# UK Pavement Management System

# Technical Note 42 – Part 2

*Northern Ireland SCANNER survey PI guidance notes for UKPMS Developers*

**Version Number 5.00 – Issue**

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## Document Information

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| ***Title (Sub Title)*** | Technical Note 42 – Part 2<br>Northern Ireland SCANNER survey PI guidance notes for UKPMS Developers |
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| ***Description*** | This Technical Note provides guidance for UKPMS Developers to allow them to produce the Northern Ireland PI based on SCANNER survey data. |

## Document History

| Version No | Status | Author | Date | Changes from Previous Version |
|---|---|---|---|---|
| 0.01 | Draft | JMG | 25.06.12 | 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.<br>Reference to specific weighting sets removed and replaced by user-specified weighting sets. |
| 0.03 | Draft | RAC | 15.07.13 | Reviewed by JMG |
| 1.00 | Issue | RAC | 22.07.13 | Ratified by Roddy Crilly for DRD(NI) |
| 1.01 | Draft | RAC | 10.03.16 | First draft of revised version to reflect the DRD(NI) requirements from 2016 onwards |
| 1.02 | Draft | RAC | 17.03.16 | Revised following response to queries by DRD(NI) |
| 1.03 | Draft | RAC | 24.03.16 | Revised following internal feedback |
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| 2.01 | Draft | RAC | 22.02.17 | First draft of revised version to reflect the DRD(NI) requirements from 2017 onwards |
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| 3.00 | Issue | RAC | 28.02.17 | Ratified by Jackie Kelly for DRD(NI) |
| 3.01 | Draft | RAC | 14.01.19 | References to the document owner have been updated to the Department for Infrastructure (Northern Ireland) |
| 3.02 | Draft | RAC | 18.01.19 | Reviewed by CCS |
| 3.03 | Draft | RAC | 08.02.19 | Revised following review by DfI(NI) |
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| 4.02 | Draft | RAC | 10.02.21 | Reviewed by CCS |
| 5.00 | Issue | RAC | 17.02.21 | Ratified by Jackie Kelly for DfI(NI) |

## Document Owner

The owner of this document is the Department for Infrastructure (Northern Ireland).

## 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. 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 the Northern Ireland PI report.

Part 1 of the Technical Note gives the requirements for calculating the PI using visual survey data.
Part 2 of the Technical Note (this document) gives the requirements for calculating the PI using SCANNER survey data.

This document provides:

- **Changes since the last version**
- **Background Information** on survey coverage
- **Processing & Reporting Requirements** including an example report

## Changes since last version

The website references have been updated.

## Background Information

The Northern Ireland PI is based on SCANNER survey data collected according to the road class as follows:

- **A Roads:** 100% of the surveyable network in one direction.  Roads must be surveyed in the opposite direction to the previous year.  The indicator must be derived from surveys covering a minimum of 90% of the 'possible survey lane length' over the last two calendar years.
- **B & C Roads:** 25% of the surveyable network in both directions each year. The indicator must be derived from surveys covering a minimum of 90% of the 'possible survey lane length' over the last four calendar years.
- **Unclassified Roads:** 10% of the surveyable network in one direction each year.  The indicator will be derived from all available data for the first 10 years and after that it will be derived from data for the most recent 10 years.  The minimum coverage will build up progressively to a target to be agreed in due course.

## Processing & Reporting Requirements

The data are processed using the SCANNER Road Condition Indicator (RCI) with user-specified weighting sets (e.g.WSPrinv0201 for A roads, WSBCv0202 for B & C roads, WSAllClassesv0202 for the unclassified roads).  The RCI should use data collected over the last two calendar years for A roads (e.g. 1 Jan 16 to 31 Dec 17 for the 2017/18 results) and over the last four calendar years for B and C roads (e.g. 1 Jan 14 to 31 Dec 17 for the 2017/18 results).  For the unclassified roads, all data from 2017 onwards is used until data has been collected for ten years (e.g. 1 Jan 17 to 31 Dec 17 for the 2017/18 results; 1 Jan 17 to 31 Dec 18 for the 2018/19 results, 1 Jan 17 to 31 Dec 19 for the 2019/20 results and so on).  From 2027 onwards only data from the last ten calendar years will be used.

