

PREVENTION AND A BETTER CURE

POTHOLES REVIEW



APRIL 2012

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COMMENTS & FEEDBACK

The HMEP Programme Board would welcome any comments and feedback on this report so that it may be reviewed, improved and refined to give the sector the best advice possible. If you wish to make a comment, please email your comments to highwaysefficiency@dft.gsi.gov.uk with the header 'Comments on the Pothole Review Report'.

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This report is supported by the following organisations:



FOREWORD

I launched the Highways Maintenance Efficiency Programme (HMEP) twelve months ago with the aim of helping the sector to maximise returns from investment in highway maintenance. At its core, HMEP has three key foundation stones. The programme must be:

- by the sector for the sector;
- centred on practical, adaptable approaches; and
- results-focused.



I am pleased that work is now well underway providing the guidance and support that you - the people involved with highway maintenance - have said would help.

At the launch of HMEP I also announced a Review into potholes. We all know the misery that potholes can cause to highway users and local communities, which is why, despite the current economic situation, this Government is providing over £3 billion to local highway authorities for road maintenance over the next four years. We also provided an additional £200 million to local highway authorities this time last year in recognition of the effect the series of harsh winters had on our roads.

The aim of the Review was to not only investigate the issue from an engineering perspective but to also explore the wider issues around potholes, including the impact of long term maintenance strategies, decision-making arrangements, the processes of reporting, prioritising and repairing, guidance and wider operational arrangements.

The Review, which has been assisted by experts from both the public and private sectors, highlights three main themes:

- **Prevention is better than cure** – intervening at the right time will reduce the amount of potholes forming and prevent bigger problems later.
- **Right first time** – do it once and get it right, rather than face continuous bills. Guidance, knowledge and workmanship are the enablers to this.
- **Clarity for the public** – local highway authorities need to communicate to the public what is being done and how it is being done.

I urge all parts of the highway maintenance sector, including councillors, chief executives, local highway practitioners, the utility sector and contractors to adopt the approaches set out in this Review, not only to make real cost savings but also to provide a first class quality service to highway users.

Norman Baker MP
Parliamentary Under-Secretary of State for Transport

EXECUTIVE SUMMARY

CONTEXT FOR THE REVIEW

Over recent years, severe winter weather has caused significant damage to local highway networks. This has manifested itself in a significant increase in the number of potholes. The local highway network has evolved over a very long period of time and therefore much of it was not designed or constructed to the standards that would be expected of a newly constructed highway today. As a consequence, many local highways are less resilient to changing environments and adapt poorly to severe weather events. The major contributors to the formation of potholes include the ingress of water, winter freeze-thaw cycles and inadequate drainage.

Potholes are one of the public's main local concerns, as they are highly visible defects. Public opinion surveys consistently show that the repair of roads, footways and cycleways is very important to highway users and local communities. Such surveys have demonstrated the importance of highway condition and many perceive that the quality of local roads may be deteriorating, with potholes being one of the main causes.

The additional cost of highway damage is not limited to local highway authorities. There is a wider cost to the economy arising from potholes, including costs to highway users and business, through the increased number of accidents and subsequent compensation and insurance claims. In addition to this, traffic disruption through repairs leads to further costs to the economy through delayed journey times.

The Department for Transport has recognised the importance of the local highway network to the economy and the public and over the past three years has provided extra funding, including an additional £200 million in March 2011 to assist local highway authorities to deal with exceptional damage caused by severe weather – this is on top of the £3 billion the Department has allocated to authorities for highway maintenance over the next four years. However, extra funding can only partly address the problem – the Department, among others, has raised concerns over the sustainability of current approaches to preventing and dealing with highway damage, particularly potholes. There is concern as to whether asset management principles have been widely adopted to ensure the efficient use of resources and better outcomes for highway users.

SCOPE OF THE REVIEW

In April 2011 the Parliamentary Under-Secretary for Transport, Norman Baker MP, announced an initiative to review the pothole problem under the umbrella of the Department for Transport sponsored Highways Maintenance Efficiency Programme (HMEP). A Project Board involving a range of key stakeholders from the public and private sectors, including road, footway and cycle user groups was set up in August 2011, chaired by Matthew Lugg, current President of the Association of Directors of Environment, Economy, Planning and Transport (ADEPT). The Board was supported by a Review team.

The Review has considered how local highway authorities in England currently deal with potholes, as well as wider stakeholder views and implications. The focus of the Review has been to identify good practice through consultation, in order to demonstrate how potholes and other related aspects of highway maintenance may be dealt with more efficiently and effectively. This will also enable sharing of knowledge between authorities, including lessons learnt.

KEY FINDINGS

In December 2011 a Progress Report was published (Ref. 1) setting out the initial findings of this Review. Progress against these findings is described throughout this Review and the final recommendations build on the Progress Report. The Review also builds on the recommendations of the Audit Commission report *Going the distance* (Ref. 2).

The Review makes 17 recommendations (listed below) that will, if implemented, provide an overall improvement in highway maintenance and are expected to reduce the number of potholes occurring on the highway network. The recommendations are aimed at local highway authorities, the broader highways maintenance sector (including suppliers), the UK Roads Liaison Group (UKRLG) and the Department for Transport. There are three key messages:

- **Prevention is better than cure** – intervening at the right time will reduce the amount of potholes forming and prevent bigger problems later.
- **Right first time** – do it once and get it right, rather than face continuous bills. Guidance, knowledge and workmanship are the enablers to this.
- **Clarity for the public** – local highway authorities need to communicate to the public what is being done and how it is being done.

As part of the Review, a study of international practice was carried out by the UK delegation of the World Road Association (WRA). This study has found that the approach to dealing with highway maintenance and potholes compares relatively well to international practice, but nevertheless there is significant scope for further improvements. Reference has been made to international practice, where appropriate, in this Review.

From consultation with the sector including local highway authorities, this Review has developed case studies to demonstrate where local highway authorities have taken actions to improve their approach. In some cases summaries of these case studies have been used in this Review to support the recommendations made. The Review should be read in conjunction with the full case studies published on the HMEP website as part of this Review: www.dft.gov.uk/topics/local-authorities/hmep. This will provide essential information to the sector including local highway authorities in implementing the recommendations from this Review.

Development of a more robust evidence base to inform funding decisions at all levels is recognised in this Review. Recommendations have been made for guidance to the sector on calculating economic benefits of highway maintenance, as well as the value of providing greater long term certainty to the funding of highway maintenance by both central and local Government.

The Review recognises that there is scope for improvement in the quality of repairs for both for potholes and reinstatements. As such, the Review considers the importance of competency through skills and training for all parts of the sector. In particular, a recommendation has been made for a specific quality scheme to be introduced by the sector, for the sector.

CONCLUSIONS AND NEXT STEPS

The recommendations presented in this Review have the support of the broad range of stakeholders represented on the Project Board. Implementation by all parties will lead to more effective outcomes for highway users and the economy, as well as more efficient use of taxpayers' money.

This Review has been carried out under the umbrella of the HMEP, which is a sector-led transformation programme to maximise returns from investment in highways and deliver efficient and effective highway maintenance services. The programme is sponsored by the Department for Transport, who are providing £6 million funding to help the public and private sectors build on existing good practice, as well as develop further tools and opportunities to realise efficiencies. The key themes promoted by the programme are greater collaboration within the public sector and with the supply chain, smarter procurement, adoption of asset management principles, and benchmarking as a means of improving performance. HMEP is developing practical guidance on efficiencies that will be of interest to local authorities, supplier organisations and representative bodies. As part of its forward agenda, HMEP will continue to support the sector to implement the recommendations in this Review.

SUMMARY OF RECOMMENDATIONS

The recommendations made in this Review have been grouped into three themes as shown below. Within each theme the recommendations are listed in priority order rather than the order in which they appear in the Review.

THEME: PREVENTION IS BETTER THAN CURE

Economic Benefits of Highway Maintenance

Recommendation 4

To evaluate and justify the need for investment in maintenance of the local highway network, the Department for Transport should work in conjunction with local highway authorities to develop advice on determining economic costs and benefits.

Commitment of Highway Maintenance Budgets

Recommendation 5

The Government should commit to establishing budgets for highway maintenance for the full four years of Comprehensive Spending Review periods. This will provide greater budget certainty for the highway sector. Local highway authorities should ensure their funding for highways maintenance is aligned to this time period.

Prevention is Better than Cure

Recommendation 6

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

Informed Choices

Recommendation 7

Local highway authorities should ensure that appropriate competencies are available to make the right choices when designing and specifying techniques and materials for the maintenance and repair of highways. These competencies can be secured through training, collaboration with neighbouring authorities or external advice.

Guidance on Materials

Recommendation 8

Comprehensive guidance should be made available in the design, specification and installation of materials for the maintenance and repair of highways, to ensure the use of appropriate materials for the right site. This guidance should be produced by the sector for the sector.

Co-ordinating Street Works

Recommendation 15

All parties undertaking works on the highway should share and co-ordinate short and long term programmes of work for up to four years in advance, based on good asset management practice.

Minimising Highway Openings

Recommendation 16

All parties involved in reinstatements must consider the need to minimise long term damage from the installation, renewal, maintenance and repair of utility and highway apparatus through alternative and innovative ways of working. Trenchless technology should be considered as part of this decision making process.

THEME: RIGHT FIRST TIME

Quality of Repairs and Reinstatements

Recommendation 14

To drive up standards, a quality scheme similar to a National Highway Sector Scheme should be developed by the sector to cover all aspects of manual surfacing operations, including pothole repairs and reinstatements, and its use specified by local highway authorities and utility companies.

Guidance on Repair Techniques

Recommendation 13

Local highway authorities should consider the guidance provided in the ADEPT report *Potholes and Repair Techniques for Local Highways* and adopt as appropriate to their local circumstances.

Inspection and Training

Recommendation 11

Local highway authorities should utilise inspection manuals to support implementation of their inspection policies. They should also ensure that highway inspectors are trained, qualified and competent in the identification and assessment of defects, including potholes, through a scheme accredited by the Highway Inspectors Board.

Technology

Recommendation 12

Local highway authorities should consider using proven technology and systems for the effective identification and management of potholes.

Research and Innovation

Recommendation 17

The sector will benefit from supporting, co-ordinating, contributing and disseminating research on all aspects of pothole operations. Innovation from such research may continue to provide opportunities for improvement of pothole management and operations.

THEME: CLARITY

Public Communications

Recommendation 3

Local highway authorities should have an effective public communications process that provides clarity and transparency in their policy and approach to repairing potholes. This should include a published policy and details of its implementation, including the prevention, identification, reporting, tracking and repair of potholes.

Public Opinion Surveys

Recommendation 2

Local highway authorities should monitor public satisfaction with road, footway and cycleway condition and repair annually through the National Highways and Transport Public Satisfaction Survey or their own surveys. The findings can be used to benchmark performance and taken into consideration in local highway maintenance policies.

Permanent Repairs Policy

Recommendation 10

Local highway authorities should adopt permanent repairs as the first choice. Temporary repairs should only be used where safety cannot be managed using alternative approaches and in emergency circumstances.

Definition of Potholes

Recommendation 9

To provide clarity, local highway authorities should adopt dimensional definitions for potholes based on best practice as part of their maintenance policy. Response times and treatment of potholes should be based on local needs, consideration of all highway users, and an assessment of risk.

Strengthen *Well-maintained Highways*

Recommendation 1

Well-maintained Highways should be revised and strengthened to include all recommendations of this Review which are relevant to local highway authorities.

1. INTRODUCTION

BACKGROUND

- 1.1 Potholes are highly visible footway, cycleway and road defects, often attracting media attention and concerns from local residents. The current focus on potholes can be partly attributed to the recent series of severe winters experienced in England. December 2010 was the coldest recorded for the last 100 years. The effect of winter weather events is well understood by local highway authorities. These events have resulted in severe and unpredictable damage to the local highway networks for which they are responsible. The significant increase in the number of potholes on the already fragile local highway network has resulted in further deterioration and created a significant maintenance problem for local highway authorities.
- 1.2 Good customer service is one of the key objectives of highway maintenance. The number of potholes arising from recent winter damage has led to significant criticism from the public and media as to how local highways are managed and how potholes are repaired. It has also led to significant demand for additional expenditure by local highway authorities for repairs. The Department for Transport recognised this and provided additional resources, firstly as emergency funds for those hardest hit in 2008-09, and then as formula-based funds for all local highway authorities in 2009-10 and 2010-11. This funding can only ever partly address the problem and the additional pressure on authorities from potholes has occurred at a time of limited financial resources and significant resource challenges. It is therefore even more important to drive value for money for taxpayers.
- 1.3 The additional costs of highway damage are not limited to local highway authorities. There is a wider cost to the economy arising from potholes, including costs to road users and business through disruption caused during repairs, increased numbers of accidents and also increased compensation claims. The Department for Transport, among others, has raised concerns over the sustainability of current approaches to dealing with highway damage, particularly potholes. There is also concern that many authorities have not adopted asset management principles as a means of ensuring efficient use of resources.
- 1.4 Due to this, the Parliamentary Under-Secretary of State for Transport, Norman Baker MP, announced an initiative to review the pothole problem in England under the umbrella of the Department for Transport sponsored Highways Maintenance Efficiency Programme (HMEP). A Project Board involving a range of key stakeholders, including representatives from motoring organisations, interest groups, local highway authorities, utilities and industry groups was established in August 2011. Matthew Lugg, President of the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), Director of Environment and Transport at Leicestershire County Council and an HMEP Advocate, chairs the Project Board. The Project Board was supported by a Project Review team.



Water filled pothole near kerb, image courtesy of NHT Network

PRINCIPLES OF THE REVIEW

1.5 It is recognised that there are constraints within which the issues and recommendations of this Review must be considered. The Review therefore acknowledges that:

- Additional funding to resolve the pothole problem may not be the most practical solution in many cases and ways to make more efficient use of current knowledge and resources need to be adopted.
- Potholes will continue to occur on the local highway network, irrespective of the findings of this Review. Potholes occur for a variety of reasons and it would be unreasonable to expect that their occurrence can be prevented in all cases. Many local roads have evolved over time, being built up with successive treatments rather than purpose designed and constructed. Consequently, their irregular construction makes the formation of potholes more likely through the actions of frost and water. Furthermore, the lack of information on materials and thicknesses makes planning effective maintenance more of a challenge.
- Local highway authorities have a statutory duty under the Highways Act 1980 (Ref. 3) to maintain a safe highway network. Potholes are potential safety defects that risk causing accidents, if not well repaired. Poorly repaired or unrepaired potholes will have a longer term effect on the condition of the network and accelerate deterioration.
- Many local highway authorities work within a similar framework of decision making for the identification and repair of potholes. This is largely based on *Well-maintained Highways* (Ref. 4), the UK Roads Liaison Group (UKRLG) Code of Practice for Highway Maintenance Management, published in 2005. Local decision making is key to how local highway authorities deliver services, which are managed and procured in a variety of different ways. This is another area in which HMEP is providing guidance.
- Local highway authorities have a responsibility to provide a highway network that supports the economic prosperity of local communities. This network is very diverse and must meet the needs of all its users, including pedestrians, cyclists, business, motorists, motorcyclists and the vulnerable. Delivery of the highway service to its customers is one of the core objectives of highway maintenance.
- The highway network carries a considerable amount of apparatus owned and maintained by utility companies, which have statutory rights to access and reinstate the highway to maintain their apparatus.



Damage surrounding drain cover, image courtesy of *Well-maintained Highways*

LINES OF ENQUIRY

- 1.6 Potholes occur for a variety of reasons. In considering the pothole problem, this Review explored the following areas:

Communication with the Public

- 1.7 Highways are important to the communities they serve and there is an expectation that they should be safe, comfortable and free from defects. The public, including highway users and local residents, are the customers of the service and should expect to be consulted on the development of service standards and maintenance priorities through appropriate local processes. When defects are reported, the public expect repairs in a timely manner or to understand why action has not been taken.

Adopting the Principles of Asset Management

- 1.8 The Audit Commission has recognised that many local highway authorities have traditionally adopted a worst-first approach to maintenance. Their report *Going the distance* (Ref. 2), recommends that authorities should adopt the principles of asset management when making investment decisions in order to optimise the use of available resources. Highway asset management has not been embraced consistently across all authorities, although it is clearly understood that a more preventative approach to maintenance and long term planning is likely to reduce the occurrence of potholes. The Department for Transport also recognises the value of good asset management in delivering effective and efficient highway services to meet local needs. The Department is working closely with the UKRLG, ADEPT, Chartered Institute of Public Finance and Accountancy (CIPFA), and others to help spread best practice in asset management, including through HMEP.

