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COUNCIL CHAMBER - TOWN HALL,

SUPPLEMENTARY AGENDA

PART I

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THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

HIGHWAY ASSET MANAGEMENT STRATEGY FOR CARRIAGEWAYS AND FOOTWAYS

January 2016

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

"The Royal Borough of Windsor & Maidenhead is a great place to live, work, play and do business supported by a modern, dynamic and successful Council"

Our vision is underpinned by four principles:

Putting residents first
Delivering value for money
Delivering together with our partners
Equipping ourselves for the future

What is Highway Asset Management?

"The way an organisation manages its highway assets to deliver its strategic priorities and service needs effectively".

1. Ensuring that core data is correct
2. Producing different models for investment which would lead to a range of outcomes going forward
3. Creating an even greater emphasis on preventative work rather than reactive repairs
4. Setting out the benefits of longer term programming

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

CONTENTS

Frequently used acronyms

DfT	Department for Transport
HAMS	Highway Asset Management Strategy
HMEP	Highway Maintenance Efficiency Programme

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

1. INTRODUCTION (WHAT IS THE PURPOSE OF THIS STRATEGY?)

1.1 The Royal Borough of Windsor and Maidenhead (the Royal Borough) is responsible for the maintenance of the majority of the highway assets in the borough. These assets include; carriageways, footways, bridges, public rights of ways, highway verges, ditches and drainage, street lighting, traffic signals, signs and street furniture. This strategy focuses on the carriageways and footways. Future updates will incorporate the other transport assets.

1.2 The carriageway and footway assets are the most valuable asset that we, the Royal Borough own. In 2014/15, they were valued at £1.37 billion (Appendix A – The Royal Borough's highway asset valuation). The carriageways and footways are essential to us meeting the Royal Borough corporate objectives of exercising the highest standards of care and control over the assets and resources available, ensuring that these are protected from the risk of loss, damage or misuse, are used in the most efficient, effective and economic way and deliver services in a way that represents the best value for money achievable. As such, a valuable and heavily used asset needs considerable expenditure to maintain an appropriate condition.

1.3 The government is promoting the implementation of asset management techniques within highway authorities and has established the Highway Maintenance Efficiency Programme (HMEP) to provide guidance and best practice examples to support this. Furthermore, in December 2014 the Secretary of State for Transport set aside £578 million for an incentive fund scheme to reward councils who demonstrate they are delivering value for money in carrying out cost effective improvements.

1.4 In addition, in 2016/17 the Whole of Government Accounts (WGA) for highway assets will form part of the Council's audited balance sheet. It is therefore vital that we can demonstrate that they are being managed efficiently and in accordance with national guidance.

1.5 This Highway Asset Management Strategy (HAMS) focuses carriageways and footways assets and forms an umbrella document for all other highway asset management strategies, setting out all generic aspects of asset management and establishing a template. This HAMS describes how we are currently maintaining our carriageway and footway assets and what we intend to do going forward to ensure we are; aligned to national best practice, contributing to the delivery of the Royal Borough's operational policies, and providing an efficient service to the road user.

1.6 In order to implement asset management, we must achieve buy-in at several levels within the Council, with leadership coming from elected Members and senior management, and implementation at an officer level.

1.7 This HAMS aligns to the UK Roads Liaison Group (UKRLG) and HMEP Highways Infrastructure Asset Management Guidance and the Royal Borough's corporate objectives. It is supported by a suite of documents including the Highway Maintenance Management Plan (HMMP) and the Highway Safety Inspection Manual (HSIM), as well as other asset specific strategies.

1.8 This HAMS outlines our approach to maintaining these essential assets and in doing so, answers the questions that follow throughout this document:

2. WHAT IS ASSET MANAGEMENT AND WHY ADOPT IT?

2.1 The Highways Maintenance Efficiency Programme (HMEP) and the UK Roads Liaison Group's 'Maintaining a Vital Asset' leaflet describes asset management and how it can help as follows:

'Asset management promotes a business-like way to highway maintenance. It makes better use of limited resources and delivers efficient and effective highway maintenance. It takes a long term view of how highways may be managed, focusing on outcomes by ensuring that funds are spent on activities that prevent expensive short-term repairs. This makes the best use of public money whilst minimising the risk involved in investing in highway maintenance.

But good asset management is not just about making best use of existing funds. It also provides a clear evidence base to justify the need for investment in highway maintenance, for example through prudential borrowing.

Many councils understand the potential benefits to them of good asset management, but often cite a lack of resource as the main reason for not adopting good practice, resulting in a short term, reactive approach being used. This is inefficient, allows more defects to develop and is more costly in the longer term. Research has shown that reactive repairs are four times more costly than preventative treatments.

Highway infrastructure asset management is an established and widely recommended approach both in the UK and internationally. Where it has been adopted for highways, savings of at least 5% on budget have been reported. It also supports decision-makers in reconciling short-term problems with long-term priorities. In other public service sectors such as the water industry, asset management has been well-established for some years, and has produced savings of up to 15%'.

2.2 In December 2014, the Secretary of State for Transport announced that £6billion will be made available between 2015/16 and 2020/21 for local highway maintenance capital funding. Of this, £578million has been set aside for an incentive fund scheme, to reward councils who demonstrate they are delivering value for money in carrying out cost effective improvements, in part through sound asset management.

2.3 Local highway authorities, such as the Royal Borough, will be assigned a proportion of the incentive fund annually based on their ability to demonstrate that efficiency measures are being implemented. Local highway authorities will be put into one of three bands. If the Royal Borough is able to demonstrate that we are in Band 3 we will receive £365,000 per year more than if we are only in Band 1. This is a significant sum of money and helps to justify allocating resources to implement robust asset management and other efficiency measures.

Figure 1: DfT Incentive Fund Distribution

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%

3. WHAT ARE OUR OBJECTIVES FOR ASSET MANAGEMENT?

3.1 To adopt the recommendations of the Highway Maintenance Efficiency Programme.

3.2 To utilise up-to-date information to understand asset condition and maintenance requirements.

3.3 To adopt life cycle planning techniques to inform asset investment need and to provide evidence for business cases and funding applications.

3.4 To use whole life costing principles to minimise the cost of asset ownership over the long-term.

3.5 To provide senior officers and elected Members of the Council with the information required to make informed decisions.

3.6 To achieve Band 2 in the DfT Incentive Fund Self-Assessment for the 2016/17 funding allocation.

3.7 To achieve Band 3 in the DfT Incentive Fund Self-Assessment for the 2018/19 funding allocation.

4. WHAT CARRIAGEWAY AND FOOTWAY ASSETS ARE WE RESPONSIBLE FOR?

4.1 We own and maintain circa 602.4km of local carriageways and circa 683.5km of local footways. We break these carriageways and footways down into classifications is shown in Table 1 below.

Table 1: Royal Borough Carriageway and Footway asset inventory.

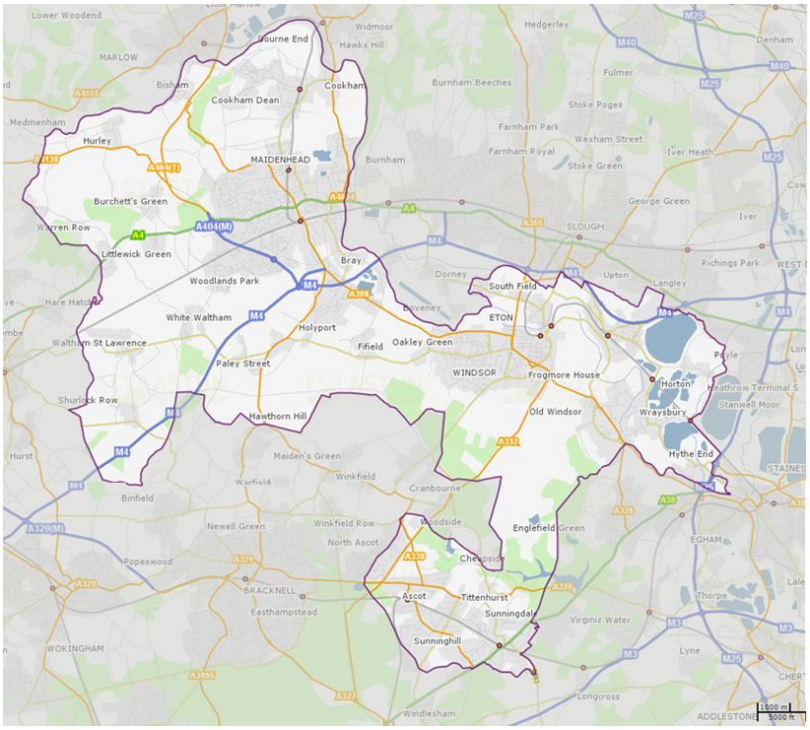
Asset Group	Classification	Length of Network (km)	Average Width of the Network (km)	Area of the Network (km2)
Carriage ways	A roads	83.8	10.10	846.38
	B & C roads	171.4	8.45	1448.33
	U roads	347.2	6.70	2326.24
	TOTAL	602.4	N/A	4620.95

4.2 Within the Royal Borough there are 6.8km of trunk roads and 20.2km of motorways, such as the A4 and M4. These are owned and maintained by Highways England (formally the Highways Agency), are not the responsibility of the Royal Borough and are therefore not included in this HAMS. These are shown in

4.3 Figure 2 overleaf.

4.4 There are also a number of private roads within the Royal Borough. The landowners and/or adjacent property owners are responsible for the maintenance of these roads.

Figure 2: The Royal Borough's map showing the network of major roads

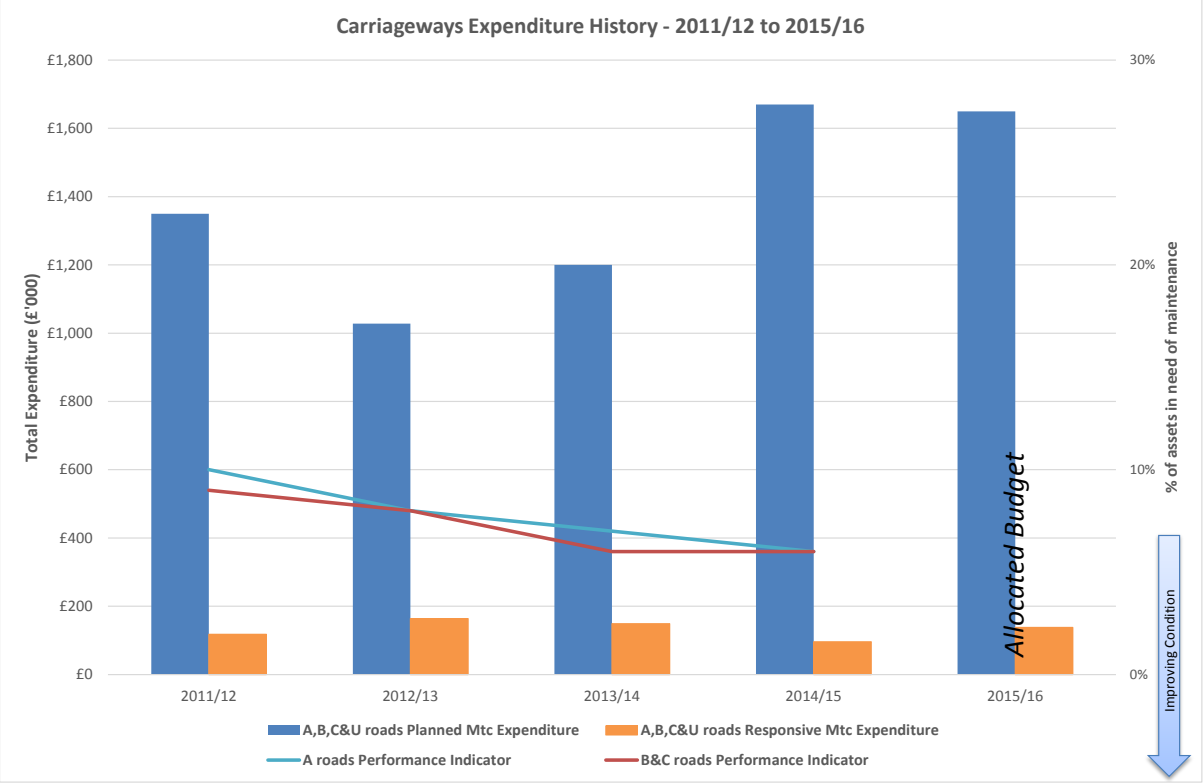


5. WHAT HAVE WE SPENT ON MAINTAINING THE CARRIAGEWAYS AND FOOTWAYS OVER THE LAST 5 YEARS AND WHAT HAS BEEN THE IMPACT ON THEIR CONDITION?

5.1 Figure 3 overleaf presents our expenditure history since 2011/12. This shows that over the years our combined carriageways and footways spend has fluctuated, with a slight rise over the course of the 5 years. In 2014/15 the budget increased significantly and has been sustained. This is a consequence of the Royal Boroughs commitment to invest more in roads.

5.2 Our level of expenditure on responsive maintenance has decreased since 2012/13. It can be seen that the increase in 2012/13 followed a significant decrease in planned expenditure in 2012/13. This implies that the amount of capital expenditure in 2012/13 was not sufficient to improve or maintain the overall condition of the carriageway and footway network, leading to a need for increase responsive maintenance.

Figure 3: Carriageways and footways expenditure history between 2011/12 and 2015/16.



Note: Performance indicators for footways are not available.

5.3 The A and B/C road performance indicators have shown a gradual improvement over the period. It should be noted however, that over this period we have not been collecting condition information on the Unclassified (local road) network. The unclassified roads account for nearly 60% of the whole network, so without this information the complete picture is unclear. We have addressed this issue, and as of 2015 we have started to collected unclassified carriageway condition data annually.

5.4 The carriageway condition data was collected via UK Pavement Management System (UKPMS) surveys to provide us with information to inform maintenance and funding requirements, to report on national performance indicators required by the Government, and to calculate asset valuation for Whole of Government Accounts. Condition data for 2014/15 is presented in Table 2.

Table 2: The Royal Borough's carriageways UKPMS condition for 2014/15.

Single List No.	**Performance Indicators**	**Performance**
	Description	**Current**
Item 130-01	% of principal roads where maintenance should be considered	6%
Item 130-02	% of non-principal classified roads where maintenance should be considered	6%
BV224b*	% of unclassified roads where maintenance should be considered	8%

** BV224b data was not collected by the Royal Borough for many years due to it not being a requirement by government. However data has started to be collected again to inform maintenance and funding needs.*

5.5 In addition, we benchmark ourselves with neighbouring boroughs to provide an insight on how we are performing compared to others and to track progress against our corporate objectives. Performance benchmarking is presented in Appendix C – Performance benchmarking with neighbouring councils.

6. WHAT IS THE CURRENT CONDITION OF THE CARRIAGEWAY ASSETS AND WHAT CONDITION ARE WE TARGETING?

6.1 For this current version of the HAMS, only investment modelling for carriageways has been undertaken, this will be further supported in future versions with investment modelling of the state of the footways in the borough.

6.2 We have established target conditions to ensure highway asset maintenance functions on the ground are aligned to and contribute to achieving the Royal Borough's corporate vision.

6.3 Table 3 outlines the categories used to define the conditions.

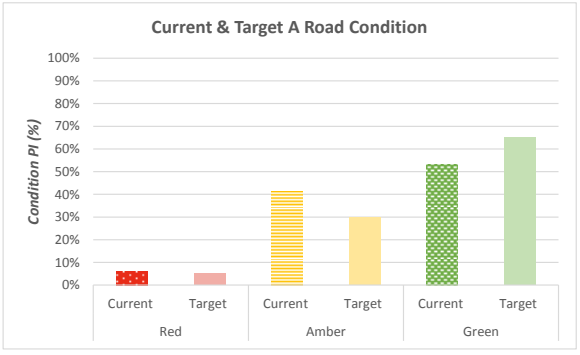
Table 3: Condition information categories.

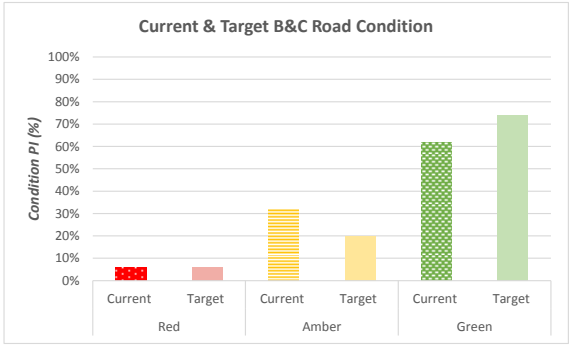
Condition	Description
Red	Roads where structural maintenance should be considered
Amber	Roads where preventative maintenance should be considered
Green	Roads in good condition

6.4 Our current and target carriageways conditions are as shown in Figure 4, and are summarised in

6.5 Table 4. The carriageway assets are split between A, B&C and U roads.

Figure 4: Current and target carriageway surface conditions for A, B&C, and U roads





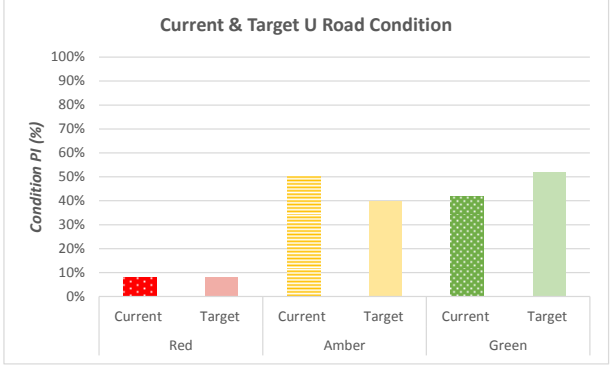


Table 4: Carriageway current and target condition summary

Condition Band	Current Carriageway Condition			Target Carriageway Condition		
	A Roads	B/C Roads	U Roads	A Roads	B/C Roads	U Roads
Red (PI)	6%	6%	8%	5%	6%	8%
Amber	41%	32%	50%	30%	20%	40%
Green	53%	62%	42%	65%	74%	52%

6.6 Our current performance indicators (red zone) are very good both regionally and nationally. The benchmarking with our neighbouring councils (Appendix C) demonstrates that we are on par with our peers for A and B/C road condition and generally better than most with regard to unclassified roads. On this basis, and in alignment with the Royal Boroughs corporate objectives, we have set performance indicator targets which represent a steady stead situation.

6.7 Within Figure 3 and Table 4 above, one will note that we have targeted improvements in the percentage of the network in the amber zone. The reason for this being that maintenance on carriageway in the amber zone is often cheaper than treatments required for carriageways in the red zone (which tend to require deeper resurfacing). As such, by targeting the amber zone our money goes further and prevents further deterioration into the red zone, which would lead to greater maintenance costs.

6.8 This 'prevention is better than cure' proactive approach is endorsed by the HMEP and is generally considered to be best practice. The approach prevents roads reaching the red zone and minimises disruption to the road user and the need for reactive maintenance such as pothole repairs.

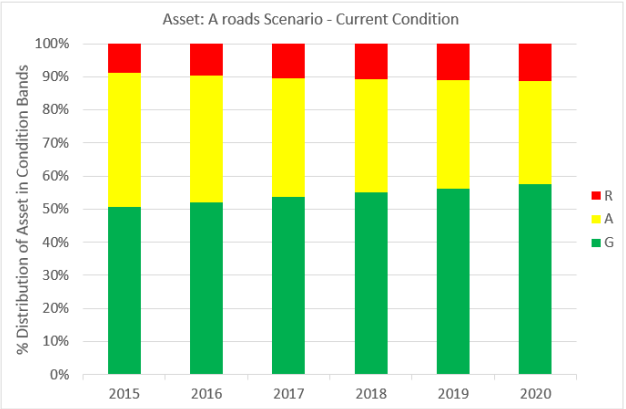
7. WHAT IMPACT WILL THE CURRENT BUDGET HAVE ON ASSET CONDITION?

7.1 We have utilised condition data and investment modelling techniques to forecast the condition for carriageways over a 5 year period, should the current budget of £1.65 million continue. This investment modelling has been carried out using the HMEP's Lifecycle Planning Toolkit, a tool endorsed by the government. For this current version of the HAMS, only carriageways have been analysed, this will be further supported in future versions with analysis of the state of the footways in the borough.

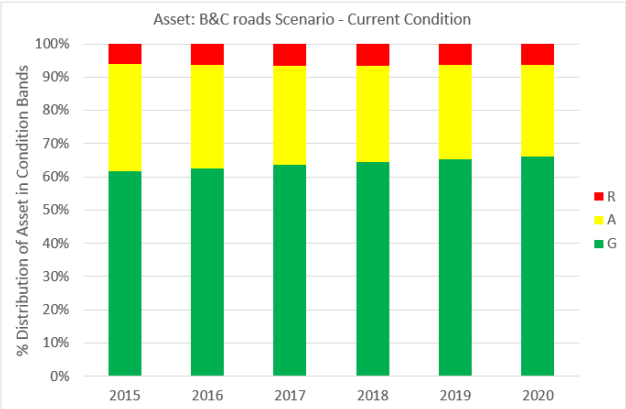
7.2 Figure 5 overleaf, illustrates the predicted condition of the carriageways on the principal network (A Roads) non-principal network (B and C roads) and the unclassified network (U roads) should the current carriageway budget and maintenance strategy continue.

Figure 5: Condition prediction at the current budget for carriageways

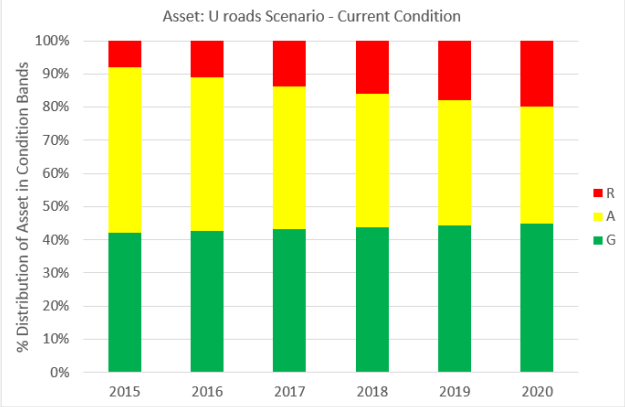
A Road Network: Current Budget - £361,350



B&C Road Network: Current Budget - £605,550



U Road Network: Current Budget - £683,100



Note 1: Red shows assets in poor condition, Amber shows assets in a deteriorating condition, and Green shows assets in good condition.

7.3 These graphs illustrate that at the current level of funding, and using the present maintenance strategy, the existing carriageways funding will enable a broadly steady state condition over 5 years for the A and B/C networks. However, the unclassified road network shows a deteriorating condition. This deterioration in condition will manifests itself in several ways, including:

- An increase in the number of roads needing repair i.e. more cracks visible, leading to potholes, more uneven roads, etc.
- An additional liability on personal injury or damage claims.
- An increase in the number of potholes, triggering more responsive maintenance to meet statutory duty.
- A 'fire-fighting approach' being adopted rather than 'invest to save' measures, hindering the Royal Borough's ability to demonstrate robust asset management practice.

7.4 Based on the current budget and maintenance strategy, there will be 89km of roads in need of repair by 2019/20, a 43km rise from 2014/15. This will have a big implication upon the level of reactive maintenance required, and therefore reducing the budget available for planned maintenance work.

7.5 We have also predicted that there will be a circa £30,000 rise in potential compensation claims to £70,000 by 2019/20.

7.6 This information is now being used to support a business case for targeted funding to maintain the current condition of the A, B/C and unclassified carriageways and prevent deterioration. This could be achieved through a combination of an appropriate level of funding and adjustments to the existing maintenance strategy.

8. WHAT ARE THE BEST INVESTMENT OPTIONS FOR THE FUTURE?

8.1 We have also investigated a number of investment options to help us understand how the carriageways network condition will change over a 5 year period.

