ROADS
UK ROADS BOARD

SCANNER Surveys for Local Roads

User Guide and Specifications
DRAFT Volume 1 for 2007

Introduction to SCANNER surveys

January 2007

Halcrow Group Limited

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Acknowledgement

THIS IS A CONSULTATION DRAFT

This SCANNER User Guide has been developed from the SCANNER specification used in 2005/06 and 2006/07.

It incorporates many detailed changes based on experience of using the SCANNER specification in 2005/06 and 2006/07, the TTS specification before that in 2003/04 and 2004/05 and a wide range of comments from interested parties.

It includes the results of research on developing SCANNER commissioned on behalf of the UK Roads Board.

The previous SCANNER specifications were based on the original "TRACS Type Surveys for the Principal Road Network- Specification and Advice Note" produced for the UK Roads Board by Chris Britton Consultancy and TRL Limited.

Considerable assistance and support has been given by members of the SCANNER Implementation Group, including local authority representatives, by TRL Limited, by the UKPMS Development Support Consultant (Chris Britton Consultancy), by SCANNER survey contractors, and by UKPMS developers.

Contents

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Foreword

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This document is one of a series of five describing the requirements for SCANNER Surveys (Surface Condition Assessment of the National NEtwork of Roads). It replaces the revised SCANNER specification first published in March 2006.

The five Volumes are:

1. Introduction to SCANNER surveys

2. Advice to Local Authorities – Procuring Surveys

3. Advice to Local Authorities – Using SCANNER Survey Results

4. Technical requirements – SCANNER Survey Data and Quality Assurance

5. Technical requirements – SCANNER Survey Parameters and Accreditation

This volume 1 provides a brief introduction to the requirements for SCANNER surveys, and is intended to be read as a free standing document, as well as providing an overview of the other four volumes. It includes a glossary of terms and a list of the SCANNER parameters as annexes.

Volume 2 contains advice to Local Authorities about procuring SCANNER surveys under the SCANNER Specification and is to be read in conjunction with the other documents. It includes advice on preparing contact documents, inviting bids, assessing tenders and managing contracts. It includes a model contact document as an annex.

Volume 3, Using SCANNER Survey Results, explains the background to SCANNER Surveys and gives further guidance on the interpretation of processed SCANNER data. It contains advice on receiving and using SCANNER data, interpreting the results for local asset management and maintenance, producing and understanding performance indicators, and reporting NRMCS results.

Volume 4, SCANNER Survey Data and Quality Assurance, defines the technical requirements for the services to be provided by the survey contractor, including

the Survey Data and the requirements for Quality Assurance procedures to ensure the Services are consistent and reliable. It also includes the specifications for audit processes, monitoring, calibration, and requirements for repeat surveys.

Volume 5, Technical requirements for SCANNER Survey Parameters and Accreditation defines the technical requirements for the parameters provided by the machine developer, including acceptance and consistency testing and accreditation. It describes the requirements for accreditation of the Equipment. It also describes the requirements for consistency testing and for the reporting and delivery of data from SCANNER accredited surveys.

1 Introduction to SCANNER Surveys

1.1 ***SCANNER***

1.1.1 SCANNER (Surface Condition Assessment for the National Network of Roads) surveys have been developed by the UK Roads Board to provide a consistent method of measuring the surface condition of road carriageways, using automated road condition survey machines, throughout the United Kingdom.

1.1.2 SCANNER consists of a Specification for the technical requirements for SCANNER survey parameters and accreditation testing, to enable machines to be developed; a Specification for SCANNER survey data and quality assurance, to enable the surveys to be carried out and reported; and a method of reporting the road surface condition (the SCANNER Road Condition Indicator).

1.1.3 Before a survey vehicle can be used to carry out a SCANNER survey, it has to pass a very stringent set of accreditation tests each year and have a valid accreditation certificate (described in volume 5). It must be operated with a defined quality assurance procedure (described in volume 4) and with an independent Auditor (currently TRL Limited).