The Pothole Problem

- 1.9 The extent of the pothole problem is described largely in anecdotal evidence and in many public surveys conducted by various motoring and other stakeholder organisations. Potholes are often treated by the public as a proxy for the overall management of the highway service. Long term implications for the network and the overall cost to the economy are less well understood.

Pothole Identification and Repair

- 1.10 The approach to identification and repair of potholes varies between local highway authorities. The guidance in *Well-maintained Highways* has been adopted by many authorities, with some local variations. Over the last two years there has been pressure on authorities to reduce maintenance standards to meet funding constraints. *Going the distance* recommends that standards should be set that are affordable, for example road condition and response times. The Department for Transport has agreed, through the UKRLG, that standards in *Well-maintained Highways* should be reviewed.



Pothole on previously repaired surface, image courtesy of Stephen Child Consultancy

- 1.11 The effectiveness of pothole repairs varies with the quality of workmanship and the durability of repair materials chosen. Based on consultation with local highway authorities and industry groups and through reviewing research, this Review considers what support authorities may need to implement best practice.

Funding of Repairs

- 1.12 Different approaches to funding the additional cost of winter damage have been adopted by local highway authorities. The impact of the current approach to allocating maintenance funding is considered as is the approach to using that funding by authorities. It is acknowledged that the Department for Transport has set up a sector working group which is currently reviewing the use of the formula approach to allocating capital funds to authorities. Of particular relevance is improving incentives for good asset management in the allocation of maintenance funding, potentially adopting an approach based on information reported for Whole of Government Accounts (WGA).

Case Studies

- 1.13 From consultation with the sector, including local highway authorities, this Review has developed case studies to demonstrate where local highway authorities have taken actions to improve their approach. In some cases summaries of these case studies have been used in this Review to support the recommendations made.

INTERNATIONAL PRACTICE

- 1.14 This Review has also considered international practice in pothole repairs and asset management in general. A study to support this Review has been undertaken by the World Road Association (WRA) and the Chartered Institution of Highways and Transportation (CIHT). Reference is made to international practice as appropriate throughout the Review. Although the findings of international practice are more relevant to the strategic road network, it may be concluded that the UK appears to perform at a similar or better level in terms of highway maintenance operations to leading international countries, including those in Australia, Europe and the United States. Nonetheless, there remains scope for improvement.

HIGHWAYS AGENCY

- 1.15 The Highways Agency is an executive agency of the Department for Transport and is responsible for operating, maintaining and improving the strategic road network in England, on behalf of the Secretary of State for Transport. Although the HMEP is primarily concerned with local authority highway maintenance, some of the research and standards utilised by the Agency in relation to the strategic road network are referenced in this Review as there are clear similarities in the work they undertake. The Highways Agency's requirements are set out in the Design Manual for Roads and Bridges, Manual of Contract Documents for Highway Works and Asset Maintenance and Operational Requirements - a newly developed document to replace the Agency's current Routine and Winter Service Code and Network Management Manual.

IMPLEMENTING THE RECOMMENDATIONS

- 1.16 Recommendations are made in this Review for Government, local highway authorities, and utility companies. Implementation by all parties will lead to more effective outcomes for highway users and the economy as well as more efficient use of taxpayers' money. The Review should be read in conjunction with the full case studies published on the HMEP website as part of this Review: www.dft.gov.uk/topics/local-authorities/hmep. This will provide essential information to local highway authorities and utility companies in implementing the recommendations from this Review. Guidance for local highway authorities in highway maintenance is provided in *Well-maintained Highways*, the UKRLG Code of Practice for Highway Maintenance Management. The Code is regularly revised and updated to reflect changing circumstances and it is recommended that it should be further revised to include the relevant recommendations arising from this Review.

RECOMMENDATION 1**STRENGTHEN *WELL-MAINTAINED HIGHWAYS***

***Well-maintained Highways* should be revised and strengthened to include all recommendations of this Review which are relevant to local highway authorities.**

DEVELOPMENTS SINCE THE PROGRESS REPORT

1.17 This Review published a Progress Report (Ref. 1) in December 2011 which identified a number of gaps in current guidance and practice. Some of these gaps were to be taken forward by this Review and have been dealt with accordingly. Those gaps which fell beyond the scope of this Review can be summarised as follows:

Addressed by HMEP

- Guidance and best practice in asset management - being progressed.
- Guidance on the standardisation of specifications - being progressed.

To be addressed by UKRLG or the Department for Transport

- Guidance on hierarchy to reflect the purpose and use of network - will be included in a future revision of *Well-maintained Highways*.
- Use of condition indicators to encourage the adoption of asset management - to be considered by the Department for Transport.

Not yet addressed

- Guidance on maintenance to improve the resilience of the road network to severe weather - likely to be included in a future revision of *Well-maintained Highways*.
- Guidance on calculating the economic benefits of highway maintenance - Recommendation 4 of this Review refers to this issue.

PARALLEL WORK WITHIN THE HMEP

1.18 A number of workstreams are being delivered through HMEP that are also relevant to this Review. These include the guidance on asset management and standard specifications, guidance on maintenance of drainage, and a common framework for procurement of services and collaboration. All of these will contribute towards a more effective approach to addressing the pothole problem.

2. PUBLIC EXPECTATIONS

GENERAL EXPECTATIONS

- 2.1 The public generally have high expectations and strong views about the surface on which they and their vehicles move. They expect to use roads, footways and cycleways without actually noticing the surface they are travelling on. Research for the Department for Transport has shown that the public’s main concern on roads is potholes and on footways it is uneven slabs and potholes. “Potholes stand out above all other defects as the most unacceptable of all conditions. Nearly everyone has this at the top of their scale” (Ref. 5).
- 2.2 Any condition that causes drivers to react to surface condition and takes attention away from driving is considered unsafe and unacceptable. Other significant concerns include poor quality patching and utility reinstatements, unevenness and raised or lowered ironwork, especially at the edge of the road or in cycle lanes.

THE HIGHWAY NETWORK

Importance of the Highway Network and its Condition

- 2.3 *Maintaining a Vital Asset* (Ref. 6), makes it clear that the highway network is the largest community asset for which local authorities are responsible. It is vital and fundamental to the economic, social and environmental well being of the community. It helps to shape the character and quality of an area, the quality of life of the local community and makes an important contribution to wider local authority priorities including growth, regeneration, education, health and community safety. Local highways also make a wider contribution to society, providing access to the strategic road network managed by the Highways Agency, as well as rail, ports and airports.
- 2.4 Road condition is given very high priority by the public in a survey conducted by Ipsos Mori in March 2011 (Ref. 7) and emerges second only to fuel cost as the highest public priority in transport (Figure 2-1).

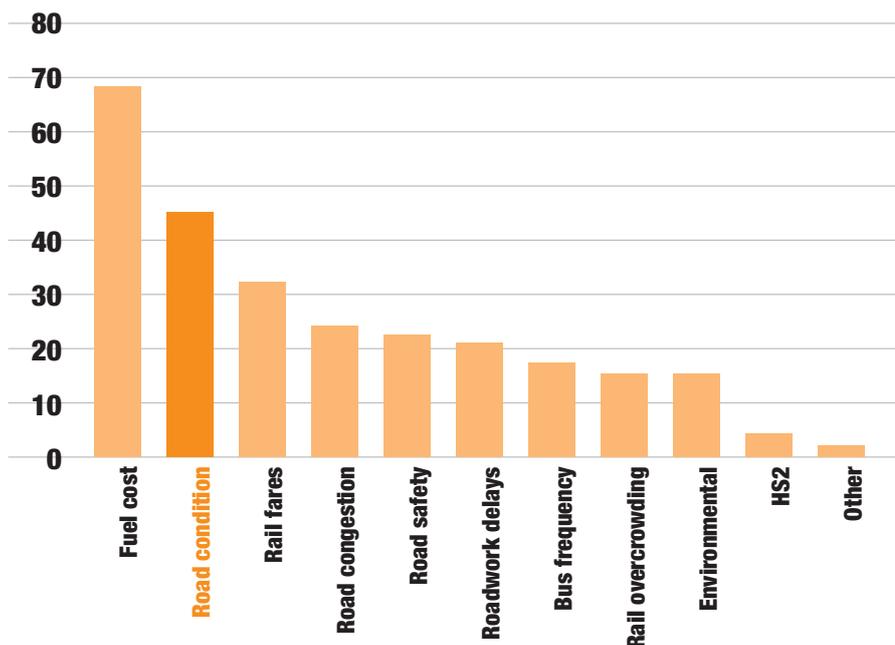


Figure 2.1 - Ipsos Mori, Top Transport Priorities, March 2011

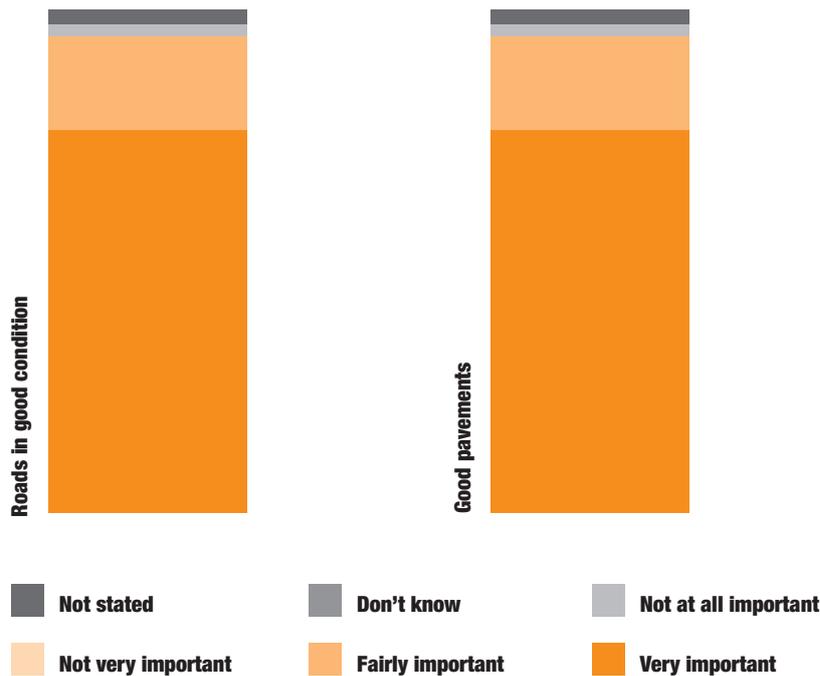


Figure 2.2 - 2011 NHT Public Opinion Survey

- 2.5 The importance of condition is emphasised in the 2011 National Highways and Transport (NHT) Public Opinion Survey (Ref. 8) where 97 per cent of users said that good roads and pavements (footways) are important (Figure 2-2). Over 60,000 people in 70 local authority areas responded to the survey.
- 2.6 The RAC Report on Motoring 2011 (Ref. 9) showed that 92 per cent of respondents consider that the quality of local roads is deteriorating, up from 69 per cent in 2008, and that maintenance of existing roads is the top priority for investment. The report is based on the findings from 1,002 drivers, representing a cross section of UK motorists. In 2010, AA Streetwatch 1 (Ref. 10) involved 1,912 members and rated potholes as the most serious issue for the public, followed by patched repairs and poorly reinstated utility trenches. In 2011, AA Streetwatch 3 (Ref. 11) consisted of approximately 1,000 volunteers and again rated potholes the most serious local streets issue, followed by poorly reinstated utility trenches and defective inspection covers/drains. An LG Insight poll of over 1,000 British adults concluded that four in ten people are not satisfied with the condition of footways (Ref. 12).
- 2.7 Roads and footways in poor condition are often the subject of compensation claims against the local highway authority. Each authority has their own approach to recording the value of claims, so an overall national figure is difficult to determine. However, according to Freedom of Information data obtained by Guide Dogs (Ref. 13), UK local highway authorities paid out over £106 million in compensation claims for trips and falls on footways between 2006 and 2010, with the true figure, including all authorities and factoring in ongoing claims, likely to be closer to £300 million. The 2012 ALARM survey (Ref. 14), to which 70 per cent of authorities in England and Wales responded, reported that the annual value of claims stands at £35 million, aggregated nationally.
- 2.8 Direct costs of accidents and vehicle damage to motorists and insurance companies are a real burden on the economy. Insurers do not specifically record claims due to potholes, so the element attributable to potholes is uncertain.

Variety of Users and Requirements

2.9 Footways, roads and cycleways are highly visible and used on a daily basis by the whole community for a wide variety of business, commercial and leisure purposes. Research carried out for the Department for Transport (Ref. 5) provided evidence that expectations are influenced by where the road fits within personal hierarchies, which were shown to differ from the standard road classification.

2.10 The national road classification system has been in place since the 1940's although the Department for Transport announced in January 2012 that from April 2012 local highway authorities would have greater responsibility for the management of the system. *Well-maintained Highways* (Ref. 4) provides guidance on network hierarchies for carriageway, footways and cycleways based on the importance and use of the routes.



Cycle group, image courtesy of Cyclists' Touring Club

2.11 Anecdotal evidence would suggest that the use of the highway network is changing. Heavy goods vehicles choose a variety of routes for the distribution of goods and some routes are sometimes inappropriate and unsuitable for heavier traffic than their strategic importance would suggest. The use of certain types of satellite navigation technology has encouraged all types of vehicles to use the unclassified road network, increasing both the volume and weight of traffic and causing increased damage to the road surface and to the edges from overrunning vehicles. These routes are at greatest risk of occurrence of potholes. The Department for Transport recently held a SatNav summit to address these problems.

2.12 In the Progress Report for this Review (Ref. 1), guidance on road hierarchy to reflect the purpose and use of the network was identified as a gap. This is now being addressed by the UKRLG, through the Department for Transport, as part of the work on revising *Well-maintained Highways*.

2.13 The Department for Transport's research further shows that the public's perceptions of road and footway surface condition are influenced by the type of user. Elderly people with physical restrictions, whether pedestrians, motorists or passengers, notice surfaces more than any others. Pedestrians, children, older people and people with mobility difficulties are at a higher risk of being affected by defect hazards and poor quality repairs. Generally, trip hazards greater than 10 mm are of greatest concern. Cyclists consider poor repairs and reinstatements to be significant hazards, with step changes greater than 20 mm of greatest concern. Motorcyclists, car drivers and passengers are most concerned about lack of grip and extreme bumpiness, particularly potholes.

2.14 Issues for highway users can run deeper than safety and condition for travelling. Surfaces in poor condition or with poor repairs are not aesthetically pleasing to local communities and may be seen to reflect wider social and economic issues. Poor quality utility reinstatements can also add to the problem.

2.15 There is a widely held expectation that journeys should be reliable and a perception that highway maintenance and utility companies' works causes delays and travel disruption. The 2012 ALARM (Ref. 14) survey reported that approximately 1.7 million potholes were filled last year and that the average number filled in England, excluding London, was just over 12,000 per local highway authority.

Opinion and Satisfaction with Roads and Footways

2.16 The NHT survey shows that the condition of roads is unlike most transport and highways services in that it attracts more public dissatisfaction than satisfaction. People are significantly less satisfied with the condition of roads compared to a range of other transport issues, including safety, congestion and bus travel (Figure 2-3).

