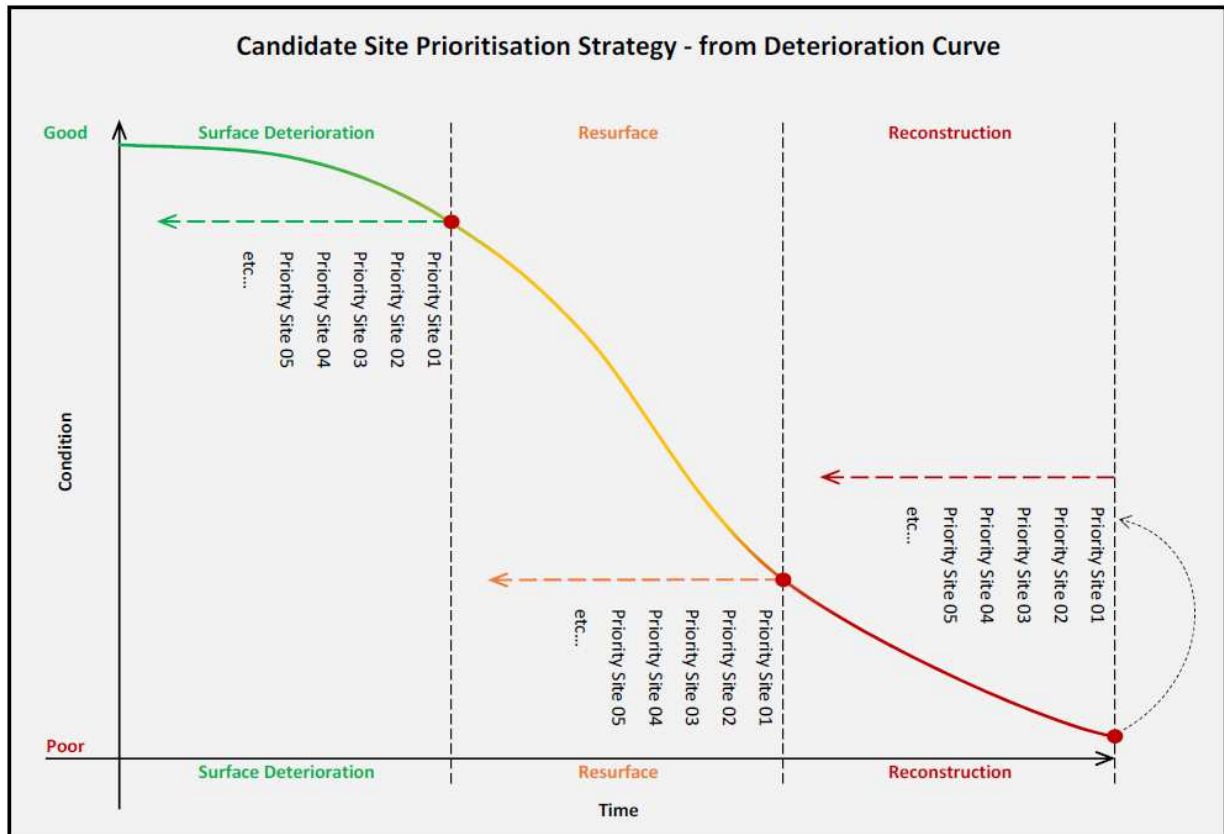
This directly links with the overall Maintenance Strategy, as covered in an earlier section. It allows the Authority to determine the estimated cost of the required treatment, coupled with the expected lifespan before secondary, tertiary and even longer-term treatments are required. By matching these condition bands and treatment costs against the relative positions in the network hierarchy, it is possible to model maintenance funding allocations to target those parts of the network where the need is greatest both from a 'worst-first' and an 'Asset Management' perspective.

18.3.3 – Candidate List

Once these sites have been grouped into their respective condition / treatment bands they are subsequently prioritised to establish which are the most critical, as in, which are most likely to 'tip-over' into a more invasive (and hence, costlier) condition band the soonest.

The Candidate List is developed using condition data derived from the Network Technical Surveys but also feedback from the Highway Inspectorate who are the 'eyes and ears' on the ground, being aware of local community concerns and utilising engineering judgement on whether a street section is in need of future capital investment or whether it can be maintained through standard reactive maintenance techniques.

The graph below illustrates this methodology.



The prioritisation methodology takes into account numerous factors:

- Technical Survey Data
- Network Hierarchy
- Area Highway Engineer input
- Highway Inspector Condition Reports
- Structures Input
- Accident Investigation Unit input
- Elected Member requests
- Public & Media reporting
- Third-Party input from:
 - Public Utilities
 - Emergency Services
 - Environment Agency
 - Department for Transport (Government) directives
 - Other key stakeholders

18.4 - Reactive Maintenance

The Highway is routinely inspected as part of a planned inspection regime detailed in The Highway Inspection & Risk Manual with inspections being carried out at a set of frequencies (Monthly, 3-Monthly, 6-Monthly, Annually) that are based upon network hierarchy. This, combined with the Customer Relations process results in all inspections being undertaken by the area Highway Inspector. Observed defects which meet the investigatory 'trigger' level are considered for repair and a response time allocated dependent upon a risk assessment as outlined in the [Highway Inspection & Risk Manual](#).

As part of the planned inspection regime there is an in-built conditional survey which allows the Highway Inspector to highlight sites that are displaying signs of deterioration into one of the three condition bands as described above. These sites are then further reviewed as part of the inspection management process, added to the Candidate List and form part of the AEI.



19. Asset Management Plan for: FOOTWAYS and CYCLETRACKS

19.1 – Survey Strategy and Condition

Nottinghamshire County Council has developed a hierarchy / risk-based technical footway survey strategy in line with recommendations contained in the Code of Practice 'Well managed Highway Infrastructure'. This strategy takes into account asset management requirements as well as national reporting protocols.

19.1.1 - Inventory

Footways: Previously the County Council commissioned a Footway Network Survey (FNS) of the entire county. This not only gave the authority some baseline condition data across the entire footway network, it has also been useful in identifying missing 'remote' footways that were not included in earlier inventories, for example, those which connect streets and locations over longer distances and often across open spaces or between existing housing or industrial developments.



Cycleways: The DfT is putting greater emphasis on the asset management of cycleways and Nottinghamshire County Council is continually enhancing its existing inventory of both on-street and off-highway cycle-tracks using data gathered from highway inspections, technical surveys by third parties and in-house improvement programmes.

19.1.2 - Condition

In 2011/12 the County Council commissioned the FNS of the entire county. This served to give the authority a 'baseline' data set of the overall condition of the county's footways. The condition data is split into four generic categories:

- As New
- Aesthetically Impaired
- Functionally Impaired
- Structurally Unsound

The data at that time revealed that overall, the highest category footways were generally in better condition than those in a lower hierarchy.

The strategy for condition identification moving forward involves utilising observations made by Highway Inspectors as part of their everyday safety and enhanced inspections across the entire network. The County Council uses this



reporting mechanism to feed in to the selection process for footways to be included in annual maintenance programmes.

This process involves the identification of potential sites which are subsequently reviewed by engineers, treatment type agreed with extents and these sites then take their place on the Candidate List for potential inclusion based upon hierarchy / priority and actual usage.

19.2 - Maintenance Strategy

19.2.1 - Works Programming.

Nottinghamshire operates a prioritised 'Candidate List' of potential footway & cycleway sites as well as carriageways based upon both their relative place in the network hierarchy and their current condition / treatment option.

Footways & Cycleways are initially grouped into their relative hierarchies. Those that are recorded as either 'as new' or 'up to standard', whilst still being recorded for lifecycle planning purposes, will not find themselves included on the Candidate List as this is primarily a prioritisation tool for scheme selection, whereas lifecycle planning looks at the useful life of treatments and the relative costs.

Broadly speaking, other than 'as new' or 'up to standard', footways & cycleways will fall into one of three condition bands, each having its own suite of potential treatments:

Aesthetically Impaired - Surface treatment required – Non-invasive.

This refers to those streets where the structural integrity remains, possibly even the 'shape' of the footway / cycleway is generally acceptable but the surface itself is showing early signs of beginning to deteriorate. Either it is becoming slippery or it is 'ravelling' where the aggregate (stone chippings) are coming loose from the surface, also a potential slipping hazard. This triggers a range of lower cost preventative treatments whereby timely intervention means the site can be halted from falling into the next condition category.

Slurry Sealing - An extremely cost-effective way of maintaining or restoring the surface texture of footways. Slurry sealing can repair imperfections and seal footway surfaces to prevent fretting caused by loss or ageing of the binder. It is semi self-levelling and is spread by hand using squeegees. It provides an even and consistent surface free from trip hazards.



Functionally Impaired – Overlay required – Semi invasive (20mm).

Overlays - These are best used when there is capacity within the cross-section of the footway for the use of an overlay surface without causing a pronounced camber on the footway. Usually best saved for when there might be a small vertical edge at the rear of the kerbing and / or a negative profile (a 'u' shape rather than an 'n' shape) where the surface can still be restored without excavation. There is a partially-invasive version which involves cutting away a strip of footway immediately to the rear of the kerbing (keying-out) followed by the overlay which won't then sit higher than the kerbs themselves.

