

Welsh Assembly: Public Accounts Committee

Evidence for the Inquiry into value for money in motorway and trunk road investment : 13.02.15

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This written evidence is given in the context of our recent work in England for the National Audit Office on infrastructure management. In-depth research in Wales has not been conducted. This evidence relates specifically to the second and third bullet points in the Terms of Reference, namely:

- The extent to which the current approach to routine maintenance and improvement of the network via Trunk Road Agents has delivered value for money
- How maintenance and improvement functions delivered by the Trunk Road Agents can be improved, in the context of the on-going Welsh Government review of these agents.

Background in England

In England the Highways Agency, HA; soon to be corporatised as Highways England, is performing well by world standards, (1). The Strategic Road Network, SRN is managed on Whole Life Asset Management, WLAM, principles. The corporatisation of the HA will provide access to additional sources of funding from both public and private sectors, provide a known level of continuous investment for contractors, minimise the effect of working in single financial years and support a pipeline of priority maintenance interventions.

The HA utilise Local Authorities as agents. However for non-SRN roads the road maintenance funding is fragmented and non-hypothecated which results in a wide spectrum of good to poor maintenance in terms of cost effectiveness and a lack of data and of staff with the correct skills and competencies to use HMEP/WLAM approaches. Consequently many minor roads are in poor condition.

The HA system or policy regarding funding is not clear on the balance between capital and operational maintenance funding. However it is too early to tell if the recent budget cuts are sustainable without adverse consequences. Expensive, emergency "pothole" repairs are not cost effective and a sustainable and resilient maintenance strategy including energy audit/ decarbonisation/ green behaviour as integral parts needs to be adopted.

Welsh Trunk Road Network

The trunk road network in Wales comprises 1,576km of trunk road and 133km of motorway with an asset value of around £13.5bn. The total road network which includes all Class A, B and C roads is 34,489km. Highway maintenance is influenced by the traffic, the weather and the maintenance regime. Recent figures show that traffic increased from 10.08bn vehicle kilometres in 2008 to 10.14bn vehicle kilometres in 2013 (2). Road condition is reported through SCANNER surveys of the road surface and Deflectograph assessment of the carriageway condition. The frequency of the Deflectograph surveys has changed from a 3 year cycle to a 5 year cycle. In 2013 only 69 percent of the motorway network and 68 percent of the trunk road network were surveyed, (2). The winters over the last few years have been relatively mild. The maintenance requirement is that "no more than 8 percent of the trunk road and motorway network to require maintenance at any one time" (3).

Since April 2012 routine maintenance has been undertaken by two public sector agents: North and Mid Wales Trunk Road Agent (NMWTRA) and South Wales Trunk Road Agent (SWTRA). In turn these agents operate on a partnership basis with local authorities, to a varying extent, to deliver the service. The management and maintenance are mainly funded through the

motorway and trunk road Spending Programme Area (SPA), of the Welsh Government budget. Budget figures for 2014/15 indicate £71m in capital expenditure and in £61m revenue expenditure. Typically capital activities include planned renewals/refurbishment and structural renewals, improvements and replacements. Revenue activities concerns routine maintenance and reactive maintenance and severe weather work. Set in global terms most of the large industrialised economies typically spend about 0.4 percent of GDP on road maintenance (4). Under the continued pressures for improved infrastructure service levels and from the need to make public sector budget savings the maintenance of the highways has to make its contribution. The Minister for Economy, Science and Transport published a statement in June 2014 focusing on improvements and savings.

The EU's transport policy has been reviewed several times since its establishment in 2001 and it identified a number of roads that form part of Trans-European Networks- Transport (TEN-T). In 2012 this has been superseded by the revised comprehensive network. In Wales the roads in this network include the M4/A48/A40/A477 corridor to the ports of Pembroke Dock and Fishguard in South Wales and the A55 to Holyhead in North Wales, (5). In 2015 there is one EU Priority Corridor in the UK (partially in Wales); the Felixstowe to Holyhead link. (6)

The Cycle of Routine Maintenance

Routine maintenance is intended to keep highway infrastructure safe, serviceable and reliable. The key to providing value for money is performing timely and appropriate maintenance interventions will:

