

# **UK Pavement Management System**



## **Technical Note 46 – Part 1**

***Financial Information to support Asset Management  
Guidance notes for UKPMS Developers  
Carriageways***

**Version Number 3.00 - Issue**

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## Document Information

<b>Title (Sub Title)</b>	Technical Note 46 – Part 1 Financial Information to support Asset Management Guidance notes for UKPMS Developers Carriageways
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<b>Description</b>	This Technical Note provides guidance for UKPMS Developers to produce carriageway information required by HAMFIG.

## Document History

<b>Version No</b>	<b>Status</b>	<b>Author</b>	<b>Date</b>	<b>Changes from Previous Version</b>
0.01	Draft	RAC	18.06.13	First draft based on 2012/13 version but revised to remove date specific references so that the Technical Note applies to any year from 2013/14 onwards until further notice.
0.02	Draft	RAC	04.07.13	Transferred to new template.
0.03	Draft	RAC	09.07.13	Revised following review by JMG. UKPMS Rule Set references updated to 'RP10.01 or later' and Weighting Set references standardised to 'WSCCIv0102 or later'.
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1.01	Draft	RAC	14.01.19	The website references have been updated
1.02	Draft	RAC	18.01.19	Reviewed by CCS
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2.01	Draft	RAC	02.02.21	Draft based on version 2.00 but revised as follows: <ul style="list-style-type: none"> <li>▪ Website references updated</li> <li>▪ References to archive documents removed</li> </ul>
2.02	Draft	RAC	10.02.21	Reviewed by CCS
3.00	Issue	RAC	17.02.21	Ratified by Chris Allen-Smith for HAMFIG

## Document Owner

The owner of this document is the Highway Asset Management Financial Information Group (HAMFIG).

## Document Support

Support for this document is provided by Linhay Consultancy Ltd and Hyperion Infrastructure Consultancy Ltd who can be contacted via [ukpms@hyperion-uk.com](mailto:ukpms@hyperion-uk.com). These organisations have been appointed as the UKPMS system accreditors by the UK Roads Board.

This document can be found online on the [RCMG website](#).



## Introduction

This Technical Note provides guidance for UKPMS Developers to allow them to produce various reports for financial information to support asset management as requested by the Highways Asset Management Financial Information Group (HAMFIG).

Part 1 of the Technical Note (this document) gives the requirements for carriageways. Part 2 of the Technical Note gives the requirements for footways and cycletracks.

This document provides:

- **Changes since the last version**
- **Background Information** on data requirements
- **Accumulated Depreciation** requirements for processing and reporting for the carriageway surface layer (and gives an example report)
- **Annual Depreciation** calculations and reporting requirements based on the same depreciation model as for the accumulated depreciation (and gives an example report).
- **Inventory Reporting Requirements** for the contribution to the calculation of the gross replacement cost (GRC) for carriageways

## Changes since last version

The website references have been updated and references to archived documents have been removed.

## Background Information

The HAMFIG reports are based on inventory data and on SCANNER, CVI and DVI condition data.

While the reports should be able to use the above survey data for any type of road and for any date range, it is anticipated that the following data sources will typically be used:

- **Classified Roads:** SCANNER data for the last two financial years.
- **Unclassified Roads:** CVI or DVI data for the last four financial years.

However, note that in Scotland, SCANNER is used for all classes of road including unclassified.

SCANNER data are processed using the Weighting Set algorithm and the CVI/DVI data are processed using the Automatic Pass.

## Prior Year Comparatives

The Whole of Government Accounts (WGA) figures for the preceding year are used to provide prior year comparatives for the current year. During the current year authorities may want to make changes to their preceding year figures to reflect improvements to data quality and quantity. They can do so, provided that they track the changes against the figures reported for the preceding year. Authorities will



therefore still require access to the preceding year's data, processing and reports during the current year so that they can rerun these if they wish.

## **Accumulated Depreciation**

The purpose of the calculation is to estimate the contribution that the carriageway surface makes to the network depreciated replacement cost (DRC). The processing and reporting requirements are described below.

### ***Processing***

The condition data are processed to produce the carriageway condition index (CCI) and this is then used in subsequent calculations to give, ultimately, the accumulated depreciation.

For SCANNER data, the CCI is produced by processing the data using a CCI Weighting Set chosen by the user (such as WSCCIv0102 or later). The run will typically be required to use data from the previous 2 years but the dates are entered by the user so as to allow some flexibility with the survey timetable. Note that the individual subsection values (i.e. the CCI value for each subsection) will be required for the production of the report.