Structurally Unsound – Reconstruction required – Highly invasive (60mm+)

These are the footways & cycleways that are generally in the worst condition and have reached the end of their 'useful-life'. There will be signs of structural failure in at least the top two layers and possibly deeper still. Evidence would be potholes at investigatory level or severe rutting (possibly from vehicle over-riding) Traditionally, a 'worst-first' approach to maintenance had authorities concentrating solely on footways and cycleways in this category whilst not fully addressing those sites which could be prevented from falling into a similar condition and hence the cycle was repeated over numerous years. The most important aspect for footways & cycleways in this condition category is that they are kept safe until a longer-term repair can be carried out. As it is, Nottinghamshire accepts that a certain number of these sites do need to be addressed every year and so the prioritisation of such sites becomes ever more paramount to ensure they are considered objectively based upon their usage.

19.3 – Future Programming & Life Cycle Planning

19.3.1 - Future Programming

A candidate list rather than a defined programme has been developed which is banded based on likely short, medium and longer-term maintenance objectives. This is not a rolling programme as it is recognised that annual deterioration can manifest in different ways and these are assessed as part of the AEI, with an 'in year' programme developed based on current condition each year.

This forms part of an annual cycle, which starts in the previous year, using network condition data and the AEI to develop an early programme from July onwards, consisting of sites where maintenance should be considered. These sites are further reviewed for feasibility and extent information, to define a programme that is endorsed by committee in the autumn to allow more detailed feasibility design to be undertaken. Final approval for the resulting following years programme is given in March ready for the start of the next financial year.

In general, footways in the upper hierarchies will generate maintenance schemes on their own, those such as Primary Walking Routes and shopping centres.

This will not always be the case but the County Council looks to raise the priority of footways which meet the criteria for more than a localised repair and are alongside carriageway schemes which are already in the forward works programme.



This will form part of a 'Whole Street Approach' to highway maintenance whereby, having an indicative multi-year maintenance programme helps the authority to consider other works which can be co-ordinated to take place concurrently or in a prescribed order to cut down on traffic management costs and repeat visits to the same site.



This can apply to both internal works such as lighting column replacement or drainage and external works such as utility plant maintenance or replacement.

19.3.2 - Life Cycle Planning

Lifecycle Planning depends on a comprehensive understanding of the condition of footway and cycleway sites across the whole network and the nature of treatment required (if any) plus associated costs and estimated lifespan. By dividing the requirements for footways and cycleways on the network into three distinct treatment bandings the County Council builds up a database of 'maintenance needs' at a network level.

- Aesthetically Impaired – Surface treatment required – Non-invasive.
- Functionally Impaired – Overlay required – Semi invasive (20mm).
- Structurally Unsound – Reconstruction required – Highly invasive (60mm+)

This directly links with the overall Maintenance Strategy, as covered in Section 19.2 above. It allows the Authority to determine the estimated cost of the required treatment, coupled with the expected lifespan before secondary, tertiary and even longer-term treatments are required. By matching these condition bands and treatment costs against the relative positions in the network hierarchy, it is possible to model maintenance funding allocations to target those parts of the network where the need is greatest both from a 'worst-first' and an 'Asset Management' perspective.

In the case of footways and Cycleways the same principal applies, although the condition bands and treatment options vary. For example, footways are generally maintained using a surface preventative treatment or are replaced. Along with historic Footway Network Survey data, these are now identified for further survey as part of the inspection regime which produces an overview of the condition of footways and cycleways across the county based upon the condition bands as described in section 19.2 above:

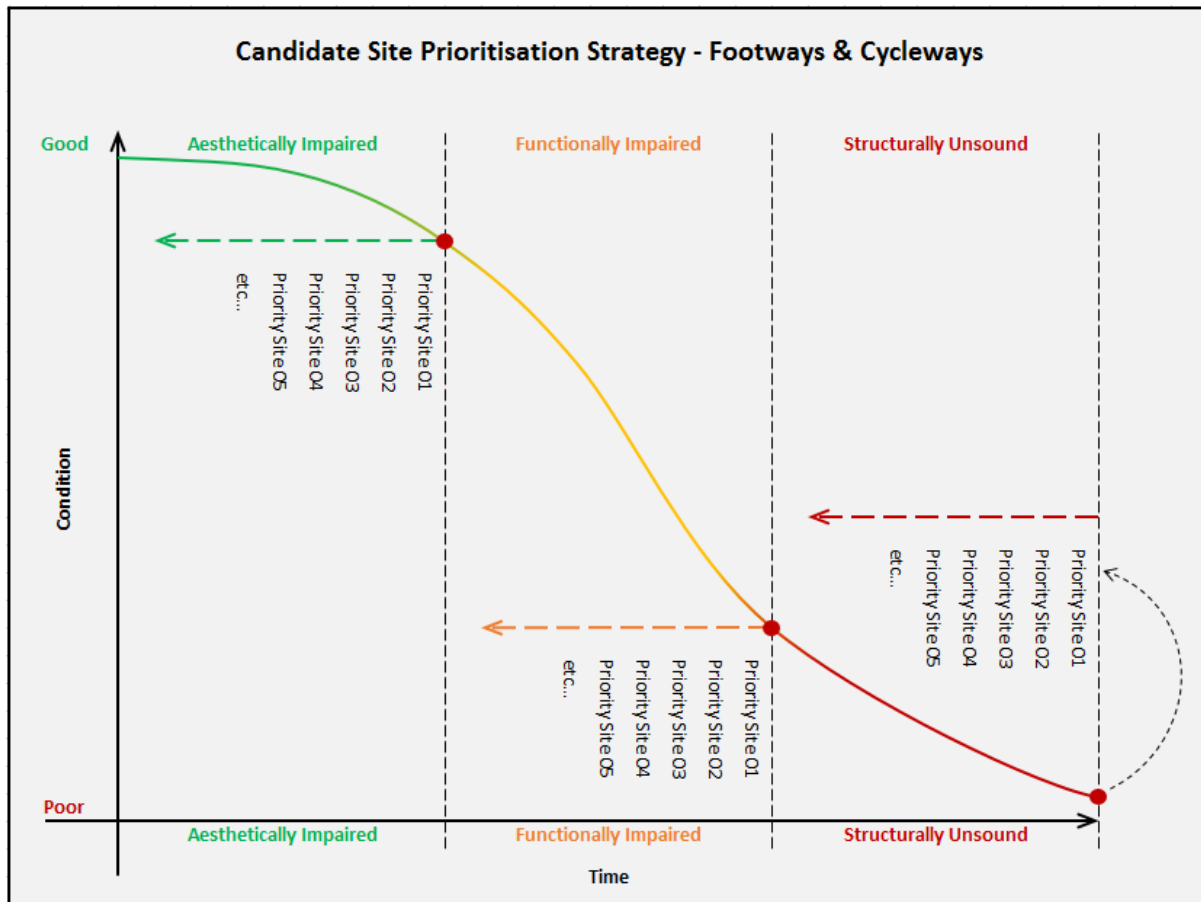
- As New
- Aesthetically Impaired
- Functionally Impaired
- Structurally Unsound

This data is utilised for the County Council's annual Whole Government Accounting submission where the 'maintenance need' for footways in the four condition bands is calculated and costed.

19.3.3 - The Candidate List

Using the same principles as with carriageways, these footway & cycleway sites are grouped into their respective condition / treatment bands and are subsequently prioritised to establish which are the most critical, as in, which are most likely to 'tip-over' into a more invasive (and hence, costlier) condition band the soonest.

The graph below illustrates this methodology.



The prioritisation methodology considers numerous factors which are broadly aligned with those considered when carriageway sites are assessed either as stand-alone sites or alongside existing prioritised works. These factors are not always directly relevant to footways in isolation but when considered alongside carriageways they create a fuller picture. These factors include:

- Technical Survey Data
- Network Hierarchy
- Area Highway Engineer input
- Highway Inspector Condition Reports
- Structures Input
- Accident Investigation Unit input
- Elected Member requests
- Public & Media reporting
- Third-Party input from:
 - Public Utilities
 - Emergency Services
 - Environment Agency
 - Department for Transport (Government) directives
 - Other key stakeholders

19.4 - Reactive Maintenance

The Highway is routinely inspected as part of a planned inspection regime detailed in The Highway Inspection & Risk Manual with inspections being carried out at a set of frequencies (Monthly, 3-Monthly, 6-Monthly, Annually) that are based upon network hierarchy. This, combined with the Customer Relations process results in all inspections being undertaken by the area Highway Inspector. Observed defects which meet the investigatory 'trigger' level are considered for repair and response time allocated dependent upon a risk assessment as outlined in the [Highway Inspection & Risk Manual](#).

As part of the planned inspection regime there is an in-built conditional survey which allows the Highway Inspector to highlight sites that are displaying signs of deterioration into one of the three condition bands as described above. These sites are then further reviewed as part of the inspection management process, added to the Candidate List and form part of the AEI.



20. Asset Management Plan for: STRUCTURES

20.1 - Inventory

Nottinghamshire's Highway Structure asset is made up of:

- River Bridges, Road Over Road Bridges, Canal Bridges and Railway Bridges;
- Other Smaller Bridges defined as structures with a span equal or greater than 3m crossing streams and other small obstacles;
- Subways;
- Culverts defined as structures with spans greater than 0.9m and less than 3m;
- Highway Footbridges (excludes rights of way bridges);
- Retaining walls greater than 1.37m; and
- Overhead sign gantries

The table below contains details of the number of assets by road hierarchy. There are also a small number of reinforced earth embankments and sign and signal gantries which fall within the Highway Structures inventory. The bridge and culvert stock is made up of a mix of masonry, concrete and steel construction types in an approximate split of 45%, 45% and 10% respectively. The retaining walls are nearly all constructed in either masonry or concrete.

