UK ROADS BOARD

SCANNER surveys for Local Roads

User Guide and Specification

Volume 1

Introduction to SCANNER surveys

Version 1.0

2011 Edition

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Acknowledgement

This SCANNER User Guide has been developed from the SCANNER specification used in 2009. It incorporates many detailed changes based on experience of using the SCANNER specification in 2005/06 2006/07 and 2009, 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 the Chris Britton Consultancy and TRL Limited.

Throughout the development of the TTS and SCANNER specifications, considerable assistance and support has been given by members of the SCANNER Implementation Group, including local authority representatives, by TRL Limited, by the Chris Britton Consultancy, by SCANNER survey contractors, by Halcrow, by Nick Lamb Consultancy Ltd and by UKPMS developers.

This document was prepared by TRL, under the PCIS support contract

Contents

Foreword

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, and subsequent updates of February 2007 and 2009.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.

Typical survey vehicles

Figure 1 Jacobs Laser RST26 vehicle

Figure 2 WDM RAV4 vehicle

Figure 3 Yotta (DCL) Roadware ARAN1 vehicle

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 The SCANNER Specification defines the technical requirements for SCANNER survey parameters and accreditation testing (to enable machines to be developed), and a specification for SCANNER survey data and quality assurance (to enable the surveys to be carried out and reported).

1.1.3 SCANNER survey data is delivered 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 (RCI) and can also be used in pavement and asset management systems for other highway maintenance and management purposes.

1.1.4 Before a survey vehicle can be used to carry out a SCANNER survey, it must have a valid accreditation certificate, which is obtained by passing a stringent set of annual accreditation tests (described in volume 5). It must be operated with a defined quality assurance procedure (described in volume 4) and supervised by an independent Auditor.

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 (shown schematically in Figure 4~~Figure 4~~):

(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 treatments, 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.

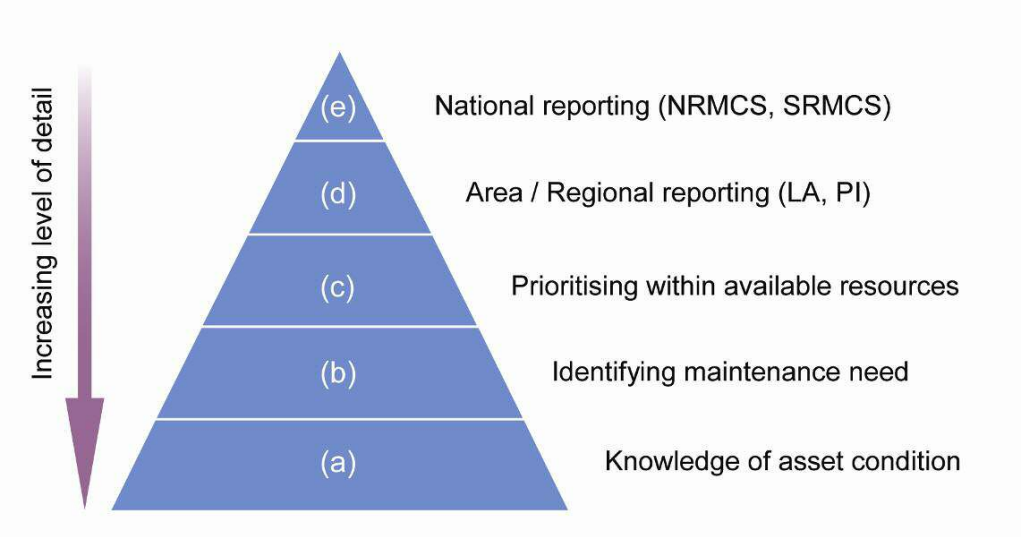

Figure 4 Use of condition data (after Ekins and Hawker, 2003)

1.3 SCANNER surveys and measured parameters

1.3.1 SCANNER surveys use machines that make a number of different measurements (at traffic-speed) - Figure 5~~Figure 5~~.

Figure 5 Operating a SCANNER survey vehicle

1.3.2 The measurements collected by the vehicle are processed to provide a number of "parameters" that describe the condition of the road surface. These parameters, which are typically reported at 10m intervals, are described in the following paragraphs.

1.3.3 The **longitudinal profile** of the nearside wheelpath in the direction of vehicle travel along the road. Longitudinal profile 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). Figure 5 shows a road where poor ride quality has been reported, and the line in the nearside wheel path, along which SCANNER measures the longitudinal profile.

