EXECUTIVE SUMMARY

PUBLISHED PROJECT REPORT PPR816 and PPR817

Development of SCANNER and UKPMS:

Task 1 - Consistency of SCANNER data

Task 2 - SCANNER Condition Parameters

Task 3 - Appropriateness of the SCANNER RCI

Report details

Report prepared for:	UK Roads Board
Project/customer reference:	
Authors	E Benbow, A Wright, N Dhillon, M Harrington and K Nesnas (TRL)
	C C Spong (Hyperion Infrastructure Consultancy)
	R A Cartwright (Linhay Consultancy)
Copyright:	© TRL Limited
Report date:	March 2017
Report status/version:	Draft
Quality approval:	

Emma Benbow (Project Manager)		Alex Wright (Technical Reviewer)	
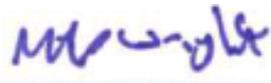
Disclaimer

Contents amendment record

This report has been amended and issued as follows:

Version	Date	Description	Editor	Technical Reviewer
1.0	17/03/2017	Final draft of Executive Summary	EB	AW

Document last saved on:	17/03/2017 18:17
Document last saved by:	Wright, Alex

Executive Summary

SCANNER surveys were introduced in 2009 to provide network-wide condition assessment of the local A, B and C road network using survey vehicles that travel at traffic-speed measuring the shape of the road surface using laser sensors, and imaging the surface using digital cameras. The collected data is processed and converted into condition parameters, such as rutting, and delivered in a UKPMS-compliant format to local authorities, for loading into their pavement management systems. It is also used to identify lengths in need of maintenance or further investigation, and to support scheme identification and prioritisation. The data also supports asset valuation, via the Carriageway Condition Index (CCI), which is a methodology recognised by HAMFIG and CIPFA for use in Whole of Government Accounts (WGA) and for reporting within local authorities' own accounts.

SCANNER was developed from the Highways Agency's TRACS survey of the strategic road network. Research supported by the DfT, was carried out between 2003 and 2007 to adopt the survey for local roads. This delivered a range of outcomes, including an updated survey specification, a set of "enhanced" parameters focussed on narrower local roads, and the definition for the SCANNER Road Condition Indicator (RCI), which is used to estimate the overall condition of each length of the network.

In 2014 a development group led by software developers, survey contractors, the SCANNER auditor, and local authorities (the SCANNER Development Group, SDG) commenced a review of the performance and status of the SCANNER survey, in the light of the experience of local authority data users, SCANNER survey contractors and the SCANNER auditor. The groups identified three key areas where enhancements or modifications to SCANNER were required:

- Consistency: Despite the detailed QA and Accreditation process employed for all SCANNER data there continue to be issues identified with the consistency of SCANNER surveys, in particular in the measurement of cracking. (**Task 1**)

- SCANNER Condition Parameters: SCANNER survey reports a wide range of parameters on surface condition. However, there is concern that these are not well used, and that SCANNER does not report all of the defects that authorities regard as important to include in a condition survey. (**Task 2**)

- Appropriateness of the SCANNER RCI: Does the SCANNER RCI relate well to LHA maintenance decisions, and how LHAs might want to track the effects of maintenance? Could the SCANNER data be better associated with the treatments that are (or would be) undertaken? (**Task 3**)

Improvements to data consistency and relevance all improve the value for money obtained from SCANNER surveys. Therefore the Scottish Road Research Board (SRRB), in collaboration with UK Roads Board, commissioned work to investigate and develop SCANNER surveys in the three key areas identified above, which have been separated into Three Tasks. The results of the work have been delivered under TRL published project reports PPR816 and PPR817, for Tasks 1&2 and Task 3 respectively. This document presents the executive summaries extracted from these two reports.

Task 1: Consistency

The cracking data has a significant effect on the year to year consistency of network level reporting. Cracking has been observed to be the main cause of the large inconsistencies seen in the QA audit process. There may be differences between the level consistency of cracking on rural and urban roads, but this was not strongly shown in individual LHAs. However, cracking data collected during the winter months *is* observed to be less consistent than data collected during the summer. Therefore it is recommended that a winter shutdown is implemented, which will require discussion with the survey industry.

There is currently no method to check that the fleet is consistent in the measurement of cracking, and the repeatability test is also weak. This project has therefore developed enhancements to the cracking Accreditation process. It is recommended that the test for repeatability devised within this project is implemented immediately. A new test for fleet consistency has also been devised within the project. It is a more complex test, that will require experience to understand its effect on the current SCANNER fleet. It is therefore recommended that this test is implemented now and trialled over the next 12 months, to allow SCANNER contractors time to develop an action plan to improve any devices found to be inconsistent. It would become a formal requirement at the end of the trial.

Rutting is generally considered a reasonably consistent parameter. However, whilst inconsistencies tend to be small, they can become significant when combined with other parameters, to influence the RCI. Overall the fleet has become more consistent in the last few years. However, there is a noticeable difference between the fleets of the two current contractors, with an average difference in rut depth of 1.7mm being reported.

Possible routes to improve the consistency of rutting have been investigated that include development in both the collection and the processing technologies. It has been shown that higher resolution systems, with wider measurement width, could provide more accurate and repeatable data. Using a centrally defined and controlled rut algorithm could also improve fleet consistency. As SCANNER contractors now employ such systems (and sample their data down), it should be practical to increase the performance requirements defined in the SCANNER specification. In addition, the TRACS rutting algorithm has been trialled and found that, subject to improvements to both the edge detection algorithm and the placement of the straight edge, it should be able to provide good performance. Therefore it is recommended that implementation of these updates to the SCANNER requirements should be considered.

