UK Pavement Management System

2006 Health Check – Principles & Objectives

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Document Information

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Document History

Version No	***Status***	***Author***	***Date***	***Changes from Previous Version***
1.01	Draft	RAC	05/05/06	1st draft
1.02	Issue	RAC	11/07/06	Updated following consultations: ▪ Add a reference to third-party tools to the requirement to map SCANNER data (Objectives 1.5.5 & 7.1.3). ▪ Add a requirement to be able to load any new SCANNER defects introduced in RP7.01 (Objective 3.3). ▪ Update the reference to the new Merge Method 3 to 'Enhanced' (Objective 5.1.3). ▪ Add a requirement to use the next most recent data if the only data for a section/feature/XSP within a particular survey is 'Not Assessed' (Objective 5.1.8). ▪ Add further information about the importing of weighting sets (Objectives 6.2, 7.3.1 & 7.5.3) ▪ Add further information about the drill-down report (Objectives 6 & 7.3.4). ▪ Add a requirement to produce a SCANNER coverage report (Objectives 6 & 7.3.5). ▪ Add a requirement to validate SCANNER data to check for non-coincident subsections prior to calculating the SCANNER RCI and to explain how historical data is handled (Objectives 6.4, 7.3.6 & 7.3.7).
1.03	Issue	RAC	17/07/06	Footnote added to clarify omission of cycletracks (Objective 9.4.1)

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UKPMS Health Check – Principles & Objectives

The purpose of the UKPMS Health Check is to provide assurance that UKPMS systems continue to meet UKPMS requirements including the current Rules & Parameters and BVPI definitions. The Health Check is only carried out on fully accredited UKPMS systems and supplements rather than replaces the UKPMS Comparability Tests.

The Health Check is intended to be a pragmatic and less onerous alternative to repeating the Comparability Tests when an existing UKPMS system is modified. Passing the Comparability Tests continues to be a requirement for any new systems that wish to become UKPMS accredited.

The UKPMS Support Contract requires the UKPMS Support Contractor to:

> *Develop and implement comparability health-check tests for the continued certification of systems already holding a UKPMS Seal of Approval.*

This document provides information about the format and content of the UKPMS Health Check. It is arranged in three parts. The first section 'Principles' provides a statement of the test arrangements and administration. The second section 'Objectives' lists the tests which will be included in the 2006 Health Check and outlines what developers will be expected to provide. Finally, the Appendix at the end of the document provides a cross reference between the 2006 UKPMS Health Check and the Tranche tests.

Principles

This section covers the test arrangements and administration. It is divided up into

- Timing and consultation
- Test arrangements

Timing and Consultation

1. The consultation mechanism is via the UKPMS Steering Group (USG) who will be asked to agree the principles and objectives for the Health Check.

2. Once the principles and objectives have been agreed with the USG they are published to the UKPMS Web Site. They are also issued to registered developers and any other stakeholders identified by the USG.

3. The Health Check will normally be updated annually, and every developer with a fully accredited UKPMS system must submit a completed test each year.

4. The Health Check is intended to reflect current needs for UKPMS rather than the existing Tranche tests and so the Health Check will evolve in the future, to reflect future needs. To facilitate this Health Checks will operate on the following annual cycle:

- The Health Check is normally revised annually during the period July – September, and published by the end of September. This revision will address the principles and objectives to see if any should be added, dropped or amended. During the revision process the USG are asked to agree the new principles and objectives and any changes to these are then reflected in the test package itself.

- Developers should return their completed self-test by the end of December, for any version(s) they wish to be accredited. The only accredited versions are those which have successfully completed the current annual Health Check.

- If developers release any new versions commercially during the year they must decide if the changes have any impact on the Health Check. If so, they should use the current annual Health Check to carry out a self-test and submit it. If it is clear that their change has no impact on the tests then they should submit a simple pro-forma stating this in order for the new version to be accredited.

5. Note that even if a developer has not changed their software they must submit a completed test once per year, corresponding to the latest version of the Health Check.

6. This annual cycle allows new DfT requirements to be added annually, and also allows for revisions of the Rules & Parameters.

Test arrangements

1. The Health Check only applies to those developers with fully accredited (i.e. Tranche 3) UKPMS systems. Any new developer wanting to develop a UKPMS system is required to pass all three Tranche tests, plus the current annual Health Check for their system to be considered fully accredited.

2. The Health Check does not test performance or speed. The tests are used to check that the UKPMS algorithms and processes are operating correctly. The tests do not include functional requirements, other than where these are necessary to establish the algorithm results or where important functionality has been added to UKPMS. For example, for the 2006 Health Check will include the requirement to produce 2006/07 Performance Indicator reports BV223, BV224a, BV224b(97b) and BV187.