Nottinghamshire's Highway Structures Stock			
Type	Principal Highways	Non-Principal Highways	Total
	A&B Class Roads	C Class & below	
River Bridges	50	65	115
Over Road Bridges	12	5	17
Canal Bridges	15	13	28
Railway Bridges	22	7	29
Other Small Bridges	62	115	177
Subways	12	13	25
Culverts 1.5m - 3.0m	80	232	312
Culverts 0.9m - 1.5m	90	237	327
Footbridges	9	13	22
Retaining Walls	72	87	159

20.2 - Condition

The condition of the County's structures is assessed through an inspection regime and scored using the ADEPT National Bridge Condition Indicator (BCI) system. There are five different types of inspection used as described in the table below. The inspections are carried out by the Councils own in-house Inspectors and Engineers except for underwater and confined space inspections, where specialist divers and confined space inspectors are employed.

The programme of inspections is determined from the inspection frequency cycle which generally follows the recommendations of the Management of Highway Structures Code of Practice.

NOTTINGHAMSHIRE'S HIGHWAY STRUCTURES INSPECTION REGIME		
Inspection	Description	Frequency
General	Remote visual inspections	2 years
Principal	All elements are inspected within touching distance	Railway / Major River – 6 years Other bridges, Subways, Culverts and Retaining Walls – 9 or 12 years if risk assessment allows, otherwise 6 years
Confined space / Underwater	Confined space and underwater inspections using specialist services/divers	Every 6 years for confined space structures and every 3 years for underwater inspections and after a major flooding event
Special	For specific requirements – i.e. following vehicle impact, monitoring defects / weak bridges / scour vulnerable bridges	As required
Superficial	Similar to General but for private bridges on the highway network as a duty of care e.g. railway bridge over highway	2 years

The data produced and information gathered during both general and principal inspections enables completion of inspection pro forma for determination of the Bridge Condition Indices (BCI). An overall score for the whole bridge stock can be determined using this measure and is useful for tracking overall condition and identifying structures in poor condition. This data is utilised for the County Council's annual Whole Government Accounting submission via the Atkins Structures Toolkit.

The Inspection data and spatial location data for highway structures is stored on Nottinghamshire's Highway Asset Management System - 'Confirm'.

In addition to the production of a principal inspection report, a strength assessment review is also undertaken. This allows the current condition of the bridge to be taken into account in the assessment review. The code of practice recommends a strength assessment review should be carried out at least every 12 years. The assessment review is undertaken at same time as the principal inspection so every 6, 9 or 12 years depending on the risk based assessment frequency cycle. The assessment review also includes for abnormal load vehicles in accordance with BD86.

20.3 - Level of service

The desired condition of the asset is not currently defined by any specific standard. The BCI rating system implies that the desired bridge stock condition should be somewhere in the categories 'good' to 'very good', scores between 80 -100 (>90 = very good). The County Council is therefore working on the basis that the desired strategy subject to funding would be to move bridge stock condition into the 'very good' category for both critical and average indicators and then to maintain it at that level.



There is no condition intervention criteria as such except when there is a risk posed to the public. In this case actions are triggered to make the structure safe and to carry out repair work. This is usually associated with emergency repairs to parapets and safety fencing following traffic accidents.

20.4 - Future demands

All of Nottinghamshire's highway structures will need to meet the increasing demands of the highway network in terms of the overall objectives of network safety, sustainability and serviceability. Specific future demands related to highway structures, include the following:

- Maintain structures in a condition to continue to carry the 40/44t vehicles and improve the capacity where traffic demands make this necessary
- Improvements in safety
- Identify and ensure structures on critical network links particularly single access are regularly inspected and well maintained

20.5 - Routine and 'steady state' maintenance

Routine maintenance activities can be classed as cyclic work and tend to be carried out on an annual basis with the timings based on historical experience. Steady state maintenance is carried out to maintain the condition of the structure by protecting it from deterioration or slowing down the rate of deterioration. Maintenance work carried out can include:

- Vegetation removal – typically carried out as a works package before the start of the bird nesting season.
- De-silting culverts, clearing grilles and cleaning out drainage systems typically carried out before winter (partly carried out by District Councils and Internal Drainage Boards).
- Work packages for masonry and concrete repair work are issued every year using defect information stored on the bridges database. This type of work forms a significant part of steady state maintenance as the majority (approximately 90%) of the bridge stock is either masonry or concrete. Repair work is prioritised using current BCI scores however road hierarchy, location and access are also taken into consideration.
- A small annual bridge painting contract is let every year for painting small items such as steel parapets.
- The County also has 10 major steel structures and a major maintenance bridge painting contract is arranged every one to two years.

Reactive maintenance is usually emergency work and is dealt with urgently on the grounds of safety such as emergency repairs following a bridge strike. Essential maintenance work can also be reactive and occurs when major repairs are identified and must be carried out quickly before the structure becomes unsafe. A good routine and steady state maintenance programme reduces the likelihood for essential maintenance.

20.6 - Upgrading / Renewal / Replacement

Upgrading work is identified usually by desk top study. A parapet protection and improvement study was carried out some years ago to identify work for bridges on the A and B classified roads including vehicle incursion protection measures on road over rail bridges. A programme of improvement of work is close to completion.

Other upgrading work includes provision and/or replacement of bridge waterproofing systems. A bridge waterproofing programme for concrete bridges has been undertaken and is close to completion. There are also masonry arch bridges suffering freeze thaw damage by water penetration through the fill. Concrete saddle or over-slabbing and waterproofing is an effective option for slowing down deterioration and extending the serviceable life. This has already been carried out in-conjunction with strengthening work, however, a programme of waterproofing work is now being developed for arch bridges suffering freeze thaw damage that don't necessarily require strengthening.

A desk stop study to identify scour risk bridges is complete and scour risk assessments in accordance with BD97 are in progress with a programme of protection and improvement work under development.

Renewal and replacement work is carried out when a structure or an element of a structure (expansion joints and bearings) reaches the end of their serviceable life. There are around 600 county owned culverts (0.9m to 3m span) and an average of 3 a year should be replaced if a 200-year life span is assumed. Many culverts inspected are considered to be beyond their serviceable life and/or are difficult to gain safe access to repair. At the time of publication, approximately 40 culverts have undergone replacement, infilling or strengthening countywide since 2008. New schemes are identified through the inspection process. Culvert replacement is sometimes not an option due to Traffic Management issues and maintaining a free-flowing network, which can lead to a major repair strategy rather than full replacement.

20.7 - Creation / Acquisition

The creation of bridges by the County takes place as part of new road schemes. In recent years there have been a total of 8 bridges, 6 culverts and 3 retaining walls created on the A617 Mansfield Ashfield Regeneration Route, A612 Gedling Integrated Transport Scheme and the Gresham Park Schools Development in West Bridgford.

Highways structures are sometimes acquired through the adoption of highways following housing and industrial developments. Normally the developer is charged a commuted sum to pay for future maintenance liabilities. Recent construction of the Newark Southern Link Road Phase 1 and future construction of Phase 2 as part of the infrastructure improvement for construction of circa 3000 houses in Newark will add further highway structures to the inventory.



Bridges have also been acquired in the past from Rail Property Board and from the Highways Agency. The authority acquired approximately 30 bridges following de-trunking of the A57, A614, A17, A60, and A606 in 2002.

As part of the hand over process principal inspections are required to ensure any outstanding maintenance issues are rectified before formal adoption.

20.8 – Disposal

Bridges can become redundant, for example after closure of railway lines, or when watercourses change direction or dry up. Subways can also become redundant because the public prefer not to use them or because a suitable crossing at road level is available. More recently underfilling rather than demolition has become preferable because there is less disruption to traffic.

20.9 - Forward works programme

The majority of future works are planned up to two years ahead with advanced design and planning work undertaken a year ahead. This allows works to be ordered early in the new financial year, taking advantage of the spring, summer and autumn months.

Five year programmes of work are currently being developed on arch bridge waterproofing, scour protection, major bridge maintenance painting and culvert replacement.

This will co-ordinate with developing multi-year indicative capital works programme for carriageways, footways, lighting and other assets as part of a 'whole street' approach to future maintenance, reducing the occurrence of repeated road closures or restrictive traffic management arrangements.

20.10 - Asset Management Toolkit

Nottinghamshire has adopted the use of the 'Structures Asset Management Planning Toolkit' developed by Atkins alongside the Department for Transport. This Excel-based toolkit supports bridge engineers and managers in their management and other related activities, for example, financial planning, prioritisation of needs, lifecycle planning and asset valuation.

The most recent version of this toolkit, released in June 2014, primarily focuses on long-term asset management and financial planning and asset valuation/depreciation for highway structures.

The objectives of the toolkit, and the requirements and principles that underpin it are:

- To clearly explain the overall methodology and supporting rationale;
- To identify the data and supporting information, i.e. rule sets and algorithms, required to support the methodology and functional specification;
- To ensure the methodology and the functional specification are standalone and independent of any computerised tool, thereby enabling the toolkit to be adopted by different commercial software/systems;
- To enable the methodology, where appropriate, to be adopted in part or in whole to suit the functionality of different commercial software/systems;
- To clearly define the minimum requirements of the methodology and functional specification;
- To enable the methodology and functional specification, where appropriate, to be applied so that the minimum requirements are met by the analysis.