Task 2: SCANNER Condition Parameters

SCANNER delivers more than 20 parameters but only a few are used to calculate the Road Condition Indicator (RCI). Also few LHAs make use of the enhanced parameters provided in the 2007 research. Conversely, the survey does not provide all the condition parameters that are considered to be important by LHAs. Better value could be obtained from SCANNER if the parameters were optimised to reflect LHA needs. LHAs and PMS providers have been consulted to identify potential revisions/enhancements to the SCANNER condition parameters, or potential new parameters that could be included in a future SCANNER survey. Several observations and recommendations resulted from this consultation and have been to identify a number of potential quick wins (enhancements

that could be implemented in the next 12 months) and longer term developments (enhancements that would require a development phase over the next 12-24 months followed by implementation).

Quick Win 1: Cracking

- The consistency improvements recommended in Task 1 should be implemented as soon as practical;

- Of the delivered cracking data, value is being drawn from Whole Carriageway Cracking and Wheeltrack Cracking. The remaining surface deterioration parameters are not required in the delivered data.

Quick Win 2: Ride Quality

- Use is only being made of one of the two roughness parameters. LPV should be phased out and replaced with eLPV. This will deliver a more stable and accurate RCI, and will reduce the adverse effect of geometry on the data;

- The measurement of roughness is failing to report defects present in the offside wheelpath. The measurements from both wheelpaths should be included in the RCI calculation, to provide a more robust assessment of ride quality.

Longer term development 1: Rutting

- The improvements to transverse profile recommended in Task 1 should be implemented as soon as practicable. Delivery of wider, higher resolution profile will improve accuracy and repeatability. A replacement for the current rut measure should also be considered. A single rut algorithm across all SCANNER devices would minimise the differences arising from the use of different algorithms by different contractors. The new rutting could be trialled alongside the current rutting, until deemed acceptable;

- Rut depth is sometimes an inappropriate measure to use on narrow roads (e.g. U roads). Transverse variance would be a more appropriate parameter on these roads. The use of this parameter should be considered further.

Longer term development 2: Fretting

- There is a clear call from LHAs for a measure of fretting. The current SCANNER texture variability provides a poor proxy for this.

- The use of multiple line texture measurements, extracted from high resolution transverse profile data, shows promise for the identification of fretting. A method should be developed to deliver fretting from this data.

Longer term development 3: Bump/pothole measure

- There has been a request for potholes to be included in SCANNER. The current SCANNER Bump Measure does not provide a reliable network level indicator of the extent to which the network is affected by such features.

- High resolution transverse profile data could be adopted to provide full lane width data, from which a more reliable bump/pothole measure could be obtained. Development of this parameter is recommended.

Longer term development 4: Training

- There is a need to develop an education strategy. This could be developed alongside the recommendations of Task 3, to include the survey, its measurements and the uses of the data (RCI/UKPMS).

- The purpose of the strategy will be to develop local authority confidence and expertise in the use of SCANNER data. It is envisaged that delivery is likely to be via high-quality multimedia education materials so that the courses are inclusive and accessible regardless of location, time constraints or other local limitations.

Task 3: Appropriateness of the SCANNER RCI

An initial desk study has identified that there are significant differences between the RCI, CCI and UKPMS Treatment Rules including the use of specific SCANNER parameters, the way the parameters are weighted and combined, the thresholds where parameters start to contribute, and the lengths over which data is processed. However, it would be necessary to carry out field studies with real data and engineering input to evaluate the impact of these differences.

A subsequent consultation with local authority practitioners has found that there is a wide range of practices in the use of SCANNER data to support maintenance decision-making, and that there is unlikely to be a single, common solution to improve the RCI. Furthermore, many of the examples of best practice identified make use of existing UKPMS functionality that users in general may not be aware of or may not use for other reasons.

The work concludes that effort should be focussed on making users aware of existing functionality and sharing examples of best practice. Accordingly, a number of 'quick win' improvements are identified that could be implemented quickly at a relatively low cost. An implementation programme has been developed to provide indicative costs for the following improvements within the range £3k to £15k:

- Providing advice on splitting the Amber Band;
- Producing guidance on using the RCI score itself (e.g. for scheme comparison via weighted average);
- Developing a library of local weighting sets (together with guidance for use);
- Capturing and sharing a methodology for developing local weighting sets using local authorities' data;
- Developing a multimedia approach to raising awareness of existing materials (e.g. use of RCI score, information about treatment rules);
- Implementing any new UKPMS Weighting Sets required to support Task 2 of this SCANNER Research Project.

Additionally, a number of longer-term improvement tasks have been identified with the themes of education and awareness, consolidation of previous work, and further analysis to extend the usability of the SCANNER data. An implementation programme has been developed to deliver the improvements, with proposed projects in the range £15k to £100k:

- Developing an overall education strategy for the use of SCANNER data within UKPMS;
- Undertaking further investigations to explore the implications of RCI and CCI differences via a field study with real data and engineering input;
- Finding ways to capture and analyse changes over time at locations and explore how this information could be used (benchmarking, maintenance decisions, valuation);
- Validating existing alternative weighting sets (e.g. Edge, complementary indicators developed by TRL for Scotland etc.);
- Developing treatment rules that use the material/surface type (as stored in UKPMS) when processing SCANNER data. This is likely to involve a calibration exercise with real data;

Implementing fully any changes arising from Task 2 of this SCANNER Research Project e.g. changes to UKPMS R&P or other national Weighting Sets.