Peterborough Highway Services

Highway Infrastructure Asset Management Plan (HIAMP)

Peterborough
Highway Services
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PETERBOROUGH
CITY COUNCIL

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Distribution

Organisation	Contact	Copies
Peterborough City Council	Cllr Peter Hiller, Cabinet Member	1
Peterborough City Council	Simon Machen, Director of Growth & Regeneration	1
Peterborough City Council	Andy Tatt, Head of Peterborough Highway Services	1
Peterborough City Council	Charlotte Palmer, Group Manager Transport & Environment	1
Peterborough City Council	Sue Addison, Insurance Manager	1
Peterborough City Council	All Service Area Managers	1
Skanska	John Birkenhead, Business Director for Cambridgeshire & Peterborough	1
Skanska	Keith McWilliams, Interim Contract Manager	1
Skanska	Graham Dodes, Operations Delivery Manager	1

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FOREWORD TO THE PETERBOROUGH CITY COUNCIL HIAMP

Peterborough's Highway infrastructure is a fundamental part of the city's fabric and public realm, including the rural area.

Peterborough's public realm is continuing to develop and it is important that we implement an approach that ensures we continue to look after the ever changing environment for the future. In having well maintained highways assets we will also develop surroundings which will help encourage people to use the city's services and amenities. We will also promote a sense of safety and wellbeing as well as proven regeneration.

With a value of in excess of £5.6bn (2015) the Highway infrastructure is one of Peterborough City Councils most important assets and in these tough economic times it is important that we manage our assets effectively. Through an asset management and risk based approach we can effectively manage our assets, prioritising our spending and maintain our position as one of the highest rated authorities within the region.

The Highway Infrastructure Asset Management Plan (HIAMP) brings together all of the strategies and policies for Peterborough Highway Services. These document how we manage and maintain the assets following both an asset management and risk based approach. They also define how we will use our resources and continue to improve the services that we provide.

EXECUTIVE SUMMARY

Everyone who lives in or travels through Peterborough will use the highway network, many on a daily basis. Those individuals will therefore have a very clear view on how the network meets their needs, whether this is in its design or how it is maintained. This will also have a significant impact on their view of Peterborough City Council (PCC) who are responsible for the maintenance of the majority of the highway network within the Peterborough area. The preservation, maintenance and improvement of this highway network itself together with its wide range of associated infrastructure is therefore vital to the economic and social well-being of Peterborough.

This HIAMP sets out the policies and investment criteria needed to keep all highway assets in a safe and operational state within the most efficient and effective manner, both on a day to day basis and in the long term.

The highway assets within the scope of this HIAMP include:

- Carriageways
- Footways
- Cycleways
- Street lighting
- Highway structures
- Traffic Signals
- Highway surface water drainage
- Street furniture.

Current best practice and experience from various published documents have guided the preparation of this HIAMP. Particular reference has been taken from 'Well-managed Highway Infrastructure – Code of practice' and appropriate documents related to the Department for Transport Incentive Fund, particularly the HMEP guidance documents for Asset Management. HMEP guidance recommends that following an Asset Management Approach supports better financial control and effective long term management of highway assets.

Peterborough Highway Services asset management approach has developed over the last few years in conjunction with the 'Incentive Fund' work. As of January 2018 Peterborough achieved band 3 in the Incentive Fund. The team are now working to make the asset management approach business as usual. This HIAMP details how the highways assets will be managed by Peterborough Highway Services.

1 INTRODUCTION

Overview

Peterborough is an area of contrasts. It is a long established city with a cathedral dating back to pre-Norman times and areas have developed naturally around this. However, Peterborough was designated a 'New Town' in 1968 and the Peterborough Development Corporation (PDC) was established to double the size of the population in close partnership with PCC.

The Corporation devised a master plan that would concentrate the new development in four new residential townships however only three of the proposed original four were completed. Currently a further new township called Hampton consisting of around 5,000 houses is being constructed to the south of the city. Another new township to the south of Hampton between the A15 and A1(M) is also planned, and will consist of 5,350 houses with commercial, retail and education facilities.

Figure 1 - The Location of Peterborough

In April 1998, PCC achieved Unitary Status and became responsible for the wider Peterborough area including many rural village areas, sharing boundaries to the north with Lincolnshire, Cambridgeshire to the south/east and Northamptonshire to the west. In March 2017 Peterborough and Cambridgeshire became part of the Cambridgeshire and Peterborough Combined Authority.

The current population of Peterborough (2016) is estimated to be around 198,100 (2014 Estimates and Forecasts Report) split between the Peterborough Urban area of 175,600 and the surrounding villages and rural area of 22,500. This will further grow with the continued development in the Hampton Township, Paston Reserve, Stanground South and Great Haddon development areas.

The highway network within the Peterborough area has developed to serve the needs of a growing community throughout its history. When the expansion of a community is slow, so is the increase in highway infrastructure. However, the rapid expansion linked to 'New Town Status' meant the extensive construction of new sections of highway network. Peterborough, in common with other 'New Town' areas now needs to consider how to react to large areas of the highway network currently reaching the end of its useful life, and make future provision for the current infrastructure expansion it is experiencing. This HIAMP details the asset management approach that Peterborough Highway Services will follow to manage its highways assets.

The term 'highway' or 'highways' in this HIAMP for Peterborough City Council is the public rights of way (of various categories or classes) maintained at public expense by Peterborough City Council. Within the highway there is an array of important assets (or parts) making up the highway network. Each asset has a wide range of detailed descriptions or component parts usually described as attributes. The Peterborough highway network is managed by Peterborough Highway Services which is a partnership between Peterborough City Council and Skanska Infrastructure Services. The Skanska contract is due to complete in October 2023 and is therefore in line with this document. There is the potential for Skanska to be awarded five year extensions twice beyond 2023.

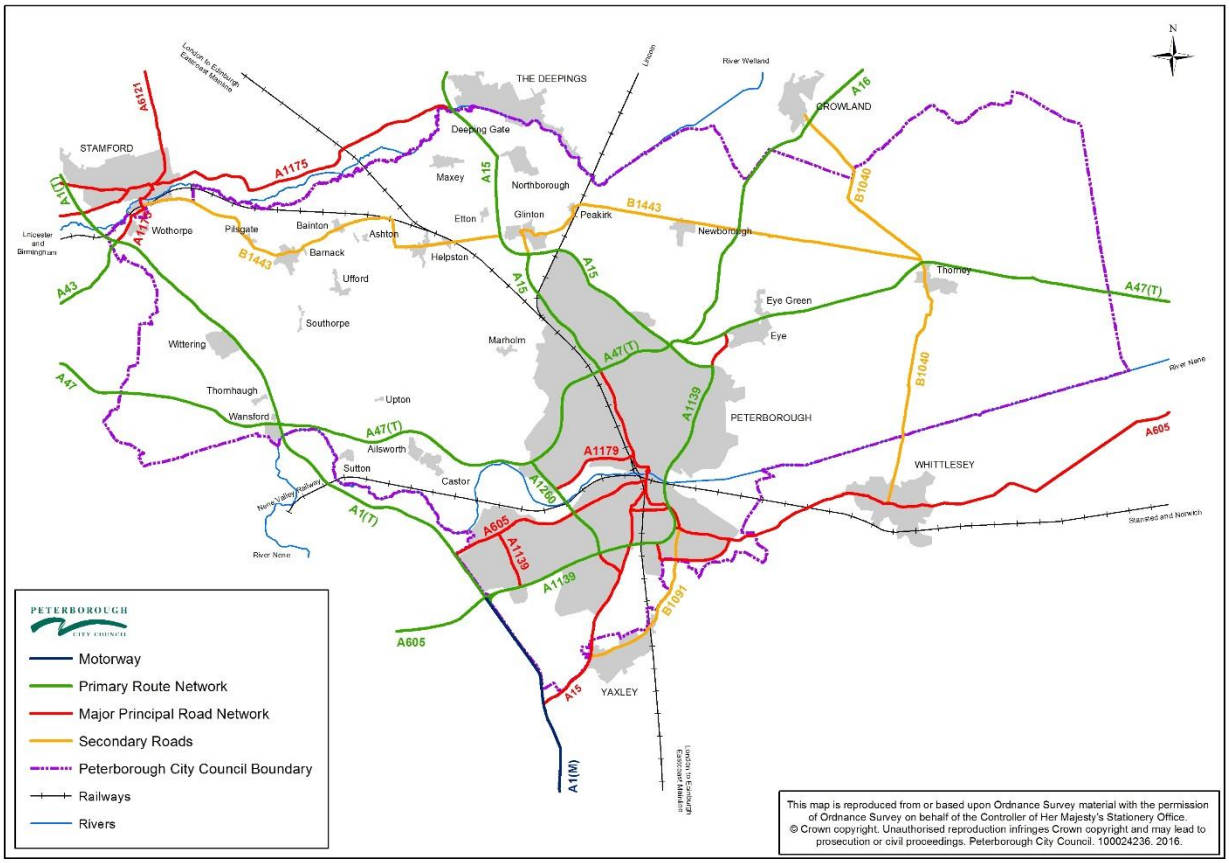


Figure 2 - Peterborough's Primary Transport Links

Purpose of the HIAMP

Nationally authorities continue to face significant and increasing challenges, foremost of which is inadequate budget provision. Highway budgets have therefore to compete for funds with other demanding services within any authority. Peterborough's Highway network was in a large part created all at the same time by the Development Corporation in the 1970's and 1980's. This has created difficulties in that assets are ageing at the same rate and therefore requiring renewal simultaneously. This is exacerbated by the increased costs of having a dual carriageway network that is the envy of many other cities. Further challenges come from increasing public expectations against decreasing budgets.