The Structures Asset Management Planning Toolkit' is currently being used for determination of Gross Replacement and Depreciated Replacement Costs (GRC and DRC).

The Life Cycle Planning aspect of the toolkit is not currently being used as a review of the maintenance and depreciation rates stored in the tool kit is required.

Maintenance programmes are currently being developed from information gathered from the inspection process and targeted to where it is needed.

21. Asset Management Plan for: HIGHWAY LIGHTING and TRAFFIC MANAGEMENT SYSTEMS

21.1 - Current Strategy for Highway Lighting

There are approximately 94,000 street lights in Nottinghamshire at the present time. There is an ongoing LED replacement programme for the entire stock of low pressure sodium (SOX) lighting. This programme is expected to be complete by 2020, and will result in approx. 40,000 new lanterns being fitted. LED's will dim between the hours of 10pm-7am unless the area has a history of night time accidents or high crime rates.

LED's are on average 60% more efficient than SOX lanterns, so their use is heavily reducing energy & carbon usage by the authority.

The LED lanterns have an expected lifespan of approximately 25 years, although general maintenance will be required and this will be built in as part of a 6 years electrical testing programme in future. A reduction of faults has already been noticed within the areas where the LED conversions have taken place.

The Authority also runs an annual Column Replacement Programme (CRP), which replaces life expired columns, based on their condition. This programme is put together using the knowledge of dedicated Lighting Maintenance Engineers. The CRP not only targets columns in the poorest condition but also dovetails with the SOX replacement programme. In this way, columns are also targeted on their ability to be fitted with LED lanterns. Non-standard column types such as cast iron are not conducive for refitting. If these types of column are replaced in conjunction with the SOX replacement programme then the whole area can effectively be changed, leaving no small pockets that are out of sync with the rest of the area.



An electrical test and visual condition check is carried out at the same time as the lantern refit.

The Authority also has a programme of Bulk Clean and changing its stock of high pressure sodium (SON) lamps with a new lamp that has a 6-year warranty. Any SOX lanterns that need replacing under reactive maintenance are also being replaced by LED ones.

21.2 – Proposed Future Highway Lighting Strategy

Once the SOX replacement programme has been completed it is proposed to start replacing the older SON lamps with LED lanterns. All SON lamps are expected to become LED by 2025.

As the LED stock of the Authority increases over the coming years, the number of lighting faults will steadily fall. Over this period the funding normally associated with reactive repairs may be redirected towards column replacement where much of the Authority's stock is already over 20 years old.

The Authority has an aging column stock which will continue to deteriorate over the lantern replacement period. As new LED lanterns will have been fitted to virtually all of the Authority's stock, column replacement will then involve refitting the existing LED lanterns back onto the new columns.

The rapid development in the LED street lighting industry has resulted in longer lifespans when compared to traditional lanterns. Combining this with the new 50 year columns will reduce future maintenance requirements enabling an area by area 6-yearly cycle of works to be established.

Testing regimes are also co-ordinated to require fewer visits. The electrical testing is undertaken every 6 years, drivers will be replaced every 12 years and the lantern replaced every 24 years. This rolling 6-year cycle results in a programmed testing and replacement regime. The co-ordination of routine but necessary maintenance gives a more efficient use of funding, reduces energy, carbon and street lighting faults and will improve the over-all asset for the County Council.

21.3 – Current Strategy for Traffic Signals

There are currently 419 traffic signal installations in Nottinghamshire, covering junctions, standalone pedestrian facilities, tram operation and traffic control for emergency service call-outs. This does not include Trunk Road installations within the County.

There is a high proportion of real time control in the form of MOVA and SCOOT, together with the use of on-crossing and kerbside detection to assist pedestrian movements and minimise vehicle delays and congestion.

As a matter of course, extra low voltage equipment and LED lamps have been routinely installed for several years, for both safety and energy reduction reasons.

As an integral part of the design process, all new installations and refurbishments are considered in future maintenance terms, in accordance with CDM Regulations. This is to minimise the risk to operatives from passing vehicles and working at height, minimise on-site operational time and to reduce the need for Traffic Management. Where practicable, demountable pole base sockets are used – this allows replacement poles to be installed with minimal delay, which is highly beneficial on a network dealing with high volumes of traffic.

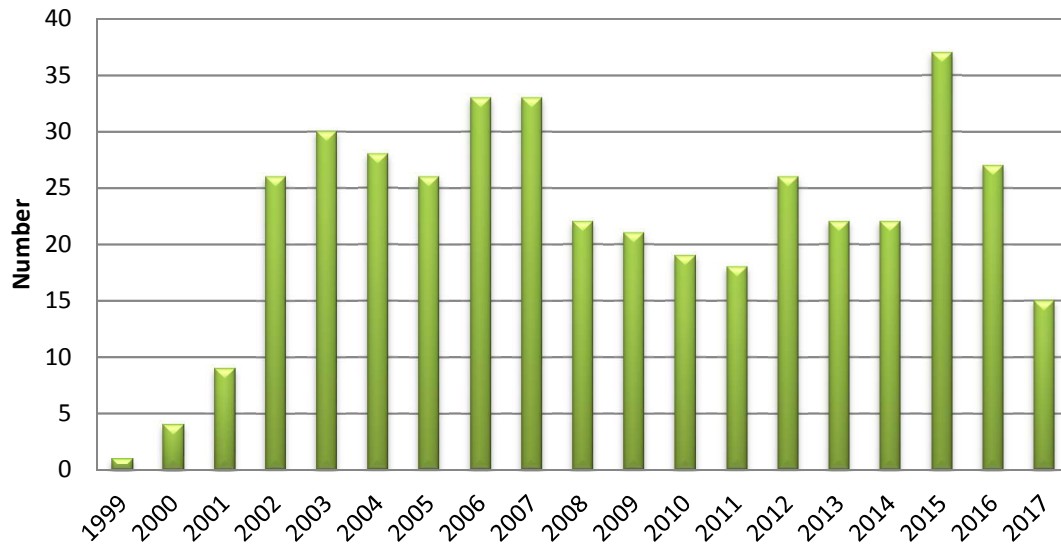


There is also a programme of replacing traditional multi-point circuits to individual Controllers with internet based communication. This allows the same level of control needed for real time operation but ALSO significantly reduces communication costs.

All installations are subject to periodic electrical and condition inspection and all are remotely monitored. In this way, faults are automatically passed through for repair.

There is a dynamic programme for the refurbishment / replacement of traffic signal equipment and whole installations. This is based on information from the Periodic Inspections reports, visual condition, maintenance activity records and Traffic Signal Engineer input.

The graph below shows the number of traffic signal sites by their year of implementation or last refurbishment.



21.4 – Proposed Future Traffic Signals Strategy

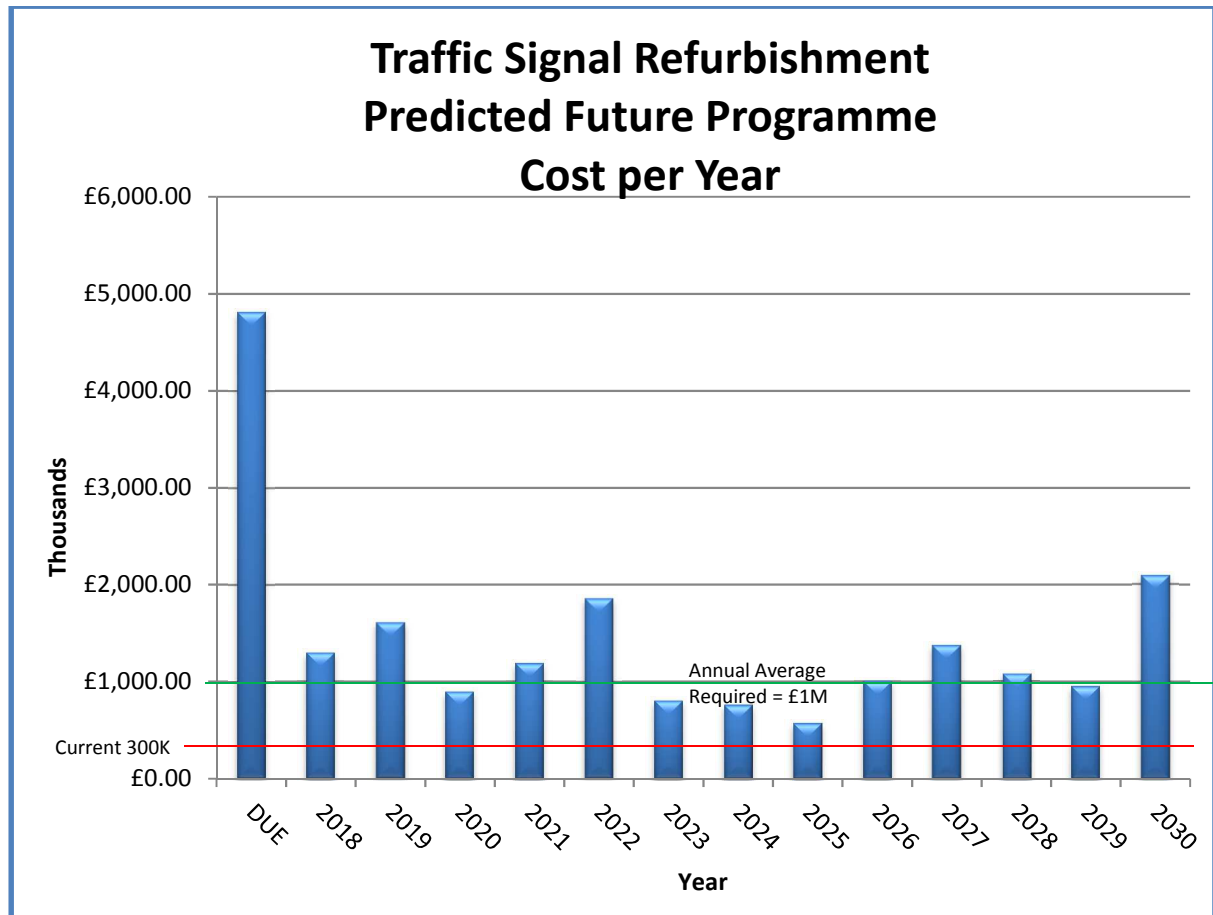
The upgrade of the Fault Management System (FMS) to a cloud-based system has enabled all the different parties involved in the fault management process to be more fully integrated, with faults being able to be very quickly reassigned to the most appropriate service provider. Fault times are assessed against performance criteria, and site history is instantly available to prevent false call-outs or multiple visits. All faults can be directly accessed, and cleared, on site via tablet / smart phone, and relevant data such as site plans, operational drawings, data sets, can also be accessed and downloaded ie: new MOVA / SCOOT data sets.