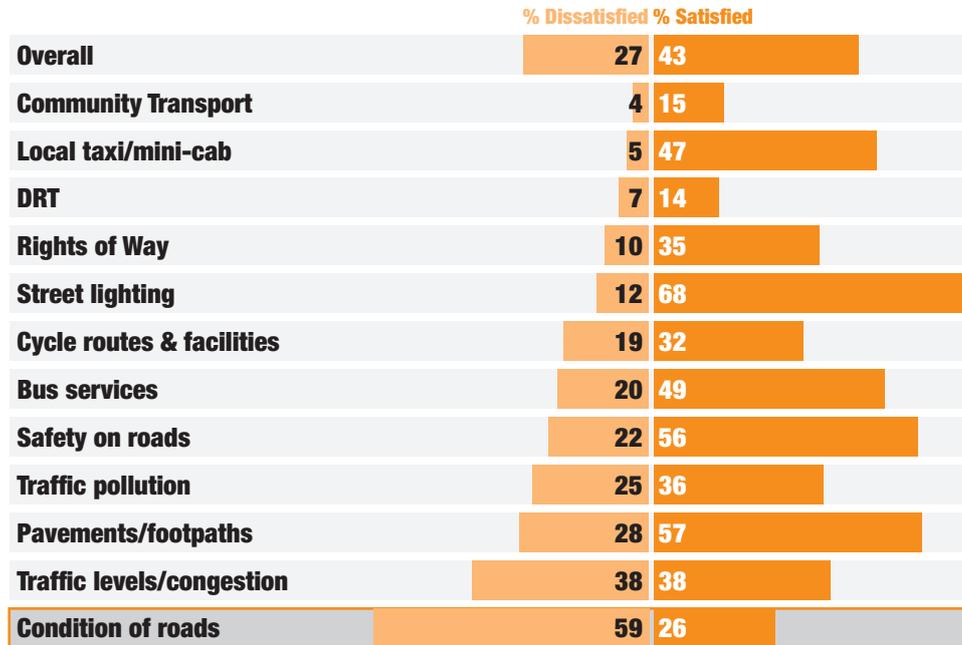


Figure 2-3 – NHT Public Opinion Survey

2.17 The survey also shows that public satisfaction with the condition of surfaces and with the speed of repairing damaged roads and footpaths has fallen significantly over the last four years. Satisfaction with the condition of roads and footpaths is low and a high percentage of people are critical of both the speed and quality of repair (Figure 2-4). [Note that the NHT survey uses the term pavements for pedestrian walkways, but the term footways has been used throughout this Review.]

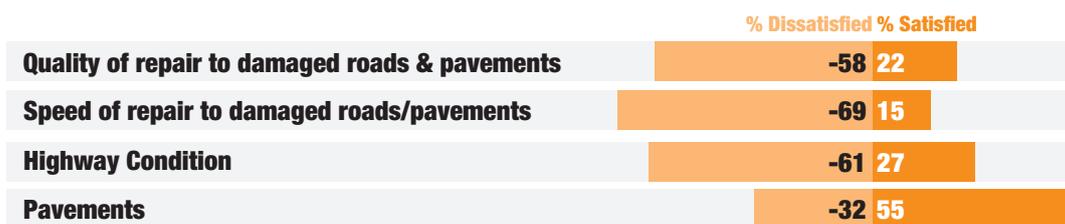


Figure 2-4 – NHT survey (All Respondents)

2.18 The NHT survey also shows that satisfaction with condition and repair varies significantly for different user groups. In particular, people with disabilities are significantly less satisfied with footways than other respondents (Figure 2-5).

	% Dissatisfied	% Satisfied
Quality of repair to damaged roads & pavements	-60	22
Speed of repair to damaged roads/pavements	-70	14
Highway Condition	-61	26
Pavements	-40	46

Figure 2-5 - NHT survey (People with disabilities)

2.19 Findings from the various public opinion surveys are interesting when considered alongside the Department for Transport Statistical Release, Road Conditions in England 2010 (Ref. 15). This reported that the condition of classified roads fell slightly in 2009-10, but that only 6 per cent were in poor condition. 'A' roads were in better condition than 'B' and 'C' roads. The proportion of the unclassified road network where maintenance should be considered was 15 per cent, the same as in 2008-09. The publication also noted that there were variations between urban and rural roads and that condition differs significantly across the country.

2.20 Local highway authorities may currently either commission their own public opinion surveys or in many cases subscribe to the NHT Survey. There are significant benefits in a survey which enables benchmarking to be carried out. There are also cost savings to be made compared to carrying out surveys independently. It is understood that some 70 local highway authorities took part in the 2011 NHT Survey, just under half the authorities in England, so there is significant scope for further participation.

Case Study - The National Highways and Transport Network

Public Opinion Survey

The NHT survey is a collaborative venture by a number of local highway authorities to give residents the chance to comment on highways and transport services provided by their authority. It is governed by a local highway authority steering group and the same questionnaire is used across all authorities so that comparisons can be made. The survey analysis enables benchmarking, trending, mapping and overlaying of data from national down to local ward level. Results are publicly available and authorities can use the feedback to manage and improve local services.

2.21 The results from public surveys carried out by a number of organisations demonstrate that satisfaction is low. To improve satisfaction, good information at a local level about what is important and how it is perceived is a fundamental requirement. This information should be considered by local highway authorities in developing their maintenance policy and standards, including pothole identification, assessment and repair. Where appropriate, it can help develop action plans. It can also be used to benchmark performance against other authorities.

RECOMMENDATION 2

PUBLIC OPINION SURVEYS

Local highway authorities should monitor public satisfaction with road, footway and cycleway condition and repair annually through the National Highways and Transport Public Satisfaction Survey or their own surveys. The findings can be used to benchmark performance and taken into consideration in local highway maintenance policies.

ENGAGING STAKEHOLDERS

Involving Communities and Users

- 2.22 Public involvement by means of informed consultation, particularly on levels of service including preventative maintenance, response times and quality of pothole repairs, is likely to be beneficial in building the understanding and support of customers. The public need to be engaged at various stages within the decision making process, so that they can appreciate the challenges local highway authorities face. People cannot be expected to understand or accept the level of service their authority provides if they have not been involved in its development or if the decision making process is not published and transparent.
- 2.23 Local highway authorities engage with and involve local communities, businesses and other services, such as emergency services, in a variety of different ways. There are a number of national and local interest groups that have an important part to play in raising awareness of issues important to their members. Interest groups are likely to include pedestrian groups, cycling and motorcycling groups, disability and mobility groups, motoring groups, business groups and transport haulage associations to name but a few. Potholes are likely to be a key concern for many of these groups.
- 2.24 Local highway authorities should also take account of people travelling through or beyond their area, and of other organisations that have an impact on the quality of the network. Collaborating with neighbouring authorities in determining levels of service is likely to be beneficial in fostering clarity.
- 2.25 Effective engagement with the community and user groups is part of the process of developing a Local Transport Plan and a key issue for local highway authorities in managing expectations and therefore satisfaction with the condition of roads, footways and cycleways.

Localism

- 2.26 The impact of localism is starting to result in a shift of emphasis in how some authorities deliver highway maintenance. One effect can be that decisions taken at local community level can easily focus on giving priority to reactive repairs to obvious defects, including potholes. This creates a tension, as a reactive approach to immediate repair of all potholes is not efficient. Indeed, it may result in a reduction of funds available for preventative work, thus perpetuating the pothole problem.
- 2.27 Prudent management of highway assets dictates that cost effective preventative maintenance to roads, cycleways and footways, possibly to those with few visible defects at the time, can prevent potholes and other defects from occurring in the first place. There is a need for local mechanisms to ensure an appropriate balance between reactive repairs and preventative maintenance. Local highway authorities should consider how they can work with local communities so that both parties understand the issues involved.

Communications Strategy

- 2.28 Potholes have always been of interest to the public and the media and this interest is likely to continue, as they can reflect the quality of an area as well as public expectations of how the highway network should function. The recent series of harsh winters led to significant national and local media coverage of the condition of the highway network.
- 2.29 There are an increasing number of websites that encourage reporting of potholes by the public and which have helped to raise the profile of potholes and repairs such as www.fillthathole.org, www.fixmystreet.co.uk and www.potholes.co.uk.
- 2.30 Providing good quality information to the public on what can be expected in terms of reporting and repairing potholes is an important aspect of customer service. This is likely to be communicated via the local highway authority website or other appropriate means such as leaflets. The NHT survey shows that satisfaction with the level of information on transport and highways generally is low at a net minus 11 per cent.

Case Study - Devon County Council

Use of Social Media to communicate with stakeholders

Devon has been working with the media for a number of years to publicise and explain the work carried out in various parts of the highway maintenance service. In 2010, following the severe winter weather, the Council held a workshop on the impact of winter with stakeholders including the BBC, freight and public transport operators, Parish Councils, the Police and the Highways Agency, in order to understand how the Council's activities affected the public. During the workshop the role of media in supporting communication with the public was highlighted. This included the longer term effect of severe weather on the road network. Road users have been regularly informed of progress on emergency pothole repair strategies, which at their peak resulted in 180,000 repairs over a twelve month period. Devon regularly encourages the public to report safety defects, like potholes, via the telephone or internet. In doing so, details are included of what safety defect is, so that the public know what to report and what to expect. Relevant information is made available on the internet, which also provides details of how to track progress with a reported problem.

- 2.31 The study into overseas practices to support this Review found that in the United States short videos of highway maintenance workers are used to communicate the importance of highway maintenance to the public. In these videos the workers explain their role, how they use resources provided and what they could do with more resources. The feedback from these videos has been very positive.

Case Study - East Sussex County Council

Communicating Achievements using the Winter Damage Fund



East Sussex provided information describing how they had used the Winter Damage funds allocated by the Department for Transport. They produced an easy to understand leaflet, which included a full list of locations where repairs had been carried out. The leaflet is available on the Council's website:

www.eastsussex.gov.uk/roadsandtransport/roads/maintenance/winterdamage.htm

East Sussex Pothole leaflet, image courtesy of East Sussex County Council

- 2.32 Potholes can be a major area of requests for service, complaints or claims to a local highway authority. The 2012 ALARM survey reported that the average number of reports to each authority outside London was over 13,000 a year. Processes must therefore be in place to deal with these communications and provide a high quality reporting and feedback process. It should be made easy for the public to make a report and track progress. Many authorities have sophisticated customer relationship management systems and some enable reports to be shown on maps and email alerts on the progress of pothole repairs. It is also possible to connect to third party websites and to use channels such as social media to provide information on maintenance and pothole repair. Other websites such as www.elgin.gov.uk provide information on repairs to the highway network.
- 2.33 A clear and effective communications strategy is required to ensure clarity and transparency for local highway policy on potholes and to deal with the volume of public requests, reports from multiple sources, and media interest in highway maintenance and pothole issues. Indeed, *Going the distance* (Ref. 2) recommends that local highway authorities publicise and explain their approach to road maintenance. A typical Framework for a Pothole Communications Strategy is included in Appendix A. In developing their strategy, authorities should provide clarity and transparency in how they make decisions in the identification, assessment and repair of potholes and how the public are involved in the decision making process. This will enable greater public understanding of how the strategy is delivered in practice.

RECOMMENDATION 3

PUBLIC COMMUNICATIONS

Local highway authorities should have an effective public communications process that provides clarity and transparency in their policy and approach to repairing potholes. This should include a published policy and details of its implementation, including the prevention, identification, reporting, tracking and repair of potholes.

3. MAINTAINING A VALUABLE ASSET

CONTRIBUTION OF HIGHWAY MAINTENANCE TO THE NATIONAL AND LOCAL ECONOMY

- 3.1 The highway network is the largest and most visible community asset for which local authorities are responsible. Despite this, there is limited information available on the contribution that investment in highway maintenance makes to the economic development of local communities. However, it is widely accepted that the condition of the local highway network, and hence the level of funding available for its maintenance, has a significant impact on the economic development and prosperity of local communities. This is supported by the experience from the recent severe winters. The media has reported widely on high levels of public discontent with potholes and other highway defects, as well as the economic and social costs that result from deteriorated and closed local highways.
- 3.2 Recently, the link between investment in highway maintenance and economic growth of local communities has been recognised in two significant reports:
- *Going the distance* (Ref. 2) highlights that “Councils must use their road maintenance to support the economic competitiveness of their area. Roads play a critical role in public service delivery and economic growth – both through the increased mobility of citizens, goods and services, through building and maintaining infrastructure”.
 - The contribution of well maintained highways has been identified by the Scottish Government in the *National Roads Maintenance Review* (Ref. 16). To this end, work has been undertaken on the economic impact of changes in budget level to the local road network and local communities. The main findings of this work have been made available but the full report is not yet published.
- 3.3 UK Infrastructure’s *National Infrastructure Plan* (Ref. 17) excludes any discussion on how investment in maintenance of the local road network can contribute to the economic development of the UK “because responsibility for locally managed roads is devolved, information on the performance of the local network is less easily available. The available evidence indicates that the condition of local roads varies significantly across the country. It is for local authorities to determine how to prioritise expenditure on local roads, including the balance between maintenance and enhancements”.
- 3.4 From the early stages of this Review, it was recognised that, although it is generally accepted that there is a link between highway maintenance funding and economic growth, the economic benefits of well maintained highways have not been systematically determined at either national or local levels. Furthermore, there is not a recognised and accepted approach to calculating these benefits. Such an approach could support local authorities in demonstrating value for money in highway maintenance against other competing services.
- 3.5 In addition, the cost of potholes to the economy through accidents, disruption, increased user costs and vehicle wear and tear, is not known with any certainty and should be included in assessing the economic benefits of highway maintenance. Research has estimated that, on average, businesses affected by poor road condition lose over £8,000 a year on vehicle damage and increased fuel costs. A third of businesses also lose about £15,000 each per year because the condition of local roads reduces their competitiveness (Ref. 18). The 2011 Asphalt Industry Alliance ALARM (Ref. 19) survey of local highway authorities estimated the wider economic impact of poor road condition and concluded that it is costing the economy and small and medium enterprises – which contribute up to 60 per cent to the economy in some regions – £4.1 billion in England and Wales.

- 3.6 This Review has identified that other countries have developed models which determine the economic benefits of highway maintenance. These models have been used by institutions such as the World Bank to determine investment in road maintenance, particularly in the developing world. The study also found that in Norway road maintenance standards for rutting were refined based on a socio-economic analysis of their network.
- 3.7 It may therefore be concluded that a comprehensive understanding of the economic benefits of investment in highway maintenance is needed by local highway authorities. This will enable them to determine how investment in improving the condition of the highway network, and reducing the number of potholes, provides economic benefit.

RECOMMENDATION 4

ECONOMIC BENEFITS OF HIGHWAY MAINTENANCE

To evaluate and justify the need for investment in maintenance of the local highway network, the Department for Transport should work in conjunction with local highway authorities to develop advice on determining economic costs and benefits.

VALUE OF THE HIGHWAY ASSET

- 3.8 Highways are a local authority's biggest asset. The value of the Highways Agency's network is estimated at around £100 billion (Ref. 20). The value of the local highway network in England is estimated to be significantly higher. Until now, this value has been reported based on historic information. As part of the introduction of WGA, in 2012-13 local highway authorities will be required to value their asset using standard accounting practices based on asset management principles, in accordance with the CIPFA Transport Infrastructure Assets Code (Ref. 21). For the first time the effect of highway asset depreciation will be reported as part of local authorities' annual accounts. Work on understanding the effect of asset condition on these accounts is currently being undertaken by the Highways Asset Management Financial Information Group (HAMFIG), which provides support to local highway authorities on the implementation of WGA.
- 3.9 Failure to invest appropriately in the highway network will be 'declared' through large depreciated replacement costs. The effect on a local authority's accounts and how depreciation charges will be funded are not yet fully understood. The likely impact, however, will be to demonstrate significant past underinvestment and, determine that significant investment is required in the local highway network.
- 3.10 As already established in this Review, potholes often arise from deterioration of the highway network. The increased presence of potholes will therefore have an impact on local authorities' accounts through increased depreciation. Authorities will wish to develop maintenance strategies that maintain the value of their asset and minimise future depreciation. Such strategies should also consider approaches that actually reduce the number of potholes.

IMPACT OF WINTER WEATHER ON A FRAGILE NETWORK

3.11 Underinvestment by authorities in the local highway network over a number of years has led to a network that is fragile and lacks resilience to respond to environmental changes such as severe winter weather, high rainfall and high summer temperatures (Refs. 22, 23).

3.12 The effect of winter weather events is well understood by authorities. These events have resulted in severe and unpredictable damage to the local highway networks for which they are responsible. The significant increase in the number of potholes on the already fragile local highway network has resulted in further deterioration and created a significant maintenance problem. The 2012 ALARM survey (Ref. 14) reported that damage from the 2010-11 extreme winter weather cost an average of £4.4 million per authority in England, excluding London. It also reported that the total cost of damage caused by the recent three successive periods of severe winter weather in England and Wales is £1.3 billion.



Road showing severe potholes, image courtesy of Gloucestershire County Council

3.13 This has led to significant additional expenditure, which has largely been covered through routine maintenance funded from revenue budgets. The Department for Transport provided additional resources, firstly as emergency capital funding and then as one-off payments, to minimise the immediate impact of the problem. In 2011-12 this amounted to £200 million. However, this has only partly addressed the problem and the additional funding pressure on authorities has occurred at a time of limited financial resources, when budgets for highway maintenance are under significant challenge. The 2012 ALARM survey reported that just over two-thirds of authorities had not been able to make good all the additional winter damage with the emergency funding provided.