It is in this context that authorities are adopting an asset management approach to managing highway networks. An asset management approach allows for the development of a maintenance strategy based upon best practice, life cycle methodologies, risk management and user needs. It also provides tangible evidence and substantiation for funding bids and decisions.

Asset management when applied to the highway network is a forward looking approach to planning, by managing investment over the whole life of the particular asset to try to ensure that value for money is obtained.

> *An example of the adoption of the asset management principles within the highway would be adding a timely surface dressing to a carriageway. This would seal the road surface and increase its longevity therefore delaying the need for full resurfacing. This reduces potholes, the need for repeated patching, less traffic disruption and a reduced whole life cost of the asset.*

There are specific advantages in adopting asset management principles in managing the highway network as it enables:

- Long term planning for budgetary purposes
- Long term planning for works
- Clear strategy and direction
- Risk management approach to resolution timescales
- Consistency and optimisation in levels of service
- Clear visibility with regard to actions taken
- The monitoring of service and asset performances
- More efficient and cost effective highways service and management of the highway network

These advantages lead on to the following real benefits:

- More informed decision making with regard to the highway service
- Proportioned response based upon risk
- Reduced whole life costing for all assets
- Customer focussed delivery for users of the highway network
- Transparency and ownership in decision making processes

This HIAMP formally endorses and adopts the asset management approach to the management of Peterborough City Council's highway network.

Budgets

Within Peterborough there are three main sources of funding and expenditure for highway assets:

Council Capital Funding is provided for the renewal of the asset and is planned to ensure that such works extend the life of the asset or renew / replace the asset. A programme of works is outlined within the 5 year Local Transport Plan. Within that programme individual schemes are planned as part of a 3 year programme. These sites are selected based upon survey data, condition scores, inspections and consideration of defects over the previous 12 months.

Revenue Funding is for the day to day maintenance and operation of the assets. Such revenue intervention arises to ensure serviceability and safe use of the assets on a daily basis. Revenue funded work is often reactive where it is related to rectifying defects meeting specific intervention criteria arising from a safety inspection. The work is generally not pre-scheduled or predictable. There is also some routine revenue work in the form of pre-planned maintenance activities e.g. gully cleansing, signs, nameplates, or cleaning of assets etc.

Grant Funding is used to supplement the above funding streams. Grant funding has in the past been awarded following applications from a number of sources, e.g. Department for Transport (DfT), Greater Cambridge and Greater Peterborough Local Enterprise Partnership (GCGP LEP), and the Cambridgeshire & Peterborough Combined Authority (CPCA). This grant funding is often large amounts for a specific project but is sometimes lower value supplementary grants e.g. Pothole Fund and Challenge Fund from the Department for Transport.

The asset management approach will enable additional information and foresight into the spending requirements of Peterborough Highway Services. The focus will be a continuation of the shift from reactive maintenance to proactive management.

Organisational Context

The scope of this HIAMP is within Peterborough Highway Services, part of the Growth and Regeneration Department of Peterborough City Council. Peterborough Highways Services is a partnership between Peterborough City Council and Skanska Infrastructure Services.