The Northern Ireland PI results are calculated separately for A roads, B roads, C roads and unclassified roads to give four separate figures and then combined to give a single composite figure.

The formula used is:
> Numerator x 100
> Denominator

For A roads:
> **Numerator:** the total length of A roads greater than or equal to the Red threshold.
> **Denominator:** the total surveyed length of A roads.

For B roads:
> **Numerator:** the total length of B roads greater than or equal to the Red threshold.
> **Denominator:** the total surveyed length of B roads.

For C roads:
> **Numerator:** the total length of C roads greater than or equal to the Red threshold.
> **Denominator:** the total surveyed length of C roads.

For unclassified roads:
> **Numerator:** the total length of unclassified roads greater than or equal to the Red threshold.
> **Denominator:** the total surveyed length of unclassified roads.

A combined indicator is defined as follows:

> **Numerator:** The total length of A roads, B roads, C roads and unclassified roads greater than or equal to the Red threshold (km)

> The numerator is calculated as (W+X+Y+Z) where:

> W = the total length of A roads greater than or equal to the Red threshold (km)
> X = the total length of B roads greater than or equal to the Red threshold (km)
> Y = the total length of C roads greater than or equal to the Red threshold (km)
> Z = the total length of U roads greater than or equal to the Red threshold (km)

> **Denominator:** The total length of A roads, B roads, C roads and unclassified roads surveyed (km)

> The denominator is calculated as (A+B+C+U) where:

> A = the total length of A roads surveyed (km)
> B = the total length of B roads surveyed (km)
> C = the total length of C roads surveyed (km)
> U = the total length of U roads surveyed (km)

All lengths shown on the reports are given in km to 3 decimal places and all percentages including the PI results are given to 1 decimal place.

Confidence limits are not specified for the Northern Ireland PI.

**Notes:**
- *The road classification is fundamental to this report.  It is important that this section attribute is populated accurately.*
- *The report excludes roundabouts.  In general SCANNER data are not collected on roundabouts, but if such data are present, they should not be included in any of the figures on the report.  Roundabouts are defined using the 'Road Type' section attribute.*
- *All road surface types are included.*
- *On occasion some of the SCANNER parameters used in the RCI calculation may be missing from individual subsections.  Such subsections are excluded from the report.  That is, the report is based only on those subsections where all the SCANNER parameters used by the weighting set have been recorded.*
- *If the data are not provided on coincident subsections then the SCANNER RCI is not valid and it is not possible to produce the PI.  [The RCI calculation is based on the premise that all data for a section within a particular survey are provided using the same subsection breakdown.  So suppose Survey 123 on Section A345 uses subsections 0-7, 7-17, 17-27 etc for rutting data (say).  All other measured parameters for that survey on that section must use the same subsections.  In the past there have been problems due to cracking data using a different set of subsections from the other measured parameters.]*

## *Content of the Reports*

*Other than that the reports should be presented in the three parts given below, the following is not intended to give guidance on the layout or format of the report merely to show what content should be included and how that content should be derived.*

### Part 1 – Run Details & Data Selected

This part of the report contains the details and identifiers for the runs used to process the data for A roads, B roads, C roads and unclassified roads.

| Ref | Description | Example | | | |
|-----|-------------|---------|---|---|---|
| 1.1 | Authority | DfI(NI) | | | |
| 1.2 | UKPMS System | Bloggs PMS | | | |
| 1.3 | UKPMS System Version | 2.45 | | | |
|  | Road Classification | A | B | C | U |
| 1.4 | Run Identifier | Run34 | Run06 | Run12 | Run14 |
| 1.5 | Run Date | 05/04/2018 | 10/04/2018 | 07/04/2018 | 11/04/2018 |
| 1.6 | Weighting Set Identifier | WSPrinv0201 | WSBCv0202 | WSBCv0202 | WSAllClassesv0202 |
| 1.7 | Rule Set Identifier | RP10.01 | RP10.01 | RP10.01 | RP10.01 |
| 1.8 | From Date | 01/01/2016 | 01/01/2014 | 01/01/2014 | 01/01/2017 |
| 1.9 | To Date | 31/12/2017 | 31/12/2017 | 31/12/2017 | 31/12/2017 |
| 1.10 | Combination method | Sum | Sum | Sum | Sum |
| 1.11 | Threshold type | Bin | Bin | Bin | Bin |

Users of the report are encouraged to check the UKPMS System and Version against the Annual Health Check results on the RCMG website to ensure that the version of the UKPMS system being used to produce the results is accredited to produce valid results for the Northern Ireland PI for the relevant year.