8.2 Four budget scenarios were processed (

8.3 Table 5) to predict the impacts of maintaining, reducing, increasing and redistributing the level of funding.

Table 5: Budget Scenarios

Budget Scenarios	**Annual Budget**	**Capital Expenditure (over 5 years)**
Current	£1,650,000	£9,900,000
Reduced (-50%)	£825,000	£4,950,000
Enhanced (+50%)	£3,300,000	£18,439,709
Steady State	£2,370,000	£14,230,500

8.4 The results of the investment modelling suggests that the current budget (£1.65million) enables a broadly steady state condition over 5 years for the A and B/C networks. However, the unclassified road network shows a deteriorating condition.

8.5 The reduced budget scenario (£0.8million) is shown to be insufficient to maintain the present condition across all classifications.

8.6 The enhanced budget scenario (£3.3million), is sufficient to maintain a steady state condition in unclassified roads. However, the A and B/C network shows a rapid improvement in condition, based on current strategy and budget distribution.

8.7 It should be noted that any increased expenditure would be offset to a certain extent by a reduction in reactive maintenance expenditure and a reduced likelihood of third party claims.

8.8 The disparity between condition trends for A, B & C roads and U roads indicates that a redistribution of budgets could aid a steady state condition across all classifications. Within the modelling we distributed the budget from 22% to 17% for A roads, 37% to 26% for B&C

roads and 41% to 58% for U roads. With this redistribution the overall budget to maintain a steady state was calculated at £2.4million.

8.9 It is possible that a steady state scenario could be achieved with a lower budget, with improvements to the current maintenance strategy, such as the adoption of innovative treatments and materials. We work closely with our highway maintenance contractors and monitor the industry for such opportunities.

8.10 A separate modelling run was also conducted, removing the surface dressing maintenance technique, to examine the effect this would have on road condition and overall budgets. The results of this analysis showed a significant decline in condition across all carriageway classifications. To maintain a steady state condition without the use of surface dressing, the budget would need to be circa £3.0million.

8.11 The recommendation of the investment modelling is to target a steady state condition, with an increased budget of £2.4million. This requires an adapted distribution of funding to ensure that unclassified roads are maintained to the same level as A and B/C roads, as well as the continued use of cost effective preventative treatments such as surface dressing.

8.12 Further results of the investment modelling undertaken can be found in the separate report 'Investment Modelling 2015 Carriageways for Royal Borough of Windsor and Maidenhead'.

9. HOW DO WE DEVELOP A 3 YEAR INDICATIVE PROGRAMME FOR THE MAINTENANCE OF THE NETWORK?

9.1 Our 3 year indicative programme for the maintenance of the carriageways and footways network is refreshed annually. This enables forward planning, helps forecast budget requirements and co-ordination of works with utility companies and other regeneration schemes.

9.2 We prioritise works using prioritisation tools, incorporating data from Coarse Visual Inspections (CVI), Detailed Visual Inspections (DVI) and SCANNER surveys, collected by specialist surveying companies. Site investigations, conducted by the Royal Borough engineers, ensure that that defects being triggered and the respective treatments reflect the defects that matter most to the Royal Borough. These factors determine the priority ranking of every carriageway. The views of the public and non-engineering factors are also taken into account at this stage. This is highlighted in

9.3 Figure 6 outlining the importance that these external factors play in developing the works programme.

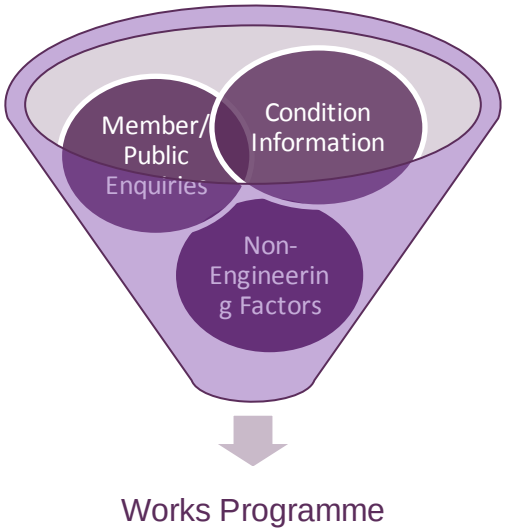
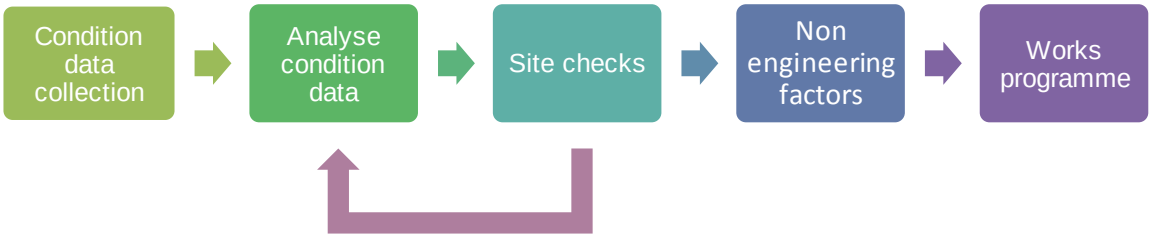


Figure 6: Work programme inputs.
A flowchart showing how the forward works programme is developed is shown in Figure 7.

Figure 7: Carriageways and footways programme of works process



10. HOW DO WE DECIDE WHAT TREATMENT IS RIGHT?

Planned Maintenance

10.1 Deciding what treatment is best value for the carriageway and footway from the suite of treatment options available (

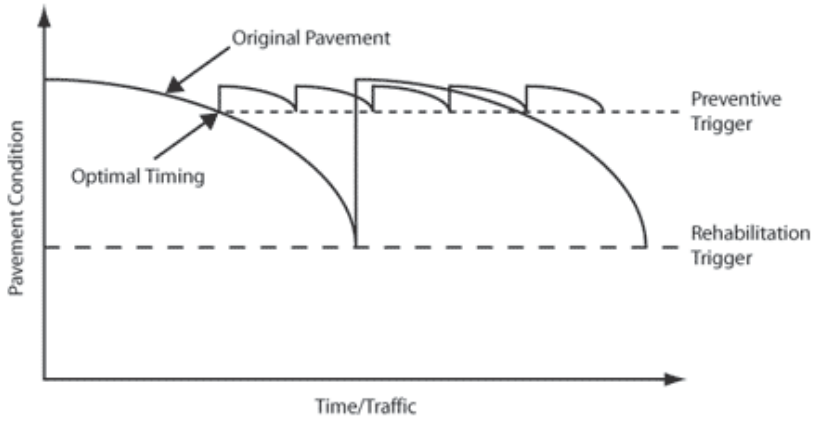
10.2 Table 6), both in the short and long term, is based on a series of factors.

10.3 It is our intention to select treatments which prolong the life of the assets in the most cost effective manner. Rather than just considering the up-front cost of a treatment we analyse its whole life cost. I.e. Treatment X may cost £10/m2 but only last 3 years, whereas Treatment Y may cost £20/m2 but last 10 years. In this example, assuming both treatments offer an acceptable level of performance, we would choose Treatment Y.

10.4 It should be noted however that it is not the intention of the Royal Borough to deliver a 'gold plated' planned maintenance service that eliminates all roads in the red condition zone. This would be extremely expensive and the entire available budget would be focused on a very small percentage of the network. Instead, as per HMEP guidance, we take a balanced approach to addressing deep structural repairs (in the red zone) and applying preventative, thin surfacing treatments (in the amber zone). In this way we can prevent roads in the amber

zone become red through early intervention with cheaper treatments. This is often cost effective and minimises disruption.

Figure 7 - Pavement Lifecycle Options



10.5 Our suite of potential planned maintenance treatment options is fed into our scheme builder tool which triggers treatments based on the condition information. This is then checked on site, and may be confirmed with coring samples, local knowledge of the site and relative traffic conditions.

Table 6: The Royal Borough's current suite of treatment options

Condition	Carriageway treatments	Footway treatments
Red	Plane and Resurface	BIT Reconstruction 170mm
	Asphalt Concrete	BIT Resurfacing 75mm
		ASP Reconstruction
Amber	Surface Dressing	BIT Slurry seal 10mm
		ASP Take up and relay

Reactive Maintenance

10.6 Reactive maintenance techniques are covered in detail in the Highway Maintenance Management Plan. It is the Royals Borough's intention that reactive maintenance, such as pothole repairs, follows the principle of 'right first time' to avoid short-term repair failures and necessitating repeat visits. This is not always possible where the defect presents and immediate danger and requires a quick fix.

11. HOW WILL WE ENSURE THE HAMS IS WORKING?

11.1 This strategy will be reviewed and updated annually to ensure we capture and adopt asset management best practice as it evolves, to update investment modelling and to ensure the highway maintenance objectives remain aligned to the corporate objectives of the council.

11.2 The strategy will be under constant use and scrutiny, and should the need arise for interim updates, possibly due to changes in national guidance or the Royal Borough circumstances, then we will carry these out.

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

APPENDIX A – THE ROYAL BOROUGH'S HIGHWAY ASSET VALUATION

Table 7: Asset valuation report figures for 2013/14.

Asset Group	GRC (£'000)	DRC (£'000)	Depreciation	
			(£'000)	%
Carriageways	£1,148,850	£1,116,969	£31,881	2.77%
Footways	£188,109	£96,363	£91,746	48.77%
Highway Structures	£134,048	£93,074	£40,974	30.56%
Street Lighting	£24,455	£23,092	£1,363	5.57%
Traffic Management	£6,877	£3,649	£3,228	46.93%
Street Furniture	£11,413	£11,413	£0	0%
Highway Land Area (m^2)	£1,322,095	1,070,394	£251,701	19%
Gross Replacement Cost (GRC)	£2,835,847		**£420,893**	
Depreciated Replacement Cost (DRC)		£2,414,954		
Depreciation	14.84%			

Note: In 2016/17 the Whole of Government Accounts (WGA) for highway assets will form part of the Council's audited balance sheet.

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

APPENDIX B – CORPORATE GOVERNANCE POLICY - 2014/2015 - CORPORATE OBJECTIVES RELEVANT TO THE HAMS

Table 8: The Royal Borough's relevant corporate objectives

Corporate Objectives	
Objective 1	Work both for and with the community in an open and effective manner, taking account of the views of all of our stakeholders, regularly reporting on our activities, performance and financial position, and maintaining the highest standards of integrity in all our dealings with the community.
Objective 2	Ensure that Service Delivery Arrangements secure the continuous improvement of services and that agreed policies, priorities and decisions are implemented on time, in a manner consistent with the needs of users and in the most efficient and effective way.
Objective 4	Exercise the highest standards of care and control over the assets and resources available, ensuring that these are protected from the risk of loss, damage or misuse, are used in the most efficient, effective and economic way and deliver services in a way that represents the best value for money achievable.
Objective 5	Ensure that the highest standards of professionalism and integrity are maintained and that all those associated with the council demonstrate leadership and public service commitment in conducting the affairs of the authority in an open and accountable manner.

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

APPENDIX C – PERFORMANCE BENCHMARKING WITH NEIGHBOURING COUNCILS

Table 9: Carriageways performance benchmarking with neighbouring councils for 2013/14

Indicator	Windsor & Maidenhead*	Bracknell Forest	Buckinghamshire	Reading	Slough	Surrey	West Berkshire	Wokingham	Neighbour Council Average
National Performance Indicators, Single List									
130-01: Percentage of principal classified roads where maintenance should be considered	7%	7%	6%	8%	9%	5%	3%	5%	6%
130-02: Percentage of non-principal classified roads where maintenance should be considered	6%	6%	8%	6%	9%	6%	7%	6%	7%
Percentage of unclassified roads where maintenance should be considered	8%*	5%	34%	Not available	5%	18%	8%	11%	14%

*Windsor & Maidenhead unclassified road performance indicator is from 2014/15 as condition data was not collected in 2013/14.

Appendix B

THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

Document Name	RBWM Highway Asset Management Strategy 2015		
Document Author	Chris Wheeler, Highways and Transport Business Manager		
Document owner	Simon Fletcher, Strategic Director of Operations		
Accessibility	Will be available on the RBWM website		
File location	TBC		
Destruction date	TBC		
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Royal Borough of Windsor and Maidenhead

Operations Directorate
Highways & Transport

HIGHWAY MAINTENANCE MANAGEMENT PLAN (HMMP)

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Abbreviations

The following abbreviations are used in this plan:

HMMP	Highway Maintenance Management Plan
NRSWA	New Roads and Street Works Act
NSG	National Street Gazetteer
PMS	Pavement Management System
PROW	Public Right of Way
SCANNER	Surface Condition Assessment
HAMP	Highway Asset Management Plan
TRMM	BA 63/94 - may be obsolete referenced in Structures section page 36
UKPMS	UK Pavement Management System
COP	Well Maintained Highways - Code of Practice for Highways Maintenance Management

EXECUTIVE SUMMARY

The Royal Borough has a statutory duty to manage and maintain the (public) highway network within the Borough. The network is the single most important and valuable asset managed by the council. Well maintained highways are essential to residents and visitors alike. The network contributes to the delivery of the Council's strategic objectives and the shared priorities of national and local government.

Efficient transport links are vital for a thriving population and economy, providing access to employment, education, healthcare, retail outlets, leisure and to all the other services and supplies we rely upon to support our needs. Maintenance of the network is vital to ensure it can continue to provide the principal element of the overall transport network.

The Highways Maintenance Management Plan (HMMP) sets out the Royal Borough's approach to providing guidance on the policies and procedures informing our highway maintenance practices. It is based upon the three Codes of Practice, listed below, published by the Roads Liaison Group with the support of the Department of Transport. The HMMP seeks to follow the framework and recommendations of the Codes of Practice whilst recognising the need for regular review and amendment to reflect local circumstances.

- 'Well lit Highways' - Code of Practice for Highway Lighting Management published in November 2004
- 'Well Maintained Highways' - Code of Practice for Highway Maintenance Management published in July 2005
- 'Management of Highway Structures' – A Code of Practice published in September 2005

The HMMP recognises that our highway maintenance cannot operate in isolation from the Council's other functions and responsibilities. The underpinning strategy demands a logical and systematic approach to achieve value for money and continuous improvement. It encompasses our statutory duties, the wish to maintain and enhance the value of the network asset and the necessity to be responsive to the needs of the community.

Section 1: Introduction

1.1 Introduction

The highway network is a key and highly visible community asset supporting both the local and national economy and contributing to the character and environment of the Royal Borough. The importance of highway maintenance and its relevance to the management of the highway network for all transport users, whatever their mode, requires an increased emphasis on management and systems to support service delivery.

The HMMP describes the policies, strategies and processes which shape the way the Royal Borough will develop and deliver its highway network maintenance service. The Plan will be reviewed as necessary and certainly during the development of the Royal Borough's Highways Asset Management Plan.

The Codes of Practice identify three core objectives of highway maintenance;

- Network Safety
- Network Serviceability
- Network Sustainability

The aims of the HMMP may be summarised as:

- Maintaining safety for all users of the network;
- Supporting community safety and accessibility;
- Maintaining the value of the network asset;
- Ensuring consistent and appropriate maintenance standards throughout the network with regard to strategic importance and usage;
- Maintaining, so far as possible, safe and efficient traffic movement throughout the Royal Borough by coordinating works in the highway;
- Ensuring optimum use of available funds;
- Facilitating technical and financial monitoring to establish network condition trends and assessing performance against expenditure;
- Ensuring that all highway maintenance is carried out with due regard for the community served and the local environment;
- Implementing the recommendations and principles outlined in the Codes of Practice and continuing development of our current systems and practices;
- Promotion of the constant review of policies and standards to ensure continual development of network maintenance strategies;

- To provide a systematic approach to decision making within a consistent framework of policies, standards and procedures;
- To provide a uniform and common basis for assessing maintenance needs and resource requirements.

1.2 Sustainability

Highway Maintenance and new construction has a direct effect on the four priority areas of sustainable consumption and production, climate change and energy, natural resource protection and environmental enhancement and sustainable communities in the following ways:

- They consume large quantities of aggregates and generate large quantities of waste;
- The extraction, processing and transporting of these materials is a significant source of greenhouse gas emissions, particularly in the production of cement and asphalt;
- The use of primary aggregates in preference to recycled or secondary aggregates results in depletion of irreplaceable natural resources and damage to the environment where the aggregates are located;
- The incorrect use of materials can result in pollution of the environment.

For highway maintenance and construction to be sustainable, there needs to be a focus on recycling materials from the existing road wherever possible, using imported recycled or secondary aggregates where appropriate, and choosing techniques that will reduce the level of carbon emissions.

Decisions made and the approach taken by the Royal Borough and its maintenance contractors are therefore crucial in contributing to achieving sustainability in highway maintenance and construction. Sustainability in highway maintenance and construction means living within our environmental limits whilst achieving a sustainable economy.

Highway maintenance has a significant role to play, and impact upon, the achievement of sustainable development. Where possible the following should be taken into account when undertaking major maintenance schemes:

- Does the scheme make use of opportunities to use local materials?
- Are all opportunities realised to minimise noise pollution?
- Does the design process encourage the use of re-used materials as the first option?
- Does the design process encourage the use of recycled materials as the second option?

1.3 Legal Framework

Much of highway maintenance activity is based upon statutory powers and duties contained in legislation and precedents developed over time as a result of claims and legal proceedings. The following Acts and Regulations place mandatory requirements on the Council (this is not an exhaustive list):

• Highways Act 1980
• Environmental Protection Act 1990
• New Roads and Street Works Act 1991
• Road Traffic Reduction Act 1997
• Road Traffic Reduction (National Targets) Act 1998
• Control of Pollution Act 1974
• Land Drainage Act 1976
• Health and Safety at Work Act 1974
• Traffic Signs Regulations and General Directions 1994 & 2002
• Environment Act 1995
• Countryside and Rights of Way Act 2000
• The Noxious Weeds Act 1959
• Road Traffic Act 2000
• The Transport Act 2000
• Rights of Way Act 1990
• Disability Discrimination Act 1995
• Human Rights Act 1998
• Freedom of Information Act 2000
• Management of Health and Safety at Work Regulations 1992
• Construction (Design and Management) Regulations 2007
• Railways and Transport Safety Act 2003
• Traffic Management act 2004
• Local Authorities (Transport Charges) Regulations 1998

Other guidance and advice on management and implementation of highway maintenance include:

• “A New Deal for Transport: Better for Everyone”. The White Paper on Integrated Transport (1998)
• The Local Governments Associations’ Code of Practice on Highway Maintenance (LGACP)
• European and British Standards
• Pesticides Regulations
• European Noise Directive
• Department for Transport Design and Advice Notes
• The Woolf Reforms
• Well-maintained Highways – Code of Practice for Highways Maintenance Management 2005
• Well-lit Highways – Code of Practice for Highway Lighting Management 2004
• Management of Highway Structures – Code of Practice 2005
• Highway Risk and Liability Claims 2005
• Maintaining a Vital Asset 2005

It is the statutory duty of the highway authority to maintain that part of the highway defined as being maintainable at public expense. This duty is consolidated in Section 41 of the Highways Act 1980. Under Section 56 of the Act any person may apply to the courts for an order requiring the highway authority to take remedial action in cases of alleged non-repair by that authority that may also face action for damages resulting from failure to maintain the highway. Section 58 of the Act provides that in the event of an action it shall be a defence to show that the road was kept in a reasonable state of repair having regard for the traffic using it, the standard of maintenance appropriate to its use and public safety.

Section 150 of the Act requires the highway authority to clear obstructions from the highway resulting from the accumulation of snow or from the falling down of banks on the side of the highway, or from any other cause. Section 41 of the Highways Act was amended to expressly include snow and ice in a Highway Authority's statutory duty to maintain the highway. Section 41(1A) states 'In particular, a highway authority are under a duty to ensure, as far as is reasonably practicable, that safe passage along a highway is not endangered by snow or ice.'

The New Roads & Street Works Act 1991 (NRSWA) is an enabling Act setting out the duties of the Council as a Street Authority to co-ordinate and regulate works carried out in the highway by any organisation. Road openings in the highway executed by statutory undertakers under the provisions NRSWA are backfilled and maintained by the organisation making them. The role of the highway authority is mainly that of coordinating and controlling road works and designating traffic sensitive routes and structures of special engineering difficulty.

The Traffic Management Act 2004 introduces a number of provisions including, Local Authority duty for network management, increased control of utility works and increased civil enforcement of traffic offences.

The most important feature of the Act is Section 16(1) which establishes a duty for local traffic authorities 'to manage their road network with a view to achieving, so far as may be reasonably practicable having regard to their other obligations, policies and the following objectives:

- Securing the expeditious movement of traffic on the authority's road network;
- Facilitating the expeditious movement of traffic on road networks for which another authority is the traffic authority.

Section 31 of the Act specifically states that the term 'traffic' includes pedestrians, so the duty requires the authority to consider all road users. The duty is not limited to the actions of the Department responsible for traffic within an authority. Local authorities will need to consider the duty when exercising their powers under any legislation where this impacts on the operation of the network. "Authorities should therefore ensure that the whole organisation is aware of the duty and the implications for them.

1.4 Claims Management

The Royal Borough aims to take timely and effective action to minmise the risk of the highway networks to users. However defects may nevertheless arise that present hazards or inconvenience to the public. Where these lead to a compensation claim against the council this will be fully investigated to establish the council's liability position, with reference to the law on negligence and the appropriate statutes.

The Royal Borough records all safety inspections, service requests, complaints, claims and compliments received, together with any actions taken, so that the authority can seek to provide a robust defence against all claims where there is no legal liability.

Where appropriate claims should be submitted via the Claims Portal to The Royal Borough of Windsor and Maidenhead.

1.5 Network Inventory

The Highways Act 1980 requires the keeping of a register of roads that are maintainable at public expense. There is also a requirement under the New Roads and Street Works Act (NRSWA) 1991 to maintain information for the purpose of:

- Identifying streets described as traffic sensitive where work should be avoided at certain times of the day.
- Identifying structures under or over the street which need special consideration when work is planned.
- Identifying reinstatement categories used by Statutory Undertakers in the reinstatement of their street works.

This information is maintained and updated on a regular basis to take account of new developments and/or amendments to the network, all within the framework of the national Street Gazetteer (NSG). The information is in a format that can be electronically accessed by Statutory Undertakers.

1.6 Network Hierarchy

The network hierarchy is the foundation of a coherent, consistent and auditable maintenance strategy. The hierarchy adopted for the Royal Borough reflects the needs, priorities and actual use of each road in the network. It is also important that local hierarchy is dynamic and regularly reviewed to reflect changes in network characteristics and use.

The COP defines hierarchies for carriageways, footways and cycle ways as presented in the tables below.

Carriageway Hierarchy

Category	Hierarchy Description	Type of Road General Description	Detailed Description
1	Motorway M4 A308(M)/ A404(M)	Limited access motorway regulations apply	Routes for fast moving long distance traffic. Fully grade separated and restrictions on use. These are maintained by the Highways
2	Strategic Route	Principal "A" roads between Primary Destinations	Routes for fast moving long distance traffic with little frontage access or pedestrian traffic. Speed limits are usually in excess of 40 mph and there are few junctions. Pedestrian crossings are either segregated or controlled and parked vehicles are generally prohibited.
3a	Main Distributor	Major Urban Network and Inter–Primary Links. Short – medium distance Traffic	Routes between Strategic Routes and linking urban centres to the strategic network with limited frontage access. In urban areas speed limits are usually 40 mph or less, parking is restricted at peak times and there are positive measures for pedestrian safety.
3b	Secondary Distributor	Classified (B & C) Roads and unclassified urban bus routes carrying local traffic with frontage access and frequent junctions	In rural areas these roads link the larger villages and HGV generators to the Strategic and Main Distributor Network. In built up areas these roads have 30 mph speed limits and very high levels of pedestrian activity with some crossing facilities including zebra crossings. On street parking is generally

4a	Link Road	Roads linking between the Main and Secondary Distributor Network with frontage access and frequent junctions	In rural areas these roads link the smaller villages to the distributor roads. They are of varying width and not always capable of carrying two-way traffic. In urban areas they are residential or industrial inter– connecting roads with 30 mph speed limits random pedestrian movements and uncontrolled
4b	Local Access Road	Roads serving limited numbers of properties carrying only access traffic	In rural areas these roads serve small settlements and provide access to individual properties and land. They are often only single lane width and unsuitable for HGV. In urban areas they are often residential loop roads or no through roads.