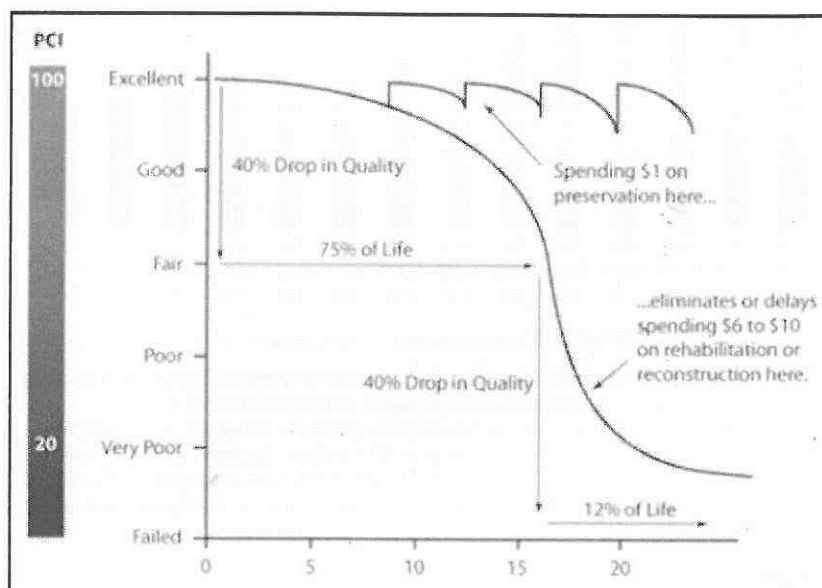
- limit the adverse effects on road users;
- prevent further deterioration; and
- minimise whole-life costs.

Intervening with planned routine maintenance at a suitable point during an asset's life can often restore it to its specified condition and hence extend the period of use between routine maintenance interventions. The importance of intervening at the right time for road repairs is paramount, in particular carrying out preventative maintenance to stop water penetrating the surface saves significant costs in later years." The Audit Commission reported that carrying out preventative maintenance during an asset's life costs less than a third of the price to reconstruct a road if it were allowed to fail", National Audit Office, (7).

Once constructed highways normally remain in service and require routine maintenance. If the regular cycle of routine maintenance is not adhered to and the period between interventions increases then the operational effectiveness of the asset decreases and the cost of maintenance intervention increases putting additional pressures on future budgets.

Recently constructed road pavements are appropriately designed and constructed with high quality materials and begin life in excellent condition. Typical UK winter weather will not cause problems for a pavement in excellent condition and prevention is the best cure for serious deterioration. Nevertheless over time the condition of the pavement starts to deteriorate and its condition will fall from excellent to good. Timely routine maintenance interventions are very cost effective and return the pavement to its excellent condition. This is shown in Figure 1 below (reproduced from the US Federal Highway Administrations Office of Asset Management, Pavements and Construction, (8)).

Figure 1: Deterioration Curves for highway pavements, Reproduced from FHAO, US (8)



If intervention is delayed the deterioration curve becomes increasingly steep and the cost and scale of maintenance required is increased in a non-linear manner. Under investment causing the delay of interventions leads to rapid and non-linear deterioration. Routine maintenance is replaced with carriageway reinstatement or even in extreme cases reconstruction of most or all of the layers which make up the carriageway. Extended delays in intervention will lead to a maintenance deficit being established with more roads offering lower operating standards and incurring higher maintenance costs in future. The asset value of the highway will also fall significantly.

Road pavements in poor condition can develop “potholes”. This is usually dealt with quickly and effectively should it occur on the motorway and trunk road network but on minor roads is a significant and sensitive issue for all road users. Patching these pot holes offers a short term fix but it does not improve the overall pavement condition, the repairs often deteriorate very quickly and the cost is estimated to be around 20 times the cost of routine maintenance, (9). This type of “worst first” strategy is very inefficient (10).

Highway Maintenance compared with Pavement Maintenance

Highways also contain bridges, tunnels, culverts, retaining walls and other structures as well as drainage, earthworks and signage that all requires routine maintenance – typically with very different design lives and very different operational periods. All elements of the highway require routine maintenance and most of the basic principles are common to but this evidence concentrates on the road pavement maintenance.