[+ pictures of survey vehicles]

1.1.4 The survey data is produced from the survey machines as an HMDIF file, the defined standard format for loading survey data into a UKPMS compliant pavement management system. The survey data is processed within an accredited UKPMS to produce the SCANNER Road Condition Indicator and can also be used in pavement and asset management systems for other highway maintenance and management purposes.

1.1.5 A brief glossary of some of the many terms associated with SCANNER surveys is at Annex A.

1.2 ***Purpose of introducing SCANNER***

1.2.1 SCANNER was introduced to provide consistent, reliable survey data on the condition of road carriageways to support five separate requirements:

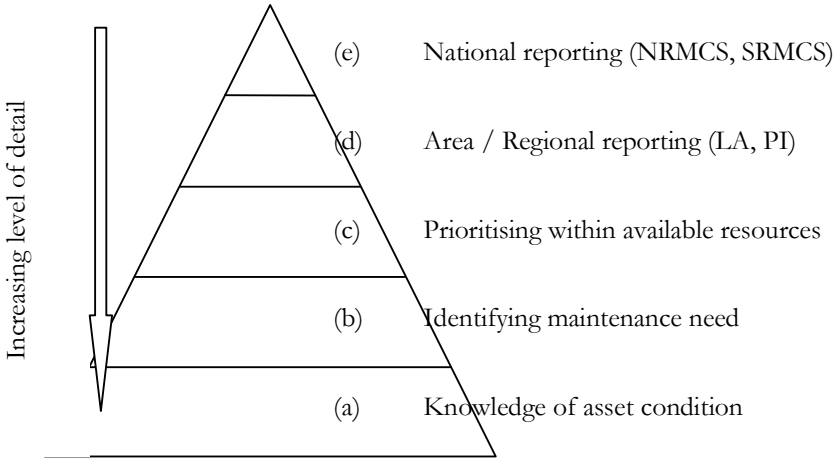
(a) As the basis for developing a detailed knowledge of the current condition and value of the paved carriageway asset.

(b) Replacing CVI and DVI surveys as the basis for defining the optimum treatment selection, and the optimum timing of treatment, to prioritise treatment and minimise the whole life cost of maintenance at a scheme or project level.

(c) Replacing CVI and DVI surveys as the basis for indicative treatment selection and budget estimation, to enable local authorities to plan carriageway maintenance at a network level.

(d) As an indication of the overall condition of a defined road network, as an outcome measure of local authority management and maintenance of their carriageway asset, replacing the Deflectograph and CVI or DVI in BVPI.

(e) As an indication of the overall condition of a length of road carriageway, or of an area of a road network, to establish long term trends in road maintenance condition, replacing CHART in NRMCS.



1.3 ***SCANNER surveys and measured parameters***

1.3.1 SCANNER surveys are machine based surveys that make a number of different measurements and process the measurements to provide a number of "parameters" that describe the condition of the road surface. These include:

(a) The profile of the road in the direction of vehicle travel along the road (the longitudinal profile). This is important for two reasons – it is the main factor controlling ride quality and hence user perception of road

condition, and it can be a good indicator of defects in the surface course, the binder course and the base (roadbase).

[***+ picture of a rough road in the direction of travel***]

(b) The profile of the road across the direction of travel (the transverse profile). This includes measuring rut depth. This is important for two reasons – ruts or other transverse unevenness features can affect steering or cause water to pond, both of which may affect road safety, and it can be a good indicator of defects in the surface course, the binder course and the base (roadbase).

[+ pictures of a road with ruts and with uneven across the road]

(c) The condition of the edge of the road, which can be an indicator of the need for an edge treatment (maintenance requirement) and may also affect serviceability and safety.

[+ picture of road with severe edge deterioration]

(d) The texture of the surface. This can be important for two reasons. It helps to provide high speed skidding resistance on fast roads, which may affect road safety. Variations in texture depth along or across the road can indicate surface wear and the presence of defects in the surface course.

[+ picture of road with variable textured surface]

(e) Cracking visible at the surface. This can be important for two reasons. It may indicate deterioration of the surface course, or of deeper seated defects in the binder course and base. It may allow water to penetrate through the pavement layers and weaken the foundations.

