UK Pavement Management System

Health Check – Principles & Objectives

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Document Information

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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 will only be carried out on fully accredited UKPMS systems and will supplement rather than replace 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 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 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 will be 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 will be published to the UKPMS Web Site. They will also be 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 after the initial Health Check subsequent Health Checks will operate on the following annual cycle:

- The Health Check will normally be 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 will be asked to agree the new principles and objectives and any changes to these would then be 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 will allow new DfT requirements to be added annually, and will also allow for revisions of the Rules & Parameters.

7. In the period leading up to July 2005 a dummy run of the Health Check was conducted based on v1.08 of the Principles & Objectives. This is referred to as the 'Dummy Health Check'. Developers were encouraged to comment on the Health Check process and the tests used. The objective of this dummy run was to identify any issues or problems and the results were not published. The dummy run did however give developers the opportunity to see what is expected from the Health Check process.

8. The intention is that the Health Check will be revised during the period July – September 2005 to reflect the lessons learnt from the informal 2004 Health Check together with the 2005/06 BVPI requirements, the latest required Rules & Parameters (RP6.01) and any new DfT requirements. This revised Health Check will form the 2005 Health Check and be published by the end of September; it will use the Rules & Parameters issued by the end of September. Developers will be required to complete the 2005 Health Check by the end of December 2005 in accordance with the timetable given above in Point 4.

Test arrangements

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

2. The Health Check will not test performance or speed. The tests will be used to test that the UKPMS algorithms and processes are operating correctly. The tests will 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 2005 Health Check will include the requirement to produce 2005/06 Performance Indicator reports BV224b(97b) and BV187.

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

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

   B: This part of the test will be conducted in the presence of a user of the system. Ideally this user will be 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 will specify the data to be loaded into the system, the processes to be carried out (typically automatic pass runs), and will provide outputs or results for the processes. The package will also include pro-formas, which will be used to sign off the test components.

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

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

5. The specific aspects of UKPMS to be tested will be as determined by the objectives, and these will be targeted at the most important parts of UKPMS. The objectives will 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 Health Check objectives.

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

7. The Health Check will use specified versions of the rules and parameters and weighting sets (RP6.01, WSAv0101 and WSBv0101 for the 2005 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 will be 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 RP6.01.
- 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 CRUT data of less than 5%
- 1.2.6 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 CRUT data in an HMDIF file

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

- 1.5.1 Load some data which is stretched, and some which is shrunk – in both cases, within the last subsection.

1.5.2 Load some data which is stretched and some which is shrunk – but beyond the final subsection.
1.5.3 Load a concrete DVI survey with a variable bay length.
1.5.4 Load a section requiring reversal.
1.5.5 Load a section which has been surveyed but which has no defects.

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

1.6.1 The measured length will lie within 1m of the section length.
1.6.2 Load some subsections of a non-standard length.
1.6.3 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.
1.6.4 Load a section requiring reversal.

1.7 Load GripTester data in an HMDIF file

2 Setting up costs

2.1. Treatment costs
Costs will only be set up for those treatments actually used during processing, and the costs set up will be markedly different for each treatment. This will help 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 will not be realistic and they should not be distributed in a 'live' system.

3 Use of correct rule set

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

3.1. Check that the Rule Set identifier is RP6.01

3.2. Check that the new SCANNER defects can be loaded (introduced in RP5.02).

3.3. Check that GripTester data is processed correctly (introduced in RP5.02)

4 Network and data composition

The data used for the tests will be 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 will include CW, KB and FW features only, but with joint features (LJ and TJ) for concrete carriageways.

4.2. The network will have 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 will have 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 will include data for the following XSP codes:

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

4.5. The data will include a range of defects, so that different ratings and CI calculations are called up. This will provide a suitable spot check that RP6.01 has been loaded correctly, but this check will not be exhaustive.

4.6. Defects and inventory will be 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.
4.6.5. CRUT changes introduced in RP4.03 are checked
4.6.5.1. CVI (BTCC) and CRUT (UK) data with no inventory
4.6.5.2. CRUT data present but no CVI data
4.6.5.3. CRUT (UK) data with CO inventory.
4.6.5.4. CRUT data of less than 5%

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

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

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

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

Any or all of these runs will include the following:
5.1.3. 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.
5.1.4. 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.
5.1.5. The ability to select specific survey types, surveys and sections
5.1.6. Use of dates to select specific survey data
5.1.7. Defect refinement (See 4.6)
5.1.8. Defect combinations (See 4.7)
5.1.9. Processing of GripTester data

Note that the reports from the Merge Method Three runs will include 2005/06 BVPI 224b(97b) and BVPI 187. (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 introduced to the 2005 Health Check with the following requirements:

6.1. The production of the RCI using the algorithm and data model described in document 070.
6.2. The capability to accommodate multiple weighting sets and to allow the user to choose which to use for any particular RCI run.
6.3. Summary reporting.

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.

7.2. 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.
7.2.2. A *Defect Length sorted by Condition Index* report will be required in accordance with the specification given in Technical Note 32.

7.3. Reports on the SCANNER Road Condition Indicator

7.3.1. A SCANNER Road Condition Indicator report will be required for each of the RCI runs specified in the test. The format for this report will be as specified in document 070.

7.4. BVPI reports

7.4.1. PI report for BVPI 224b(97b) for 2005/06. This includes the ability to extract and process the unclassified part of the supplied network.

7.4.2. PI report for the BVPI 187 (footway indicator) for 2005/06. 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, CRUT, DVI, TTS, GripTester) 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 SCANNER Road Condition Indicator weighting set can be chosen for any particular run.
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 ability to view and report weighting set values.
8.3.2. The capability to set up and manage local weighting sets.
8.3.3. Drill-down reporting.
8.3.4. The ability to output the results to file(s).
8.3.5. Grouping of the results by geographical attribute or by pavement.
8.3.6. Functionality to import weighting sets.

9 Not included in the current Health Check

The list below gives tests which are not included in the current 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 2005. They may be required for future Health Checks, particularly as national requirements change.

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

9.1.1. Works Records
9.1.2. DRUT
9.1.3. HRM
9.1.4. SCRIM
9.1.5. Deflectograph

9.2. Setting up costs

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

9.3. Use of correct rule set

There will be some 'spot checks' to indicate if RP6.01 has been loaded and used, but these will not be 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 will not include:

9.4.1. Verges and cycletracks
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 will 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

The Health Check will 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 will not be 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)

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 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 will be 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[1]
2	Interactive Maintenance of Sections and Section-Related Data	No[2]
3	Establish an Inventory	No[3]
4	Maintain Inventory Data	No[4]
5	Establish Visual Condition Data	Part[5]
	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[6]
7	Maintain Visual and Machine Condition Data	No
8	Split and Merge Sections	No

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

[2] See Footnote 1

[3] See Footnote 1

[4] See Footnote 1

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

[6] Although the Health Check will not test the loading of HRM, Deflectograph or SCRIM data, it will require SCANNER/TTS, CRUT and GripTester 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[7]
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

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