To be effective routine maintenance has to take place in a particular time frame, as shown by the deterioration curves discussed above. This requires an asset management plan.

The need for the Highways Maintenance Efficiency Programme Approach

The Highways Maintenance Efficiency Programme, HMEP, is a £6 million initiative, funded by the Department of Transport, to improve the efficiency of highways maintenance in England, using asset management principles, (11). The programme is concerned with facilitating the change to highways services, so that greater savings and efficiencies can be achieved and the demand for improved highway services can be met. HMEP seeks to connect the networks across the highways sector and provides tools and resources to help managers transform delivery of highways through greater efficiencies. The programme has ambitious goals to deliver 15% savings by 2015 and 30% by 2020 based on transforming the sector. The Asphalt Industries Alliance ALARM survey, (12), indicated that 80% of all local Authorities that responded to their recent survey were participating in HMEP.

HMEP is relevant in the context of Wales because there is recognition of the importance of well-maintained roads for economic prosperity. Roads that are fit for the future are the concern of government, business and communities. The HMEP programme is operating with a view to deliver improved roads in an environment of tighter budgets, rising costs and greater demands from consumers. HMEP seeks to enable and embed change at both a strategic and operational level. At the strategic level HMEP is seeking to engage with the leaders of local authorities including elected members, senior officers and practitioners to recognise the opportunities arising from change across the sector.

HMEP's strategic approach encourages new ways of organising and approaching delivery of services and include shared service models, scale economies and building capacity from within the sector network by sharing practice.

Asset management takes a long term, whole life approach to the management of new and existing highways assets. It allows for planned decision making rather than short term reactive decisions that inevitably cost more. HMEP has developed a number of guidance documents to support the development of asset management practices including a Lifecycle planning toolkit, (13). Where HMEP asset management has been adopted savings of 5 percent have been reported and in cases with more developed asset systems savings of 15 percent were reported. Asset management led decision making embeds a value and benefits achievement approach.

Collaboration is central to the change envisaged within HMEP. The approach is about creating the correct culture for opportunities for efficiency and improvement to flourish. HMEP encourages client/client as well as client/provider collaborations. It recognises that collaboration already exist and deliver improved performance but seeks to embed this culture. In support of collaboration it has developed a number of support guides and standards. These include; Maximising Client Provider collaboration toolkit for highways,(14), Local Authorities Collaborative Alliance Toolkit, (15), Shared Services Toolkit, (16), and Lean Toolkit, (17). One of the most significant outcomes is the reduction of disruption when highways and utilities collaborate on renewal and maintenance projects.

HMEP has developed guidance on procurement and contracts for highways. They seek to rationalise and consolidate documents that support delivery. These documents include the Form of Contract for Highways Maintenance Services, (18), procurement route choices toolkit for highways maintenance services, (19) and a supply chain collaborations toolkit, (20). Standardisation promotes greater certainty and consistency for clients and providers.

The ability to deliver improved efficiency is also dependent on the capability, competency and capacity of the participants. The new "Improving infrastructure delivery: project initiation routemap", supported by Infrastructure UK, (21), places a great deal of emphasis on the project management capability and competence of officials to deliver projects. It would therefore be relevant to consider a capability and competence audit within Transport Wales. Part of the work associated with HMEP also addressed competence and capability within organisations. It identified a lack of understanding of key decision making roles, an absence of whole life

management skills as well as project and collaborative management skills. To deliver efficient projects competent people are needed.

Maintenance trends in Wales

As in the rest of the UK the motorway network in Wales appears to be maintained to a high standard. There is no published evidence of increasing deterioration in the state of the motorway and trunk road network. However there is evidence that in recent years there have been fluctuations in the pavement condition with an improvement in the state of the asset from 2002 to 2010 but a significant downward trend in 2011 and 2012 back to 2002 levels. This is partially due to adverse weather conditions but other factors are likely to have been involved, including the recovery in vehicle kilometres, mentioned above, (11).

Spending on pot hole repairs continues. If all minor roads are included then last year some 156,00 potholes were filled, costing £7.4m but over £1.8m was paid out in compensation for damage and injuries caused by potholes (12).

How can delivery & performance be improved?