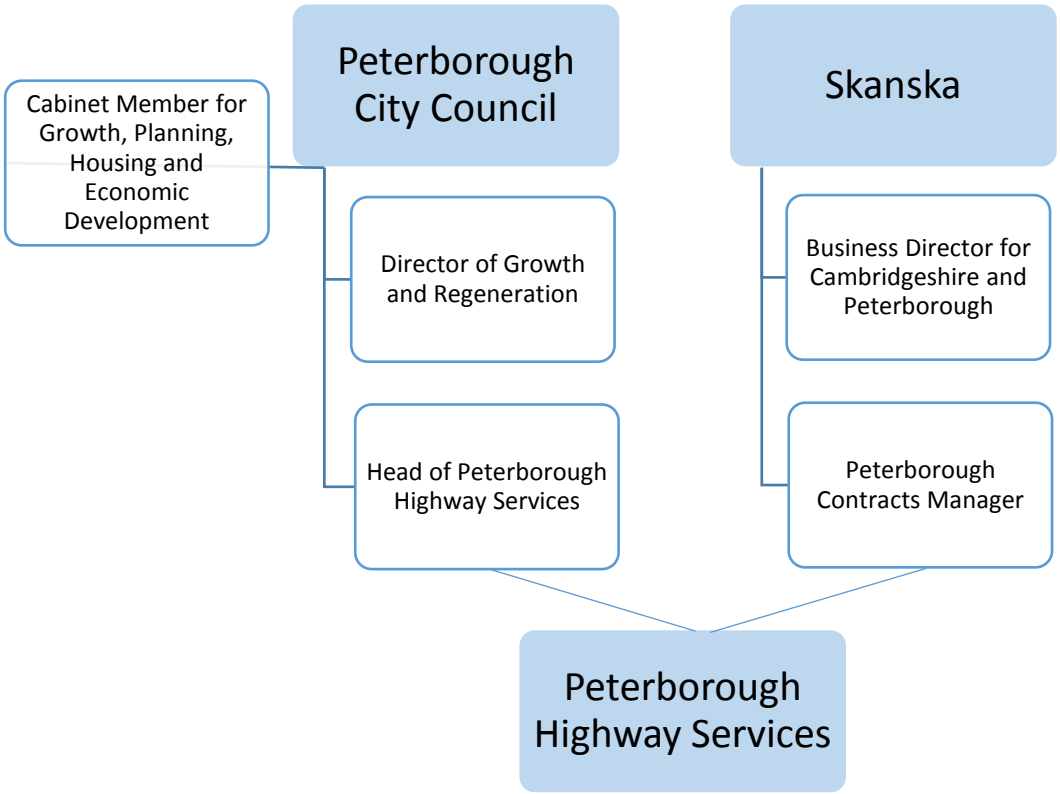


Figure 3 - Peterborough Highway Services Senior Management

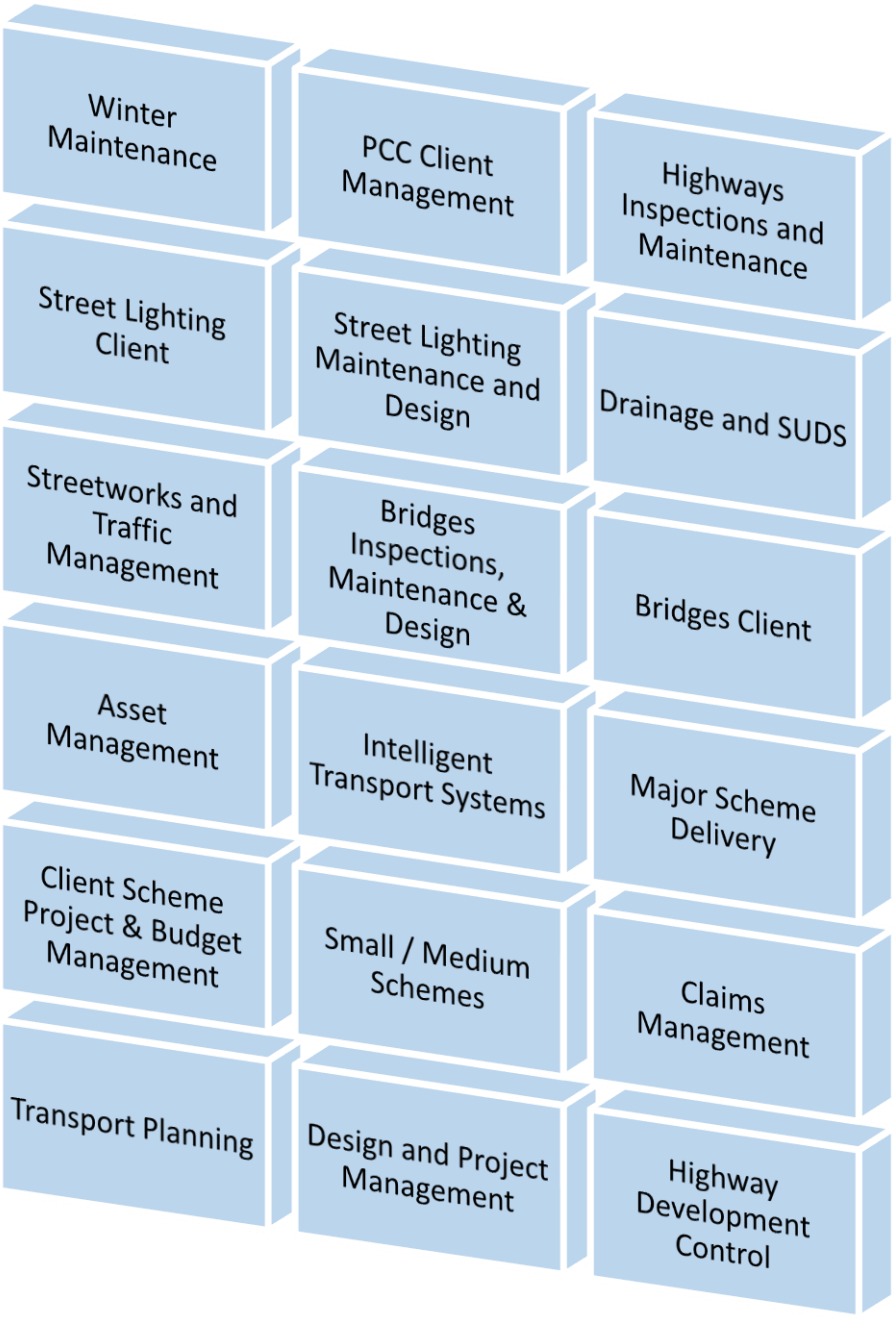


Figure 4 - Peterborough Highway Services Functions

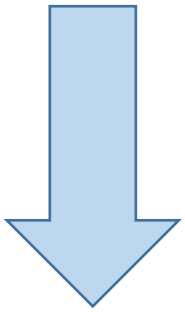
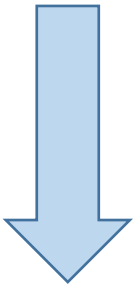
2 ASSET MANAGEMENT FRAMEWORK

The Highway Infrastructure Asset Management Plan (HIAMP) brings together all of the strategies and policies for Peterborough Highway Services (PHS). The Asset Management Framework encompasses all of these key documents and demonstrates the inter-dependencies between them. It also illustrates the local and national influences that are in place to deliver these services.

As well as linking in with the City Council's own strategic priorities, the framework shows the link with the wider objectives of the Cambridgeshire & Peterborough Combined Authority (CPCA) in its role as the strategic transport authority for the area. The Cambridgeshire and Peterborough Devolution Deal, announced in 2017, includes a responsibility for a Key Route Network and responsibility for a multi-year local transport budget.

A key element of the Asset Management Framework are the operational procedures, policies & guidance, service standards and interventions that reflect the Highway Authority's legal requirements. The PHS strategies and policies reflect the guidance laid down in the suite of national codes, in particular "Well-Managed Highway Infrastructure, A Code of Practice". They are also integrated with the asset management principles of the Incentive Fund and related HMEP (Highway Maintenance Efficiency Programme) guidance.

The Peterborough Highway Services delivery is overseen by the PHS Strategic Board. Reporting to this board is the Peterborough Highways Operations Team (PHOT) with six performance sub groups. The Asset Management Performance Group is one of these and whilst originally set up to deliver the requirements of the DfT's Incentive Fund their role is now to guide the asset management approach of PHS.

Meeting	Direction / Guidance	Attendees	Purpose	Reporting	Escalations
Peterborough Highway Services Strategic Board		Senior Partnership Directors	Strategic direction		
Peterborough Highway Services Operational Team		Senior Managers	Operational Management		
Performance Groups		Members from each team as appropriate	Contract Performance		

Performance Groups

Programme Management Group	Contract Management Group	KPI (Key Performance Indicators) Group	Efficiency Group	Health and Safety Group	Asset Management Group

Figure 5 - Peterborough Highway Services Structure

The organisational structure, strategies, policies and practises will be regularly reviewed to ensure the most efficient and cost effective means of managing the highway assets is provided. This will ensure that the latest policies and guidance are adhered to whilst delivering the best value for money service to the public of Peterborough through efficient asset management of its highways assets.

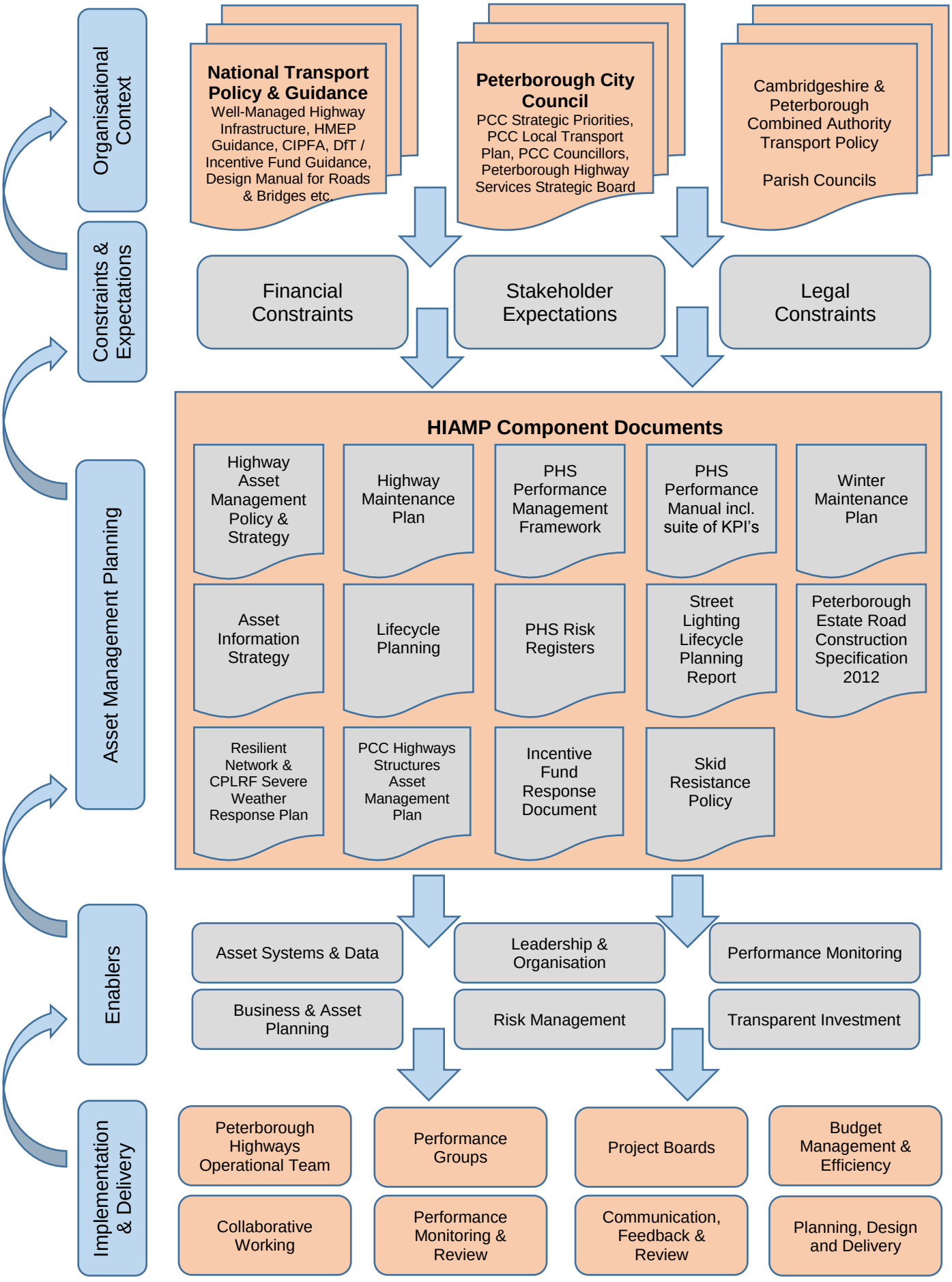


Figure 6 - Peterborough Highway Services Asset Management Framework

3 ASSET MANAGEMENT POLICY AND STRATEGY

The Asset Management Policy and Strategy for Peterborough Highway Services is a separate document as detailed within the HIAMP component documents in the Asset Management Framework (section 2).

Its purpose is to provide a clear position on how the Council will maintain the highway network to ensure that it is adequate to support the growth of the city and specifically to meet the Council's Strategic Priorities. It details Peterborough Highway Services asset management approach under the following headings:

- Purpose of asset management
- Data collection and asset inventory
- Levels of service
- Lifecycle planning
- Scheme selection
- Materials
- Performance monitoring
- Emergency works and network resilience
- Winter maintenance
- Strategy review
- Consultation and engagement

4 PERFORMANCE MANAGEMENT AND LEVELS OF SERVICE

Key Performance Indicators

Key Performance Indicators are defined as part of the PHS Performance Manual. This document includes definitions, explanations of the calculations and targets for each KPI. The performance manual also details how the annual performance score for the Peterborough Highway Services contract is calculated. There are also detailed measures for addressing poor contract performance and details of the requirements for contract extensions.