A combination of enhanced fault handling, the design process and improved infrastructure / equipment means that future maintenance requirements are minimised, thereby providing reduced risk to operatives, less 'down time' for installations, less disruption to the travelling public, reduced Traffic Management requirements, reduced maintenance costs and, ultimately, giving some potential to increase the life expectancy of traffic signal installations. Communication costs will also continue to be reduced by the extended use of Internet Protocol (IP) based equipment.



There are 419 traffic signal sites across Nottinghamshire, with an average cost of refurbishment for each site of £53,767 (at 2017 prices).

The following graph demonstrates the number of sites and the costs associated with maintaining these in line with a 15-year replacement cycle. Funding for this service area has been running at approximately £300,000 per annum, as denoted by the red line in the graph below, whereas the required level of funding to meet the service standard is in the order of £1,000,000 as denoted by the green line on the graph below.



22. Asset Management Plan for: DRAINAGE

This plan is aligned with the recommendations set out in the HMEP document 'Guidance on the Management of Highway Drainage Assets' (GMHDA)

22.1 - Effective use of limited budgets

Adopt highway drainage asset management strategies based on information held.

GMHDA - Page IV

Nottinghamshire has adopted a 'Risk-Based Approach' to the management of drainage assets in line with the recommendations in the 2012 HMEP Guidance on the Management of Highway Drainage Assets. This method provides the most effective way for all local authorities to maximise limited budgets. The County Council utilises condition data from a countywide inspection and cleansing programme to form a maintenance regime which takes account of how drainage assets perform over a period of time in respect of their capacity, their location on the network hierarchy and any other localised conditions. Assets such as road gullies are placed on a matrix based upon the severity and the frequency with which their condition changes ie: how often and at what rate the silt level rises within the gully chamber. This subsequently led to the creation of a 'Targeted Cleansing Strategy' which means some assets are inspected and maintained more or less frequently than others based upon the relative risk of their becoming a hazard to road / footway / cycleway users or residents, and the potential severity.

22.2 - Understanding evolving duties and Responsibilities

New regulations bring new obligations. These evolving responsibilities will have an effect on budgets and operations. Understand and adapt to these changes.

GMHDA - Page III

After extensive flooding in 2007 the UK government commissioned a review, which recommended that 'Local authorities should lead on the management of local flood risk, with the support of the relevant organisations', (The Pitt Review, 2008). This led to the Flood and Water Management Act (2010).

Nottinghamshire County Council is now a Lead Local Flood Authority (LLFA) and has new powers and duties for managing flooding from local sources, such as watercourses, surface water runoff and groundwater in the administrative area of Nottinghamshire.



The County Council works together with Nottingham City Council through a joint Strategic Flood Risk Management Board with other relevant organisations to steer local flood risk management activities in Nottingham and Nottinghamshire. Partnership working between the County Council, Risk Management Authorities, other relevant organisations and local communities is key to managing flood risk

in the future, funding future flood schemes and helping communities to become more resilient to flooding.

Since 2007, greater collaboration has been established between the County Council and other stakeholders such as the Environment Agency, Highways England, Emergency Services, Neighbouring County and Unitary Authorities, District Councils, Internal Drainage Boards, Water Companies and Landowners.

The role of Lead Local Flood Authority brings both greater responsibility and enhanced opportunity. Nottinghamshire is better placed to co-ordinate programmes of work with other bodies and to secure financial and technical contributions. This allows far greater scope in meeting the challenge of managing the county's drainage assets now and in the future through greater collaboration and a 'whole catchment' approach to understanding how best to manage water from rainfall to outfall.

22.3 - Selection of highway drainage asset survey equipment & methodology

Before selecting equipment, have a detailed equipment requirement specification and evaluation check-list to ensure that equipment being trialled is done in an objective and consistent manner. Allow sufficient time for the trial. Ensure mobile GPS software complies with the latest National Marine Electronics Association (NMEA) protocols.

GMHDA - Page III

Nottinghamshire uses an approved drainage survey & maintenance contractor sourced through an ongoing partnership arrangement with Tarmac. The information data on drainage asset condition and performance is gathered in such a way that it is easily transferred into the existing asset management system, 'Confirm'. FME (Feature Manipulation Engine) software is also used to pull together information from existing disparate datasets and insert them into the asset register.



Gully emptying, jetting, survey and GIS plotting work is routinely carried out on the county's drainage assets. Assets are plotted and given a unique ID. This data gives a focal point for the ongoing work of plotting the entire highway drainage network and also gives a reference for decision making on ownership and maintenance responsibilities and future design modelling to reduce the likelihood and / or scale of flooding events.

22.4 - Involvement of colleagues in selecting technology

Understand your authority's information technology procurement processes, purchasing documentation requirements and get the appropriate council staff (finance, IT GIS etc.) involved early on.

GMHDA - Page III

The County Council awarded its Term Service Contract (TSC) for highway services which included gully emptying in April 2013. The award of this contract involved a robust bidding process which followed the OJEU restricted route. The specification included a requirement to capture data which included location, amount of silting, date and time and defect reporting. The data collected forms the basis of a risk based approach to cyclic gully emptying regime in line with the revised Code of Practice - Well Managed Highway Infrastructure. It is anticipated that these frequency adjustments will result in significant efficiency savings and service improvements.

The defect reporting data captured through this arrangement is used to compile programmes of remedial works which are undertaken by the County Council's operational arm.

The electronic data is transferred via batch files which are uploaded into the Authority's GIS and HAMS.

22.5 - Data Integration

Link systems to maintenance activities, focus future activities and map 'hotspots'. Address the causes of problems as opposed to symptoms.

GMHDA - Page IV

Nottinghamshire currently has a spatially located dataset of its highway gullies. Work is ongoing to map other drainage assets such as manholes, catch-pits, soakaways, pipes and outfalls using information from hard copy plans and as-built drawings from historic works and investigations. This is being digitised as a layer of nodes and lines with associated attributes attached to them where known. This will continue to build over time into a comprehensive database.

This data is linked directly to the highway network itself via Confirm, the Authority's asset management system. Drainage assets are tied to specific streets where possible using the unique street reference number (USRN) and in this way enquiries are connected to inspections and defects to particular assets and hence, a picture is built up of the performance of whole drainage systems.

The costs of surveying pipework using CCTV can be very expensive and the current practice is to carry out such surveys at known hotspots where significant flooding events have occurred to help understand the causes and identify potential solutions. It is important to have detailed knowledge of the size and condition of the surface water network in specific locations, taking in the whole catchment as the solution to a specific problem is more often than not in a different location to the site of the flooding itself, usually an upstream / downstream blockage caused by collapse, tree root ingress or third-party works causing damage.

It can also be the case, in a fully functioning system that its capacity is insufficient to cope with sustained periods of heavy rain. Understanding and modelling the capacity of these drainage systems against predicted future rainfall is essential to directing funding and technical expertise in the right areas.

The key to the future and the adoption of a risk-based approach to maintenance of all drainage assets lies in the quality and quantity of the data. This helps with cross-referencing the gathered information against those of other stakeholders such as the Environment Agency and Severn Trent Water.

22.6 - Data Use

Use highway drainage asset data to focus, support and inform maintenance activities. These should be linked to the overall asset management objectives for local highways.

GMHDA - Page III

The more complex the data, the greater the cost of collection, so in Nottinghamshire a risk based prioritisation system has been adopted to select sites and the method of data collection to be employed at them.

The more asset specific data that is available, the greater the ability to pursue a credible risk based approach to maintenance of the county's drainage systems. Benchmarked data is vital for this work as it enables the authority to take a clear balanced view and ensures fairness for all whilst resisting challenge from parties with particular interests.

Activities such as lifecycle planning, flood modelling, targeted budget allocation and repair / replacement strategies are better served by having robust asset data available. The County Council recognises this and has been steadily growing its inventory dataset over a number of years. This will continue for the foreseeable future.



22.7 - Partnerships

Form partnerships with all relevant bodies, such as the Environment Agency and water companies, to address water management issues and to cooperate in service delivery and information sharing.