[+ picture of road with severe cracking]

1.3.2 SCANNER surveys are not visual inspections. Therefore they cannot identify the condition of a road in the same terms as a visual inspection. In a visual survey or inspection the trained and experienced engineer or inspector interprets the visible signs in the overall context before assigning a condition to the length of road carriageway. Whereas a machine makes a specific measurement, which has to be analysed and interpreted to produce meaningful information.

[+ picture of inspectors looking at road with data capture devices]

1.4 ***SCANNER User Guide and Specifications***

1.4.1 This set of five documents is intended to provide local highway authorities with all the information they require to make well informed decisions about the procurement of SCANNER accredited surveys on their local road networks and to use the data produced by those surveys.

[+ picture of road works being carried out]

1.4.2 They are intended to provide survey machine developers and survey contractors with all the information they require to develop, accredit and operate automated road condition survey machines to the SCANNER specification.

[***+ picture of machine being built***]

1.4.3 Also they are intended to provide UKPMS developers with all the information they need to develop their accredited pavement management systems to support local authorities effectively.

[+ picture of people working at computers]

- These documents provide advice to Local Authorities on procuring SCANNER surveys under the SCANNER Specification including advice on preparing contact documents, inviting bids, assessing tenders, network referencing and managing contracts. (Volume 2)
- They explain the background to SCANNER Surveys and provide further guidance on the interpretation of processed SCANNER data including advice on receiving and using SCANNER data, interpreting the results for local asset management and maintenance, producing and understanding performance indicators. (Volume 3).
- They provide a full technical specification for carrying out SCANNER accredited surveys including the requirements for quality assurance and audit. (Volume 4).
- They provide the detailed technical requirements of the survey parameters provided by the machine developer, including acceptance and consistency testing and accreditation and the delivery of survey data from SCANNER accredited surveys. (Volume 5)

1.4.4 They do not provide detailed technical guidance on the use of automated road condition survey data within a UKPMS accredited pavement management system or the preparation of local maintenance management reports. Further information is available on the UKPMS website: [insert link to www.ukpms.com/index.asp.]

1.4.5 Neither do they provide detailed technical guidance on the preparation of reports for national road condition monitoring (NRMCS and SRMCS), on the preparation

of best value performance indicator reports or local maintenance management reports. Further information is available on

- the SCOTS website: [insert link to www.scotsnet.org.uk/];
- the Department for Transport's website: [insert link to www.dft.gov.uk/stellent/groups/dft_roads/documents/divisionhomepage/032471.hcsp]
- and the Audit Commission's website: [insert link to www.audit-commission.gov.uk/performance/]

1.5 Using SCANNER data

1.5.1 In order to collect SCANNER survey data, the Survey Equipment makes many thousands of measurements within each 10m subsection along the carriageway. These are analysed and combined into a set of parameters which are reported as SCANNER parameter values for every 10m subsection along the road network. The parameters included in the current specification are listed in Annex B

1.5.2 Even after the measurements have been reduced to SCANNER survey parameters, this produces an enormous volume of data, far too much to be analysed by hand, or using simple spreadsheets. Therefore SCANNER data has to be analysed through a pavement or an asset management system, or other bespoke data handling system.

1.5.3 SCANNER data is collected with geographic referencing and is loaded to an accredited UKPMS system to produce the BVPI results. This requires the survey data to be fitted to the road network defined within the UKPMS accredited system.

1.5.4 The minimum specification for UKPMS accreditation currently provides the capability to load SCANNER data in the form of an HMDIF file, to analyse the data to produce the overall SCANNER Road Condition Indicator and a limited capability to analyse survey parameters gathered by SCANNER in terms of indicative treatment selection and budget estimation.

1.6 SCANNER Road Condition Indicator

1.6.1 The SCANNER Road Condition Indicator (RCI) has been developed to characterise the overall condition of the road carriageway, as a basis for reporting BVPI and, in future, SPI and NRMCS. The SCANNER RCI is described in more detail in Volume 3, section [x].

