SCHEDULE 15

Technical Specification Document

AUTHORITY'S APPROACH TO MEASURING THE CONDITION OF CARRIAGEWAYS AND FOOTWAYS

Sheffield City Council CCI & FCI Models
Technical Specification Document

Detail of the data requirements, processing logic and outputs from the Sheffield PFI Carriageway and Footway Condition Index Models.

APPIA INFRASTRUCTURE SOLUTIONS
VERSION 9 – 5th July 2012

Contents

SECTION **Page No.**

1. OVERVIEW

The Sheffield City Council Carriageway Condition Index (CCI) and Footway Condition Index (FCI) Models use pavement condition measures obtained through machine and visual survey methods to generate a set of Sub-Section, Section and Network Condition Indices based on a defined Carriageway Hierarchy of Primary, Secondary, Link and Local Roads. The Footway network has a Footway Hierarchical Type of High Pedestrian Usage and Low Pedestrian Usage. Condition data for both Carriageway and Footway will be processed and the model will apply a set of pre-defined rules to calculate CCI and FCI values at Section level, Carriageway and Footway Hierarchical Type level, Community Assembly area and whole network level.

2. NETWORK DEFINITION

Sheffield's road network for PFI Project purposes has been defined and has been related to normal Road Section Lengths as per the network definition within the UKPMS visual survey manual. Each Road Section will contain the following mandatory attributes:

- Unique Section identifier (Section Label)
- Road Number
- Road Category
- PFI Carriageway Hierarchical Type (see Table 2.1 below)
- Section Length
- Average Section Width
- Footway Hierarchy (where relevant)
- Number of Lanes

CARRIAGEWAY HIERARCHY

For the purpose of this Project, Sheffield has decided to categorise the network depending on each road's maintenance requirements, not necessarily by its road classification, and the Carriageway Hierarchical Type does not therefore follow the DFT hierarchy as stated in the "Well Maintained Highways" code of practice. Table 2.1 below, sets out the Project hierarchy of Primary, Secondary, Link and Local Roads. The network description shows whether roads have been promoted or demoted within the new PFI network categories.

Table 2.1 - Carriageway Hierarchy

PFI Network Category	Description	Possible DfT Categories
Primary Road	A Roads & Promoted Roads This category is not speed dependent. This is the Strategic Network, which comprises roads between Primary destinations and Main Distributors which are strategic urban routes	2 + 3a
Secondary Road	B Roads C Roads Demoted A Roads Promoted Unclassified Roads This category includes both urban and rural roads and is not speed dependent. This network category comprises primarily of B and C roads and includes Main Distributors that are not strategic urban routes and unclassified roads that have been promoted into this category.	3a, 3b + 4a

Link Road	Link Roads Demoted C Roads – (Road which cannot be surveyed by the SCANNER machine) This category includes both urban and rural roads and is not speed dependent. This network category comprises main roads linking major routes (Primary and Secondary Roads), including major housing estate roads, which are bus routes and carry high volumes of traffic. This category also includes major industrial estates taking HGV traffic, which in certain cases may be cul-de-sac (not a through route)	4a, 4b
Local Road	Local Access Roads This category includes both urban and rural roads and is not speed dependent. Urban and residential roads comprising of low vehicular usage link roads through estates, which may be suitable for HGVs. This category also includes cul-de-sac, service roads etc. Rural link roads, which are low vehicular usage and/or serve few properties, e.g. farms	4b, 5

FOOTWAY HIERARCHY

The Footway hierarchy follows the principle of the DFT hierarchy as stated in the "Well Maintained Highways" code of practice. For the purpose of this Project, Sheffield has decided to categorise the network as shown in Table 2.2 below. The Footways adjacent to the Carriageway are given the same section reference as the Carriageway therefore the majority classification will be allocated against the Carriageway section. The PFI Footway network categories of High Usage and Low Usage Footway are described in Table 2.2 below:

Table 2.2 - Footway Hierarchy

PFI Network Category	Description	Possible DfT Categories
High Usage Footway	Includes Prestige Areas which are defined as "*Heavily used Footways and pedestrianised areas primarily within the City Centre which have high value paving/ornamental paving*" and; highly used Footways in key locations e.g.: • Main Railway Stations to Main Bus Terminus • Main Railway/Bus Stations/Supertram to Pedestrian Areas • Main Railway/Bus Stations/Supertram to Main Civic Buildings • Main Walking Routes in Town Centres • Pedestrian Corridors • Routes to School/Hospitals • Elderly persons' homes and care centres • Local Shopping Areas of 6 or more shops • Universities and Schools - Footways outside entrance(s) • University Campus areas • Libraries - Footways outside entrance(s) • Local Government Offices that have significant access by the public - Footways outside entrance(s) • Cinemas - Footways outside entrance(s) • Sporting Venues and Arenas - Footways outside entrance(s) • Leisure Centres - Footways outside	1a, 1 & 2

PFI Network Category	Description	Possible DfT Categories
	entrance(s) • Parks (Class A) Footways outside entrance(s) • Hospitals - Footways outside entrance(s) • Railway Stations to nearest bus stops.	
Low Usage Footway	All other Footways which do not fall into the above categories including Cycle Ways, Cycle Paths and remote Footpaths	3 & 4

3. SURVEY DATA & DEFECTS USED FOR GENERATING THE CONDITION INDICES

CARRIAGEWAY SURVEYS

Currently there are four types of surveys carried out on the network which feed into the Carriageway Condition Index (CCI) part of the Sheffield Performance Model namely SCANNER, SCRIM, CVI and a bespoke patching survey.

SCANNER Survey

For the Classified road network in England, SCANNER surveys are to be undertaken for production of National Performance indicators NI 168 & NI 169 and are to be carried out using survey vehicles equipped with lasers, video image collection and inertial measurement apparatus to enable surveys of the road surface condition to be carried out whilst travelling at variable speeds of up to 100 km/h to match prevailing traffic and hence cause minimum disruption to other road users. They are carried out over both lanes of single Carriageways and all lanes of the main Carriageway on dual Carriageways and lane 1 of slip roads. Roundabouts are excluded from SCANNER surveys. SCANNER surveys are controlled by an end result specification for the survey equipment and a detailed Quality Audit procedure for the surveys includes regular independent checks to maintain quality assurance.

Skid Resistance Survey

In accordance with HD28/04, measurements for monitoring the in-service skid resistance are made with a Sideway-force Coefficient Routine Investigation Machine (SCRIM) or equivalent as approved by Authority.

All Skid Resistance investigations are to be carried out in accordance with the Output Specification Performance Requirements 2.21(a), 2.21(b) and 2.26(a) in order to ensure effective management of Skid Resistance. Annexure 1 contains the Site Categories and Investigatory levels used which follows HD28/04 methodology. It also contains the process to be adopted by the Service Provider for prioritising site investigations.

UKPMS CVI Survey

The Coarse Visual Inspection Survey (CVI) is to be carried out in accordance with the UKPMS Visual Survey Manual, Chapter 5. It is a chainage-related survey generally undertaken from a slow-moving vehicle. By assessing a limited range of broadly defined defects, and by recording “lateral” extents, rather than measurements of defects, it is a quick, repeatable measure of the network condition. The survey has been adapted for Sheffield to reflect the percentage area which is defective. This has been processed through UKPMS to deliver reliable and representative data.

Patching Survey

The level of patching on a road is a matter of public concern, but there is no nationally recognised survey. Sheffield has therefore created for this Project a bespoke patching survey based upon a CVI type survey. Collection follows the same approach used by the UKPMS CVI survey thus achieving data collection by the quickest method. The surveyor drives the network section recording the various types of patching i.e. longitudinal, transverse or area patches.

Survey Summary

The survey data to be utilised in the Carriageway Condition Index part of the Sheffield Performance Model can be summarised as follows:

Table 3.1 - Carriageway Survey Summary

PFI Carriageway Category	SCANNER	SCRIM	CVI	Patching Survey
Primary Road	✓	✓	✓	✓
Secondary Road	✓	✓	✓	✓
Link Road		✓	✓	✓
Local Road			✓	✓

DEFECTS USED FOR GENERATING THE CARRIAGEWAY CONDITION INDICES

Defects measured by SCANNER

Although SCANNER measures a number of different defects only the following are used in the Carriageway Condition Index part of the Sheffield Performance Model due to concerns over repeatability:

Table 3.2 - Defects measured by SCANNER survey:

Defect	Typical Surface	Description
Rutting	The defects within this category can occur on bituminous surfaces	Transverse Profile (rutting) is measured across a 3.2m width of Carriageway at approximately 0.1m longitudinal intervals to determine the rut depth
Longitudinal Profile Variance	The defects within this category occur on bituminous and concrete Carriageways	Longitudinal Profile Variance is measured in the nearside wheel-track at approximately 0.1m longitudinal intervals to determine the variance along 3& 10m lengths

Defects measured by SCRIM:

The SCRIM readings are used to establish SCRIM deficiency values. The amount the section is deficient in comparison to the investigatory level is used in the calculation.

Defects measured by CVI survey

Table 3.3 - Defects measured by CVI survey:

Defect	Typical Surface	Description
CVI Wheel Track Cracking	The defects within this category can occur on bituminous surfaces	Wide single cracking or multiple cracking/coarse crazing with visible crack width >2mm within the Wheel Tracks
CVI Wearing Course Deterioration	The defects within this category can occur on bituminous surfaces	Loss of material other than surface applied chippings from the surface course or pot holing to the degree that the original surface course is no longer discernible. Includes cracking >2mm
CVI Surface Deterioration	The defects within this category can occur on bituminous surfaces	Any or all of: 1. Extensive loss of surface applied chippings with less than two thirds of chippings remaining. 2. The appearance of bituminous binder in the surface course such that the friction material is flush or covered. 3. Loss of material other than surface applied chippings from the surface course where the original surface course remains discernible
CVI Settlement/ Subsidence	The defects within this category can occur on bituminous and concrete Carriageways	Local settlement or subsidence producing a difference in level greater than 30mm, (50mm in concrete). This will include patches or Statutory Undertaker reinstatements and areas where the Carriageway has heaved, for example due to tree roots.
CVI Transverse/ Reflection Cracking	The defects within this category can occur on all surface types but the road construction will include a lower layer of concrete or cement bound material	Single or multiple transverse cracks at regular spacing
CVI Edge Deterioration	The defects within this category can occur on bituminous surfaces	Major cracking, fretting or deformation confined to the edge of the Carriageway, where NO edge restraint is present

Table 3.3 - Defects measured by CVI survey contd.

Defect	Typical Surface	Description
CVI Major Block Deterioration	The defects within this category can only occur on blocked/sett surfaces	Depression, settlement or subsidence resulting in a difference in level of 13mm or greater. This will include patches or Statutory Undertaker reinstatements where the feature type has heaved (for example due to tree roots). Rocking blocks or missing blocks.
CVI Minor Block Deterioration	The defects within this category can only occur on blocked/sett surfaces	Areas where the pattern of blocks has been disrupted resulting in loss of interlock. Cracked, spalled or otherwise damaged blocks, which have no depressions or vertical projections greater than 13mm
CVI Concrete Cracking	The defects within this category can only occur on concrete surfaces	Cracking further than 500mm from the edge of the pavement or a joint including cracking associated with ironwork, and cracking in permanent concrete patches and reinstatements.
CVI Concrete Surface Deterioration	The defects within this category can only occur on concrete surfaces	Loss of material from the surface of the concrete slab, including scaling, punch outs, pop outs and potholes but excluding joint or crack spalling. Also includes loss of texture.
CVI Concrete Defective Surface Dressing	The defects within this category can only occur on concrete surfaces	Stripping, fretting or chip loss in surface dressing, thin bituminous overlays or high friction surfacing.
CVI Concrete Longitudinal and Transverse Joint Defectiveness	The defects within this category can only occur on concrete surfaces	Any or all of: Difference in level between slabs of 15mm or greater; Evidence of pumping; Evidence of dynamic movement; Loss of material from the joint edge; Cracking within 500mm of the joint, including cracking and/or spalling at the corner of the slab; Opening of longitudinal joints greater than 15mm.

Defects measured by the Patching survey

Table 3.4 - Defects measured by the Patching survey:

Defect	Typical Surface	Description
Statutory Undertaker Reinstatement (BPUT = BPTR+BPLO)	The defects within this category can occur on all surface types.	Reinstatements within the Carriageway resulting from utility openings/Statutory Undertakers' works. Please note that for this purpose, Statutory Undertakers' works includes Licensed works. BPTR = Transverse Patch BPLO = Longitudinal Patch
Maintenance Patching (BPAT)	The defects within this category can occur on all surface types.	Patches within the carriageway carried out for routine highway maintenance purposes.

Patching can only be recorded with the following extents or individual areas.
BPAT can be recorded as:

- 25% of Carriageway lane width
- 50% of Carriageway lane width
- 75% of Carriageway lane width
- 100% of Carriageway lane width
- Smaller individual patches can be recorded as 0.5m^2, 1m^2, 2m^2 or 3m^2
- If duplicate longitudinal reinstatements exist in the Carriageway, then area patching shall be recorded with the appropriate extent (minimum 25%)
- Trench reinstatements greater than 1m in width shall be recorded with the appropriate extent (minimum 25%)

BPLO is recorded for:

- Longitudinal trench reinstatements less than or equal to 1m in width and are assumed to be 1m in width for area calculations

BPTR is recorded for:

- Transverse trench reinstatement less than or equal to 1m in width and are assumed to be 1m in width for area calculations

The following diagram illustrates an example of patching data collection where patches C and F are Statutory Undertakers' reinstatements.

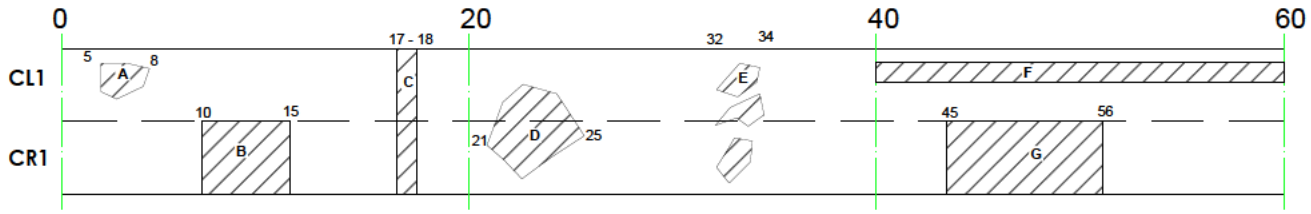


Diagram 3.1

Table 3.5 (a) - Example of processing prior to resurfacing or surface treatment by the Service Provider

Patching	Sub-Sections		
	0 – 20m	**20 – 40m**	**40 – 60m**
A	75% BPAT in CL1 Ch. 5-8		
B	100% BPAT in CR1 Ch. 10-15		
C	1 No. Transverse Patch BPTR (1m *7.3 (Road Width) = 7.3m^2)		
D	-	75% BPAT in CR1 Ch. 21-25 50% BPAT in CL1 Ch. 21-25	
E	-	2m^2 BPAT in CR1 3m^2 BPAT in CL1	
F			20m Longitudinal Patch BPLO
G			n/a (as patch is full lane width and > 10m long)
Total	**5% BPUT in CL1 & CR1 25% BPAT in CR1 11% BPAT in CL1**	**18% BPAT in CR1 14% BPAT in CL1**	**27% BPUT in CL1**
	Patch C relates to Statutory Undertaker's Works and IS included in total)		Patch F relates to Statutory Undertaker's Works and IS included in total)

The calculation for 0-20m in CL1 is:

((8-5) * 3.65)*75% = 8.2m^2

(1 * 7.3) / 2 = 3.65m^2

BPUT = (3.65/(20*3.65))*100 = **5%**

BPAT = (8.2/(20*3.65))*100 = **11%**

BPAT Total = 11+5 = 16%

Prior to resurfacing or applying a surface treatment to an RSL or RSL XSP, the Service Provider shall record all patching whether Statutory Undertakers' Works or Maintenance as Maintenance Patching (BPAT). This is due to the fact that both types of patching contribute to the Patching index before resurfacing or surface treatment takes place and also the Service Provider may find it difficult to distinguish between the two types of patching.

Table 3.5 (b) - Example of processing after resurfacing or surface treatment by the Service Provider

Patching	Sub-Sections		
	0 – 20m	**20 – 40m**	**40 – 60m**
A	75% BPAT in CL1 Ch. 5-8		
B	100% BPAT in CR1 Ch. 10-15		
C	1 No. Transverse Patch BPTR (1m *7.6 (Road Width) = 7.6m^2)		
D	-	75% BPAT in CR1 Ch. 21-25 25% BPAT in CL1 Ch. 21-25	
E	-	3m^2 BPAT in CL1 2m^2 BPAT in CR1	
F			20m Longitudinal Patch BPLO
G			n/a (as patch is full lane width and > 10m long)
Total	**25% BPAT in CR1** **11% BPAT in CL1 (**Patch C relates to Statutory Undertaker's Works and is NOT included in total)	**18% BPAT in CR1** **14% BPAT in CL1**	**No Patching Recorded** Patch F relates to Statutory Undertaker's Works and is NOT included in total)

Post resurfacing or surface treatment of the RSL or RSL XSP, the Service Provider shall record Maintenance and Statutory Undertakers' Works Patching separately but only Maintenance Patching will contribute to the Patching index for that RSL or RSL XSP where appropriate.

In all cases the total area of patching for that particular defect within each 20m Sub-Section length is converted into a percentage area. The percentage of patching is calculated using the following formula:

$$\text{BPAT} = \frac{\text{(Area of Patch within Sub-Section*)}}{\text{Carriageway Width** x Sub-Section Length}}$$

$$\text{BPUT} = \frac{\text{(Area of Patch within Sub-Section*)}}{\text{Carriageway Width** x Sub-Section Length}}$$

*Sub-Section Length is 20m unless the RSL is less than 20m long or the Sub-Section is at the end of an RSL in which case the Sub-Section length can be less than 20m.

** The Carriageway width is taken from inventory for the RSL and will be the lane width when surveyed at full XSP.

In order for the Patching Defect Rating to be determined from the patching rating curve the Service Provider shall provide the survey data in accordance with Fig 3.1 Patch HMDIF Format, shown below:

```
HMSTART ukPMS 001 " " ; , \
TSTART;
SURVEY\TYPE,VERSION,NUMBER,NAME,SUBSECT,CWXSPUSED,OFFCWXSPUSED;
SECTION\NETWORK,NUMBER,LABEL,NORMDIR,SURVDIR,MASTER,LENGTH,COMMENT,SDATE,EDAT
E,STIME,ETIME,INSP;
OBSERV\NUMBER,DEFECT,VERSION,XSECT,SCHAIN,ECHAIN;
OBVAL\PARM,OPTION,VALUE,PERCENT;
OBNOTE\NOTE,COMMENT;
TEND\7;
DSTART;
SURVEY\PATCH,001,50,"Sheffield Specific Patch Survey HMDIF",20M,M,M;
SECTION\UKPMS,,A57/001,F,F,M,1000,"",010708,010708,,,JSW;
OBSERV\1,BPAT,,C,300,320;
OBVAL\1,,13.75,N;
OBSERV\2,BPAT,,C,460,480;
OBVAL\1,,8.75,N;
SECTION\UKPMS,,UA117/3,F,F,M,1000,"",010708,010708,,,JSW;
OBSERV\1,BPUT,,C,100,120;
OBVAL\1,7.5,,N;
OBSERV\2,BPUT,,C,280,300;
OBVAL\1,10,,N;
DEND\13;
HMEND\22;
```

Figure 3.1 – Patch HMDIF Format

Table 3.6 below describes the content within the Patch HMDIF file format/structure.

Line Number	Item in HMDIF	Description
1-9	HMSTART etc.	Typical HMDIF Header line in accordance with UKPMS Technical Note 3
10	Survey\	Survey type
11	SECTION\UKPMS,,A57/001,	Section surveyed details
12	OBSERV\1,BPAT,,C,300,320;	Contains Patch Defect code, XSP and chainage range typically 20m
13	Obval\1,,13.75,N;	Contains the percentage area of patching for the previous Observation in line 12
21	DEND\13	Contains the number of lines within the data file minus the header (9)
22	HMEND\22	Contains the number of lines within the data file

Table 3.6 – Patch HMDIF Format

Defect types which contribute to the Carriageway Condition Indices for each Carriageway Hierarchical Type

All the data is either supplied as HMDIF or is converted into HMDIF. The individual defects from all the above survey types, except SCRIM, are loaded into a UKPMS which contains a set of Rules & Parameters which have been adapted or created to meet Sheffield's requirements. The data is then processed in UKPMS and the resultant defect lengths containing the following Condition Indices at Sub-Section level are used as the input into the Carriageway Condition Index part of the Sheffield Performance Model:

- Structural
- Surface
- Ride Quality
- Patching
- Edge

SCRIM data is not loaded into the UKPMS system. Instead it is processed from its original HMDIF format within the Carriageway Condition Index part of the Sheffield Performance Model to produce individual SCRIM deficiency values, at 10m intervals (*See Graph 4.10*).

Tables 3.7 to 3.10 show the surveys and defect types which contribute to the Carriageway Condition Index type for each Carriageway Hierarchical Type:

Table 3.7 - Surveys used for the Primary Road Carriageway Condition Index

Condition Index Type	Survey Type	Defect Types
Structural	CVI SCANNER	Settlement/Subsidence Wheel Track Cracking Wearing Course Deterioration Concrete Cracking Concrete Joint Defects Major Block Deterioration Rutting
Surface	CVI	Wearing Course Deterioration Surface Deterioration Defective Surface Dressing Minor Block Deterioration
Patching	Patching Survey	Patching Defects
Ride Quality	SCANNER	LPV3m LPV10m
Edge	CVI	Edge Defects
SCRIM	SCRIM	Scrim deficiency

Table 3.8 – Surveys used for the Secondary Road Carriageway Condition Index

Condition Index Type	Survey Type	Defect Types
Structural	CVI SCANNER	Settlement/Subsidence Wheel Track Cracking Wearing Course Deterioration Concrete Cracking Concrete Joint Defects Major Block Deterioration Rutting
Surface	CVI	Wearing Course Deterioration Surface Deterioration Defective Surface Dressing Minor Block Deterioration
Patching	Patching Survey	Patching Defects
Ride Quality	SCANNER	LPV3m and LPV10m
Edge	CVI	Edge Defects
SCRIM	SCRIM	Scrim deficiency

Table 3.9 – Surveys used for the Link Road Carriageway Condition Index

Condition Index Type	Survey Type	Defect Types
Structural	CVI	Settlement/Subsidence Wheel Track Cracking Wearing Course Deterioration Concrete Cracking Concrete Joint Defects Major Block Deterioration
Surface	CVI	Wearing Course Deterioration Surface Deterioration Defective Surface Dressing Minor Block Deterioration
Patching	Patching Survey	Patching Defects
Edge	CVI	Edge Defects
SCRIM	SCRIM	Scrim deficiency

Table 3.10 – Surveys used for the Local Road Network Carriageway Condition Index

Condition Index Type	Survey Type	Defect Types
Structural	CVI	Settlement/Subsidence Wheel Track Cracking Wearing Course Deterioration Concrete Cracking Concrete Joint Defects Major Block Deterioration
Surface	CVI	Wearing Course Deterioration Surface Deterioration Defective Surface Dressing Minor Block Deterioration
Patching	Patching Survey	Patching Defects
Edge CI	CVI	Edge Defects

FOOTWAY SURVEY

The Footway Network Survey (FNS)

The Footway Network Survey (FNS) is to be carried out in accordance with the UKPMS Visual Survey Manual, Chapter 9. It is a walked chainage-related survey which assesses a limited range of broadly defined defects. The "Enhanced FNS Methodology" records Footway defect "lateral" extents, Kerb defects and inventory (including Footway surface type, Footway average width and start/end locations for Footway and Kerbs). It is a quick, repeatable measure of the Footway network condition.