3. The 2006 Health Check is a self-test package and does not include a site visit by the UKPMS Support Contractor. However, the UKPMS Support Contractor will do some spot checks on the results. There are two parts to the test:

   A: This part of the test is conducted entirely by the developer.

B: This part of the test is conducted in the presence of a user of the system. Ideally this user is a member of the USG and of the developer's user group. This part of the test should be able to be conducted during a half day visit.

For both parts of the test, reports or other evidence (as specified for the test) will be submitted.

4. The test package specifies the data to be loaded into the system, the processes to be carried out (typically automatic pass and road condition indicator runs), and provides outputs or results for the processes. The package also includes pro-formas, which will be used to sign off the test components.

   The onus is on developers to track down any differences between their software and the test results and so the test package includes some additional 'audit' information for the automatic pass and road condition indicator runs. However, developers are not required to submit an audit trail themselves.

   To facilitate the checking of results by the UKPMS Support Contractor the Health Check is prescriptive about the defect length output, as this provides the main check of automatic pass results.

5. The specific aspects of UKPMS to be tested are given below in the objectives, and these are targeted at the most important parts of UKPMS. The objectives do not necessarily provide a complete list of the requirements for a UKPMS system; the complete requirements are established by the Tranche tests. The Appendix below provides a cross check between the Tranche test requirements and the 2006 Health Check objectives.

6. The tests are designed around the smallest number of sections and processing runs necessary to test all the objectives. The test data is 'artificial'; it is designed specifically for the tests and is not drawn from real data.

7. The Health Check uses specified versions of the rules and parameters and weighting sets (RP7.01, WS223 and WS224a for the 2006 Health Check).

Objectives

The objectives are presented in a hierarchical fashion, with a top-level objective followed by more detailed objectives which address additional requirements related to the top-level objective. Although the objectives do not imply any particular sequence for the tests, the test package produced from these may require certain tests to be carried out in a specified order.

1 Loading data

1.1 Data specifying sections, nodes and inventory is provided in the test package. This data must be loaded into the system but the loading mechanism itself will not be tested. The developer will be expected to provide evidence (such as screen shots, or reports) to prove that the UKPMS system has been populated with this data.

1.2 Find errors during HMDIF load of condition data
Some loads will fail with an error message. Some errors which may be included in this test are:

- 1.2.1 Trying to load data for a section which does not exist in the system.
- 1.2.2 Trying to load inventory or condition data which exceeds specified length tolerances (ie too long, or too short).
- 1.2.3 Trying to load a defect which is not recognised in RP7.01.
- 1.2.4 Trying to load a defect with an invalid parameter option (e.g. zero number of lanes affected for wheel track cracking) or an invalid parameter value (e.g. length of wheel track cracking set to -1).
- 1.2.5 Trying to load 'overlapping' data (that is, data where for the same section/feature/XSP within the same survey, the start and end chainages of one occurrence of the defect overlap with the start and chainages of another occurrence of the same defect)

1.3 Load CVI data in an HMDIF file
Issues which may be included in this test are:

- 1.3.1 Load some data which has to be shrunk and some which has to be stretched to match the section length.
- 1.3.2 Load a section requiring reversal.
- 1.3.3 Load a section which has been surveyed but which has no defects.

1.4 Load DVI data in an HMDIF file
Issues which may be included in this test are:

- 1.4.1 Load some data which is stretched, and some which is shrunk – in both cases, within the last subsection.
- 1.4.2 Load some data which is stretched and some which is shrunk – but beyond the final subsection.
- 1.4.3 Load a concrete DVI survey with a variable bay length.

1.4.4 Load a section requiring reversal.
1.4.5 Load a section which has been surveyed but which has no defects.

1.5 Load SCANNER/TTS data in an HMDIF file
Issues which may be included in this test are:

1.5.1 The measured length will lie within 1m of the section length.
1.5.2 Load some subsections of a non-standard length.
1.5.3 Load some non-integer start and end chainages, including point item data (e.g. crack map and co-ordinate data) where after rounding the chainage of the data is equal to the measured length of the section.
1.5.4 Load a section requiring reversal.
1.5.5 Display SCANNER data against a map background, in conjunction with third-party tools as required.

2 Setting up costs

2.1. Treatment costs
Costs are only set up for those treatments actually used during processing, and the costs set up are markedly different for each treatment. This helps developers and the UKPMS Support Contractor to check that the results of the automatic pass are correct (because if the wrong treatment is selected the cost is likely to differ by a clearly noticeable amount). The costs used are not realistic and they should not be distributed in a 'live' system.