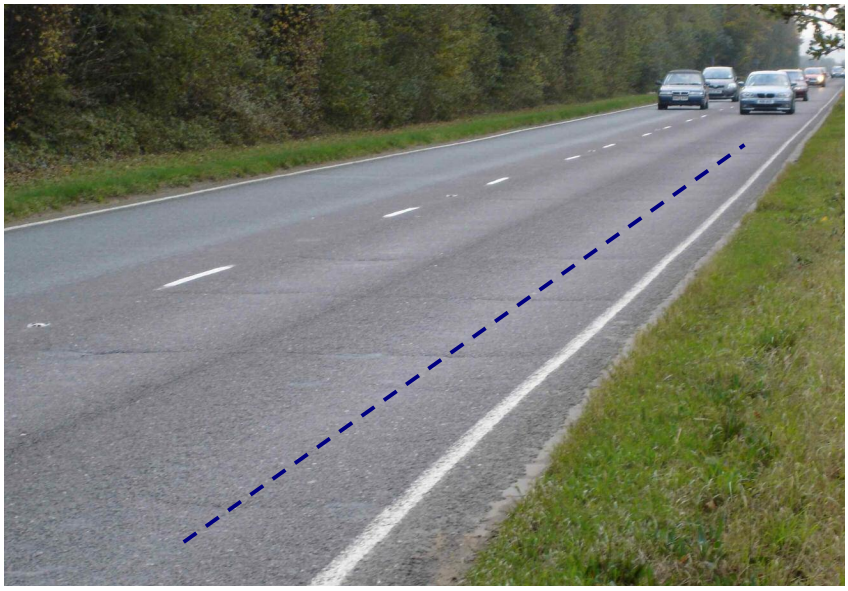

Figure 6 Road where poor ride quality has been reported

1.3.4 The **transverse profile** of the road across the direction of travel (Figure 7~~Figure 7~~). The rut depth is calculated from the measured transverse profile. Rutting, or other forms of transverse unevenness, can affect vehicle handling or cause water to pond, both of which may affect road safety. Rutting can be a good indicator of defects in the surface course, the binder course and the base (roadbase).

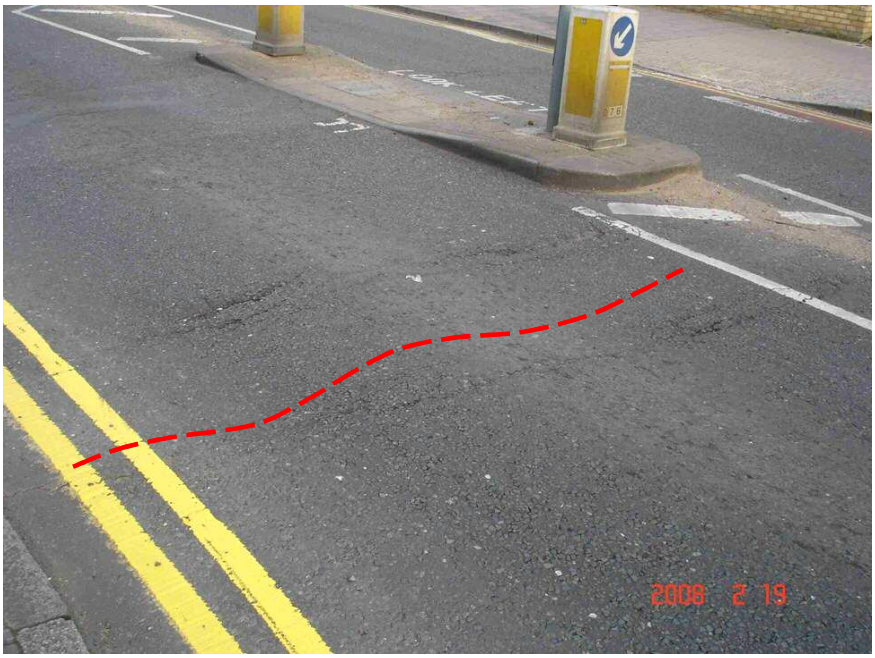

Figure 7 Road with poor transverse profile (rutting)

1.3.5 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 (Figure 8~~Figure 8~~).