GMHDA - Page IV

Nottinghamshire works collaboratively across organisational boundaries to develop the strategy, deliver efficient and integrated solutions, support local communities and manage flood risk within wider river catchments.

As Lead Local Flood Authority, Nottinghamshire County Council has a duty to determine which risk management authorities have relevant powers to investigate flood incidents to help understand how they happened, and whether those authorities have, or intend to exercise their powers. By working in partnership with communities, the County Council raises awareness of flood risks. Local flood action groups (and other organizations that represent those living and working in areas at risk of flooding) are useful and trusted channels for sharing up-to-date information, guidance and support direct with the community. The County Council encourages local communities to participate in local flood risk management. Depending on local circumstances, this includes developing and sharing good practice in risk management, training community volunteers so that they can raise awareness of flood risk in their community, and helping the community to prepare flood action plans. Local communities are also consulted about the authority's local flood risk management strategy.



Sustainable measures are continuously being developed to manage flood risk in the County that take account of the needs of the local economy, communities and the environment. Other organisations and the voluntary sector contribute key skills and experience as the authority considers how it can manage flood risk in an integrated manner into the future across the County. There is a depth of understanding and appreciation of the extent of others' work, which may not be directly related to the work of the County Council, to look for opportunities to improve the environment that will have multiple benefits for all.

22.8 - Data Sharing

Drainage data must be transferable between owners and stakeholders who understand its value and make use of it.

GMHDA - Page IV

Under the Flood and Water Management Act 2010 all risk management authorities have a duty to co-operate with each other and to share data. A key theme of the Pitt Review was for flood risk management authorities to work in partnership to deliver flood risk management more effectively to the benefit of their communities.

Sharing data between agencies is fundamental to informing better decision making and driving the design process. The County Council is continually gathering drainage data on sites across the county and this is being included in the asset management system 'Confirm'. This data is spatially referenced and freely available to all flood risk management stakeholders.

22.9 - Understanding demand and service delivery requirements

Develop a clear understanding of the demand or service delivery level for the drainage asset, as this will clarify and focus activities and budgets to deliver efficient and effective service.

GMHDA - Page III

Highway drainage elements fall into five main categories:

- Gullies, grips and ditches, which may be obstructed by the growth of vegetation or damaged by traffic. In most cases the responsibility for maintenance of ditches will rest with the adjoining landowner;
- Culverts under roads which may be affected by blockage, subsidence or structural damage;
- Other piped drainage which may be affected by blockage or subsidence;
- Sustainable urban drainage systems, which may require special maintenance attention for maximum effectiveness; and
- Surface boxes and ironwork for both drainage and non-drainage applications, which may be affected by subsidence or obstructed access.

Some of the assets named above are quite simple to clarify in terms of serviceability. They are either working (serviceable) or they are not. Ironwork is an example: once a manhole cover or gully grating is broken, it is deemed to have instantly failed and requires attention for safety reasons.

Other assets such as gully pots themselves or piped drainage will have degrees of usability. Reductions in usable volume or diameter can be caused by silting or in extreme cases, blocked completely due to damage by third parties.

The level of service for an existing drainage network should also consider the suitability of its overall capacity, even when it is functioning at 100%. The County Council, adopting a 'whole

catchment approach' is working towards an understanding of the causes of flooding and the solutions which serve to prevent further events now and in the future, modelled from climate change estimates. The level of service for each component in the drainage cycle therefore needs to be managed and maintained in such a way as to mitigate risk (as it cannot always be removed completely) and to become part of an overall more resilient network.

For these reasons, Nottinghamshire has an ongoing programme of gathering location, type, condition and performance data for all its drainage assets. This creates the opportunity to allocate budget and resources in the most effective way possible. A risk register includes those known 'hotspots' where flooding is either frequent, severe or both and these are the sites most in need of attention but this process will broaden to include all locations once enough data is in place to make informed decisions.



22.10 - Use people's knowledge

In many cases the organisation's employees are the best source of asset management information. Ensure local knowledge of drainage assets held by long service experienced staff is captured and incorporated into data records.

GMHDA - Page IV

Nottinghamshire, along with its highway service partner Via East Midlands has a wealth of experience and knowledge within its staff base. Highway Inspectors, Customer Liaison Officers and Area Engineers among others have all carried investigative or project design work in all areas of the county at various times and a background knowledge of drainage systems and catchments has built up over the years. Work is ongoing to bring this knowledge into the authority's asset database, Confirm, to ensure that this important local knowledge is retained even after experienced staff have moved on.

Often vital information can be gleaned from local residents, Parish Councils and the like who are usually first-hand witnesses to flooding from the moment it begins. There is a wealth of information often in the form of photographic & video evidence to help build a picture of the factors contributing to a flooding event. This data is also included in the highways asset register.

22.11 - Resourcing

Allocate resources and funds to routes, sections, or specific areas or assets where most needed. Monitor the maintenance of these assets and require contractors to provide details of the condition of assets; for example, gully cleansing records that details the location of the asset and amount of material removed.

GMHDA - Page IV

October 2016 saw the publication of 'Well Managed Highway Infrastructure - A Code of Practice. This is a guidance document which advocates a risk-based approach to the management and maintenance of highway infrastructure assets. A risk-based approach enables the County Council to direct resources more effectively to the areas of greatest need.

Nottinghamshire already has a wealth of drainage information from historic drawings, as-built drawings, adoption records and local surveys and is continually adding this data to the asset register. On top of these records data is gathered on location and condition / performance of road gullies. Once a fully comprehensive second round of data for all of these gullies is established, this enables the creation of a risk-based approach to their future maintenance by placing each gully into a performance category which subsequently helps to decide on cleansing frequency and whether any specific repair, replacement or upgrading is required to bring them up to an acceptable performance level.

The County Council is working to enhance its understanding of whole catchments so it is better able to model the predicted / desired performance of the county's drainage systems and resource accordingly.

22.12 - Solutions

Do not let the management tool become more important than the job deliverables and recommend simple solutions that do not require a great deal of maintenance or administration.

GMHDA - Page IV

It is important for those involved with this service not to become too dependent on the technology. Mapping information does not always show exact positions of apparatus and in many cases the whole catchment should be considered rather than the immediate locality. Sometimes the simple solution is all that is required. A drainage system is only as good as its narrowest point resulting from poor third party repairs, inadequate flow / storage designs or inadequate maintenance.

Sustainable Urban Drainage (SUDs) should always be considered as a low maintenance solution where water is designed to be attenuated within the system, creating natural features and reducing the pressure on downstream apparatus and outfalls.

These considerations are also important when advising on potential development sites and amendments / changes to the existing Highway Network.

Appendix 01 - Service Levels & Performance Indicators

Service satisfaction

- Customer satisfaction with highway services (overall, maintenance, walking & cycling, tackling congestion, road safety - Based on National Figures
- Percentage of Standard Enquiries where a full response is given within 10 working days of the escalation date
- Percentage of Complex Enquiries where an acknowledgement is made to customers clearly stating the target timescale when they can expect a full response
- Complaints received, upheld/partially upheld, and not upheld/active
- Total number of highways related enquiries, and proportion of these that are complaints

Asset condition

- Bridge stock index a) Primary elements, b) All elements
- Percentage of the principal road network, non-principal classified network, and unclassified network, where structural maintenance should be considered.

Safety & performance (response)

- Number of defects identified/reported
- Average number of days to repair a category 1 (urgent) defect, category 2 (high) defect, and category 2 (low) defect
- Percentage of emergency incidents attended within 2 response time - 2 hours
- Percentage of category 1 (urgent), category 2 (high), and category 2 (low) defects made safe within response time
- Percentage of precautionary road salting completed on time
- Percentage of street lighting faults under the control of the Highway Authority repaired within response time
- Average number of days to repair street lighting faults under the control of the Local Authority
- Average number of days to undertake DNO street lighting repair
- Percentage of signal emergencies made safe within response times.
- Percentage compliance with other signal fault repair response times
- Percentage of remedial works completed within mutually agreed response times

Safety & performance (inspection/maintenance)

- Percentage of NRSWA inspections achieved against agreed target
- Percentage of network inspected within stated frequency
- Percentage of principal bridge inspections completed within stated frequency.
- Percentage of gullies cleansed within stated frequency

Road Safety

- Number of (& reduction in) people/children killed or seriously injured in road traffic accidents

Staff Health & Safety

- LTIFR: Lost time per 100,000 hours worked (Year to Date)
- AFR: Percentage of reportable accidents per 100,000 hours worked (Year to Date)
- Percentage of all staff that have undertaken Health and Safety training

Fleet performance

- Percentage of NCC vehicles returned to service on time
- Operator Compliance Risk Score (OCRS) – NCC / Via

Effectiveness

- Percentage of reports for all claim types received that are comprehensive in nature and contain sufficient information to allow the Risk & Insurance Team to make a decision on liability
- Scheme Design Changes
- Annualised defined cost with percentage annualised target cost
- Saving / Innovation register submitted at monthly TOB meetings
- Team Effectiveness report completed and submitted to MHA annually

Insurance

- Number of insurance claims received, closed, active, repudiated, agreed
- Reports for all claim types provided with 14 days of request
- Requests for information responded to within 5 days
- Where a Highway tree has been identified as causing damage for which the Highways Authority has a liability and is subject to an insurance claim, draw up a scheme for appropriate remedial works within 14 days and undertake the works within 1 month of the cause being identified
- Relevant staff to have undertaken Court Room Skills training in the last 5 years

Appendix 02 - Policy and Strategic Documentation

Highway Network Management Plan (HNMP)

The following is a direct link to Nottinghamshire County Councils Highway Network Management Plan which is published on the NCC website.