These KPI's are assessments of a mixture of traditional operational measures, customer feedback and environmental measures. They are grouped under the headings: Operations, Customer Service, Commercial & Financial and Added Value.

Performance Management Framework

The Performance Management Framework comprises of further measures that are in many cases less mechanical in nature than traditional KPI's. They are grouped within the subjects: Sustainability, Serviceability, Safety and Stakeholder Satisfaction. They include public satisfaction information, energy usage, recycling of material and road condition data. A number of the measures are from established national measures and the national NHT Survey results. Therefore, there are targets set for these based upon the national average score in a bid to maintain Peterborough Highway Services position as one of the better performing authorities.

Stakeholder Perceptions

Stakeholder perceptions are monitored through Peterborough's participation in the National Highways and Transport survey (NHT) which is used to collect data nationally on public perceptions of, and satisfaction with, highways and transportation services. The survey asks the public which services they think are most important and how satisfied they are with delivery of those services. The main survey topics include (but are not limited to):-

- Highway maintenance and management
- Condition of roads and pavements
- Rating roads and transport services
- Pavements and pedestrian facilities
- Causes of congestion

It allows benchmarking with other authorities both in the Eastern Region and nationally. The survey results provide information on trends over time and a number of the themes are used within the PHS Performance Management Framework. There are other benchmarking exercises that take place within the Eastern Region e.g. winter maintenance comparison.

5 ASSET INFORMATION AND DATA

Consistent and reliable asset information and data is essential for Peterborough Highway Services to make informed decisions and fulfil its service delivery requirements. The Asset Information Strategy for Peterborough Highway Services is a separate document as detailed within the HIAMP component documents in the Asset Management Framework (section 2).

The assets referred to in this HIAMP and the Asset information Strategy include:

- Carriageways
- Footways
- Cycleways
- Street Lights
- Illuminated Street Furniture (e.g. lit signs, lit bollards, flashing beacons)
- Highway Structures (e.g. bridges, subways, culverts)
- Highway surface water drainage including gullies
- Street furniture (e.g. signs, seats, bollards, road markings, street nameplates, safety fencing, pedestrian guardrail, bus shelters, anti-skid, traffic calming, grit bins)
- Traffic Signals
- Public Rights of Way
- Former Housing Land Hard Surfaces

The following activities and assets, although in some cases the responsibility of Peterborough City Council, are not included within the scope of this HIAMP as they are performed by other departments:

- Street cleansing
- Trees, grass cutting, weed control and horticulture
- Memorials
- Private or unadopted roads
- Litter bins
- CCTV

The trunk road network that passes through Peterborough is also excluded and is the responsibility of Highways England. This consists of the A1 and A47 with the exception of the A47 west of Wansford until the authority boundary which is de-trunked and therefore the responsibility of Peterborough City Council. Regular liaison meetings are held between Highways England and Peterborough Highway Services. This includes co-ordination of roadworks and diversions that affect the other party's road network.

6 LIFECYCLE PLANNING

Principles of Lifecycle Planning

Gone are the days of programming asset maintenance and renewals on a needs must basis. To be able to offer a high level of services to its residents and users, Peterborough must work towards a more integrated approach to asset management. This can be achieved by taking a long term view of what is required to achieve the desired levels of service for all asset components. To achieve this outcome the life of the asset will be managed to maximise its serviceable life, through lifecycle planning.

Lifecycle Planning identifies key stages in an asset's life and highlights all stages as possible points for different options of investment. The objective of this approach is to ensure that each component part of an asset achieves its full expected design life, therefore offering maximum value for money. This principle of minimum whole life costing is at the heart of good asset management.

> *Investing in routine maintenance and replacement of certain aspects of an asset will help to prolong the service life span way beyond its original design life.*

The process which identifies specific stages for potential investment intervention is called the Whole Life Costing model and the key intervention stages are shown in figure 7.

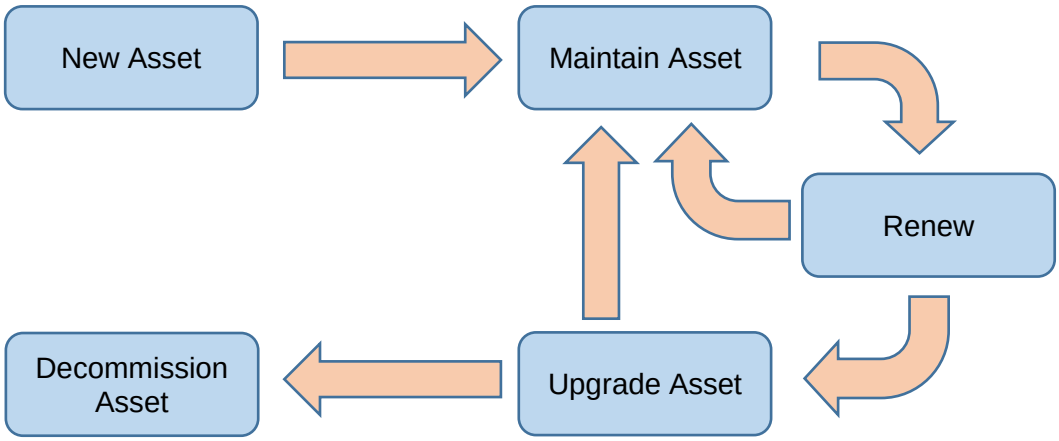


Figure 7 – Stages of the Whole Life Costing Model

Each of the individual intervention stages have been outlined in the table below.

Whole Life Stage	Description
New Asset	A new asset would be described as one that may have been adopted as a package of newly completed highways work, installation of a new lighting column, bollards, erection of a new road sign etc.
Maintain Asset	At this stage routine maintenance would be undertaken to meet or attain the correct level of service.
Renew/Replace Asset	Investment in work which may be carried out to return the asset back to its 'as new' condition or capacity to maximise the asset's design life. This may also mean renewing the entire asset or simply renewing key components when routine maintenance alone will not singly sustain the assets' service level.
Upgrade	The asset or its specific components could be upgraded above its original standard to meet future needs or capacity.
Decommission	When an asset has reached the end of its design life it is either demolished or decommissioned. Carriageways, footways and cycleways are rarely decommissioned, however individual components may be decommissioned and replaced e.g. surface course.

These key stages outline the staged investment approach required to achieve and maximise an assets serviceable life cycle under the Whole Life Costing model. The diagram has been altered slightly to demonstrate a cyclic approach from both renew and upgrade back to maintain asset. An example of how this works would be for a carriageway that is surface dressed or even resurfaced. From that point it then returns to the maintain asset stage instead of proceeding to the decommission stage.

Approach for Carriageways and Footways

Historically most authorities capital funded highway maintenance programme has been based on a 'worst first' approach. The approach developed in recent years and becoming more mature as each year progresses is to assess whole life costing and risk. This asset management approach includes improving assets to maintain their life and prevent them from needing complete replacement. Figure 8 shows how the lifecycle of an asset is changed by these different maintenance approaches.

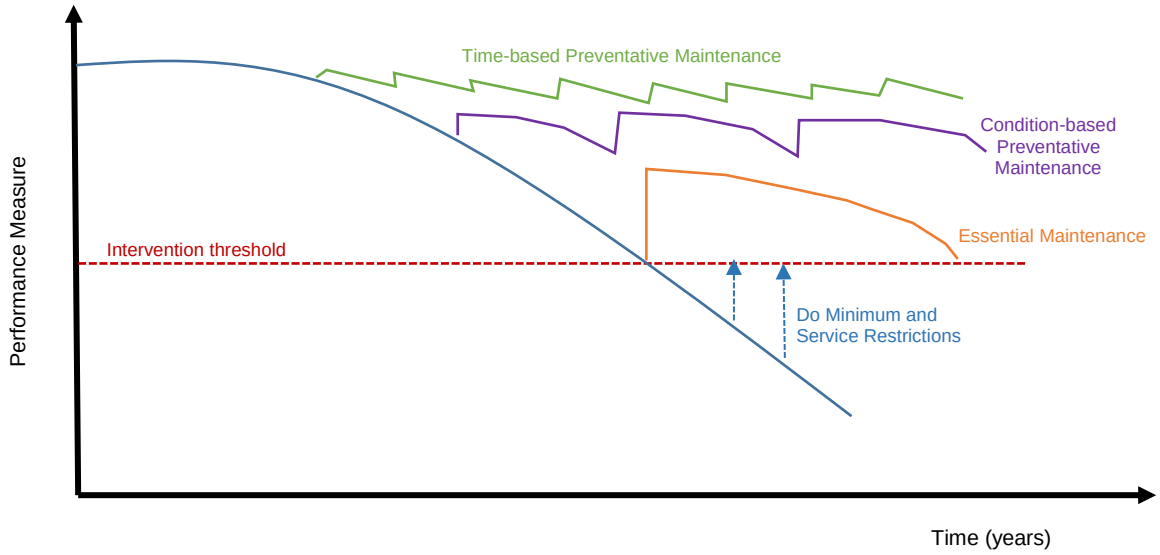


Figure 8 - Asset Management Approach to Whole Life Cost

Time-based Preventative Maintenance – These are cyclic maintenance activities e.g. annual or more regular, that are used to maintain the condition of the asset. Examples of this would include gully cleansing, weed spraying, grass cutting, drainage grip cutting, sign cleaning etc. Using a carriageway as an example: weed spraying, grip cutting and gully cleansing help to maintain the integrity of the road surface and therefore its longevity. These are low cost activities that delay the necessity of more costly works.