3 Use of correct rule set

The Health Check includes tests that help to indicate whether the correct rule set has been loaded. However, this is not an exhaustive check, and so if the rule set has been loaded using a manual process, any resulting errors may not be trapped.

3.1. Check that the Rule Set identifier is RP7.01

3.2. Check that the new SCANNER treatment rules are used (introduced in RP6.02).

3.3. Check that new SCANNER defects can be loaded (introduced in RP7.01).

4 Network and data composition

The data used for the tests is based on a subset of features, construction types and pavements types. The reason for this is solely to reduce the volume of the tests, and so this does not imply any reduction in UKPMS requirements in this respect.

4.1. The network includes CW, KB and FW features only, but with joint features (LJ and TJ) for concrete carriageways.

4.2. The network has inventory of the following construction types:

CW

BT – bituminous
BL – block paved
XC – covered concrete
CRC – continuously reinforced concrete
RJC – reinforced jointed concrete
CO – concrete

KB

KB – kerb

FW

BL – block paved
BT – bituminous
FL – flagged
CO – concrete

4.3. The network has condition data for the following pavement types:

CW

BTCC – bituminous surface, unknown construction
BP – block paved
COCO – covered concrete
CU – concrete surface unknown construction
UK – unknown

FW

BP – block paved
BT – bituminous
FG – flagged
CR – concrete

4.4. The network includes data for the following XSP codes:

Minimal:	L, R, C
Full:	L1, LE, CL1, CL2, CR1, CR2, RE, R1, R2

4.5. The data includes a range of defects, so that different ratings and CI calculations are called up. This provides a suitable spot check that RP7.01 has been loaded correctly, but this check is not exhaustive.

4.6. Defects and inventory are chosen so that:

4.6.1. Defect refinement is required. BTCC to be mapped to BT or COCO depending on inventory construction. CU to be mapped to CCR or RCR, depending on inventory construction.
4.6.2. Defect chainages are adjusted to match compatible inventory
4.6.3. Defects are dropped which have inventory, but none of a construction type compatible with the pavement type.

4.6.4. The default inventory is used where there is no inventory present.

4.7. Defects are chosen so that defect combinations are generated.

4.8. The network and survey data is designed to test the BVPI calculations.

4.8.1. The network includes principal, non-principal classified and unclassified sections.
4.8.2. The network includes footways with a range of hierarchies.
4.8.3. The network includes at least one section which has not been surveyed.
4.8.4. The network includes a least one section which has been surveyed but which has no defects.
4.8.5. The network includes a section which only has survey data outside the BVPI date range.
4.8.6. Some 'not assessed' data is included.
4.8.7. Sections with different road types are included.

5 Automatic Pass processing

5.1. Non-projection: Check that the defect lengths, together with their condition indices, treatments, costs and rankings are correct. Three types of automatic pass run are required:

5.1.1. Merge Method One with 100m fixed intervals.
5.1.2. Merge Method Three (standard variable merge) with the default parameters.
5.1.3. Merge Method Three (enhanced variable merge) with the default parameters.

Any or all of these runs will include the following:
5.1.4. A check that the distinction between Full & Minimal XSPs has been dropped and that CVI data collected at the minimal XSP level can be processed regardless of whether there is inventory present.
5.1.5. Use of the CVI/DVI switch. Only one setting of this switch will be tested; the setting used will be that most likely to be used for automatic pass runs used to produce BVPI results.
5.1.6. The ability to select specific survey types, surveys and sections
5.1.7. Use of dates to select specific survey data
5.1.8. Correct selection of data based on the most recent available for a section/feature/XSP. Note that if the only data for a section/feature/XSP within a particular survey is 'Not Assessed' then the next most recent data should be used.
5.1.9. Defect refinement (See 4.6)
5.1.10. Defect combinations (See 4.7)

Note that the reports from the Merge Method Three runs will include 2006/07 BV224b(97b) and BV187. (See Objective 7.4). Some systems may be able to generate these reports from a single Automatic Pass run; others may need to

carry out an Automatic Pass run corresponding to each of the BVPI reports. Either of these approaches is acceptable.

6 SCANNER Road Condition Indicator

The SCANNER Road Condition Indicator (RCI) will be included in the 2006 Health Check with the following requirements:

6.1. The production of the RCI using the algorithm and data model described in document 070, including data selection and the choice of weighting set.
6.2. The ability to import weighting sets (or equivalently, to link to weighting sets) published on the UKPMS website without requiring Developer involvement.
6.3. The ability to view and report weighting set values.
6.4. Validation to reject data on non-coincident subsections, and an explanation of how any existing historical data on non-coincident subsections is handled.