Footway Hierarchy

Category	Category Name	Brief Description
1a	*Prestige Walking Zone*	*Prestige areas in towns and cities with exceptionally high usage.*
1	Primary Walking Route	Busy urban shopping and business areas and main pedestrian routes linking interchanges between different modes of transport such as railways and underground stations, bus stops etc.
2	Secondary Walking Route	Medium usage routes through local areas feeding into primary routes, local shopping centres, large schools, industrial centres etc.
3	Link Footway	Linking local access footways through urban areas and busy rural footways.
4	Local Access Footway	Footways associated with low usage, short estate roads to the main routes and *cul de sacs*.

Cycleway Hierarchy

Category	Description
A	Cycle lane forming part of the carriageway, commonly 1.5 metre strip adjacent to the nearside kerb. Cycle gaps at road closure point.
B	Cycle track, a route for cyclists not contiguous with the public footway or carriageway. Shared cycle/pedestrian paths, either segregated by a white line or other physical segregation, or un-segregated.
C	Cycle trails, leisure routes through open spaces. These are not necessarily the responsibility of the highway authority

These maintenance designations are not directly matched to the national classifications such as A, B, or C class roads and the required designations as stipulated by the New Roads and Street Works Act. It was never intended that these hierarchies be the same as they cover different aspects of network traffic and purpose. A reasonable correlation has been established, however, between these and other designations

Section 2: Inspection, Assessment and Recording

2.1 Inspection Categories

It is recognised that an effective regime of inspection, assessment and recording is a crucial component of highway maintenance. The inspection, assessment and recording regime provides the basic information for addressing the core objectives of highway maintenance: network safety, network serviceability and network sustainability. It will also provide condition data for the development of programmes for maintenance as part of the wider HAMP.

The network inspection regime in Royal Borough consists of three types of inspection and surveys:

Network Safety – the inspection and assessment regime seeks to ensure that the network is in a safe condition and that 'safety-related' defects are dealt with at defined intervals and response times. Maintenance works are planned and supervised to ensure safety for all affected parties and appropriate treatments are designed to minimise risks and intervention throughout the lifecycle of the asset.

Network Serviceability – the availability of the network is maximised through effective co-ordination and by the allocation of appropriate resources. The maintenance regime is designed to keep to a minimum the occurrence of unplanned lane closures. Intervention treatments are designed to maintain or enhance the value of the asset. The activities of the statutory undertakers are regulated. The winter maintenance service deals with snow and ice.

Network Sustainability – the design of maintenance treatments considers whole life cost issues, the effect on the environment and accessibility for all.

2.2 Network Safety Inspections

Using a risk based approach the Council will use the following criteria to assess inspection frequency:

1. Category within the network hierarchy;
2. Traffic characteristics, and trends;
3. Incident, complaint and insurance claim history;
4. The number of orders being raised on inspection;
5. Special designation of routes e.g. safer routes to schools, temporary diversion routes.
6. Resurfacing history;
7. Surveys - skid resistance, traffic speed condition, "coarse visual" (see 2.5 Network Sustainability Surveys" for details).

This is not an exhaustive list. To ensure the inspection programme is dynamic and responsive to local conditions, the inspector also uses their discretion based on any additional local factors. The frequencies set out in the tables below should be regarded as a starting point which may be modified following consideration of the above. Carriageways adopted as publicly maintainable are to be inspected in accordance with the following frequencies:

Category Name	Category	Inspection Frequency	Method of Inspection	Maximum Interval Between Inspections
Strategic Route	2	1 month	Driven	6 weeks
Main Distributor	3(a)	1 month	Driven	6 weeks
Secondary Distributor	3(b)	3 month	Driven	16 weeks
Link Road	4(a)	6 months	Driven	30 weeks
Local Access	4(b)	12 months	Driven	60 weeks

Footways and footpaths adopted as publicly maintainable are inspected in accordance with the following frequencies:

Category Name	Category	Inspection Frequency	Method of Inspection	Maximum Interval Between Inspections
Prestige Walking Zone	1a	2 week	Walked	4 weeks
Primary Walking Route	1	1 month	Walked	6 weeks
Secondary Walking Route	2	3 months	Walked	16 weeks
Link Footway	3	6 months	Walked	30 weeks
Local Access Footway	4	12 months	Walked	60 weeks

Cycleways adopted as publicly maintainable will be inspected, in accordance with the following frequencies:

Category Name	Category	Inspection Frequency	Method of Inspection	Maximum Interval Between Inspections
Part of Carriageway	A	As for Roads	Driven	Same as adjacent carriageway
Shared footways and cycleways	B	As per footways	Cycled or Walked	30 weeks

Highway items such as traffic signs, road markings, reflective studs, roadside trees, gully and manhole covers etc. will be inspected for safety during the routine inspection.

Frequencies should be regarded as minimum values, with enhanced frequencies being determined by a simple risk assessment of these factors, carried out by an inspector in consultation with the senior Streetcare officer as per the below.

Risk assessment for variation in inspection frequency

Road no.

From: To:

Circumstances giving rise to the need to vary the inspection frequency:

Existing inspection frequency:

Proposed inspection frequency:

Period of varied inspection frequency:

Completed by: Date:

Endorsed by: Date:

The maximum intervals shown in the table are applied to take account of variations in the available resources due to national holidays, standard leave entitlements, absence due to sickness and the demands of any adverse weather. If the interval is exceeded, a record of the reasons and the mitigation measures taken will be kept.

Safety Inspection of Trees and Landscaped Areas

Trees are important for amenity and nature conservation reasons and should be preserved but they can present risks to the highway users and adjoining land users if they are dead, diseased, damaged or have become unstable. The highway authority is responsible for ensuring that trees outside the highway boundary are made ‘safe’ if due to their condition they are likely to cause danger by any part of them falling on the highway. All trees within falling distance are collectively termed ‘highway trees’. Section 154 of the Highways Act 1980 empowers the authority to deal by notice with hedges, trees and shrubs growing on adjacent land which overhang the highway or are a danger to it, and to recover costs.

Inspectors will take note of any encroachment or visibility obstruction and any obvious damage, obvious ill health or trip hazards and pass any relevant information to the arboricultural team. A programme of detailed tree inspections, for trees situated on the adopted highway, is undertaken by arboricultural advisors.

Information from all inspections, together with any immediate or programmed action, including nil returns, is accurately and promptly recorded, monitored, and utilised with other relevant information in regular reviews of maintenance strategy and practice. This is particularly relevant in the case of safety inspections.

Although maximum intervals are identified in the above tables between inspections, it should be noted that in periods of prolonged extreme weather, it may not be possible to achieve these on all occasions for all classes of inspection category.

2.3 Defect Categories and Priority Response Times

All observed defects that pose a risk to users are recorded and the level of response determined on the basis of inspector judgment. The degree of deficiency in highway elements will take account of particular circumstances. For example the degree of risk from a pothole depends upon not merely its depth but also its surface area and location.

It is the policy of the Royal Borough that all repairs are permanent but if this cannot be arranged within each timescale the defect will temporarily be made safe or signed / barriered off.

Defects are defined in two categories:

Category 1 - Those that require prompt attention because they represent an immediate or imminent hazard or because there is a risk of short-term structural deterioration.

Category 2 - All other categories
Category 2 defects are those which are deemed not to represent an immediate or imminent hazard or risk of short term structural deterioration. Such defects may have safety implications but are not required to be urgently rectified. Access requirements, other works on the road network, traffic levels, and the need to minimise traffic management, should be considered as part of the overall assessment regarding response time.

The priority of response that a defect is to be allocated is based upon a risk assessment which considers impact against probability.

Where a defect is identified a risk score is assessed. This is a value derived by considering the impact and probability of an event. This score identifies the overall seriousness of the risk and the appropriate speed of response to remedy the defect. Inspectors have full discretion to escalate the response if they consider it necessary given the character of the defect and its location.

The priority response time for dealing with the defect is determined by reference to the Risk Response matrix table:

Risk Response matrix

Risk score	Low	Low/Medium	Medium	Medium/High	High	Extreme
Defect category	2	2	2	2	1	1
Response category	P6	P5	P4	P3	P2	P1
Priority response	Within 3 months.	Works to be repaired within 28 calendar days	Up to 14 calendar days	Up to 7 calendar days	24 hours. Make safe or repair.	3 hours. Make safe or repair.

The Defect Assessment Risk Matrix below provides guidance to inspectors on the evaluation of particular defect types and locations.

Defect Assessment Risk Matrix

Appendix C

Potholes and general surface defects						Verge erosion	Depressions	Manholes, stopcocks covers. Gullies
Recognised pedestrian areas, footways and marked cycle lanes.			Carriageway					
Risk of interaction with pedestrians (f/way)	>= 25mm	< 25mm Likelihood of worsening in short term e.g. advanced local crazing likely to pothole.	Risk of interaction with vehicle (c/way)	>= 40mm	<40 mm Likelihood of worsening in short term. Advanced local crazing likely to pothole.	Road edge breaking away so as to be potentially hazardous. >100 mm depth adjacent to f/way edge >150 mm depth adjacent to c/way edge	Sunken bowl type defect with no defined edge determined on a case by case basis. Investigatory levels are >50mm depth and <300mm in width.	If not RBWM, these are referred to the utility companies with P1 and P3 made safe in the meantime.
Extreme. In a town centre or a main footfall area Cat 1a	**P2**	**P4** Inspector discretion for repairs where there is evidence of short term deterioration	Extreme. In line with vehicle path of very high traffic flow. Cat 2	**P2**	**P4** Inspector discretion for repairs where there is evidence of short term deterioration.	**P3** Inspector discretion for repairs where there is evidence of short term deterioration	**P4**	**P1** Cover missing/dislodged
Major. Adjacent to main areas of footfall in vulnerable areas. Cats 1 & 2	**P2**		Major. Adjacent to vehicle path in area of very high traffic flow. Cat 3(a)	**P2**				**P2** broken cover
Moderate. Most other footway areas. Cat 3	**P4**	**P5** Inspector discretion for repairs…	Moderate. Most other carriageway areas. Cat 3(b) and 4(a)	**P3**	**P5** Inspector discretion for repairs…	**P4**	**P5**	**P4** loose or uneven covers
Minor. Negligible risk of interaction, particularly obscure or unused locations. Cat 4	**P5**	**P6** Inspector discretion for repairs…	Minor. Negligible risk of interaction, particularly obscure or unused locations. Cat 4(b)	**P4**	**P6** Inspector discretion for repairs…	**P5**	**P6**	**P5** cracked or noisy covers not providing an immediate danger

2.4 Network Serviceability Inspections

Service inspections are primarily intended to identify deficiencies compromising the overall reliability, quality, comfort and ease of use of the network, from the users point of view. These mainly comprise more detailed inspections tailored to the requirements of particular highway elements to ensure that they meet requirements for serviceability. Service inspections for carriageways, footways and cycleways will generally be undertaken at less frequent intervals than safety inspections. These will be carried out as appropriate for the various functions as set out in Section 3 Policy and Standards.

2.5 Network Sustainability Surveys

A regime of condition assessment surveys has been developed in accordance with the UK Pavement Management System protocols to meet the following objectives;

To comply with national legislation and any National Indicators.

To establish an objective measure of the current condition of the highway pavement asset.

To aid development of planned maintenance programmes.

Survey methods to reflect the different requirements of the network include:

- Skidding resistance
- Traffic-speed condition (SCANNER)
- 'Coarse Visual' surveys

(i) A skid resistance survey will be carried on the principal roads (A roads) every 2 years (half of this class of road each year) with a reassessment of the Investigatory Level each time a road is surveyed. A detailed investigation will be undertaken where the skidding resistance of a site has fallen to, or is lower than the pre-determined Investigatory Level for that site. Treatment should be prioritised if the skidding resistance is significantly below this level, or if the number of accidents or proportion of accidents in wet conditions, or that involving skidding, is greater than normal.

(ii) A SCANNER (Surface Condition Assessment for the National NEtwork of Roads) survey will be carried out on the principal roads (A roads) every year and the non-principal classified (B and C roads) every two years.

Note: SCANNER is a machine survey carried out at traffic-speed and includes the collection and processing of road surface cracking data in addition to GPS location referencing and detailed measurement of transverse profile as well as measurements of longitudinal profile, surface texture and road geometry.

(iii) Coarse Visual Inspections (CVIs) will be carried out on unclassified roads every four years (a quarter of the network each year).

Sustainable treatments are looked at on a scheme by scheme basis. Noise reducing materials are used on highly trafficked roads that are in residential areas for example SMA and all plainings are recycled.

Section 3: Policy and Standards

3.1 Carriageways

Policy

Haunching works are carried out to strengthen and repair the edges of the carriageway.
Funds for haunching will be allocated on a priority basis following a site assessment and taking into account the category of road.

Kerbs and Channels the purpose of kerbs is to protect pedestrians, to provide a channel for surface water and to support the edge of the carriageway.
Apart from urgent repairs undertaken for safety reasons, kerbs or channels will normally be replaced in association with other carriageway or footway works. In all such works provision should be made for dropped kerbs to assist people with mobility handicaps or disabilities in accordance with current codes of practice and opportunities for installing vehicular crossings should also be afforded to adjacent occupiers.

Joint Sealing the object is to optimise the life expectancy of a carriageway by sealing its joints against ingress of water.
Joint sealing to be undertaken as funds permit with priority being given to category 2,3a and 3b roads.

• Highway defects once notified will be assessed . Any repairs identified as necessary will be programmed in accordance with the Royal Borough's adopted priority response times.

Standards

• Haunching will not normally be undertaken on kerbed roads.

• Haunching in unkerbed category 2,3a and 3b roads will normally only be undertaken as part of a reconditioning programme.

• Localised haunching (50m in length or less) may be carried out as part of Basic Structural Maintenance where it is considered necessary for safety reasons.

• Joints and cracks in carriageways of flexible construction to be sealed as required subject to the road not being included in a reconditioning or improvement programme.

• Due regard must be taken of the NRSWA 1991 procedures in respect of those reinstatements that are within the guarantee period and are still the responsibility of the Undertaker.

• Existing trenches or reinstatements which have a level difference greater than that identified in the code of practice in relation to the surrounding carriageway to be repaired with the priority to be determined in relation to the nature of the defect and in accordance with the Royal Borough's adopted priority response times.

• Minor Highway defects such as areas of minor crazing, fretting and isolated weak areas to be patched as a part of a patching programme, subject to the road not being included in a reconditioning or improvement programme.

• Resurfacing of category 2,3a and 3b roads will normally only be undertaken as part of a reconditioning programme.

• Resurfacing of category 4a and 4b roads should be considered where it is more economical to do so rather than undertake extensive patching or pothole repairs, subject to the road not being included in a reconditioning or improvement programme and subject to the budget available

• It is not possible to set standards for when carriageway reconditioning and surface treatments will be undertaken as the inclusion of a scheme in the carriageway reconditioning programme will depend on its assessed priority and on the budget available.

• Any covers, gratings or boxes which have a level difference greater than 25mm in relation to the surrounding carriageway to be re-set with the priority to be determined in relation to the nature of the defect and will be programmed in accordance with the Royal Borough's adopted priority response times.

• Manhole, inspection chamber, valve covers and the like which are defective in any way which are Utility Company apparatus to be reported to the responsible Utility company for action in accordance with approved procedures.

• If these are not made safe within 24 hours after the initial report the Council is to make safe the defect and recover its costs from the Utility Company concerned.

3.2 Footways and Cycleways

Policy

The object is to repair defective areas of footways and cycleways to provide a surface for pedestrians and cyclists which is free from hazardous defects. To ensure highway safety is maintained by undertaking continual programmes of pothole and patching repairs.

Accessibility Improvements the object is to provide dropped kerbs and tactile information where appropriate to ensure that the highway is accessible to all and that health and safety is maintained by providing tactile information.

Footway Reconditioning the object of reconditioning work is to restore the footway to its original standard.
Schemes for inclusion in the annual reconditioning programme will be decided on a priority basis in accordance with the results of condition and usage assessments.

Standards

• Footway Reconditioning It is not possible to set standards for when footway reconditioning will be undertaken as the inclusion of a scheme in the footway

reconditioning programme will depend on its assessed priority and on the budget available.

• Due regard must be taken of the NRSWA 1991 procedures in respect of those reinstatements that are within the guarantee period and are still the responsibility of the Undertaker.

• Existing trenches or reinstatements which have a level difference greater than that identified in the code of practice in relation to the surrounding area to be repaired with the priority to be determined in relation to the nature of the defect and in accordance with the Royal Borough's priority response times.

• Areas of minor crazing, fretting and bumps or depressions to be patched as part of a patching programme taking account of the reconditioning programmes.

• Footway Reconditioning Complete resurfacing should be considered where it is more economical to do so rather than undertake extensive patching or pothole repairs, subject to the footway or cycleway not being included in a reconditioning or improvement programme and subject to the budget available.

3.3 Public Rights of Way

All public rights of way in the Royal Borough are inspected on a three year rolling programme by the East Berks Ramblers on the Council's behalf. These inspections cover the following:

• Signposting off the road in accordance with section 27 of the Countryside Act 1968 and to the extent necessary to allow users to follow the path;

• Free from unlawful obstructions or other interference (including overhanging vegetation);

• Surface and lawful barriers (e.g. stiles, gates etc) in reasonable repair.

Defects that are reported to the Council, either through routine inspections or by members of the public, will be investigated and where they are deemed to pose a safety hazard they will be repaired in accordance with the priorities set out in the Council's Milestone Statement.

Maintenance and enforcement

• Obstruction to footways and footpaths shall not be permitted below 2.4m in height for the entire width of the footway/footpath;

• Obstruction to carriageways shall not be permitted between points 450mm beyond the kerb line and 5.3m above the highest point of the carriageway.

• Where necessary formal notice will be served on land owners under the appropriate statute should there be an obstruction adversely affecting a right of way.

• If they fail to respond the obstruction shall be removed and the costs incurred recovered. Prosecution under Section 137 of the Highways Act 1980 will also be considered, particularly for persistent offenders.

• When a bridge crossed by a right of way requires maintenance the Council's bridge specialists should be consulted to specify the works.

• Maintenance of and requests for new gates and stiles on public paths is dealt with under Section 146 and 147 of the Highways Act 1980. Gates should be capable of being opened from a mounted horse. New stiles or gates can be authorised where the land is to be used for agriculture or forestry and to prevent the ingress or egress of animals on both footpaths and bridleways. Barriers, rails and fences may also be provided to safeguard people using footpaths (Section 66(3) of the Highways Act 1980).

• All other powers open to the Highway Authority in relation to rights of way should be considered as necessary.

• All works carried out on behalf of the Highway Authority (including those undertaken by authorised volunteers) should comply with the Councils Rights of Way Practice Advice Notes applicable at the time.

• Improvements sought solely by owners of property served by rights of way can be authorised on the understanding that they carry out the works to an agreed specification at their own cost, and any maintenance thereafter to that improved standard would continue to fall on them.

• Maintenance of rights of way over and above the standards required for the level of public use where these rights of way are for example over 'private streets' or 'unadopted highways' shall be at the expense of the adjacent property owners.

3.4 Highway Drainage

Policy

Drainage and Ironware the object of highway drainage is to ensure that water is removed from the highway as quickly as possible and is not allowed to pond or penetrate to the foundations of the road.
To undertake any necessary minor works to ensure that existing drainage systems continue to function to their full capacity and where funds are available to assess more major schemes individually for inclusion in a drainage maintenance/improvement programme.

Drainage Cleansing the object is to ensure that surface water is removed from the carriageway as quickly as possible by ensuring that all highway drainage is functioning efficiently.
To undertake the appropriate amount of drainage cleansing commensurate with achieving this objective.

Accumulations of water on carriageways, footways and cycleways can increase risks to the safety of highway users, or frontagers, particularly on high speed roads and when standing water exists in freezing
conditions. Displaced covers and frames can be a hazard to pedestrians and a potential hazard to drivers and cyclists. Damaged covers may collapse leaving a void in the highway.

An effective well maintained drainage system will meet the authorities' duty to prevent nuisance to adjoining landowners by flooding
Pollution of roadside watercourses can occur due to contaminated run off from carriageways.

Standards

• Drainage defects such as collapsed, damaged or missing manholes, catchpits and gullies once notified will be assessed in accordance with approved procedures. Any repairs identified as necessary will be programmed in accordance with the Royal Borough's adopted priority response times.

• Drainage defects such as damaged, broken, or missing gratings and frames which could constitute a hazard to users of the highway once notified will be assessed in accordance with approved procedures and made safe. Any repairs identified as necessary will be programmed in accordance with the Royal Borough's adopted priority response times.

• All gullies, kerb weirs and other drainage channels on highways to be cleansed at least once per annum and other drainage channels as necessary

Highway drainage systems are installed to capture surface water run-off to reduce flooding and protect the fabric of the road.

• Blocked or broken pipework to be remedied when a problem is identified.

• Additional gully cleansing to deal with problem areas to be undertaken as required subject to available budget and other drainage channels as necessary

• Any highway drains which are not discharging to be jetted to attempt to remove the blockage.

• Where blockages are not resolved by jetting these shall be investigated and remedied as required subject to available budget.

• Culverts, manholes and catchpits to be cleansed regularly on a priority basis.

• Soakaways to be checked and cleansed as necessary at least every 5 years.

• Grips to be inspected and cleansed or recut as necessary.

• Highway ditches to be cleansed regularly to ensure the efficient functioning of highway drainage systems and to prevent structural deterioration occurring to the fabric of the highway.

3.5 Embankments and Cuttings

Policy

The object is to preserve the stability of slopes in embankments and cuttings which are part of the highway, including where appropriate, deep ditches.
To implement any measures necessary to maintain highway safety in the event of a problem arising with regard to the stability of a slope.

Standards

• Repairs to slopes to be undertaken on a priority basis as necessary following geotechnical investigations into the cause of the problem.

• Where slopes, etc. in private ownership represent a hazard to the adjacent highway emergency action is to be arranged to make the site safe in accordance with the Royal Borough's priority response times, followed by full repair as part of a works programme following consultation with the owner of the adjacent land.

• Significant embankments and cuttings will be subject to a visual inspection at least every two years. A more detailed specialist geotechnical survey will be arranged if necessary.

• Damage or loss of habitat;

• Interruption or pollution of watercourse

• Extent of damage and reduced life.

• Significant embankments and cuttings will be subject to a visual inspection at least every two years. A more detailed specialist geotechnical survey will be arranged if necessary.

3.6 Landscaped areas and Trees

Policy

The object is to maintain safety, to prevent highway trees from obstructing sight lines, traffic signs and street lights and to prevent encroachment onto both footways and carriageways and prevent damage to third party property.
To promote the safe and healthy growth of highway trees whilst achieving this objective and to ensure that adjoining landowners deal with all matters that are their responsibility, which may affect the highway.

• To prevent damage or injury occurring from failure of a tree or part of it;

• To prevent encroachment onto footways, cycleways and carriageways;

• To prevent highways trees from obstructing sight lines, traffic signals, traffic signs and street lights;

Standards

• All trees on the adopted highway or on land maintained by the Highway Authority should be inspected by an arboriculturist once every five years. This is a default period, which may be reduced on the advice of an arboriculturist All 'highway trees' to be inspected annually taking note of any encroachment or visibility obstructions and any obvious damage, obvious ill health or trip hazards. Where a problem is identified, the advice of an arboriculturist may be sought. Problems identified to be dealt with as necessary, either by the Council or referring the problem to the landowner where appropriate.

• Trees, hedges and shrubs which are the responsibility of the Highway Authority are only to be felled or pruned when necessary to abate, an actionable nuisance, to comply with a statutory obligation or for health and safety reasons. Further details can be found in the 'Tree Management Guidelines' in the Royal Borough's 'Tree and Woodland Strategy 2010-2020'.