Condition-based Preventative Maintenance – These are maintenance activities that improve the condition of the asset. Examples of this would include surface dressing, micro-asphalt, slurry seal, painted treatment to wooden bollards etc. Using a carriageway as an example: surface dressing eradicates cracking and minor defects to seal the road surface and improve the texture. This will increase the life span of the carriageway and is sometimes carried out more than once during the asset's lifecycle. These activities provide long term cost savings, for instance surface dressing costs approximately a quarter of the cost to resurface a carriageway.

Essential Maintenance – These are maintenance activities that improve or even renew the condition of the asset. Examples of this would include re-surfacing, large areas of inlay patching etc. With a carriageway the base / sub structure is sound and the resurfacing will improve the asset substantially. This large jump in the condition of the asset will substantially increase its longevity. Whilst the cost of resurfacing is quite high it is less than a full reconstruction.

Below the Intervention Threshold – Where the condition of the asset falls below the intervention threshold then the only available option ultimately is full reconstruction. Upon completion of the reconstruction the asset lifecycle process would effectively re-start.

Whilst condition is the primary driver when determining a programme of remedial works, local authorities have to take account of local factors when managing the local highway network. The local agenda needs to be met, coupled with stakeholder requirements and issues relating to road safety. There is therefore a need to quantify external risk factors so that local priorities can be incorporated into the development of any renewal programmes.

Treatments

Carriageway Maintenance:

- Micro Asphalt - *Micro surfacing (also referred to as 'micro asphalt', 'micro' or 'thin surfacing') is a 'surface treatment' for roads; one which is laid over the top of the existing surface to seal and protect it. It consists of a water- based mix of stones and bitumen which is spread over the existing surface by a special machine.*

- Surface Dressing – *Surface Dressing is a principal method of routine maintenance of road surfaces. The concept is straightforward: in its simplest form, a thin layer of bituminous binder is applied to the road surface and stone chippings, nominally single sized, are spread and rolled into it. Surface Dressing performs two functions: Improved Safety and Durability. It increases the texture of the road surface, with minimum usage of scarce high-quality aggregate. These properties directly influence the skid resistance of the road surface, a significant aspect of its contribution to safety. It also seals the underlying surface against the ingress of water and air, which cause deterioration of the structural courses of the road.*

- Localised Patching / Resurfacing – *This process involves removing areas of the carriageway but only parts of the road that are damaged. These areas are then inlaid with new material making the new surface smooth again and sealed against water ingress.*

- Resurfacing - *Resurfacing is generally planing out the surface course and replacement with new surface course. Sometimes it is necessary to excavate or plane deeper to enhance the structural capacity of the road but the deep planing is usually only in isolated areas where failure is noted.*

- Re-tread / In situ Recycling - *The existing surface is scarified to a depth of up to 75mm with intermittent rolling to allow the passage of traffic. Where necessary, improvements to the material grading can be made by the addition of aggregate. The surface is the harrowed and graded to form the new road profile. Carriageway Retread Emulsion is applied followed by a further harrowing to ensure maximum distribution and penetration of the emulsion. After rolling, a second application of binder is followed by 14mm chippings to close surface voids. The last stage of the process is a coat of emulsion and 6mm chippings. To prolong the life of the reconstruction, a surface treatment or overlay is advisable the following season.*

- Renewal / Reconstruction – *Full reconstruction is the most costly option but will leave the road as new and should last for a number of years without any maintenance.*

Footway Maintenance:

- Slurry Seal – *The footway slurry seal process consists of covering the footway with a veneer of cold laid surfacing material. This is used to seal the surface, restore visual/overall quality and prolong its lifespan.*

- Flexi-Pave - *FlexiPave is a mixture of decorative stone aggregate and rubber granules, bound with a unique and immensely strong polyurethane binder. Mixed up and wet-laid on site, the polyurethane binder locks the aggregates together to provide a tough and hard-wearing surface which is both flexible and incredibly strong. It is highly porous for easy drainage. By utilising rubber as one of the main components, the finished material is slip resistant, making it ideal for inclined paving. The key features of the product also make it extremely low-maintenance, creating long-term cost benefits against the capital investment in the product and reducing ongoing maintenance cost. The flexible nature of the finished material means that it is highly resistant to sub-surface movement that could cause separation and trip hazards in other materials.*

- Slab Replacement – *Replacement of slabbed footpaths that may be cracked or moving with tarmac to reduce possible trip hazards for pedestrians and create a more even surface for all users.*

- Localised Patching / Resurfacing - *This process involves removing areas of the footway but only parts of it that are damaged. These areas are then inlaid with new material making the new surface smooth again and sealed against water ingress.*

- Resurfacing - *Resurfacing is generally planing or digging out the surface course and replacement with new surface course. Sometimes it is necessary to excavate or plane deeper to enhance the structural capacity of the footway.*

- Renewal / Reconstruction - *Full reconstruction is the most costly option but will leave the footpath as new and should last for a number of years without any maintenance.*

Typical costs of individual treatments are detailed in the Highway Maintenance Plan.

Scheme Selection

The scheme selection process determines both the location of the schemes and the type of scheme to be undertaken. Having identified a location where work is required there needs to be a consideration of the most cost effective maintenance in terms of the asset management approach to whole life costing. Factors to consider include:

- Road / footway condition scores
- Highways Inspectors assessment
- Volume and type of defects raised within the last year
- On site engineers assessment
- Consideration of previous maintenance work
- Assessment of suitability for different treatment types
- Risk assessment of site and any special factors to consider
- Cost v improvement level consideration
- Type and volume of usage

Street Lighting

Since September 2016 Peterborough City Council has been undertaking an LED replacement project. This will result in all of the city's street lights being LED by August 2019. This will result in a reduction in electricity costs and reduced maintenance as all lights will have an expected life span

of 20 – 25 years. The monitoring of the street lighting asset will also be improved through remote monitoring using Telensa units on each light. These can report faults with lights to a software system that is monitored in the office.

Following completion of this project there will be much less maintenance required on the street lighting asset and less manual intervention required. The outstanding scheme work following the installation of the LED lighting will be to upgrade the private cable network that supplies the lights. The other issue that Peterborough City Council will need to decide is how to approach the replacement of the lamps as they reach the end of their lifespan. It may be prudent to adopt a phased approach to this rather than another large project to replace all of them within a 3 year window again. This approach may mean replacing some early but staggering replacements over a much bigger timescale.

Bridges and Structures

The structures forward works programme is determined using condition information collected during two yearly inspection of every highway structure and the application of local knowledge and engineering judgement.

A bridge of any significant size represents a major past investment and it will rarely be more cost effective to replace such a structure when compared to maintaining it. This is particularly true for bridges in urban areas or on busy roads where the disruption caused by a bridge replacement scheme can be extensive. As such the lifecycle plan is focused on making best use of the existing infrastructure.

To develop future investment needs the structures team has developed a programme based on the following priorities:-

- Structures with safety related issues
- Structures with known structural defects or limits to load bearing capacity.
- Structure with known time dependant and costly maintenance requirements – such as painting or bearing replacement
- Structures with defects that directly influence long term durability

There is a well-established tool for the calculation of value for a bridge stock along with providing long term scenarios for predicting maintenance requirements.

Peterborough City Council has being using the Structures Asset Management Planning Toolkit (promoted by The Chartered Institute of Public Finance and Accounting, the UK Bridges Board, ADEPT and the Department of Transport) to calculate Gross Replacement Cost (GRC) and Depreciated Replacement Cost (DRC) for the purposes of bridge stock valuation for over five years. This involves populating the Toolkit with a detailed breakdown of the construction type, material and condition of every element of every bridge on the network. This data is taken from the most up to date inspections records.