[Highway Network Management Plan](#)

Highway Infrastructure Asset Management Plan (HIAMP)

The following is a direct link to Nottinghamshire County Councils Highway Infrastructure Asset Management Plan which is published on the NCC website.

[Highway Infrastructure Asset Management Plan](#)

Highway Inspection & Risk Manual (HIRM)

The following is a direct link to Nottinghamshire County Councils Highway Inspection & Risk Manual which is published on the NCC website.

[Highway Inspection & Risk Manual](#)

Well-Managed Highway Infrastructure – A Code of Practice (WMHI)

The following is a direct link to Nottinghamshire County Councils website where a copy of the national document, Well-Managed Highway Infrastructure – A Code of Practice is displayed.

[Well Managed Highway Infrastructure – A Code of Practice.](#)

Highway Infrastructure Asset Management Guidance Document (HIAMGD)

The following is a direct link to Nottinghamshire County Councils website where a copy of the national document, Highway Infrastructure Asset Management Guidance is displayed.

[Highway Infrastructure Asset Management Guidance Document](#)

Appendix 03 - Other Documentation and Organisation Links

Nottinghamshire County Council Documentation Links

The following is a direct link to Nottinghamshire County Councils documentation which is published on the NCC website:

[Nottinghamshire Rights of Way Improvement Plan](#)

[Strategic Plan 2014-2018](#)

[Third Local Transport Plan](#)

National Documentation Links

The following is a direct link to National documentation which is referred to in this document:

[Highways Act 1980](#)

[Prudential Code](#)

[Whole of Government Accounts](#)

[Highways - Maintaining a vital asset \(What should councillors know about asset management?\)](#)

['Inspire' Regulations 2009](#)

Organisational Links

The following is a direct link to organisational bodies referred to in this document:

Midlands Service Improvement Group ([MSIG](#))

Midlands Highway Alliance ([MHA](#))

National Highways & Transportation Survey ([NHT](#))

Eastern Shires Purchasing Organisation (Technical Surveys - [ESPO](#))

Other Sources

More details on the Department for Transport and other government highway related matters are available at: www.gov.uk

Appendix 04 - Glossary of terms / abbreviations

An explanation of the terms, abbreviations and acronyms used in Nottinghamshire County Council's Highways Documentation:

AEI – Annual Engineering Inspection

An annual inspection of Candidate sites prescribing specific treatment options over whole sections or routes to help identify the 'maintenance need', defined as what treatment, if any, is required for the asset in its current condition, whether that be preventative, patching, resurfacing or reconstruction.

ADEPT - Association of Directors of Environment, Economy Planning and Transport

This is an umbrella organisation representing local authority, county, unitary and metropolitan Directors responsible for 'Place based' services. Remits include economic development, transport and communications, planning and housing and the environment. Responsible for the public services primarily relating to the physical environment and the economy, ADEPT has a significant impact on all aspects of the nation's well-being.

APSE – Association for Public Service Excellence

APSE is a network of some 23,000 officers and councillors responsible for frontline services in local authorities in England, Northern Ireland, Scotland and Wales. APSE helps councils to share information and best practice. APSE's team of advisors also provide specialist briefings, training and events.

Asset Management

A strategic approach which identifies the optimal allocation of resources for the management, operation, preservation and enhancement of the highway infrastructure to meet the needs of current and future customers.

Asset Valuation

The calculation of the current monetary value of an authority's assets purely in terms of their maintenance and replacement costs. It excludes therefore any consideration of the value to the community in terms of the economic and social benefits of providing a means for people to travel to work, socialise and live.

Candidate List

Nottinghamshire has developed a priority candidate list of potential sites that form the basis of a multi-year works programme. This programme effectively remains live and subject to changes and evolution dependent upon factors within and outside of the local authority environment. These changes may be engineering or non-engineering based but the severity of their likely effect can be reduced by early intervention and forward planning.

CIPFA - Chartered Institute of Public Finance and Accountancy

A professional body for people in public finance. 14,000 members work throughout the public services, in national audit agencies, in major accountancy firms, and in other bodies where public money needs to be effectively and efficiently managed.

CVI - Coarse Visual Inspection

This is a coarse, rapid survey, usually carried out from a slow-moving vehicle, which allows a large part of the authority's unclassified road network to be assessed each year.

A CVI survey is normally undertaken using the 'cross-sectional position' method, where the carriageway is assessed as a whole, and kerbs, footways and cycle tracks are separately inspected for the left and the right of the carriageway.

Depreciation

The consumption of economic benefits embodied in an asset over its service life arising from use, ageing, deterioration, damage or obsolescence.

Deterioration

The change in physical condition of an asset resulting from use or ageing. Often displayed as a 'curve' in graphical form.

DfT - Department for Transport

Government department responsible for providing policy, guidance, and funding to English local authorities to help them run and maintain their road networks, improve passenger and freight travel, and develop new major transport schemes.

DRC - Depreciated Replacement Cost

The current value of the asset, normally calculated as the gross replacement cost minus accumulated depreciation and impairment.

DVI - Detailed Visual Inspection

This type of survey is more comprehensive than the CVI, with defects identified by a larger number of more detailed classifications. The DVI is a walked survey, and is typically targeted at lengths already identified as defective and potentially in need of treatment either by the CVI, or from some other sources of information such as enquiries, reactive maintenance records or identified by the Highway Inspection Team.

The DVI records measured areas or lengths for a wider range of more closely defined defects (than for CVI), aggregated within short sub-sections, 20 metres in length by default. The defects collected for DVI are generally defined to a closer level of detail than CVI. In order to ensure broad consistency between the two surveys a single CVI defect is normally equivalent to a number of DVI defects.

ESPO - Eastern Shires Purchasing Organisation

This is a public sector owned professional buying organisation. Utilising commercial experience, market insight, category expertise and best practice sourcing it is able to respond quickly and effectively to the changes in the public sector and achieve economies of scale. Nottinghamshire's current SCANNER survey supplier was secured using this framework.

Firmstep

Firmstep is specifically designed Customer Relations software providing data management and integration requirements for large Public-Sector organizations and is used for enquiry management, business process management, knowledge management, real time analytics and social media capabilities in order to support local authority channel shift initiatives.

FNS - Footway Network Survey

The FNS is a walked survey, intended to provide a simple, efficient and reliable survey to enable authorities to obtain a picture of the condition of their whole footway network. It records four condition levels: As new, Aesthetically Impaired, Functionally Impaired and Structurally Unsound.

GIS - Geographic Information System

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and visually represent all types of spatial or geographical data.

GRC - Gross Replacement Cost

The total admissible cost of replacing the existing highway asset to a modern equivalent standard, taking into account up-to-date technology and materials.

GMHDA - Guidance on the Management of Highway Drainage Assets

This is a document from the Highway Maintenance Efficiency Programme (HMEP) and provides the underlying guidance on OUR own methods and procedures with regard to highway drainage.

HAMS - Highways Asset Management System

The Highways Asset Management System (HAMS) is a large database comprising all the available highway asset data for Nottinghamshire held within a modular software package which enhances the effective and efficient management of the highway network.

HIAMGD - Highway Infrastructure Asset Management Guidance Document

Produced by the UK Roads Liaison Group, under the banner of the Highway Maintenance Efficiency Programme (HMEP) this document lays the foundation for good asset management by outlining 14 recommendations which, if adhered to, will secure a sound future for maintenance of all highway assets.

HIMP – Highway Infrastructure Maintenance Plan

This is Nottinghamshire County Council's signpost document which links the ACOP with the Authority's Policy and Strategy documentation.

HMEP - Highway Maintenance Efficiency Programme

HMEP is a £6million, Department for Transport funded and sector led transformation programme. HMEP connects networks from across the highways sector and provides the tools and resources to ignite ideas and help leaders and managers to transform delivery of roads and services through greater efficiencies. HMEP has worked very closely with the DfT and CIPFA in creating 14 recommendations which local authorities need to adopt, along with 'Asset Management Principles' to fully retain, via a system of self-assessment, a comprehensive level of funding from the DfT's 'Incentive Fund'.

HNMP - Highway Network Management Plan

This is Nottinghamshire County Council's policy document for all matters relating to highway activities and the maintenance of the highway network and aligns with relevant national policies and legislation.

INSPIRE Regulations 2009

INSPIRE is a set of regulations that define how to publish and share spatial data among public sector organisations through a common Europe wide spatial data infrastructure. Spatial data is information that corresponds to a location, allowing it to be viewed on a map. INSPIRE enables data to be comparable across regions, the UK and Europe to give decision makers consistent evidence about the environment. The regulation came into force in 2009 and its implementation is led by the UK INSPIRE team in Defra.

For further information see data.gov.uk/inspire

Levels of service

A statement setting out the performance of the asset in terms customers can readily understand. Levels of service typically cover condition, availability, capacity, amenity, safety, environmental impact and social equity. They cover the condition of the asset and non-condition related demand aspirations, i.e. a representation of how the asset is performing in terms of both delivering a service to customers and maintaining its physical integrity at an appropriate level.