(a) The RCI is calculated from some of the parameters measured by SCANNER including:
(b) Ride quality measured by 3m and 10m longitudinal profile variance.
(c) Rut depth in the nearside and offside wheel paths.
(d) Texture depth in the nearside wheel path.
(e) Whole carriageway cracking intensity.
(f) Wheel track cracking intensity in the nearside and offside wheel paths.

1.6.2 The RCI is calculated in three steps

(a) Score each 'measured parameter average value' over a 10 metre subsection length on a scale of 0 to 100.
(b) Combine the scores to obtain a value for each 10 metre subsection length of the road.
(c) Combine the value for each subsection to give an overall figure for the section, the route or the network.

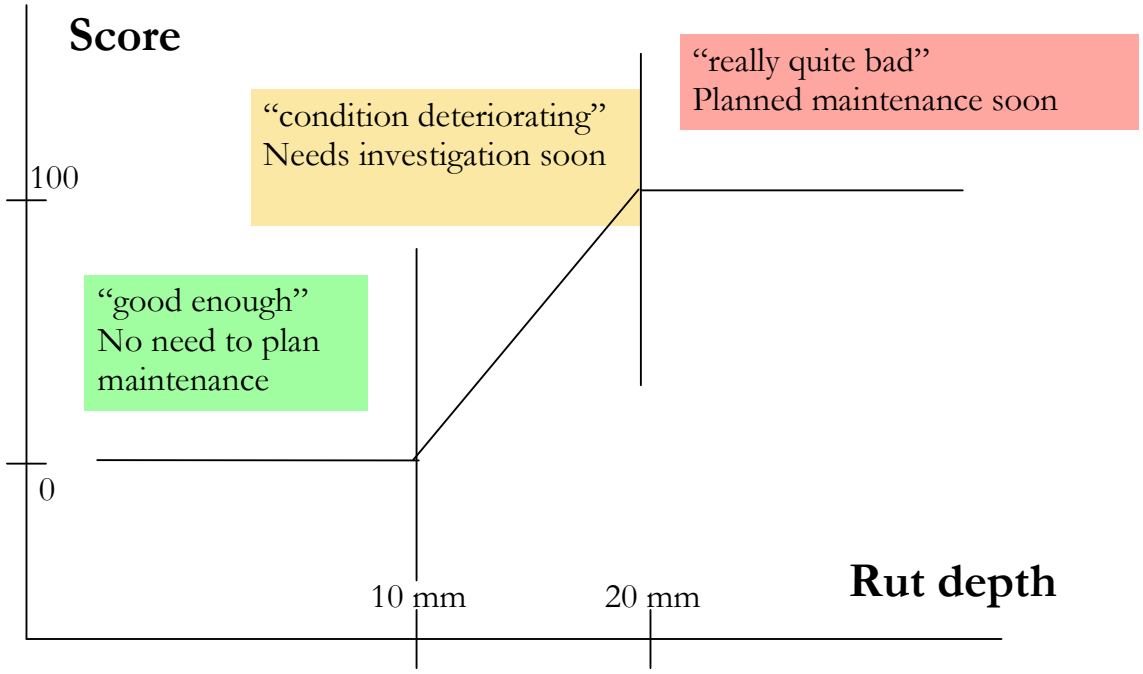


Figure 1 – Stage 1: Scoring SCANNER parameters

1.6.3 In the first stage, each parameter is scored between a lower threshold value (below which it is not counted) and an upper threshold value (above which further

increase in the parameter does not increase the score. The basic pattern of thresholds and weightings is the same for each parameter, as illustrated for rut depth in figure 1. Below the lower threshold, the parameter scores zero. Above the upper threshold the parameter scores a maximum value of 100. Between the two thresholds the parameter scores an increasing value. In principle, this could be with proportionally more points allocated the nearer the parameter is to the upper threshold, although in practice only a linear relationship has been used so far.