For CVI or DVI data, the CCI is produced by processing the data using an Automatic Pass with RP10.01 or later. The Automatic Pass will typically be required to use data from the previous 4 years but the dates are entered by the user to allow some flexibility with the survey timetable. The Automatic Pass will normally be run using the standard variable merge method with the default parameters, but other merge methods and parameters should also be accommodated. The CCI is one of the condition indices produced for each defect length.

### **CCI Calculation**

The CCI calculation is described below for each data source. In all cases the CCI value is stored (and used) to 2 decimal places.

#### ***SCANNER data***

The SCANNER CCI is obtained for each subsection using a specified Weighting Set. It is defined as:

$$\begin{aligned} & \text{Max (LLRT, LRRT)} \\ & + \text{LV3} \\ & + \text{LV10} * 0.1 \\ & + \text{LTRC} * 10 \\ & - \text{LLTX} * 2.5 \end{aligned}$$

Note that even if one or more of these SCANNER parameters is missing from a subsection, the CCI value is still calculated for that subsection (but with the contribution from the missing parameter(s) set to zero).

#### ***CVI data***

The CCI for CVI data is obtained for each defect length as a condition index from the Automatic Pass. It is defined using the rated defects as:



BCKJ \* 0.60  
+ Max(BFEJ, BSDE) \* 0.60  
+ BSES \* 0.75  
+ BLED \* 0.25  
+ BRED \* 0.25

### ***DVI data***

The CCI for DVI data is obtained for each defect length as a condition index from the Automatic Pass. It is defined as:

BCRJ \* 8  
+ BCRN \* 4  
+ BCHJ \* 4  
+ BCHN  
+ BFRJ \* 5  
+ BFRN \* 2  
+ BFAJ \* 2  
+ BFAN  
+ BLSS \* 8  
+ BLMS \* 5  
+ BRUT \* 5  
+ BTC1  
+ BTC2 \* 4  
+ BLE1 \* 0.5  
+ BLE2  
+ BRE1 \* 0.5  
+ BRE2

### **Notes:**

- For BCRJ, BCRN, BCHJ, BCHN, BFRJ, BFRN, BFAJ, BFAN, BLSS, BLMS, BLE1, BLE2, BRE1, BRE2 the percentage defectiveness is used.
- For BRUT the raw measurement (in mm) is used.
- For BTC1, BTC2 the number normalised over a 20m length is used and these two defects are only included for covered concrete and bituminous surface/leanmix construction pavement types.
- Because this calculation requires 'unrated' defects it is performed on copies of these defects obtained via the Defect Composition process and rated using a straight line from (0,0) to (100,100).

### ***Additional Information***

There are some preparatory stages required before the accumulated depreciation report is produced. These may be linked to running the report or they may be carried out as a separate task prior to running the report. The UKPMS Developer is free to implement these preparatory stages in a way which best suits the user interface for their system, subject to any explicit requirements stated in the explanatory text below.



## Network Grouping

Prior to running the accumulated depreciation report the user will be required to set up network groupings to use for the report from up to two of the following attributes:

- Road Hierarchy
- Urban or Rural
- Speed Limit
- Road Type
- DfT Classification

The typical grouping is expected to be Urban/Rural subdivided by DfT Classification. Users do not need to use the same grouping as for GRC but they do need to use the same grouping for both accumulated and annual depreciation. The network grouping used for depreciation should be that which best suits the user's asset management planning.

The number of nesting levels required by UKPMS systems has been limited to two in order to facilitate the design of readable reports. It is anticipated that if more detailed discrimination is required in the future this will be part of a more sophisticated model, beyond the scope of the simple depreciation model described here.

## Depreciation Parameters

For each group the user must enter the following depreciation parameters:

- $T_{INI}$ : The time (in years, 0dp) to when deterioration commences (deterioration initiation). Note that  $T_{INI}$  may be zero.
- $T_{TUL}$ : The time (in years, 0dp) to when the pavement is unserviceable and needs replacement (total useful life).
- Renewal Unit Rate: The average surfacing renewal rate (£/m<sup>2</sup>, 2dp). This is an 'all-in' rate which includes any add-ons required.

Recommended values for  $T_{INI}$  and  $T_{TUL}$  are provided in supporting material to the Highways Network Asset Code published by CIPFA.