• Owners of private hedges and trees to be required to control hedge and tree growth to prevent obstruction on footways and carriageways and ensure appropriate visibility is maintained;

• Obstruction to footways and footpaths shall not be permitted below 2.4m in height for the entire width of the footway/footpath.

• Obstruction to carriageways shall not be permitted between points 450mm beyond the kerb line and within 5.3m above the highest point of the carriageway.

• Ensure that adjoining land owners deal with all matters that are their responsibility, which may affect the highway.

• In cases where an important amenity tree is within clearance distances, the wider environmental considerations shall be assessed against the risk as to whether a minor encroachment can be allowed. This will particularly be the case where tree stems are within 450mm of the kerb line;

• Trees removed shall be replaced where feasible;

• Alterations to the highway will seek to avoid impact on trees/landscape where possible and include mitigation where necessary. In the case of new schemes, the advice of an arboriculturist shall be sought.

3.7 Grass Cutting

Policy

Urban Grass Cutting the object is to ensure that the length of the grass on areas of highway does not become such that it obstructs, sight lines and traffic signs.
To undertake the minimum number of cuts commensurate with maintaining the grass height between 25mm and 75mm.

Rural Grass Cutting the object is to maintain safety, to prevent obstruction of sight lines and traffic signs, to inhibit the growth of injurious weeds and to conserve the wildlife.
To undertake the minimum amount of cutting consistent with maintaining highway safety and to conserve fauna and flora at sites of special scientific interest, cutting the grass to between 75mm and 100mm high.

To manage other areas of verge where appropriate to encourage the growth and survival of local fauna and flora.

Grass is cut for safety purposes to maintain visibility for highway users and to ensure that road and footway widths are not reduced by overgrowing vegetation. In areas where no footway exists there may be a need to provide a safe refuge on the highway verge for pedestrians, particularly on busy roads.

Standards

• Visibility splays and lines of sight to receive additional cuts as necessary to ensure these give maximum visibility at all times.

Grass cutting in urban areas, and on housing estates, is carried to condition standards specified for safety, but additional cuts are carried out for amenity purposes.

• The whole width of all adopted highway verges to be cut a maximum 15 times per year.

• Grass cuttings to be cleared from adjoining hard surfaces, kerblines, channels and mowing margins after mowing.

• Verges divided by a footway will have the whole of the verge between the footway and the kerb cut plus a single swathe width beyond the footway.

• To undertake the minimum amount of cutting consistent with maintaining highway safety and to conserve fauna and flora at sites of special scientific interest, cutting the grass to between 75mm and 100mm high.

• A single swathe width to be cut a minimum of three times per year on all rural verges except at sites of special scientific interest.

• Sites of special scientific interest and other verges which are naturalised to be cut at times when appropriate to do so (i.e. when local flora has flowered and set seed).

3.8 Weed Control

Policy

The object is to inhibit the growth of various plants (as listed in the Injurious Weeds Act 1959) on the highway and to eradicate all plant growth on paved areas to prevent structural damage to the fabric of the highway.

To achieve this objective with the minimum use of chemicals and using only pesticides approved by the Ministry of Agriculture, Fisheries and Food and the Environment Agency for highway maintenance purposes.

Weed growth can impair safety for highway users by reducing available road and footway widths. The Weeds Act 1959 lists a number of weeds which can be injurious to human and animal health. It places a duty on controllers of land to eliminate the following scheduled weeds from their land to prevent seeds contaminating their neighbour's land:
• Spear thistle;
• Creeping or field thistle;
• Curled dock;
• Broad leaf dock;
• Common ragwort.

The Wildlife and Countryside Act 1981 specifies control of certain plants such as giant hogweed or Japanese knotweed. The Ragwort Act 2003 and associated code of practice gives further information on treating the growth of this weed.
The following legislation controls the use of herbicides:
• Food and Environment Protection Act 1985
• Control of Pesticide Regulations 1986
• Health and Safety at Work Act 1974
• Control of Substances Hazardous to Health Regulations 1988

Standards

• Weeds can cause structural damage to the fabric of the highway, disrupt drainage, obstruct pedestrians and look unsightly.

Additional treatments of weed growth for amenity purposes may be undertaken subject to the above policy, and the budget available.

• Weed growth on paved areas to be treated twice per annum using nonresidual weed killers.

• Noxious weeds to be dealt with as necessary on an ad-hoc basis.

3.9 Safety Fences, Edge Markers and Boundary Fences

Policy

Safety Fences, Edge Markers

The object is to maintain safety fences and edge markers in a sufficiently sound structural condition to serve their function and not be dangerous to road users or pedestrians. Safety fences, barriers and edge markers provide separation for traffic and vulnerable road users from each other and other hazards such as watercourses and the edge of the carriageway.

To undertake the minimum amount of maintenance commensurate with achieving this objective.

Boundary Fences

The object of boundary fences which are a highway authority responsibility is to define the highway boundary to define the tops of embankments and to prevent animals etc. from straying on to the highway.

To only undertake maintenance when necessary to maintain highway safety.

Standards

Safety fences

Tensioned safety fences to be inspected whenever repairs are carried out, with regard to loose tensioning bolts. Safety fences and guard rails on category 2 and 3 roads to be cleaned where they are being used in lieu of chevron warning signs where necessary in the interests of road safety.

Damaged safety fences should be made safe within 3 hours of being notified. A full repair to be undertaken following procurement of the appropriate barriers with a timescale to be determined in relation to the nature of the defect.

Safety fences are to be painted as necessary on a priority basis.

Pedestrian barriers

Damaged pedestrian barriers should be made safe as necessary. A full repair to be undertaken following procurement of the appropriate barriers with a timescale to be determined in relation to the nature of the defect.

Pedestrian barriers within Town Centres and other high amenity areas to be inspected annually for condition and appearance.

Guard rails within Town Centres and other high amenity areas to be ‘touched in’ or repainted. Pedestrian barriers are to be painted as necessary on a priority basis.

Other fences including boundary fences

In most cases this fencing will be owned by the adjacent property owner. The owner will be contacted where possible and be requested to make the fence safe. If the owner cannot be contacted will be made safe on an ad-hoc basis to achieve the aim of the adopted policy.

Safety fences, barriers and edge markers need to be kept in a sufficiently sound structural condition to serve their function and not be dangerous to road users or pedestrians.

Fences and barriers in poor repair may be detrimental to the appearance of environmentally sensitive areas. Appropriate designs of barriers should be used in such areas. Breaches in boundary fencing may lead to the risk of stock escaping onto the highway

Edge Markers
Edge markers to be cleaned as necessary in the interest of road safety. Damaged edge markers should be made safe as necessary. A full repair to be undertaken following procurement of the appropriate barriers with a timescale to be determined in relation to the nature of the defect.

3.10 Road Markings and Studs

Policy

Road Markings The object is to ensure that the information given by carriageway markings is clearly visible by day and night particularly in respect of mandatory and warning markings.
To undertake all necessary maintenance to achieve this objective as the provision of adequate road markings is an essential part of the campaign to reduce the number of road traffic accidents.

Road Studs The object is to assist motorists by defining carriageway lanes and edges at night and in conditions of poor visibility.
To maintain all existing reflective road studs to a standard commensurate with this objective

Road markings and studs assist in defining carriageway markings, lanes and edges in darkness and in conditions of poor visibility, particularly in respect of mandatory and warning markings. Loose road studs can present a hazard to road users. Edge markings can reduce damage to carriageway edges.

Standards

Mandatory markings and junction markings to be inspected at the same frequencies as the safety inspection system.

Road markings on category 2,3a and 3b roads to be inspected every year during the hours of darkness.

On category 4a and 4b roads non-mandatory longitudinal warning lines to be renewed when more than approximately 50% of their area becomes ineffective or worn away.

All road markings other than those listed above to be renewed on all categories of road when more than approximately 50% of their area becomes ineffective or worn away.

Road studs should be inspected every 2 years during the hours of darkness.

Road studs to be replaced when more than approximately 20% of those within a drivers vision are defective or missing, subject to the road not being included in a reconditioning or surface dressing programme.

3.11 Traffic Signals, Pedestrian and Cycle Crossings

Policy

Traffic Signals, Pedestrian and Cycle Crossings The object is to keep the signals in correct and efficient operation at all times. To provide appropriate tactile information that is essential for pedestrian safety. To undertake all necessary works to achieve this objective as it is essential for road and pedestrian safety.

Zebra Crossings To undertake all necessary works to achieve this objective as it is essential for road and pedestrian safety. To provide appropriate tactile information that is essential for pedestrian safety.

Standards

Traffic Signals, Pedestrian and Cycle Crossings

• Urgent faults to be attended to within 3 hours of being notified, full repairs being made within 48 hours.

• Individual lamp failures to be replaced within 48 hours of being notified

• External inspection for alignment of heads, cleansing of lenses and examination for damage to be undertaken every 12 months.

• All lamps to be bulk changed every 12 months.

• A detailed functional check and electrical examination, including phasing, to be undertaken annually in line with periodic inspection schedule or when a fault is suspected.

• Full electrical insulation and earth impedance tests to be undertaken every 5 years, or in line with the latest Industry standards should they change.

• Non-urgent faults to be attended to within 48 hours of being notified, full repairs being made within 72 hours.

Zebra Crossings

• Pedestrian crossings to be inspected for illumination every month.

• Individual lamp failures to be attended to within 24 contract hours of being notified and made safe.

• All lamps to be bulk changed every 3 months.

• A detailed functional check, including beacon control mechanism, and electrical examination to be undertaken annually or when a fault is suspected.

• Full electrical insulation and earth impedance tests to be undertaken every 3 years.

• Electrical faults to be repaired with the priority to be determined in relation to the nature of the defect but in any case within 5 working days

3.12 Non-illuminated Traffic Signs and Bollards

Policy

The object is to keep all traffic signs legible and visible from as far as possible at all times in relation to the road use and traffic speeds

To undertake all necessary maintenance to achieve this objective as the provision of adequate signing is an essential part of the campaign to reduce the number of road traffic accidents.

• Identification of risk to users;

• Indication of mandatory and statutory manoeuvres and restrictions;

• Separation of potential traffic conflicts

• Heavy traffic routing can optimise highway maintenance;

• Can contribute to the local economy;

• Support of sustainable transport modes.

Standards

• Sign cleaning on category 2,3a and 3b roads only to be undertaken when necessary in the interests of road safety.

• All signs to be inspected for general condition once per annum.

• Signs on category 2,3a and 3b roads to be inspected every year during the hours of darkness.

• Signs on category 4a and 4b roads to be inspected every 2 years during the hours of darkness.

• Damaged or missing signs to be repaired or replaced with the priority to be determined in relation to the nature of the defect.

3.13 Street Lighting, illuminated Traffic Signs and Bollards

Policy

Street Lighting The object is to maintain an appropriate level of illumination keeping energy consumption to a minimum and to protect the capital investment in street lighting equipment. To undertake the minimum amount of maintenance commensurate with achieving this objective, using the most energy efficient lamps and equipment.

Traffic Signs and Bollards (Illuminated) The object is to ensure that all illuminated signs and bollards are legible by day and night. To undertake all necessary

maintenance to achieve this objective as the provision of adequate signing is an essential part of the campaign to reduce the number of road traffic accidents.

Street lighting is provided to meet the duty of care role the authority has to provide road safety benefits to all users, support the integrated transport network agenda, public amenity and crime reduction.

Street lighting needs to be kept in good operating order and sound structural condition to serve their function and not be dangerous to road users or pedestrians

Cyclical maintenance intervals for lighting installations should be determined to ensure the installation's correct operation and light output, minimize failures and maximize life.

Street lighting in poor repair may be detrimental to the appearance of environmentally sensitive areas. Use of appropriate columns should be used in such areas.

Standards

• Defects which could be dangerous to be attended to within 3 hours of being notified and made safe.

• Electrical faults to be repaired in line with those stated in the contract with the priority to be determined in relation to the nature of the defect.

• Damaged columns to be replaced in line with those stated in the contract with the priority to be determined in relation to the nature of the defect.

• A detailed electrical check to be undertaken annually or when a fault is suspected.

• Full electrical insulation and earth impedance tests to be undertaken every 3 years.

• Lamp columns to be checked for structural integrity and condition every 5 years

• Street lights to be inspected for illumination monthly during the hours of darkness.

• All lamps to be bulk changed at regular intervals according to lamp life characteristics.

• Generally metal lamp columns to be 'touched in' or repainted as necessary when required.

• Metal lamp columns in high amenity areas to be 'touched in' or repainted as necessary annually in the spring.

3.14 Bridges and other Highway Structures

Policy

Bridges and other Highway Structures Bridges and highway structures need to be maintained to such a standard that structural inadequacy does not affect the use of the highway network, the safety of all users of the highway is reasonably assured and the condition of the structure does not compromise the amenity of the area in which it is located.

Bridge Inspections The purpose of regular bridge inspections is to check the condition of all structures and identify any deficiencies that require attention.
To ensure that all defects of a safety nature or that put the structural integrity of the structure at risk are repaired or made safe as soon as is reasonably practicable.

General inspections of all elemental:

Minor Structural Maintenance The object is to ensure that all structures are maintained so that their continued performance in service without loss of safety and efficiency is assured.

To undertake all necessary works to achieve this objective, unless the bridge or culvert is programmed for renewal or strengthening wizen only the minimum of maintenance consistent with safety will be carried out.

Major Structural Maintenance (Strengthening) The object is to accommodate 40 tonne vehicles on all strategic routes and all local routes which serve the particular needs of local industry.
To assess existing bridges to identify the need for strengthening and replacement in order to meet this objective and to undertake a rolling programme of bridge strengthening and replacement in order of priority.

Standards

Special inspections to be carried out as follows:

• When necessary to investigate a specific problem or if a particular problem has been identified on other similar structures;

• When a structure has to carry an abnormal heavy load if assessment calculations indicate that the margin of safety is below that which would be required for a design to current standards or if similar loads are not known to have been carried before. Inspections should be undertaken before, during and after the passage of the load;

• If unexpected settlement is observed;

• To check river bridge foundations during principle inspections. Where probing indicates the possibility of scour, further underwater inspections should be carried out;

• To investigate possible structural damage after major accidents or fires adjacent to structures.

• Defects which cause a hazard to users of the highway to be made safe within 3 hours of being notified followed by repair as soon as reasonable practicable.

• Principal inspections for all structures to be carried out at intervals not exceeding nine years.

• Iron and steel work of structures to be painted in a periodic works programme, the frequency of which will be determined by local conditions and the results of inspections.

• All bridges to be assessed with assessments being carried out in road category order.

Special inspections to be carried out as follows:
• To investigate possible structural damage after major accidents or fires adjacent to structures.

• Non-urgent minor structural maintenance to be assessed on a priority basis taking account of the road category, the structural importance of the element of the bridge that is affected and the severity of the defect. The inclusion of works in the minor maintenance programme will depend on their assessed priority and the budget available.

• The bridge strengthening and replacement programme to prioritised taking account of the road category, the availability and suitability of alternative routes and the carrying capacity, condition, estimated future life span and maintenance costs of the bridge.

• The inclusion of a structure in the bridge strengthening programme will depend on its assessed priority and on the budget available.

3.15 Sweeping and Street Cleansing

Policy

There are four main purposes of sweeping and street cleansing:

• To remove debris from the channels in order to prevent surface water ponding, and an excess of detritus being washed into gullies.
• To remove loose material or deposits that could present a hazard to highway users. To remove or treat moss where it is identified as a safety hazard on the footway
• To maintain a clean and tidy environment and ensure the general cleanliness of the highway network.

The first and third objectives should be achieved in order to meet statutory requirements under the Environmental Protection Act, and the second to maintain highway safety, when necessary on an emergency basis only.

Standards

• Emergency sweeping and cleansing to be undertaken only when immediate action is required to remove deposits or spillages to maintain public safety.

• Footways and adjacent areas at shopping parades to be cleaned and litter removed at least once a week.

• All outer urban roads and rural roads will be swept and litter removed at least 8 times a year.

• Fly-tipping to be removed from the highway as soon as practicably possible.

• Litter complaints to be responded to promptly in accordance with the corporate policy.

• Within these designated Category 1 areas, the Contractor shall Sweep and De-Litter so as to achieve Grade A standard by 08:30hrs each morning."

• In the event that roads within these areas fall to grade "B" or below, they shall be restored to Grade "A" within one (1) hour, and thereafter maintain a standard better than Grade "B" at all other times, until 20:00hrs in Windsor town centre and until 19:00.

• Litter bins will be emptied as necessary to prevent them overflowing in Windsor and Maidenhead town centres. All other bins will be emptied at least once a month.

3.16 Verge Maintenance

Policy

The object is to maintain verges to facilitate grass cutting, to provide a safe refuge for pedestrians where there are no footways, to prevent the encroachment of verge soil and growth onto paved areas and so far as possible to minimise damage caused by improper use, particularly by vehicles

To undertake the works necessary commensurate with achieving this objective, taking into consideration the likely cause of the need for maintenance

Standards

• Verge repairs should only be carried out on a priority basis as determined by a site inspection and may include minor measures to prevent reoccurrence of damage where appropriate.

• Siding of footways and cycleways should be carried out where required to maintain their width.

• Carriageway siding of unkerbed roads should be undertaken where necessary and prior to renewal of edge of carriageway markings

3.17 Pumping Stations

Policy

The object is to ensure that the highway does not flood by pumping surface water to a suitable outfall in places where there is no natural point of discharge.
To undertake all necessary maintenance commensurate with achieving this objective

Standards

• Defects which could be dangerous to be attended to within 4 hours of being notified and made safe.

• Faults to be repaired with the priority to be determined in relation to the nature of the defect but in any case within 20 working days (4 weeks).

• A general inspection to be undertaken monthly to ensure continued satisfactory operation of pumping stations.

• A detailed electrical and mechanical check to be undertaken annually or when a fault is suspected.

3.18 Highway Encroachments And Obstructions

The Council has a responsibility to keep public highways open and remove obstructions and encroachments which may affect the use and safety of the highway**.**

This policy covers the regulatory matters relevant to this responsibility, which include issues such as obstructions, encroachments, highway obstructions and licences related to permitted activities on the highway.

Policy

The Council shall take any necessary measures to ensure that the public maintained highway is safe to use and be enjoyed by the public.

Encroachments on the Highway

Any encroachment on the public highway is preventing the legitimate use of the highway and whenever an encroachment has taken place on the public highway measures shall be taken by the Authority to remove the encroachment. (Or if appropriate and the land is considered surplus to highway requirements the extinguishments of Highway Rights may be pursued under Section 116 of the Highways Act 1980.)

Whenever an encroachment is suspected on the public highway, the Authority shall carry out a status check to determine the exact limits of the highway thereby establishing whether an encroachment has occurred.

Removal of obstructions

Obstructions on or over the highway prevent the legitimate use of the highway and are a potential safety hazard for road users and measures shall be taken by the Authority for the removal of the obstruction.

Obstructions on the highway take various forms and the most commonly encountered occurrences are as follows.

Items placed on the highway causing an obstruction (unauthorised signs, erections, materials or trading booths).

The Council shall serve notice under the appropriate section of the Highways Act to deal with the removal of the obstruction.

Overhanging trees and hedges

The Council shall serve a notice under Section 154 of the Highways Act 1980 on the owners of overhanging hedges and trees requiring that they are cut back to provide the necessary clearance and abate any nuisance.

Unauthorised Signs on the Highway

It is necessary to place signs on the highway to give information and direction to the road user in the interests of road safety and mobility. These signs, for highway purposes, are placed under statutory powers and regulations are in place in relation to the type and positioning of these signs.

Policy

The Council has no power to authorise any signs placed on the highway other than for highway purposes and shall invoke its powers under section 132, 137 and 143 of the Highways Act 1980 to remove unauthorised signs.

Royal Borough of Windsor and Maidenhead

Operations Directorate
Highways & Transport

HIGHWAY SAFETY INSPECTION MANUAL (HSIM)

Highways & Transport
Operations Directorate
Royal Borough of Windsor & Maidenhead
Town Hall
St Ives Road
Maidenhead
SL6 1RF

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Abbreviations

The following abbreviations are used in this plan:

EToN	Electronic Transfer of Notices
NRSWA	New Roads and Street Works Act
SUSTRANS	A Charitable organisation that administers The National Cycle Network
WERR	Windsor and Eton Relief Road
COP	Well Maintained Highways - Code of Practice for Highways Maintenance Management

Section 1: Introduction

1.1 Introduction

This document forms part of the Royal Borough of Windsor and Maidenhead's Highways Asset Management Plan and describes the procedures for carrying out Highway Safety Inspections and sets out consistent investigatory levels to be applied across the road network for assessing the occurrence of safety defects with the highway boundary.

Motorway and All Purpose Trunk Roads that pass through the Royal Borough's geographical boundary are the responsibility of Highways England and their Agents and as such are outside the remit of this policy.

The responsibility for maintaining private streets rests with the landowner or frontagers and as such is outside the remit of this policy.

The Inspectors Duties
Inspectors should carry out scheduled inspections of the adopted highway in accordance with the frequencies set out in Section 2. They also carry out ad hoc inspections in response to Customer Contacts and Adverse Weather events.

Systems
The Council uses Pitney Bowes Confirm software for recording inspections and Highway asset data, QGIS for its mapping requirements and Agresso for its financial records. We are currently carrying out assessments to enable mobile working using handheld technology.

Recording Defects
Inspectors where appropriate will mark up defects on site or will photograph the site to assist contractors in the location and identification of an area for repair works. Photographs may also be used for before and after comparisons following repair works for quality control purposes.

Works Order
All Works Orders to both internal and external contractors are issued via the Confirm system. This function is currently office based but will be site based following changes to allow mobile working. Works orders will normally be raised the same day a defect is recorded or as soon as is reasonably practicable.

Customer Enquiries
All highway maintenance related customer contacts are logged onto Confirm and issued to the area inspector for site inspections and action where appropriate.

1.2 Legislation

Under Section 41 of the Highways Act 1980 the Council as a Highway Authority has a statutory duty to maintain a public highway in a safe manner for all users. Neglecting this duty can lead to claims against the Council for damages resulting from a failure to maintain the highway.

Under Section 58 of the Highways Act 1980, the highway authority can use a special defence in respect of action against it for damages for non-repair of the highway if it can prove that it has taken such care as was reasonable. Part of the defence rests upon:
"*Whether the highway authority knew, or could have reasonably expected to know, that the condition of the part of the highway to which the action relates was likely to cause danger to users of the highway"*

This is where highway authorities have to show that they carry out highway inspections in accordance with their policies and national guidance. Highway inspection reports are part of the evidence used to show that the highway authority has acted reasonably.

The highway authority must also record all customer reports of highway defects, however not all defects which the authority becomes aware of by inspection or customer report need to be repaired.

Statutory Undertakers have a duty to maintain their apparatus in the highway (New Roads and Streetworks Act, Section 81) but it has been established that they can rely on the highway authority's safety inspection to some extent when defending claims. To avoid the possibility of the Council becoming jointly liable in a claim resulting from an incident involving Statutory Undertakers apparatus, any defect identified must be faxed, emailed or notified via EToN to the appropriate Undertaker within 24 hours, or as soon as practically possible after the defect has been identified.

1.3 Purpose of Safety Inspections

Inspecting the highway allows the Council to identify and take action to remove those hazards causing danger to highway users. The inspections also help to develop longer term planned maintenance programmes to help deliver the Highway Asset Management Plan.

Safety inspections are designed to identify all defects likely to create danger or serious inconvenience to users of the network or the wider community. This includes defects that require urgent attention (within 24 hours) as well as those where the location and reduced level of severity is such that a longer response time is acceptable, or confirm that no repair is needed.

Highway Safety Inspections also:

• Identify defects which should be repaired as part of a maintenance programme to arrest further deterioration and avoid more serious problems developing.

• Demonstrate a structured inspection regime, which can provide evidence for the Highway Authority to defend claims.

Section 2: Network Hierarchy and Inspection Frequency

A network hierarchy is the foundation of the maintenance strategy and safety inspection regime. The hierarchy adopted by the Royal Borough reflects the needs, priorities and actual use of each road in the network.