Note that the reports from the SCANNER Road Condition Indicator will include 2006/07 BV223 and BV224a (see Objective 7.4) and will also include a drill-down report (Objective 7.3.4) and a coverage report (Objective 7.3.5).

7 Evidence

Evidence will be required to support the developer's assessment that their system meets the Health Check requirements. This evidence will be based on the following list:

7.1. Reports or other feedback (for example screenshots) as specified in the test instructions to show:

7.1.1. That the system has been set up with the required network, inventory and condition data.
7.1.2. That the system has rejected those HMDIFs with errors, giving sufficient details to locate and correct the errors.
7.1.3. That SCANNER data can be displayed against a map background (in conjunction with third-party tools as required).

7.2. Reports on the Automatic Pass

7.2.1. A defect length report to a specified format will be required for each of the automatic pass runs specified in the test. The format for this report will be an Excel spreadsheet with agreed columns.

7.3. Reports or other feedback (for example screenshots) as specified in the test instructions for the SCANNER Road Condition Indicator to show:

7.3.1. That weighting sets can be imported (or linked to) once published on the UKPMS website without requiring Developer involvement.
7.3.2. The interface for an RCI run including the choice of weighting set and data selection parameters.

7.3.3. That weighting set values can be viewed and reported
7.3.4. The drill-down report giving subsection values plus either family or individual defect scores, for a user-specified part of the network.
7.3.5. The coverage report (as specified in document 70).
7.3.6. That SCANNER data is validated prior to calculating the RCI and rejected if the data does not lie on coincident subsections.
7.3.7. How historical data on non-coincident subsections is handled.

7.4. BVPI reports

7.4.1. PI report for BV223 for 2006/07. This includes the ability to extract and process the principal part of the supplied network.
7.4.2. PI report for BV224a for 2006/07. This includes the ability to extract and process the non-principal classified part of the supplied network.
7.4.3. PI report for BV224b(97b) for 2006/07. This includes the ability to extract and process the unclassified part of the supplied network.
7.4.4. PI report for the BV187 (footway indicator) for 2006/07. This includes the ability to extract and process the footways of hierarchies 1a, 1 and 2.

7.5. Confirmation by the user present at the Part B tests that:

7.5.1. Condition data (CVI, DVI, TTS) can be loaded using HMDIF files.
7.5.2. The selection and run time parameters for the Automatic Pass can be set up interactively.
7.5.3. The data selection and weighting set for SCANNER Road Condition Indicator can be set up interactively, and that weighting sets published on the UKPMS website can be used without Developer involvement.
7.5.4. Reports can be produced by the system, as required for the Health Check.

8 Likely to be included in future Health Checks

8.1. Automatic Passes carrying out projection, economic prioritisation and network trends.

8.2. Outputs to meet NRMCS requirements.

8.3. Further functionality relating to the SCANNER Road Condition Indicator:

8.3.1. The capability to set up and manage local weighting sets.
8.3.2. The ability to output the results to file(s).
8.3.3. Grouping of the results by geographical attribute or by pavement.

9 Not included in the 2006 Health Check

The list below gives tests which are not included in the 2006 Health Check. But, this does not imply that these aspects can be dropped by developers; they are part of the Tranche tests, and so should be included in any fully accredited UKPMS system. However, because they do not have a direct impact on the results submitted for

comparisons on a national basis, they are not included in the annual Health Check for 2006. They may be required for future Health Checks, particularly as national requirements change.

9.1. Loading the following types of data are not included in the Health Check

9.1.1. Works Records
9.1.2. CRUT
9.1.3. DRUT
9.1.4. HRM
9.1.5. SCRIM
9.1.6. GripTester
9.1.7. Deflectograph

9.2. Setting up costs

Costs are only required for the treatments used during processing, and the mechanism used to set up and change costs is not tested. Routine maintenance costs are not tested.

9.3. Use of correct rule set

There are some 'spot checks' to indicate if RP7.01 has been loaded and used, but these are not exhaustive. For instance, if the rule set has been loaded using a manual technique (rather than by loading whole tables) with the possibility of isolated errors, then these are unlikely to be discovered during the tests, and so developers should have their own tests and checks in place to ensure that the rules have been loaded correctly.

9.4. Network and data composition

The Health Check does not include:

9.4.1. Verges and cycletracks[1]
9.4.2. The full range of pavement and construction types
9.4.3. The full range of XSPs
9.4.4. The full range of defects

9.5. Automatic Pass processing

The Health Check does not include:

9.5.1. The full range of settings for the CVI/DVI switch
9.5.2. The full range of merge methods
9.5.3. Condition projection
9.5.4. Economic prioritisation
9.5.5. Network trends

9.6. Budgeting

[1] Within UKPMS a cycletrack is defined as an area of the highway, off carriageway, which is exclusively reserved for the use of pedal cycles. When a cycletrack and footway occur together a footway shall be recorded.