**Note:**
- *For those Developers who choose to implement the RCI as a type of Automatic Pass, the Run Identifier is simply the Automatic Pass identifier.*
- *The From Date (Ref 1.8) for unclassified roads will remain at 01/01/2017 until 2027.*

## Part 2 – Surveyed Network

This part of the report gives the possible survey lane length together with the length which has actually been surveyed.

| Ref | Description | Example | | | |
|---|---|---|---|---|---|
| | | *A roads* | *B roads* | *C roads* | *U roads* |
| 2.1 | Selected network sections | 91 | 218 | 526 | 24512 |
| 2.2 | Selected network length | 75.838 | 165.438 | 426.838 | 6212.230 |
| 2.3 | Possible survey lane length | 127.113 | 321.445 | 846.193 | 11327.160 |
| 2.4 | Actual survey lane length | 120.030 | 316.650 | 710.129 | 635.215 |
| 2.5 | Percentage of selected network surveyed in survey period | 94.4% | 98.5% | 83.9% | 5.6% |

The selected network sections figure is the number of sections in the selected network (i.e. with DfT classification 3 for A roads, DfT Classification 4 for B roads, DfT Classification 5 for C roads and DfT Classification 6 for unclassified roads).

The selected network length is the sum of the *Section Length Number* for the selected network.

**Note:**
- *Any sections which are roundabouts should be excluded from these figures (Ref 2.1 and Ref 2.2) and from all other figures on the report.*

The possible survey lane length is calculated as:
Σ(*Section Length Number* multiplied by *Nearside Multiplier* for the section Road Type),for the selected network.

The actual survey lane length is the sum of all subsection lengths with eligible data.  (The definition of 'eligible' here is that the data satisfy the date criteria and the road classification criteria; only those subsections with all SCANNER parameters for the weighting set are eligible).

The percentage (Ref 2.5) is calculated as actual survey lane length (Ref 2.4) divided by possible survey lane length (Ref 2.3) expressed as a percentage.  For A, B and C roads this figure should be at least 90%.

In addition to providing the above statistics a breakdown of the network on the basis of Rural/Urban/Undefined is also required.

| Ref | Description | Example | | | |
|-----|-------------|---------|---|---|---|
| | | A roads | B roads | C roads | U roads |
| 2.6 | Rural surveyed network | 82.321 | 260.123 | 440.346 | 406.553 |
| 2.7 | Urban surveyed network | 36.674 | 55.647 | 268.143 | 226.073 |
| 2.8 | Undefined surveyed network | 1.035 | 0.880 | 1.640 | 2.589 |
| 2.9 | Total surveyed network percentage | 158.3% | 191.4% | 166.4% | 10.2% |

The rural surveyed network is the sum of all rural subsection lengths with eligible data; similarly the urban surveyed network is the sum of the urban subsection lengths with eligible data.  The undefined network length is the sum of all those subsections with eligible data but which are not defined as either urban or rural.  Together the rural, urban and undefined figures should add to give the actual survey lane length (Ref 2.4).

The total surveyed network percentage is the actual survey lane length (Ref 2.4) expressed as a percentage of the selected network length (Ref 2.2).

**Note:**
- *For road classes surveyed in both directions this figure is normally greater than 100% once sufficient coverage has built up.*
- *For the unclassified network this figure should build up progressively towards the minimum coverage target.*

## Part 3 – Northern Ireland PI Results

This part of the report contains the Northern Ireland PI results.

As the weighting set uses a Bin type threshold, the length and percentage in each bin is given.

| Ref | Description | Example | | | |
|-----|-------------|---------|---------|---------|---------|
| | | **A roads** | **B roads** | **C roads** | **U roads** |
| 3.1 | Bin description | Red | Red | Red | Red |
| 3.2 | Bin threshold | >=100 | >=100 | >=100 | >=100 |
| 3.3 | Length (km) in bin | 33.020 | 15.516 | 130.271 | 103.882 |
| 3.4 | Percentage in bin | 27.5% | 4.9% | 18.3% | 16.4% |

Note that the sum of the length in all bins should total to give the actual survey lane length (Ref 2.4) for that road class, and the sum of the percentages should be 100% (subject to rounding errors).