There is no evidence to indicate that there is a problem with the maintenance and management of the motorway and trunk road network in Wales. However like most aspects of the public sector budget there are pressures to delivery savings whilst not adversely affecting the levels of service. The “Do nothing” option, delaying intervention until a later time, can appear as a “free or cheap” option and without problems but this is not the true position. Further the strategy of “worst first”, usually applied to potholes is not cost or operationally effective.

Budget cuts must be considered in future and consideration given to how this can be achieved without detrimental effect of the network. From work with the HA and NAO in England, the following criteria have been identified to facilitate the improvement of the cost effective delivery of road network maintenance:

- Strategy must be based on HMEP asset management principles to make appropriate and timely maintenance interventions, (22)
- Staff must be trained appropriately
- Prioritisation criteria in line with the National Infrastructure Plan, (23)
- Up to date and accurate data on the condition of the network must be available
- Secure sustainable long term funding must be in place
- Development of a set of key performance indicators

It is likely that some initial investment is needed to ensure all these conditions exist before the savings in road pavement maintenance can be delivered. This will take time and it is likely that “savings” made by reducing funding before these conditions are satisfied will be detrimental and non-sustainable.

To provide a single strategic highways vision for Wales consideration should be given to the creation of a single entity that takes responsibility for the trunk and motorway network. This would facilitate a closer strategic delivery link between national infrastructure plan and a “new strategic roads agency”. The mechanisms for service delivery that follow can then be flexible.

In the longer term there are a number of maintenance options that deserve further consideration. One approach adopted in several countries around the world is the Toll-Operate Toll, TOT, system of road maintenance. Realistically this option is only viable where the motorway and trunk road network is wholly or partially tolled. Although unpopular, the option for variable, full-time, 24 hours for 7 days a week, tolling of the highway asset is likely to be introduced at some point in the future. TOT consists of transferring a length of road to the private sector, allowing tolls to be charged and using the dedicated income to upgrade, improve and maintain the road to a high standard for the duration of the PPP concession at which time it is either transferred back to the public sector as a toll road or re-contracted to a private operator.

References

1. The Chartered Institution of Highways & Transportation, Road Maintenance Review International Comparison, May 2012
2. Welsh Government, Statistical bulletin on road lengths and conditions, December 2014
3. Welsh Government, Programme for Government Indicator, December 2012
4. Unpublished World Bank Internal Report
5. European Parliament Report for Directorate General for Internal Policies, Policy Department B: Structural and Cohesion Policies, Transport and Tourism, Financing instruments for the EU's transport infrastructure, 2014.
6. <http://ec.europa.eu/transport/themes/infrastructure/news/2015-01-15-corridors.en.t>
7. National Audit Office Report, 2011, Reducing Costs in the Department of Transport, 14 December
8. US Federal Highway Administrations Office of Asset Management, Pavements and Construction, www.planning.dot.gov/documents/ASI_report/asi-01.htm.
9. All Party Parliamentary Group on Highway Maintenance, Managing a valuable asset: improving local road condition, 14 October 2013
10. Audit Commission, Going the Distance: Achieving better value for money in road maintenance, 2011
11. HMEP Highway Infrastructure Asset Management Guidance Document. HMSO (2013)
12. The Asphalt Industries Alliance ALARM Survey
13. HMEP Lifecycle Planning Toolkit Incorporating Default Carriageway Deterioration Models .HMSO (2012)
14. HMEP Maximising Client/Provider Collaboration in Highways Maintenance Services. HMSO (2013)
15. HMEP Local Highway Authorities Collaborative Alliance Toolkit. HMSO (2012)
16. HMEP Shared Services Toolkit. HMSO (2013)
17. HMEP A Lean Toolkit for Highway Services. HMSO (2013)
18. HMEP The Form of Contract for Highways Maintenance Services . Notes for Guidance. HMSO (2013)
19. HMEP Guidance on the Standard Specification and Standard Details for Local Highway Maintenance. HMSO (2012)

20. HMEP Local Highway Authority Supply Chain Collaboration Toolkit . HMSO (2014)
21. HM Treasury Improving Infrastructure Delivery: Project Initiation Routemap Handbook . HMSO (2014)
22. National Audit Office, Maintaining strategic infrastructure: roads, 6 June 2014
23. ICE State of the Nation Infrastructure 2014