In addition to calculating the GRC and DRC the toolkit applies complex deterioration profiles to predict the life span of each element. This is influenced by the environment of the individual element. The toolkit then can be used with several maintenance strategies to decide intervention levels for maintenance, along with the cost and consequence of such intervention. This allows for the condition of the bridge stock and the maintenance expenditure to be calculated over a period to 30 years. The output of this toolkit will always require some ‘reality checking’ by experienced engineers. This is mainly because the costs of intervening when a single element on a structure reaches a predetermined condition level will often be disproportionate to the benefit and the correct

judgement would be to wait for further deterioration to occur when a larger package of work would be justified.

There are four general maintenance strategies considered:-

1. Planning Targeted Strategy

   Interventions aimed towards delivering a required target condition for the structure. All elements are considered for treatment when they reach condition 3C. This approach is mainly used for the Primary Route Network Structures.

2. Planned Preventative Strategy

   To be used for regular and frequent minor intervention that slow down rate of deterioration. All critical elements are considered for treatment when they reach a condition of 3C. This approach would be used for all gritting routes, listed structures and Ancient Monuments.

3. Planned Do Minimum Strategy

   To be used for infrequent, but major interventions. The Structures Asset Management Planning Toolkit suggests intervention at an element condition of 4D. This would be the strategy for all other routes not covered by 1 and 2.

4. Unplanned reactive Strategy

   All elements are considered for treatment when they reach condition 5B. This strategy would be very unlikely to be used in practice as it represents intervention only at the point of failure. The only circumstance where it would be used by choice is when a structure is planned to be made obsolete by future development. However, it can also be used to calculate the cost of repairing / replacing elements when they fail which should be the least efficient method of asset management. Therefore this will represent the worst case budget shortfall.

As noted above, the deterioration profiles for the elements are very complex and are under review. The default deterioration profiles have been found not to reflect the observed deterioration on the network. In general they have been found to be predict a much quicker deterioration than what has been experienced. Whilst alternative deterioration profiles are being developed this is a long term process. In the meantime the deterioration calculated by the Toolkit is being reviewed against local knowledge and engineering judgement to identify forward works.

Traffic Signals

An individual traffic signal site has three distinct elements;

- Street furniture (the physical onsite components such as signal heads, poles and controllers that can usually be seen by the public)

- Software (the internal workings of the controller, which cannot be seen but control the sequencing of how signals operate)

- Communications (the connectivity between the site and the office to enable monitoring, reporting and external control)

The asset management data is stored, processed and managed on a system called IMTRAC. Here all individual components that make up a site are documented in terms of type, installation date

along with overall drawings and specifications. Any associated faults with the site are recorded along with condition information and observations received from the periodic annual inspections.

From here, the age of equipment can be analysed, fault rates can be compared and sites can be categorised in terms of installation date, age, fault rate and type of equipment or site. This data enables informed decisions to be made to determine which sites require upgrading, either in terms of replacing street furniture or modifications to the software.

The operation of the asset is governed by the software, and changes to this may be required to improve efficiency of the signals and thus reduce congestion. This is determined by local knowledge, experience and observation of queue lengths. Such improvements may be necessary as a result of changes to the traffic patterns following installation of the signals, either as a result of a new facility or destination that attracts significant traffic or by the combination of several smaller changes across the road network that may not be easily identifiable in isolation. In this case the traffic signals are validated against existing traffic flows and any necessary changes to the timings or controller operation can be identified and implemented.

Traffic signal site upgrades can also be dependent on communication infrastructure. All sites need to communicate to remote monitoring systems for fault monitoring and operational management purposes. Historically this was achieved through PSTN lines, ADSL lines and GSM mobile SIM cards. With the Siemens RMS outstation becoming obsolete and a new fibre network available at all traffic signal sites in the city, there is a requirement to upgrade the communication at sites to IP based fibre or wireless communication. With this change being implemented, alongside hardware and software upgrades, sites are able to communicate to the IP based UTC system, further enhancing the life span and efficiency of the traffic signal assets.

7 INVESTMENT STRATEGIES

Levels of Investment

Annual condition inspections, condition surveys and objective assessments are critical to any forward planning and scheme selection process. The annual condition surveys / inspections serve to inform the asset maintenance and replacement process. Consistently reviewing this data also serves to determine trends about conditions over time. If conditions are improving over time then investment levels are sufficient and if they are deteriorating over time then investment is clearly insufficient.

As part of asset management, life cycle plans are now being produced for key asset types that detail the different options for evaluation. There is also now a process in place for developing a three year programme for highway assets, linked to achieve the intended level of service within the parameters of the available financial resources.

Carriageways and Footways

Investment Programmes

Funding is sourced in a variety of ways including:

- Major projects – Department for Transport bid processes e.g. Challenge Fund, National Productivity Investment Fund, Cambridgeshire and Peterborough Combined Authority, Local Enterprise Partnership, corporate capital borrowing

- Schemes and improvements – Government grant funding, Local Transport Plan funding, corporate capital borrowing, Department for Transport special grants e.g. Pothole fund

- Maintenance – local revenue funding

Prevention Better than Cure

A Pothole Review report published in April 2012 by HMEP with the subject Prevention Better than Cure emphasised that:

> *"local highway authorities should adopt the principle that 'prevention is better than cure' in determining the balance between structural, preventative and reactive maintenance activities in order to improve the resilience of the highway network and minimise the occurrence of potholes in the future".*

Within Peterborough a minimum of annual inspections of carriageways and footways are undertaken to determine the condition of these assets. Based upon the hierarchy, usage and risk of these assets some are inspected more frequently: six monthly, quarterly or monthly. The information from these inspections is then used to formulate the capital programme of schemes to improve the assets. These assets are then improved using a mixture of patching, resurfacing, surface treatments and reconstruction. The main focus being on surface treatments and patching to prevent the condition deteriorating thus meaning that much more costly reconstruction becomes necessary.

Figure 9 illustrates the increase in maintenance costs as the condition of the road or pavement asset deteriorates. However, reactive and preventative costs will vary depending upon the asset so the costs are not necessarily to scale. It does though illustrate the point that 'prevention is better

than cure'. The cost of preventative work on multiple assets is equivalent to reconstruction of just one.

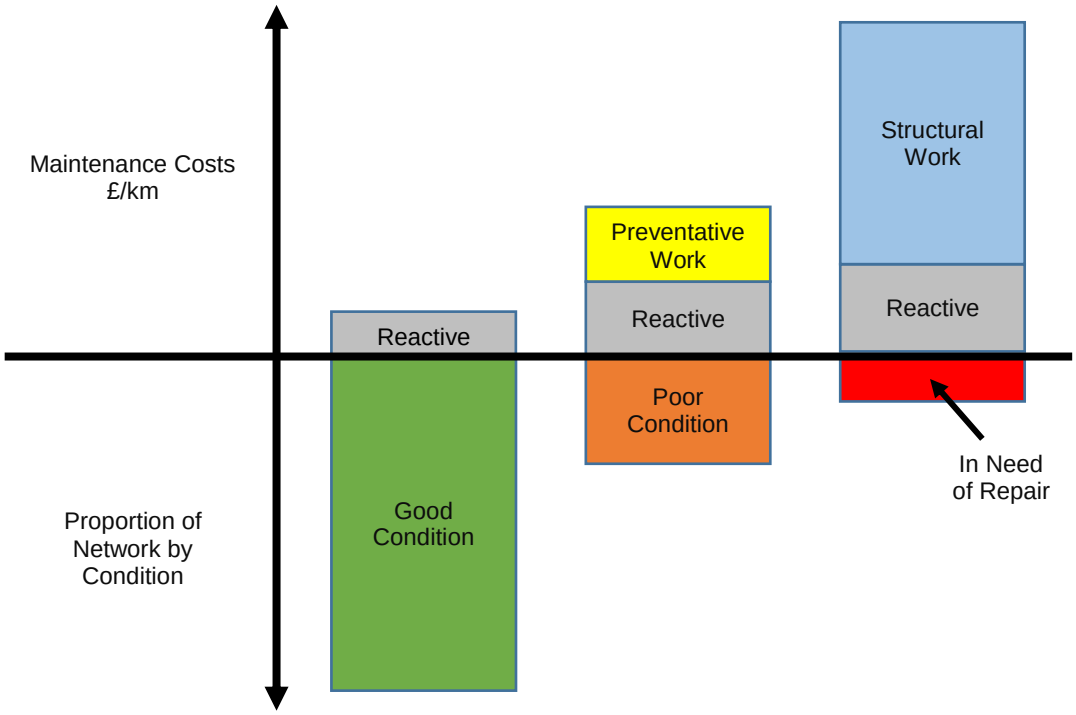


Figure 9 - Illustration of Maintenance Costs by Asset Condition (not to scale)

The table below illustrates the potential cost savings that can be achieved by applying a preventative strategy to various assets. The figures are from general industry costs for illustrative purposes and may differ from the Peterborough Highway Services contract.