The Highway Safety inspection regime has been developed with reference to the COP.

2.1 Carriageways

Carriageways adopted as publicly maintainable are to be inspected in accordance with the following frequencies:

Category Name	Category	Inspection Frequency	Method of Inspection	Maximum Interval between Inspections
Strategic Route Principal A roads between Primary Destinations	2	1 month	Driven	6 weeks
Main Distributor Other A and heavily trafficked B roads	3a	1 month	Driven	6 weeks
Secondary Distributor Other B and C roads	3b	3 months	Driven	16 weeks
Link Road Local through routes, main estate roads and all other bus routes	4a	6 months	Driven	30 weeks
Local Access Urban and Rural unclassified side roads	4b	12 months	Driven	60 weeks

2.2 Footways

Footways adopted as publicly maintainable are inspected in accordance with the following frequencies:

Category Name	Category	Inspection Frequency	Method of Inspection	Maximum Interval between Inspections
Prestige Walking Zone Prestige Shopping Area	1a	2 weeks	Walked	4 weeks
Primary Walking Route Busy Shopping Parade areas and Busy urban areas	1	1 month	Walked	6 weeks
Secondary Walking Route Medium usage through local area and outside local shops and schools	2	3 months	Walked	16 weeks

Link Footway Local access through urban area and busy rural footways	3	6 months	Walked	30 weeks
Local Access Footway Low usage estate roads	4	12 months	Walked	60 weeks

2.3 Cycleways

Cycleways adopted as publicly maintainable will be inspected, in accordance with the following frequencies:

Category Name	Category	Inspection Frequency	Method of Inspection	Maximum Interval between Inspections
Part of Carriageway	A	As for carriageway	Driven	Same as adjacent carriageway
Part of Shared use Footway	B	As for footway	Cycled or Walked	Same as adjacent footway

Any Cycle tracks that are not part of the adopted public highway are not included within any inspection regime e.g. off road SUSTRANS routes.

In the case of highway surfaces being obscured by flood water or snow to such an extent that an inspection cannot take place during the maximum interval an inspection will be carried out as soon as possible after the obstruction has cleared and resources become available.

Section 3: Safety Inspections

3.1 Procedure / Method

Highway safety inspections focus on the recording of defects that are deemed to pose a hazard but not at the expense of the inspector's own safety or that of others using the highway.

The safety of all road users must not be compromised when carrying out the inspection and the list given under the headings Vehicle Inspections and Inspections on Foot details the practice to be adopted. Where an inspector feels that the procedures given do not give sufficient protection at specific locations they should inform their manager.

The Inspector is responsible for carrying out and recording all scheduled Highway safety inspections. This includes a good description of the location for every item recorded in sufficient detail to enable all other parties involved a reasonable chance to locating its position and using known abbreviations.

Highway Safety Inspections should be avoided during the hours of darkness/dusk or under conditions of poor visibility, e.g. snow, fog, heavy rain.

Carriageway and cycleway inspections can be undertaken on foot if the associated footway is being inspected at the same time.

3.2 Driven Inspections

Driven inspections are always be carried out by two inspectors in a suitable vehicle and at a speed that enables defects to be spotted. The guidance speed is 25mph, although this is not always possible, particularly on unrestricted dual carriageway. Driven inspections of the A332 Royal Windsor Way and A335 WERR Slough Spur will usually be undertaken at prevailing traffic speeds.

One inspector will drive and the other will be looking for defects. The driver is not expected to be actively looking for and recording defects. The name of both inspectors must be recorded for insurance purposes.

Class A high visibility jackets must be worn whenever inspectors alight from the vehicle. When necessary to stop it is preferable to park the vehicle off the carriageway. If this cannot be achieved and the vehicle must be stopped on the carriageway then there should be clear visibility in both directions, the light bar should be switched on, and moving vehicles should not be forced to cross solid centre line road markings.

3.3 Walked Inspections

Walked inspections are carried out by one inspector who will walk down one footway surveying that footway and the adjoining carriageway to the centreline, then walk the opposite footway in the alternative direction repeating this process.

High visibility jackets to Class A must be worn where the footway is narrow or not continuous and part inspections involves walking on a verge or carriageway.

3.4 Associated Matters

a) Formalised pedestrian crossing points - should have the same safety defect standards as those defined for the adjacent footways.

b) Uncontrolled pedestrian crossing (dropped kerbs and tactile slabs) - should be treated as footway and the intervention levels for these areas will be the same as for footways.

c) Parking bays - within the highway should be treated as carriageways with the intervention levels for defects being the same as those for carriageways. This means that parking bays located along a road will not require an enhanced regime; however areas where there is a higher than average footfall, such as shopping parades which include parking will be risk assessed to review inspection regimes.

d) Cycleways within the highway should be treated as carriageway or footway, depending on their location, with the intervention levels for defects being the same as those for the carriageway or footway.

e) Fences and barriers – A visual inspection of all Highway fences, pedestrian barriers and safety fences will be undertaken during routine highway safety inspections. Any obvious damage to tensioned restraint barriers should be recorded and details reported to the Structures Team as soon as possible.

f) Road markings and Non-illuminated traffic signs - A coarse assessment of the overall condition of signs, road markings and studs will be made at each carriageway safety inspection.

g) Due to the impracticability of carrying out detailed inspections, manhole and utility covers will not be subject to any specific inspection beyond a visual check as part of the scheduled regime. Where practical ironwork within footways in hierarchy category 1a and 1 will be stepped on to ensure its stability.
Whilst the following fall within other maintenance and inspection regimes the Highway Inspector is expected to note and report any potential hazard during a Safety Inspection;

i) Street Lighting columns, illuminated signs and Traffic Lights - missing covers or panels, exposed wiring, damaged / defective / displaced or missing traffic signals shall be recorded and details passed to the Electrical Team as soon as possible.

ii) Highway Trees – The Council has a Duty to ensure that all trees growing on or within falling distance of the highway do not pose a danger to Highway users. Therefore a basic visual inspection will be included in highway safety inspections. Trees will be inspected at the same time as the footway to which they are adjacent. If the tree is not adjacent to a footway the carriageway inspection regime will be used. Should a basic visual inspection raise concerns with trees the information must

be passed to the Arboriculture Team so that an appropriately trained inspector can investigate within 28 days of notification.

iii) Bridges and Retaining walls – surface cracks or potholes in the surface of an overbridge should be identified and recorded as per adjacent carriageway and footways. Any obvious damage to a bridge or retaining wall parapet should be recorded and details reported to the Structures Team as soon as possible

iv) Railway Level crossing - Carriageways, cycleways and footways and other highway features between the STOP road markings, traffic warning lights, barriers & associated
signs are the responsibility of Network Rail. Although the Council is not responsible for safety inspections between the STOP markings, any potential safety defect identified during safety or any other inspections will be reported to Network Rail as soon as possible.

Section 4: Defects

All observed defects that are deemed to pose a safety hazard to highway users are recorded. The level of response is determined with reference to the Risk Response Matrix (see 4.1) together with inspector judgement. Inspectors have full discretion to escalate the response if they consider it necessary given the character of the defect and its location.

The Defect Assessment Risk Matrix below provides guidance to inspectors on the evaluation of particular defect types and locations.

Depressions are generally identified as a sunken bowl type defect with no defined edge. Whether a depression is an actionable safety defect will be determined on a case by case basis by the inspector with particular reference to the Defect Assessment Risk Matrix.

Defect Assessment Risk Matrix

Appendix D

Potholes and general surface defects						Verge erosion	Depressions	Manholes, stopcocks covers. Gullies
Recognised pedestrian areas, footways and marked cycle lanes.			Carriageway					
Risk of interaction with pedestrians (f/way)	>= 25mm	< 25mm Likelihood of worsening in short term e.g. advanced local crazing likely to pothole.	Risk of interaction with vehicle (c/way)	>= 40mm	<40 mm Likelihood of worsening in short term. Advanced local crazing likely to pothole.	Road edge breaking away so as to be potentially hazardous. >100 mm depth adjacent to f/way edge >150 mm depth adjacent to c/way edge	Sunken bowl type defect with no defined edge determined on a case by case basis. Investigatory levels are >50mm depth and <300mm in width.	If not RBWM, these are referred to the utility companies with P1 and P3 made safe in the meantime.
Extreme. In a town centre or a main footfall area Cat 1a	**P2**	**P4** Inspector discretion for repairs where there is evidence of short term deterioration	Extreme. In line with vehicle path of very high traffic flow. Cat 2	**P2**	**P4** Inspector discretion for repairs where there is evidence of short term deterioration.	**P3** Inspector discretion for repairs where there is evidence of short term deterioration	**P4**	**P1** Cover missing/dislodged
Major. Adjacent to main areas of footfall in vulnerable areas. Cats 1 & 2	**P2**		Major. Adjacent to vehicle path in area of very high traffic flow. Cat 3(a)	**P2**				**P2** broken cover
Moderate. Most other footway areas. Cat 3	**P4**	**P5** Inspector discretion for repairs…	Moderate. Most other carriageway areas. Cat 3(b) and 4(a)	**P3**	**P5** Inspector discretion for repairs…	**P4**	**P5**	**P4** loose or uneven covers
Minor. Negligible risk of interaction, particularly obscure or unused locations. Cat 4	**P5**	**P6** Inspector discretion for repairs…	Minor. Negligible risk of interaction, particularly obscure or unused locations. Cat 4(b)	**P4**	**P6** Inspector discretion for repairs…	**P5**	**P6**	**P5** cracked or noisy covers not providing an immediate danger

4.1 Categories
The COP defines defects in two categories:

Category 1 - Those that require prompt attention because they represent an immediate or imminent hazard or because there is a risk of short-term structural deterioration.

If it is not possible to correct or make safe the defect at the time of inspection, which will generally be the case, repairs will be carried out as soon as possible and in any case within a period of 24 hours (or within 3 hours if considered to pose a particularly high risk). It is the policy of the Council that all repairs are permanent but if this cannot be arranged within each timescale the defect will be temporarily made safe or signed / barriered off.
Where further, permanent repairs are required these will, where possible, be carried out within 28 days. If, in order to carry out the works safely, a road closure or extensive traffic management is required then further works will be programmed to be undertaken as soon as practicable.

All Category 1 defects are therefore assessed and prioritised as follows:

Priority 1 – Works to be repaired or made safe within 3 hours of notification to the contractor.

Priority 2 – Works to be repaired or made safe within 24 hours of notification to the contractor.

Category 2 - All other categories.

Category 2 defects are those which are deemed not to represent an immediate or imminent hazard or risk of short term structural deterioration. Such defects may have safety implications but are not required to be urgently rectified. Access requirements, other works on the road network, traffic levels, and the need to minimise traffic management, should be considered as part of the overall assessment regarding response time.

The priority of response that a defect is to be allocated is based upon a risk assessment which considers impact against probability.

Category 2 defects are therefore assessed and prioritised as follows

Priority 3 – Works to be repaired within 7 calendar days.
Priority 4 – Works to be repaired within 14 calendar days.
Priority 5 – Works to be repaired within 28 calendar days.
Priority 6 – Works will be programmed by the contractor and agreed by the Council to be commenced with three months

For defects involving utility plant or other private equipment the Highway Authority is obliged to notify the owner of the apparatus that a defect is present, failure to do so may lead to the Highway Authority being held liable for any damage or injury to other third parties. Where a Category 1 defect is found then the relevant utility must be

informed and allowed to take the appropriate action. Where the action has not been taken within the specified time the Highway Authority must take steps to render the defect safe. Costs for the action may be reclaimed.

Risk Response matrix

The road hierarchy and defect location are important considerations in this assessment. In general, the greater the traffic flow, the higher the probability of an event occurring.

Where a defect is identified a risk score is assessed. This is a value derived by considering the impact and probability of an event. This score identifies the overall seriousness of the risk and the appropriate speed of response to remedy the defect. The priority response time for dealing with the defect is determined by reference to the Risk Response matrix table:

Risk score	Low	Low/Medium	Medium	Medium/High	High	Extreme
Defect category	2	2	2	2	1	1
Response category	P6	P5	P4	P3	P2	P1
Priority response	Within 3 months.	Works to be repaired within 28 calendar days	Up to 14 calendar days	Up to 7 calendar days	24 hours. Make safe or repair.	3 hours. Make safe or repair.

4.2 Investigatory Levels

The table below describes the defects that inspectors seek to identify during safety inspections.

Items for inspection, defect type and intervention levels

Item	Defect Type	Intervention Level
Carriageway	Pothole / spalling	40mm depth (150mm across in any horizontal direction)
	Ridge or rutting	40mm – depth
	Sunken cover	40mm depth
	Gap/crack	40mm depth (> 20mm width)
	Depression	>50mm, ≤300mm

Item	Defect Type	Intervention Level
Footway	Trip / pothole / sunken cover	25mm depth (75mm across in any horizontal direction)
	Rocking slab / block	Identifiable rocking
	Missing item such as lack of dropped kerb causing a barrier to access	Item identified
	Missing item – tactile paving	Event Occurrence
	Depression	>50mm, ≤300mm
Kerbs	Misaligned / chipped/cracked	50mm
	Loose/rocking Missing	Event Occurrence
	Gap/crack	25mm
Verge Erosion	Adjacent to carriageway edge	Depth 150mm
	Adjacent to footway edge	Depth 100mm
Statutory Undertakers Iron work	Gaps within framework (other than designed by manufacturer)	40mm carriageway, 25mm footway
	Level differences within framework	Event Occurrence.
	Rocking covers Cracked / broken covers Worn / polished covers Missing covers	Event Occurrence – Notify relevant Statutory Undertaker in line with NRSWA Procedures.
Flooding	Standing water two hours after cessation of rainfall 1.5m from edge of carriageway	Event Occurrence
	Substantial running water across carriageway	Event Occurrence
	Substantial running water across footway	Event Occurrence
	Property inundation as a result of defective highway drainage	Event Occurrence
	Blockage of waterway resulting in flooding of adjacent properties or ground	Event Occurrence
	Flooded subways following pump failure/drain blockages	Event Occurrence

Item	Defect Type	Intervention Level
Highway Drainage	Substantial standing water adjacent to edge of carriageway	Event Occurrence
	Blocked gully (silted above outlet)	Event Occurrence
	Collapsed/blocked/ settled items or systems	Event Occurrence
	Gully Covers – Rocking, cracked, broken, missing	Event Occurrence
	Soakaway Covers – Damaged, Looses, rocking, missing	Event Occurrence
Road markings	Faded or worn markings	50% loss of effective markings
Road studs	Missing hole left in c/way	Event Occurrence
	Displaced item on c/way	Event Occurrence
	Defective item	Event Occurrence
Non-illuminated Signs/bollards	Damaged/misaligned item causing a hazard (including sign fixings)	Event Occurrence
	Missing item causing a hazard (including sign fixings)	Event Occurrence
	Item missing	Event Occurrence
	Item obscured/dirty/faded	Event Occurrence
Safety fencing and barriers	Item damaged or misaligned causing a hazard	Event Occurrence
	Unstable item or section	Yes/no
Trees, hedges and shrubs	Unstable tree causing danger of collapse onto highway	Yes/no
	Overhanging tree/hedge/shrub leading to loss of height clearance over carriageway, footway or cycleway	< 5.3m over carriageways < 2.4m over footways < 2.4m over cycleways
Vandalism	Offensive graffiti	Event Occurrence
Highway general	1. Oil/debris/mud/stones and gravel likely to cause a hazard	Event Occurrence
	2. Street furniture missing/ damaged likely to cause a hazard	Event Occurrence
	3. Illegal signs	Event Occurrence
	4. Obstructions in the highway	Event Occurrence

Item	Defect Type	Intervention Level
	5. Obstructed sight lines 6. Illegal Ramps in carriageway to aid vehicular movement	Event Occurrence Event Occurrence
	7. F/way damage caused by vehicular access where no vehicle crossing	Event Occurrence
	8. Scaffolding likely to cause a hazard 9. Skips likely to cause a hazard	Event Occurrence Event Occurrence
	10. Unprotected building materials on the highway 11. Abandoned vehicles likely to cause a hazard 12. Weeds and moss	Event Occurrence Event Occurrence Event Occurrence

Whether these defects should be treated as Category 1 in particular circumstances, the nature and speed of response will depend, amongst other things, upon the assessed risk posed by:

• the depth, surface area or other degree of deficiency of the defect or obstruction;

• the volume, characteristics and speed of traffic;

• the location of the defect relative to highway features such as junctions and bends;

• the location of the defect relative to the positioning of users, especially vulnerable users, such as in traffic lanes or wheel tracks;

• the nature of interaction with other defects;

• forecast weather conditions, especially where there is a potential for freezing of surface water.

If a defect is found below intervention level then the inspector may identify the area for repair. However, this will depend on whether the defect is perceived to be hazardous due to its location, or whether the defect will deteriorate by the time of the next inspection. Therefore, it may not be necessary to identify such a defect for repair on roads that are inspected on a higher frequency, as it will be possible to monitor the progress of the defect as it approaches or exceeds intervention level.

KBI Summary Report

KBI 23 - Condition of highways

This report provides a complete picture of your Authority's results for KBI 23 - Condition of highways. It shows your ranking, how you compare with others and how your results are changing over time. It also includes details of the best performing Authorities for this KBI in this year's survey.

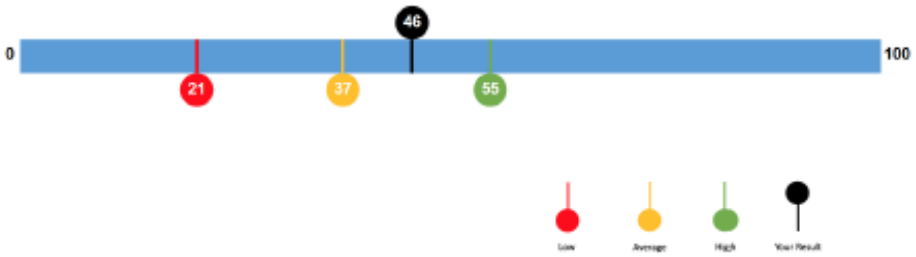
This year's results

The number of your residents responding to this year's survey, and your result for this KBI compared with the other Authorities taking part in the survey this year.

Your Responses

582

How your result this year oompares with others



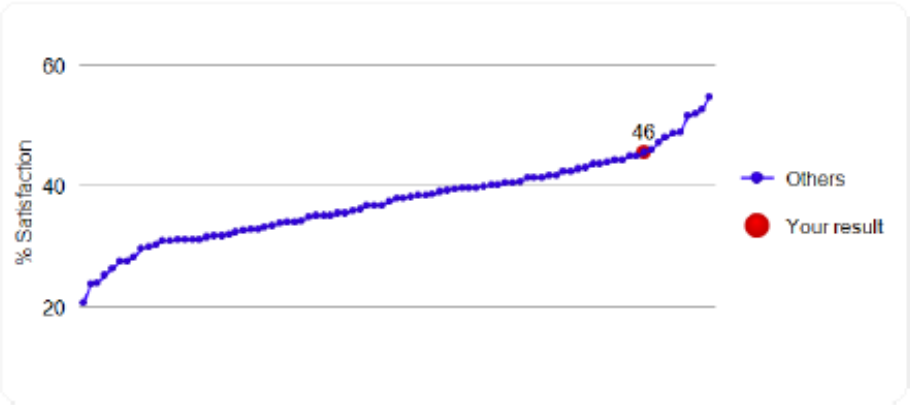
Ranking against others

The ranking of your result for this KBI against other authorities in the survey this year, and the distribution of this year's results for this KBI.

Your Ranking

10 of 87

Where your result appears in this year's distribution of results



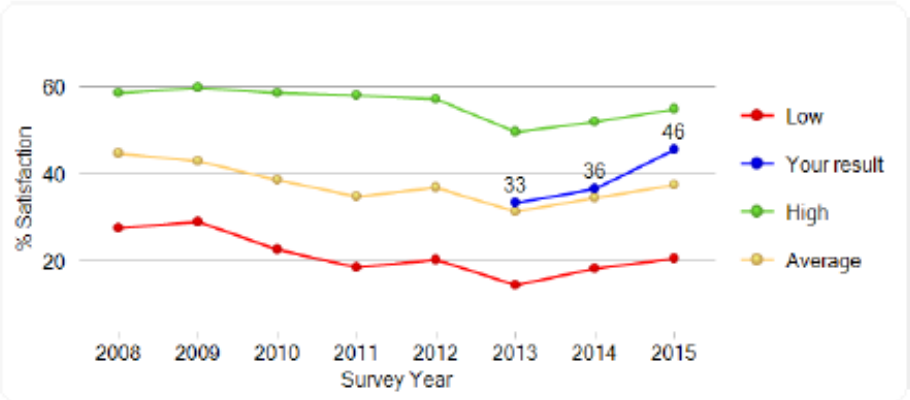
Comparing results over time

The change in your Authority's result for this KBI from last year, 'your trend', and the change in results for this KBI over the last eight years.

Your Trend

9

How your results oompare with others over time



KBI Summary Report

KBI 24 - Highway maintenance

This report provides a complete picture of your Authority's results for KBI 24 - Highway maintenance. It shows your ranking, how you compare with others and how your results are changing over time. It also includes details of the best performing Authorities for this KBI in this year's survey.

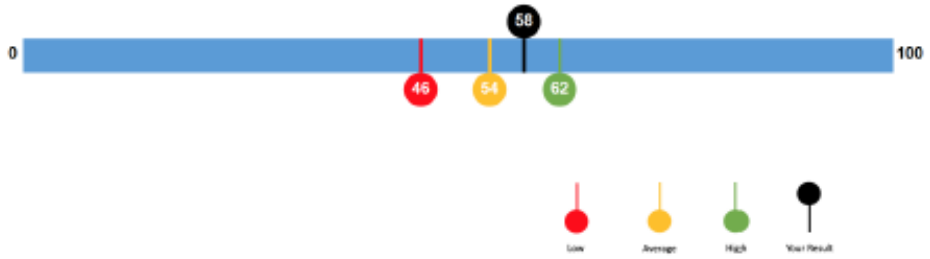
This year's results

The number of your residents responding to this year's survey, and your result for this KBI compared with the other Authorities taking part in the survey this year.

Your Responses

582

How your result this year compares with others



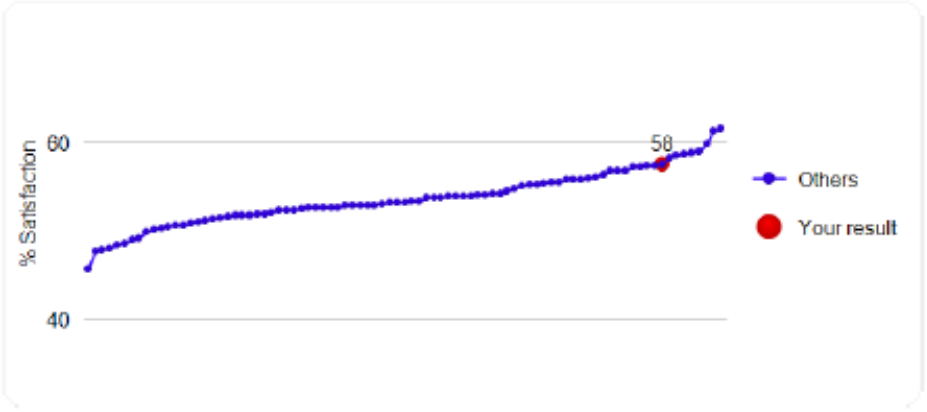
Ranking against others

The ranking of your result for this KBI against other authorities in the survey this year, and the distribution of this year's results for this KBI.