Figure 8 Road where edge of carriageway deterioration has been identified

1.3.6 The **texture** of the road surface. Texture helps to provide high speed skidding resistance on fast roads. Also, uneven texture along or across the road can indicate surface wear and the presence of defects in the surface course (Figure 9~~Figure 9~~).

Figure 9 Unevenness of texture across the carriageway

1.3.7 **Cracking** visible at the road surface. Cracking 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 (Figure 10~~Figure 10~~).

Figure 10 Road showing wheel track and transverse cracking

1.3.8 SCANNER surveys are not visual inspections. Therefore they cannot identify the condition of a road in the same terms as a visual inspection (Figure 11~~Figure 11~~). In a visual survey or inspection an inspector interprets the visible signs in the overall context before assigning a condition to the length of road carriageway. A machine makes a specific measurement, which has to be analysed and interpreted to produce meaningful information.

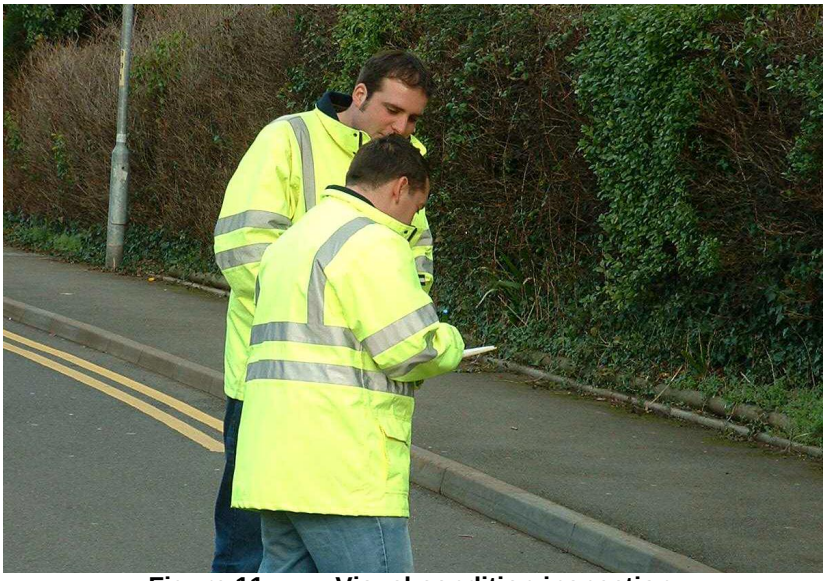

Figure 11 Visual condition inspection

1.3.9 Although it is not a compulsory requirement of SCANNER, all current survey contractors can provide a **video 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. Local authority engineers have found these videos particularly useful, firstly to check on the appearance of lengths of road at the time of survey, as a guide to

the actual condition and the interpretation of the survey data. Also, as a tool for inspecting the appearance of the road for scheme preparation (both maintenance and improvement schemes) without having to make repeated trips to site to gather information. The videos do not eliminate the need for site inspections, but enable engineers to prepare for site visits, and to identify what needs to be checked during the site inspection.

1.4 SCANNER User Guide and Specifications

1.4.1 The SCANNER User Guide and Specification (referred to below as the Specification) is intended to provide local highway authorities with information to support well informed decisions about the procurement and use of SCANNER accredited surveys on their local road networks:

- Volume 2 provides advice to Local Authorities on procuring SCANNER surveys under the SCANNER Specification including advice on preparing contact documents, inviting bids, assessing tenders, appointing an Auditor, network referencing and managing contracts.

1.4.2 The Specification also provides guidance on using the data produced by SCANNER surveys:

- Volume 3 explains the background to SCANNER Surveys and provides 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.
- This guidance should not be regarded as comprehensive, it is an introduction to the use of the data, to help stimulate good use of the tools available to engineers.

1.4.3 The Specification also provides survey machine developers and survey contractors with information to develop, accredit and operate automated road condition survey machines:

- Volume 4 provides a full technical specification for carrying out SCANNER accredited surveys including the requirements for quality assurance and audit.
- Volume 5 provides 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.

1.4.4 The Specification does 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 PCIS website at www.PCIS.org.uk.

1.4.5 Neither does the Specification provide detailed technical guidance on the preparation of reports for national road condition monitoring, the preparation of best value performance indicator or local maintenance management reports. Further information is available on

(a) the SCOTS website at www.scotsnet.org.uk,

(b) the Department for Transport's website at www.dft.gov.uk/pgr/roads/network/local/servicelevels,

(c) and the Audit Commission's website at www.audit-commission.gov.uk/performance.