1.6.4 The thresholds and weightings for the SCANNER RCI are published on the DfT website.

1.6.5 In the second stage the scores for each parameter are multiplied by two factors to allow for the importance of the factor in assessing road condition and the reliability of the measurement and then added to give an overall score for the subsection. The importance (relevance) and reliability factors for the SCANNER RCI are published on the DfT website.

1.6.6 In the third stage the results are combined to give overall percentage lengths in three categories for the road network. Depending on the total points scored each 10m sub section is allocated to one of the categories, with the following definitions:

"GREEN" = lengths where the carriageway is generally in a good state of repair.
"AMBER" = lengths where some deterioration is apparent which should be investigated to determine the optimum time for planned maintenance treatment. (Where there may be justification for carrying out a lesser maintenance treatment sooner, rather than more extensive treatment later, in order to minimise whole life costs. i.e. "economic prioritisation").
"RED" = lengths in poor overall condition which are likely to require planned maintenance soon (i.e. within a year or so) on a "worst first" basis (Although there may be justification for postponing major repairs, and only carrying out minor repairs to keep the road safe and serviceable, in order to minimise whole life costs. i.e. "economic prioritisation").

1.6.7 The total point scores used to determine to which category each sub-section is allocated are given on the DfT website.

1.6.8 In England, the proportion of the network in the "red" category is reported as BV223 on principal roads and BV224a on other classified roads, but there is no requirement to report the "amber" or "green" proportions.

1.6.9 In Scotland, road condition is currently reported on the basis of a Statutory Performance Indicator based on only 3 of the SCANNER parameters, although it is likely that Scotland will move to using the SCANNER RCI in future, with the intention that the SCANNER Specification and RCI will become the standard methodology of assessing road condition throughout the UK.

1.7 ***Using the SCANNER RCI to identify and prioritise schemes.***

1.7.1 The "amber" category identifies lengths where there is sufficient deterioration in carriageway condition to investigate the causes and the condition in detail and consider whether there may be justification for carrying out a lesser maintenance treatment sooner, rather than more extensive treatment later, in order to minimise whole life costs.

1.7.2 Local authority engineers might look for lengths of carriageway which include a significant percentage of "red" and "amber" lengths as being suitable lengths for maintenance schemes. [***+ show map***]

1.7.3 Because each subsection length has an individual score, local authority engineers might use the scores as a way of prioritising between different schemes on a "worst first" basis. [***+ show example***]

1.7.4 Alternatively, local authority engineers might use the lengths of "red" as a way of prioritising between schemes and treatments, to try to get the greatest reduction in the "red" percentage from a given maintenance expenditure. [***+ show distribution***]

1.7.5 In either case, engineers should be aware that lengths of "amber" with high scores are nearing the "red", and it would be prudent to treat them before they too become "red".

1.7.6 Whichever approach is adopted, the SCANNER RCI does not provide sufficient information for project or scheme design, and lengths which are likely to require maintenance should be investigated in greater detail to develop cost effective maintenance treatment schemes.

1.8 ***Analysing survey data in more detail***

1.8.1 Because each parameter is measured on a scale and is geographically referenced, it is possible to divide the results using simple thresholds and present the information graphically, for example as an overlay on a map representation of the road network in a GIS. This can be a particularly effective way of displaying the SCANNER RCI results. [***+ show example***]

1.8.2 However the approach can also be applied to individual parameters. For example, the scores for each parameter could be divided into three, four or even more bands, to identify where particular parameters are high and low, or where particular combinations of parameters are high or low. [***+ show example***]

1.8.3 Some survey contractors and some UKPMS developers provide systems to present SCANNER data on a map background, divided by thresholds into different bands.

1.8.4 All survey contractors can provide a pictorial record of the road ahead of the survey vehicle, usually in the form of a video survey with frames taken every 5 metres along the road, and a viewer to enable the engineer to inspect the video record. [***+ stress benefit of video data***]

1.8.5 Some survey contractors and UKPMS developers provide systems to inspect the video record synchronised to the survey data, so that it is possible to view an image of the length of road with the recorded values of the survey parameters on a map background, displayed in windows on the same screen. [***+ show example]***

1.9 ***Using SCANNER data in UKPMS***

1.9.1 UKPMS is controlled by the "Rules and Parameters" set which is updated from time to time to enable UKPMS compliant systems to carry out specific data analysis and processing tasks.