Your Ranking

9 of 87

Where your result appears in this year's distribution of results



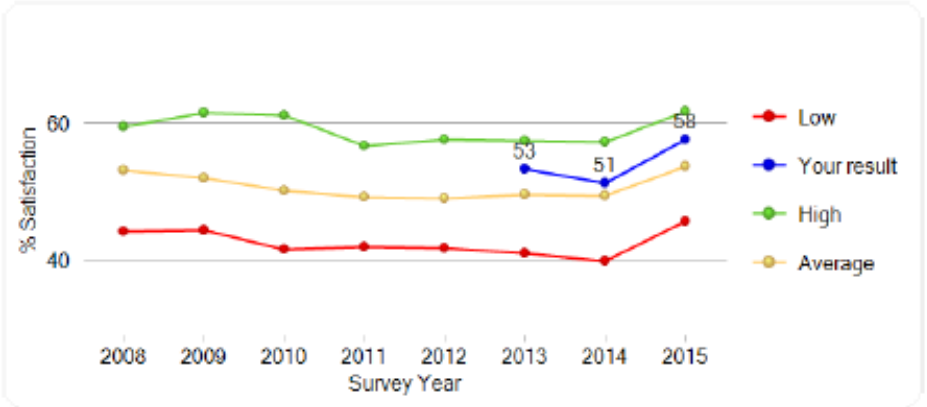
Comparing results over time

The change in your Authority's result for this KBI from last year, 'your trend', and the change in results for this KBI over the last eight years.

Your Trend

6

How your results compare with others over time



INVESTMENT MODELLING 2015

CARRIAGEWAYS

FOR

ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

THE ROYAL BOROUGH OF
WINDSOR AND
MAIDENHEAD

Prepared by:	Mehdi Jawad	Date:	November 2015
Reviewed by:	Simon Jones	Version:	V 1.1

Contents

1. Executive Summary

Royal Borough of Windsor and Maidenhead's (Windsor and Maidenhead) Highways team wish to develop a robust business model to support future funding opportunities, to ensure adequate funding of highway assets to achieve the Council's desired provision of services.

For this reason, Windsor and Maidenhead appointed Metis Consultants Ltd (Metis) to liaise with the Highways team and to conduct highway asset investment modelling to deliver the supporting information required for a robust business model. This report outlines the results of this investment modelling for the carriageway network.

The carriageway network totals 602.4km; A Roads 83.8km, B&C Roads 171.4km and U Roads 347.2km.

Using two systems in tandem, Metis' Regenerate–IM and the Highways Maintenance Efficiency Programme's (HMEP) Lifecycle Planning Toolkit, eight budget scenarios were modelled, predicting the condition of the A, B/C and Unclassified (U) carriageway networks over 5 years to 2020. The budgets modelled are shown in Table 1 below.

Asset Group	Budget Scenario 1	Budget Scenario 2	Budget Scenario 3	Budget Scenario 4
	Current Budget	Reduced Budget (-50%)	Enhanced Budget (+50%)	Steady State
All Carriageways	£1,650,000	£825,000	£3,300,000	£2,371,750
Asset Group	Budget Scenario 5	Budget Scenario 6	Budget Scenario 7	Budget Scenario 8
	Current Budget	Reduced Budget (-50%)	Enhanced Budget (+50%)	Steady State
All Carriageways (without surface dressing)	£1,650,000	£825,000	£3,300,000	£3,000,000

Table 1 - Budget scenarios

The results of the investment modelling suggests that the current budget (£1.65million) enables a broadly steady state condition over 5 years for the A and B/C networks. However, the Unclassified Road network shows a deteriorating condition.

Considering the current budget scenario without surface dressing (SD) as a treatment option, this shows a deterioration in condition across all classifications.

The reduced budget scenario (£825,000) is shown to be insufficient to maintain the present condition across all classifications. Similarly without surface dressing.

The modelling results indicate that the enhanced budget scenario (£3.3million), is sufficient to maintain a steady state condition in Unclassified Roads. However, the A and B/C network shows a rapid improvement in condition. This disparity between the condition trend for the Unclassified network and the A and B/C networks indicates that the current budget distribution could be rebalanced to even up these trends across all classification. In comparison to the 'without surface dressing scenario' the A and B/C network shows very similar results for the enhanced budget. However, for the Unclassified Road network there is a rapid decline condition.

The modelling indicates that a budget of £2.4million is required to maintain a steady state condition across all classifications. An extra £0.8million on existing current budget. Without surface dressing as a treatment option, the steady state budget is circa £3.0million, almost double the current budget.

The condition of the network as a whole and the impact of capital (planned maintenance) investment on the cost of pothole repairs and third party claims is shown in Table 2 below. Where the revenue expenditure is made up of Cost of Claims, Cost of Pothole Repairs and Cost of Re-occurring Defects.

Budget Scenarios	Capital Expenditure (Initial year to 2020)	Revenue Expenditure (Initial year to 2020)	Grand Total (Initial year to 2020)
Current (£1,650,000)	£9,900,000	£5,396,597	£15,296,597
Reduced (£825,000)	£4,950,000	£6,855,638	£11,805,638
Enhanced (3,300,000)	£18,439,709	£3,474,681	£21,914,390
Current without SD (£1,650,000)	£9,900,000	£6,814,005	£16,714,005
Reduced without SD (£825,000)	£4,950,000	£7,563,855	£12,513,855
Enhanced without SD (3,300,000)	£19,715,349	£5,318,734	£25,034,083
Steady State (£2,371,750)	£14,230,500	£4,161,041	£18,391,541
Steady State without SD (£3,000,000)	£18,000,000	£4,133,631	£22,133,631

Table 2 - Impact on Reactive Maintenance Need and Third Part Claims

Only half the scenarios apply to Windsor and Maidenhead's current maintenance strategy. The other half does not include surface dressing as a treatment option. Funding across the asset groups apply to Windsor and Maidenhead's historic budget distribution. In order to achieve steady state, funding was redistributed to across the road classifications in both steady state budget scenarios.

To elaborate on the condition banding and definitions and key for graphs;

Red	roads is need of maintenance
Amber	roads where maintenance should be considered
Green	roads in good condition

The condition of the network as a whole and the impact of capital (planned maintenance) investment on carriageways with and without surface dressing is shown in Tables 3, 4, 5 and 6 below.

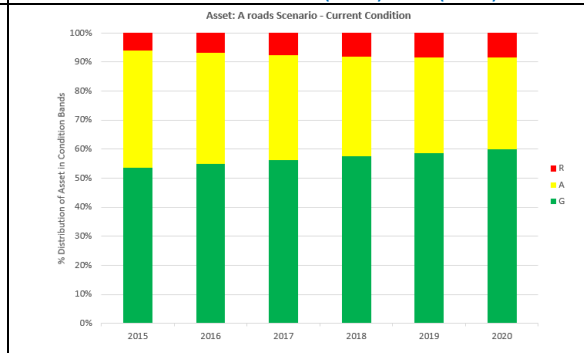
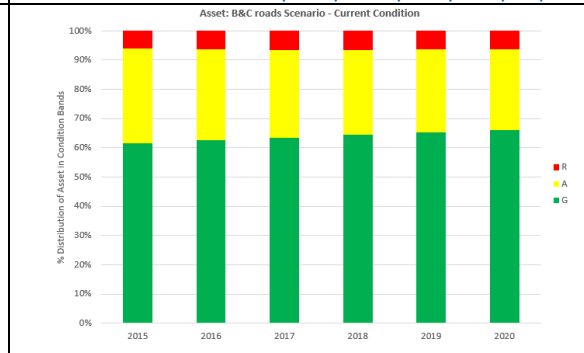
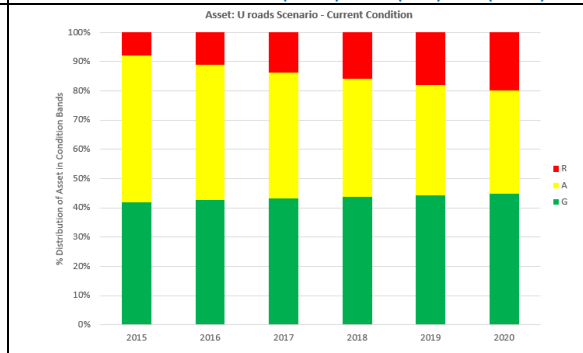
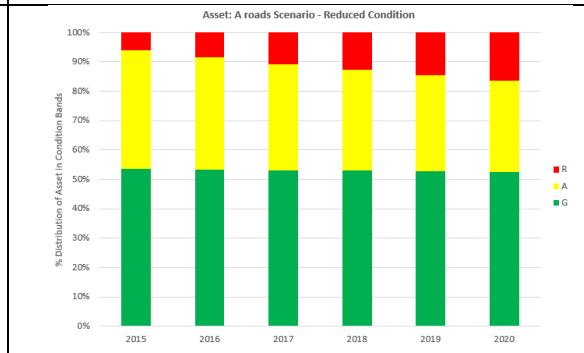
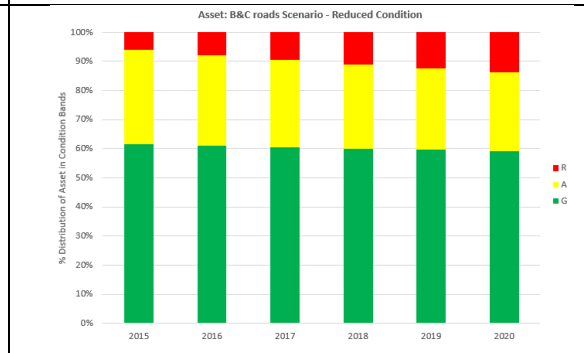
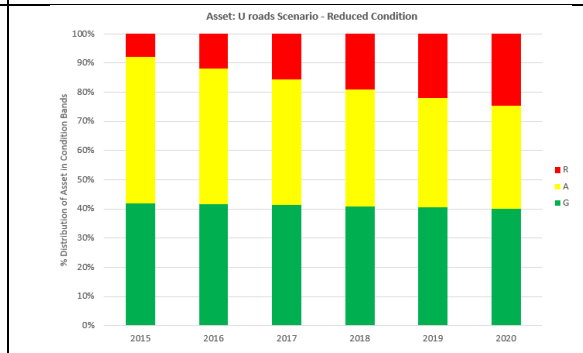
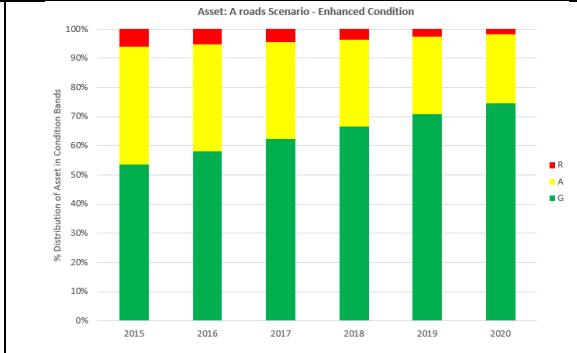
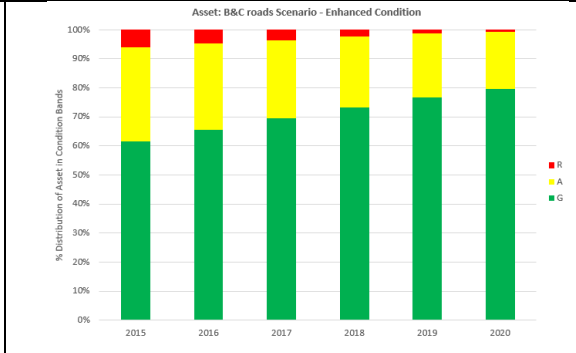
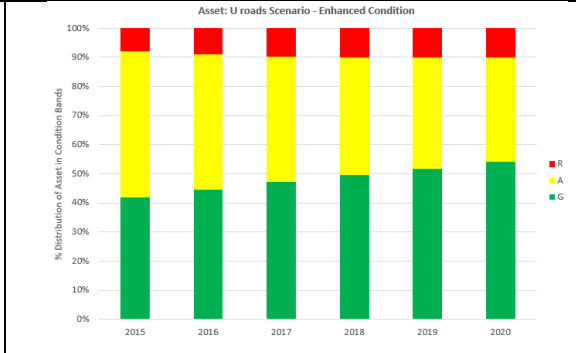
	A Road Network % treatments - SD (54%) PRS (46%)	B&C Road Network % treatments - SD (48%) PRS (49%) AC (3%)	U Road Network % treatments - SD (25%) PRS (7%) AC (68%)
Current Budget (£1,650,000)			
Reduced Budget (£825,000)			
Enhanced Budget (£3,300,000)			

Table 3 - Budget scenarios

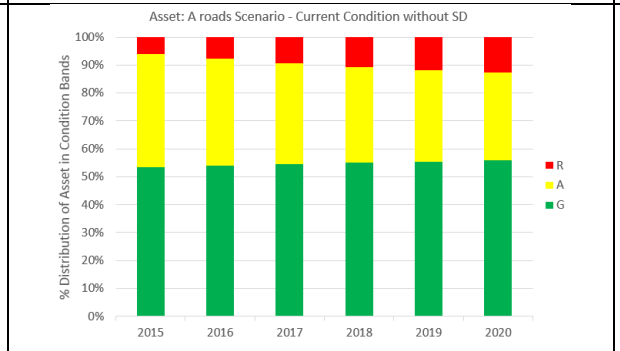
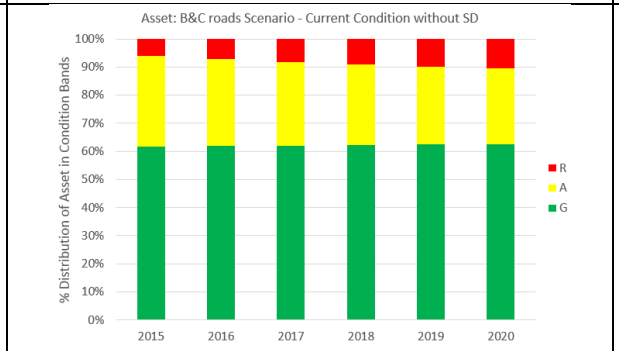
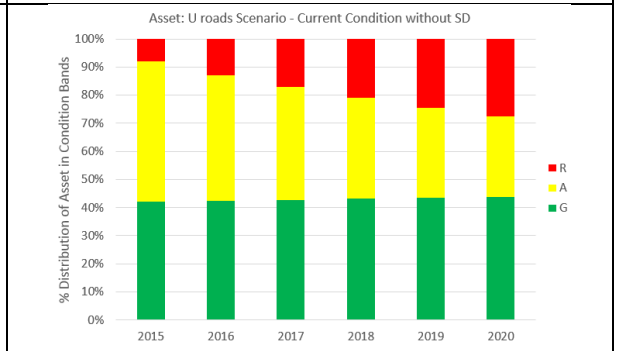
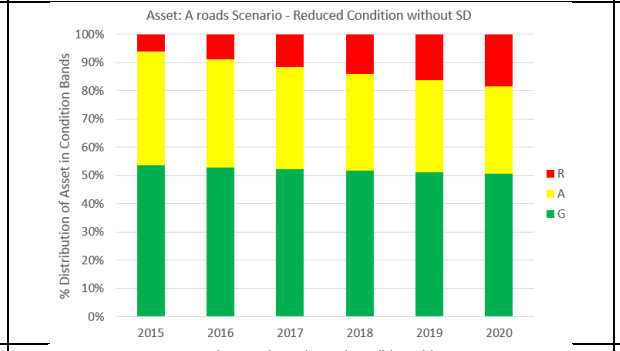
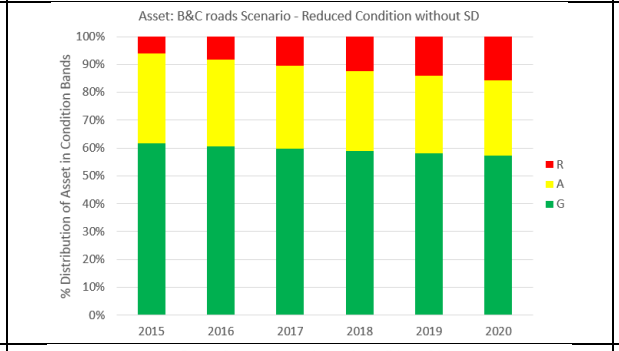
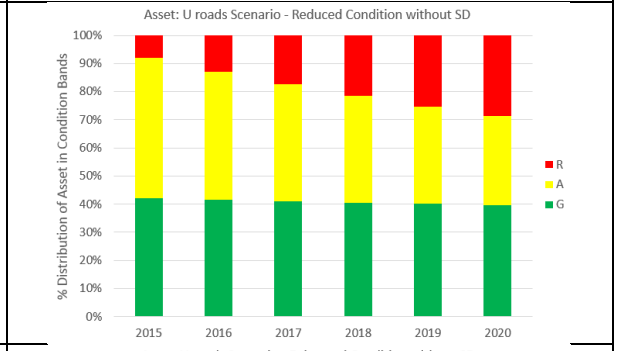
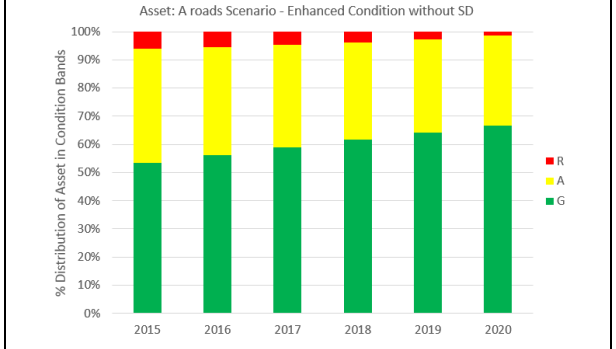
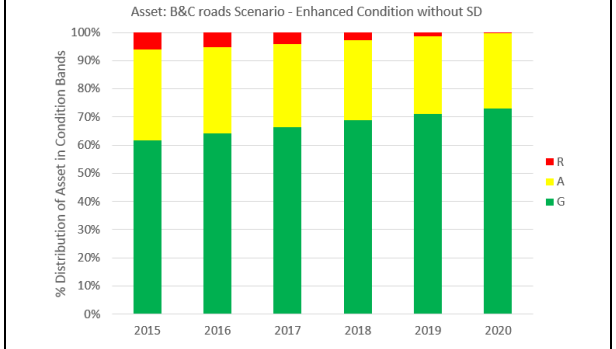
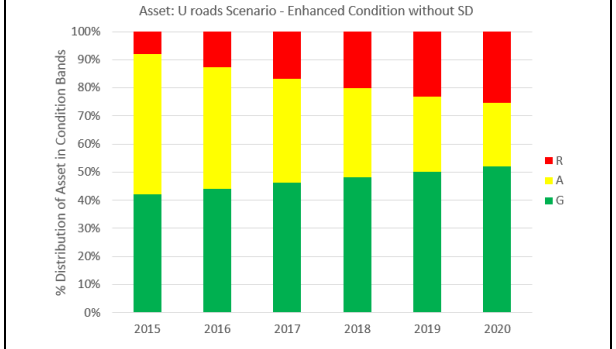
	A Road Network % treatment - PRS (100%)	B&C Road Network % treatments - PRS (94.2%) AC (5.8%)	U Road Network % treatments - PRS (9.3%) AC (90.7%)
Current Budget (£1,650,000)			
Reduced Budget (£825,000)			
Enhanced Budget (£3,300,000)			

Table 4 - Budget scenarios (without surface dressing)

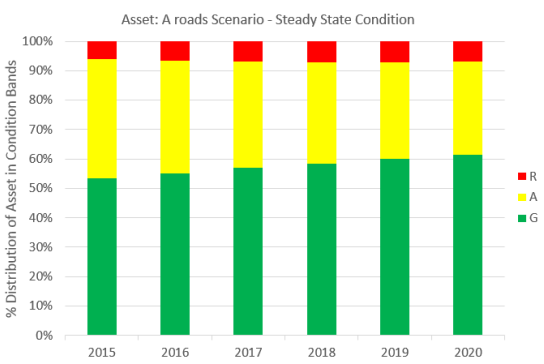
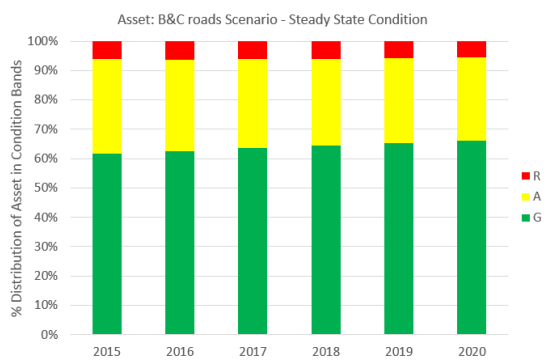
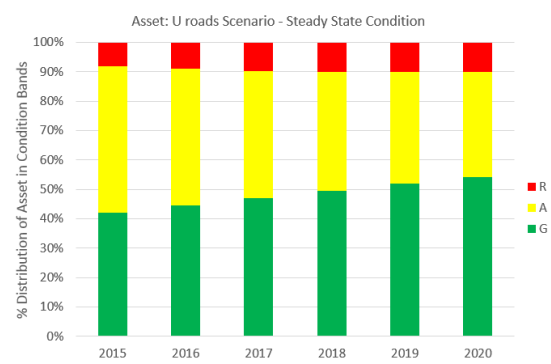
	A Road Network % treatments - SD (54%) PRS (46%)	B&C Road Network % treatments - SD (48%) PRS (49%) AC (3%)	U Road Network % treatments - SD (25%) PRS (7%) AC (68%)
Steady State Budget (£2,371,750)			

Table 5 - Steady state budget scenario

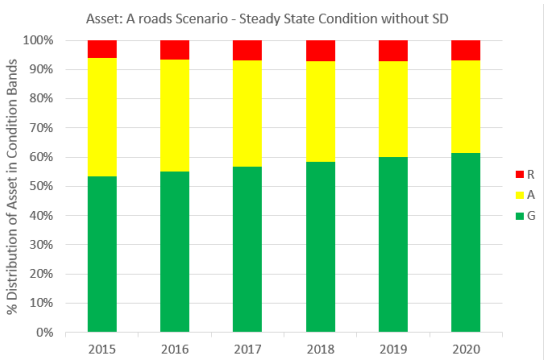
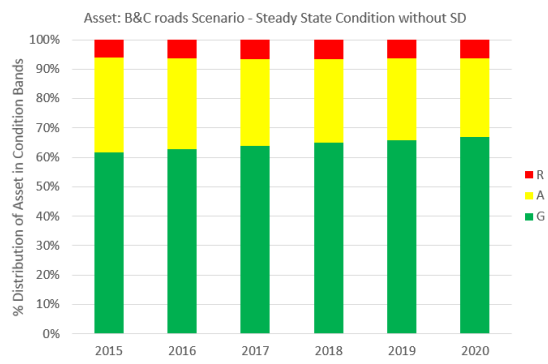
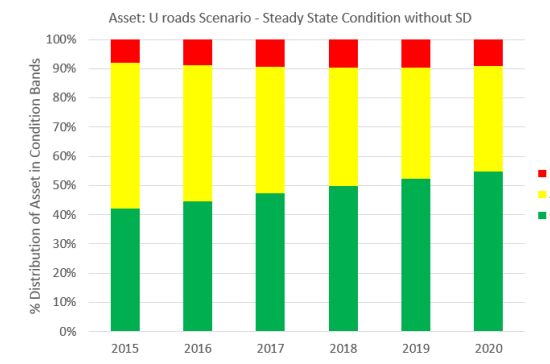
	A Road Network % treatment - PRS (100%)	B&C Road Network % treatments - PRS (94.2%) AC (5.8%)	U Road Network % treatments - PRS (9.3%) AC (90.7%)
Steady State Budget (£3,000,000)			

Table 6 - Steady state budget scenario (without surface dressing)

2. Introduction

Royal Borough of Windsor and Maidenhead (Windsor and Maidenhead) is approaching a key budget setting period and the Highways team wish to develop a robust business case to support their funding applications to ensure that the highway assets are adequately funded to achieve the Council's desired level of service.

For this reason, Windsor and Maidenhead asked Metis Consultants Ltd (Metis) to work in partnership with the Highways team to carry out investment modelling for the Carriageways asset group to deliver the supporting information required for the business cases.

The investment modelling methodology had to be at a network level and appropriate and proportionate to the time and data available, as well as being sympathetic to the limited availability of the asset managers. The required outcome of the investment modelling was to be succinct information illustrating the necessary budget to maintain the present condition of the assets and to model the implications of various budget scenarios.