1.5 Collating the SCANNER survey 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. A brief description of the parameters included in the current specification is given above, with a completed list given in Annex B, and further detail given in Volumes 3 and 4.

1.5.2 Even after the measurements have been reduced to SCANNER survey parameters, this produces an enormous volume of data, which cannot be practically analysed by hand, or by using simple spreadsheets. Therefore SCANNER data is typically analysed through a pavement or asset management system, or other bespoke data handling system. This is typically an accredited UKPMS system.

1.5.3 SCANNER survey data is collected with reference to the road network provided to the survey contractor by the local authority. When the data is loaded into an accredited UKPMS system the data will be stored with reference to this network.

1.5.4 The minimum specification for UKPMS accreditation currently requires that the PMS have 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 National Indicators and, in future, SPI and NRMCS.

1.6.2 The RCI is calculated using a sub-set of the parameters measured by SCANNER. Each parameter is converted to a score between 0 and 100.

1.6.3 The scores for each parameter are weighted and combined to give an overall figure for the 10m subsection length. The weightings are used to allow for the importance of the factor in assessing road condition and the reliability of the measurement.

1.6.4 There are two approaches to calculating the RCI – original and revised

- In 2006 and 2007 the SCANNER RCI was based on an original set of parameters, thresholds and weightings.
- From 2008 the SCANNER RCI was based on a revised set of parameters, thresholds and weightings.

1.6.5 Both sets of parameters, thresholds and weightings are available on the UKPMS website under “SCANNER Road Condition Indicator” at www.pcis.org.uk/index.php?p=25/42/0

1.6.6 The importance (relevance) and reliability factors for the SCANNER RCI are also published on the DfT website at www.dft.gov.uk/pgr/roads/network/local/servicelevels.

1.6.7 Survey data can be processed using either the “original” or the “revised” weighting set, and the results can be compared, so that local highway authorities can identify how much of any change is due to the changed thresholds and weightings, and how much may be due to changes in road condition.

1.6.8 The RCI values for each 10m length can be collated to determine the overall percentage of the 10m lengths within the network falling into three categories:

(a) "GREEN" - lengths where the carriageway is generally in a good state of repair.

(b) "AMBER" - lengths where some deterioration is apparent which should be investigated to determine the optimum time for planned maintenance treatment.

(c) "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.

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

1.6.10 In England, the proportion of the network in the "red" category is reported as NI168 on principal roads and NI169 on other classified roads, but there is no requirement to report the "amber" or "green" proportions.

1.6.11 In Scotland, the Statutory Performance Indicator for road condition is similarly based on the RCI, but rather than reporting solely on the proportion in the red category, the indicator in Scotland also includes the amber category and cover

all road classes including unclassified roads. Each year 100% of the A road network is surveyed in one direction, together with 50% of the B and C Class network and a 10% sample of unclassified roads.

1.6.12 It is consequently the intention that the SCANNER Specification and RCI will become the standard methodology of assessing road condition throughout the UK.

1.6.13 The SCANNER RCI is described in greater detail in Volume 3 (section 4) of this specification.

1.7 Using the SCANNER data within a PMS

1.7.1 Currently SCANNER data can be processed through any accredited UKPMS compliant system to produce the SCANNER RCI within the PMS.

1.7.2 The RCI provides a useful tool to identify lengths of the network in need of maintenance or further investigation. For example, local authority engineers might use tools within their PMS to look for lengths of carriageway which include a significant percentage of “red” and “amber” lengths as being suitable lengths for maintenance schemes. This is particularly informative when the PMS functionality is linked to a GIS, as shown in Figure 12~~Figure 12~~.

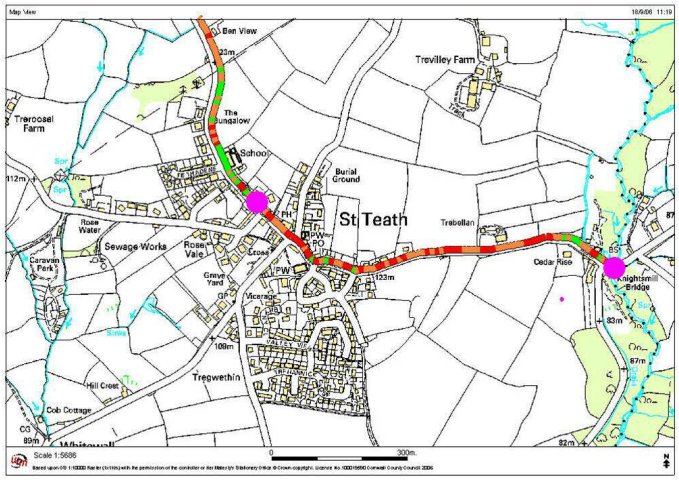

Figure 12 Using SCANNER RCI data to identify scheme lengths using a GIS (courtesy of Cornwall County Council and WDM Limited)