LLFA - Lead Local Flood Authority

The Flood & Water Management Act 2010 created the concept of a 'one-stop-shop' for flooding related matters and gave this role to Local Authorities. Nottinghamshire County Council is now a Lead Local Flood Authority and has new powers and duties for managing flooding from local sources, such as watercourses, surface water runoff and groundwater in the administrative area of Nottinghamshire, in partnership with other organisations such as the Environment Agency, emergency services, utilities, and internal drainage boards.

LLPG - Local Land & Property Gazetteer

This is a collection of address and location data created by a local authority. The Local Land and Property Gazetteers were created by extracting information from a variety of sources such as the Electoral Register. The information within the Local Land and Property Gazetteers were then standardised to BS7666, which means that all data within them, regardless of the authority, is stored and maintained in an identical fashion.

LTP - Local Transport Plan

Sets out Nottinghamshire's transport strategy and outlines a programme of measures to be delivered over the short, medium and long term. The strategy covers all types of transport including public transport, walking, cycling, cars and freight.

MARCH - Maintenance Assessment Rating & Costing for Highways

A forerunner of the Coarse Visual Inspection system (CVI) and Detailed Visual Inspection system (DVI) which used a method of defect severity and defect coverage to create a costed list of streets and footways requiring treatment.

MHA - Midlands Highways Alliance

The first partnership of its kind in the UK which began in July 2007, the MHA delivers the regional procurement and implementation of highways maintenance, professional services and capital works through framework agreements.

MOVA - Traffic Control

Originally designed by TRL during the 1980s, MOVA is now a very well-established strategy for the control of traffic light signals at isolated junctions. It can also be used at stand-alone pedestrian crossings, i.e. Puffin and Pelicans.

MSIG - Midlands Service Improvement Group

This group is a collective of Midlands and North-West English Shire Counties, Shire Unitary Authorities and City Unitary Authorities sharing Best Practice within the disciplines of Highways and Transportation.

NHT - National Highways & Transportation Survey

An annual postal survey which collects public perspectives on, and satisfaction with, highways and transportation services in local authority areas.

NSG - National Street Gazetteer

The NSG is a centralised unique referencing system, designed to improve the relationship between local authorities and utilities. Its fundamental aim is to make the street works process more convenient to the citizens who use them.

The National Street Gazetteer (NSG) is the definitive reference system used in the notification process and the coordination of street works. Under legislation, each local highway authority in England and Wales is required to create and maintain its own Local Street Gazetteer (LSG) and Associated Street Data (ASD). These are then compiled into the only master index built

to the national standard BS 7666, for access by a number of other organisations via the NSG online hub and managed by GeoPlace.

OJEU - Official Journal of the European Union (European Union Procurement Directive)

The European Union Procurement Directives establish public procurement rules throughout the European Union and apply to any public purchases above the defined thresholds. The purpose of the directives is to open up public procurement within the European Union and to ensure the free movement of supplies, services and works. The directives are enacted in the UK by The Public Contracts Regulations.

PMS - Pavement Management System

The Pavement Management System (PMS) is a software tool to aid Highway Management decisions. The PMS models network deterioration, provides condition data for national reporting and recommends maintenance treatments based on the assets condition parameters.

Risk Management

The formal assessment of risks with the potential to affect delivery of the service via a process of identification, assessment, ranking and control planning. See 'Well Managed Highway Infrastructure - A Code of Practice' published in October 2016.

SCANNER - Surface Condition Assessment for the National Network of Roads

SCANNER surveys use automated road condition survey machines to measure a range of road condition parameters including ride quality, rut depth, intensity of cracking, texture depth and edge condition. Measurements from SCANNER accredited machines are used to produce a national performance indicator (the SCANNER Road Condition Indicator) for carriageways, as well as for planning highway maintenance schemes and programmes.

SCOOT - Traffic Control

SCOOT is a type of adaptive traffic control system. It coordinates the operation of all the traffic signals in an area to give good progression to vehicles through the network.

SCRIM - Sideways-force Coefficient Routine Investigation Machine

This type of survey was introduced in the early 1970s to provide a method of measuring the wet skidding resistance of the road network. The normal testing speed for the machine is 50kmh and skidding resistance values for the nearside wheel track only (usually the location of the lowest skidding resistance) are generally recorded as the average for each 10m section.

Section 151 Officer

An officer appointed under section 151 of the Local Government Act 1972 which requires every local authority to appoint a suitably qualified officer responsible for the proper administration of its affairs.

Single Data Lists - National and Best Value Performance Indicators

The national governments of the UK monitor local authority performance in maintaining their road networks through a range of performance indicators. Some of which are required for national statistics, some which Local Authorities collect for asset management and other purposes such as Whole of Government Account requirements.

In England, local authorities Best Value Performance Indicators and National Indicators (NI) have been replaced by the following Single Data List data topics relating to the condition of local roads:

- SDL 130-01 – Principal roads where maintenance should be considered
- SDL 130-02 – Non-principal classified roads where maintenance should be considered
- BVPI 224b - Local authority survey data, if carried out, of unclassified roads. This is not part of the Single Data list but where it has been provided by a local authority it is published in the Road Conditions England Report.

SOX / SON Lighting

The name for a sodium-vapour lamp. They come in low (SOX) and high (SON) pressure forms. They have varying light spectrums and tend to have poorer colour rendering than other types of lamps. Low-pressure SOX lamps only give monochromatic yellow light and so inhibit colour vision at night.

UKRLG - UK Roads Liaison Group

This group brings together national and local government from across the UK to consider roads infrastructure engineering and operations matters. It was set up in 2001, along with its Bridges, Lighting and Roads boards. The Network Management Board was formed in 2002.

Via EM - Via East Midlands Ltd

Via East Midlands Ltd is a joint-venture company (Nottinghamshire County Council and Cornwall Council) formed in July 2016. It is entirely owned by the public sector. Via provides highways, fleet management and maintenance functions to the residents of Nottinghamshire in partnership with Nottinghamshire County Council.

WGA - Whole of Government Accounts

Preparing the Whole of Government Account (WGA) is necessary to meet the undertaking in the Code for Fiscal Stability to produce consolidated accounts for the whole public sector on the basis of International Financial Reporting Standards (IFRS). Publishing audited WGA also improves the transparency of government's finances. It attempts to show in a single document what the government owes, owns, spends and receives.

WMHI - Well Managed Highway Infrastructure – A Code of Practice

Published in October 2016, the code is designed to promote the adoption of an integrated asset management approach to highway infrastructure based on the establishment of local levels of service through risk-based assessment.

Appendix 05 – Network Hierarchy - Carriageway

HIERARCHY		STREET PROPERTIES
R	Resilient Network	Is an 'A' class road or Has a Key Service* located on it or is required by the Key Service to gain access to the Resilient Network or Is an Emergency Diversion Route for the Trunk Road network or Is a road identified with an isolation factor associated with the winter maintenance plan (severe weather gritting route)
H1	Main Distributor	Is RURAL and has an AADT of > 5000 or Is URBAN and has an AADT of > 2000
H2	Secondary Distributor	Is RURAL and has an AADT of > 1500 or Is URBAN and has an AADT of > 1700
H3	Tertiary Distributor	Is a 'B' class road or Is RURAL and has an AADT of > 151 or Is URBAN and has an AADT of > 101 or Has > 200 Residential Properties or Has > 10 Commercial Properties with a density of ≥ 50 Properties per Km
H4	Local Access Road	Is an URBAN 'C' class road or Is an URBAN Bus Route or Is RURAL and has ≥ 28 Residential Properties with a density of 50 to 100 Properties per Km or Is URBAN and has ≥ 28 Residential Properties with a density of < 100 Properties per Km
H5	Local Road	Has ≥ 50 Residential Properties with a density of < 10 Properties per Km
H6	Minor Road	Is Metalled
H7	Track	Is suitable for Motor Vehicles
H8	Unsuitable for Vehicles	Unsuitable for Vehicles

Appendix 05 – Network Hierarchy – Footway and Cycleway

HIERARCHY		STREET PROPERTIES
Footway		
F1	Primary Walking Route	Is a Pedestrianised Zone ① # or Has Belisha Beacons ② located on it or Has Flashing Amber Warning Lights (FAWLS) ③ located on it or Has an Educational Facility located on it
F2	Secondary Walking Route	Is URBAN and is on a BUS ROUTE # or Has > 10 Commercial Properties ④ located on it
F3	Tertiary Walking Route	Has > 5 Commercial Properties ④ located on it #
F4	Local Access Footway	Has a 'bound' or slabbed surface
F5	Rights of Way (footpath)	See NCC 'Countryside Access' for info

Cycleway		
C1	Cycleway	On Carriageway
C2	Cycleway	On Footway
C3	Remote Cycleway/ Trails on Highway	Cycleway or route on designated facility off carriageway or footway

Key

This framework assumes the highway in question is adopted and has extents.

Carriageway

* Key Services = Fire, Police, Ambulance, A&E Hospital, Gritting Depot, Emergency Diversion for Trunk Road Network or connects these to the Strategic (Trunk) Road Network.

AADT = Annual Average Daily Traffic (Ave number. of vehicles per day)

= Is Metalled and suitable for traffic.

Footway

① = Pedestrian Zone indicated by the presence of this sign (Diagram 618.3B in Traffic Signs Regulations & General Directions 2016) or a derivative of it.



② = Belisha Beacons indicates the location of a Zebra Crossing.

③ = Flashing Amber Warning Lights indicate the location of a School Crossing Patrol.

④ = Commercial Properties includes Retail and Key Services.

= Assumes the Footway does not have an 'un-bound' surface.