This report is the output of the investment modelling conducted for the **carriageway** asset group and outlines the data utilised, methodology adopted and the results of the modelling, as well as an analysis of the results and any conclusions and recommendations.

3. Modelling Input Data and Parameters

3.1. Inventory

Table 7 below describes the scale of the carriageway inventory modelled.

Homogeneous Asset Group	Length of Network (km)	Average Width of Network (m)
A Roads	83.8	10.10
B/C Roads	171.4	8.45
Unclassified Roads	347.2	6.70
Total Network	602.4	

Table 7 - Carriageway Inventory

3.2. Condition and Performance Targets

Table 8 shows the current and targeted red, amber and green condition bands. These condition targets represent a slight, controlled deterioration of each asset group.

To elaborate on the condition banding and definitions;

Red	roads is need of maintenance
Amber	roads where maintenance should be considered
Green	roads in good condition

Condition Band	Current Carriageway Condition			Target Carriageway Condition		
	A Roads	B/C Roads	U Roads	A Roads	B/C Roads	U Roads
Red	6%	6%	8%	5%	6%	8%
Amber	40%	32%	50%	30%	20%	40%
Green	54%	62%	42%	65%	74%	52%

Table 8 - Current and target condition profiles

3.3. Treatment Options, Costs and Lives

Modelling has been based around Windsor and Maidenhead's suite of typical treatment options. Other treatment types are utilised but for the purpose of this modelling only the typical, commonly used treatment options have been considered. These options are described in Table 9 below, alongside the cost per square metre of the treatment and the life expectancy.

The treatment costs are all inclusive rates to cover all pre-patching, intermediate treatments and other items such as traffic management. They have been calculated based on cost analysis of recent maintenance schemes provided by Windsor and Maidenhead.

The treatment lives have also been determined based on historic treatment performance information specific to Windsor and Maidenhead, tempered by Metis' database of treatment performance. The 'expected life' figure is that expected under normal conditions for the road classification.

Treatment	A Roads		B/C Roads		U Roads	
	Rate (£/sqm)	Expected Life (Yrs)	Rate (£/sqm)	Expected Life (Yrs)	Rate (£/sqm)	Expected Life (Yrs)
Plane and Resurface	18.70	40	18.70	40	18.70	40
Asphalt Concrete	16.50	40	16.50	40	16.50	40
Surface Dressing	5.50	10	5.50	10	5.50	10

Table 9 - Treatment options, unit rates and life expectancies

3.4. Budget Scenarios

The capital (planned maintenance) budget scenarios to be modelled were decided upon in consultation with Windsor and Maidenhead and are illustrated in Table 10 below. They have been selected to represent the current, reduced, enhance and steady state budget (with and with surface dressing (SD)) to enable meaningful comparison between the investment model outcomes.

Asset Group	Budget Scenario 1	Budget Scenario 2	Budget Scenario 3	Budget Scenario 4
	Current Budget	Reduced Budget (-50%)	Enhanced Budget (+50%)	Steady State
All Carriageways	£1,650,000	£825,000	£3,300,000	£2,371,750
Asset Group	Budget Scenario 5	Budget Scenario 6	Budget Scenario 7	Budget Scenario 8
	Current Budget	Reduced Budget (-50%)	Enhanced Budget (+50%)	Steady State
All Carriageways (without SD)	£1,650,000	£825,000	£3,300,000	£3,000,000

Table 10 - Budget scenarios

The scenarios 1-4 where rerun as scenarios 5-8 excluding the surface dressing (SD) treatments option. The reason for this being that the council are considering not using SD as a treatment option in the future due to a perception of public dislike of this treatment. As such, the outcomes of scenarios 5-8 enable comparison of network performance without SD as an option to scenarios 1-4 which do include SD.

4. Methodology

4.1. Lifecycle Analysis

Windsor and Maidenhead require investment modelling at a network level. This means that the asset group is treated as a whole, or in the case of carriageways, split into homogeneous groups. This methodology enables strategic decisions to be made based on outputs that can be understood by key decision makers and lay persons.

The network level approach means that uncertainties that exist with asset by asset information is less important, as at the network level the confidence in the data is improved. Where data does not exist, the approach allows for assumptions and extrapolation to be made, avoiding the need for potentially expensive data collection.

The lifecycle methodology analyses the performance of the asset group over time, based on knowledge of deterioration profiles and treatment intervention performance.

4.2. Systems and Deterioration Calculations

To deliver Windsor and Maidenhead's requirements for the investment modelling we have utilised two systems as outlined in Table 11 below.

System	Outputs	Deterioration Algorithms
Regenerate – Investment Modeller	• Steady State budget requirement (based on expected treatment lives). • Multi-year impact of capital investment on planned spend. • Multi-year impact of capital investment on reactive spend.	• Based on experience of treatment lives. • Windsor and Maidenhead's historic performance information utilised.
HMEP Lifecycle Planning Toolkit	• Multi-year performance prediction against budget scenarios.	• Tailored transition matrices selected to best match the classification group in Windsor and Maidenhead.

Table 11 - Systems specification

The two systems have been used side-by-side to deliver all of the required output, but also as a reality check to ensure similar outputs are being produced.

4.3. Analysis Period

A 5 year analysis period was chosen in consultation with Windsor and Maidenhead. This provides information over a reasonable investment period but avoids very long-term predictions which can prove inaccurate.

4.4. Assumptions and Limitations

- The modelling is sensitive to changes in the life expectancies of the treatment options. Care has been taken to refine these but in some cases treatments and materials that are relatively new to the network have limited performance information to base life expectancies on. As life expectancy information improves over time the modelling should be refined.

- Treatments have been normalised to three types. Other less used treatment options have been considered to not be significant to the output of the network level model.
- The percentage of amber/green split is assumed for the U roads as this information was not available.
- An uplift of 10 percent has been applied to all unit rates to allow for unforeseen maintenance expenses and an element of price inflation over the investment period.
- The results of the modelling should be used to consider trends and enable comparison between maintenance strategies and budget scenarios. The modelling outputs should not be considered on a year by year basis, but only as a predicted direction of travel.
- The actual network performance may differ considerably to the modelling predictions should factors such as price fluctuations, severe weather events or an increase in usage exert significant influence.

5. Results and Analysis

5.1. Budget Scenarios

The carriageways budget has been further broken down into the homogeneous asset groups of, A Roads, B/C Roads and Unclassified (U) Roads as shown in Tables 12, 13, 14, 15, 16, 17, 18 and 19 below with and without surface dressing. The proportions of the total budget assigned to each group is based on the average spend profile over the period 2010 to 2015. This proportion has been applied to each budget scenario for consistency of maintenance strategy and comparability of the scenarios.

The graphs show the various scenarios that have been modelled over a 5 year period to help determine the most effective investment strategy. Further discussion and background to the scenarios below is outlined below using the HMEP Lifecycle Planning Toolkit.

To elaborate on the condition banding and definitions and key for graphs;

Red	roads is need of maintenance
Amber	roads where maintenance should be considered
Green	roads in good condition

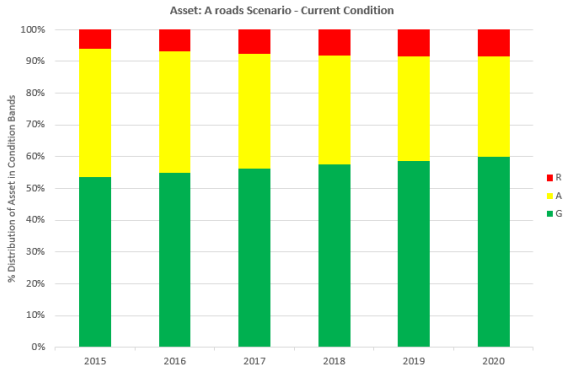
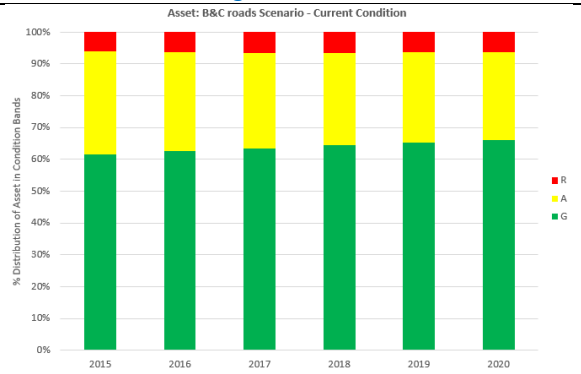
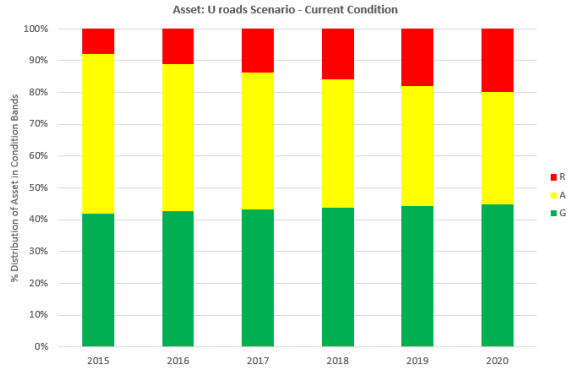
	A Road Network	B&C Road Network	U Road Network
	21.9% average spend historically % treatments - SD (54%) PRS (46%) Total budget breakdown per km - £19,689.7/km Length of network - 83.8km Budget - £361,350	36.7% average spend historically % treatments - SD (48%) PRS (49%) AC (3%) Total budget breakdown per km - £9,626.6/km Length of network - 171.4km Budget - £605,550	41.4% average spend historically % treatments - SD (25%) PRS (7%) AC (68%) Total budget breakdown per km - £4,752.3/km Length of network - 347.2km Budget - £683,100
Current Budget (£1,650,000)			
	Investment of treatment in the amber zone is slightly increasing the % of green roads. There is a slight increase in rate of deterioration from amber to red with this level of investment. Based on the current budget scenario there is a gradual decline in the condition of the A Road network with an increase of roads in need of maintenance from 6% in 2015 to 8% in 2020.	Investment of treatment in the amber zone is slightly increasing the % of green roads. Over the 5 year period the proportion of roads in the red zone is fairly constant, implying a steady state scenario. Based on the current budget scenario the B/C Road network can be considered to be at steady state.	Investment in treatment in the amber zone is slightly increasing the % of green roads. But there is a rapid increase in rate of deterioration from amber to red. Based on the current budget scenario there is a rapid deterioration in the condition of the U Road network with an increase of roads in need of maintenance from 8% in 2015 to 20% in 2020.

Table 12 - Current Budget scenario A, B/C, U Road condition prediction

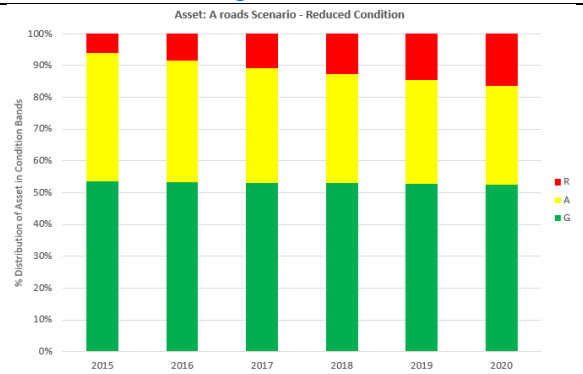
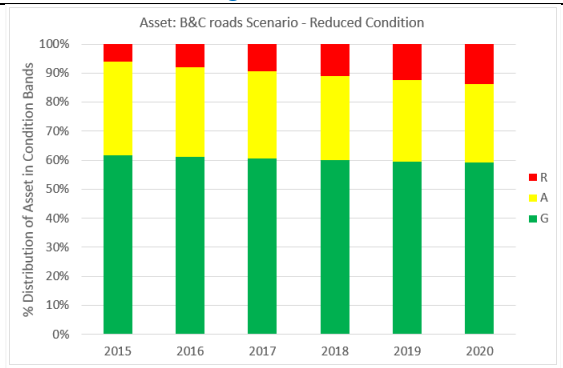
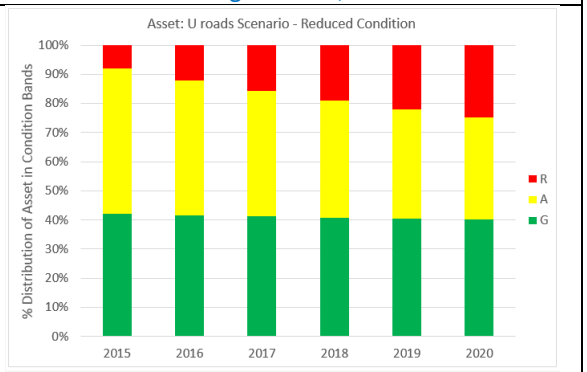
	A Road Network	B&C Road Network	U Road Network
	21.9% average spend historically % treatments - SD (54%) PRS (46%) Total budget breakdown per km - £9,844.9/km Length of network - 83.8km Budget - £180,675	36.7% average spend historically % treatments - SD (48%) PRS (49%) AC (3%) Total budget breakdown per km - £4,813.3/km Length of network - 171.4km Budget - £302,775	41.4% average spend historically % treatments - SD (25%) PRS (7%) AC (68%) Total budget breakdown per km - £2,376.2/km Length of network - 347.2km Budget - £341,550
Reduced Budget (£825,000)	 This scenario shows the outcome with half the current budget. Under the reduced budget scenario the A Road network deteriorates very rapidly with an increase of roads in need of maintenance from 6% in 2015 to 16% by 2020.	 This scenario shows the outcome with half the current budget. Under the reduced budget scenario the B/C Road network deteriorates gradually with an increase in roads in need of maintenance from 6% in 2015 to 14% by 2020.	 This scenario shows the outcome with half the current budget. Under the reduced budget scenario the U Road network deteriorates rapidly with an increase in roads in need of maintenance from 8% in 2015 to 25% by 2020.

Table 13 - Reduced Budget scenario A, B/C, U Road condition prediction

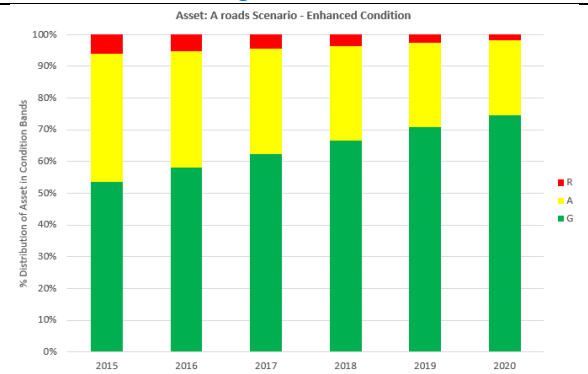
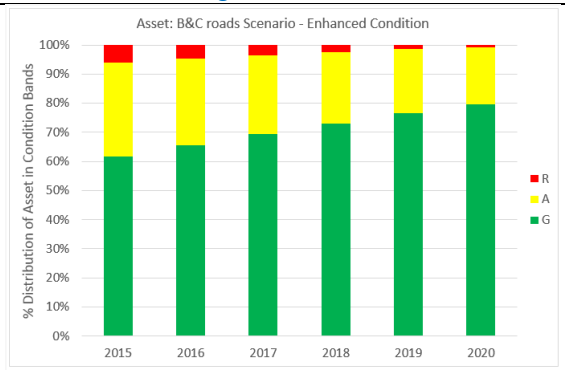
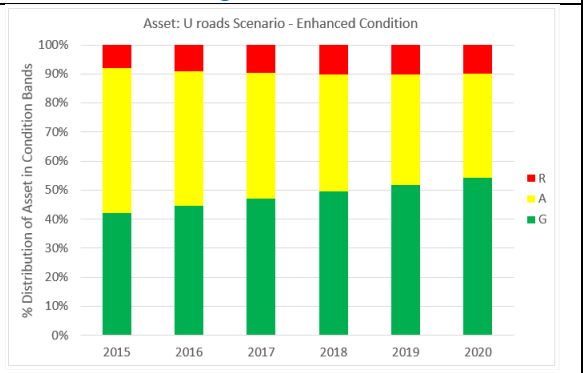
	A Road Network	B&C Road Network	U Road Network
	21.9% average spend historically % treatments - SD (54%) PRS (46%) Total budget breakdown per km - £39,379.5/km Length of network - 83.8km Budget - £722,700	36.7% average spend historically % treatments - SD (48%) PRS (49%) AC (3%) Total budget breakdown per km - £19,253.2/km Length of network - 171.4km Budget - £1,211,100	41.4% average spend historically % treatments - SD (25%) PRS (7%) AC (68%) Total budget breakdown per km - £9,504.6/km Length of network - 347.2km Budget - £1,366,200
Enhanced Budget (£3,300,000)	 This scenario shows rapid improvement with double the current budget. Investment of treatment in the amber zone is rapidly increasing the % of green roads. Based on the enhanced budget scenario there is a rapid improvement in condition of the A Road network with a decrease of roads in need of maintenance from 6% in 2015 to 2% in 2020.	 This scenario shows rapid improvement with double the current budget. Investment of treatment in the amber zone is rapidly increasing the % of green roads. Based on the enhanced budget scenario there is a rapid improvement in condition of the B/C Road network with a decrease of roads in need of maintenance from 6% in 2015 to 1% in 2020.	 This scenario shows rapid improvement with double the current budget. Investment of treatment in the amber zone is gradually increasing the % of green roads. Based on the enhanced budget scenario there is a gradual decline in condition of the U Road network with an increase of roads in need of maintenance from 8% in 2015 to 10% in 2020.

Table 14 - Enhanced Budget scenario A, B/C, U Road condition prediction

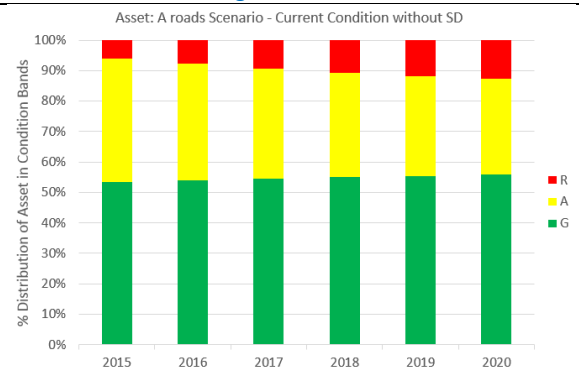
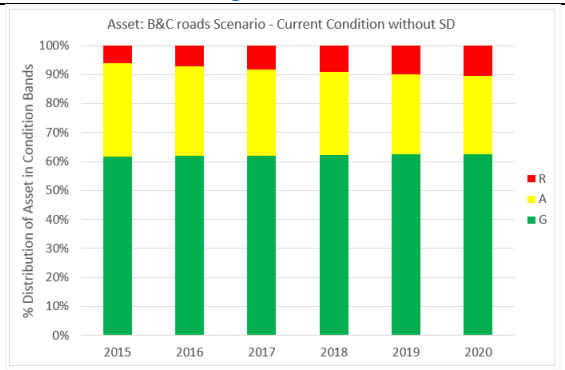
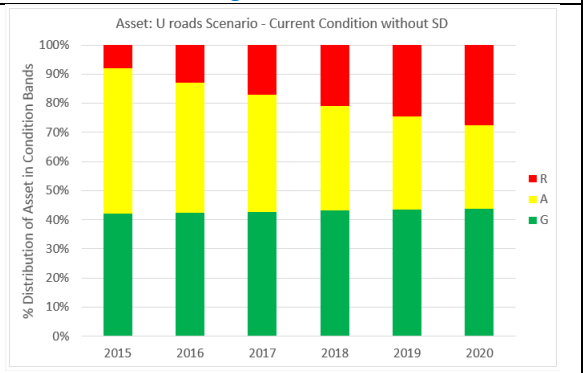
	A Road Network	B&C Road Network	U Road Network
	21.9% average spend historically % treatment - PRS (100%) Total budget breakdown per km - £19,689.7/km Length of network - 83.8km Budget - £361,350	36.7% average spend historically % treatments - PRS (94.2%) AC (5.8%) Total budget breakdown per km - £9,626.6/km Length of network - 171.4km Budget - £605,550	41.4% average spend historically % treatments - PRS (9.3%) AC (90.7%) Total budget breakdown per km - £4,752.3/km Length of network - 347.2km Budget - £683,100
Current Budget (£1,650,000)	 Investment in treatment in the amber zone is gradually increasing the % of green roads. But there is a gradual increase in rate of deterioration from amber to red. Based on the current budget scenario there is a decline in the condition of the A Road network with an increase of roads in need of maintenance from 6% in 2015 to 13% in 2020.	 Investment in treatment in the amber zone is maintaining a constant % of green roads. But there is a gradual increase in rate of deterioration from amber to red. Based on the current budget scenario there is a decline in condition of the B/C Road network with an increase of roads in need of maintenance from 6 % in 2015 to 11% in 2020.	 Investment in treatment in the amber zone is slightly increasing the % of green roads. But there is rapid increase in rate of deterioration from amber to red. Based on the current budget scenario there is a rapid decline in the condition of the U Road network with an increase of roads in need of maintenance from 8% in 2015 to 28% in 2020.

Table 15 - Current Budget scenario A, B/C, U Road condition prediction without SD

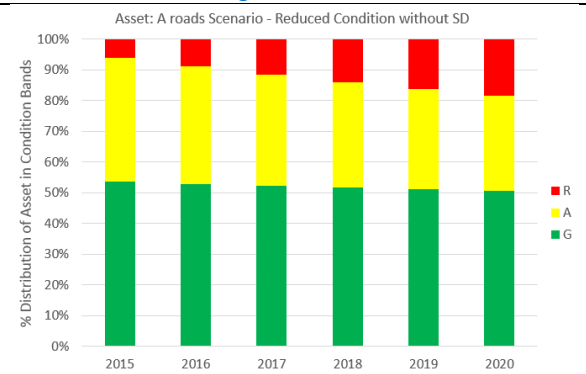
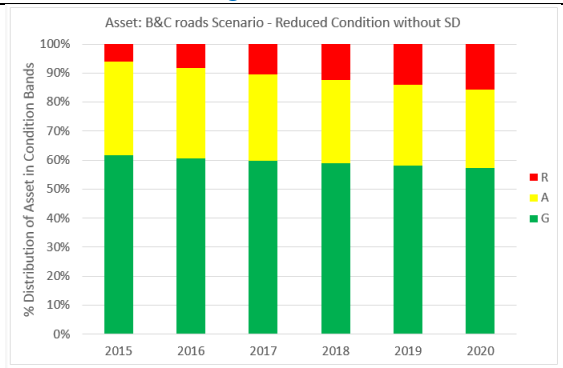
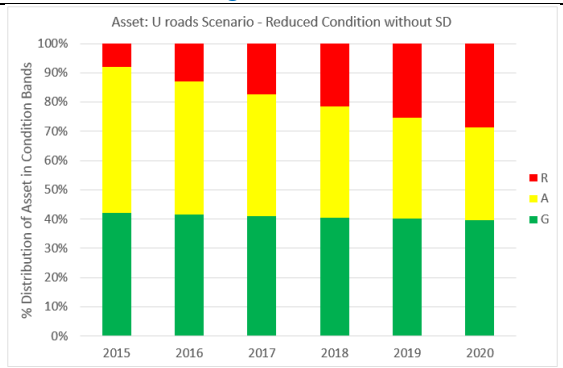
	A Road Network 21.9% average spend historically % treatment - PRS (100%) Total budget breakdown per km - £9,844.9/km Length of network - 83.8km Budget - £180,675	B&C Road Network 36.7% average spend historically % treatments - PRS (94.2%) AC (5.8%) Total budget breakdown per km - £4,813.3/km Length of network - 171.4km Budget - £302,775	U Road Network 41.4% average spend historically % treatments - PRS (9.3%) AC (90.7%) Total budget breakdown per km - £2,376.2/km Length of network - 347.2km Budget - £341,550
Reduced Budget (£825,000)	 This scenario shows the outcome with half the budget without SD. There is a rapid increase in rate of deterioration from amber to red. Under the reduced budget scenario the A Road network deteriorates rapidly with an increase in roads in need of maintenance from 6% in 2015 to 18% by 2020.	 This scenario shows the outcome with half the budget without SD. There is a gradual increase in rate of deterioration from green to amber and amber to red. Under the reduced budget scenario the B/C Road network deteriorates gradually with an increase in roads in need of maintenance from 6% in 2015 to 16% by 2020.	 This scenario shows the outcome with half the budget without SD. There is a rapid increase in rate of deterioration from amber to red. Under the reduced budget scenario the U Road network deteriorates rapidly with an increase in roads in need of maintenance from 8% in 2015 to 29% by 2020.