1.7.3 The RCI can be used in a number of ways:

- 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.
- 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.
- Also, 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.

1.7.4 However, it should be noted that 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.

1.7.5 UKPMS compliant systems are also able to analyse SCANNER data using simple treatment selection rules to identify indicative treatments and hence estimate budgets.

1.7.6 In future, UKPMS will be developed 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

1.7.7 The use of SCANNER data is not restricted to analyses defined with UKPMS. Different types of PMS will offer different analysis and display tools. For example, 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.

1.7.8 The use of the SCANNER data is described in greater detail in Volume 3 (section 5) of this specification

Annex A – Glossary of terms

Term	Definition
3- Dimensional Spatial Coordinates	A geo-centric orthogonal co-ordinate system that identifies the location of a point in space
Acceptance Tester	The organisation appointed to carry out Acceptance Testing as described in Volume 5 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 Accreditation Certificate valid for one year.
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 (one year) Accreditation Certificate
Accreditation Tester	The organisation appointed to carry out Accreditation Re-testing as described in Volume 5 of the SCANNER guidance documents.
Altitude	The height, in metres above mean sea level, of the road surface at the position of the equipment
Average speed	The average operating speed of the equipment.
Audit of vehicle operation.	The purpose of Audit is to ensure that Quality Assurance procedures are being operated effectively.
Auditor	The independant organisation appointed to provide Quality Assurance and Audit functions on behalf of the Employer as described in Volumes 2 and 4.
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.
Carriageway	The main paved area of the highway carrying vehicular traffic.
Chainage	A distance measured along a line from a known point, typically a distance measured along, and from the start of, a Section or a Survey. In the case of a Section, the line is likely to be notional, e.g. the ‘centre’ of the carriageway, rather than one of the delineation lines painted on the Road.
Contractor	The survey operator that carries out SCANNER accredited surveys on behalf of the Employer.

Term	Definition
Coverage	Proportion of the Network over which Valid Data are collected during the Surveys.
Cracking Intensity	A measure of the percentage area containing cracks.
Crossfall	The underlying slope of the Road in the horizontal plane and perpendicular to the direction of travel. By convention, positive values of Crossfall imply that the offside is higher than the nearside. The slope is defined as the increase in height divided by the horizontal component of the distance travelled (known as the "Tan" convention).
Cross Section Position	Longitudinal strips of carriageway and off carriageway features using a Cross Sectional Position (XSP) naming convention ie - CL1, CL2, CR1
Curvature	The underlying rate of change of direction of the road in the horizontal plane usually expressed in terms of 'Radius of Curvature'. By convention, positive values of Radius of Curvature imply a left-hand bend in the direction of travel.
Derived values	Parameters derived from the Raw Condition Data by the Contractor's processing software. Includes Longitudinal Profile Variance, Rut Depth, SMTD and Cracking Intensity.
Employer	The client for the SCANNER accredited surveys, normally a local authority.
Enhanced LPV	Enhanced Longitudinal Profile Variance
Enhanced Longitudinal Profile Variance	Variance of individual deviations of the Longitudinal Profile relative to a datum derived from Longitudinal Profile measurements filtered over a given length.
First Party QA	Quality Assurance by the supplier of the product or service, in this case, the Contractor for SCANNER accredited surveys.
Geometry	Generic term for parameters relating to the general shape of the Road i.e. Gradient, Curvature and Crossfall.
GPS	Global Positioning System. Location referencing system using data from earth orbiting satellites to define position in relation to a reference point.
Gradient	The underlying slope of the Road in the vertical plane in the direction of travel. By convention, positive values of gradient imply that there is an uphill slope in the direction of travel. The slope is defined as the increase in height divided by the horizontal component of the distance travelled (known as the "Tan" convention).