UKPMS systems are required to store the depreciation parameters in sets so that the user can simply retrieve the particular set of depreciation parameters to be used for the report rather than entering them afresh each time. Specifically the user must be able to:

- Enter and save multiple sets of depreciation parameters (potentially with different groupings)
- Choose any existing set of parameters for the report
- Edit and save any existing set of parameters
- Delete any existing set of parameters

## Average Carriageway Width

The report calculations (see below) require the average carriageway width for each group. The user can choose from one of the following two options for each group:



1. Use the inventory data for sections with carriageway inventory present, and an external value for those sections without any carriageway inventory. The external value is derived from external sources and entered by the user for each group. The average carriageway width is calculated as:

$$\frac{\sum_{INV} 0.5 * (I_E - I_S)(W_E + W_S) + \sum_{NoINV} LW}{\sum L}$$

Where:

*INV*: Those sections with carriageway inventory  
*NoINV*: Those sections without any carriageway inventory  
*I<sub>E</sub>*: Inventory end chainage  
*I<sub>S</sub>*: Inventory start chainage  
*W<sub>E</sub>*: Inventory end width  
*W<sub>S</sub>*: Inventory start width  
*L*: Section length  
*W*: External width

2. Use an external value for the average carriageway width for the group. This value is derived from external sources and entered by the user.

The width status for the group is assigned accordingly:

- **M**: The width is based on measured inventory data for all sections in the group
- **E**: The average width for the group has been entered by the user based on external data.

In addition to the above two width status settings, a hybrid setting may also occur. This is:

- **M/E**: This arises when inventory is only available for some sections in the group and an external width has been used for the remaining sections.

In all cases the average carriageway width is stored (and used) in metres to 1 decimal place.

## **Report Calculations**

Note that the accumulated depreciation report and all associated calculations should be restricted to the carriageway feature.

The accumulated depreciation report requires a calculation to be carried out on the CCI results in order to evaluate the accumulated depreciation. In essence the outline of this calculation is to convert the CCI results to a accumulated depreciation percentage, via a deterioration curve and depreciation line, and then use this percentage to obtain the accumulated depreciation (as a value).

## **Deterioration Curve**

The deterioration curve for each network group is defined as follows for  $x \geq 0$ :

For  $x < T_{INI}$ ,



$$y = 0 \quad (1)$$

For  $x \geq T_{INI}$ ,

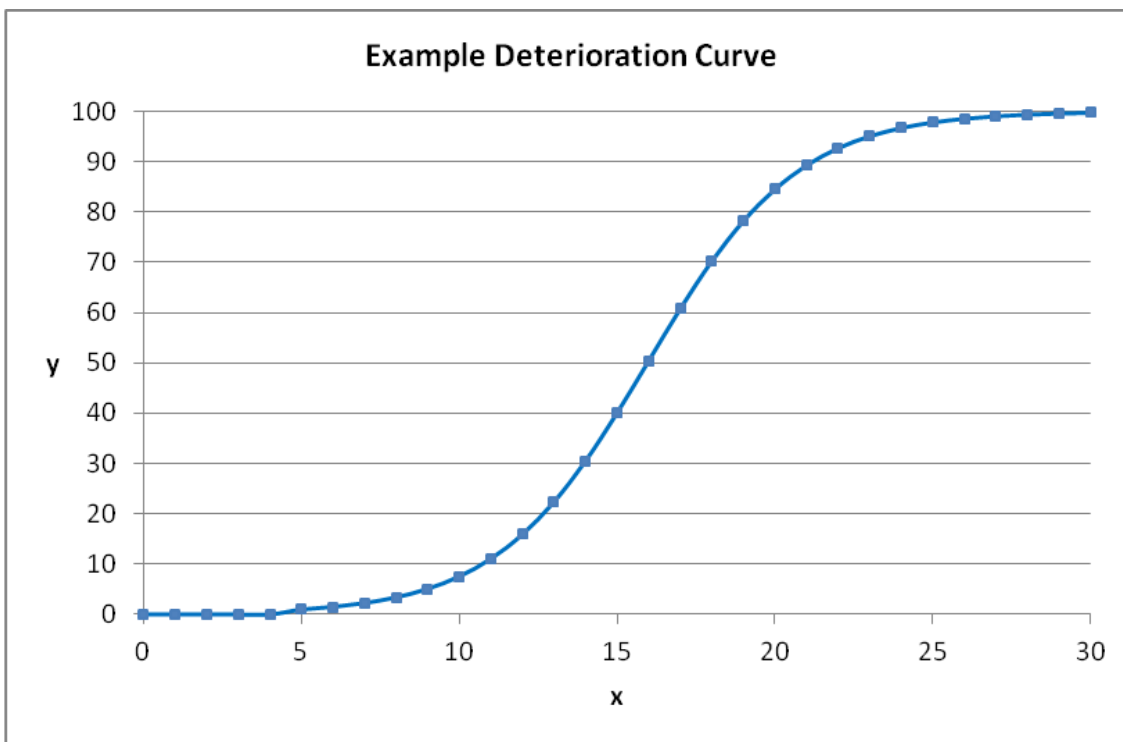
$$y = \frac{100}{(1 + 100 * e^{-c(x-T)})} \quad (2)$$