The Health Check does not include:

9.6.1. A check that multiple budgets can be set up, with multiple instances and with different heads and limits applied to each instance.

9.6.2. A check that budget and instance can be selected, and applied to an automatic pass.

9.7. Reports

The following reports are not required for the Health Check:

9.7.1. Inconsistency report

9.7.2. Automatic Pass audit trail (but note that audit information will be supplied for developers to use to track down any differences between the official test results and their own results.)

9.7.3. Monitor network condition report and Project network trends report.

9.7.4. Budgeting reports (budget summary, budget head detail, budget detail by section)

9.7.5. Defect Lengths sorted by Condition Index report

9.7.6. Road Condition Indicator summary report

Appendix

This appendix provides a cross reference between the UKPMS Health Check and the Tranche tests. It lists the title of each Tranche test script, and indicates if it is included in the 2006 Health Check. It is intended to indicate the scope and emphasis of the Health Check, and provide a framework for the debate about what the Health Check should and should not include. Note that new data and test runs have been designed for the Health Check; the Tranche test scripts will not be re-used for the Health Check.

	Tranche Test Script	***Included in Health Check***
1	Bulk Loading of Network Sections and Related Nodes	No[2]
2	Interactive Maintenance of Sections and Section-Related Data	No[3]
3	Establish an Inventory	No[4]
4	Maintain Inventory Data	No[5]
5	Establish Visual Condition Data	Part[6]
	57 Load CVI HMDIF	*Yes*
	58 Load DVI HMDIF	*Yes*
	59 Check Non-Overwriting of Measured Length (DVI)	*Yes*
	60 Check Stretching of Section Length and Associated Observations to Fit (DVI)	*Yes*
	61 Check Overwriting of Estimated Section Length (DVI)	*No*
	65 Check Stretching of Section Length and Associated Observations to Fit (CVI)	*Yes*
	67 Load Single Section DVI HMDIF with Data Collected in Reverse Direction	*Yes*
	71 Load / Merge Partial Survey by Cross Sectional Position (DVI)	*No*
	72 Attempted load of Erroneous DVI HMDIF	*Yes*
	73 Manual Correction of Errors in DVI HMDIF	*No*
	74 Load of Error-Corrected DVI HMDIF	*No*
	78 Print DVI Inconsistency Report	*No*
	80 Listing of DVI Defects for Selected Sections	*No*
	102 Listing of CVI Defects for Selected Sections	*No*
6	Establish Machine Condition Data Associated with a Network	No[7]
7	Maintain Visual and Machine Condition Data	No
8	Split and Merge Sections	No

[2] Although the 2006 Health Check does not test the way in which section and inventory data is loaded and maintained, the developer is expected to be able to load a small quantity of section, node and inventory data to provide a database for the tests.

[3] See Footnote 1

[4] See Footnote 1

[5] See Footnote 1

[6] Non-overwriting of measured length (59), shrink/stretch(60 & 65) and data reversal (67) may be included in the Health Check as required, but will not necessarily be included in every Health Check.

[7] Although the 2006 Health Check does not test the loading of CRUT, DRUT, HRM, Deflectograph, SCRIM or GripTester data, it does require SCANNER/TTS data to be loaded.

9	Automatic Pass Processing (without Condition Projection) *146 Select / Nominate from Multiple Rule Sets (First Pass)* *147 Select Sections for inclusion in Automatic Pass Run (First Pass)* *148 Specify Run Time Parameters for Automatic Pass Run (First Pass)* *159 Identify and Carry Out an Automatic Pass (First Pass)* *183 Report on Defect Lengths (First Pass)* *184 Automatic Pass Audit Trail (First Pass)* *187 Delete an Automatic Pass* *189 Process all Sections (Fixed Length Merging)* *190 Process All Sections (Variable Length Merging)*	Part *No* *Yes* *Yes* *Yes* *Yes* *No* *No* *Yes* *Yes*
10	Estimating Cost Rates	No[8]
11	Budgeting	No
12	Maintenance of Works Records	No
13	Tranche 3 Automatic Pass Processing (with Condition Projection and Economic prioritisation)	No
14	Projection of Network Trends	No
15	Monitor Network Condition	No

[8] The 2006 Health Check does not test the way in which unit costs are entered into the system, but developers are expected to be able to set up and use unit costs within their system. Costs are provided for the tests.