1.9.2 Currently SCANNER data can be processed through a UKPMS compliant system to produce the SCANNER RCI.

1.9.3 Some SCANNER data can be analysed using simple treatment selection rules to identify indicative treatments and hence estimate budgets.

1.9.4 In future, UKPMS will be modified to enable wider use of SCANNER data, for example to generate indicative treatments using the full range of SCANNER

parameters to produce a range of specific condition indicators and treatment requirements including:

(a) Surface condition and surface treatments
(b) Edge condition and edge treatments
(c) Surface course condition and surface course treatments
(d) Binder course and base (roadbase) condition and strengthening treatments

1.10 Using SCANNER data in NRMCS

1.10.1 NRMCS currently reports road condition based on results from CHART visual surveys and Deflectograph an SCRIM machine surveys.

1.10.2 Research is being carried out to develop a systematic way of gathering the SCANNER survey data, matched to the road network, directly from the survey contractors, and loading it into a national database, referenced to national grid co-ordinates (OSGR). So that national statistics can be compiled from a reference data set.

ANNEX A – Glossary of terms

Acceptance Tester The organisation appointed to carry out Acceptance Testing as described in Volume 3 of the SCANNER guidance documents.

Acceptance Tests or Testing Initial tests or testing of a survey machine to demonstrate that it can meet the SCANNER specification requirements under rigorously controlled test conditions. Successful testing leads to the award of an initial Accreditation Certificate.

Accreditation Re-testing Subsequent tests or testing of a survey machine to demonstrate that it still meets the SCANNER specification requirements under rigorously controlled test conditions. Successful testing leads to the award of a further Accreditation Certificate.

Accreditation Tester The organisation appointed to carry out Accreditation Re-testing as described in Volume 3 of the SCANNER guidance documents.

Audit of vehicle operation. The purpose of Audit is to ensure that Quality Assurance procedures are being operated effectively.

AuditorThe organisation appointed to provide Quality Assurance and Audit functions on behalf of the Employer as described in Volume 4 of the SCANNER guidance documents.

BCD Base Condition Data. Processed survey data in a UKPMS HMDIF format that enables the results of a SCANNER survey to be loaded to a UKPMS compliant system.

Contractor The survey operator that has undertaken to carry out SCANNER accredited surveys on behalf of the Employer.

Cracking Intensity A measure of the percentage area containing cracks. The figure depends on the scale of the grid used to count cracks, in general the smaller the grid size, the smaller the reported cracking intensity.

Cross- fall. The difference in elevation between the two sides of a carriageway

Employer The client for the SCANNER accredited surveys, normally a local authority.

Survey Equipment Accredited survey machine or vehicle used to carry out the surveys.

First Party QA Quality Assurance by the supplier of the product or service, in this case, the Contractor for SCANNER accredited surveys.

GPS Global Positioning System. Location referencing system using data from earth orbiting satellites to define position in relation to a reference point.

Gradient. The difference in elevation between two points along the carriageway.

HARRIS Highways Agency Road Research Information System.

HMDIF Highway Maintenance Data Interchange Format. Standard computer file format which enables data to be transferred into a UKPMS compliant pavement management system. Defined in the current version of UKPMS Technical note 3.

Longitudinal Profile The "shape" of the carriageway in the direction of traffic movement.

MSP Machine Survey Pre-processor. Bespoke software system for converting RCD to BCD to prepare SCANNER survey data for loading into UKPMS.

National Grid Co-ordinates Positions in relation to a standard grid covering the United Kingdom.

Network Tests Part of Acceptance Testing and Accreditation Testing. The network tests assess the operational capabilities of the survey equipment when carrying out surveys under normal operating conditions on one or more routes selected by the Acceptance Tester and located on the public road network

OSGR Ordnance Survey Grid Reference. Location referencing system defining position in relation to a standard grid covering the United Kingdom.