Kerb defects are not included within the Footway and Carriageway Condition index calculations but the Service Provider may find it beneficial to collect Kerb defects and inventory data as part of the "Enhanced FNS Methodology" for their own analysis. This methodology also permits surveys to be carried out to obtain kerb only condition and inventory data.

The FNS footway defects are processed within the Sheffield Performance model to produce the corresponding Sub-Section condition indices.

The survey has enabled reliable consistent data to be collected quickly and this has then been used to calculate a Footway Condition Index (FCI). The defects collected in this survey are shown in the following table and the UKPMS User Manual Volume 2, Chapter 9 contain the defect definitions and examples:

Table 3.11 – Defects & Extent codes collected in the FNS

Footway Condition Category	Valid Extent
As New	100%
Aesthetically Impaired	100%
Functionally Impaired	25%, 50%, 100%
Structurally unsound	25%, 50%, 100%
Kerb Deterioration	Length

1. The condition category and extent is recorded for every part of the Footway network. Where condition does vary across the Footway, surveyors are instructed to record the "worst" condition category that applies, NOT the majority condition level.

2. The condition levels apply to all types of Footway construction although the detailed definitions and guidance for surveyors that relate to each surface type do vary. This has benefits in terms of survey simplicity and productivity.

3. The surveyor records the predominant surface type.

DEFECTS USED FOR GENERATING THE FOOTWAY CONDITION INDICES

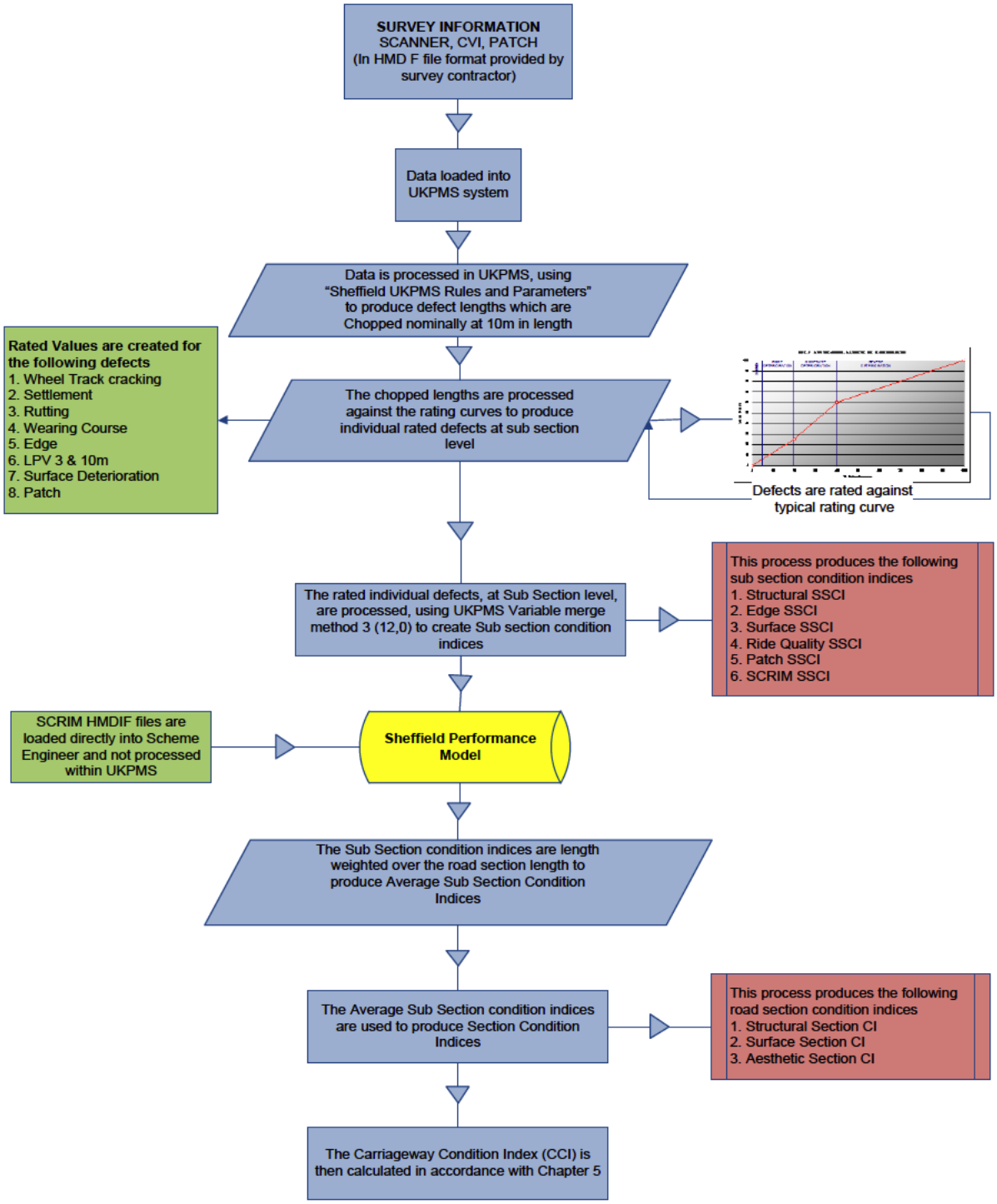
The following table shows the survey and defect types which contribute to the Footway Condition Indices:

Table 3.12 – Surveys used for the Footway Condition Index

Condition Index Type	Survey Type	Defect Types
Structural	FNS	Structurally Impaired
Surface	FNS	Functionally Impaired
Aesthetically	FNS	Aesthetically Impaired

4. CALCULATION OF CARRIAGEWAY CONDITION INDEX VALUES – (CCI)

The CCI calculation is summarised in the following process chart:



CARRIAGEWAY SUB-SECTION CONDITION INDICES (SSCI)

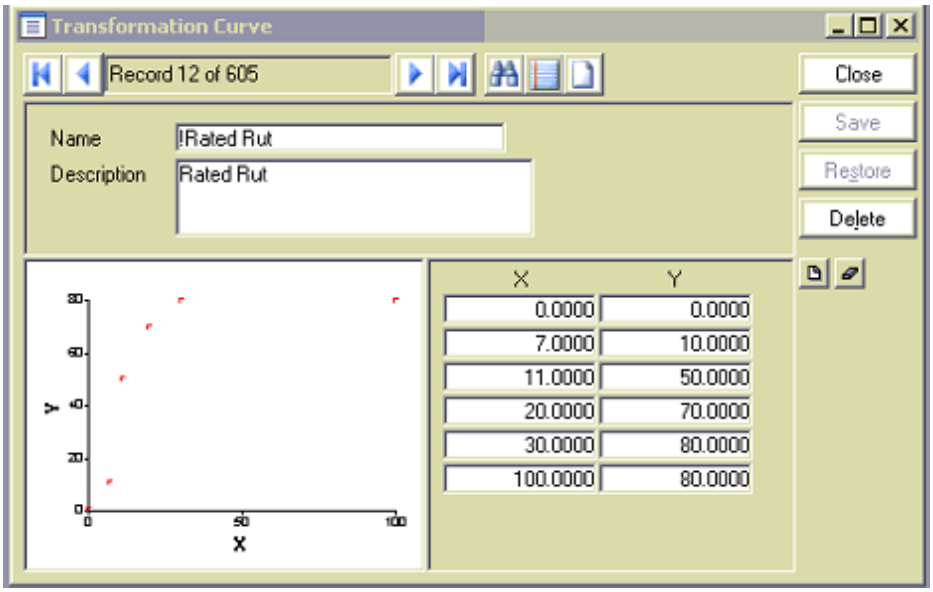
Defect Rating Curves

The data from the various surveys referred to in Section 3 (with the exception of SCRIM) is processed through UKPMS to produce defect ratings at Sub-Section level (Typically 10 or 20m) using the rating curves set out in Graphs 4.1 to 4.9, where appropriate, for the Carriageway Hierarchical Type being considered. In the case of SCRIM, the data is directly input into the Carriageway Condition Index part of the Sheffield Performance Model and deficiency values are calculated using the rating curve in Graph 10.

Sub-Sections are 'chopped' wherever there is a change in chainage for any of the survey types being analysed so they can be processed together.

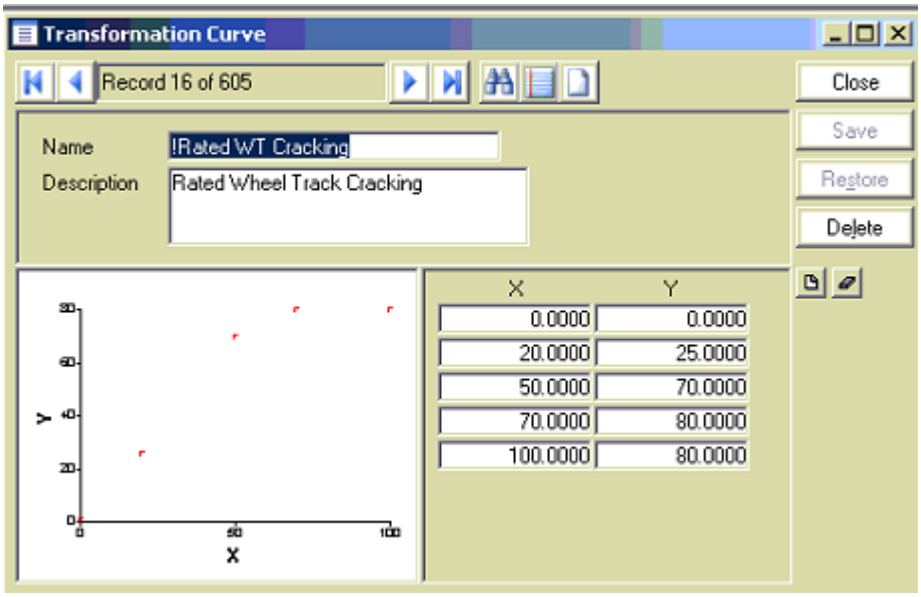
The rating curves normalise the defects to a common rating range between 0 and 100.

Graph 4.1 – Rutting



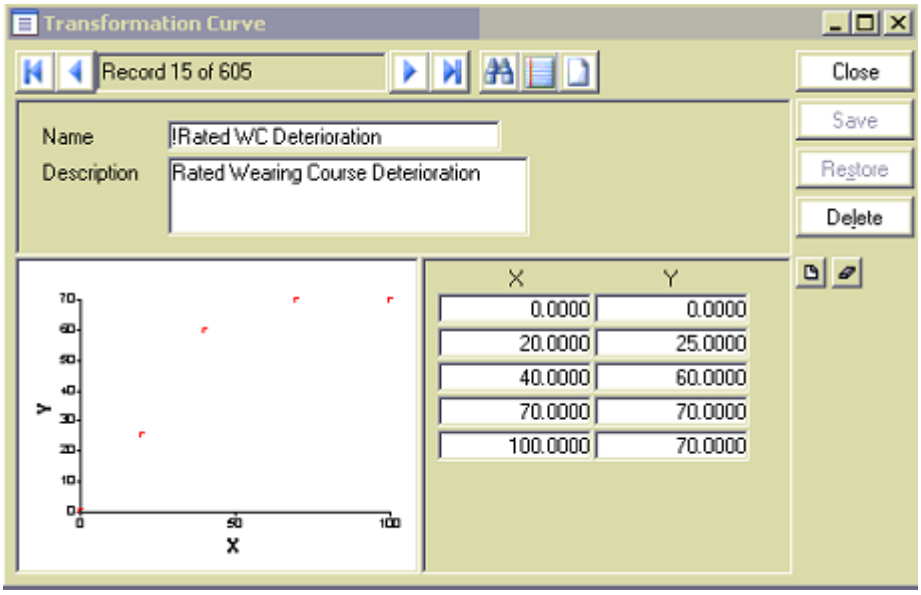
Rutting is defined as a depression of the surface course in the vehicle wheel paths relative to the remainder of the surface course and is measured in millimetres over a 2m straight edge. The defect used for calculation is SCANNER defect LLRT (Left Wheel Path Rut).

Graph 4.2 – Wheel Track Cracking



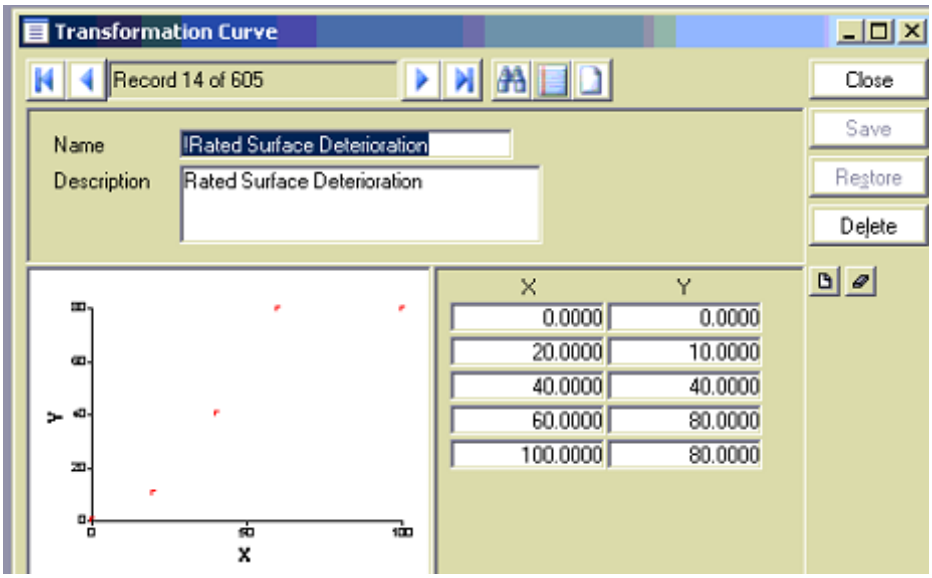
Wheel track cracking is defined as wide single cracking or multiple cracking/coarse crazing with visible crack width, within the Wheel Paths. The defect used for calculation is CVI defect BCKJ, this is identified as XCKJ within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes,

Graph 4.3 – Wearing Course Deterioration



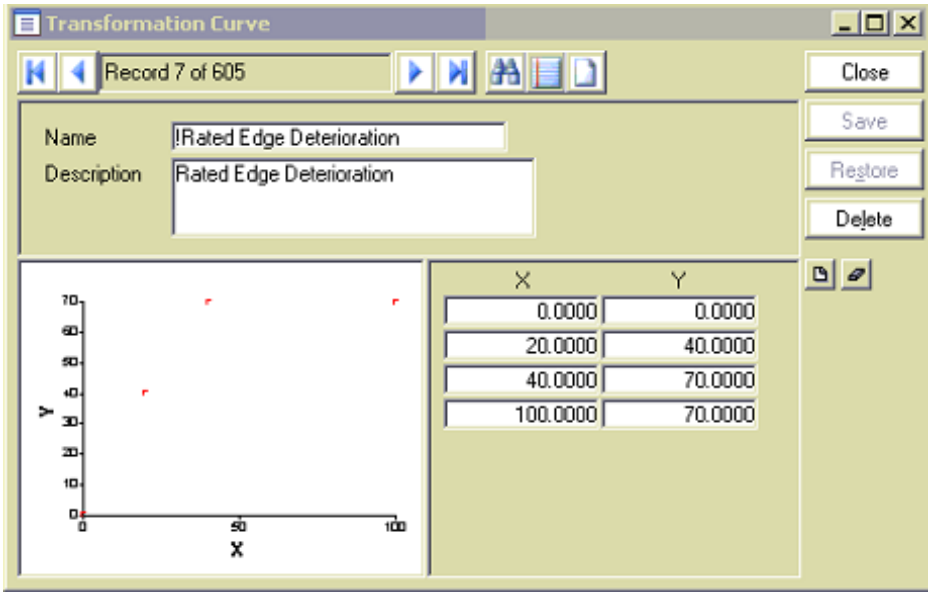
Wearing course deterioration is defined as the loss of material other than surface applied chippings from the surface course, or pot holing to the degree that the original surface course is no longer discernible, including cracking outside of wheel tracks. The defect used for calculation is CVI defect BFEJ. , this is identified as XFEJ within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.4 – Surface Deterioration



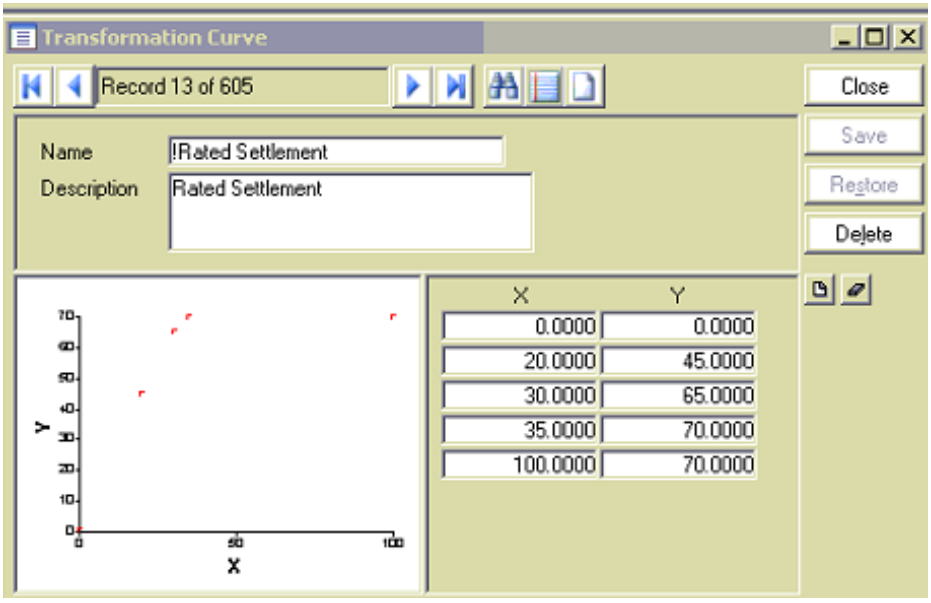
Surface deterioration is defined as extensive loss of surface applied chippings with less than two thirds of chippings remaining, or the appearance of bituminous binder in the surface course such that the friction material is flush or covered, or loss of material other than surface applied chippings from the surface course where the original surface course remains discernible. The defect used for calculation is CVI defect BSDE, this is identified as XSDE within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.5 – Edge Deterioration



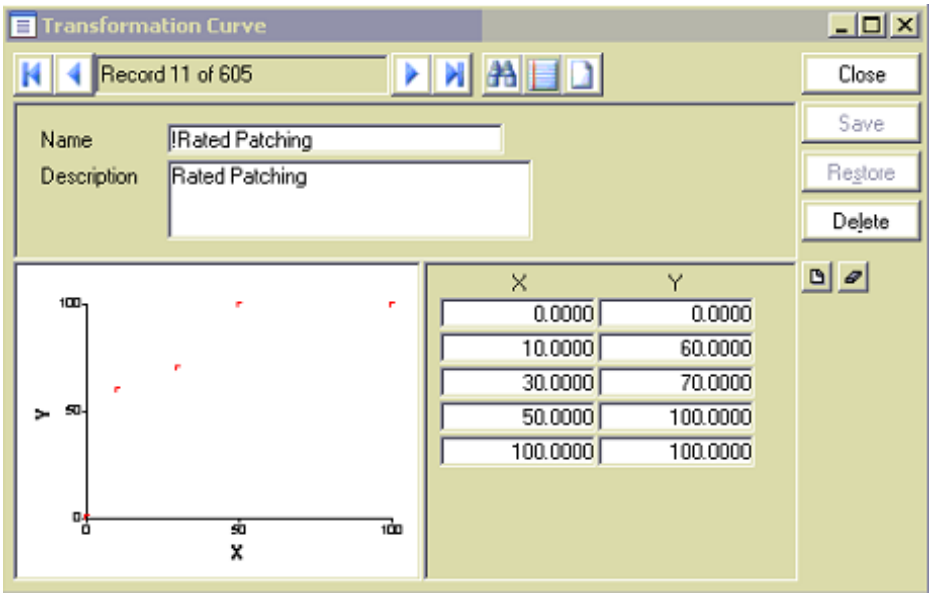
Edge deterioration is defined as major cracking, fretting or deformation confined to the edge of the Carriageway, where no edge restraint exists i.e. kerb or channel. The defect used for calculation is CVI defect BLED and BRED. These defects are identified as XLED and XRED within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.6 – Settlement



Settlement is defined as local settlement or subsidence producing a difference in level greater than 30mm. This will include patches or Statutory Undertakers' reinstatements and areas where the Carriageway has heaved, for example due to tree roots. The defect used for calculation is CVI defect BSES, this is identified as XSES within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.7 – Patching



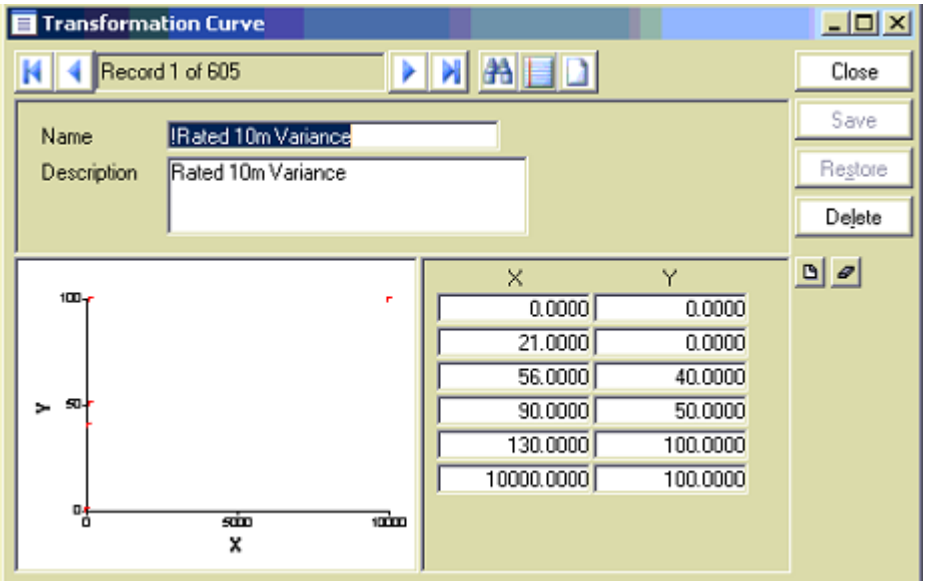
Prior to Resurfacing or Surface Treatment by the Service Provider

Patching is defined as the temporary or permanent replacement or repairs of Carriageway material, where this constitutes an area of pavement less than the full lane width and a length less than 10m. This patching includes ALL patches including both Maintenance and Statutory Undertakers' Works. The defect used in the patching calculation is BPAT.