FUNDING OF HIGHWAY MAINTENANCE

Funding Arrangements

3.14 *Going the distance* recommends that councillors and senior managers ensure they set service standards that they can afford.

3.15 In local highway authorities, highway maintenance is funded through a combination of capital and revenue funding. Capital funds come in part via the Local Transport Capital Settlement from central Government. In recent years, even though overall capital budgets have reduced, highway maintenance budgets have remained relatively stable.

3.16 Revenue funding is made available to local highway authorities from Government and generally supports routine activities. Some authorities have adopted a policy of replacing some of their revenue budget with capital maintenance activities.

3.17 Local highway authorities generally base revenue expenditure on annual budgets. Some are beginning to look at longer periods to generate budget stability, however, guaranteed spend is only available year on year, as approved by the authority. The allocation of capital funding varies between authorities. Some authorities have set capital budgets for two years or more, with indicative spend for two to three years thereafter. However, many authorities only commit capital highway maintenance budgets for one year.

- 3.18 The Department for Transport is providing over £3 billion in capital to authorities from 2011-12 over the four year Spending Review period. It is currently reviewing the approach of allocating capital maintenance budgets, with a view to introducing any changes from 2015. These changes may include a new methodology for calculating capital allocation as well as a budget commitment for periods longer than one year. Currently the Maintenance Formula Grant allocated through the Local Transport Capital Settlement (Highways Maintenance Block) includes an element based on highway condition data, although, as announced in December 2010, this element is being phased out in the Spending Review period. This element has the perverse effect that it potentially provides poorly performing authorities with more funding and therefore does not encourage them to spend their grant on highway maintenance.

Case Study - Hampshire County Council

Developing a Business Case for Prudential Borrowing

Hampshire has used a lifecycle planning approach to determine the level of capital funding in highway maintenance required to bring its highway network to the desired level of service that is essential for the prosperity of Hampshire and its residents. Asset management information was used to build a case for Prudential Borrowing. Through this approach, a commitment to provide additional capital funding of £10 million per year for seven years, to allow the authority to improve condition and improve resilience in the network, was agreed in 2010. The increasing number of potholes on the network following the severe winter weather events was one of the drivers that encouraged Hampshire to adopt this approach.

- 3.19 The majority of authorities consulted as part of this Review confirmed that they supplemented their capital highway maintenance budgets with additional capital funds from other sources to address damage caused by severe winter weather. This was in addition to the winter damage money allocated by the Department for Transport. In some cases, this additional capital was funded using Prudential Borrowing. At the same time, revenue budgets, the normal source of funds for routine highway maintenance activities, had been reduced by most authorities.
- 3.20 Where Prudential Borrowing has been used, it has provided an injection of capital funds to improve the condition of the local highway network. The cost of Prudential Borrowing is paid from revenue budgets. Authorities need to ensure that in developing a case for Prudential Borrowing, they determine a robust and affordable business case based on asset management principles.

Case Study - Blackpool Council

Demonstrating the Need for Funding

Blackpool has a network of 500 km. Its total maintenance funding (capital and revenue) before 2010 was approximately £1.2 million, which was insufficient to arrest deterioration of the network. Much of this funding was therefore spent on routine maintenance, including the patching of potholes. Consequently insufficient investment could be obtained for preventative maintenance treatments. Blackpool presented a robust argument for greater funding to develop a preventative approach to maintenance. Their business case was based on asset management principles supported by specifically developed asset management tools. This approach was successful in obtaining an additional £30 million of funding through Prudential Borrowing. This additional funding enabled Blackpool to develop levels of service which met the needs of their stakeholders, including Elected Members and the public, using preventative maintenance approach. Blackpool will now use the asset management tools developed to share as best practice with other local highway authorities aiming to achieve similar outcomes.

- 3.21 In recent years, highway maintenance Private Finance Initiative (PFI) grants have been made available by Government to some local highway authorities. Portsmouth City Council and Birmingham City Council are the two examples where highway maintenance PFI are in operation. This has provided the opportunity for significant investment in their existing networks to bring their condition to a desired state, after which they will be maintained in steady state until hand back at the end of the 25 year contract. Such contracts result in commitment of budgets for a 25 year period.

Commitment of Budgets

- 3.22 Prudential Borrowing and highway maintenance PFI have provided a means of committing funds for long term improvement in the condition of the highway network. Investment has also led to the reduction in the number of potholes occurring on the network and an improvement in public satisfaction.

Case Study - Portsmouth City Council

Long Term Investment in Highway Maintenance

Portsmouth's 450 km road network had suffered serious deterioration over a number of years, resulting in poor condition scores. Limited investment in highway maintenance was typified by large numbers of potholes and poor public perception. In 1997 Portsmouth was selected as a pathfinder for highways maintenance PFI. The PFI has provided significant investment to raise the road condition to that defined by Portsmouth. The core investment period was completed in 2009. Since then the contractor has maintained the network in a steady state. Securing this 25 year investment has enabled Portsmouth to improve the condition of their network, reduce the amount of potholes and improve public satisfaction as measured through the NHT. Portsmouth has one of the highest public satisfaction ratings for unitary and county authorities.

- 3.23 The benefits of commitment to longer term highway maintenance funding have recently been highlighted in the report *A fresh start for the Strategic Road Network* (Ref. 24), which recommended that budgets should be fixed over five years giving greater opportunity for flexibility in delivery of the Highways Agency's capital programme. It was estimated that savings of up to 20 per cent could be achieved through this approach.
- 3.24 Similarly, it is considered that local highway authorities would benefit from greater certainty in their budget allocation to support commitment to long term highway maintenance funding. This would allow maintenance strategies to reduce the number of potholes and achieve better value for money over the longer term, as commitment to funding allocation would enable greater efficiencies to be delivered. Furthermore, more certainty in work for the supply chain has the potential to reduce costs.
- 3.25 Where authorities set their budget for one year, there is limited opportunity for long term thinking or to plan highway maintenance activities in advance. The 2012 ALARM survey reported that most local highway authorities set annual budgets, which hinder efficient planning of maintenance. It also reports that the majority of respondents believed that funding should be set for five years or more.
- 3.26 This Review carried out extensive consultation with stakeholders, including local highway authorities and the Department for Transport. There was significant support for a commitment to long term budgets for highway maintenance from both central and local Government, including the Highways Maintenance Capital Block Review Group. The benefits include greater certainty in the implementation and planning of asset management by local highway authorities. Commitment for four year rolling budgets has been suggested as a workable approach. In practice, however, capital allocation from Government is set out in four year Comprehensive Spending Review periods.

RECOMMENDATION 5**COMMITMENT OF HIGHWAY MAINTENANCE BUDGETS**

The Government should commit to establishing budgets for highway maintenance for the full four years of Comprehensive Spending Review periods. This will provide greater budget certainty for the highway sector. Local highway authorities should ensure their funding for highways maintenance is aligned to this time period.

Adoption of Asset Management

- 3.27 The adoption of asset management principles by local highway authorities is seen as a key enabler to support the longer term commitment of budgets in two ways, because it:
- Allows authorities to estimate the funding required to deliver the required level of service for their highway network.
 - Provides the tools and processes that ensure efficient and effective use of available resources.
- 3.28 As indicated in this Review's Progress Report (Ref. 1), HMEP has developed a number of work packages related to asset management. These include updated asset management guidance, a lifecycle planning toolkit and a deterioration model for carriageway assets. These three projects are currently underway (www.dft.gov.uk/topics/local-authorities/hmep/), and these can be used to determine how to plan for the longer term and demonstrate the effect of budget allocations. The lifecycle planning toolkit will support the determination of service standards against budgets. Local highway authorities are encouraged to use these and other tools they have available to support their asset management planning.

4. DEVELOPING MAINTENANCE PROGRAMMES

HIGHWAY MAINTENANCE PROGRAMMES

- 4.1 The Highways Act 1980 (Ref. 3) sets out the main statutory duties of local highway authorities in England and Wales. This includes a duty to maintain highways maintainable at public expense in a safe condition. To achieve this, three types of maintenance activities are undertaken:
- **Routine (cyclic and reactive) maintenance** – This is work that is planned and performed on a routine basis to maintain the condition of the highway or to respond to specific conditions and events. Routine maintenance activities restore the highway asset to a safe state but do not increase its structural capacity.
 - **Preventative maintenance** – This is a planned strategy of cost-effective treatments to an existing highway in order to preserve it, prevent water ingress, reduce the rate of future deterioration and increase service life, without increasing its structural capacity. Preventative maintenance is typically applied to highways with some remaining service life and comprises road surface treatments that include crack sealing, surface dressing, slurry or micro-surfacing and thin and hot-mix asphalt overlay.
 - **Structural maintenance** – This consists of structural enhancements that extend the service life of existing highways either by restoring structural capacity through the elimination of age-related surface cracking, or by strengthening existing highways to accommodate existing or projected traffic.
- 4.2 It has been recognised by the sector for some time that the condition of the local highway network continues to be below the desirable level. In 2000 the Department for Transport, as part of a published Ten Year Transport Plan, suggested that there was a maintenance backlog of several billion pounds (Ref. 25) on the local highway network. Local highway authority engineers generally recognise that the condition of their network does not meet the desired level of service. The 2012 ALARM survey (Ref. 14) reports a backlog figure in England and Wales of £9.8 billion.
- 4.3 There is general acceptance that highway maintenance has been consistently underfunded over a number of years. *Going the distance* (Ref. 2) reports that with current funding levels, many authorities will not be able to remove the existing maintenance backlog because new maintenance needs arise faster than they can be addressed.
- 4.4 In making maintenance decisions, a number of parameters are taken into consideration. These include the authority's priorities and approach to highway maintenance, importance of the highway, existing condition and cost of treatments. The way treatments are selected and prioritised varies significantly between authorities.
- 4.5 The condition of the existing highway network is a key parameter in maintenance decisions. It is vital that highway condition data is collected and used appropriately to determine maintenance solutions and programmes of work. Data from SCANNER, Coarse Visual Inspections (CVI) and Detailed Visual Inspections (DVI), all of which measure surface condition in various types of roads, and SCRIM which measures skidding resistance, are key information used to measure road condition. The UKPMS Footway Network Survey (FNS) provides a categorisation system for condition assessments specific to footways.
- 4.6 Available resources have not always been used in an effective manner. Best Value Performance Indicators, and then National Indicators, have driven many authorities to adopt a worst-first approach to maintenance. Treatments then focus on the worst sections of the network, which may well have deteriorated to a state where potholes are more likely to occur. They also become more susceptible to winter damage. As they require structural treatment, they are likely to be the most expensive roads to repair. Consequently, authorities have carried out less preventative maintenance.

- 4.7 National Indicators were abolished in October 2010 as they were considered an unnecessary burden on local highway authorities. There is still a requirement on authorities to collect road condition data, which is published annually by Government in the form of the 'Single Data List' (Ref. 26). The information is the same as that previously required for National Indicators, ie it reports the proportion of the network that requires structural maintenance.
- 4.8 An approach based on condition data as described above does not encourage adoption of an asset management approach, nor does it encourage an appropriate balance between preventative and structural maintenance. The Department for Transport is currently reviewing its approach to measurement of highway condition.

PREVENTION IS BETTER THAN CURE

- 4.9 *Going the distance* reports that giving higher priority to the worst roads will limit funds available for preventative work on the ones that are in the optimum state of repair to receive it. It also reports that one Council estimated that it is four times cheaper to adopt a preventative treatment regime. Preventative maintenance is also considerably better value than reactive work. The 2012 ALARM survey reported that planned preventative maintenance is at least 20 times less expensive than reactive maintenance.

- 4.10 The Roads Surface Treatments Association (RSTA) has reported that from 2000 to 2010 the area of surface dressing treatments gradually reduced, despite funding remaining reasonably constant. Over the last two years however it has increased, mainly due to the additional funding that has been made available by the Department for Transport to address winter damage.



Maintenance team repairing road, image courtesy of Road Surface Treatments Association

- 4.11 Good routine maintenance of the highway drainage network, including ditches and gullies, will also contribute to prolonging the life of a highway by keeping water out of the highway structure. Where roads are of evolved construction this is of particular importance as they are unlikely to incorporate designed drainage systems to remove ground and surface water from the highway structure.

Case Study - VicRoads – Australia

Keeping Moisture out of a Road Pavement

At VicRoads, safety issues are currently the highest priority, followed by strategies for keeping the moisture out of the pavement. Other priorities, such as reducing roughness and minimising user costs, are deferred until more funds become available. As a result of these priorities, the agency has sacrificed funding for the highest category of roads to fund resealing of the local roads in an effort to keep moisture out of the system and to reduce the risk associated with the deterioration of the local road network. VicRoads also reports that due to the priority it places on keeping moisture out of the road surface, contractors must reseal the roads before any area has more than 100 ft² of deterioration. The emphasis is on keeping pavements from deteriorating to the point that rehabilitation is required.

- 4.12 In the Progress Report (Ref. 1) published as part of this Review, it was reported that improving the resilience of the local highway network must be a priority in order to provide efficient and effective service to all highway users and meets users' requirements. Adopting a preventative maintenance regime will lead to a more resilient highway network, because appropriate preventative treatments can prolong the service life of highways by protecting them from water.

- 4.13 The provision of guidance on the maintenance of local highways to enable greater resilience should be considered. This must include maintaining roads in a changing climate with appropriate materials and techniques and should take account of the ADEPT report on *Climate Change and Evolved Pavements* (Ref. 22) and the report *Maintaining Pavements in a Changing Climate* (Ref. 23). This guidance will be included as part of the update of *Well-maintained Highways* (Ref. 4) being carried out by UKRLG through the Department for Transport.



Maintenance team repairing footway, image courtesy of Road Surface Treatments Association

Case Study - Hertfordshire County Council

Prevention is Better than Cure

Hertfordshire has worked for a number of years to understand the impact of different maintenance scenarios on the projected condition of the road network. To this end, it has compared a worst-first option against an optimised solution, based on adopting preventative maintenance. This demonstrated that the preventative maintenance approach delivers greater benefit for the same budget, over the long term. This information was used to develop a bid to Elected Members for additional capital funding, which was successful due to the ability to project future condition and demonstrate the consequences of various options to best meet Elected Members' aspirations.

To demonstrate their belief that 'prevention is better than cure', the authority is using the example of a rural road that includes a bridge section running over a motorway. Following the severe winter of 2009-10, the road showed some deterioration and was treated with surface dressing. The bridge section was not treated due to technical restrictions. The treated road remained in good condition during the following two severe winters. However, the untreated bridge section deteriorated significantly and potholes proliferated. This demonstrates that the best way to fix a pothole is to prevent it from forming in the first place.

- 4.14 There is general recognition that potholes may be reduced by adopting a more preventative approach to highway maintenance by intervening when highways are at their optimum condition. This would be in line with good asset management principles and may create savings in, and make better use of, both routine and structural maintenance budgets. Lifecycle planning tools to assist in determining the balance between structural, preventative and routine works will be developed through HMEP.

Case Study - Lancashire County Council

Prevention Prevents Potholes

Lancashire has utilised preventative maintenance for many years, particularly through surface dressing. The use of surface dressing to act as a waterproofing agent against the ingress of water together with a pre-patching programme that has not only added life to roads but has prevented pothole formation. Surface dressing roads has filled the cracks and fissures with binder sealing the surface against water penetration hence 'water has nowhere to hide'.

Roads in Lancashire that have been surface dressed over the last five to seven years have been virtually pothole free in the last few years, the only exceptions being where highway openings and subsequent reinstatements have broken the waterproofing. If budget permitted many more roads would be surface dressed as performance and evidence in Lancashire certainly shows that 'prevention is better than cure'.

- 4.15 In many authorities, structural treatments currently absorb the majority of the available funds. With capital maintenance budgets remaining relatively stable, a greater move to preventative maintenance may result in those sections of the network in worst condition deteriorating even further, leading to a greater risk of potholes. However, given that the cost of preventative treatments is lower than structural ones, for a given capital budget a larger proportion of network can be treated. In the longer term, this approach will lead to a reduction of the proportion of the network requiring structural treatments. There is a risk that in the shorter term, some of the worst roads may only receive routine maintenance. In these cases, the appropriate message needs to be communicated to the public, so that expectations can be realistic.
- 4.16 The effectiveness of preventative maintenance is well understood by practitioners who consider it the most effective way of prolonging the serviceable life of highways. The same approach is adopted by Government in areas such as health through stop smoking campaigns, and by Fire Services through encouraging the adoption of smoke alarms. Both follow the principle that 'prevention is better than cure'.
- 4.17 A preventative approach has the potential to provide greater efficiency in the longer term, as well as reducing the number of potholes through applying surface treatments at the right time.