Where:

$$c = 7.5473 * (T_{TUL} - T_{INI})^{-1.0418}$$

$$T = T_{INI}$$

A typical curve, with  $T_{INI} = 5$  and  $T_{TUL} = 21$ , is illustrated below:



### Converting from CCI to depreciation

The CCI value for the defect length (when derived from the Automatic Pass) or sub-section (when derived from the Weighting Set algorithm) is constrained to a value lying between 0 and 100 as follows by replacing CCI by:

$$\text{Min}(100, \text{Max}(0, \text{CCI}))$$

Throughout the text below, CCI is taken to be this capped value.

The accumulated depreciation percentage is calculated by shifting the CCI value onto a depreciation line, defined as the line between coordinates (0,0) and ( $T_{TUL}$ ,100). More specifically, the CCI score is converted to a notional 'AGE' via the deterioration curve, and then the depreciation line is used to convert the AGE value to an accumulated depreciation percentage.





Consider the deterioration curve function with  $x=AGE$  and  $y=CCI$ . The following inverse function can be used when  $\frac{100}{101} \leq CCI < 100$ :

$$AGE = T_{INI} - \frac{\ln\left\{\frac{(100-CCI)}{100*CCI}\right\}}{c} \quad (3)$$

Because equation (2) is only valid when  $AGE \geq T_{INI}$ , this inverse function can only be used when  $\frac{100}{101} \leq CCI$ .

When  $CCI < \frac{100}{101}$ , then:

$$AGE = 0.5 * T_{INI} \quad (4)$$

The explanation for the upper bound on CCI is that the inverse function is not defined when  $CCI = 100$ , but as  $CCI \rightarrow 100, AGE \rightarrow \infty$ . Because, as can be seen from equations (6) and (7) below, any  $AGE \geq T_{TUL}$  leads to an accumulated depreciation percentage of 100, the following formula can be used when  $CCI=100$ :