PMS Pavement Management System.

Primary Reference Data Primary Reference Data forms the basis for initial assessment of the performance of the survey equipment.

Primary Reference Test Site The site chosen by a Contractor as the basis for checking the continuing accuracy of the Equipment.

Quality Assurance (QA) The purpose of Quality Assurance is to give the Employer confidence that the data and results being provided are reliably consistent and suitable for purpose.

Radius of curvature The measure of the amount of curvature on a non straight section of road

RCD Raw Condition Data. Detailed survey data in a format that enables the Acceptance Tester, the Accreditation Tester and the Auditor to carry out detailed checks on the operation of the survey equipment

Reference Methods Standardised methods used by the Acceptance Tester and the Accreditation Tester to asses the accuracy of the Equipment in the Site Tests.

SCANNER Surface Condition Assessment of the National NEtwork of Roads

SCANNER Accreditation Certificate Certificate provided by the Acceptance Tester or the Accreditation Re-tester to confirm that a survey vehicle has passed the Acceptance Tests (or Accreditation Re-tests) and is accredited to carry out SCANNER accredited surveys. Normally valid for 12 months.

SCANNER accredited surveys Surveys accredited to the SCANNER specification.

SCANNER BCD file BCD Base Condition Data. Contains processed survey data in a UKPMS HMDIF format that enables the results of a SCANNER survey to be loaded to a UKPMS compliant system.

SCANNER RCD file RCD Raw Condition Data. Contains detailed survey data in a format that enables the Acceptance Tester, the Accreditation Tester and the Auditor to carry out detailed checks on the operation of the survey equipment.

SCANNER Road Condition Indicator (RCI) A specified way of combining measurements using defined thresholds and weightings, to provide a "score" for each 10 m sub-Section, used as the basis for a performance indicator.

Secondary Reference Data Secondary Reference Data used to assess the sensitivity and accuracy of the survey equipment in relation to other examples of survey equipment (operated by other Contractors), for example that provide measurements of cracking.

Second Party QA Quality Assurance by the purchaser of the product or service, in this case, the Employer for SCANNER accredited surveys.

Site Tests Part of Acceptance Testing and Accreditation Testing. In the site tests the parameters measured by the survey equipment are compared with those measured by the Reference Methods on test sections located on sites selected by the Acceptance Tester

Survey Data Data measured by a SCANNER accredited survey before processing to produce RCD.

Third Party QA Quality Assurance by an independent third party which is neither the supplier nor the purchaser of the product or service, in this case, the Auditor for SCANNER accredited surveys.

UKPMS United Kingdom Pavement Management System. Provides a framework for combining the systematic collection of data with the decision making processes necessary to optimise resources for the maintenance and renewal of pavements, including the generation of programmes of works and corresponding budgets

Works Accredited surveys and data processing described in the contract

ANNEX B – SCANNER survey parameters

SCANNER / TTS measurement description	*UKPMS Defect (OBSERV) Code*	*Notes*
LOCATION REFERENCING (Position)		
SCANNER or TTS Coordinate	**LCOO**	**"x" co-ordinate = OSGR**
		"y" co-ordinate = OSGR
		"z" co-ordinate = Altitude
ROAD GEOMETRY		
SCANNER or TTS Curvature	**LCRV**	**Measured as radius of curvature**
SCANNER or TTS Crossfall	**LFAL**	
SCANNER or TTS Gradient	**LGRD**	
LONGITUDINAL PROFILE (Ride Quality)		
SCANNER or TTS 3m moving average Longitudinal Profile Variance (left/nearside)	**LV3**	

SCANNER / TTS measurement description	*UKPMS Defect (OBSERV) Code*	*Notes*
SCANNER 3m Longitudinal Profile Enhanced Variance (left/nearside)	**LL03**	
SCANNER or TTS 10m moving average Longitudinal Profile Variance	**LV10**	
SCANNER 10m enhanced Longitudinal Profile Variance (left / nearside)	**LL10**	
SCANNER or TTS 30m moving average Longitudinal Profile Variance (left/nearside)	*LV30*	*This measurement is not reported or used in SCANNER surveys from 2007/08 onwards.*
SCANNER Bump intensity (CDM) left wheel path	**LLBI**	
SCANNER 3m enhanced Longitudinal Profile Variance (right / offside)	**LR03**	