After Resurfacing or Surface Treatment by the Service Provider

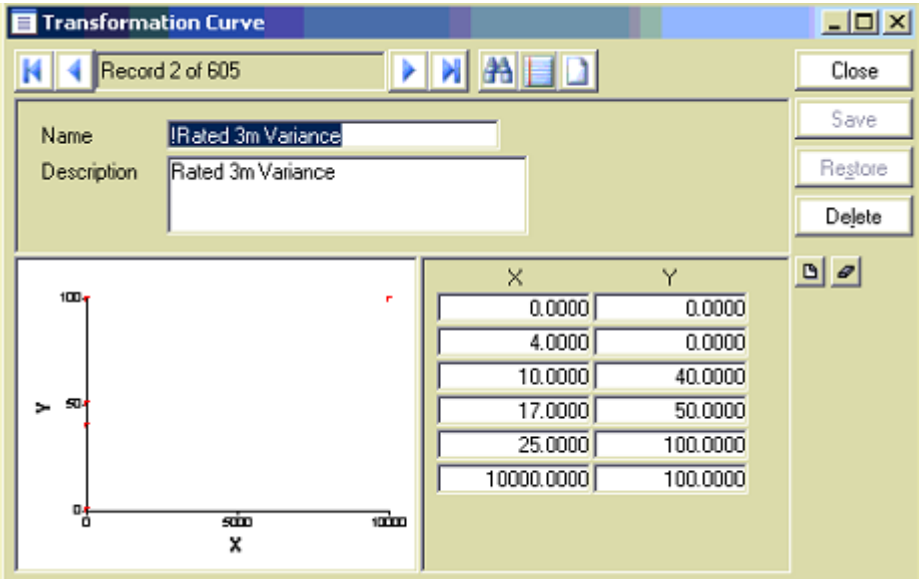
Patching is defined as the temporary or permanent replacement or repairs of Carriageway material, where this constitutes an area of pavement less than the full lane width and a length less than 10m. Patching relating to Statutory Undertaker Openings is recorded in the survey as BPUT but is excluded from this calculation. All other Maintenance Patching (BPAT) is used for this calculation

Graph 4.8 – 10m Profile Variance



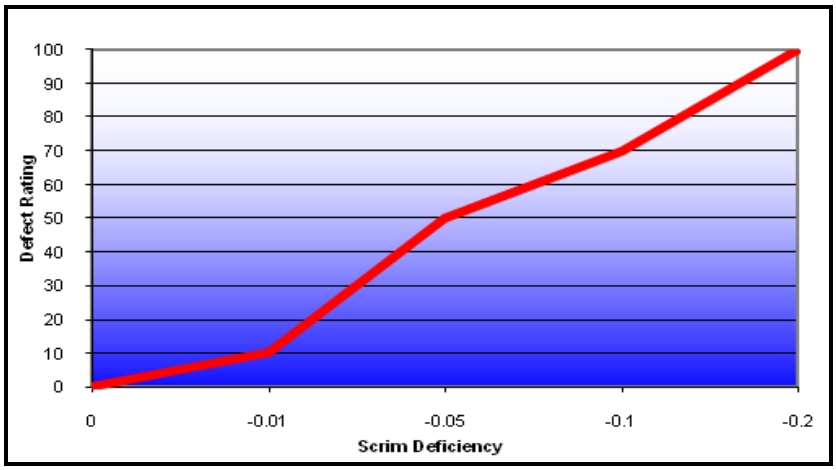
10m Profile Variance is defined as the shape of the Carriageway measured in the direction of traffic movement. The 10m profile is the moving average profile measurement over a 10m length. The defect used for calculation is SCANNER LV10.

Graph 4.9 – 3m Profile Variance



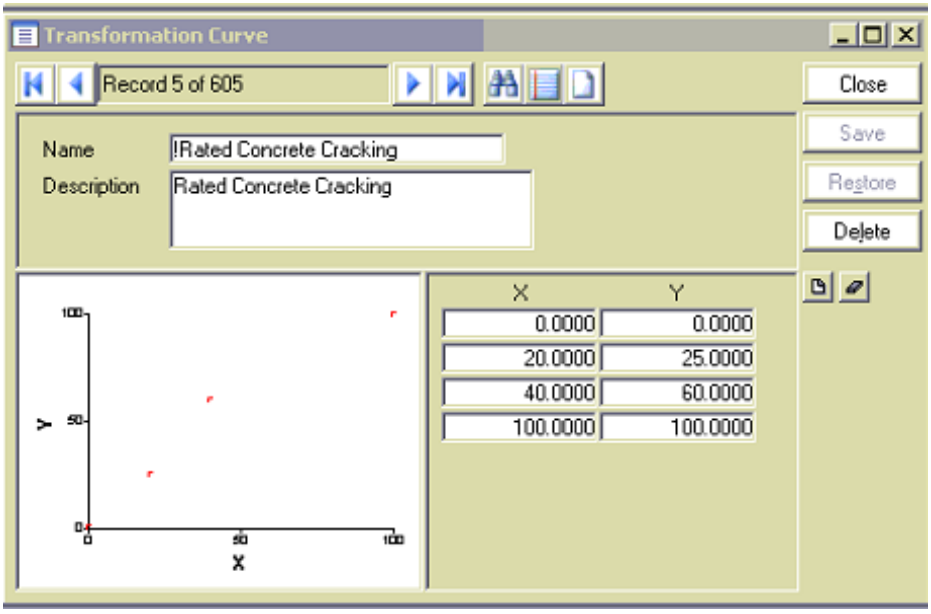
3m Profile Variance is defined as the shape of the Carriageway measured in the direction of traffic movement. The 3m profile is the moving average profile measurement over a 3m length and represents the impact on road users. The defect used for calculation is SCANNER LV3.

Graph 4.10 – SCRIM deficiency



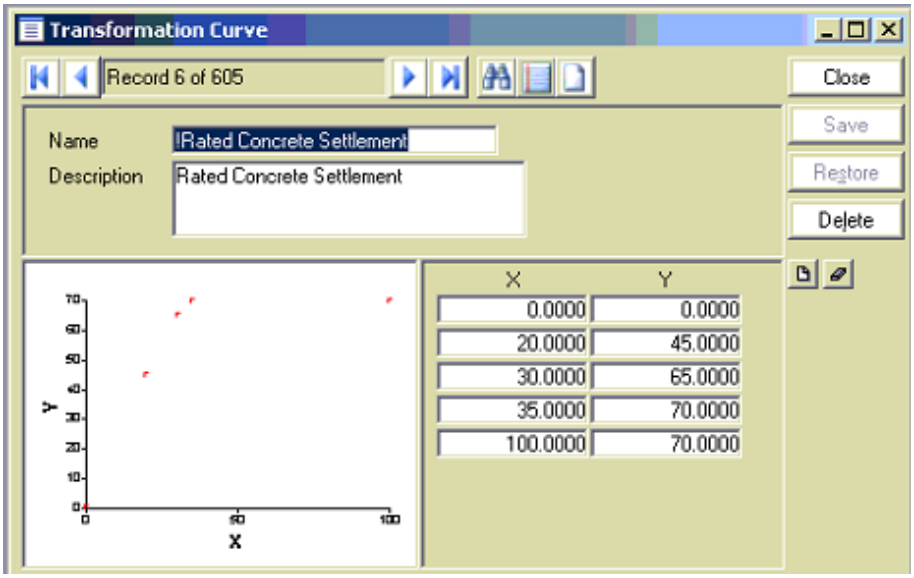
SCRIM deficiency is defined as the Investigatory Level less the SCRIM reading (where the SCRIM reading is less than the Investigatory Level) This is measured within the nearside wheel path and is the only defect which is imported directly into the Carriageway Condition Index part of the Sheffield Performance Model.

Graph 4.11 – CVI Concrete Cracking



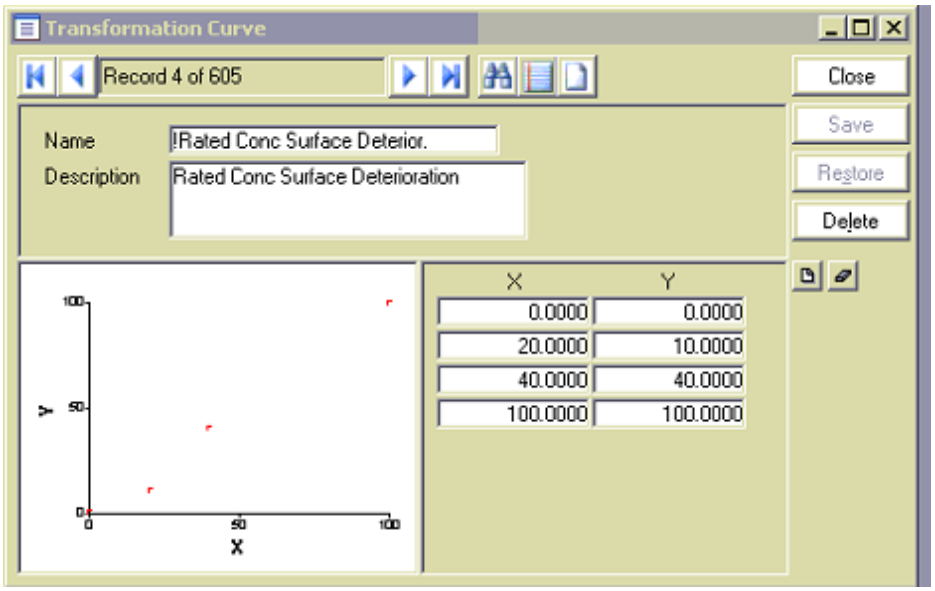
Concrete Cracking is defined as cracking within a concrete bay further than 500mm from the edge of the pavement or a joint, including cracking associated with ironwork, and cracking in permanent concrete patches and reinstatements. The defect used for calculation is CVI defect NCRA, this is identified as XCRA within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.12 – CVI Concrete Settlement



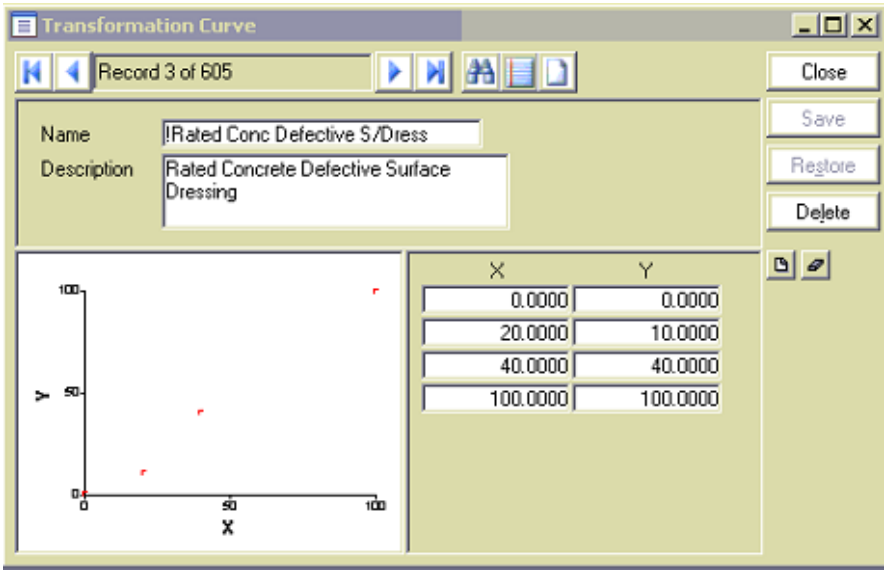
Concrete settlement is defined as local settlement or subsidence producing a difference in level greater than 50mm. The defect used for calculation is CVI defect NSTM, this is identified as XSTM within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.13 – CVI Concrete Surface Deterioration



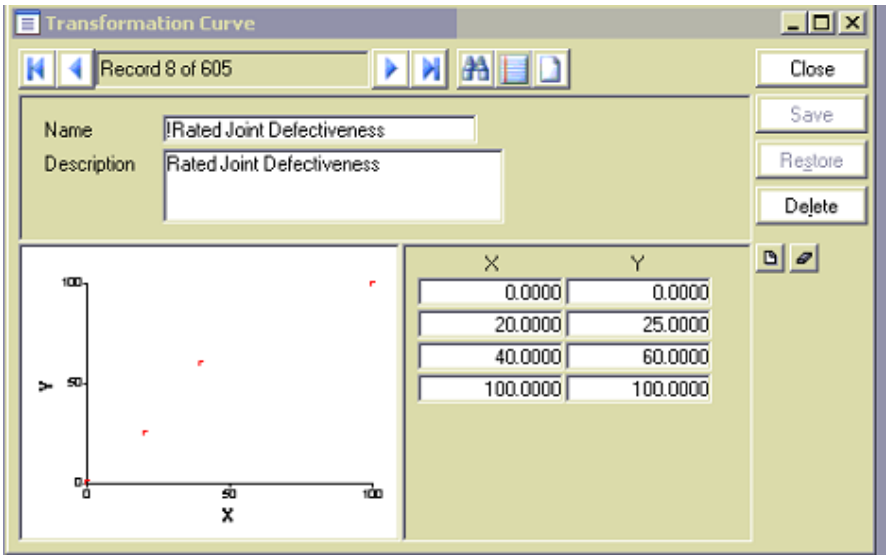
Concrete Surface Deterioration is defined as the loss of material from the surface of the concrete slab, including scaling, punch outs, pop outs and potholes but excluding joint or crack spalling. Also includes loss of texture. The defect used for calculation is CVI defect NSCR, this is identified as XSCR within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.14 – CVI Concrete Defective Surface Dressing



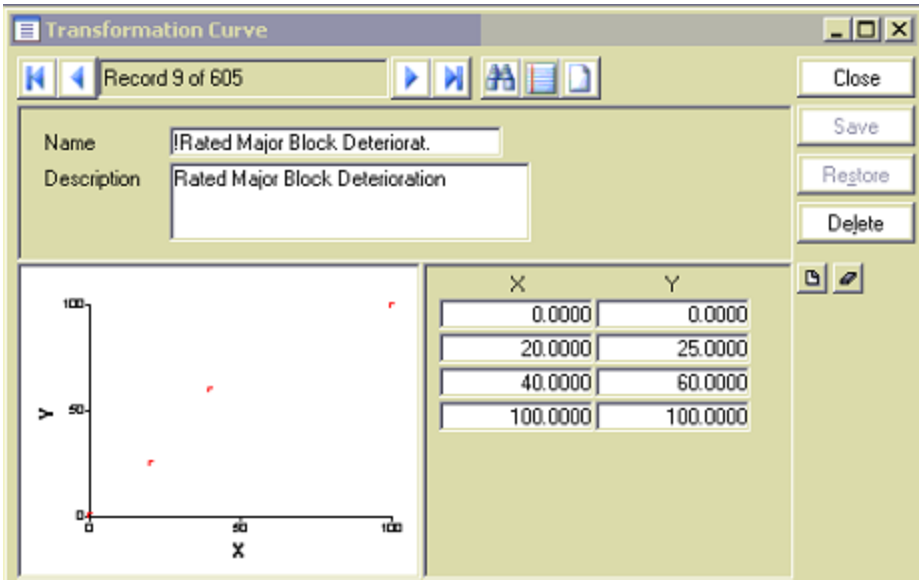
Defective Surface Dressing is defined as stripping, fretting or chip loss in surface dressing, thin bituminous overlays or high friction surfacing. The defect used for calculation is CVI defect NDSU, this is identified as XDSU within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.15 – CVI Longitudinal and Transverse Joint Defectiveness



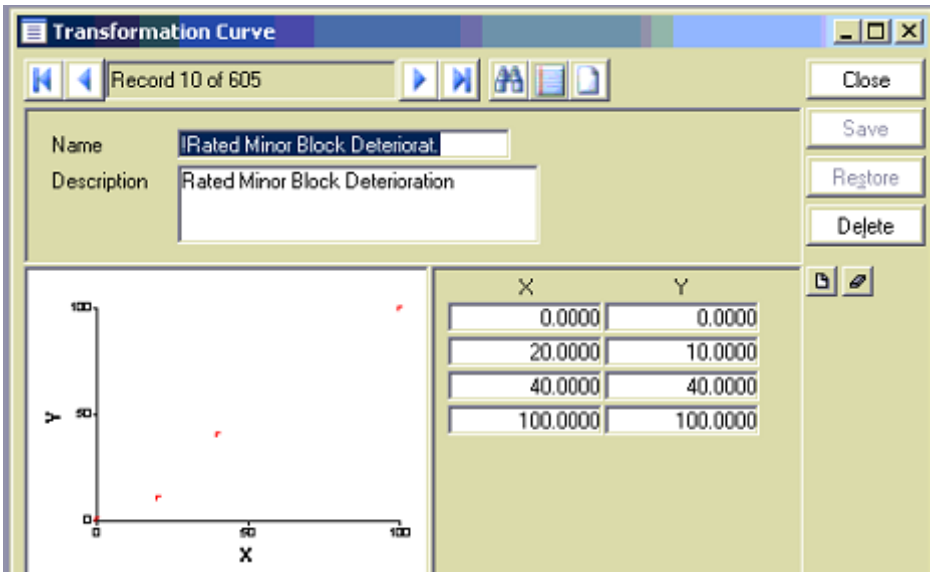
Concrete joint defectiveness is defined as any or all of; difference in level between slabs of 15mm or greater, evidence of pumping, evidence of dynamic movement, loss of material from the joint edge, cracking within 500mm of the joint, including cracking and/or spalling at the corner of the slab and opening of longitudinal joints greater than 15mm. The defect used for calculation is CVI defect NFLT and NJDF, this is identified as XFLT and XJDF within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.16 – CVI Major Block Deterioration



Major block deterioration is defined as depression, settlement or subsidence resulting in a difference in level of 13mm or greater. This will include patches or Statutory Undertakers' reinstatements where the feature type has heaved, for example due to tree roots. Rocking or missing blocks. The defect used for calculation is CVI defect KBLD, this is identified as XBLD within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

Graph 4.17 – CVI Minor Block Deterioration



Minor block deterioration is defined as areas where the pattern of blocks has been disrupted resulting in loss of interlock. Cracked, spalled or otherwise damaged blocks, which have no depressions or vertical projections greater than 13mm. The defect used for calculation is CVI defect KBLN, this is identified as XBLN within the CONFIRM UKPMS System to differentiate between the normal CVI UKPMS defect codes and the Sheffield PFI CVI defect codes

COMBINING DEFECT RATINGS INCLUDING WEIGHTING FACTORS

The next stage in the process is to produce the following condition indices at Sub-Section level (SSCIs):

- Structural
- Edge
- Surface
- Ride Quality
- Patching
- SCRIM

Table 4.1 sets out which defect ratings at Sub-Section level potentially contribute to the above Carriageway SSCIs:

Table 4.1 – Relationship of defects to Sub-Section Condition Index

Sub-Section Condition Index	Structural SSCI	Edge SSCI	Ride SSCI	Surface SSCI	SCRIM SSCI	Patch SSCI
Contributing Defects	Wheel Track Cracking CVI	Edge CI CVI*	LPV3*	Wearing Course CVI	SCRIM *	Patch CI*
	Settlement CVI*		LPV10*	Surface Deterioration CVI*		
	Rutting SCANNER			Defective Surface Dressing CVI		
	Wearing Course CVI			Minor Block Deterioration CVI		
	Concrete Cracking CVI					
	Major Block Deterioration CVI					
	Concrete Joint Defectiveness CVI					

* Indicates that this defect can exist for all surface types.

The standard UKPMS model uses weighting sets. Tables 4.2 – 4.7 below show the weighting sets used within "Sheffield UKPMS Rules and Parameters" which are used to determine how the defects combine together to produce the individual SSCI values.

The Individual SSCI values are then merged using UKPMS variable length merge method (See UKPMS Engineering Documents Vol.2) to produce the final SSCI values for import into Sheffield Performance model. There are three merge methods available within UKPMS; the Sheffield Performance model uses Merge Method three with an alteration to the percentage of results outside the allowable range.

Therefore the Sub-Sections CI values will be merged together to form defect lengths using variable Merge Method 3 – Variable intervals, where contiguous Sub-Sections will be merged together to form larger lengths if their CI values are within (±12) of the average value. The only difference to Merge Method 3 is that solitary results outside of this range will not be accepted.