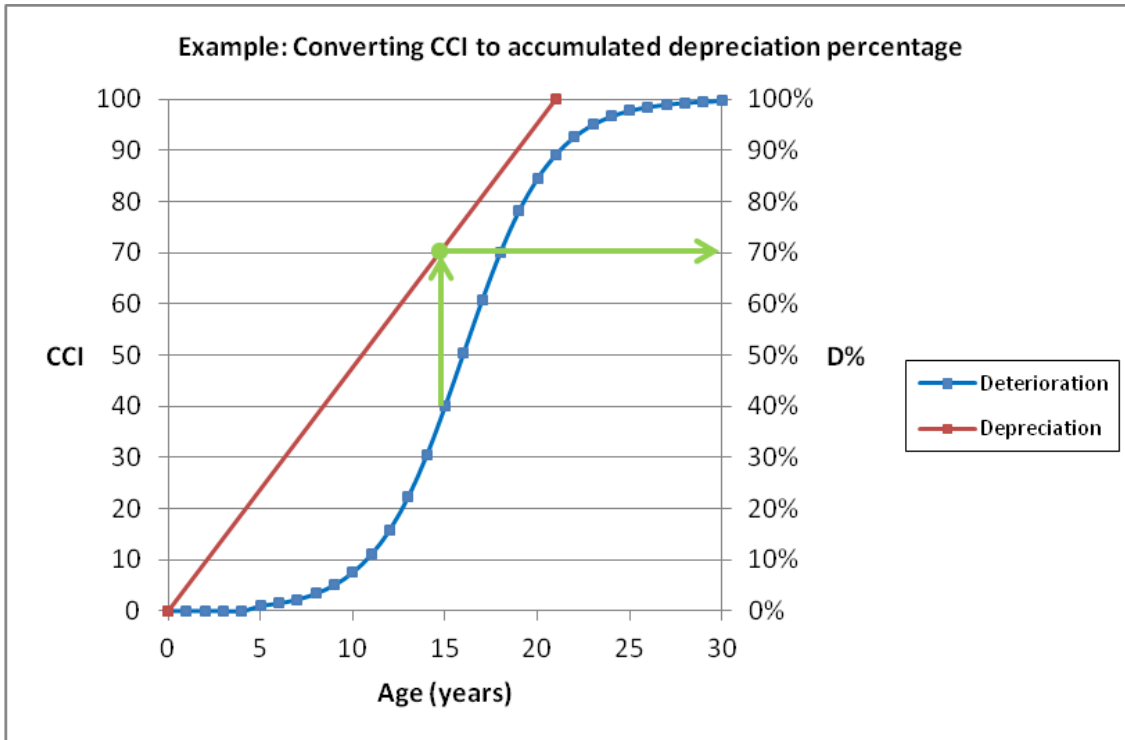
$$AGE = T_{TUL} \quad (5)$$

The AGE can be converted to an accumulated depreciation percentage (D%) using the following formula when  $AGE \leq T_{TUL}$ :

$$D\% = \frac{100 * AGE}{T_{TUL}} \quad (6)$$

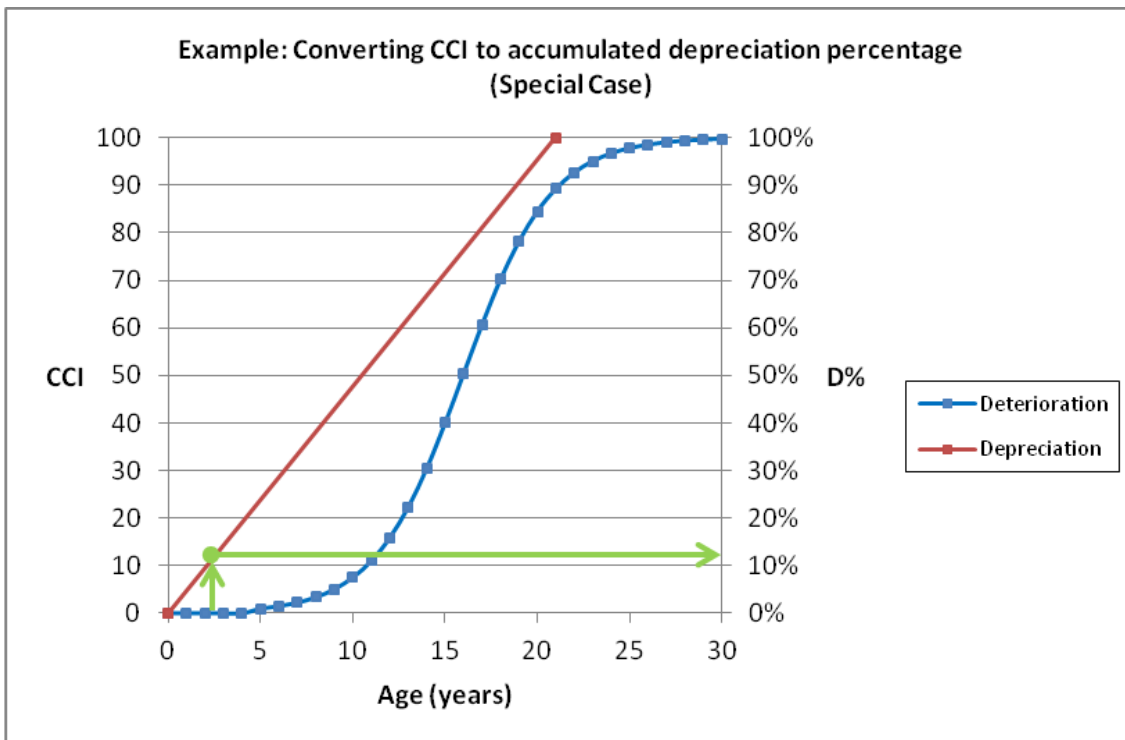
When  $AGE > T_{TUL}$ , then  $D\% = 100$ . (7)

An example of this process is illustrated below:



Here CCI is approximately 40 and this gives an accumulated depreciation percentage of approximately 70% for the defect length (or sub-section).

A special case exists when  $CCI < 100/101$ . In this case the depreciation is calculated by assuming the AGE is half-way between zero and  $T_{INI}$ . This is illustrated below:





For this example  $T_{INI}$  is 5 (years). The depreciation is therefore assumed to be equivalent to  $0.5 * 5$  i.e. 2.5 years. This gives an accumulated depreciation percentage of 11.9%.