SCANNER / TTS measurement description	*UKPMS Defect (OBSERV) Code*	*Notes*
SCANNER 10m enhanced Longitudinal Profile Variance (right / offside)	**LR10**	
SCANNER Bump intensity (CDM) right wheel path	**LRBI**	
TRANSVERSE PROFILE		
SCANNER or TTS Left Wheel Path Rut depth	**LLRT**	
SCANNER nearside rut depth from cleaned profile	**LLRD**	
SCANNER or TTS Right Wheel Path Rut depth	**LRRT**	
SCANNER offside rut depth from cleaned profile	**LRRD**	
SCANNER absolute deviation of 1st derivative of transverse profile	**LTAD**	

SCANNER / TTS measurement description	***UKPMS Defect (OBSERV) Code***	***Notes***
SCANNER absolute deviation of 1st derivative of nearside of transverse profile (ADFD)	*LLAD*	*This measurement is not reported or used in SCANNER surveys from 2007/08 onwards.*
SCANNER absolute deviation of 1st derivative of offside of transverse profile (ADFD)	*LRAD*	*This measurement is not reported or used in SCANNER surveys from 2007/08 onwards.*
EDGE CONDITION		
SCANNER transverse variance	**LTRV**	
SCANNER edge roughness	**LEDR**	
SCANNER road edge step L1	**LES1**	
SCANNER road edge step L2	**LES2**	
SCANNER edge coverage	**LEDC**	
TEXTURE (Depth and variability)		
SCANNER or TTS Left Wheel Path Average Texture depth (SMTD)	**LLTX**	

SCANNER / TTS measurement description	*UKPMS Defect (OBSERV) Code*	*Notes*
SCANNER Left Wheel Path Average Texture depth (MPD)	**LLTD**	
SCANNER Left Wheel Path Mean RMST Texture depth	**LLTM**	
SCANNER Left Wheel Path RMST Variance	**LLTV**	
SCANNER or TTS Wheel Path Centre Average Texture depth (SMTD)	*LCTX*	*This measurement is not reported or used in SCANNER surveys from 2007/08 onwards.*
SCANNER Centre Mean RMST Texture depth	**LCTM**	
SCANNER Centre RMST Variance	**LCTV**	
SCANNER or TTS Right Wheel Path Average Texture depth (SMTD)	*LRTX*	*This measurement is not reported or used in SCANNER surveys from 2007/08 onwards.*
SCANNER Right Wheel Path Mean RMST Texture depth	**LRTM**	
SCANNER Right Wheel Path RMST Variance	**LRTV**	

SCANNER / TTS measurement description	*UKPMS Defect (OBSERV) Code*	*Notes*
SCANNER Overall Texture Variability – RMST 5th Percentile Value	**LT05**	
SCANNER Overall Texture Variability – RMST 95th Percentile Value	**LT95**	
SCANNER Overall Texture Variability – RMST Variance	**LTVV**	
CRACKING and other surface defects		
SCANNER or TTS Crack Map	**LMAP**	**Length/m**
		Offset
		Angle
		Type Code
SCANNER or TTS Cracking (whole carriageway)	**LTRC**	
SCANNER or TTS Left Wheel Track Cracking Intensity	**LWCL**	

SCANNER / TTS measurement description	*UKPMS Defect (OBSERV) Code*	*Notes*
SCANNER or TTS Right Wheel Track Cracking Intensity	**LWCR**	
SCANNER Edge of carriageway cracking	**LECR**	
SCANNER Transverse/reflection cracking	**LRCR**	
SCANNER Surface Deterioration Parameter	**LSUR**	
SCANNER other visible defect (OVD) intensity	*LOVD*	*This measurement is not yet reported or used in SCANNER surveys in 2007/08.*