Table 4.2 – Calculation of Carriageway Structural SSCI

Defect	Weighting Factor	OR
Wheel Track Cracking	0.8	Or
Wheel Track Crack Settlement *	0.6 + 0.8	Or
Wheel Track Crack Rutting	0.6 + 0.8	Or
Wheel Track Crack Settlement * Wearing Course	0.6 + 0.6 + 0.6	Or
Wheel Track Crack Rutting Wearing Course	0.6 + 0.6 + 0.6	Or
Settlement*	1	Or
Rutting	0.6	Or
Wearing Course	0.7	Or
Settlement* Wearing Course	0.8 0.6	Or
Rutting Wearing Course	0.8 0.6	Or
Major Block	1	
Concrete Cracking	1	Or
Concrete Cracking Settlement *	0.6 + 0.8	Or
Concrete Joint Defective	0.8	Or
Concrete Cracking Concrete Joint Defective	0.6 + 0.6	Or

* Applies to all surface types

Table 4.3 – Calculation of Carriageway Surface SSCI

Defect	Weighting Factor	OR
Wearing Course	0.8	Or
Surface Deterioration *	0.8	Or
Wearing Course Surface Deterioration*	0.6 + 0.6	
Surface Deterioration* Defective Surface Dressing	0.6 + 0.6	Or
Defective Surface Dressing	1	Or
Minor Block Deterioration	1	

Table 4.4 – Calculation of Carriageway Patching SSCI

Defect	Weighting Factor	OR
Patching*	1	

Table 4.5 – Calculation of Carriageway Ride Quality SSCI

Defect	Weighting Factor	OR
LPV3*	1	Or
LPV10*	0.8	

Table 4.6 – Calculation of Carriageway Edge SSCI

Defect	Weighting Factor	OR
Edge CI – CVI*	1	Or

Table 4.7 – Calculation of Carriageway SCRIM SSCI
Please note the calculation of SCRIM SSCI is carried out within the Sheffield Performance Model NOT within UKPMS processing

Defect	Weighting Factor	OR
SCRIM*	1	

* Applies to all surface types

Table 4.8 – Calculation of Carriageway Overall SSCI
Please note the calculation of Overall SSCI is carried out within the Sheffield Performance model NOT within UKPMS processing. It is used for De-minimis Calculation only and does not contribute to the Section Condition Index (SCI)

Sub-Section CI	Average Sub-Section Condition Indices		
	Structural (SSCI)	Patch (SSCI)	Surface (SSCI)
Overall Sub-Section CI (SSCI)	1	1	1

The Average SSCI by Road Section Level XSP values are then calculated within the Sheffield Performance Model using length-weighted figures for each individual recorded condition SSCI as follows:

$$\text{Average XSP SSCI} = \Sigma \left(\frac{\text{XSP Sub-Section length} \times \text{XSP Sub-Section SSCI}}{\text{Section Length}} \right)$$

RULES FOR CONFIRM TO PRODUCE THE SUB-SECTION CONDITION INDICES

The rules in the previous chapter are generic for any UKPMS system. The following chapter is CONFIRM specific to ensure the CONFIRM system provided by Pitney Bowes is configured correctly.

The rules have been created and imported into Confirm. Full details of the rule tables and import process into Confirm can be found in Annexure 2.

In order for all defects from all survey types to be processed together in Confirm they must have the same feature group. This feature group will need to be the generic “Carriageway” (code CW) feature group, standard CVI defects are usually converted to the specific feature group when imported from a standard UKPMS HMDIF import file. For example Wearing Course Deterioration (BFEJ or XFEJ) is a bituminous surface defect and in UKPMS logic is loaded against the feature group “Carriageway Bituminous Surface, Unknown Construction” (code CWBU), but SCANNER defects such as longitudinal profile variance are recorded by a machine survey on all surface types, so must be imported against the generic feature group “Carriageway”.

Therefore there is a requirement to convert the HMDIF import files into Confirm Specific Tab (or Comma) Delimited files, particularly for CVI and Patching surveys. The files need to be of the following format:
(The import files may be tab or comma delimited, but must be consistent for each dependent import files – i.e. all comma delimited or all tab delimited; it is therefore recommended that all import files produced are Tab delimited.

CVI Percentage Defectiveness

The CVI percentage defectiveness must be imported through 3 interdependent files:
A Survey file defining information specific to the survey
A Section file defining each surveyed section
An Observation file defining every defect (observation) recorded within the survey

The Survey File

The survey file should have the following 4 (to 7) headers:
(Note this is the SURVEY record within a standard UKPMS HMDIF import file)

TYPE – This must always be XCVI (This is a mandatory field)
NUMBER – This must be unique within the confirm database and is twenty characters long and can be alpha numeric, the survey year and survey type are useful, but not mandatory conventions. E.g. “2012CVI” (This is a mandatory field)

NAME – “2012 Percent CVI” This is 30 characters long and will be truncated if longer on import (Whilst this is not a mandatory field, it is strongly recommended as this can be used to easily identify – and differentiate the survey details)
VERSION – This should be 1 (This is an optional field)
SUBSECT – The subsection lengths, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
CWXSPUSED – XSP used for Carriageway items, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
OFFCWXSPUSED – XSP used for Off-Carriageway items, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field). *Note that the example below and data provided by Appia does not have this field*

There should only be one Survey Record

The order of the fields is not important

The following Excel screenshot illustrates a CVI Survey import file

	A	B	C	D
1	TYPE	VERSION	NUMBER	NAME
2	XCVI	1	2012CVI	PCENT_CVI_SURVEY
3				

The Section File

The section file should have the following 7 (to 11) headers:
(Note this is the SECTION records within a standard UKPMS HMDIF import file)

LABEL –This must match the Section Label in the Confirm Database (This is a mandatory field)
SURVNUM – This must match the “NUMBER” field from the Survey File above (This is a mandatory field)
SDATE – This should be the date of survey and can be in any of the following formats: ddmmyy, ddmmyyyy, dd/mm/yy or dd/mm/yyyy, if this field is blank or not included in the import file then the date of import is defaulted – this is not recommended (This is an optional field)
SURVDIR – This should be F if surveyed in the forward direction and R if surveyed in the Reverse direction, if this field is blank or not included in the import file then the forward direction is defaulted (This is an optional field)
Note if a section’s survey has been conducted in the reverse direction, but all of the section’s data reversed in the pre-processing stage then the SURVDIR should be recorded as F, Forward

NORMDIR – This should be F, this field is actually ignored by Confirm (This is an optional field)
MASTER – This should be M, if this field is blank or not included in the import file then the "M" is assumed (This is an optional field)
COMMENT – This can be used to insert comments against the network section, sometimes the road name is used (This is an optional field)
LENGTH – This is the surveyed section length and may differ from the Section length in the Confirm database, if this length is within a user defined tolerance of the database length then the data will be imported and "rubber-banded" (stretched or shrunk) to the database length (This is an optional field). If length is not supplied then it is filled in from the relevant section in the database. However, if supplied for one section then it must be supplied for all sections
Note that the example below and data provided by Appia does not have this field because rubber-banding the data appeared to cause minor differences within the comparisons with benchmark data; data had been Quality checked and rubber-banded in the processing of the visual surveys
INSP – The survey inspector's initials can be entered here, however the inspector must be populated within the Confirm system (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
STIME – The start time of the survey (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
ETIME – The end time of the survey (This is an optional field). *Note that the example below and data provided by Appia does not have this field*

There should only be one Section Record for every surveyed section

The order of the fields is not important

The following Excel screenshot illustrates a CVI Section import file

	A	B	C	D	E	F	G
1	LABEL	NORMDIR	SURVDIR	MASTER	COMMENT	SDATE	SURVNUM
2	A57/001	F	F	M		050411	2012CVI
3	A57/003	F	F	M		050411	2012CVI
4	A57/005	F	F	M		050411	2012CVI
5	A57/007	F	F	M		050411	2012CVI
6	A57/009	F	F	M		050411	2012CVI
7	A57/011	F	F	M		050411	2012CVI
8	A57/013	F	F	M		050411	2012CVI
9	A57/015	F	F	M		050411	2012CVI
10	A57/017	F	F	M		050411	2012CVI
11	A57/019	F	F	M		050411	2012CVI
12	A57/023	F	F	M		050411	2012CVI
13	A57/025	F	F	M		050411	2012CVI

The Observation File

The section file should have the following 8 headers:
(Note this is an amalgamation of OBSERV and OBVAL records within a standard UKPMS HMDIF import file)

LABEL –This must match the Section Label in the Confirm Database and must also match the “LABEL” field within the Section File above (This is a mandatory field)
SURVNUM – This must match the “NUMBER” field from the Survey File above and the “SURVNUM” field from the Section File above (This is a mandatory field)
FEATGROUP –This must be “CW” (This is a mandatory field)
OBSTYPE - This must match the Observation codes with the Confirm Database; this is the standard UKPMS CVI 4 character codes with the first letter replaced with an “X”, e.g. XCKJ (This is a mandatory field)
Note that every surveyed section and lane (XSP) must have at least one defect recorded against it so that historical data is superseded for processing in Confirm – this is standard UKPMS processing logic. Whole lanes within a section that have no visible defects must be recorded as “Up To Standard” (code XUTS), this should have a start and end chainage from the start to end of the lane, normally 0 to the section length. Multiple XUTS observations every 20m should not be loaded as the chop process for XUTS differs from Confirm and the benchmark software
XSECT –This must be a valid XSP code (This is a mandatory field)
SCHAIN –The start chainage must be less than the end chainage and within the surveyed section length (This is a mandatory field)
ECHAIN –The end chainage must be greater than the start chainage and within the surveyed section length (This is a mandatory field)
VALUE –The percentage defectiveness of the observation should be between 0 and 100 (This is a mandatory field)

There should only be an Observation Record for every Defect (observation)

The order of the fields is not important

The following Excel screenshot illustrates a CVI Observation import file

	A	B	C	D	E	F	G	H
1	VALUE	LABEL	XSECT	SCHAIN	ECHAIN	SURVNUM	FEATGROUP	OBSTYPE
2	100	UR387/1	CL1	0	7	2012CVI	CW	XUTS
3	100	UR387/1	CR1	0	7	2012CVI	CW	XUTS
4	50	UC068/3	CL1	0	8	2012CVI	CW	XNUS
5	50	UC068/3	CR1	0	8	2012CVI	CW	XNUS
6	50	UP307/3	CL1	0	8	2012CVI	CW	XNUS
7	50	UP307/3	CR1	0	8	2012CVI	CW	XNUS
8	50	UP307/5	CL1	0	8	2012CVI	CW	XNUS
9	50	UP307/5	CR1	0	8	2012CVI	CW	XNUS
10	100	UL281/6	CL1	0	9	2012CVI	CW	XUTS
11	100	UL281/6	CR1	0	9	2012CVI	CW	XUTS
12	100	UN193/4	CL1	0	9	2012CVI	CW	XUTS
13	100	UN193/4	CR1	0	9	2012CVI	CW	XUTS
14	55	UK123/2	CL1	0	10	2012CVI	CW	XNUS

Patching Survey

The Patching Survey must be imported through 3 interdependent files:
A Survey file defining information specific to the survey
A Section file defining each surveyed section
An Observation file defining every defect (observation) recorded within the survey

The Survey File

The survey file should have the following 4 (to 7) headers:
(Note this is the SURVEY record within a standard UKPMS HMDIF import file)

TYPE – This must always be XPAT (This is a mandatory field)
NUMBER – This must be unique within the confirm database and is twenty characters long and can be alpha numeric, the survey year and survey type are useful, but not mandatory conventions. E.g. “2012PAT” (This is a mandatory field)
NAME – “2012 Patching Survey” This is 30 characters long and will be truncated if longer on import (Whilst this is not a mandatory field, it is strongly recommended as this can be used to easily identify – and differentiate the survey details)
VERSION – This should be 1 (This is an optional field)
SUBSECT – The subsection lengths, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field).
CWXSPUSED – XSP used for Carriageway items, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field).
OFFCWXSPUSED – XSP used for Off-Carriageway items, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field).

There should only be one Survey Record

The order of the fields is not important

The following Excel screenshot illustrates a Patching Survey import file

	A	B	C	D	E	F	G
1	TYPE	VERSION	NUMBER	NAME	SUBSECT	CWXSPUSED	OFFCWXSPUSED
2	XPAT	1	2012PAT	ALL PATCHING DATA	20M	M	M

The Section File

The section file should have the following 7 (to 11) headers:
(Note this is the SECTION records within a standard UKPMS HMDIF import file)

LABEL –This must match the Section Label in the Confirm Database (This is a mandatory field)
SURVNUM – This must match the “NUMBER” field from the Survey File above (This is a mandatory field)
SDATE – This should be the date of survey and can be in any of the following formats: ddmmyy, ddmmyyyy, dd/mm/yy or dd/mm/yyyy, if this field is blank or not included in the import file then the date of import is defaulted – this is not recommended (This is an optional field)
SURVDIR – This should be F if surveyed in the forward direction and R if surveyed in the Reverse direction, if this field is blank or not included in the import file then the forward direction is defaulted (This is an optional field)
Note if a section’s survey has been conducted in the reverse direction, but all of the section’s data reversed in the pre-processing stage then the SURVDIR should be recorded as F, Forward
NORMDIR – This should be F, this field is actually ignored by Confirm (This is an optional field)
MASTER – This should be M, if this field is blank or not included in the import file then the “M” is assumed (This is an optional field)
COMMENT – This can be used to insert comments against the network section, sometimes the road name is used (This is an optional field)
LENGTH – This is the surveyed section length and may differ from the Section length in the Confirm database, if this length is within a user defined tolerance of the database length then the data will be imported and “rubber-banded” (stretched or shrunk) to the database length (This is an optional field). If length is not supplied then it is filled in from the relevant section in the database. However, if supplied for one section then it must be supplied for all sections
Note that the example below and data provided by Appia does not have this field because rubber-banding the data appeared to cause minor differences within the comparisons with benchmark data; data had been Quality checked and rubber-banded in the processing of the visual surveys

INSP – The survey inspector's initials can be entered here, however the inspector must be populated within the Confirm system (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
STIME – The start time of the survey (This is an optional field). *Note that the example below and data provided by Appia does not have this field populated*
ETIME – The end time of the survey (This is an optional field). *Note that the example below and data provided by Appia does not have this field populated*

There should only be one Section Record for every surveyed section

The order of the fields is not important

The following Excel screenshot illustrates a Patching Section import file

	A	B	C	D	E	F	G	H	I	J
1	SURVNUM	LABEL	NORMDIR	SURVDIR	MASTER	COMMENT	SDATE	EDATE	STIME	ETIME
2	2012PAT	A57/001	F	F	M		310312	310312		
3	2012PAT	A57/003	F	F	M		310312	310312		
4	2012PAT	A57/005	F	F	M		310312	310312		
5	2012PAT	A57/007	F	F	M		310312	310312		
6	2012PAT	A57/009	F	F	M		310312	310312		
7	2012PAT	A57/011	F	F	M		310312	310312		
8	2012PAT	A57/013	F	F	M		310312	310312		
9	2012PAT	A57/015	F	F	M		310312	310312		
10	2012PAT	A57/017	F	F	M		310312	310312		
11	2012PAT	A57/019	F	F	M		310312	310312		
12	2012PAT	A57/023	F	F	M		310312	310312		
13	2012PAT	A57/025	F	F	M		310312	310312		
14	2012PAT	A57/027	F	F	M		310312	310312		

The Observation File

The section file should have the following 8 headers:
(Note this is an amalgamation of OBSERV and OBVAL records within a standard UKPMS HMDIF import file)

LABEL –This must match the Section Label in the Confirm Database and must also match the "LABEL" field within the Section File above (This is a mandatory field)
SURVNUM – This must match the "NUMBER" field from the Survey File above and the "SURVNUM" field from the Section File above (This is a mandatory field)
FEATGROUP –This must be "CW" (This is a mandatory field)
OBSTYPE - This must match the Observation codes with the Confirm Database: BPUT, BPAT or NOPT (This is a mandatory field)

Note that every surveyed section and lane (XSP) must have at least one defect recorded against it so that historical data is superseded for processing in Confirm – this is standard UKPMS processing logic. Whole lanes within a section that have no visible defects must be recorded as "No Patching" (code NOPT), this should have a start and end chainage from the start to end of the lane, normally 0 to the section length. Multiple NOPT observations every 20m should not be loaded as the chop process for NOPT differs from Confirm and the benchmark software
XSECT –This must be a valid XSP code (This is a mandatory field)
SCHAIN –The start chainage must be less than the end chainage and within the surveyed section length (This is a mandatory field)
ECHAIN –The end chainage must be greater than the start chainage and within the surveyed section length (This is a mandatory field)
VALUE –The percentage defectiveness of the observation should be between 0 and 100 (This is a mandatory field)

There should only be an Observation Record for every Defect (observation)

The order of the fields is not important

The following Excel screenshot illustrates a Patching Observation import file

	A	B	C	D	E	F	G	H
1	VALUE	LABEL	OBSTYPE	XSECT	SCHAIN	ECHAIN	SURVNUM	FEATGROUP
2	100	A57/001	NOPT	CL1	0	1000	2012PAT	CW
3	100	A57/001	NOPT	CR1	0	1000	2012PAT	CW
4	100	A57/003	NOPT	CL1	0	999	2012PAT	CW
5	100	A57/003	NOPT	CR1	0	999	2012PAT	CW
6	5	A57/005	BPAT	CL1	360	380	2012PAT	CW
7	7.5	A57/005	BPAT	CL1	380	400	2012PAT	CW
8	7.5	A57/005	BPAT	CL1	579	599	2012PAT	CW
9	8.75	A57/005	BPAT	CL1	599	619	2012PAT	CW
10	6.25	A57/005	BPAT	CL1	619	639	2012PAT	CW
11	2.5	A57/005	BPAT	CL1	639	659	2012PAT	CW
12	20	A57/005	BPAT	CL1	699	719	2012PAT	CW
13	2.5	A57/005	BPAT	CL1	719	739	2012PAT	CW
14	10	A57/005	BPAT	CL1	739	759	2012PAT	CW

SCANNER (formerly known as TTS) Survey

The SCANNER Survey can be imported through a standard UKPMS HMDIF file or be imported through 3 interdependent files:
A Survey file defining information specific to the survey
A Section file defining each surveyed section
An Observation file defining every defect (observation) recorded within the survey

The Survey File

The survey file should have the following 4 (to 7) headers:
(Note this is the SURVEY record within a standard UKPMS HMDIF import file)

TYPE – This must always be TTS (This is a mandatory field)
NUMBER – This must be unique within the confirm database and is twenty characters long and can be alpha numeric, the survey year and survey type are useful, but not mandatory conventions. E.g. “2012SCAN” (This is a mandatory field)
NAME – “2012 SCANNER Survey” This is 30 characters long and will be truncated if longer on import (Whilst this is not a mandatory field, it is strongly recommended as this can be used to easily identify – and differentiate the survey details)
VERSION – This should be 1 (This is an optional field)
SUBSECT – The subsection lengths, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
CWXSPUSED – XSP used for Carriageway items, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
OFFCWXSPUSED – XSP used for Off-Carriageway items, this field is actually ignored by Confirm and concatenated into the Notes field (This is an optional field). *Note that the example below and data provided by Appia does not have this field*

There should only be one Survey Record

The order of the fields is not important

The following Excel screenshot illustrates a SCANNER Survey import file

	A	B	C	D
1	TYPE	VERSION	NUMBER	NAME
2	TTS	1	2012SCAN	ALL SCANNER DATA

The Section File

The section file should have the following 4 (to 11) headers:
(Note this is the SECTION records within a standard UKPMS HMDIF import file)

LABEL –This must match the Section Label in the Confirm Database (This is a mandatory field)
SURVNUM – This must match the “NUMBER” field from the Survey File above (This is a mandatory field)

SDATE – This should be the date of survey and can be in any of the following formats: ddmmyy, ddmmyyyy, dd/mm/yy or dd/mm/yyyy, if this field is blank or not included in the import file then the date of import is defaulted – this is not recommended (This is an optional field)
SURVDIR – This should be F if surveyed in the forward direction and R if surveyed in the Reverse direction, if this field is blank or not included in the import file then the forward direction is defaulted (This is an optional field)
Note if a section's survey has been conducted in the reverse direction, but all of the section's data reversed in the pre-processing stage then the SURVDIR should be recorded as F, Forward
NORMDIR – This should be F, this field is actually ignored by Confirm (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
MASTER – This should be M, if this field is blank or not included in the import file then the "M" is assumed (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
COMMENT – This can be used to insert comments against the network section, sometimes the road name is used (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
LENGTH – This is the surveyed section length and may differ from the Section length in the Confirm database, if this length is within a user defined tolerance of the database length then the data will be imported and "rubber-banded" (stretched or shrunk) to the database length (This is an optional field). If length is not supplied then it is filled in from the relevant section in the database. However, if supplied for one section then it must be supplied for all sections
Note that the example below and data provided by Appia does not have this field because rubber-banding the data appeared to cause minor differences within the comparisons with benchmark data; data had been Quality checked and rubber-banded in the processing of the visual surveys
INSP – The survey inspector's initials can be entered here, however the inspector must be populated within the Confirm system (This is an optional field). *Note that the example below and data provided by Appia does not have this field*
STIME – The start time of the survey (This is an optional field). *Note that the example below and data provided by Appia does not have this field populated*
ETIME – The end time of the survey (This is an optional field). *Note that the example below and data provided by Appia does not have this field populated*

There should only be one Section Record for every surveyed section

The order of the fields is not important

The following Excel screenshot illustrates a SCANNER Section import file

	A	B	C	D
1	LABEL	SDATE	SURVNUM	SURVDIR
2	A57/001	310312	2012SCAN	F
3	A57/003	310312	2012SCAN	F
4	A57/005	310312	2012SCAN	F
5	A57/007	310312	2012SCAN	F
6	A57/009	310312	2012SCAN	F
7	A57/011	310312	2012SCAN	F
8	A57/013	310312	2012SCAN	F
9	A57/015	310312	2012SCAN	F
10	A57/017	310312	2012SCAN	F
11	A57/019	310312	2012SCAN	F
12	A57/023	310312	2012SCAN	F
13	A57/025	310312	2012SCAN	F

The Observation File

The section file should have the following 8 headers:
(Note this is an amalgamation of OBSERV and OBVAL records within a standard UKPMS HMDIF import file)

LABEL –This must match the Section Label in the Confirm Database and must also match the “LABEL” field within the Section File above (This is a mandatory field)
SURVNUM – This must match the “NUMBER” field from the Survey File above and the “SURVNUM” field from the Section File above (This is a mandatory field)
FEATGROUP –This must be “CW” (This is a mandatory field)
OBSTYPE - This must match the Observation codes with the Confirm Database: LLRT, LRRT, LV3 and LV10 (This is a mandatory field)
XSECT –This must be a valid XSP code (This is a mandatory field)
SCHAIN –The start chainage must be less than the end chainage and within the surveyed section length (This is a mandatory field)
ECHAIN –The end chainage must be greater than the start chainage and within the surveyed section length (This is a mandatory field)
VALUE –The value of each defect (This is a mandatory field)

There should only be an Observation Record for every Defect (observation)

The order of the fields is not important

The following Excel screenshot illustrates a SCANNER Observation import file

	A	B	C	D	E	F	G	H
1	VALUE	LABEL	OBSTYPE	XSECT	SCHAIN	ECHAIN	SURVNUM	FEATGROUP
2	6.4	A57/001	LLRT	CL1	0	10	2012SCAN	CW
3	5.3	A57/001	LLRT	CL1	10	20	2012SCAN	CW
4	5.2	A57/001	LLRT	CL1	20	30	2012SCAN	CW
5	5.4	A57/001	LLRT	CL1	30	39	2012SCAN	CW
6	4.4	A57/001	LLRT	CL1	39	49	2012SCAN	CW
7	5	A57/001	LLRT	CL1	49	59	2012SCAN	CW
8	5.9	A57/001	LLRT	CL1	59	69	2012SCAN	CW
9	6	A57/001	LLRT	CL1	69	79	2012SCAN	CW
10	4.6	A57/001	LLRT	CL1	79	89	2012SCAN	CW
11	6.7	A57/001	LLRT	CL1	89	99	2012SCAN	CW
12	6.2	A57/001	LLRT	CL1	99	108	2012SCAN	CW
13	7.6	A57/001	LLRT	CL1	108	118	2012SCAN	CW

CARRIAGEWAY SECTION CONDITION INDICES (SCI)

This process is calculated within Scheme Engineer, which contains the Sheffield Performance Model.