RECOMMENDATION 6

PREVENTION IS BETTER THAN CURE

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

RIGHT TREATMENT RIGHT SITE

- 4.18 For any maintenance strategy to be successful, the right treatment must be selected for the right site. The treatment should then be carried out using correctly selected materials and techniques. For preventative maintenance this will include use of a variety of surface treatments such as surface dressing, slurry or micro-surfacing and other techniques such as crack sealing.
- 4.19 A number of issues have been identified in this Review as important in ensuring that the right treatment is proposed at the right site:
- **Treatment selection** - Selection of the right treatment is potentially complex and relies on the local highway authority understanding the suitability of the site for the material and thus specifying the correct material.
 - **Knowledge** - Specialised engineering and materials knowledge, required to specify treatments and associated products, is available to varying extents in local highway authorities. Concerns have been raised during this Review that these skills have been lost from many authorities.
 - **Laying of material** - Treatments must be installed correctly. Some proprietary materials may be more sensitive than traditional materials. It is essential that operatives undertaking works are correctly trained and lay the materials to the correct specifications. It is recognised that some suppliers provide proprietary materials for contractors to lay under licence and it is essential that the contractor adheres to the suppliers' specification for both materials and operator competency.

4.20 Where maintenance has required use of an asphaltic surface course, this has traditionally used British Standard materials including Hot Rolled Asphalt (HRA) and Dense Bitumen Macadam (DBM). These tend to be dense in nature with a low void content.

4.21 Over the last twenty years, the sector has moved towards Thin Surface Course Systems (TSCS), proprietary materials that have different bituminous properties. These materials are designed to be safer, easier and cheaper to lay and offer environmental benefits such as reduced traffic noise. In addition they provide good deformation resistance. These materials have become favoured as the materials of choice. However, their performance is particularly sensitive to laying conditions and correct site selection. They tend to be open-textured and potentially more susceptible to the ingress of water.



Resurfacing works, image courtesy of *Well-maintained Highways*

4.22 The general consensus found during this Review across the sector is that the inappropriate use of proprietary surfacing materials is a contributory factor to early surface failures, including the formation of potholes. Many authorities consulted are moving away from these proprietary materials in favour of more traditional ones, such as HRA, that are denser and more water resistant. Many believe such a move may improve the resilience of the local highway network to the formation of potholes in the future. Other authorities have developed their own specifications for TSCS to provide a material that is more durable. For example, Staffordshire County Council has developed a specification for TSCS and has successfully implemented it for a number of years.

Case Study - Transport Scotland

New Surfacing Materials Specification

Transport Scotland (TS) adopted proprietary thin surfacings in place of chipped hot rolled asphalt largely because of the operational benefits of the laying process for these materials in terms of traffic management and disruption. These materials, however, presented significant maintenance problems. Rapid progression from localised failure to widespread issues of early failure highlighted the need for early identification and treatment of potholes. This poor performance of proprietary thin surfacings prompted TS to drive the technical development of an improved specification that adhered more closely to specifications with proven performance in continental Europe, from which the UK materials had been developed. This permitted the use of smaller aggregate sizes which, together with the use of polymer modified binders and fibres, has resulted in dense, impermeable materials. The first pilot in place since 2008 which used straight run bitumen with fibre, a higher binder content and a stringent aggregate grading, has demonstrated the benefits having survived the recent harsh winters 'without a mark'.

4.23 Despite these concerns, authorities still use proprietary materials and systems for structural and preventative maintenance. The sector has invested a significant amount in these materials and it is widely accepted that they offer credible solutions when used appropriately. However, their successful use depends on selecting the right material for the right site and laying the material correctly. Many materials and systems are accredited to the Highway Authorities Product Approval Scheme (HAPAS), managed by the British Board of Agrément, which provides reassurance to the construction industry by assessing manufacturers' products, systems and procedures to ensure they are fit for purpose. This is referenced in Appendix B.

Case Study - Highways Agency

New Surfacing Materials Specification

The Highways Agency has been working with the Mineral Products Association and the Refined Bitumen Association on a number of initiatives to optimise Thin Surface Course Systems (TSCS) to maintain safety standards, further improve durability and make more efficient use of resources. A comprehensive research programme completed in 2011 demonstrated that TSCS consistently delivers better than predicted skid resistance when compared to traditional surfacing. This has enabled changes to be made to the specification requirements in the Manual of Contract Documents for Highway Works (MCHW) to reduce both the initial and retained texture depth requirements for TSCS. This is widely regarded as a significant factor in improving the service life of these materials. In addition, the MCHW will also include a maximum permitted texture depth to ensure that materials are not 'over-designed' to achieve compliance with the retained texture measure. These changes are due to be published in summer 2012.

- 4.24 National Highway Sector Schemes (NHSS), referenced in Appendix B, are bespoke integrated management schemes within the ISO 9001 Framework. They have been developed in partnership with all sides of the sector to interpret the international quality management standard as it applies to a particular activity or industry within the UK. The NHSS documents are published by the UK Accreditation Service (UKAS) on behalf of technical advisory committees. Relevant NHSS's include:
- **NHSS 13** - Supply and application of Surface Treatments to Road Surfaces.
 - **NHSS 14** - Quality Assurance for the Production of Asphalt Mixes.
 - **NHSS 16** - Laying of Asphalt Mixes.
- 4.25 To ensure that they realise the benefits, local highway authorities should ensure that the supply and installation of surfacing and surface treatments comply with the appropriate NHSS. It is essential that authorities, or their service providers, have access to competent expertise when specifying materials and treatments for maintenance to ensure that they can make informed choices.
- 4.26 There are likely to be significant benefits to authorities by collaborating on materials and treatment specifications. A joint approach by several authorities would share the best knowledge, simplify the variety of treatments used and provide the opportunity for cost savings in supply of material.

Case Study - London Boroughs and Transport for London

London Highways Alliance Contract

The London Highways Alliance Contract was developed under the Transforming London's Highways Management (TLHM) Programme, a joint initiative between all the London Boroughs and Transport for London (TfL). TLHM has developed a common specification for highway maintenance that is being used as the basis for the four new area contracts that are to be let. The benefits of this collaboration are a reduced menu of materials and treatments together with economies of scale through larger contracts with greater scope and volume of work, whilst also reducing road user disruption through the co-ordination of works across multiple authorities. The contract is structured in such a way as to allow authorities total flexibility over which services they choose to purchase and the levels at which they require them. Preventative and structural maintenance will be undertaken using this contract which will also cover routine and reactive works such as pothole repairs as well as capital projects. The specification requires the use of hot mix asphalt for permanent repairs although cold proprietary materials can be used in temporary repairs.

- 4.27 Training and qualifications available on how materials and treatments should be specified is limited. In addition, many local highway authorities have limited resources for training and development of specialists. As a consequence, it is common practice to rely on advice from specialist contractors undertaking the works, which may carry risks.
- 4.28 Where local highway authorities do not have the skills required, they should seek to collaborate with neighbouring authorities. If these skills do not exist within those authorities, they should seek to develop them through training or look towards the external market for independent materials advice.

RECOMMENDATION 7

INFORMED CHOICES

Local highway authorities should ensure that appropriate competencies are available to make the right choices when designing and specifying techniques and materials for the maintenance and repair of highways. These competencies can be secured through training, collaboration with neighbouring authorities or external advice.

GUIDANCE ON MATERIALS

- 4.29 There are a number of examples where guidance has been developed to support local highway authorities in making decisions about the use of materials and treatments. For example, the Road Surface Treatments Association (RSTA) has produced a series of Codes of Practice (Ref. 27), peer reviewed by ADEPT, that are available for those designing, specifying and installing road surface treatments. A comprehensive list of guidance developed on behalf of local highway authorities and the wider sector is referenced in Appendix B. In addition, work is currently being carried out by HMEP to develop common specifications for materials.
- 4.30 Some of the documents referenced in Appendix B are well publicised and used but others are not widely known. Indeed, some of the documents, although produced on behalf of local highway authorities, are not necessarily available to all authorities. The intention is that a repository for such information will be made available on the HMEP website within the Knowledge Hub.
- 4.31 It is essential that the sector provides and promotes guidance on the design, specification and installation of materials and treatments for use in highway maintenance. This should include all aspects of material performance, including anticipated service lives and flexibility in performance. This will be of significant benefit to the sector in selecting the right treatment for the right site and the information should be readily available.

RECOMMENDATION 8

GUIDANCE ON MATERIALS

Comprehensive guidance should be made available in the design, specification and installation of materials for the maintenance and repair of highways, to ensure the use of appropriate materials for the right site. This guidance should be produced by the sector for the sector.

5. SETTING THE APPROACH TO REPAIR OF POTHOLES

WHAT IS A POTHOLE?

- 5.1 There is no agreed definition of a pothole. Many would agree that they are isolated failures in a road, footway or cycleway that have caused a sizeable hole. It is the precise size and possible cause where there is less agreement.
- 5.2 Failure mechanisms that result in a pothole have been identified as either ‘top down’ or ‘bottom up’ (Ref. 28). A top down failure is essentially a localised fault that develops into fretting and becomes progressive. A bottom up failure results from a fault at depth, usually involving the presence of water, which causes cracking and leads to a block of material breaking away. In both cases, it is the resultant form of damage that is called a pothole, rather than the failure mechanism involved.
- 5.3 Potholes can affect walking and ride quality. They are also often considered safety defects which require a quick response to make the highway safe. They can cause a relatively thin road, footway or cycleway structure to deteriorate quickly, but thicker structures are less likely to be affected in the same way.

DEFINING A POTHOLE

- 5.4 Defining a pothole is something that has been debated by local highway authorities for a number of years. There is no nationally agreed measurement for a pothole, although some authorities have adopted a dimensional definition as a basis for inspection. Others adopt a risk-based approach, where the highway inspector makes a judgement. However, it would seem that the majority of authorities adopt an approach that combines a dimensional definition with risk-based decision making.

DUTY TO MAINTAIN AND GUIDANCE

- 5.5 Local highway authorities have a duty to maintain their network in a safe condition, in accordance with the Highways Act 1980 (Ref. 3). Highway maintenance policy is a key consideration when courts determine whether a local highway authority has acted reasonably in the circumstances of a particular personal injury claim.
- 5.6 *Well-maintained Highways* (Ref. 4), the Code of Practice for Highway Maintenance Management, provides guidance on a range of activities, generally on a risk based approach. Typical defects, safety inspection frequencies and response times for different road hierarchies are included in the guidance. The Code is not a statutory document, but authorities are encouraged to set their policies by reference to it, and it is often considered relevant in court decisions.
- 5.7 *Well-maintained Highways* does not include a definition of potholes, either in terms of depth or lateral extent, but states that the degree of risk from a pothole depends not merely upon its depth, but also its surface area and location.



Severe pothole in carriageway, image courtesy of Stephen Child Consultancy

NETWORK HIERACHY

- 5.8 Determining local policy in relation to pothole dimension and response time is likely to be affected by the position of the defect on the highway network. The network is very diverse, including major roads, shopping areas, residential areas, industrial areas, rural roads and a range of footways and cycleways. Developing and implementing a network hierarchy is a key consideration in determining inspection frequency and response times for repair. *Well-maintained Highways* provides guidance on development and application of network hierarchy based on function. Some authorities have developed a different approach to hierarchy based on function and social value.
- 5.9 The Progress Report of this Review (Ref. 1) said that “Consideration should be given to how local highway authorities develop maintenance hierarchies for all road users based on the function and use of the route. Guidance should be further developed to support such an approach, which would be beneficial in ensuring that maintenance focuses on the needs of all road users”. This work will be developed by the Department for Transport, on behalf of UKRLG.

CURRENT PRACTICE

- 5.10 Consultation for this Review showed that local highway authorities have policies to identify potholes and other safety defects. Definitions adopted for potholes have remained largely unchanged over the last three years, despite funding pressures.
- 5.11 Defects on footways and cycleways are usually considered separately to roads by local highway authorities. Footway defect thresholds vary between 15 mm and 25 mm depth and for roads between 40 mm and 50 mm depth. The majority of consultees defined a pothole in a road as 40 mm deep. The 2012 ALARM survey (Ref. 14) reported that the majority of respondents used 40 mm.
- 5.12 This Review found that neighbouring local highway authorities do not often collaborate on pothole policy. Consequently there can be different approaches between neighbouring authorities. This does not provide clarity for the public, who tend to compare service levels.

Case Study - Highways Agency

Pothole Definition

As part of their new Asset Support Contracts, the Highways Agency has set new requirements for repairs to paved area defects, such as potholes, on the motorway and trunk road network. This is set around an outcome based specification which centres on the need to conduct a risk based approach to inspection, make safe and repair of the asset, thereby providing the opportunity for contractors to achieve efficiencies. There is an overarching requirement to make safe any defect, but as a minimum requirement, potholes greater than or equal to; 150 mm in diameter; the thickness of surface course; or 40 mm depth, must be repaired within 24 hours.

CLARITY

- 5.13 The public do not necessarily discern between different surface defects. Minor defects may be perceived as potholes, even if they do not meet the authorities’ definition. Perception of the number of potholes may therefore exceed the actual number that are seen to present a safety hazard.

Case Study - Gloucestershire County Council

Pothole Definition and Policy

Gloucestershire developed a risk adverse safety inspection policy in 2006. The policy gave definitions for all safety defects, which led to an inflexible approach to inspections and significant resource requirements for repairs. The floods of 2007 meant that there were insufficient resources to implement the policy, which was reviewed and revised to introduce a risk based approach. The revised policy includes clear definitions for defects, including potholes, as well as clear guidance on defining category 1 defects. This allows the trained and accredited inspectors to assess the risk of the defects within the guidance and defect criteria set out in the policy. Response times were also revised. As a result, around 80 per cent of pothole repairs are carried out within 28 days as planned/programmed work with only 20 per cent repaired reactively within the next working day. This allows permanent repairs to be carried out as well as better planning of repairs, leading to increased efficiencies and productivity of the repair teams. Before the revised policy, each team would repair between 4 and 8 potholes per day. With the new policy, this number has increased to between 10 and 20 potholes per day.

- 5.14 The AA recently carried out an online survey to determine views around the definition of a pothole. The survey, with over 20,000 responses, found that: “Most agree (60 per cent) – 30 per cent strongly – that the size and depth of a pothole should be clearly defined in guidance so highway authorities know which ones must be repaired. However, four-in-five (80 per cent) agree that the size and depth of a pothole is irrelevant and the decision to repair should be based on the threat the pothole poses to road users”.
- 5.15 In Norway a standard definition for a pothole is adopted. Anything wider than 100 mm for a road and 30 mm for a bike lane should be repaired within a week. However in practice a risk assessment is applied to these defects before repair.
- 5.16 Local highway authorities have adopted a number of different approaches and, in some cases, lack of a published policy on if and when it is considered necessary to intervene in a particular pothole, results in a significant lack of clarity for the public. The plethora of media headlines around the repair of potholes may in part reflect this.
- 5.17 Defining a pothole in clear and concise terms, such as width and depth, provides clarity and transparency, both for the public and for local highway authority inspectors when recording and assessing defects. Response times and treatment of potholes should be based on local needs, consideration of all highway users, and assessment of risk. The definition should be part of the Communications Strategy recommended in Section 2 of this Review.

RECOMMENDATION 9

DEFINITION OF POTHOLES

To provide clarity, local highway authorities should adopt dimensional definitions for potholes based on best practice as part of their maintenance policy. Response times and treatment of potholes should be based on local needs, consideration of all highway users, and an assessment of risk.

RESPONSE TIMES

5.18 *Well-maintained Highways* defines two categories of defect:

- **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 defects.

5.19 *Well-maintained Highways* advises that Category 1 defects should be made safe at the time of inspection. If this is not possible, which is often the case, repairs of a permanent or temporary nature should be carried out as soon as possible and in any case within 24 hours. Permanent repair should be carried out within 28 days. Some local highway authorities also define an emergency or urgent response of two or three hours in certain circumstances.