Account must also be taken of those parts of the network which are presumed 'not defective' since these should contribute to the accumulated depreciation. The mechanism for including the 'not defective' part of the network is to set up a notional defect length for each section and XSP which already has one or more actual defect lengths. The length for this notional defect length is calculated as:

$$N_{S,X} = L_S - \sum l_{S,X}$$

Where:

$N_{S,X}$  is the notional defect length for Section S and XSP X

$L_S$  is the section length for Section S

$l_{S,X}$  is the length of a particular defect length for Section S and XSP X, and the summation is carried out over all such defect lengths.

For notional defect lengths, CCI = 0 and an accumulated depreciation percentage is then calculated in the same way as for any other defect length.

### **Depreciation for network group**

The **accumulated depreciation percentage** for the network group is simply the length-weighted average of the accumulated depreciation percentage for the constituent defect lengths (or sub-sections). The accumulated depreciation percentage for the network group is stored (and used) rounded to 1 decimal place.

The **accumulated depreciation** for the network group is calculated as:

- Accumulated Depreciation Percentage (% , 1dp)
- × Network Length (m, 0dp)
- × Average Carriageway Width (m, 1dp)
- × Renewal Unit Rate (£/m<sup>2</sup>, 2dp)

The accumulated depreciation for the network group is calculated in £ and is not rounded. It is displayed as £'000s rounded to 3 decimal places.

## ***Running the report***

### **User Input**

To run the report the user selects:

- The Automatic Pass(es) and Weighting Set run(s) to use
- The network grouping
- The set of depreciation parameters
- The average carriageway width option for each network group

The user must select the Automatic Pass(es) and Weighting Set run(s) in such a way that no section/XSP contributes to more than one processing run. As a bare minimum UKPMS systems must check for this eventuality and issue a prominent warning on the report if any section/XSP contributes to more than one processing run. UKPMS



Developers are encouraged to offer more than this bare minimum approach. For example:

- By the use of precedence conventions to select automatically one and only one of the CCI processing runs for each section/XSP.
- By appropriate drill-down reports so that the user can track down the offending section/XSP.

The Automatic Pass(es) selected by the user should be based on RP10.01 or later. Likewise the Weighting Set run(s) should be based on a CCI weighting set (such as WSCCIv0102 or later). UKPMS Developers are encouraged to check this and issue warnings if inappropriate Rule Sets or Weighting Sets have been used.

## Report Contents

The report contents are as follows:

- Local Authority name
- Report run time
- UKPMS system
- UKPMS system version
- For each Automatic Pass included:
  - a. Run identifier
  - b. Rule Set identifier
  - c. Run date
  - d. Date range for survey data
  - e. Automatic Pass run parameters
- For each Weighting Set run included:
  - a. Run identifier
  - b. Weighting Set identifier
  - c. Run date
  - d. Date range for survey data
- For each network group:
  - a.  $T_{INI}$  (Yrs, 0dp)
  - b.  $T_{TUL}$  (Yrs, 0dp)
  - c. Renewal Unit Rate (£/m<sup>2</sup>, 2dp)
  - d. Network sections (number, 0dp)
  - e. Network Length (km, 3dp)
  - f. Average width (m, 1dp)
  - g. Average width status ( 'M', 'E' or 'M/E')
  - h. Survey Coverage (km, 3dp)
  - i. Percentage survey coverage (% , 1dp)
  - j. Accumulated depreciation percentage (% , 1dp)
  - k. Accumulated depreciation (£'000s, 3dp)
- For composite groups (Level 1, Level 2) and for whole network:
  - a. Network sections (number, 0dp)
  - b. Network Length (km, 3dp)
  - c. Survey Coverage (km, 3dp)
  - d. Percentage survey coverage (% , 1dp)
  - e. Accumulated depreciation percentage (% , 1dp)
  - f. Accumulated depreciation (£'000s, 3dp)



**Notes:**

1. Network Length is the sum of the section lengths for all sections in the group
2. Survey Coverage is the sum of the section lengths for those sections which have survey data for the Automatic Pass(es) and Weighting Set run(s) included.
3. Percentage survey coverage is Survey Coverage divided by Network Length expressed as a percentage
4. Level 1 and Level 2 are the network grouping levels set up by the user (typically Urban/Rural and DfT Classification). Sub-totals are required for the Level 1 network groups but are optional for the Level 2 network groups.
5. The accumulated depreciation for the composite groups (Level 1, Level 2) and the whole network is calculated as the sum of the accumulated depreciation for the appropriate constituent groups.
6. The accumulated depreciation percentage for the composite groups (Level 1, Level 2) and the whole network is calculated as:

$$D\% = \frac{D}{\sum_i \left\{ \frac{D_i}{D\%_i} \right\}}$$

Where:

- D* is the accumulated depreciation,
- D%* is the accumulated depreciation percentage,
- i* is a subscript to denote each constituent network group which contributes to the composite group in question.