Asset Type	Preventative Maintenance (Treating Asset in a 'Poor Condition')	Cure Maintenance (Treating Asset in a 'In Need of Repair Condition')	Cost Factor of Cure against Preventative Treatment
A, B & C Roads	£13 per m^2	£87 per m^2	6.7 times greater
U Roads	£11 per m^2	£58 per m^2	5.2 times greater
Footways	£33 per m^2	£78 per m^2	2.4 times greater

Investment strategies based upon 'Prevention Better than Cure' have been developed, and will be evolved and refined to ensure that the asset management approach successfully maximises the potential benefits. The following strategies are being followed:

- An increased use of pre-emptive preventative surface treatments to help to maintain the asset condition and prevent decline
- A greater capital investment and reduced revenue reactive maintenance
- Annual improvements to the principal road network following a staged approach to prevent wholesale reconstruction costs
- Balanced spending across the asset to prevent the need for one off large funding bids to reconstruct the assets

For an asset management approach to be successful the strategies need to be flexible based upon condition data, assessment and available finance / resources. This helps to ensure the most appropriate response to the asset's needs.

Street Lighting

The capital LED replacement programme upon completion will mean that over 25,000 LED lanterns will have been installed and over 6,000 street lighting columns replaced. This programme will have cost £16m but is expected to result in cost savings for Peterborough City Council. The budget case for the project estimated an electricity saving of over 5 million kWh per annum.

The project included both structural and electrical testing. This resulted in replacement columns as required and an identified need for work on the private cable network supplying some of the street lights. The required upgrading of the private cable network is now being considered as a separate improvement project. All developer led new installations are now LED lighting schemes in preparation for adoption as highway assets.

In terms of funding there is now a capital investment required in the cable network but the lamps themselves should be relatively maintenance free for at least 15-20 years. A decision has also been taken to replace illuminated bollards with retroreflective self-righting bollards. In addition illuminated signs are being replaced with the LED equivalent as part of the LED replacement programme.

Bridges and Structures

Funding sources for bridges and structures are very similar to those for carriageways and footways. The aim for the forward programme is to only rely on local funding for most maintenance work whilst to identify larger schemes with enough advance warning that additional funding can the sought.

The investment strategy is focused on delivering the four basic service attributes required of the bridge stock; Safety, Availability for use, Serviceability during use and Condition.

Attribute	Desired Standard	Performance Measure
Safety	To function without failure	None
Availability	Provide adequate load carrying capacity width and headroom. Note in some location 'adequate' may mean less than standard.	None
Serviceability	Maintain appropriate appearance for public users. No disruption to obstacles, watercourses, footpath etc.	None
Condition	At a level consistent with achieving minimum whole life cost	For highway structures the Bridge Stock Condition Indicators ($BSCI_{crit}$ and $BSCI_{ave}$) are calculated annually.

Priority is given to structures based on the route hierarchy and also the risk and consequences associated with any defect or failing. Therefore, a minor defect on a less robust bridge may be given a higher weighting than a more severe defect on a different bridge when the second bridge is known to be less susceptible to defects of this type.

Replacement of a structure is only considered if

1) Maintenance of the existing is proving uneconomic, or

2) The structure in its current form does not meet the network need and it is uneconomic to alter it.

A Critical Infrastructure Risk Based Asset Management Plan has been produced which identified three bridges that cross the River Nene as critical links in the Peterborough Network. These bridges receive special priority to ensure that the chance of any failure is minimised.

The final area of investment strategy is to produce robust evidence to support decision making. As a small authority with a very limited budget there is always pressure to spend every penny of the budget on works on site. Whilst this desire is understandable it is also important that planned works to the network are not only justified but that the justification is recorded and can be for the decision being made about the network. This evidence is general obtained through increased surveys, detailed analysis and investigations.

New structures

Brand new structures, as opposed to replacement structures, are usually the result of developments. These often result in structures, built as part of the development, being adopted by the council. The developers of these structures will provide a commuted sum for each structure to cover the cost of future maintenance.

Developments can also create new desire lines and demands on the network which require new structures to satisfy. This is a much rarer event and would typically require one of the sources of major project funding to be available for it to be considered.

Traffic Signals

Funding and investment for traffic signal upgrades are through the LTP (as identified in a 3 year plan), adhoc investments (capacity bids) and upgrades as part of new development contributions. In 2013/14, the traffic signal assets were predominantly upgraded to LED technology through a capacity bid and LTP funding has been used to upgrade signalised crossings. Moving forwards the focus for the LTP capital associated with traffic signals is to have a three year programme that incorporates multiple factors (such as equipment age, technology type, congestion, safety, pedestrian / cycle facilities) to ensure value for money.

New sets of traffic signals, as opposed to refurbishment or replacement of existing signals, can often result from housing or commercial developments. These often result in new traffic signals, built as part of the development, being adopted by the council. The developers of these structures will provide a commuted sum for each structure to cover the cost of future maintenance.

Highway Surface Water Drainage

Highway gullies are cleansed routinely as budget allows. Both during the cleansing process and during a highways inspector's footway or carriageway inspection, defects may be recorded. These

defects are then repaired on a reactive basis. There is also a small annual capital budget for drainage replacements where necessary. A part of maintenance for highway surface water drainage also includes street cleansing / sweeping, vegetation cutting, weed killing and grip cutting in highways verges. These activities are performed by the cleansing and grounds maintenance service on behalf of the highways service.

New drainage systems are generally installed by developers of new housing estates. The Sustainable Drainage Team promotes sustainable drainage (SuDS) techniques through the planning process. The team influence developers to utilise SuDS for all new roads that are adopted by the Council wherever possible. SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to transport (convey) surface water, slow runoff down (attenuate) before it enters watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).

SuDS are drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental damage. They are often regarded as a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface water, while minimising pollution and managing the impact on water quality of local water bodies. Due to highways being conveyors of high pollutants because of the main use of them, SuDS can double up as an asset that drains and reduces pollution from the highway. There may also be elements of reduced whole life cost of the asset through reduced maintenance costs and future replacement costs.

Street Furniture

Items of street furniture are generally repaired, replaced or removed only by way of reactive works. The exception to this will be as a result of specific capital investment as part of an area improvement scheme or through a bulk replacement capital programme. Street furniture condition assessments are not specifically carried out but are monitored and assessed as part of the footway and carriageway inspections. There is currently a consideration to implement a small capital replacement programme each year for bulk replacements. This will create efficiencies through the work being better planned and co-ordinated.

Winter Maintenance

The winter maintenance service procedures and policies are set out in the Winter Maintenance Plan, which is a component document to this HIAMP. The Winter Maintenance Plan is updated each year before the start of the winter season on 1st October. It is developed based upon the following approach:

- A review of the effectiveness of the previous winter operations including the gritting routes. Where appropriate the introduction of improvements into the plan.
- Due consideration of the lesson learnt from previous reviews and experience from previous spells of severe winter weather.
- Guidance and consultation with the Cambridgeshire and Peterborough Local Resilience Forum.
- Information and experience from weather forecasting providers and neighbouring authorities.
- Establishing and maintaining adequate salt stock levels, including appropriate reporting procedures.

- Setting in place weather prediction services including communication of decisions.
- Operational arrangements for decision making, treatment process and communications.
- Stand by and out of hours procedures.

8 WORK PROGRAMMING

Development of Programme of Works

The development of works programmes for asset management comprises the identification, prioritisation, optimisation, programming and delivery of individual schemes. It takes into account the annual budgets that have been developed by the authority, supported by the life cycle planning process described in section 6 of this document.

The process for identifying candidate schemes and developing a programme of works is summarised in figure 10 below:

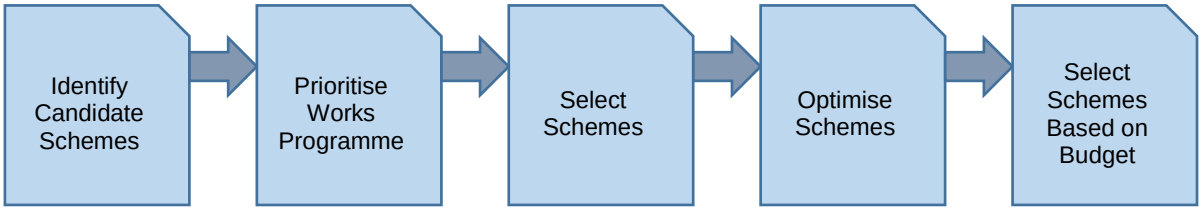


Figure 10 - Developing a Works Programme

Candidate schemes in the initial works programme are prioritised taking into consideration selected treatment options developed for lifecycle plans. This helps to identify both the works requiring the most immediate action and the most suitable response in terms of whole life costs of the asset. A 3 year programme is developed to ensure effective planning and preparation, with years 2 and 3 being provisional and subject to review each year.