To ensure the process is performed correctly the Sheffield Performance Model (SPM) requires the Project Network, Survey Coverage to indicate which sections have been surveyed and the processed defect lengths.

Project Network
This should be exported from CONFIRM, for import into Scheme Engineer as the CONFIRM system will be constantly updated with network amendments for other business purposes. This export ensures the same Networks are being used for processing. The exported file will be in a comma separated value (CSV) format and will contain the following information as a minimum:

ITEM	Description
SECTION_LABEL_CODE	This is the unique reference for each RSL
ROAD_NO	This is the Road Number
ROAD_NAME	The Road Name
MAINTENANCE_HIERARCHY_ID	Maintenance Hierarchy 1 = Primary 2 = Secondary 3 = Link 4 = Local
SECTION_DESCRIPTION	Description of the RSL including the start and end location
SECTION_LENGTH	Length of the RSL
NO_OF_LANES	How many permanent lanes are within the RSL
FEATURE_CODE	CW for Carriageway
WIDTH	Average Road Width
ENVIRONMENT	U = Urban R = Rural
DISTRICT	Community Assembly Area which will be one of the following: Comm Assy 1 - South East Comm Assy 2 - South Comm Assy 3 - South West Comm Assy 4 - Central Comm Assy 5 - Northern Comm Assy 6 - North East Comm Assy 7 - East
REGION	The region in which the RSL resides which will be one of the following:

	Arbourthorne | Graves Park Beauchief & Greenhill | Hallam Beighton | Handsworth Birley | Heeley Broomhill | Hillsborough Burngreave | Manor Castle Castle | Mosborough Central | Nether Edge Chapel-Green | Netherthorpe Crookes | Norton Darnall | Richmond Dore & Totley | Sharrow East Ecclesfield | Shiregreen & Brightside Ecclesall | South Wortley Firth Park | Southey Fulwood | Stannington Gleadless Valley | Stocksbridge & Upper Don Graves Park | Walkley | West Ecclesfield | Woodhouse
CW Type Desc	Description of the road section
Cway_Surface_Type	The majority surface type of the RSL

Survey Coverage

This should be exported from CONFIRM, for import into Scheme Engineer to determine which sections have been surveyed over the valid survey period.

The exported file will be in a comma separated value (CSV) format and will contain the following information:

ITEM	Description
SECTION_LABEL_CODE	This is the unique reference for each RSL
ROAD_NO	This is the Road Number
SCANNER Survey	This denotes if the XSP has been surveyed for this survey type. 1=Surveyed, 0=Unsurveyed
SCRIM Survey	This denotes if the XSP has been surveyed for this survey type. 1=Surveyed, 0=Unsurveyed
CVI Survey	This denotes if the XSP has been surveyed for this survey type. 1=Surveyed, 0=Unsurveyed
PATCH Survey	This denotes if the XSP has been surveyed for this survey type. 1=Surveyed, 0=Unsurveyed
FNS Survey	This denotes if the XSP has been surveyed for this survey type. 1=Surveyed, 0=Unsurveyed
Deflectograph Survey	This denotes if the XSP has been surveyed for this survey type. 1=Surveyed, 0=Unsurveyed

A detailed report is also required from CONFIRM which determines the XSP's which have been surveyed within the valid survey period. This report should contain the following:

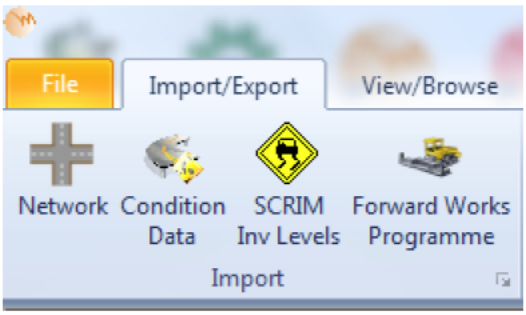
ITEM	Description
SECTION_LABEL_CODE	This is the unique reference for each RSL
ROAD_NO	This is the Road Number
XSP	Every valid XSP for the above section label
SCANNER Survey	Survey Date for XSP
SCRIM Survey	Survey Date for XSP
CVI Survey	Survey Date for XSP
PATCH Survey	Survey Date for XSP
FNS Survey	Survey Date for XSP
Deflectograph Survey	Survey Date for XSP

Defect Lengths

The export from CONFIRM containing the SSCIs shall be in CSV file format and contain the following

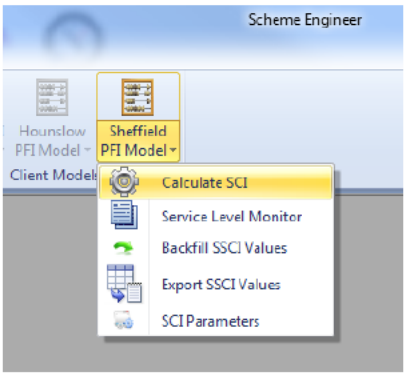
ITEM	Description
SECTION_LABEL_CODE	This is the unique reference for each RSL
XSP	This is Cross Sectional Position in which the SSCI resides
Start Chainage	The chainage along the section where the SSCI starts
End Chainage	The chainage along the section where the SSCI Ends
Structural SSCI	Structural Sub Section Condition Index
Edge SSCI	Edge Sub Section Condition Index
Ride SSCI	Ride Sub Section Condition Index
Surface SSCI	Surface Sub Section Condition Index
Patch SSCI	Patch Sub Section Condition Index

The output from UKPMS containing the Network and SSCIs shall be imported into the Sheffield Performance Model (SPM) using the import routine within Scheme Engineer as shown in the screen shot below:



Import/Export Screen from Scheme Engineer

The next stage in the process is to combine the above Average SSCIs within each XSP and Road Section to produce XSP based Section Condition Indices (SCI). This process is carried out within the Sheffield Performance Model, for the Carriageway specific database, when calculate SCI has been run. Screen shot below.



Sheffield Performance Module Screen from Scheme Engineer

The following XSP based Section Condition Indices are produced using the rules contained within the tables below:

- Structural SCI
- Surface SCI
- Aesthetic SCI

The individual average SSCIs contribute to these Section Condition Indices as shown in Table 4.9 below:

Table 4.9 – Relationship of Carriageway SSCI to SCI

	XSP Based Section Condition Index (SCI)						
	Structural SCI			**Surface SCI**		**Aesthetic SCI**	
Average Sub-Section Condition Index	Average Structural SSCI	Average Edge SSCI	Average Ride SSCI	Average Surface SSCI	Average SCRIM SSCI	Average Ride SSCI	Average Patch SSCI

A weighting set is used to determine how the average SSCIs combine together to produce 3 individual, XSP based, Section CIs (for Structural, Surface and Aesthetic). The 3 individual SCIs are determined using the maximum of the combinations within Table 4.10 below:

Table 4.10 – Calculation of Section Condition Indices (SCI)

Section CI	**Average Sub-Section Condition Indices**						**OR**
	Structural (SSCI)	**Edge (SSCI)**	**Ride (SSCI)**	**Patch (SSCI)**	**Surface (SSCI)**	**Scrim (SSCI)**	
Structural (SCI)	1						OR
Structural (SCI)		1					OR
Structural			1				OR

Section CI	Average Sub-Section Condition Indices						OR
	Structural (SSCI)	Edge (SSCI)	Ride (SSCI)	Patch (SSCI)	Surface (SSCI)	Scrim (SSCI)	
(SCI)							
Structural (SCI)	0.8		0.65				OR
Structural (SCI)	0.8	0.8					OR
Structural (SCI)		0.8	0.65				
Surface (SCI)					1		OR
Surface (SCI)						1	OR
Surface (SCI)					0.65	0.65	
Aesthetic (SCI)				1			OR
Aesthetic (SCI)			0.8				OR
Aesthetic (SCI)			0.65	0.65			

Calculation of Carriageway Overall SCI

$$\text{Carriageway Overall SCI} = \Sigma \frac{(\text{Overall SSCI x Sub Section Length by XSP})}{\text{Section length by XSP}}$$

The result of this process will be a set of one or more SCI figures for each Road Section, depending on the number of XSPs against which condition data has been recorded.

CALCULATION OF THE CARRIAGEWAY CONDITION INDEX (CCI)

This process is carried out within the Sheffield Performance Model. For each Section, the 3 individual, XSP based, Carriageway Section CIs, Structural, Surface and Aesthetic CIs are added together to produce a Combined Carriageway Section CI for each XSP within that Road Section. The Carriageway Section CI is then calculated as follows:

$$\text{The Carriageway Section CI} = \frac{(\text{Sum of the individual Combined Carriageway Section CIs by XSP})}{\text{Number of XSPs}}$$

The Carriageway Condition Index (CCI) for each Carriageway Hierarchical Type (Primary, Secondary, Link & Local) is calculated using the formula below and reported at Network and Community Assembly Area level:

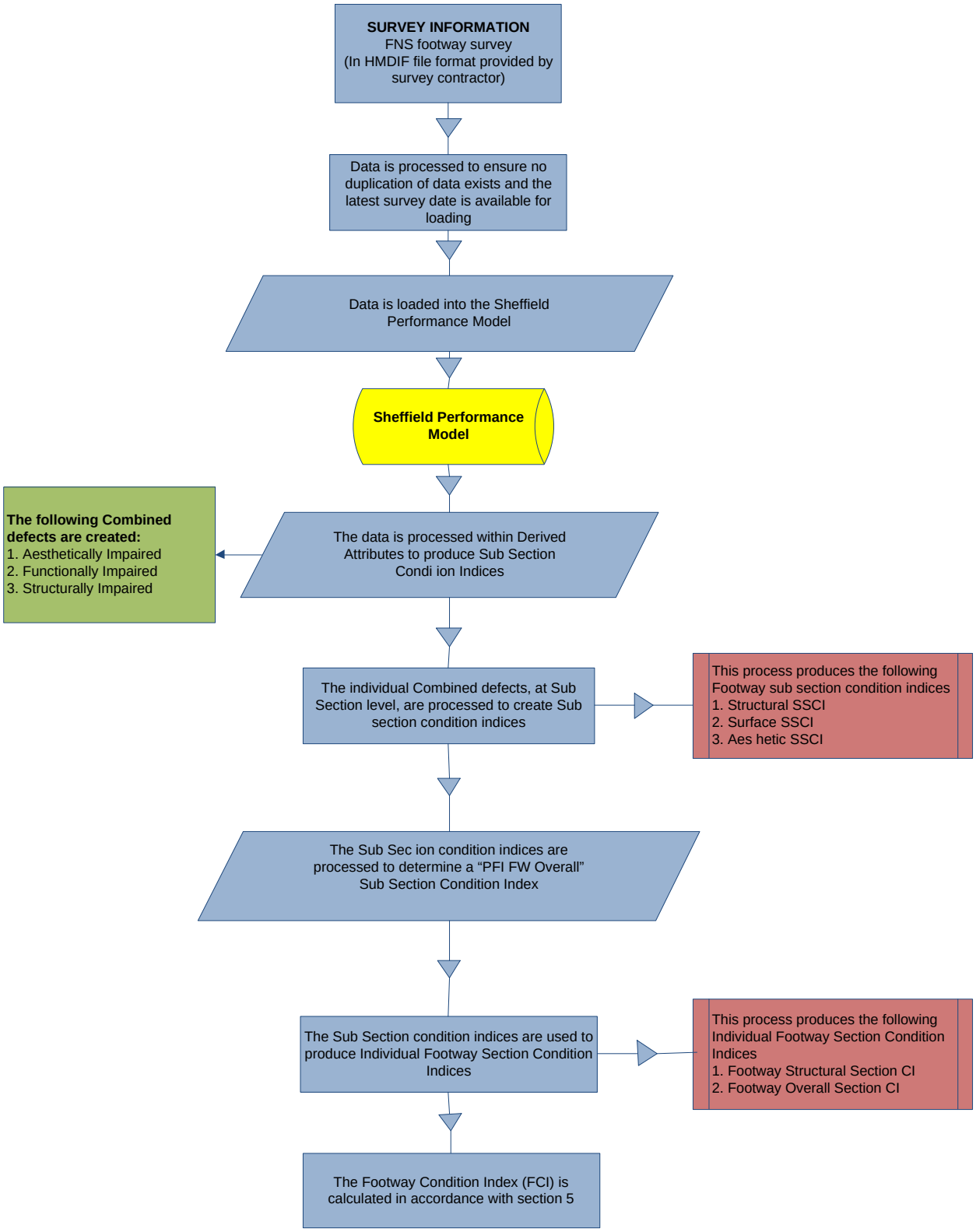
$$CCI = \Sigma \left(\frac{\text{Section length x Carriageway Section CI}}{\text{Total length}^{**}} \right)^{*}$$

* For each individual Road Section within the Network or Community Assembly Area being reported

** Total length of road Network within the Network or Community Assembly Area being reported

5. CALCULATION OF THE FOOTWAY CONDITION INDEX (FCI)

The FCI calculation is summarised in the following process chart:



FOOTWAY SUB-SECTION CONDITION INDICES (SSCI)

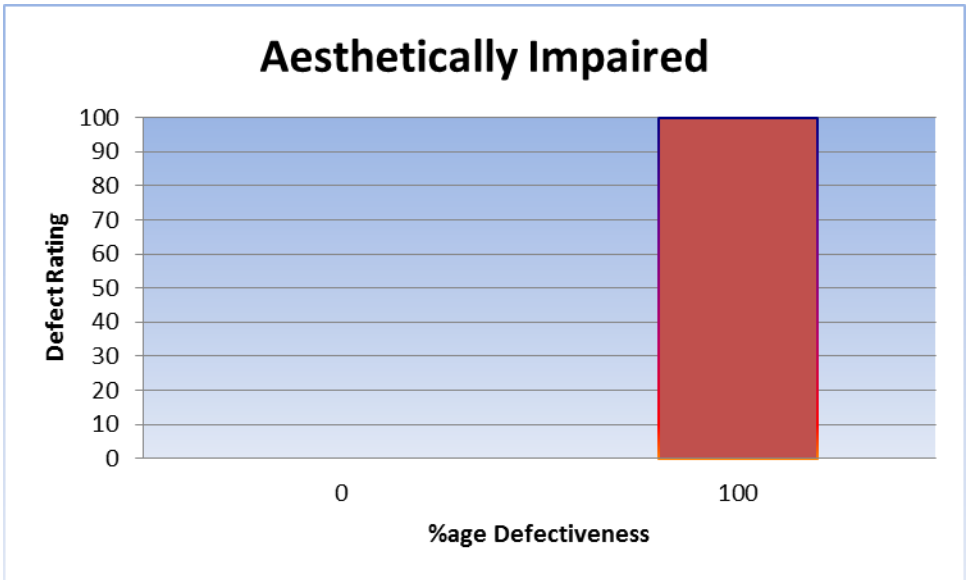
Defect Rating Curves

The data from the Footway Network Survey referred to in Section 3 is used to generate defect rating values at Sub-Section level. Sub-Section level is the same as the recorded defect length for FNS surveys for:

- Aesthetically Impaired
- Functionally Impaired
- Structurally Impaired

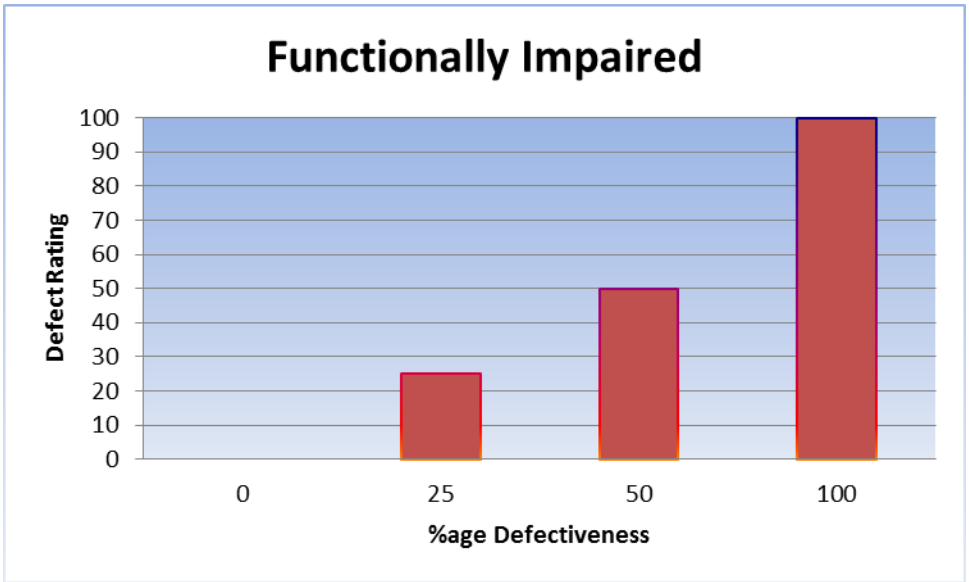
The defect rating values are the same value as that recorded within the FNS survey. The relationship is shown in the following Graphs 5.1 – 5.3

Graph 5.1 – Aesthetically Impaired



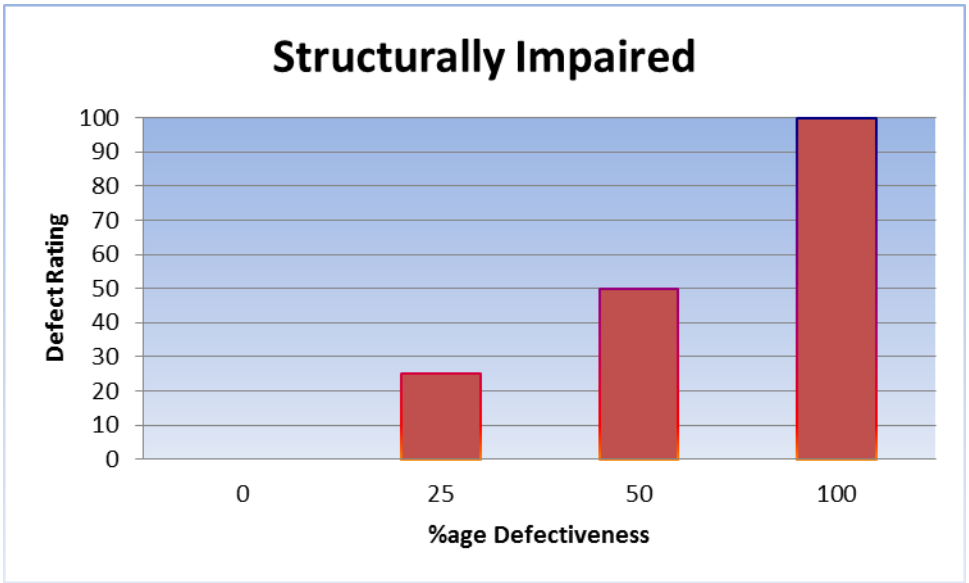
Aesthetically impaired is defined as a Footway having areas of patching, loss of coloured surfacing, faded bituminous material or graffiti/spray paint etc. The defect used for calculation is F(B,C,F,K,U)AI, where the characters change within the brackets for different surface types.

Graph 5.2 - Functionally Impaired



Functionally impaired is defined as a Footway having areas of cracked but level flags, cracked but level blocks, missing filler, minor fretting (including appearance of moss), fatting (Footway surface dressing), minor cracking (bituminous and concrete), minor scaling or moderate local settlement/subsidence. The defect used for calculation is F(B,C,F,K,U)FI, where the characters change within the brackets for different surface types.

Graph 5.3 - Structurally Impaired



Structurally impaired is defined as a Footway having areas of cracked and depressed flags, depressed flags, cracked & depressed blocks, depressed or missing blocks, major cracking, major fretting, major scaling, trips exceeding 13mm, potholes etc. or severe local settlement/subsidence. The defect used for calculation is F(B,C,F,K,U)SU, where the characters change within the brackets for different surface types..

COMBINING DEFECT

There is no requirement to combine the individual condition indices, as per other processes within this document; due to the fact that only one Footway condition defect can exist within a Sub-Section.