**Example Report**

The example report below uses fictitious data and is intended to illustrate the data required and provide a possible layout for the report.



**Local Authority** **Accumulated Depreciation 2012/2013**

**Accumulated Depreciation Report – Run Time: dd/mm/yyyy hh:mm:ss**  
**UKPMS System & Version: UKPMS System & Version**

<b>Processing</b>								
<i>Automatic Passes</i>								
<i>Using survey data</i>								
Identifier	Rule Set	Run Date	From	To	Merge Method & Parameters			
ABC01	RP10.01	28/04/2013	01/04/2009	31/03/2013	3	12	10	
XYZ44	RP10.01	27/04/2013	01/04/2009	31/03/2013	3	12	10	
<i>Weighting Set runs</i>								
<i>Using survey data</i>								
Identifier	Weighting Set	Run Date	From	To				
A9134	WSCCiv0102	06/04/2013	01/04/2011	31/03/2013				
Run58	WSCCiv0102	13/04/2013	01/04/2011	31/03/2013				
R23/56	WSCCiv0102	15/04/2013	01/04/2011	31/03/2013				

<b>Parameters</b>				
Environment	Class	T <sub>INI</sub>	T <sub>TUL</sub>	Renewal Unit Rate
		Yrs	Yrs	£/m <sup>2</sup>
Urban	A	7	21	17.85
	B	4	21	14.75
	C	6	21	13.32
	U	8	19	10.68
Rural	A	8	21	14.52
	B	5	21	12.58
	C	6	21	11.23
	U	9	20	5.46

<b>Results</b>									
Environment	Class	Network Length		Average width		Survey Coverage		Accumulated Depreciation	
		Num	km	m	Status	km	%	%	£'000s
Urban	A	927	106.000	8.8	M	99.000	93.4%	49.3%	8,208.687
	B	675	88.300	7.0	M	81.400	92.2%	54.2%	4,941.400
	C	3276	425.200	7.6	M/E	410.000	96.4%	56.9%	24,491.949
	U	12774	1,668.100	5.5	E	1,619.200	97.1%	58.0%	56,830.833
Rural	A	2745	313.700	8.8	M	297.500	94.8%	47.7%	19,119.749
	B	1228	155.100	7.0	E	140.000	90.3%	55.5%	7,580.249
	C	5783	886.000	7.6	M/E	870.400	98.2%	55.2%	41,741.317
	U	5744	624.900	5.0	E	600.500	96.1%	59.2%	10,099.384
Overall by class	A	3672	419.700			396.500	94.5%	48.2%	27,328.436
	B	1903	243.400			221.400	91.0%	55.0%	12,521.649
	C	9059	1311.200			1280.400	97.7%	55.8%	66,233.266
	U	18518	2293.000			2219.700	96.8%	58.2%	66,930.216
Urban	All	17652	2287.600			2209.600	96.6%	56.6%	94,472.868
Rural	All	15500	1979.700			1908.400	96.4%	53.6%	78,540.699
All	All	33152	4267.300			4118.000	96.5%	55.2%	<b>173,013.567</b>

Average width status	M	Measured (inventory)
	E	External (manual input)
	M/E	Mixture of M and E



## Annual Depreciation

### Report Calculations

The general principle for calculating annual depreciation is that it is the total life cycle cost divided by the number of years in the life cycle (for each length), summed over all network lengths.

Using the above model for depreciation the total life cycle cost for a network group is:

$$\begin{aligned} & \text{Network Length (m, 0dp)} \\ & \times \text{Average Carriageway Width (m, 1dp)} \\ & \times \text{Renewal Unit Rate (£/m}^2\text{, 2dp)} \end{aligned}$$

The number of years in the life cycle is the total useful life ( $T_{TUL}$ ).

This gives the following formula for annual depreciation (AD) for a network group:

$$AD = \frac{(\text{Network Length} \times \text{Average Carriageway Width} \times \text{Renewal Unit Rate})}{T_{TUL}}$$

The annual depreciation for the network group is calculated in £/yr and is not rounded. It is displayed as £'000s per year rounded to 3 decimal places.