Table 16 - Reduced Budget scenario A, B/C, U Road condition prediction without SD

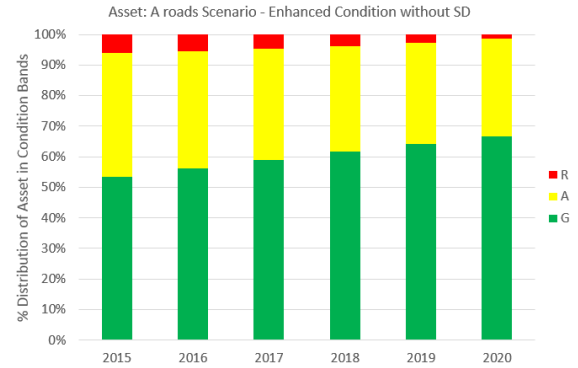
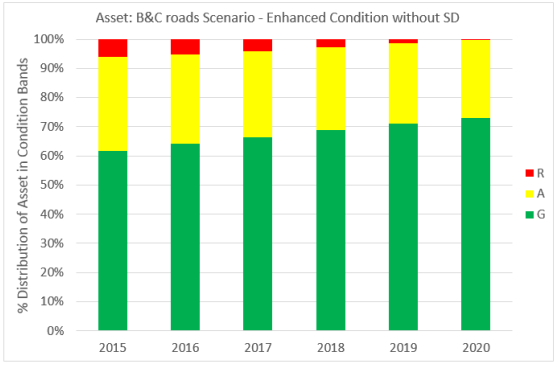
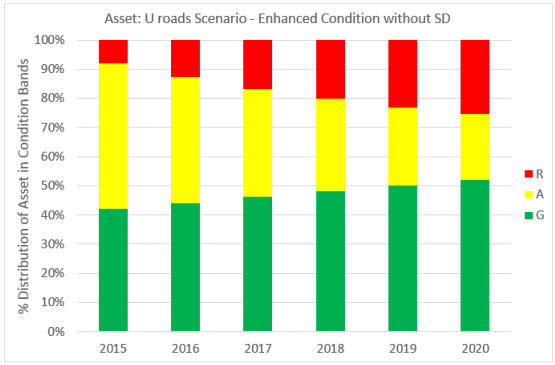
	A Road Network 21.9% average spend historically % treatment - PRS (100%) Total budget breakdown per km - £39,379.5/km Length of network - 83.8km Budget - £722,700	B&C Road Network 36.7% average spend historically % treatments - PRS (94.2%) AC (5.8%) Total budget breakdown per km - £19,253.2/km Length of network - 171.4km Budget - £1,211,100	U Road Network 41.4% average spend historically % treatments - PRS (9.3%) AC (90.7%) Total budget breakdown per km - £9,504.6/km Length of network - 347.2km Budget - £1,366,200
Enhanced Budget (£3,300,000)	 This scenario shows rapid improvement with double the budget without SD. Investment of treatment in the amber zone rapidly increasing the % of green roads. Based on the enhanced budget scenario there is a gradual improvement in condition of the A Road network with a decrease of roads in need of maintenance from 6% in 2015 to 1% in 2020.	 This scenario shows rapid improvement with double the budget without SD. Investment of treatment in the amber zone rapidly increasing the % of green roads. Based on the enhanced budget scenario there is a rapid improvement in condition of the B/C Road network with a decrease of roads in need of maintenance from 6% in 2015 to 1% in 2020.	 This scenario shows double the budget without SD. Investment in treatment in the amber zone rapidly increasing the % of green roads. But there is rapid increase in rate of deterioration from amber to red. Based on the enhanced budget scenario there is a rapid decline in condition of the U Road network with an increase of roads in need of maintenance from 8% in 2015 to 25% in 2020.

Table 17 - Enhanced Budget scenario A, B/C, U Road condition prediction without SD

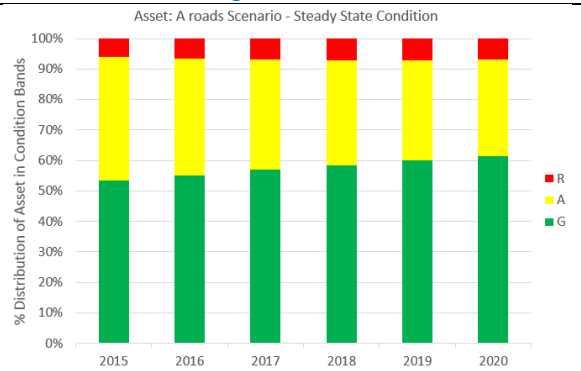
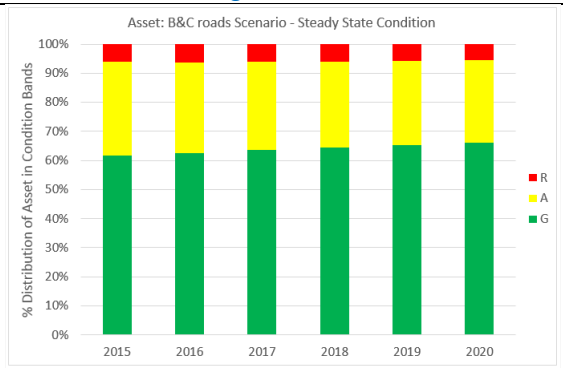
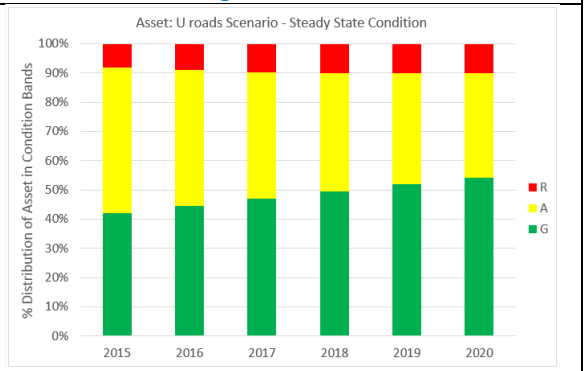
	A Road Network 16.9% spend split % treatments - SD (54%) PRS (46%) Total budget breakdown per km - £28,302.5/km Length of network - 83.8km Budget - £400,000	B&C Road Network 25.5% spend split % treatments - SD (48%) PRS (49%) AC (3%) Total budget breakdown per km - £13,837.5/km Length of network - 171.4km Budget - £606,000	U Road Network 57.6% spend split % treatments - SD (25%) PRS (7%) AC (68%) Total budget breakdown per km - £6,831.1/km Length of network - 347.2km Budget - £1,366,000
Steady State Budget (£2,371,750)	 In this scenario we have targeted a consistent red zone to represent steady state condition. The outcome being the budget required to achieve this level of steady state condition in the A Road network is c. £400,000 The amber zone show a slight decline in favour of green.	 In this scenario we have targeted a consistent red zone to represent steady state condition. The outcome being the budget required to achieve this level of steady state condition in the B/C Road network is c. £605,000 The amber zone show a slight decline in favour of green.	 In this scenario we have targeted a consistent red zone to represent steady state condition. The outcome being the budget required to achieve this level of steady state condition in the U Road network is c. £1,366,000 The amber zone show a slight decline in favour of green.

Table 18 – Steady State Budget scenario A, B/C, U Road condition prediction

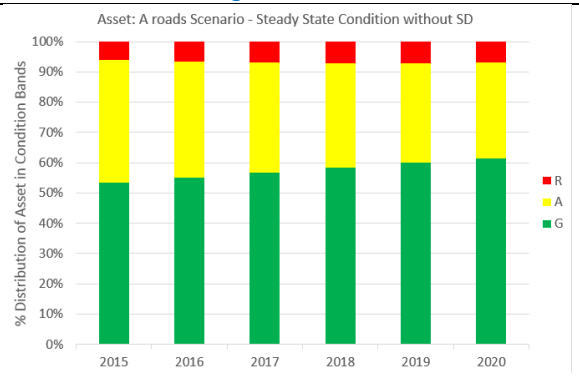
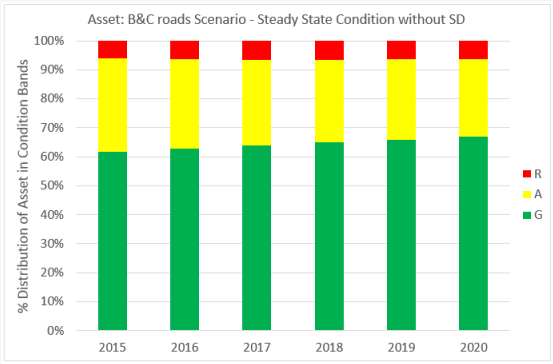
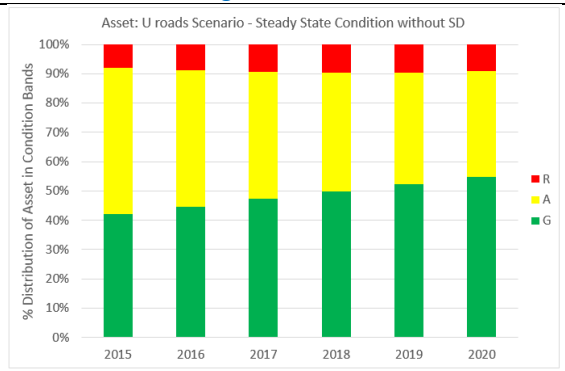
	A Road Network 18.3% spend split % treatment - PRS (100%) Total budget breakdown per km - £35,799.5 Length of network - 83.8km Budget - £550,000	B&C Road Network 28.3% spend split % treatments - PRS (94.2%) AC (5.8%) Total budget breakdown per km - £17,502.9 Length of network - 171.4km Budget - £850,000	U Road Network 53.4% spend split % treatments - PRS (9.3%) AC (90.7%) Total budget breakdown per km - £8,640.6 Length of network - 347.2km Budget - £1,600,000
Steady State Budget (£3,000,000)	 In this scenario we have targeted a consistent red zone to represent steady state condition without the use of surface dressing. The outcome being the budget required to achieve this level of steady state condition in the A Road network is c. £550,000 The amber zone show a slight decline in favour of green.	 In this scenario we have targeted a consistent red zone to represent steady state condition without the use of surface dressing. The outcome being the budget required to achieve this level of steady state condition in the B/C Road network is c. £850,000 The amber zone show a slight decline in favour of green.	 In this scenario we have targeted a consistent red zone to represent steady state condition without the use of surface dressing. The outcome being the budget required to achieve this level of steady state condition in the U Road network is c. £1,600,000 The amber zone show a slight decline in favour of green.

Table 19 – Steady State Budget scenario A, B/C, U Road condition prediction without SD

5.2. Impact on Reactive Maintenance Need and Third Part Claims

The condition of the network as a whole and the impact of capital (planned maintenance) investment on the cost of pothole repairs and third party claims is shown in Table 20, 21, 22 and 23 below.

Budget Scenarios	Capital Expenditure (Initial year to 2020)	Revenue Expenditure (Initial year to 2020)			Total Expenditure (Initial year to 2020)
		Cost of Claims	Cost of Pothole Repairs	Cost of Reoccurring Defects	
Current (£1,650,000)	£9,900,000	£6,540	£4,241,865	£1,148,192	£15,296,597
Reduced (£825,000)	£4,950,000	£8,318	£5,395,054	£1,452,266	£11,805,638
Enhanced (3,300,000)	£18,439,709	£4,045	£2,623,303	£847,333	£21,914,390
Current without SD (£1,650,000)	£9,900,000	£8,463	£5,489,050	£1,316,492	£16,714,005
Reduced without SD (£825,000)	£4,950,000	£9,280	£6,018,466	£1,536,109	£12,513,855
Enhanced without SD (3,300,000)	£19,715,349	£6,839	£4,435,436	£876,459	£25,034,083
Steady State (£2,371,750)	£14,230,500	£4,734	£3,070,278	£1,086,029	£18,391,541
Steady State without SD (£3,000,000)	£18,000,000	£4,684	£3,037,894	£1,091,053	£22,133,631

Table 20 - Impact on Reactive Maintenance Need and Third Party Claims

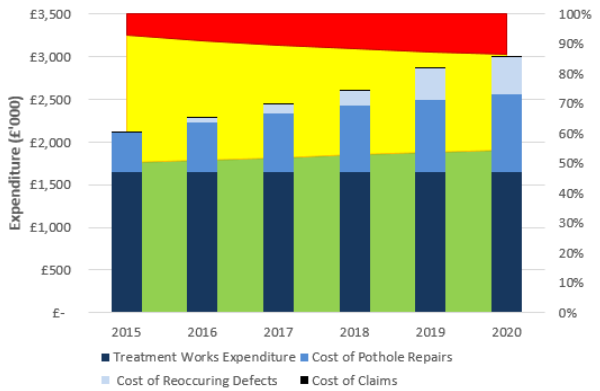
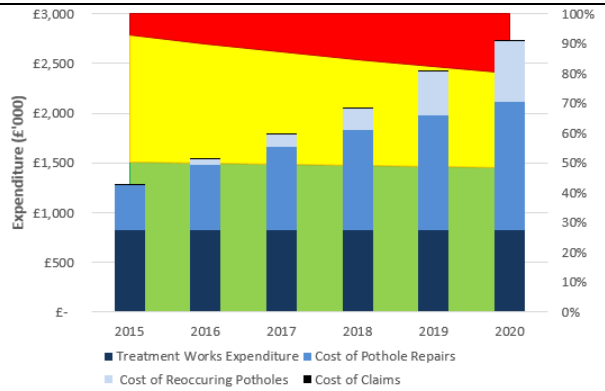
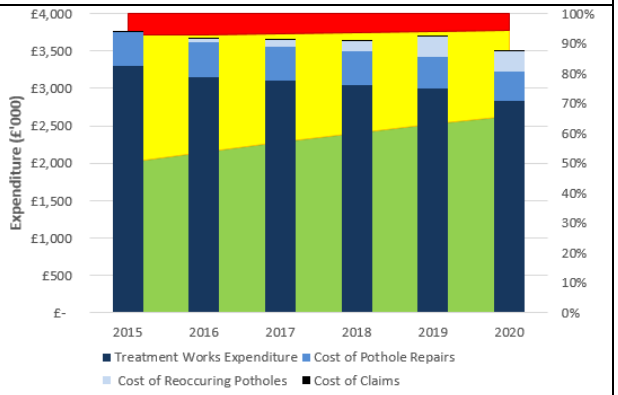
Current Budget (£1,650,000)	Reduced Budget (£825,000)	Enhanced Budget (£3,300,000)
		
Under the current budget scenario the graph shows a gradual increase in the cost of pothole and third party claims. This is against a backdrop of a slight deterioration in the overall network condition.	Under the reduced budget scenario the cost of pothole repairs and third party claims increases rapidly, exceeding the capital budget by 2020. This is against a backdrop of a rapid deterioration in the overall network condition.	Under the enhanced budget scenario there is a small but significant decrease in the cost of pothole repairs and third party claims. This is against a backdrop of a slight improvement in the overall network condition.

Table 21 – Current, Reduced, Enhanced Budget scenario. Overall condition and expenditure prediction

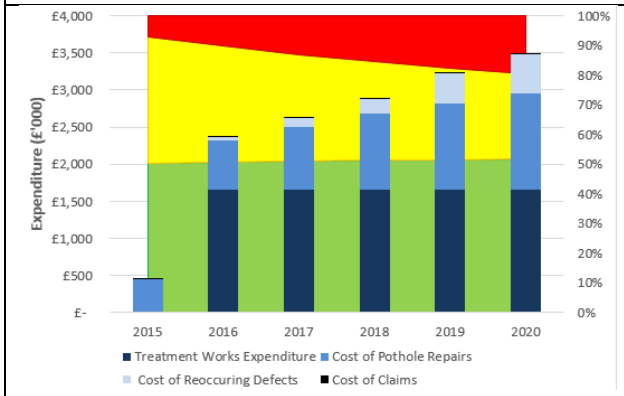
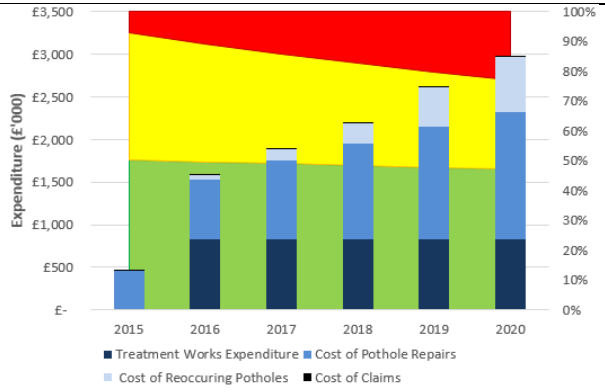
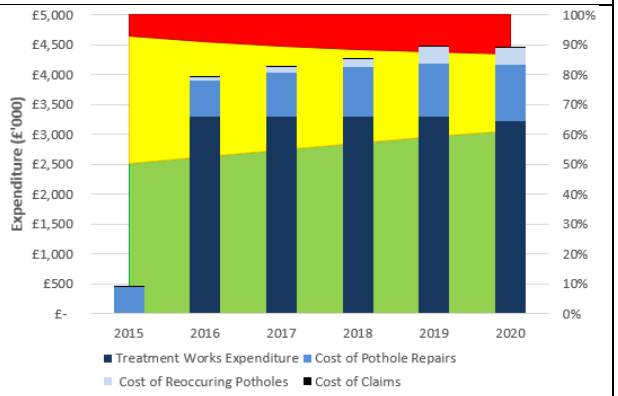
Current Budget without SD (£1,650,000)	Reduced Budget without SD (£825,000)	Enhanced Budget without SD (£3,300,000)
		
Under the current budget scenario without SD the cost of pothole and third party claims increase rapidly, exceeding the capital budget by 2020. This is against a backdrop of a rapid deterioration in the overall network condition.	Under the reduced budget scenario without SD the cost of pothole repairs and third party claims increases rapidly, exceeding the capital budget by 2020. This is against a backdrop of a rapid deterioration in the overall network condition.	Under the enhanced budget scenario without SD there is a small but significant increase in the cost of pothole repairs and third party claims. This is against a backdrop of a slight deterioration in the overall network condition.

Table 22 – Current, Reduced, Enhanced Budget without SD scenario. Overall condition and expenditure prediction

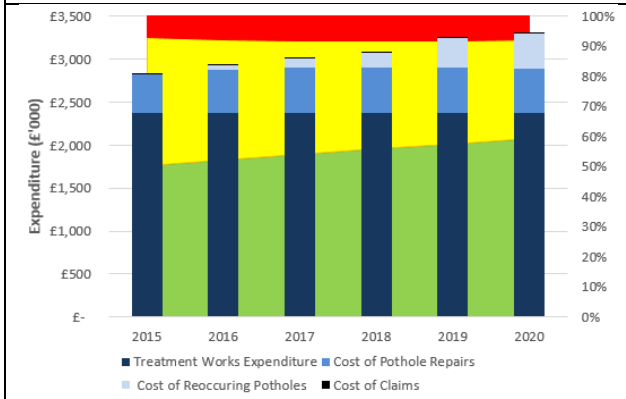
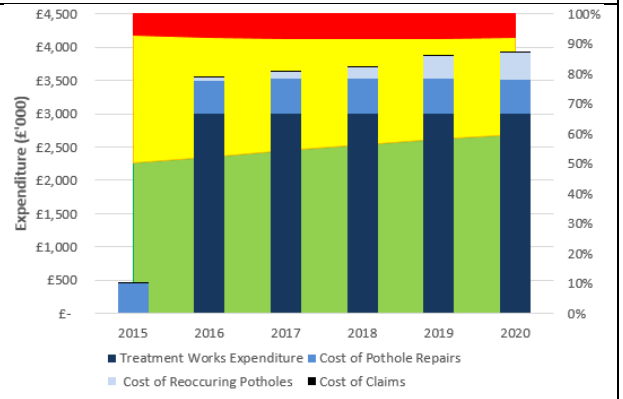
Steady State Budget (£2,371,750)	Steady State Budget without SD (£3,000,000)
	
Under the steady state budget scenario the graph shows a gradual increase in the cost of pothole and third party claims. This is against a backdrop of a steady state overall network condition.	Under the steady state budget scenario without SD the graph shows a gradual increase in the cost of pothole and third party claims. This is against a backdrop of a steady state overall network condition.

Table 23 – Steady State Budget with and without SD scenario. Overall condition and expenditure prediction

6. Conclusions and Recommendations

6.1. Conclusions

The results of the investment modelling suggests that the current budget (£1.65million) enables a broadly steady state condition over 5 years for the A and B/C networks. However, the Unclassified Roads deteriorate rapidly and require more investment.

Considering the current budget scenario without surface dressing (SD) as a treatment option, a more rapid deterioration of the Unclassified Roads is shown. The A and B/C roads show a gradual but accelerated deterioration compared with the with SD scenario.

The reduced budget scenario (£825,000) is shown to be insufficient to maintain the present condition across all classifications. This leads to rapid deterioration of all classifications. Similarly without SD.

The modelling results indicate that the enhanced budget scenario (£3.3million), using Windsor and Maidenhead's current investment strategy, is sufficient to maintain a steady state condition in Unclassified Roads. However, the A and B/C network shows a rapid improvement in condition, resulting in a small percentage roads in the red zone (in need of maintenance) by 2020. This disparity between the condition trend for the unclassified network and the A and B/C networks indicates that the current budget distribution could be rebalanced to even up these trends across all classification. In comparison to scenario 7 (without SD the A and B/C network shows very similar results for the enhanced budget. However, for the unclassified road network there is a rapid decline in the red zone. In both cases the A and B/C roads have rapidly improved. With the unclassified network there is a significant difference between a treatment option with SD and without.

The modelling indicates that a budget of £2.4million is required to maintain a steady state condition across all classifications. An extra £0.8million on existing current budget. Without SD as a treatment option the steady state budget is circa £3.0million, almost double the current budget.

Modelling of the impact of capital expenditure on the need for reactive maintenance and the predicted cost of third party claims supports the case for an enhanced capital expenditure and retaining SD as a treatment option. Under the steady state budget scenario (shown in Table 20), a lower revenue expenditure is demonstrated with an increase in budget, when compared to the current budget scenario.

Looking at the steady state budget scenario with or without SD in Table 20 the revenue expenditure is very similar for a significant difference in capital expenditure. It must also be noted that he impact of potholes and third party claims goes beyond monetary consideration; potentially injuring people, causing delays and effecting the Council's reputation.

6.2. Recommendations

In order to achieve Windsor and Maidenhead's target of a broadly steady state network condition, we would recommend that a capital planned maintenance budget of approximately £2.4million be adopted and increased annually in-line with cost inflation.

In order to achieve a steady state condition across all classifications the budget distribution between the classifications needs to be rebalanced for a long-term approach, increasing the budget on the unclassified

network, as described above. In order for this budget to enable steady state condition, SD would need to be retained as a treatment option.

7. Recommended Further Work

7.1. Maintenance Strategy Analysis

The modelling has shown that, in order to achieve a long-term steady state condition across the carriageway network, there needs to be a redistribution of the budget between the different classifications.

The modelling has illustrated appropriate steady state budgets for each classification group. This is based on the application of Windsor and Maidenhead's typical treatment options and historic budget distribution.

Once the Highways team have been informed of their future budget allocation it would be useful to review the performance of the typical treatment options and triggers against other options that may be available. In this way the maintenance strategies can be refined to ensure the whole life cost is minimised and the impact of the budget maximised.

A review of the current maintenance strategies against other options would draw on the Highways team's experience of trialling innovative new materials and techniques.

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