5.20 Category 2 defects are those which, following risk assessment during an inspection, are not deemed an immediate or imminent hazard or risk of short term structural deterioration. These defects are not required to be urgently repaired and may be categorised as high, medium or low priority with local target response times. The majority of these defects will form part of planned programme maintenance within an authority's asset management strategy.

5.21 Most local highway authorities have adopted the guidance for response times in *Well-maintained Highways*. However, some have recently extended response times to make first time permanent repairs, and reduce the need for temporary repairs.

Case Study - Northamptonshire County Council

Response Times

Northamptonshire introduced its Highway Maintenance Initiative in April 2010 to increase the amount of preventative maintenance. It also increased the response period for safety defects from 24 hours to five days, with most defects repaired on a semi-permanent basis. The period for other defects was initially increased to six months, but has now been reduced to between two and four months.

Efficiency savings of £457k have resulted from minimising temporary repairs and from effective patching. Longer term savings of £3.5 million are anticipated from the preventative approach. In the first year public satisfaction increased, claims reduced by 48 per cent, and customer reports of potholes fell by 23 per cent. The rate of network deterioration is beginning to slow, and environmental benefits have resulted from a reduction in vehicle mileage.

PERMANENT AND TEMPORARY REPAIR

5.22 It is for each local highway authority to determine its approach to repair. Pothole repairs have been found to include temporary, permanent, and semi-permanent treatments, but there are no standard definitions for how long these treatments should be in place.

5.23 Temporary repairs are mainly used when a defect is being made safe until a more permanent solution is delivered. Temporary repairs are often undertaken in the knowledge that a permanent repair will be undertaken within 28 days or within the life expectancy of the material used. Some authorities use temporary repairs that will be in place until a wider repair programme is undertaken.

- 5.24 Some local highway authorities use the term semi-permanent or intermediate repair in a situation where they are buying time before a wider maintenance treatment is undertaken.
- 5.25 There is evidence that temporary repairs lead to public dissatisfaction. People perceive return visits to make a temporary repair permanent as a failed and therefore costly repair. Temporary repairs should therefore only be used where safety cannot be managed using alternative approaches, and in emergency circumstances.
- 5.26 To deliver a better service, and in defining response times, local highway authorities need to consider how permanent and temporary repairs are applied to strike a balance between the need for immediate pothole repairs to ensure the safety of all highway users, and 'right first time' solutions that provide better value for money.
- 5.27 Clarity of a local highway authority's policy on permanent and temporary repairs will enable a better understanding of the repair service and should be part of the Communication Strategy recommended in Section 2 of this Review.

RECOMMENDATION 10

PERMANENT REPAIRS POLICY

Local highway authorities should adopt permanent repairs as the first choice. Temporary repairs should only be used where safety cannot be managed using alternative approaches and in emergency circumstances.

6. EFFECTIVENESS OF POTHOLE OPERATIONS

IMPLEMENTING POLICY

- 6.1 Each local highway authority has its own approach to implementing its policy for the management of potholes. *Well-maintained Highways* (Ref. 4) has some guidance on the assessment and classification of defects, including potholes, as well as response times for treatment. It does not, however, directly advise how repairs can be achieved effectively and efficiently.
- 6.2 Managing potholes involves identification, reporting, assessment, decision making and repair. An effective inspection, assessment and recording regime provides the basic information for local highway authorities to address the core highway maintenance objectives of customer service, network safety, serviceability and sustainability. Such a regime provides support in delivering an efficient service and responding to claims.

IDENTIFICATION AND REPORTING

- 6.3 During the recent severe winters there has been much media coverage of the reporting mechanisms for potholes. In some instances, the media have reported that the public have been disappointed by lack of response from local highway authorities. It is important that there is clarity around how public reports can be made and how they are responded to.
- 6.4 Authorities undertake formal safety inspections to identify all defects likely to create danger or serious inconvenience to highway users and the wider community. Highway inspectors assess the risk on site against local policy and the result is recorded and categorised for action.
- 6.5 Anecdotal evidence suggests that around 30 per cent of defects are reported by the public, but this varies according to locality. The majority of authorities provide reporting facilities through their website as well as via email, telephone and customer service desk options, all of which have made reporting of defects by the public easier and more accessible. Whichever methods are made available, an easy way of describing the type and location of the defect should be provided.
- 6.6 Customer Relationship Management Systems are used by many authorities to manage public enquiries. When linked to the internet, these systems can facilitate public engagement and help to manage expectations. They also give authorities a way of providing feedback to customers and transparency through performance information.
- 6.7 Defects reported by the public are treated in different ways by local highway authorities. Some assess reported defects whilst others repair on the basis of the report.

ASSESSMENT, COMPETENCY AND TRAINING

- 6.8 Many authorities use highway safety inspection manuals to provide clarity in the implementation of their inspection policy. The manuals include guidance to highway inspectors on how defects are to be assessed and the appropriate response time, but there is a wide variation in the quality of manuals.
- 6.9 Inspection manuals should lead to consistency of approach and to a more easily understood public response to reports. Not all authorities use inspection manuals, and where they are not available, there is a risk of inconsistency in how defects are assessed and associated response times.

- 6.10 The success of identification, reporting and assessment of potholes is underpinned by inspector competency. Highway inspectors require an understanding and a level of competency in relevant legislation, local policy, guidance, risk management, highway engineering, material performance and appropriate actions, all of which can be provided through appropriate training.
- 6.11 The Institute of Highway Engineers (IHE) believes that only 15 to 20 per cent of highway inspectors have undergone formal training. Training standards are incorporated in *Well-maintained Highways* and in the associated *Highway Risk and Liability Claims* (Ref. 29). Whilst some authorities do ensure the competency of their inspectors through formal training, others may simply provide new inspectors with on-the-job experience alongside more senior colleagues.
- 6.12 There is now a UK Highway Inspectors training and certification scheme. The scheme is approved by the UK Roads Board and administered by the IHE. The Highway Inspectors Board oversees accreditation of training schemes and training providers can seek accreditation for their schemes. Successful candidates of approved schemes are now eligible to join the National Register of Highway Inspectors, where registration lasts for five years.

Case Study - Leicestershire County Council

Inspector Training

Leicestershire recognised the need for their highway inspectors to be trained to ensure effective identification and assessment of potholes. This would assist in ensuring defects were identified and repaired correctly, and minimise potential highway claims. It has put all of its highway inspectors through an accredited training course leading to a Lantra Award for Highway Inspectors. The course covers nine individual modules and is accredited by the Highway Inspectors Board. The training scheme is available to others as part of the Midlands Highways Alliance Skills Academy.

- 6.13 It is clear that for local highway authorities to ensure a consistent approach to pothole identification and assessment, inspection manuals and competent highway inspectors are a basic requirement.

RECOMMENDATION 11

INSPECTION AND TRAINING

Local highway authorities should utilise inspection manuals to support implementation of their inspection policies. They should also ensure that highway inspectors are trained, qualified and competent in the identification and assessment of defects, including potholes, through a scheme accredited by the Highway Inspectors Board.

DELIVERY ARRANGEMENTS

- 6.14 Local highway authorities use various delivery arrangements to implement their inspection and repair policies. These range from fully in-house services to contract arrangements where aspects of the highways service are delivered by service providers and contractors. It is beyond the scope of this Review to further consider contract arrangements, but all should be designed to deliver the local highway authorities' policies.

- 6.15 Delivery models range from highway inspectors assessing defects for subsequent repair to ‘find and fix’, where teams are allocated an area or a route and seek out defects such as potholes to repair as they go. Some authorities operate ‘find and fix’ alongside planned responses. In this case, repair teams assigned to repair specific defects also carry out repairs on other nearby defects.
- 6.16 ‘Find and fix’ can be a cost effective approach. However, operatives may have broad but not specialised knowledge and the right material or equipment for a particular repair may not be available. The approach may be beneficial where the defects on a network are of a consistent nature and standard processes and materials can be adopted.

Case Study - Bath and North East Somerset Council

Inspector Gangs

Bath and North East Somerset has developed ‘Inspector Gangs’. Gangs belonging to their term contractor are assigned to an area’s inspector and collaborate with them to ensure all highway defects, including potholes, are managed effectively and efficiently. During their daily repair duties, Inspector Gangs are empowered to identify safety defects and, through liaison with the inspector, can affect repairs to previously unidentified defects immediately. Benefits have included improvement in customer satisfaction and a reduction in enquiries. Bath and North East Somerset was the most improved unitary authority for customer satisfaction in road condition in the 2011 National Highways and Transport Survey and saw a 62 per cent reduction in public liability claims.

TECHNOLOGY

- 6.17 Technology can, and does, play a major part in pothole operations. The Progress Report published as part of this Review (Ref. 1) considered the potential benefits of investing in technology.
- 6.18 Many local highway authorities use various technologies as part of their approach to pothole operations. However, this Review has found that some authorities continue to rely on manual input of inspections to their highway management systems. Typical technology that may be beneficial to an authority in the effective and efficient identification, assessment and response to potholes include:

- **Internet based facilities** - These are often linked to an authority’s maintenance management system and provide the opportunity for the public to report highway defects, including potholes, at any time. Reports can be acted on as soon as a highway inspector is made aware of the report through the maintenance management system and there is the potential to present the information to the public via a website.
- **Mobile hand held devices** - These enable highway inspectors to record defects immediately and can be linked via wireless to the maintenance management system, allowing the inspector to control the management and response to each defect. The devices often include mapping facilities and cameras so that defects can be plotted and recorded. Benefits include accuracy, speed of reporting and photographic evidence.
- **Integrated suite of technology products** - These can reduce the number of data entry interventions and also enable an instruction to repair a defect to take only minutes from the moment a pothole is identified. There is potential for significant efficiency savings.



Website image, courtesy of Somerset County Council

6.19 Where authorities wish to develop their technology for managing pothole operations, investment needs to be based on a business case that clearly sets out the benefits. Consideration should also be given to any contractual arrangements for the highway maintenance service and how the technology can be deployed.



Portable technology in use, image courtesy of Blackpool Council

6.20 In developing a business case for investing in technology, the following should be considered:

- **Total Cost of Ownership** - The cost of the technology over its lifecycle and how the authority will maximise value from the system. A key aspect of any technology is future proofing to meet changing needs without significant changes in software and hardware or in development costs. Access and security are other key considerations.
- **Adoption of Industry Standards** - In developing the specification full consideration should be given to ensuring that the technology meets industry formats.
- **Certainty of Cost** - In developing the technology specification, authorities will want to focus on how cost certainty can be achieved and minimise the risk of high future support costs.
- **Training and Future Support** - It is necessary to clearly identify future training requirements and the likely need for specialist support in the use of the technology.

Case Study - Somerset County Council

Use of Technology

Somerset carries out safety inspections on its network and instructs its contractor to carry out repairs. Somerset uses a proprietary system for managing defects. The contractor uses an in-house developed system to manage works ordering and the repair works. A fully automated approach has been adopted for managing Category 1 and 2 defects. Both inspection and repair teams use mobile electronic devices to receive instructions and update records. Information is updated in the system in real time using wireless technology. The automated system demonstrated considerable benefit through the improved efficiency of inspections and repairs, as well as the management of claims. It has also provided a service that is more responsive to network needs. Somerset Highways was awarded the Highways Magazine Excellence Award for 'Most Innovative Local Authority Project Scheme of the Year 2011'.

6.21 Technologies available to the public include web-based reporting and smart phone applications that enable mobile and location-based reporting. It may be beneficial to make provision for these systems to link to the authority's system.

Case Study - Cyclists' Touring Club

Smartphone Pothole Reporting



The Cyclists' Touring Club has developed a smart phone application linked to their www.fillthathole.org website. The application combines a photograph of a pothole with GPS technology to pinpoint and report the exact location of the hazard – all in less than two minutes. Once a report is logged, the relevant local highway authority is informed so they can respond.

Cyclist recording damaged surface, image courtesy of Cyclists' Touring Club

- 6.22 Use of technology facilitates a seamless and efficient method of managing the response to potholes. Automated responses to members of the public who have reported potholes can be generated ensuring customers remain informed at various stages. It also provides a robust audit trail of operations, decisions and performance information. Technology has also been used to assist in defence of claims against local highway authorities.

RECOMMENDATION 12

TECHNOLOGY

Local highway authorities should consider using proven technology and systems for the effective identification and management of potholes.

7. RIGHT FIRST TIME DELIVERY

OBJECTIVE

- 7.1 This Review has concluded that adopting a preventative approach through good asset management will reduce the number of potholes. Nevertheless, there will still be a need to repair the potholes that do occur and it is essential this is done 'right first time' wherever possible.
- 7.2 The objective of 'right first time' delivery is to do the job correctly in accordance with the policy and specification of the local highway authority. A pothole or other similar defect is resolved to provide safety for highway users, to protect the road or footway structure and minimise risk and liability.
- 7.3 'Right first time' repairs must seek to minimise the risk of further failure. Key considerations for durable repairs include keeping water out and withstanding the traffic stress in any particular location.

GUIDANCE

- 7.4 As described in Section 5 each local highway authority will have its own policy for highway maintenance, including its approach to potholes. There is, however, no common guidance or specification available on how to deliver 'right first time' pothole repairs. *Well-maintained Highways* (Ref. 4) does not provide advice on how to carry out repairs.
- 7.5 There is limited information published on pothole repair techniques. The ADEPT report *Potholes and Repair Techniques for Local Highways* (Ref. 28), provides a process for 'right first time' pothole repairs using hot material. The report is not a comprehensive review of materials and methods as it concentrates on hot mix repair. It recognises that a variety of materials and methods, products and processes, particularly cold mix and proprietary systems, are successfully used in a wide variety of situations. It does not include a detailed specification, but the advice may be adopted by authorities as good practice.
- 7.6 The report highlights that many pothole repairs on local roads are undertaken in relatively thin, evolved roads. It concentrates on hot mix repairs on roads, and describes the use of aggregate dominated or matrix dominated materials and the need to consider both engineering characteristics and compatibility with the surrounding material. The following is a summary of the essential aspects of the repair process:
 - Preparation is key to good repair.
 - Clean and dry excavation is essential.
 - Debris and water must be removed from the pothole.
 - Edge formation, usually vertical edges, provide cleaner surfaces for bond adhesion and is mainly achieved by saw cutting.
 - Avoidance of acute angles.
 - Application of a bond coat to the base and sides of the excavation for full adhesion and to mitigate against later water ingress.
 - Selection of compatible infill material on the basis of ease of installation and good compaction.

RECOMMENDATION 13

GUIDANCE ON REPAIR TECHNIQUES

Local highway authorities should consider the guidance provided in the ADEPT report *Potholes and Repair Techniques for Local Highways* and adopt as appropriate to their local circumstances.

CURRENT PRACTICE

7.7 Local highway authorities use a wide variety of solutions to repair potholes. Hot mix asphalt is the most commonly used solution, but there are situations where cold material is used, particularly as a temporary repair, and both velocity patching and thermal road repairs are also used, refer to Appendix B.

7.8 A number of themes and issues arise in considering the repair of potholes:

- All products and processes considered for the repair of potholes must be easy and safe to use by operatives carrying out the repairs. Potholes requiring repair will not all be treated the same given the size, risk to safety and the road surface construction in any one location.
- Although various authorities have trialled products and processes, there is no comprehensive guidance as to what repair solution and material is the most durable and cost effective. Hot material may provide a more durable solution as it is easier to compact and will bond more effectively with existing road surfaces.
- Proprietary cold materials may be laid quickly with the advantage of 'make safe' repairs minimising traffic disruption. They may, however, be less durable.
- Materials laid hot from hot-box equipment are the preferred method of permanent repair amongst a number of authorities.
- It is important that whichever solution is used, the works must be done right and in accordance with specifications.
- The repair of potholes varies with the quality of workmanship and the durability of the repair materials chosen.



Resurfacing work in progress, image courtesy of Road Surface Treatments Association

PROPRIETARY PRODUCTS

7.9 There are a variety of proprietary products that are supplied in bags or tubs available for repairing potholes. Different aggregate type and size and different polymer additives make it difficult to compare products and there is no central database where such a comparison can be made. Some materials are HAPAS approved for reinstatements and low traffic roads, refer to Appendix B.

7.10 All products must be used in the correct circumstances of traffic, location and existing road or footway. Some product data advises the uses that can be made whilst some have HAPAS certificates, which clearly state the application range for a particular product.

7.11 Many local highway authorities have tried products and some have settled on one or more that suits them, however few have undertaken comprehensive trials to provide performance data over time. It may be possible to obtain advice and experience in the use of various techniques and products directly from authorities, or through organisations such as ADEPT and APSE.