The following are considered when determining which assets are most in need of maintenance:

- Critical to ensuring safety
- Risk assessment of asset and its surrounding environment
- Support corporate objectives
- Stakeholder interest / concerns
- Consideration of asset lifecycle and whole life costing

It should be noted that the outcome is not always ‘worst first’. In order to consider the life of the asset many schemes are carried out to extend the assets life and not just to repair a failing asset, as explained in sections 6 and 7. Candidate schemes are routinely prioritised to ensure that those that provide the greatest contribution to the asset management strategy at the minimum cost are undertaken. This approach ensures that value for money is achieved.

The Forward Programme

Initial forward programmes are developed comprising of schemes for each of the asset types and planned to be carried out within the next three years which support the financial planning detailed in the Investment Strategy section of this document.

The three year programme is subject to annual review and updated using the latest sources of data e.g. condition survey data. A cabinet member decision notice is completed each year identifying

what budget is to be spent on what schemes including where and when they will be undertaken. This report will identify how the programme meets the requirements of the asset management strategy. It should be noted that years two and three will be expected to change due to the multiple variables that can affect the condition and use of a highway asset.

9 OVERALL RISK IMPLICATIONS OF THE PLAN

The Peterborough City Council highway network is used by its residents and a considerable number of travellers passing through the city. With the easy links to both the East Coast Mainline and the A1 its road network is an attractive link for both passengers and freight. There are numerous distribution centres in Peterborough sending goods around the country and a great proportion of the country's fresh produce travels along the parkway network to the A1 on its journey out of Lincolnshire.

The highway network has a wide array of assets each of which is affected by continual use and sometimes damage. Keeping each item in a safe and serviceable condition at all times represents a considerable challenge and in an increasingly litigious society this represents a considerable risk which needs to be managed.

Risk Identification

In order to manage the risks involved it is important to firstly identify the source of the risks:

- Safety – in relation to both highway users, those involved in delivering the service and nearby people or property.
- Natural events – predominantly the weather, associated effects and resulting processes e.g. freeze thaw cycle.
- Physical risks – resulting from the failure of the asset.
- External – an array of factors but including legislative and economic factors (e.g. changes in government policy, legal case outcomes, oil price changes, inflation, budget levels etc.)
- Internal and corporate – reliance on key personnel and systems

It is generally impossible to completely eliminate risk and so risk management is used to reduce the exposure of the organisation to risks. Following the identification of risks it is then possible to undertake a risk analysis, risk reduction and possibly mitigation of the risks.

Risk Analysis

Risk analysis is the determination of those events most critical to disrupting the requisite level of service, considerations likely to be included are:

- Injury or loss of life
- Failure to meet statutory requirements or reduction in service
- Costs of repair or loss of revenue
- Third party losses

In determining the probability of an event occurring experience is one consideration along with the availability of relevant data including:

- Accident statistics
- Number of claims

- Trends and geographical data

Following the consideration of impact and likelihood of risks occurring in a risk matrix the most critical risks are then prioritised.

Risk Reduction

Actions that can be deployed to reduce risk or its impact are:

- Capital expenditure to reduce the probability of failure e.g. timely replacement of lamp columns, repairs to structures or highway improvements
- Revenue expenditure to reduce the probability of failure e.g. patching / making safe of defects
- Reducing the impact of a failure by the production of appropriate contingency plans e.g. reducing speed limit until adequate repairs can be made
- Insuring against the consequential loss
- A combination of the above actions

An alternative action is to accept the particular risk and any consequential costs met should the failure event occur.

Risk Register

Peterborough Highway Services operate a high level contractual risk register for the management and delivering of the highway contract. Further risk registers to support the implementation of good asset management principles have been set up for each discipline e.g. highways, street lighting, bridges, traffic signals etc. These risk registers are being developed further to link in to the contractual risk register in order to raise issues with the strategic board if required. Further risk management occurs for scheme delivery through the project board and risk is considered as part of the inspection process.

Monitoring and Review

For asset management to be effective it is necessary to monitor, record and mitigate identified risks. The contract risk register is reviewed monthly at the Peterborough Highways Operational Team (PHOT) meetings. The discipline based risk registers are currently reviewed annually but this process is still being fully developed. Scheme risks are escalated as necessary if they become issues at the monthly project board. Measures of the effectiveness of risk management are shown in the outcomes from:

- Highway inspections, electrical testing, insurance liability and settlements
- Flood mapping and critical drainage
- Highway structures principal and general inspections
- Street lighting structural testing
- Highways condition assessment

10 PERFORMANCE MONITORING

The performance of Peterborough Highway Services is monitored through a number of mechanisms:

- Suite of Key Performance Indicators (KPI's) – the KPI's have some stringent industry leading targets including expected performance levels of 100% for emergency response and CAT 1 defects, 98% for winter maintenance delivery and 95% for a number of other targets including CAT 2 defects

- Performance Management Framework – a number of performance mechanisms including volume of recycled materials, condition survey data, inspections completed and public survey responses. In many cases the targets for these are linked to the national averages with an aim to be better than or equal to the national average. This performance will place Peterborough Highway Services in the higher performing authorities in the country.

- Department for Transport national reporting – reporting this data enables a readily available method of benchmarking our performance with other authorities e.g. highway condition survey data, bridge condition data, accident statistics.

- National Highway and Transport (NHT) network survey – this is an independently organised survey that is sent randomly to households in the city. Once collated the results are benchmarked regionally, nationally and against previous year's performance.

- NHT Customer Quality Cost (CQC) assessment – financial and condition data are assessed by a team at Leeds University to give authorities an efficiency rating. Once collated the results are benchmarked regionally, nationally and against previous year's performance.

Where underperformance is identified this is addressed through the performance groups and the PHOT meeting initially. Subsequent reports to the strategic board will include proposed remedial actions.

APPENDIX 1 – LEGISLATION AND GUIDANCE

The following list contains principal examples of the main controls and influences under which Peterborough Highway Services operates and therefore impact upon this HIAMP (note the list is not exhaustive).

Legislation:

- The Highways Act 1980 – main legislation governing the strategic operation and management of highway assets
- The New Roads and Street Works Act 1991 – governs the activities of statutory undertakers (utilities) when working on the highway
- The Traffic Management Act 2004 – imposes a duty (the network management duty) to keep all types of traffic moving and is important in minimising disruption when planning highway maintenance works
- The Health and Safety at Work Act 1974
- The Management of Health and Safety at Work Regulations 1972
- Construction (Design and Management) Regulations 2015
- The Equality Act 2010
- The Environmental Protection Act 1990
- The Flood and Surface Water Management Act 2010

Guidance:

- Maintaining a Vital Asset, 2005 produced by the Department for Transport, DfT via the UK Road Liaison Group (UKRLG)
- Well-Managed Highway Infrastructure: Code of Practice for Highways Maintenance Management, 2016 produced by the Department for Transport, DfT via UKRLG. Suite of documents including an overarching introduction and separate daughter documents for highways, lighting and structures(superseding Well Maintained Highways, Well-Lit Highways and Management of Highway Structures)
- Building on Strong Foundations – A Framework for Local Authority Asset Management, February 2008, produced by the Department for Communities and Local Government
- Local Authority Asset Management Best Practice Guides produced by the Royal Institution of Chartered Surveyors, RICS, 2009
- Prevention and a Better Cure, Pothole Review published by the Department for Transport as part of the Highway Maintenance Efficiency Programme in April 2012
- Lifecycle Planning Toolkit incorporating Default Carriageway Deterioration Models published by the Department for Transport as part of the Highway Maintenance Efficiency Programme in November 2012

- Highway Infrastructure Asset Management Guidance Document published by the Department for Transport as part of the Highway Maintenance Efficiency Programme in May 2013

APPENDIX 2 – PETERBOROUGH CITY COUNCIL POLICY DOCUMENTS

The following is a list of Peterborough City Council policy documents that have some influence or significance with regard to the HIAMP:

- Peterborough City Council Strategic Priorities
    1. Drive Growth, Regeneration and Economic Development
    2. Improve Educational Attainment and Skills
    3. Safeguard Vulnerable Children and Adults
    4. Implement the Environment Capital Agenda
    5. Support Peterborough's Culture and Leisure Trust Vivacity
    6. Keep All Out Communities Safe, Cohesive and Healthy
    7. Achieve the Best Health and Wellbeing for the City

- Biodiversity Strategy
- Sustainable Community Strategy 2008-21
- Peterborough Tree and Woodland Strategy
- Local Transport Plan / Long Term Transport Strategy (including Bus Strategy and Rights of Way Improvement Plan)
- Peterborough Rights of Way Improvement Plan 2006 – 2026
- Peterborough Core Strategy Development Plan Document
- Peterborough Site Allocations Development Plan Document
- Peterborough Planning Policies Development Plan Document
- Peterborough Public Realm Strategy - May 2008
- Flood Risk Management Strategy
- Environment Policy and Action Plan
- Peterborough City Centre Development Plan Document
- Peterborough Infrastructure Delivery Schedule (IDS) 2016
- Safer Peterborough Partnership Plan 2017-2020
- Medium Term Financial Strategy 2017/2018 – 2026/27