### Running the report

#### User Input

To run the report the user selects:

- The network grouping
- The set of depreciation parameters
- The average carriageway width option for each network group

#### Report Contents

The report contents are as follows:

- Local Authority name
- Report run time
- UKPMS system
- UKPMS system version
- For each network group:
  - a.  $T_{TUL}$  (Yrs, 0dp)
  - b. Renewal Unit Rate (£/m<sup>2</sup>, 2dp)
  - c. Network sections (number, 0dp)
  - d. Network Length (km, 3dp)
  - e. Average width (m, 1dp)
  - f. Average width status ( 'M', 'E' or 'M/E')
  - g. Annual depreciation (£'000s per year, 3dp)
- For composite groups (Level 1, Level 2) and for whole network:
  - a. Network sections (number, 0dp)
  - b. Network Length (km, 3dp)



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c. Annual depreciation (£'000s per year, 3dp)

**Notes:**

1. Network Length is the sum of the section lengths for all sections in the group
2. Level 1 and Level 2 are the network grouping levels set up by the user (typically Urban/Rural and DfT Classification). Sub-totals are required for the Level 1 network groups but are optional for the Level 2 network groups.
3. The annual depreciation for the composite groups (Level 1, Level 2) and the whole network is calculated as the sum of the annual depreciation for the appropriate constituent groups.

***Example Report***

The annual depreciation report may be provided as a separate report or may be added as extra information to the accumulated depreciation report. The example report on the following page uses fictitious data and is intended to illustrate the data required and provide a possible layout.





<b>Local Authority</b>		<b>Annual Depreciation 2012/2013</b>						
<b>Annual Depreciation Report – Run Time: dd/mm/yyyy hh:mm:ss</b>								
<b>UKPMS System &amp; Version: UKPMS System &amp; Version</b>								
<b>Results</b>								
Environment	Class	Network Length		Average width		T <sub>TUL</sub>	Renewal Unit Rate	Annual Depreciation
		Num	km	m	Status	Yrs	£/m <sup>2</sup>	£'000s/Yr
Urban	A	927	106.000	8.8	M	21	17.85	792.880
	B	675	88.300	7.0	M	21	14.75	434.142
	C	3276	425.200	7.6	M/E	21	13.32	2,049.707
	U	12774	1,668.100	5.5	E	19	10.68	5,157.063
Rural	A	2745	313.700	8.8	M	21	14.52	1,908.730
	B	1228	155.100	7.0	E	21	12.58	650.386
	C	5783	886.000	7.6	M/E	21	11.23	3,600.873
	U	5744	624.900	5.0	E	20	5.46	852.989
Overall by class	A	3672	419.700					2,701.610
	B	1903	243.400					1,084.528
	C	9059	1311.200					5,650.580
	U	18518	2293.000					6,010.052
Urban	All	17652	2287.600					8,433.792
Rural	All	15500	1979.700					7,012.978
All	All	33152	4267.300					<b>15,446.770</b>
Average width status	M	Measured (inventory)						
	E	External (manual input)						
	M/E	Mixture of M and E						



## Inventory Reporting Requirements (GRC)

The HAMFIG requirement is for a report based on inventory data. This information may then be copied to an external spreadsheet (published as supporting material to the Highways Network Asset Code) and used to calculate the Gross Replacement Cost (GRC) for carriageways.

The CIPFA spreadsheet has been designed based on the R199b figures for carriageway length with an adjustment for dual carriageways and for de-trunked roads. The GRC rates in the spreadsheet already allow for the other additional elements that are not reflected in the R199b figures (such as roundabouts, slip roads etc). Therefore if other measures of carriageway length were to be used (such as the UKPMS carriageway length) there is a risk of double counting and the local authority would be expected to be able to justify the departure from R199b.

The external spreadsheet provides GRC rates for Rural/Urban subdivided by each Road Class (M, A, B, C, U/C). This is the basis on which central rates will be provided for the foreseeable future. UKPMS must be able to provide carriageway average width information to support this approach.

### Report Contents

The inventory information provided for each group (R/U split by DfT Classification) is:

- Total number of sections (i.e. including those with no inventory)
- Network Length, defined as the sum of Section Length for all sections in the group, including those with no inventory
- Number of sections with carriageway inventory
- Total Inventory Length, defined as:

$$\sum_{INV} L$$

Where:

$L$  is the Section Length

and the sum is performed over all sections in the group which have carriageway inventory records

- Total Inventory Area, defined as:

$$\sum 0.5 * (I_E - I_S) * (W_E + W_S)$$

Where:

$I_E$  is the Inventory End Chainage,

$I_S$  is the Inventory Start Chainage,

$W_E$  is the Inventory End Width,

$W_S$  is the Inventory Start Width

and the sum is performed over all carriageway inventory records in the group

- Calculated average width (i.e. Total Inventory Area divided by Total Inventory Length for the group)