- 7.12 A variety of products can be used to a greater or lesser extent in the wet, in a wide temperature range and as a longer term, but non-permanent, repair solution. The main advantage of such products is the ease of use and speed of repair in difficult situations such as high speed roads and highly stressed locations such as roundabouts. In some cases, achieving faster repair and minimising traffic disruption may take priority over a 'right first time' approach to making a durable long term repair.

TRAFFIC MANAGEMENT

- 7.13 Traffic management for pothole repair work is generally carried out with reference to Chapter 8 of the Traffic Signs Manual (Ref. 30). A number of those consulted have commented that it is difficult to apply some of the requirements to works on minor roads. Appropriate traffic management is important when considering a 'right first time' approach and safety of the workforce is paramount at all times. The *Safety at Street Works and Road Works Code of Practice* (Ref. 31) is currently being revised and will apply to pothole repairs in due course.

WORKMANSHIP AND TRAINING

- 7.14 Highway maintenance has often been considered the poor relation compared to new works. Repairing potholes can be considered the basic end of maintenance and can be perceived as something that can be undertaken by unskilled labour. Historically this has generated a culture in places of "do not care", "it does not matter", "it's not important work" whereas it requires competent, trained, skilled resources to undertake the work correctly. As a result, performance is sometimes an issue within the industry. The competence of operatives must be maintained and with changing materials and technology it is essential that the workforce is competent to achieve the benefits of new materials and equipment. However, there is no consistent approach to providing appropriate training and qualifications. There is also the risk in austere times that training is reduced by both local highway authorities and by contractors.



Resurfacing work in progress, image courtesy of Atkins Limited

- 7.15 Qualifications available for operatives undertaking highway maintenance include City and Guilds and the new QCF qualifications, which may include NVQs. Potholes and repair materials, however, are not a major focus of these qualifications and some of the organisations consulted for this Review have established their own training schemes and academies.
- 7.16 It is clear that all those involved from supervisors to operatives in local highway authorities and contractor organisations should be competent and suitably trained. Good examples of training, such as that provided by the Midlands Highways Alliance Skills Academy, Cheshire West and Chester Council and RSTA training programmes for contractors and local highway authorities is evidence that this can be achieved. There must be a focus in organisations on competency and training, as without such it is unlikely that the right material, product or process will be used at the right site, and getting it 'right first time' will be difficult.

Case Study - Walsall Council

Improved Quality Pothole Repairs

Walsall carried out a Lean review of its pothole response processes following a long period of network deterioration. 84 per cent of pothole repairs were failing after three months and there was widespread public dissatisfaction. The review was undertaken with the full cooperation and involvement of politicians, staff and term contractor. New processes, practices and equipment were introduced and the people supported by a comprehensive change programme.

Efficiency savings of £405k per annum have been achieved. There have been no failed repairs, public satisfaction has increased and claims have decreased.

QUALITY CONTROL AND SUPERVISION

7.17 There is often minimal, if any, direct supervision or quality control of pothole repairs. Contractors undertaking the work will carry out normal managerial supervision of operatives but this is not production control of the end product. Local highway authorities often rely on contractors self certification, or on random quality checks. Auditing contractors' method statements should be an important step in managing quality.

7.18 Some local highway authorities have instigated a regime of before, during and after photographs for defect repair, similar to the process set out in the ADEPT report. This provides evidence of the initial defect and the completed repair and is available for review as necessary. Ideally, any pothole reported by the public can be completed by responding automatically with a photograph of the repair.

QUALITY ASSURANCE

7.19 There are two relevant schemes:

- The National Highway Sector Schemes (NHSS). These are bespoke integrated management schemes for certain highway maintenance activities, covering planning, quality, training, competence, audit and certification, refer to Appendix B. Pothole repairs and utility company or highway authority reinstatements are not covered by the current schemes.
- The Highway Authority Product Approval Scheme (HAPAS). This is for product approval with certificates issued either through guidelines or a one-off assessment, refer to Appendix B. At present some, but not all, proprietary products used for pothole repairs are certified through this scheme.

Case Study - National Highway Sector Scheme

All Surface Dressing, Slurry Surfacing and Velocity Patching members are registered to National Highway Sector Scheme 13 (Surface Treatments). NHSS13 makes it mandatory for all operatives and supervisors to be trained and qualified to NVQ Level 2 and 3 respectively and have their CSCS cards endorsed by the RSTA. This means the RSTA has vetted and verified the experience and competency of the NVQ assessors. Having a fully trained and qualified workforce improves road worker safety on the highway, helps to ensure work is completed 'right first time', minimises re-work and allows the highway authority to comply fully with health and safety requirements.

- 7.20 It is evident that there is a need to drive up standards in the repair of potholes to ensure 'right first time' delivery, that the workforce is adequately trained and that there is a quality management system in place. At present there is no quality scheme such as an NHSS in place for the repair of potholes using hand-lay materials.
- 7.21 One way to achieve higher standards would be to introduce a new quality scheme specifically for pothole repairs, utility or highway authority reinstatements, and similar work, but it is recognised that the audit and certification requirements of a full NHSS scheme can be costly, especially for small businesses. It is therefore proposed that the sector develops a recognised and appropriate quality scheme which will then be available to be specified by highway authorities and utility companies for use on their works.
- 7.22 Time, perhaps two years, will be needed to develop and introduce such a scheme before its use can be specified by highway authorities and utility companies.

RECOMMENDATION 14

QUALITY OF REPAIRS AND REINSTATEMENTS

To drive up standards, a quality scheme similar to a National Highway Sector Scheme should be developed by the sector to cover all aspects of manual surfacing operations, including pothole repairs and reinstatements, and its use specified by local highway authorities and utility companies.

8. MANAGEMENT OF REINSTATEMENTS

BACKGROUND

- 8.1 This Review has considered how reinstatements may contribute to the formation of potholes on the highway network and what measures may be taken, by both local highway authorities and utility companies involved in the management of reinstatements, to minimise the occurrence of potholes.
- 8.2 This Review recognises that the quality of reinstatements is a long standing issue between local highway authorities and utility companies. It also recognises that poor quality reinstatements may have a longer term impact on the highway network. This is a concern for the public, local highway authorities and utility companies.
- 8.3 A reinstatement, no matter how good, will introduce a discontinuity in a highway. This has been established through research; *A Charge Structure for Trenching in the Highway* (Ref. 32) states that the reinstatement of a highway will affect its long term performance, reducing the average lifespan of a road structure by about 17 per cent. This reduction in lifespan may include the formation of defects such as potholes.
- 8.4 During severe winter weather weaknesses caused by reinstatements may be exacerbated as water may enter, particularly at joints. Physical actions such as 'freeze thaw' have the potential to cause further damage to the highway.
- 8.5 There is a cost to both highway authorities and utility companies from them identifying and rectifying poor workmanship. In April 2011 the Local Government Association reported that highway authorities are left with a cost of £70 million a year due to inadequate reinstatements (Ref. 33). Cumbria County Council reported in June 2011 that the cost of inadequate reinstatements was between £10 million and £15 million per annum. However, it should be noted that not all the costs associated with rectifying poor reinstatements were from the repair of potholes and other defects. The utilities have challenged both sets of figures on the basis that they are required to rectify any faulty reinstatements at their own cost. Through the National Joint Utilities Group (NJUG) they have offered to meet the authors of both reports to better understand the costs and agree a plan of action.
- 8.6 Local highway authorities can recover the cost of investigating failed reinstatements from the responsible utility company and the utility must carry the cost of undertaking remedial work on failed reinstatements. There is also an indirect cost from poor quality reinstatements in reduced public satisfaction.
- 8.7 *Going the distance* (Ref. 2) reported that work undertaken by utilities can undermine the effectiveness of maintenance spending, with one council estimating that roads are not suitably reinstated in 30 per cent of cases.
- 8.8 To minimise these costs, it is essential that both highway authorities and utility companies work together to ensure a 'right first time' culture in highway reinstatements. An approach to joint working between highway authorities and utilities is well established through the Highway Authorities and Utilities Committee (HAUC), the Joint Authorities Group (JAG) and the National Joint Utilities Group (NJUG).



Damaged highway, image courtesy of Bradford City Council

LEGAL FRAMEWORK

- 8.9 It is not the remit of this Review to consider how the legal framework could be improved to better legislate on the respective roles of local highway authorities and utility companies in minimising the impact of reinstatements on the highway, where reinstatements are a contributory factor in the occurrence of potholes.
- 8.10 Utility companies have a right to access and renew their apparatus within a highway and a duty to reinstate the highway on completion of these works. When reinstating the highway utility companies must comply with the Specification for the Reinstatement of the Highway (SROH) (Ref. 34), see section on Quality of Workmanship below.
- 8.11 The efficient co-ordination of street works is one of the most important aspects of the New Roads and Street Works Act 1991 (NRSWA) (Ref. 35).
- 8.12 The Traffic Management Act 2004 (TMA) (Ref. 36) was introduced to encourage authorities to keep traffic, which includes pedestrians and cyclists, moving through better co-ordination and control. Fixed penalty notices have been introduced to encourage accurate and timely notice data, improving the co-ordination of works. This contributes to minimising disruption arising from road and street works.
- 8.13 Other legislation is available under the TMA that has not yet been enacted. In particular this includes a proposal that utility companies carry out full width or half width carriageway resurfacing when carrying out reinstatements, under certain circumstances. This would need to be supported by appropriate guidance. An international study carried out as part of this Review has found that this practice is carried out in Singapore. The adoption of such an approach in England may further improve the quality of works, but will increase the cost to utility companies.

CO-ORDINATION

- 8.14 The aim of both local highway authorities and utility companies should be to minimise the number of reinstatements through better co-ordination. Many local highway authorities and utility companies work together to plan, co-ordinate and adopt good practice within the principles of the TMA. Utilities also adopt good asset management practice and generally have sufficient knowledge of future works to allow for longer term planning of maintenance to their apparatus. At present, however, there is no prescribed period over which programmes should be co-ordinated.
- 8.15 Under the TMA Permit Schemes may be implemented by the authority to co-ordinate all activities in the highway including their own works and those of utility companies. Examples include Transport for London and Kent. The Department for Transport is also inviting up to three English local authorities to pilot lane rental schemes. Under such schemes, authorities will be able to charge utility companies carrying out work up to £2,500 a day on the busiest roads at peak times. Realistic durations of reinstatements must be agreed between both parties, otherwise there is a risk that quality of workmanship may be affected through pressures to complete on time.



Streetworks in progress, image courtesy of Blackpool Council

Case Study - Transport for London

Permitting

Managing congestion is a key priority for Transport for London (TfL), who recognise that highway maintenance activities can cause significant traffic delays. In early 2010, TfL introduced a permitting scheme to control and co-ordinate works on their highway network and define when these can be carried out. Under this scheme, which is managed by TfL, anyone who wishes to carry out work on the network, should ask for a permit to do so. This includes TfL and its contractors as well as utility companies. The number of permits is limited and this has encouraged the adoption of first time permanent repairs to minimise the need for repeat visits to a site. Furthermore, the scope of co-ordination of works between TfL contractors and utility companies has increased.

- 8.16 Local highway authorities and utility companies would both benefit from sharing their programmes over longer periods. This would provide the benefits described in Section 3 of this Review. In doing this, authorities should identify a suitable period for the co-ordination of programmes with utility companies. Both should aim to plan work up to four years ahead. Typically this approach would enable utility works to be carried out in advance of planned highway maintenance.

RECOMMENDATION 15

CO-ORDINATING STREET WORKS

All parties undertaking works on the highway should share and co-ordinate short and long term programmes of work for up to four years in advance, based on good asset management practice.

ALTERNATIVES TO REINSTATEMENTS

- 8.17 To minimise the impact of reinstatements that may result in potholes and other defects in the highway it is essential that both local highway authorities and utility companies work together. Through good co-ordination they should consider alternatives to reinstatements by adopting the principle that 'prevention is better than cure'.
- 8.18 The need for utility companies to access their apparatus using excavation and reinstatements may be minimised through greater use of trenchless or minimum dig technology. The use of minimum dig technology, such as directional drilling will minimise reinstatements. This approach may be faster, less disruptive and cheaper than conventional approaches, depending on the circumstances in which it is used. It has been reported that some utilities have achieved at least 90 per cent of their work by minimum dig when replacing pipes. The use of such technology may be more challenging in some urban environments where there are large concentrations of utility apparatus, and also may be more expensive to adopt by utility companies.
- 8.19 Despite these challenges, the objective of both local highway authorities and utility companies should be to minimise the number of reinstatements. Adoption of minimum dig technology or other approaches that will minimise the need for reinstatements will have less impact on the long term performance of the highway network. Adoption of minimum dig technology should therefore be considered as part of the decision making process and as the first choice for accessing, repairing and renewing apparatus.

Case Study - Utility Company

Trenchless Technology

A utility company and its contractor have developed a way to replace 3/8th inch service pipes with minimal excavation. A pipe puller feeds a cable through the pipe and fills it with special material which locks with the pipe to create a single 'composite rope'. This is then attached to the new pipe and pulled through. As the old pipe is pulled out, the new pipe replaces it. The innovative development has transformed a formerly dangerous and burdensome process into a safe and speedy procedure. Other similar case studies may be found on www.njug.org.uk/category/3/pageid/7/.

- 8.20 Local highway authorities and utility companies should consider including a requirement in contracts that would encourage the contractor undertaking the works to adopt minimum dig technology. Where this technology cannot be used, an agreement should be made with relevant parties specifying why and what alternative approaches can be used.

RECOMMENDATION 16

MINIMISING HIGHWAY OPENINGS

All parties involved in reinstatements must consider the need to minimise long term damage from the installation, renewal, maintenance and repair of utility and highway apparatus through alternative and innovative ways of working. Trenchless technology should be considered as part of this decision making process.

QUALITY OF WORKMANSHIP

- 8.21 This Review has found that many local highway authorities still have problems arising from the quality of reinstatements by utility companies. Utilities operate in a regulated sector controlled by independent economic regulators on behalf of the Government. As such their investment plans are controlled and monitored by their respective Regulators. It should be noted that there are no specific obligations placed by the Regulators regarding defective workmanship or the quality of reinstatements. However, utilities' regulatory settlements do not include any allowance for rectification of faulty workmanship and defect fees, and so this acts as an incentive for utilities to reinstate to the required standard.
- 8.22 When reinstating the highway utility companies must comply with the SROH, part of NRSWA. The current version of the SROH was published in April 2010, and was agreed by a working party of highway authorities and utilities under the auspices of HAUC (UK). The utility company must also ensure that the reinstatement conforms to prescribed performance standards – in the case of an interim reinstatement, until a permanent reinstatement is effected, and, in the case of a permanent reinstatement, for either two or three years after completion of the reinstatement, depending on the overall depth of the reinstatement.
- 8.23 The SROH specifies the materials and workmanship to be used when reinstating the highway. The specification has not been reviewed in detail as part of this Review but from consultations it is understood that the requirements of the SROH are generally considered adequate. There is however a challenge concerning the application of requirements in the SROH, in terms of how materials, workmanship and inspections are interpreted by utilities. This Review has found that in particular meeting the SROH compaction requirements by utilities is one of the issues identified by many local highway authorities. Reinstatements that do not meet the requirements of the SROH will result in increased risks of failure and defects such as potholes occurring in both the short and the long term.