Therefore:

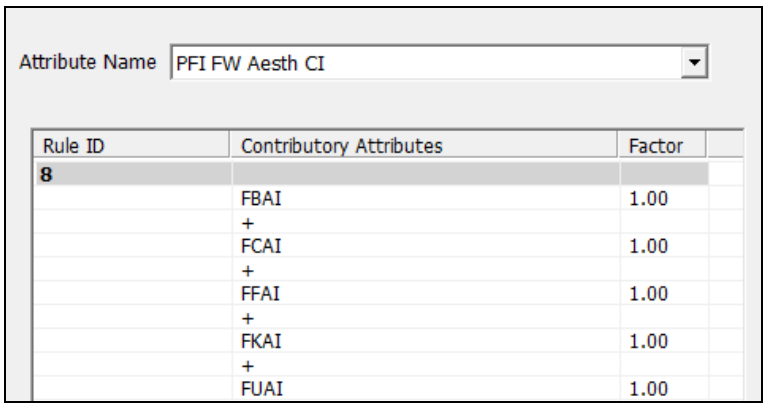
The Footway Structural Sub-Section Condition index = Rated Structurally Impaired defect
The Footway Surface Sub-Section Condition index = Rated Functionally Impaired defect
The Footway Aesthetic Sub-Section Condition index = Rated Aesthetically Impaired defect

However the defect codes change to reflect the change in surface type, **not** the change in defect. Therefore the raw defects are combined to create one of the following for each defective length:

- PFI FW Aesth CI
- PFI FW Surface CI
- PFI FW Structural CI

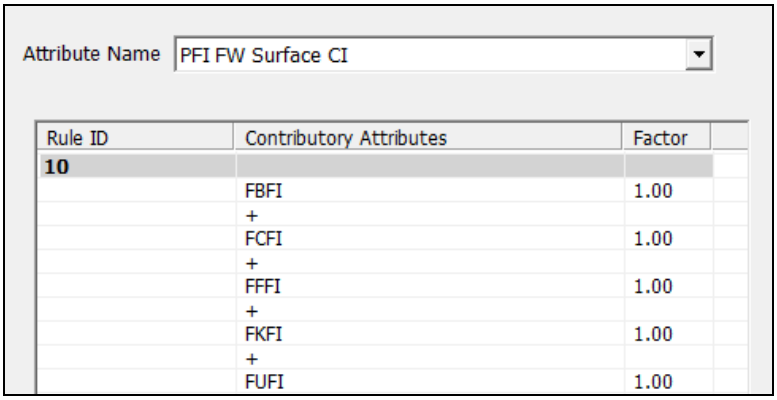
These are created within the derived Attribute part of the SPM and use the following rules which should not be altered:

PFI FW Aesth CI



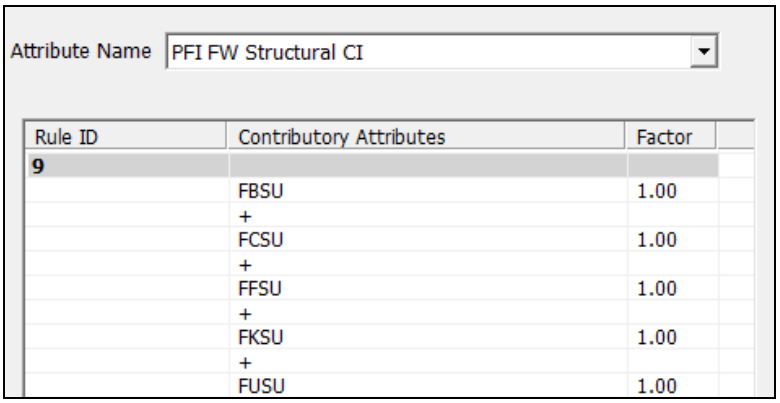
Rule ID	Contributory Attributes	Factor
8		
	FBAI	1.00
	+	
	FCAI	1.00
	+	
	FFAI	1.00
	+	
	FKAI	1.00
	+	
	FUAI	1.00

PFI FW Surface CI



Rule ID	Contributory Attributes	Factor
10		
	FBFI	1.00
	+	
	FCFI	1.00
	+	
	FFFI	1.00
	+	
	FKFI	1.00
	+	
	FUFI	1.00

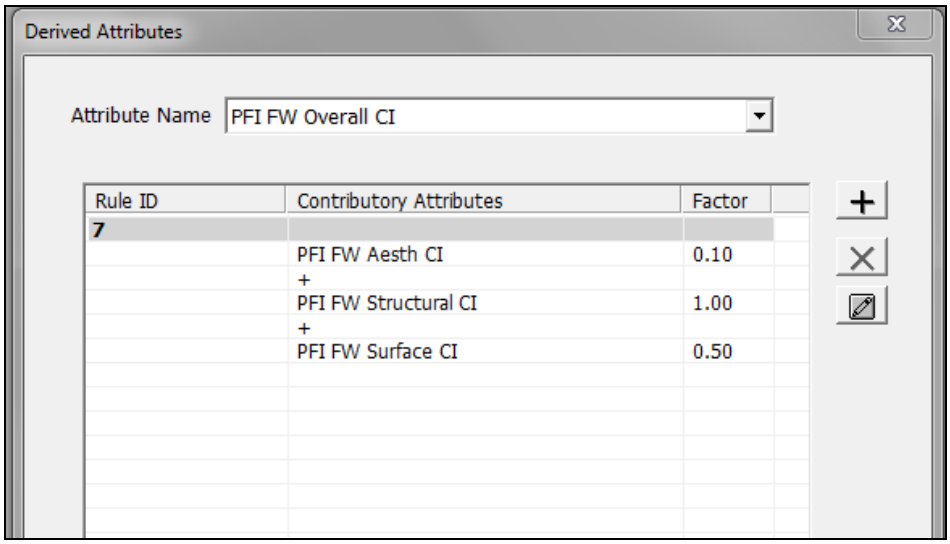
PFI FW Structural CI



The creation of the Footway Sub Section Condition indices is carried out within the SPM. The Service Provider shall ensure that no duplication of data exists and that the latest survey information is always available for loading into the SPM.

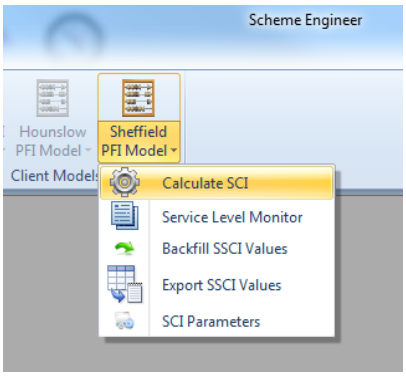
CREATION OF FOOTWAY OVERALL CI

To ensure correct processing every Defect Length requires an overall score to allow for consistent processing, therefore a derived attribute of “PFI FW Overall CI” is created using the following rule. This rule should not be altered.



CALCULATION OF THE FOOTWAY CONDITION INDEX (FCI)

The next stage of the process is to obtain the Footway Condition Index (FCI) for each Footway Section Length. This process is carried out within the Sheffield Performance Model when calculate SCI has been run, for the Footway specific database. Screen shot below.



Sheffield Performance Module Screen from Scheme Engineer

This is derived from the following formula

$$\text{FCI for FSL} = \frac{\Sigma\ (\text{PFI FW Overall CI} \times \text{Defect Length})}{\Sigma\ \text{Footway Section Inventory Length}}$$

The Footway Condition Index FCI is calculated for each Footway Hierarchical Type (High Usage & Low Usage using the formula below and reported at Network and Community Assembly Area level:

$$\text{FCI for Hierarchy} = \frac{\Sigma\ (\text{FCI} \times \text{Footway Inventory Length})^{*}}{\Sigma\text{Footway Section Inventory Length}^{**}}$$

* For each individual section within the Network Hierarchy or Community Assembly Area being reported

** Total Inventory length of Footway within the Network Hierarchy or Community Assembly Area being reported

6. STRUCTURAL MONITORING OF PRIMARY AND SECONDARY CARRIAGEWAY NETWORKS

The structural monitoring of the Primary and Secondary Road Networks is assessed using the Deflectograph Machine, which is a well-recognised method for assessing the structural requirements of a flexible pavement. A Deflectograph survey shall be carried out in accordance with HD29/08 or as revised and the results will only be valid if the temperature recorded for the survey (measured in accordance with the requirements of HD29/08) is between 17^{O}C and 25^{O}C.

Deflectograph Survey

The Deflectograph survey of a "flexible" road pavement measures deflection values of the road pavement whilst the road is subject to a standard load. The deflection is measured in the inside and outside wheel tracks. The use of the Deflectograph is restricted to the period March to mid–June, and September to November because of the critical nature of the temperature range required. All Deflectograph surveys for the Authority will be carried out using machines which have been annually accredited by TRL.

Table 6.1 below shows the Network category which is surveyed using Deflectograph. This network has been categorised further to reflect its requirement to carry traffic loading. Table 6.2 states the different loading categories which Deflectograph is assessed against.

Table 6.1 – Deflectograph Surveys

PFI Carriageway Category	Deflectograph
Primary Road	✓
Secondary Road	✓
Link Road	
Local Road	

Table 6.2 – Deflectograph Road Categories

Deflectograph Category	HGV Traffic Loading
1	High
2	
3	
4	
5	
6	
7	
8	
9	Low

Calculation of the Carriageway Structural Integrity

The Deflectograph parameter most commonly used is 'Residual Life' which gives an indication of the remaining life of the pavement before strengthening is required. The 'Residual Life' of a pavement decreases over time until a 'Zero Life' condition is reached. Beyond this point, negative 'Residual Life' values are reported and the pavement is considered to be in a 'Critical Life' condition. The calculation of residual life requires further information such as road construction and traffic information. This influences the results and therefore the Authority decided to adopt a different approach using raw deflection data as road construction and traffic information is not required for this approach.

The raw deflection data, measured in mm^{-2}, gives a good indication of the pavement strength; the higher the deflection the weaker the pavement. The Authority has decided to use this measure to calculate the structural integrity of the Carriageway, and all raw deflections shall be measured within a temperature range of 17-25^{O}C as stated previously, therefore minimising the influence of external factors.

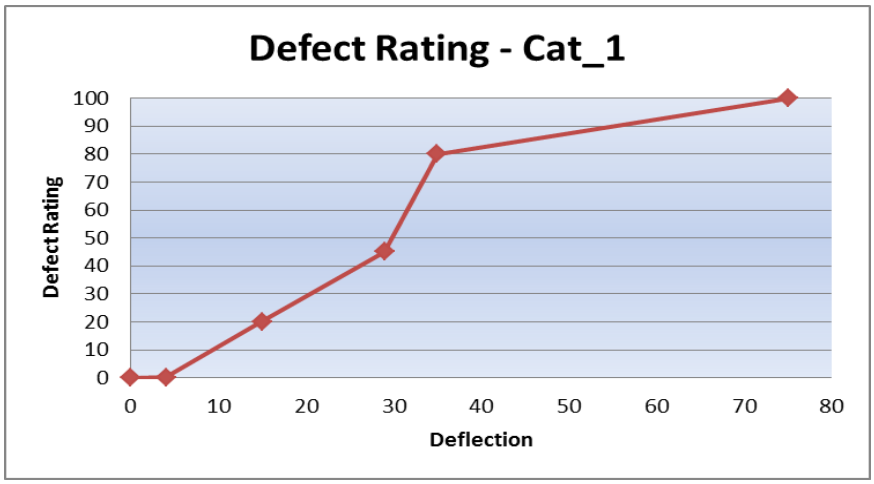
The Service Provider shall provide the raw deflections in a CSV file format for loading into the SPM. This file shall contain the following information:

ITEM	Description
SECTION_LABEL_CODE	This is the unique reference for each RSL
XSP	This is the Cross Sectional Position where the Deflection Result has been recorded
Start Chainage	The chainage along the section where the Deflection has been recorded starts
End Chainage	The chainage along the section where the Deflection has been recorded Ends
Def CAT 1 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 1 -
Def CAT 1 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 1 -
Def CAT 1 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 1
Def CAT 2 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 2 -
Def CAT 2 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 2 -
Def CAT 2 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 2
Def CAT 3 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 3 -
Def CAT 3 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 3 -
Def CAT 3 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 3
Def CAT 4 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 4 -
Def CAT 4 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 4 -
Def CAT 4 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 4
Def CAT 5 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 5 -

Def CAT 5 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 5 -
Def CAT 5 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 5
Def CAT 6 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 6 -
Def CAT 6 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 6 -
Def CAT 6 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 6
Def CAT 7 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 7 -
Def CAT 7 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 7 -
Def CAT 7 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 7
Def CAT 8 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 8 -
Def CAT 8 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 8 -
Def CAT 8 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 8
Def CAT 9 - Left Raw Deflection	Deflection recorded within the Left hand (Nearside) wheelpath for Def CAT 9 -
Def CAT 9 - Right Raw Deflection	Deflection recorded within the Right hand (Offside) wheelpath for Def CAT 9 -
Def CAT 9 - Max Raw Deflection	Maximum of Left and Right raw deflection for Def CAT 9
Temperature	Temperature recorded at tie of survey
Date	Date of Survey

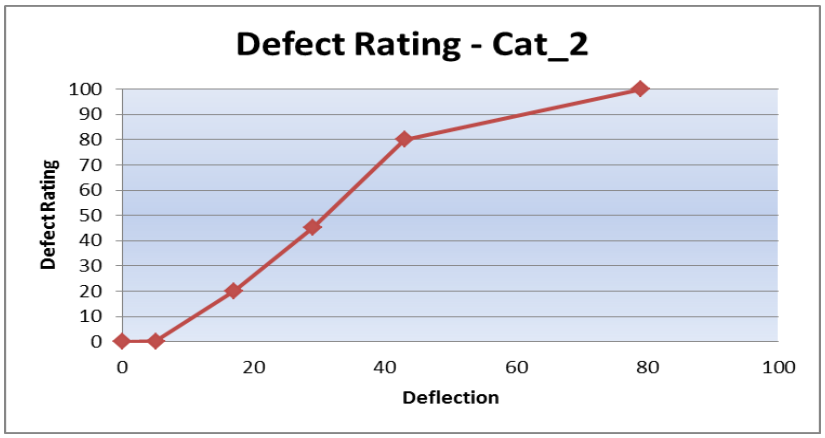
The graphs below show the Deflectograph rating curves for the different Deflectograph categories.

Graph 6.1 – Deflectograph – Category 1



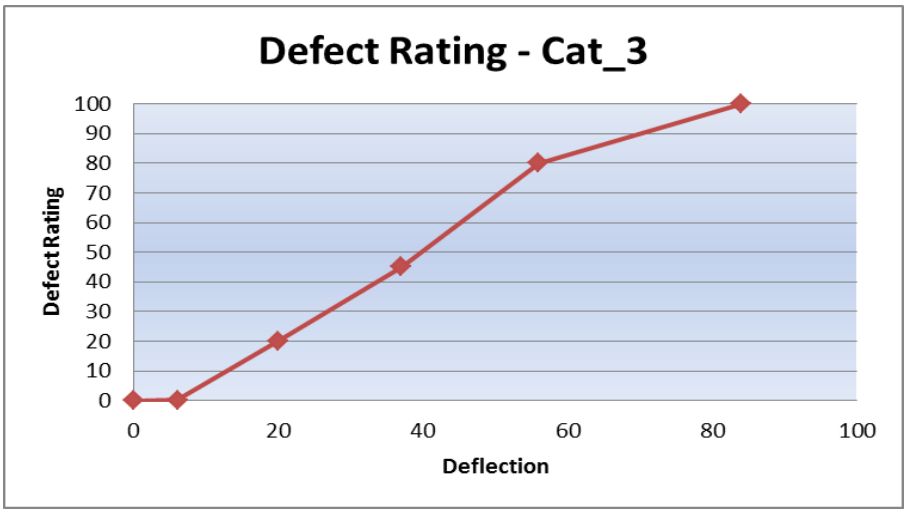
Deflec CAT	Deflection	Defect Rating
1	0	0
1	4	0.1
1	15	20
1	29	45
1	35	80
1	75	100

Graph 6.2 – Deflectograph – Category 2



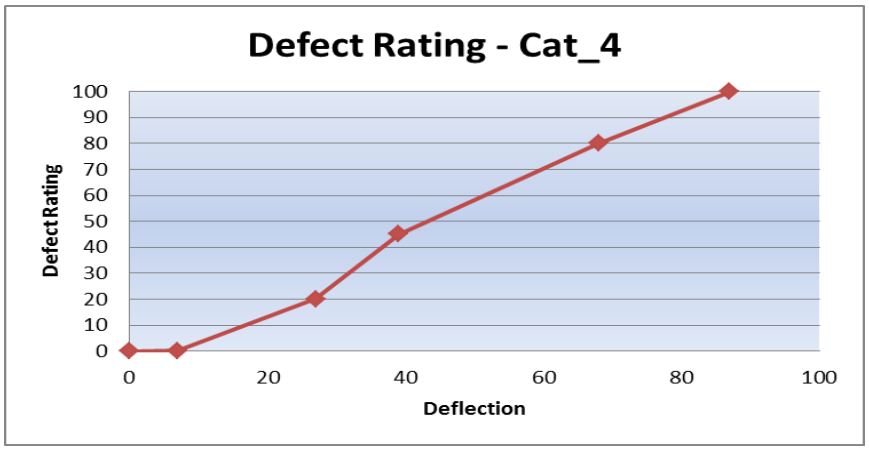
Deflec CAT	Deflection	Defect Rating
2	0	0
2	5	0.1
2	17	20
2	29	45
2	43	80
2	79	100

Graph 6.3 – Deflectograph – Category 3



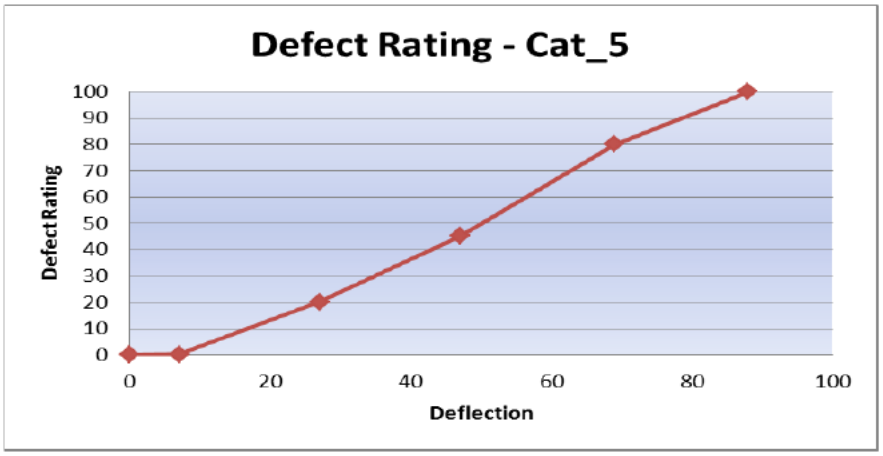
Deflec CAT	Deflection	Defect Rating
3	0	0
3	6	0.1
3	20	20
3	37	45
3	56	80
3	84	100

Graph 6.4 – Deflectograph – Category 4



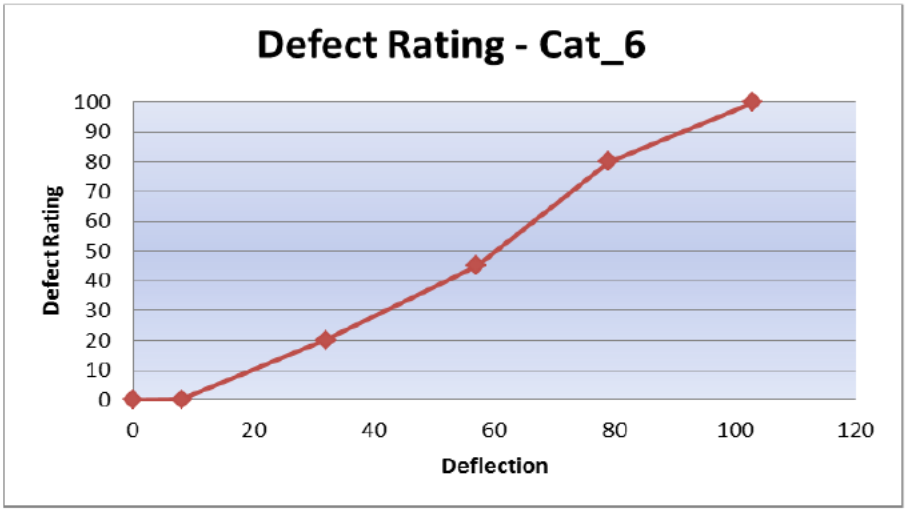
Deflec CAT	Deflection	Defect Rating
4	0	0
4	7	0.1
4	27	20
4	39	45
4	68	80
4	87	100

Graph 6.5 – Deflectograph – Category 5



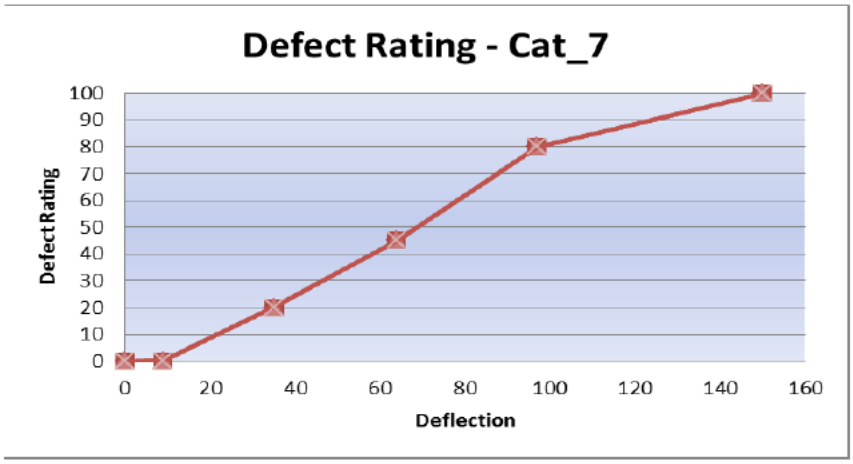
Deflec CAT	Deflection	Defect Rating
5	0	0
5	7	0.1
5	27	20
5	47	45
5	69	80
5	88	100

Graph 6.6 – Deflectograph – Category 6



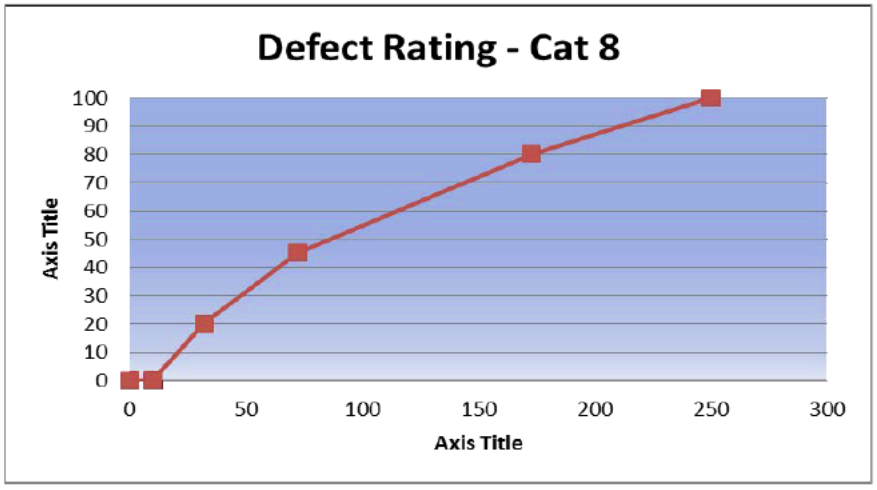
Deflec CAT	Deflection	Defect Rating
6	0	0
6	8	0.1
6	32	20
6	57	45
6	79	80
6	103	100

Graph 6.7 – Deflectograph – Category 7



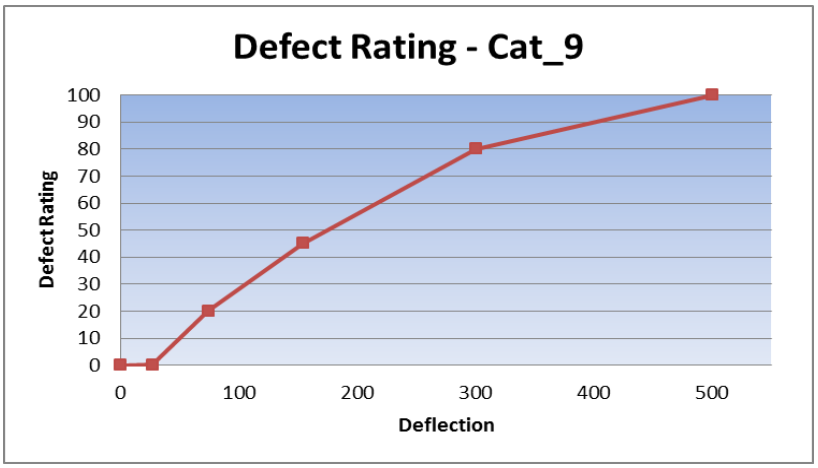
Deflec CAT	Deflection	Defect Rating
7	0	0
7	9	0.1
7	35	20
7	64	45
7	97	80
7	150	100

Graph 6.8 – Deflectograph – Category 8



Deflec CAT	Deflection	Defect Rating
8	0	0
8	10	0.1
8	32	20
8	72	45
8	173	80
8	250	100

Graph 6.9 – Deflectograph – Category 9



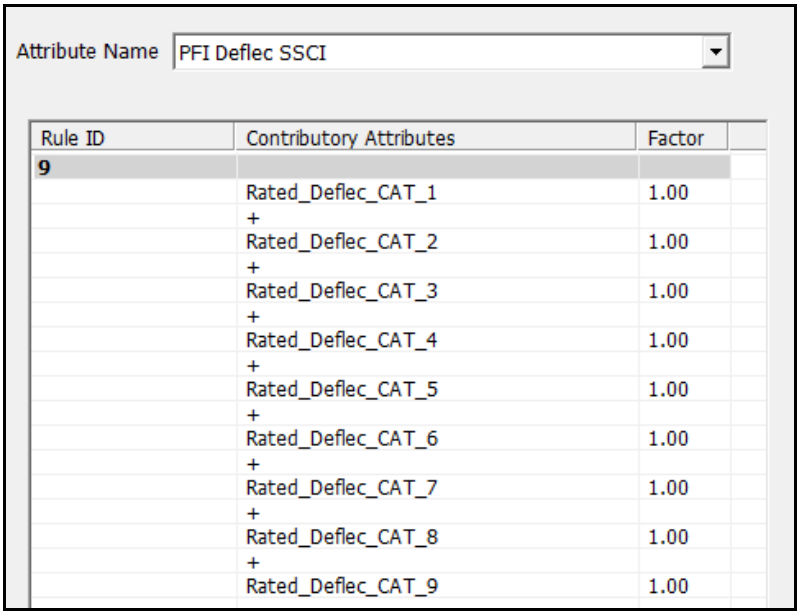
Deflec CAT	Deflection	Defect Rating
9	0	0
9	27	0.1
9	74	20
9	154	45
9	300	80
9	500	100

The structural integrity of the Carriageway shall be analysed at the end of the 9th, 14th, 19th and 24th Contract Years as set out in clause 27.13.7 of this Contract.