The individual Northern Ireland PIs are the percentage in the Red bin for the relevant road class.

| Ref | Description | Example | | | |
|-----|-------------|---------|---------|---------|---------|
| | | **A roads** | **B roads** | **C roads** | **U roads** |
| 3.5 | Individual PI | 27.5% | 4.9% | 18.3% | 16.4% |

The final figure in the report is the composite Northern Ireland PI.

| Ref | Description | Example |
|-----|-------------|---------|
| | | **Composite** |
| 3.6 | Composite PI | 15.9% |

The composite PI is the total length in the Red bin, expressed as a percentage of the total actual survey lane length. Using the reference notation from above, the composite PI is defined as follows:

$$\text{Composite PI} = (3.3_{RED, A} + 3.3_{RED, B} + 3.3_{RED, C} + 3.3_{RED, U}) / (2.4_A + 2.4_B + 2.4_C + 2.4_U)$$

Based on the example data given above, the composite PI is calculated as:

(33.020 + 15.516 + 130.271 + 103.882) / (120.030 + 316.650 + 710.129 + 635.215)

= 15.9%

## Example Report: Northern Ireland PI

| Run Details & Data Selected | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Authority: | DfI(NI) | | | | | | | |
| UKPMS: | Bloggs PMS v2.45 | | | | | | | |
| Road classification: | A | | B | | C | | U | |
| Run Identifier: | Run34 | | Run06 | | Run12 | | Run14 | |
| Run Date: | 05/04/2018 | | 10/04/2018 | | 07/04/2018 | | 11/04/2018 | |
| Weighting Set ID: | WSPrinv0201 | | WSBCv0202 | | WSBCv0202 | | WSAllClassesv0202 | |
| Rule Set ID: | RP10.01 | | RP10.01 | | RP10.01 | | RP10.01 | |
| Dates: | From 01/01/2016 to 31/12/2017 | | From 01/01/2014 to 31/12/2017 | | From 01/01/2014 to 31/12/2017 | | From 01/01/2017 to 31/12/2017 | |
| Combination method: | Sum | | Sum | | Sum | | Sum | |
| Threshold type: | Bin | | Bin | | Bin | | Bin | |

| Surveyed Network | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Selected network sections: | 91 | | 218 | | 526 | | 24512 | |
| Selected network length: | 75.838 km | | 165.438 km | | 426.838 km | | 6212.230 km | |
| Possible survey lane length: | 127.113 km | | 321.445 km | | 846.193 km | | 11327.160 km | |
| Actual survey lane length: | 120.030 km | 94.4% | 316.650 km | 98.5% | 710.129 km | 83.9% | 635.215 km | 5.6% |
| | | | | | | | | |
| Rural surveyed network: | 82.321 km | | 260.123 km | | 440.346 km | | 406.553 km | |
| Urban surveyed network: | 36.674 km | | 55.647 km | | 268.143 km | | 226.073 km | |
| Undefined surveyed network: | 1.035 km | | 0.880 km | | 1.640 km | | 2.589 km | |
| Total surveyed network: | 120.030 km | 158.3% | 316.650 km | 191.4% | 710.129 km | 166.4% | 635.215 km | 10.2% |

| PI results | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Green | (<40) | 44.669 km | 37.2% | 218.488 km | 69.0% | 283.313 km | 39.9% | 231.582 km | 36.5% |
| Amber | (>=40) | 42.341 km | 35.3% | 82.646 km | 26.1% | 296.545 km | 41.8% | 299.751 km | 47.2% |
| Red | (>=100) | 33.020 km | 27.5% | 15.516 km | 4.9% | 130.271 km | 18.3% | 103.882 km | 16.4% |

| **Individual PI** | | **27.5%** | | **4.9%** | | **18.3%** | | **16.4%** |
|---|---|---|---|---|---|---|---|---|

| **Composite PI** | **15.9%** |
|---|---|