- 8.24 Local highway authorities may inspect all reinstatements on their network. However, NRSWA provides for payment by utilities to authorities for a sample inspection of 10 per cent at each of three stages. Authorities have advised that they do not have the resources to inspect all reinstatements. The current process for the inspection of utility works is set out in NRSWA as follows:
- **Category A** - time that works are taking place.
 - **Category B** - six months after the permanent reinstatement.
 - **Category C** - the end of the guarantee period, usually done two months before the end date.
- 8.25 Utility companies have a two year or three guarantee period, in accordance with NRSWA, after which there is no statutory requirement to repair defective workmanship. Consequently there is no long term obligation on utilities concerning the performance of reinstatements.
- 8.26 Local highway authorities only have the guarantee period to identify defective workmanship. If defective workmanship is identified outside this period then recourse may be obtained through legal precedent using 'the Nottinghamshire CC v British Telecom judgment'. In this case the utility company was held responsible for defective work through coring evidence provided by the local highway authority well past the guarantee period. If authorities pursue this route then they are responsible for bringing the case and proving defective workmanship, through coring or other means.
- 8.27 Cumbria is typical of an authority that has identified problems with reinstatements on their highway network. In their Scrutiny Report published in July 2011 (Ref. 37) they made a number of recommendations regarding how reinstatements should be carried out. In particular quality of workmanship was identified as a key issue affecting long term performance of the highway network.
- 8.28 Poorly placed and poorly compacted reinstatements will not be as durable as those that are compliant with all aspects of the SROH. They will deteriorate faster and this will result in remediation being required, maybe by the utility company although probably in the longer term by the local highway authority, depending on when it is identified. During this Review one authority has reported that over 90 per cent of reinstatements pass sample visual inspection, however compliance drops considerably when more thoroughly assessed as part of coring programmes.
- 8.29 There is no mechanism for capturing this data in a consistent manner and the number of potholes that are caused is based on anecdotal evidence. HAUC has issued a guidance document recently on a structured coring programme, which will be used to drive improvement in the quality of reinstatements and maintain the integrity of the assets. This should reduce the future potential for potholes, although it is recognised that some authorities have already made full use of this approach. Where issues have been raised, both utilities and authorities have agreed to work jointly to improve the quality of reinstatements.
- 8.30 Every effort needs to be made by both utility companies and local highway authorities to ensure that all reinstatements are completed to the required quality and are delivered 'right first time'. Section 7 of this Review established the benefits of a 'right first time' approach.
- 8.31 This Review also recognises that those accessing their apparatus in the highway are required to minimise occupancy of the network to reduce congestion. As such they are required to ensure not only the quality of workmanship but also that work is carried out in an expedient manner.
- 8.32 At present there is a requirement in NRSWA for each reinstatement to have a trained and licensed operative on site while the works are in progress, and a trained and licensed supervisor overseeing the work. The licenses must be registered on the Street Works Qualifications Register and renewed every five years.

- 8.33 These requirements were scrutinised as part of the 'Red Tape Challenge'. The Government is currently consulting on removing them, as they represent a potentially unjustifiable burden to business and an additional layer of bureaucracy in the street works sector. The consultation is on two options:
- Scrap the regulations (preferred).
 - Simplify the regulations whilst maintaining mandatory qualifications.
- 8.34 Within the simplification option there is a further option to leave the system as it is. Scraping the regulations could take effect in early 2015, but amendments could take effect in late 2013.
- 8.35 The consultation argues that safety and reinstatement standards are already regulated by statutory codes of practice and that the detailed requirements of the qualification system have become more expensive and complex than originally envisaged. It hopes that the removal of bureaucracy will result in cost savings for the sector, and give employers the opportunity to ensure their staff have the appropriate training, rather than the mandatory training.
- 8.36 It is recognised that, notwithstanding the outcome of the 'Red Tape' challenge, there are mandatory requirements on those undertaking highway reinstatements. It is also recognised that such mandatory requirements do not apply to those undertaking pothole repairs.
- 8.37 Despite the statutory codes, this Review has found concerns over workmanship from both local highway authorities and utility companies. Training of operatives and supervisors is an effective way of managing the standard of workmanship.
- 8.38 This Review therefore considers, given the concerns expressed by the sector, that the requirement for mandatory training and reassessment of operatives and supervisors should be retained with simplification to the regulations. In doing so, current training requirements for operatives and supervisors should be amended to address any perceived shortfalls.

Case Study - South West HAUC

Improving the Quality of Workmanship

Within South West HAUC there was an acceptance that despite continued efforts by all parties, there was an on-going need to drive up the standard of reinstatements in the highway. A working party was formed of representatives from local highway authorities, utility companies and their contractors, to investigate and resolve the underlying issues. A training package utilising a DVD has been produced using industry workers to demonstrate best practice in carrying out reinstatement from quarry to road. This also comes with a selection of Tool Box Talks designed by reinstatement supervisors to enhance the package.

- 8.39 This Review has already proposed the introduction of a recognised sector scheme for manual surfacing operations (see Recommendation 14). The objective of this scheme is to drive up the quality of pothole repairs by ensuring a recognised quality management system is adopted by contractors undertaking the works. This sector scheme would include training and qualification of supervisors and operatives. Such a scheme would be available to be specified by authorities and utility companies for their works and would be beneficial in ensuring that a minimum quality standard was achieved by all undertaking the works.

- 8.40 In a similar way, for those undertaking reinstatements, retention of a mandatory training and reassessment regime could be supplemented by the sector scheme for manual surfacing operations (Recommendation 14). Utility companies could adopt this scheme as part of their contract arrangements. If adopted by utility companies this would provide a recognised quality standard for those undertaking reinstatements. Such a scheme if adopted by utilities should be jointly managed by the sector, including utility companies.

RECOMMENDATION 14 (REPEATED)

QUALITY OF REPAIRS AND REINSTATEMENTS

To drive up standards, a quality scheme similar to a National Highway Sector Scheme should be developed by the sector to cover all aspects of manual surfacing operations, including pothole repairs and reinstatements, and its use specified by local highway authorities and utility companies.

9. RESEARCH

BACKGROUND

- 9.1 Historically highway research has generally been in support of new build roads, and has largely focused towards the strategic road network. If potholes did occur in these roads they were usually infrequent, confined to the surface course materials and did not materially affect the integrity of the overall road pavement.
- 9.2 Until recently, there has been little or no research attention directed towards gaining a better engineering understanding of how and when potholes form, how they may be predicted and their progression managed. There has also been little research on effective and efficient repair.
- 9.3 The recent severe winter weather followed a decade or so of milder winters in much of the UK has resulted in widespread distress in the form of pothole defects. ADEPT had commissioned a research study *Potholes and Repair Techniques for Local Highways* (Ref. 28) which started just before these extreme winter periods. Its focus was of an engineering nature and following publication those institutions that had already had strongly established research credentials embarked upon fundamental research to better understand the failure mechanics and deterioration which had resulted in such extensive damage.
- 9.4 There has been limited research into the point at which road pavement materials fail both in the UK and internationally. Unless this damage process is clearly understood and the engineering mechanics, which lead to potholes is properly elaborated, there can be no sound way in which the efficacy of repair can be evaluated. Consequently much of the current academic research is focused upon a first principles understanding of the micro-mechanical behaviour of asphalt materials at the point of failure initiation.
- 9.5 International research in the field of pothole distress has been very limited. However in 2010 a guide was published by the Council for Scientific and Industrial Research (CSIR) in South Africa following increases in the number of potholes caused by the summer rainfall season. Practical information is given on the effective and appropriate repair of differing categories of potholes in the *Pothole-Causes Prevention and Repair* (Ref. 38) guidelines. It should be noted that these guidelines were developed for very different conditions to the UK maritime weather and highway network conditions albeit that similar engineering conclusions are reached.
- 9.6 Key themes upon which current research projects are mainly focussed are 'preventative maintenance' and 'right first time' delivery key themes of this Review. A detailed list of current research projects is referenced in Appendix B.
- 9.7 Collaborative European research on potholes is also being carried out. The European Research Area Network (ERA-Net) is carrying out a three year research project, which commenced in October 2011.

INNOVATION

- 9.8 An enhanced understanding, through fundamental research, of the engineering behaviour of preventative maintenance and repairs in existing local roads provides a sound platform for innovation and the development of more durable and efficient solutions.
- 9.9 Harnessing the potential of emergent technologies, through innovation application, may provide benefits in the future. As an example, the Smartphone Pothole Predictor project provides the opportunity, not only to secure close to real time measurements about pothole defects but also provides road condition information and identification of those sections of highway where safety may be an issue to be addressed. The deployment of the Smartphone application would also mean that all classes of highway would be included, thereby extending at little or no cost a rational and consistent means of condition measurement on those highways not included in existing periodic surveys.
- 9.10 Developing the engineering principles of a Pothole Repair Tester through to prototype stage by research may provide a robust and consistent platform for industry to innovate and manufacture.
- 9.11 There is strong expectation that as the key research projects unfold over the next few years that many further opportunities for innovation will present themselves for deployment into highway maintenance practice, leading to enhanced efficiency. It is essential that the sector responds to the opportunity of innovation provided by this research.

ROLE OF SECTOR AND GOVERNMENT IN RESEARCH

- 9.12 The focus of the research projects referenced in Appendix B is principally academic in nature as this is the means by which higher degrees are awarded. All of the projects at each of the institutions have a strong practical emphasis and are being undertaken in recognition of the sector need with prospective application in practice in mind and in some cases with sector collaboration. All of the projects are of high calibre and are being undertaken as true research, independent from other pressures.
- 9.13 Academic research at Universities is generally funded by a research council or other research bodies which will generally cover the process from blue-sky to proof-of-concept. Beyond the concept proof stage there is less likelihood of funding being available from these sources, as research councils will not generally support that which is perceived to be close to market. Other funding streams will probably need to be secured to deploy and apply the fundamental research into practice and both Government and the sector have a role to play.
- 9.14 The Highways Agency, ADEPT and industry associations such as the Mineral Products Association (MPA) and the Refined Bitumen Association (RBA) also commission research either independently or in collaboration. This is generally focussed in specific areas to address immediate need. Due to funding pressures the volume of research undertaken by these sponsors is not as previously.
- 9.15 In the highway maintenance sector there have been a number of proprietary products and processes brought to market by individual promoters who have invested in research and development. The means by which promoters can seek certification for their proprietary material or process is through the Highway Authorities Product Approval Scheme (HAPAS) which is operated by the British Board of Agrément.

USE OF RESEARCH

- 9.16 The benefit of research is at a fundamental level enables a culture of innovation to flourish. Independent and respected research has the potential to make a tangible difference to the sector.
- 9.17 The sector and academic engineering research are in a constant state of evolution. To keep practitioners engaged over time a practical means of knowledge capture, co-ordination and dissemination on a regular basis would benefit the sector as a whole. The Transport Advice Portal, www.tap.iht.org, is a one-stop-shop depository of web links to core documents produced by a range of organisations including research reports. It provides a mechanism to convey relevant, periodic and useful information on research findings to practitioners. It would also act as a means of identifying any gaps which could be usefully filled by research and potentially encourage further industry input to research projects. The Highways Agency also publishes their Knowledge Compendium (Ref. 39) on their website.
- 9.18 In 2009 the UKRLG carried out a review of 'Research on Research' (Ref. 40). This provided valuable information on the extent of research currently being undertaken in the sector. Dissemination of research projects on a regular basis would improve the sector understanding of the potential contribution of research to innovate in highway maintenance in general.

RECOMMENDATION 17

RESEARCH AND INNOVATION

The sector will benefit from supporting, co-ordinating, contributing and disseminating research on all aspects of pothole operations. Innovation from such research may continue to provide opportunities for improvement of pothole management and operations.

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GLOSSARY

ADEPT	Association of Directors of Environment, Economy, Planning and Transport
AIA	Asphalt Industry Alliance
ALARM	Annual Local Authority Road Maintenance
APSE	Association for Public Service Excellence
BBA	British Board of Agrément
BVPI	Best Value Performance Indicator
CIHT	Chartered Institution of Highways and Transportation
CSCS	Construction Skills Certificate Scheme
CSIR	Council for Scientific and Industrial Research
CTC	Cyclists' Touring Club
CVI	Coarse Visual Inspections
DBM	Dense Bitumen Macadam
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DVI	Detailed Visual Inspections
FNS	Footway Network Survey
FTA	Freight Transport Association
GPS	Global Positioning System
HAMFIG	Highway Asset Management Financial Information Group
HA	Highways Agency
HAPAS	Highway Authorities Product Approval Scheme
HAUC	Highway Authorities and Utilities Committee
HMEP	Highways Maintenance Efficiency Programme
HRA	Hot Rolled Asphalt
HTMA	Highways Term Maintenance Association
IAM	Institute of Advanced Motorists
IHE	Institute of Highway Engineers

ISO	International Organization for Standardization
JAG	Joint Authorities Group
LGA	Local Government Association
MCHW	Manual of Contract Documents for Highway Works
MPA	Mineral Products Association
NHSS	National Highway Sector Scheme
NHT	National Highways and Transport
NI	National Indicators
NJUG	National Joint Utilities Group
NRSA	New Roads and Street Works Act
NVQ	National Vocational Qualification
PFI	Private Finance Initiative
QCF	Qualifications and Credit Framework
RBA	Refined Bitumen Association
RHA	Road Haulage Association
RSTA	Road Surface Treatments Association
SCANNER	Surface Condition Assessment for the National Network of Roads
SCRIM	Sideway-force Coefficient Routine Investigation Machine
SROH	Specification for the Reinstatement of Openings in the Highway
TAG	Transport Advisory Group
TfL	Transport for London
TMA	Traffic Management Act
TS	Transport Scotland
TSCS	Thin Surface Course Systems
UKAS	UK Accreditation Service
UKPMS	UK Pavement Management System
UKRLG	UK Roads Liaison Group
WGA	Whole of Government Accounts
WRA	World Road Association

APPENDIX A – FRAMEWORK FOR A TYPICAL POTHOLE COMMUNICATIONS STRATEGY

CONSULTATION

Who:

- The wider local community
- User groups representing, eg pedestrians, cyclists, elderly, mobility impaired, motorcyclists, motorists, haulage, etc.
- Neighbouring highway authorities.

What:

- The size/shape of pothole considered to be a safety defect on different parts of the network, eg footways, carriageways, locally defined special areas, etc.
- The time from report to repair.
- Whether the initial repair will usually be permanent or temporary.

INFORMATION, REPORTING AND FEEDBACK

What:

- Published policy on pothole identification and repair.
- Facility for the public to report potholes, eg directly on to a website, by email, telephone or other suitable means, including contact information.
- Facility for the public to track progress on their report.
- Facility for the public to access general and detailed map based information on potholes reported through inspection or public report, and on repairs undertaken.
- Facility to feedback actions on individual public reports.
- Published performance information on numbers of potholes discovered and percentage repaired in the prescribed time.

How:

- Web sites
- Community group meetings
- Local and Parish council meetings
- Discussions with user groups
- Discussions with neighbouring highway authorities
- Leaflets
- Local news items
- Local media features

APPENDIX B – SUPPLEMENTARY INFORMATION

A number of documents support this Review and its recommendations. These are located on the HMEP website at the following address:

www.dft.gov.uk/topics/local-authorities/hmep/

Each of these documents is summarised below:

B1 - CASE STUDIES

Full case studies from consultations undertaken as part of this Review. These provide essential information to the sector, including local highway authorities, on implementing the recommendations of this Review.

B2 - TECHNICAL NOTES

Background technical information on processes for preventative maintenance, specifying and repair of potholes.

- Pavement deterioration and preventative maintenance
- Velocity patching
- Thermal road repairs
- Hot mix repairs
- Cold repairs

B3 - GUIDANCE DOCUMENTS

Comprehensive list of guidance documents that are available to the sector, covering preventative maintenance and pothole repair.

B4 - RESEARCH PROJECTS

Outline of projects that have been undertaken in the area of potholes, with research body, theme and scope.

B5 - NATIONAL HIGHWAY SECTOR SCHEMES (NHSS)

Details of National Highway Sector Schemes currently in operation.

B6 - HIGHWAYS AUTHORITIES PRODUCT APPROVAL SCHEME (HAPAS)

Details of the scheme in place to assess of manufacturers' products, systems and procedures, to ensure they are 'fit for purpose'.

APPENDIX C – CONTRIBUTORS AND CONSULTEES

Asphalt Industry Alliance

Association of Directors of Environment,
Economy, Planning and Transport

Bath and North East Somerset Council

Blackpool Council

Bradford City Council

Cheshire West and Chester Council

Chartered Institution of Highways & Transportation

Cornwall Council

Cyclists' Touring Club

Devon County Council

Dorset County Council

East Sussex County Council

Freight Transport Association

Gloucestershire County Council

Hampshire County Council

Highway Authorities and Utilities Committee

Hertfordshire County Council

Highways Agency

Highways Term Maintenance Association

Institute of Highway Engineers

Joint Authorities Group

Lancashire County Council

Leeds City Council

Leicestershire County Council

Living Streets

London Technical Advisers Group

National Highways & Transport Network

National Joint Utilities Group

Northamptonshire County Council

Portsmouth City Council

Road Haulage Association

RAC Motoring Services

Road Surface Treatments Association

Somerset County Council

South West Highways Authorities and Utilities Committee

Staffordshire County Council

Swansea City Council

Transport for London

Transport Scotland

Walsall Council

WDM

Wokingham Borough Council

Worcestershire County Council

World Road Association