Term	Definition
HARRIS	An independent survey device - 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.
Kph or Kmh	Kilometres per hour
Location Referencing	Location Referencing comprises the techniques and conventions that are used to locate items on the road Network.
Location Referencing Label	Alphanumeric label given to a point on the Network, typically at the start and end of sections.
Location Referencing Point	(LRP) A known physical or abstract point somewhere on a section having an accurate Locational reference.
Longitudinal Profile	The variation of level along the length of a carriageway, excluding wavelengths less than 0.5m or greater than 100m. Used to calculate Longitudinal Profile Variance.
Macro Texture	The texture of the pavement surface that provides a water drainage capability between the tyre and the Road.
Mean Profile Depth (MPD)	Mean Profile Depth, A measure of Macro Texture, as defined in ISO Standard 13473-1, Part 1.
National Grid Co-ordinates	Positions in relation to a standard grid covering the United Kingdom.
Nearside	The left-hand side of a Lane in the direction of travel.
Network	A group of road sections that form a consistent model for administrative purposes. Specifically, in the context of SCANNER, this refers to the roads that are to be surveyed.
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.
Offside	The right-hand side of a Lane in the direction of travel.
OSGR	Ordnance Survey Grid Reference. Location referencing system defining position in relation to a standard grid covering the United Kingdom.
PMS	Pavement Management System.

Term	Definition
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 underlying rate of change of direction of the Road in the horizontal plane. By convention, positive values of Radius of Curvature imply a left-hand bend in the direction of travel. Defined as the reciprocal of Curvature, i.e. (Curvature)-1
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.
Rut depth	The depth of rutting
Rutting	Permanent depressions in the Wheel Tracks, relative to the remainder of the road surface, caused by repeated vehicle loading.
Section	A length of the road network each having fixed start and end positions and road alignment.
Section Label	An alphanumeric label that uniquely identifies a Section.
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 Road Condition Indicator (RCI)	A specified way of combining measurements using defined thresholds and weightings, to provide a "score" for each 10m sub-Section, used as the basis for a performance indicator.”

Term	Definition
SCOTS	Society of Chief Officers of Transportation in Scotland
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
SMTD	Sensor Measured Texture Depth - A measure of Macro Texture, defined in Volume 5 of the Specification.
Survey Data	Data measured by a SCANNER accredited survey before processing to produce RCD.
Survey Equipment	Accredited survey machine or vehicle used to carry out the surveys.
Survey route	An ordered list of Sections, each with a Start Reference Label. A Survey Route also shall have an End Reference Label.
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.
TRACS	TRAffic-speed Condition Surveys. The automated condition survey of the Highways Agency's trunk road network.
TTS	TRACS Type Surveys – a survey developed from the TRACS survey, which was later developed into SCANNER
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
Wheel track	The location on the traffic lane where the wheels of vehicles predominately run.

Term	Definition
Wheelpath	For the purposes of this document, this is generally synonymous with Wheel Track. The location of the nearside and offside wheelpaths are further defined in Volume 4 of the specification.
Works	Accredited surveys and data processing described in the contract.

Annex B – SCANNER survey parameters

SCANNER measurement	UKPMS Defect (OBSERV) Code	Notes
LOCATION REFERENCING (Position)		
SCANNER Coordinate	LCOO	"x" co-ordinate = OSGR "y" co-ordinate = OSGR "z" co-ordinate = Altitude
ROAD GEOMETRY		
SCANNER Curvature	LCRV	Measured as radius of curvature
SCANNER Cross-fall	LFAL	
SCANNER Gradient	LGRD	
LONGITUDINAL PROFILE (Ride Quality)		
SCANNER 3m moving average Longitudinal Profile Variance (left/nearside)	LV3	The method of reporting ride quality currently used in the SCANNER RCI
SCANNER 3m Longitudinal Profile Enhanced Variance (left/nearside)	LL03	A new, more robust, method of reporting ride quality that is related to moving average variance
SCANNER 10m moving average Longitudinal Profile Variance	LV10	The method of reporting ride quality currently used in the SCANNER RCI
SCANNER 10m enhanced Longitudinal Profile Variance (left / nearside)	LL10	A new, more robust, method of reporting ride quality that is related to moving average variance
SCANNER 30m moving average Longitudinal Profile Variance (left/nearside)	*LV30*	*This measurement is no longer required in SCANNER surveys from 2007/08 onwards.*
SCANNER Bump intensity (CDM) left wheel path	LLBI	A measurement which identifies isolated bump-like features
SCANNER 3m enhanced Longitudinal Profile Variance (right / offside)	LR03	A new, more robust, method of reporting ride quality that is related to moving average variance