Deflection Condition Index

The Deflectograph machine delivers raw deflection in the nearside and offside wheel path. The Deflectograph SSCI is based upon the maximum deflection, taken from either the nearside or offside wheel path for the defect measurement length (typically 3m or 4m for Deflectograph) and is rated against the appropriate rating curve for the RSL's Deflection Category, to ascertain the Rated Deflection for that defect measurement length to produce the Deflection SSCI.

Deflection SCI is produced by processing the Raw Deflections through the SPM via the rating tables above and combining them within Derived Attributes (See table below) to create the Deflectograph SSCI.



Rule ID	Contributory Attributes	Factor
9		
	Rated_Deflec_CAT_1	1.00
	+	
	Rated_Deflec_CAT_2	1.00
	+	
	Rated_Deflec_CAT_3	1.00
	+	
	Rated_Deflec_CAT_4	1.00
	+	
	Rated_Deflec_CAT_5	1.00
	+	
	Rated_Deflec_CAT_6	1.00
	+	
	Rated_Deflec_CAT_7	1.00
	+	
	Rated_Deflec_CAT_8	1.00
	+	
	Rated_Deflec_CAT_9	1.00

PFI Deflec SSCI combination within Scheme Engineer

The average XSP by Road Section Length SCI values are then calculated using length-weighted figures for each individual recorded condition SSCI as follows:

$$\text{Average XSP Deflection SCI} = \Sigma \left(\frac{\text{XSP Sub-Section length x XSP Sub-Section CI}}{\text{Section Length}} \right)$$

The Deflection Section Condition Index is then calculated as follows:

$$\text{The Deflection Section CI} = \left(\frac{\Sigma \text{ Individual Def SCIs for each XSP}}{\text{Number of XSPs}} \right)$$

The Deflection Condition Index is calculated for each Deflectograph Category Network (for both Primary and Secondary Networks) using the formula below and reported by Deflectograph Category Network level:

$$\text{Deflection Condition Index} = \Sigma \left(\frac{\text{Section length x Deflection SCI}}{\text{Total length}^{**}} \right)^{*}$$

* For each individual RSL within the Deflectograph Category Network being reported

** Total length of “deemed coverage” Carriageway within the Deflectograph Category Network being reported

7. DE-MINIMIS CALCULATIONS

The Sheffield Performance Model carries out a number of calculations to determine whether the Performance Requirements in Service Standard 2 of the Output Specification have been achieved. This Section sets out how these calculations are carried out.

CARRIAGEWAY

Performance Requirement 2.16 *"no continuous length of more than 100m or 40% of a Road Section Length XSP, whichever is the lesser, has a carriageway Average Sub-Section Condition Index greater than the thresholds stated in Table A1.1*;" is calculated using a parameter set which is hard coded within the Sheffield Performance Model. This parameter set is analogous with the scheme generation parameter set used for scheme generation within the Sheffield Performance Model. Figure 7.1 illustrates the parameter set used for Structural CI, as the parameter set is not visible within the Sheffield Performance Model.

For every condition index value contained within Table A1.1, the lower threshold has been set at 10 points below, although all 100m Sub-Sections delivered have an average condition index greater than or equal to the condition index value set in Table A1.1. Other parameters which have been set are minimum length of 100m and a merge buffer length of 20m.

The resultant 100m De-Minimis length for performance requirement 2.16 is calculated in two ways, from a rolling process as per figure 7.1 and as the average condition index value over fixed 100m lengths i.e. 0-100, 100-200 etc. Where these two methods duplicate lengths over the same chainage range they are chopped and merged to remove overlaps and deliver the total length of 100m failure for each RSL.

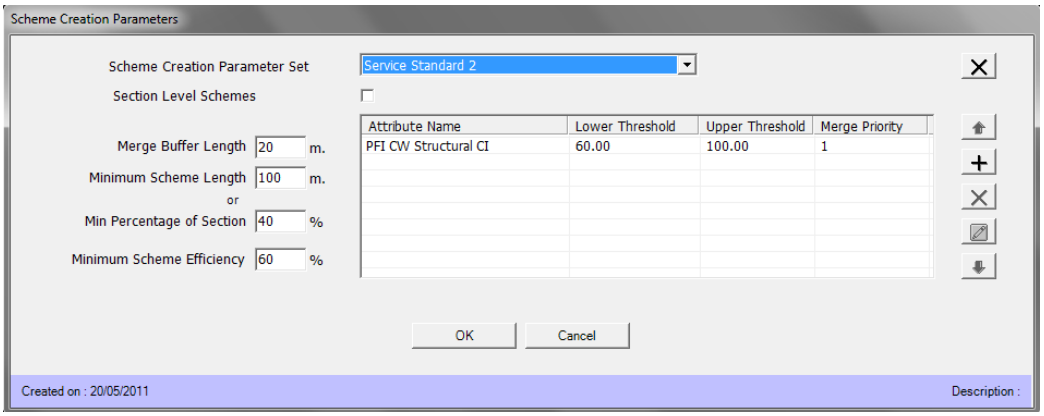


Figure 7.1 – Example Scheme Parameter Set used for Structural CI De-Minimis

Performance Requirement 2.17 *"no continuous length of more than 50 metres or 40% of a Road Section Length XSP, whichever is the lesser, has a Carriageway Average Sub-Section Condition Index greater than the thresholds stated in Table A1.1*;" is calculated using a parameter set which is hard coded within the Sheffield Performance Model. This parameter set is analogous with the scheme generation parameter set used for scheme generation within the Sheffield Performance Model. Figure 7.2 illustrates the parameter set used for Structural CI, as the parameter set is not visible within the Sheffield Performance Model.

For every condition index value contained within Table A1.1, the lower threshold has been set at 10 points below, although all 50m Sub-Sections delivered will have an average condition index greater than or equal to the condition index value set in Table A1.1. Other parameters which have been set are minimum length of 50m and a merge buffer length of 20m.

The resultant 50m De-Minimis length for performance requirement 2.17 is calculated in two ways, from a rolling process as per figure 7.2 and as the average condition index value over fixed 50m lengths i.e. 0-50, 50-100 etc. Where these two methods duplicate lengths over the same chainage range they are chopped and merged to remove overlaps and deliver the total length of 50m failure for each RSL.

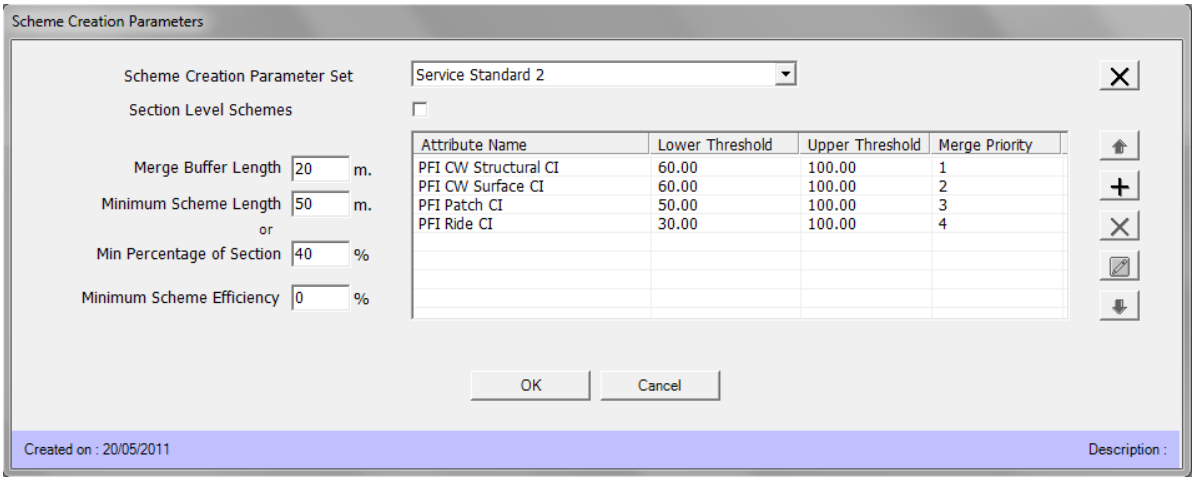


Figure 7.2 – Example Scheme Parameter Set used for 50m De-Minimis

Performance Requirement 2.21 (a) and (b) *"…a Road Section Length XSP of 50m or more has a Skid Risk Score…."* The 50m length is determined using a parameter set which is hard coded within the Sheffield Performance Model. This parameter set is analogous with the scheme generation parameter set used for scheme generation within the Sheffield Performance Model. Figure 7.3 illustrates the parameter set used for SCRIM Deficiency CI, as the parameter set is not visible within the Sheffield Performance Model.

The upper threshold has been set at -0.03 CSC deficiency, however only the sections with an average at or below -0.05 CSC deficiency will be reported and have a Skid Risk Score assigned.

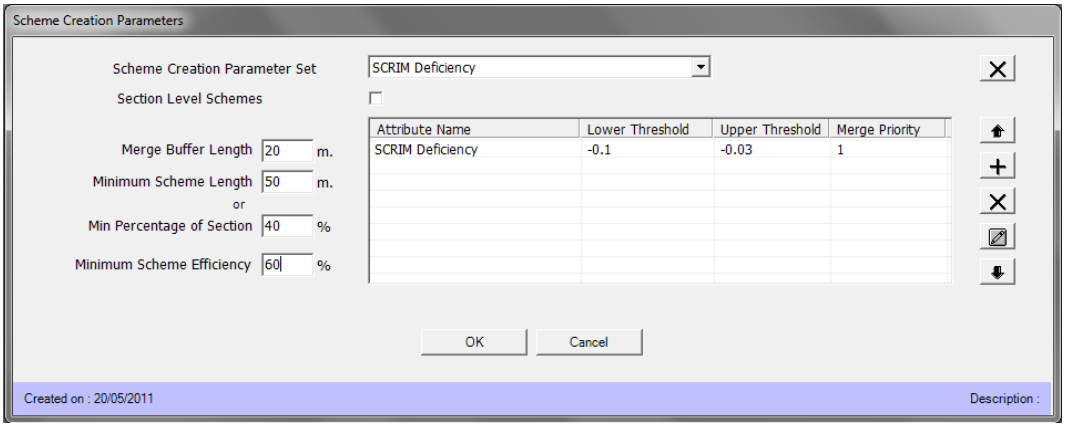


Figure 7.3 – Example Scheme Parameter Set used for Skid Deficiency

The resultant 50m De-Minimis length for performance requirement 2.21 (a) and (b) is calculated in two ways, from a rolling process as per figure 7.3 and as the average condition index value over fixed 50m lengths i.e. 0-50, 50-100 etc. Where these two methods duplicate lengths over the same chainage range they are chopped and merged to remove overlaps and deliver the total length of 50m failure for each RSL.

Performance Requirement 2.36 "…, in relation to the Primary Road Network and the Secondary Road Network, no continuous 50 metres or 40% of a Road Section Length XSP, whichever is the lesser, has a Deflection Average Sub-Section Condition Index greater than 45…." The 50m length is determined using a parameter set which is hard coded within the Sheffield Performance Model. This parameter set is analogous with the scheme generation parameter set used for scheme generation within the Sheffield Performance Model. Figure 7.4 illustrates the parameter set used for Deflection CI, as the parameter set is not visible within the Sheffield Performance Model.

For the condition index of 45, the lower threshold has been set at 10 points below, although all 50m Sub-Sections delivered have an average condition index greater than or equal to the condition index value of 45. Other parameters which have been set are minimum length of 50m and a merge buffer length of 10m.

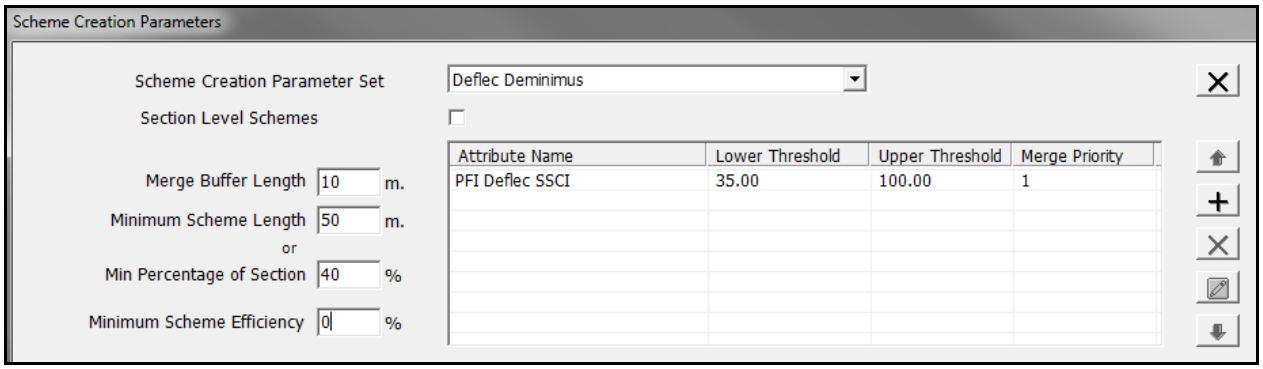


Figure 7.4 – Example Scheme Parameter Set used for Deflectograph Calculation

FOOTWAY

Performance Requirement 2.46 *"…no continuous length of more than 10m of a Footway Section Length has a 10m Structural Sub-Section Condition greater than the figures shown in Table A1.3*…" is calculated using a parameter set which is hard coded within the Sheffield Performance Model. This parameter set is analogous with the scheme generation parameter set used for scheme generation within the Sheffield Performance Model. Figure 7.4 illustrates the parameter set used for FW Structural CI, as the parameter set is not visible within the Sheffield Performance Model.

For every value contained within Table A1.3 of Service Standard 2, the lower threshold is set at 10 points below, although all 10m Sub-Sections delivered have an average condition index greater than or equal to the value set in Table A1.3. Other parameters which have been set are minimum length of 10m and a merge buffer length of 3m.

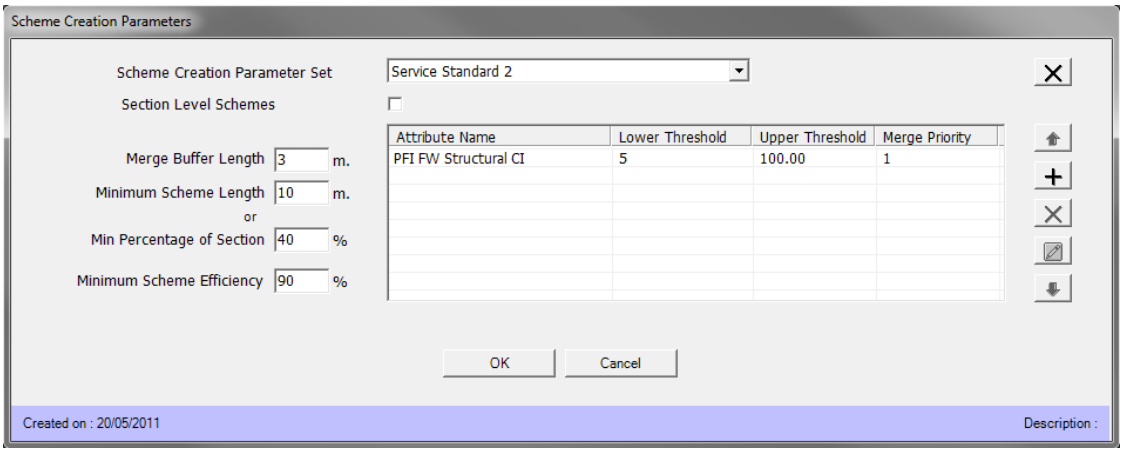


Figure 7.4 – Example Scheme Parameter Set used for FW Structural CI

Performance Requirement 2.47 "*…no continuous length of more than 50m or 40%, whichever is the lesser, of a Footway Section Length has a Footway 50m Overall Sub-Section Condition Index greater than the figures shown in Table A1.3*…" is calculated using a parameter set which is hard coded within the Sheffield Performance Model. This parameter set is analogous with the scheme generation parameter set used for scheme generation within the Sheffield Performance Model. Figure 7.5 illustrates the parameter set used for FW Overall CI, as the parameter set is not visible within the Sheffield Performance Model.

For every value contained within Table A1.3 of Service Standard 2, the lower threshold has been set at 10 points below, although all 50m Sub-Sections delivered have an average condition index greater than or equal to the value set in Table A1.3. Other parameters which have been set are minimum length of 50m and a merge buffer length of 10m.

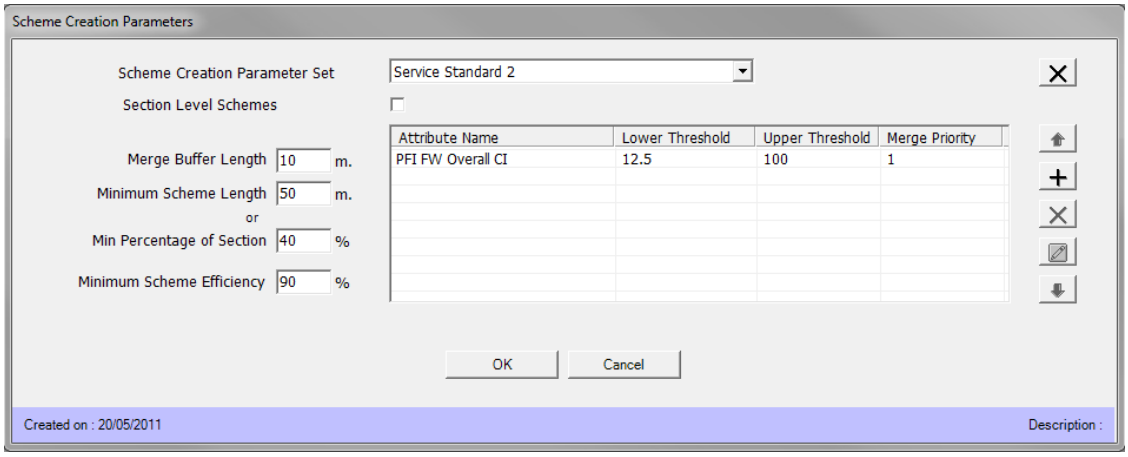


Figure 7.5 – Scheme Parameter Set used for FW Overall CI

The resultant 50m De-Minimis length for performance requirement 2.47 is calculated in two ways, from a rolling process as per figure 7.5 and as the average condition index value over fixed 50m lengths i.e. 0-50, 50-100 etc. Where these two methods duplicate lengths over the same chainage range they are chopped and merged to remove overlaps and deliver the total length of 50m failure for each RSL.

ANNEXURE 1 – SKID RESISTANCE MANAGEMENT

The purpose of this Annexure is to outline the Authority's approach to maintaining the appropriate levels of skid resistance on the Project Network the aim being to minimise the number of accidents where skidding is a contributory factor.

Primary and Secondary Road Networks

Table A1 below sets the Authority's Investigatory Levels for the Primary and Secondary Road Networks and is based upon the Department of Transport's HD28/04 Table 4.1. In Table A1 below, **X** denotes the initial Investigatory Level used for the relevant site category. The shading indicates the minimum value the Authority will allow the Investigatory Level to be changed to when an investigation of a deficient site concludes that the Investigation Level should be changed.