SCANNER measurement	UKPMS Defect (OBSERV) Code	Notes
SCANNER 10m enhanced Longitudinal Profile Variance (right / offside)	LR10	A new, more robust, method of reporting ride quality that is related to moving average variance
SCANNER Bump intensity (CDM) right wheel path	LRBI	A measurement which identifies isolated bump-like features
TRANSVERSE PROFILE		
SCANNER Left Wheel Path Rut depth	LLRT	The method of measuring rut depth currently used in the SCANNER RCI
SCANNER nearside rut depth from cleaned profile	LLRD	A new method of reporting rut depth, designed to be more robust, but which is still under trial.
SCANNER Right Wheel Path Rut depth	LRRT	The method of measuring rut depth currently used in the SCANNER RCI
SCANNER offside rut depth from cleaned profile	LRRD	A new method of reporting rut depth, designed to be more robust, but which is still under trial.
SCANNER absolute deviation of 1st derivative of transverse profile	LTAD	A measure of the unevenness of the road surface across the road
EDGE CONDITION		
SCANNER transverse variance	LTRV	This measure compares the unevenness of the left and the right halves of the transverse profile
SCANNER edge roughness	LEDR	This measures the unevenness of a ribbon along the edge of the road
SCANNER road edge step L1	LES1	This reports the presence of “medium” height steps at the edge of carriageway
SCANNER road edge step L2	LES2	This reports the presence of large height steps at the edge of carriageway

SCANNER measurement	UKPMS Defect (OBSERV) Code	Notes
SCANNER edge coverage	LEDC	A reliability measure, reporting how often the edge of carriageway has been detected within each subsection
TEXTURE (Depth and variability)		
SCANNER Left Wheel Path Average Texture depth (SMTD)	LLTX	The method of reporting texture depth used in the SCANNER RCI
SCANNER Left Wheel Path Average Texture depth (MPD)	LLTD	The European standard measurement of texture depth
SCANNER Left Wheel Path Mean RMST Texture depth	LLTM	A parameter that reports the average texture depth using a lower frequency measurement than required for SMTD, enabling SCANNER systems to obtain measurements in several lines using lower cost sensors
SCANNER Left Wheel Path RMST Variance	LLTV	Reports the variability of the RMST texture depth
SCANNER Centre Mean RMST Texture depth	LCTM	A parameter that reports the average texture depth using a lower frequency measurement than required for SMTD, enabling SCANNER systems to obtain measurements in several lines using lower cost sensors
SCANNER Centre RMST Variance	LCTV	Reports the variability of the RMST texture depth
SCANNER Right Wheel Path Mean RMST Texture depth	LRTM	A parameter that reports the average texture depth using a lower frequency measurement than required for SMTD, enabling SCANNER systems to obtain measurements in several lines using lower cost sensors
SCANNER Right Wheel Path RMST Variance	LRTV	Reports the variability of the RMST texture depth
SCANNER Overall Texture Variability – RMST 5th Percentile Value	LT05	Reports a typical low value of the average RMST texture depth in each subsection

SCANNER measurement	UKPMS Defect (OBSERV) Code	Notes
SCANNER Overall Texture Variability – RMST 95th Percentile Value	LT95	Reports a typical high value of the average RMST texture depth in each subsection
SCANNER Overall Texture Variability – RMST Variance	LTVV	Reports the variability of the RMST texture depth
CRACKING and other surface defects		
SCANNER Crack Map	LMAP	Length/m
		Offset
		Angle
		Type Code
SCANNER Cracking (whole carriageway)	LTRC	The method of reporting crack intensity used in the SCANNER RCI
SCANNER Left Wheel Track Cracking Intensity	LWCL	The method of reporting crack intensity over part of the carriageway used in the “original” SCANNER RCI.
SCANNER Right Wheel Track Cracking Intensity	LWCR	The method of reporting crack intensity over part of the carriageway used in the “original” SCANNER RCI.
SCANNER Transverse/reflection cracking	LRCR	Reports the intensity of one type of crack, based on a new algorithm that is still under trial.
SCANNER Surface Deterioration Parameter	LSUR	Reports the whether the cracking detected tends to be isolated or spatially related, using a new algorithm that is still under trial.