Table A1 - Site Categories & Investigatory Levels for Primary & Secondary Road Networks

Site category and definition		Investigatory Level at 50km/h							
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
B	Dual Carriageway non-event		X						
C	Single Carriageway non-event			X					
Q	Approaches to and across minor and major junctions, approaches to roundabouts				X				
K	Approaches to pedestrian crossings and other high risk situations					X			
R	Roundabout				X				
G1	Gradient 5-10% longer than 50m				X				
G2	Gradient >10% longer than 50m					X			
S1	Bend radius <500m – dual Carriageway				X				
S2	Bend radius <500m – single Carriageway					X			

Notes:

Investigatory Levels are set for each 10m Sub-Section length within a Road Section Length XSP

Link and Local Road Networks

Table A2 below sets the Authority's Investigatory Levels for the Local and Link Road Networks (together with Primary and Secondary Roads with a speed limit less than 40 mph) and is an amended version of the Department of Transport's HD28/04 Table 4.1. **X** denotes the initial Investigatory Level used for the relevant site category. The shading indicates the minimum value the Authority will allow the Investigatory Level to be changed to when a deficient site investigation concludes that the Investigation Level should be changed.

Table A2 - Site Categories & Investigatory Levels for Link and Local Road Networks (Together with Primary and Secondary Roads with a speed limit less than 40 mph)

Site category and definition		Investigatory Level at 50km/h							
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
B – 1	Dual Carriageway non-event	X							
C – 1	Single Carriageway non-event		X						
Q – 1	Approaches to and across minor and major junctions, approaches to roundabouts			X					
K – 1	Approaches to pedestrian crossings and other high risk situations				X				
R – 1	Roundabout			X					
G1 – 1	Gradient 5-10% longer than 50m			X					
G2 – 1	Gradient >10% longer than 50m				X				
S1 – 1	Bend radius <500m – dual Carriageway			X					
S2 – 1	Bend radius <500m – single Carriageway				X				

Notes:

Investigatory Levels are set for each 10m Sub-Section length within a Road Section Length XSP

Prioritisation of Skid resistance Deficient Sites

The following risk analysis is applied within the Sheffield Performance Model to prioritise Skid resistance deficient sites for investigation in accordance with Service Standard 2 Performance Requirements 2.21(a), 2.21(b) and 2.26. Table A3 below shows the two hazard attributes and weightings used in this prioritisation process.

Table A3 - Weighting of Attributes

Hazard Attributes	Weighting (%)
Skid Deficiency	50
Investigatory Level	50

Skid Deficiency (50% weighting)

Where on the Road Network a lane length of 50m or more has an average Skid Resistance that is greater than or equal to 0.05 CSC below the appropriate Investigatory Level, then it shall be given a score in relation to Table A4 below:

Table A4 – Skid Deficiency Categories

Skid Deficiency	Score
Between -0.05 & -0.06	1
Between -0.06 & -0.08	2
Between -0.08 & -0.10	3
Between -0.10 & -0.15	4
Greater than -0.15	5

Investigatory Level (IL) (50% weighting)

This attribute accounts for the importance of the site in terms of skid resistance need. A higher value indicates that there is a greater requirement for skid resistance as motorists will be required to either stop or slow down quickly or negotiate sensitive road alignments such as bends, gradients, etc. These values are taken from Tables A1 and A2 above. A score from 1 to 5 is allocated depending upon the Investigatory Level as shown in Table A5 below:

Table A5 - Investigatory Categories

Investigatory Level	Score
0.30	1
0.35	2
0.40	3
0.45	4
Greater than 0.50	5

The Skid Risk Score

To calculate the Skid Risk Score, which is referred to in Service Standard 2, the Sheffield Performance Model calculates the average skid resistance over the nominated 50m length using the following parameters in figure scrim_1, within the Sheffield Performance model.

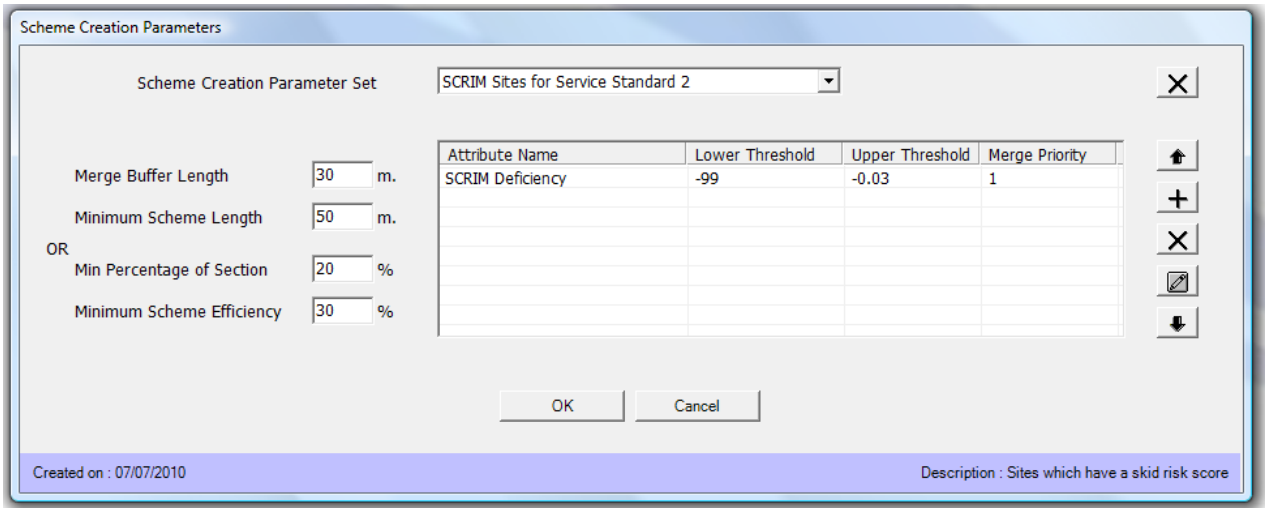


Figure – scrim_1

The process defined above identifies the Skid risk sites which have a minimum length of 50m and an average scrim deficiency of <-0.05 CSC below investigatory level. If this is not achieved the sections which do not meet this criteria are allocated a Skid Risk Score of 0 (zero) and are not subject to the requirements of PR 2.21 (a) and(b) of Service Standard 2.

The Skid Risk Score = (Average Scrim Deficiency score * 50) + (Max Investigatory Level score * 50)
This Skid Risk Score approach is only applicable to Primary, Secondary and Link Roads. Local roads are investigated in accordance with Performance Requirement 2.26(b).

Site Investigation Process

In accordance with Performance Requirement 2.21(a) and (b) and 2.26 of the Output Specification, the Service Provider shall carry out an investigation on a Road Section Length which has been highlighted as deficient or potentially deficient.

Where the investigation has confirmed that the average Skid Resistance is 0.05 CSC units or more below the appropriate Investigatory Level, the Service Provider shall notify the Authority of the proposed appropriate action

In all cases the investigation shall require the Service Provider to complete Site Investigation form SKID-1. Where the site investigation has concluded that the site requires amendment of the relevant Investigatory Level, such amendment shall be subject to Authority Approval, and form SKID-2 shall be completed and submitted to the Authority for approval. Where Authority Approval is not given within one (1) month, the Service Provider shall make, within a further period of one (1) month, a further proposal which does not require amendment of the relevant Investigatory Level.

All of the data contained on the SKID forms shall be entered into the Sheffield Performance Model for auditing purposes and shall be available to the Authority at all times.

SCC Site Investigation Form
Form: SKID-1

Ref No ……..…..

Date ……

1. GENERAL		
Investigating Officer:		
Date of site visit:		
General weather at time of visit?		
Reason for site visit?	**OS 2.21**	
	OS 2.26	
	Accident report	
Dates of any previous site visits	Reasons for Visit:	Date:

2. SITE DETAILS	
Road classification	Primary / Secondary / Link / Local
Road Name	
UKPMS Section label(s)	
Carriageway/ Lane tested (CL/CR)	
Site Category taken from Table A1 and/or A2 within the Technical Specification	
Current Investigatory Level (CSC Value)	
Have any substantial changes been made to the site or road usage since Investigatory Level was assigned, if YES give details.	

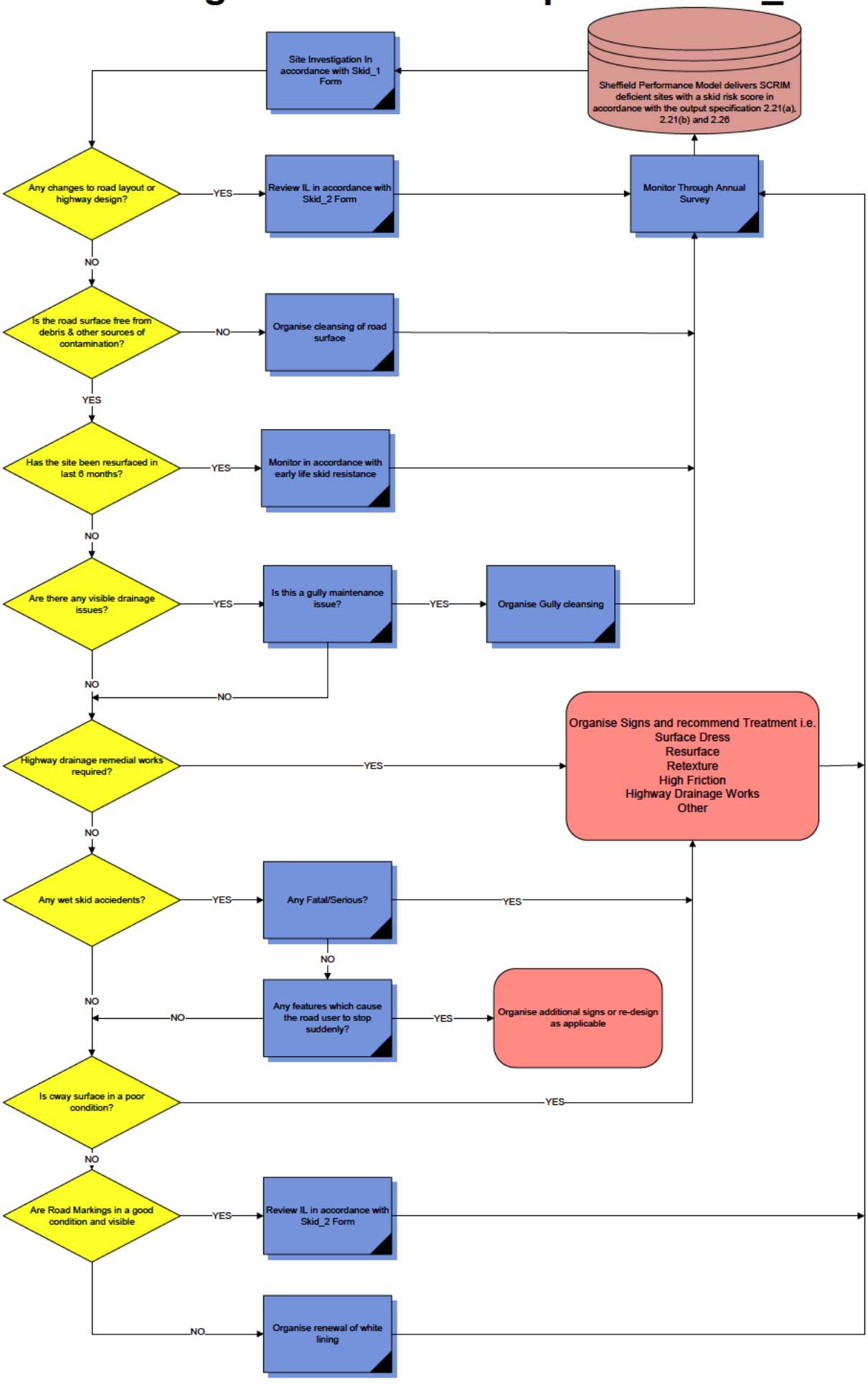
3. SUMMARY OF ACCIDENT HISTORY		
	Number	**%**
Number of accidents in the last 3 years?		
Number and % of wet weather accidents		
Types of accidents:		
• Fatal		
• Seriously injured		
• Minor injuries		

4. CONDITION DATA	
Current CSC Value	
How much is it below Investigatory Level?	
Lowest value and location or is it consistent across the site? If not, what are the variations?	
Is the area of the maintained pavement surface free from debris and other sources of contamination, if NO give details:	YES / NO
Has the area of maintained pavement been surfaced in the last 6 months, if YES give date of treatment.	YES / NO
5. VISUAL ASSESSMENT	
Surface Type	Stone Mastic Asphalt / Hot Rolled Asphalt / Dense Bituminous Macadam / Surface Dressing / Micro asphalt / Anti-Skid / Concrete / Block If other please state:
CCI Value from Sheffield Performance Model, for maintained pavement surface under investigation	
Texture depth from SCANNER **OR** **Sand Patch test results**	Minimum Value: Maximum Value: Average Value: …….. mm
Traffic	AADF Value:
Site Speed	20 / 30 / 40 / 50 / 60 / 70
Drainage- **Any visible issues?** **If YES please give details:**	Yes / No
6. ROAD USERS AND LAYOUT	
Are there any features at the site which would require users to stop suddenly? **(Junctions, signals, crossings, schools, shops, bus stops, public amenities, OAP Homes, etc.)** **If YES please give details**	Yes / No
Are the Signs and traffic signals- clear to drivers and relevant? **If NO please give details**	Yes / No
Are road markings clear to drivers **If NO please give details**	Yes / No
Is the site affected by overgrown vegetation/trees **If YES please give details**	Yes / No

7. RECOMMENDATIONS	
Recommendation after site visit:	**No Further Action** **Change IL** **Recommend Surface Treatment** **Other Recommendations**
No Further Action **If no further action is required please give details and submit form to Authority for approval**	
Change IL **Should consideration be given to raising or lowering the Investigatory Level?** **If YES, please submit Form SKID-2 (Re-Assignment of Site Category) to Authority for approval.**	**Yes / No** **SKID-2** **Ref No. ……** **Date: ……..**
Recommended Surface Treatment • **Surface dressing** • **Resurface** • **Re- texture surface** • **High friction surfacing** • **Other (give details)** **If NO please give details:**	**Yes / No**
Other Recommendations • **Cleansing of road** • **Cleansing of gullies** • **Signs: replacement or additional** • **Road markings** • **Redesign of junction/ carriageway** • **Other (please give details)**	
Name of investigating officer:	**Print name:** **Signature**
Position:	
Date:	
Approved and checked by:	**Print name:** **Signature:**
Position:	
Date:	

8. CHECKLIST	
Confirm signs have been erected	**Yes / No / Not Applicable** Date erected: …… Notified by: …… Checked by: ……..
Surface treatment works complete?	**Yes / No / Not Applicable** Date completed: …… Notified by: …… Checked by: ……..
Testing of new surface?	**Yes / No / Not Applicable** Pass or Fail: …… Inspected by: …… Date: ……
If new surface fails testing, give details of failure and required remedial/rectification works	
Removal of Temporary Warning Signs	**If testing is accepted by Authority and authorisation has been given for removal of signs acknowledge sign removal:** Inspected by: …… Date: ……
Investigating Officer:	**Print name:** **Signature:**
Date:	
Approved and checked by:	**Print name:** **Signature:**
Date:	

Site Investigation Process Map: Skid Risk_1



Re-Assignment of Site Category
Form SKID-2

Ref No ……..…..

FORM SKID-2	
Reason for Assignment	Recommended from form SKID-1 Ref no. Or • Review • New Road • Improvement • Other (please state):
Road Name(s)	
Road Classification	Primary / Secondary / Link / Local
Road Sign Speed	20 / 30 / 40 / 50 / 60 / 70
Traffic (AADF)	
UKPMS section labels	

Site Category	Site Description	XSP (CL1/CR1)	Start Chainage	End Chainage	Proposed Site Category (If Applicable)	Current Intervention Level	Proposed Intervention Level

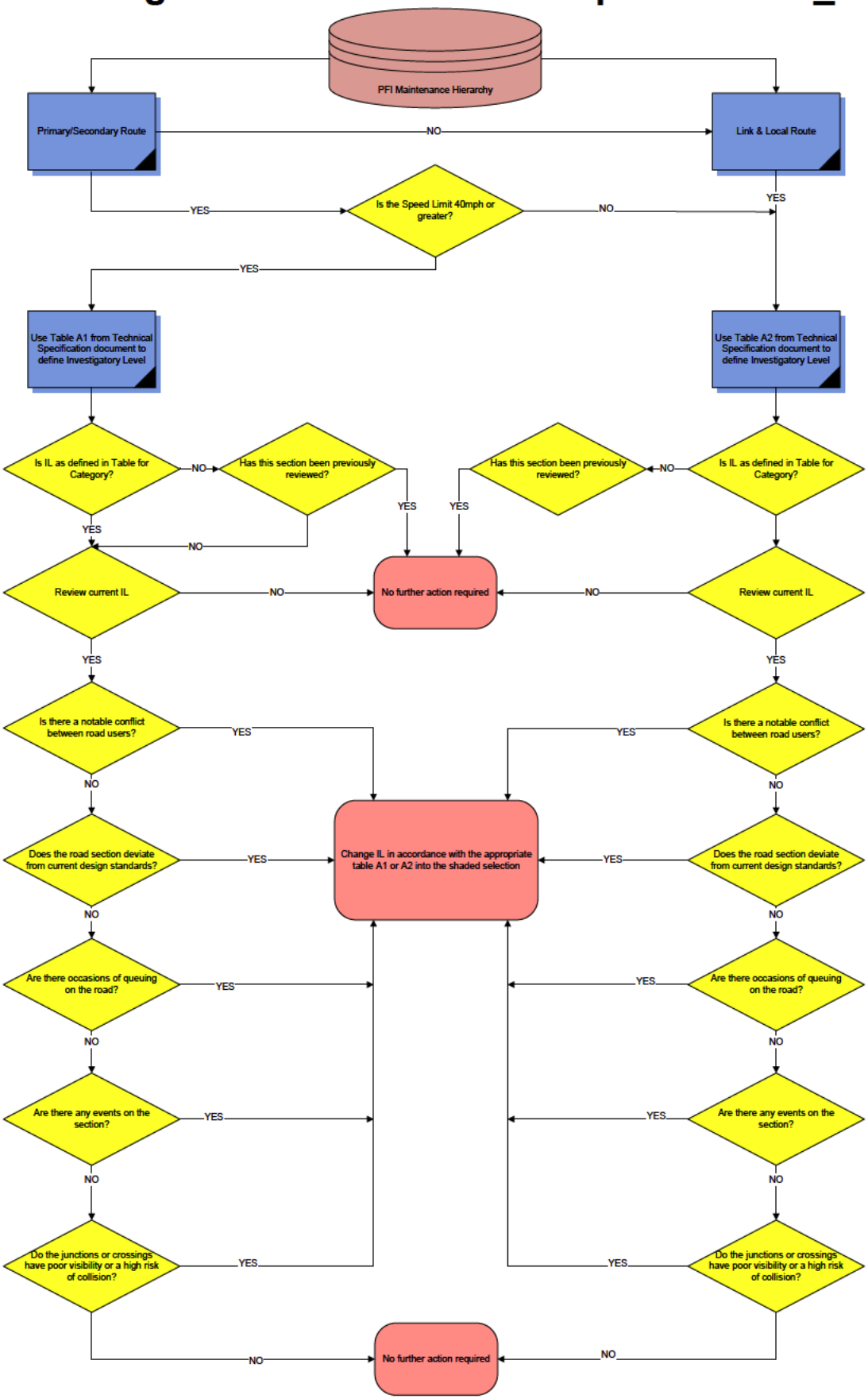
Other comments or notes:

Map(s) attached to this document? Yes / No
Map Reference No.

Does the road deviate away from the current Design Standards? **If YES please detail**	**Yes / No**
Is there a notable conflict between road users at the site? **If YES please detail conflict (i.e. head on collision, high speed impact)**	**Yes / No**
Are there occasions of queuing on the road? **If YES please detail**	**Yes / No**
Are there any 'events' in the proximity: i.e. traffic lights or a gradient. **If YES please give details:**	**Yes / No**
Please state Texture depth? **Please state if data is from SCANNER / Sand Patch Test**	**……. mm**
Approaches to junctions, is there poor visibility or a high risk of collision? **If YES please give details:**	**Yes / No**
At pedestrian crossings, is there poor visibility? **If YES please give details:**	**Yes / No**
How many accidents have occurred at the site over the last 3 years?	
Of the accidents listed above, how many have been wet weather related accidents?	**No. ……..** **% ……..**

Does this site category require revision? **If YES please state revision**	**Yes**
Does the Investigatory Level require revision? **If YES please state revision**	**Yes**
Investigating Officer	
Date of site visit	
Approved by:	
Date:	

Re-Assignment of IL Process Map: Skid Risk_2



ANNEXURE 2 – IMPORTING SHEFFIELD UKPMS RULES INTO CONFIRM PMS

Carriageway

Import Observation Types - Bespoke observations and Indices

Select:
Network Manager > Network Utilities > Import Observation Lookups
Select the pick list for the following import files:
Observation parameter - 1observ_paramV3.txt
Observation parameter option - 1observ_type_param_optV8.txt
Observation Type – 1observ_typeV6.txt
Observation Type Feature Group – 1observ_type_feat_groupV6.txt

Import Survey Types – Bespoke patching and CVI percentage survey

Select:
Network Manager > Network Utilities > Import Survey Types
Select the pick list for the following import files:
Survey Type – 2survey_type.txt
Survey Type Feature Group – 2survey_type_feat_group.txt
Survey Type Observations – 2survey_type_obsV2.txt

Import Rule Set - Bespoke Rule Set

Select:
Data Analyser > Data Analyser Imports > Import Rule Sets
Select the pick list for the following import files:
Rule Set – 3rule_setV8.txt
Transformations – 3transform.txt
Transformation Points – 3transform_pointV5.txt
Index Rules – 3index_ruleV8.txt
Index Rule Calculation – 3index_rule_calcV8.txt
Index Rule Applicability – 3index_rule_applicV8.txt

Import Process (Survey) Types – Bespoke Process Type

Select:
Network Manager > Network Utilities > Import Survey Types
Select the pick list for the following import files:
Survey Type – 4survey_typeV8.txt
Survey Type Process – 4survey_type_procV8.txt
Manually update variable merge parameters

Select:
Data Analyser > Data Analyser Lookups > Process Type
Navigate to the “PFI Rules”
Highlight Stage 40 and select the “Detail” button

Select the “Parms” button
Ensure that the Parameters are set as 12 and 0 (Some CONFIRM Defaults use 12 and 10 and this cannot be changed by the import files)
As per the screen shot below