

Wiltshire Skid Resistance Policy



September 2018

WILTSHIRE COUNCIL SKID RESISTANCE POLICY

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1. Introduction

1.1 General

The Council is required to have in place a Policy governing the use of skidding resistance tests and the actions that arise from the survey data produced. This requirement is contained in 'Well Managed Highway Infrastructure: A Code of Practice 2016', which also recommends that a Policy be adopted as part of the Highways Asset Management Plan.

This document 'the policy' is applied to that part of the road network on which the Council conducts a skid resistance survey. In Wiltshire this skid resistance survey is carried out on the Scrim Survey road network (please see Appendix D for exceptions) using a *Sideway-force Coefficient Routine Investigation Machine* (SCRIM). The policy describes how the provision of appropriate levels of skid resistance will be managed to meet advice and guidance issued by the Highways Agency for Motorways and Trunk Roads in HD 28/15 'Skidding Resistance'; and how measurements of skid resistance are to be made and interpreted to meet the adopted levels through a staged prioritisation process to identify sites for further investigation and treatment.

In this document, the term 'skid resistance' refers to the frictional properties of the road surface measured using a specific device under standard conditions. The term always refers to measurements made on wet roads, unless specifically stated otherwise. These measurements are used to characterise the road surface and assess the need for maintenance, but cannot be related directly to the friction available to a road user making a particular manoeuvre at a particular time.

1.2 Background

An important aspect of maintaining the safe condition of the road is to provide an adequate wet road skid resistance. Studies have shown that improving skid resistance at targeted wet road crash locations can substantially reduce crash rates. The relationship between skid resistance and potential crash sites is not precise and there is no simple dividing line between a 'safe' and 'unsafe' skid resistance condition for a particular section of road but research has been carried out to establish some broad outlines. In the mid 1980s a study by the Department of Transport showed that for some site categories there was a sharp increase in crash risk below certain levels of Characteristic Scrim Coefficient (CSC). The results of this study were used to define the Investigatory CSC originally found in HD28/94 'Skid Resistance' and subsequently updated by HD 28/04 followed by HD 28/15 and 'Well-maintained Highways', Code of Practice for Highway Maintenance Management which has been subsequently updated by 'Well Managed Highway Infrastructure: A Code of Practice. The levels were based on a risk analysis.

Skid resistance improvements can be implemented at relatively low cost by use of surface dressings, retexturing and other means and can produce very substantial benefits to the community in terms of savings in crash costs, and in the reduction of crashes resulting in personal injury. Various studies have shown that expenditure on compliance with skid resistance standards has been cost effective. This is particularly noticeable at high stress sites such as those at approaches to traffic signals and pedestrian crossings since crash densities are high at these locations. Achieving the appropriate skid resistance requirement has produced a high benefit/cost ratio particularly in urban areas. Taking this idea even further, research carried out at Transport Research Laboratory has calculated that a 0.10 increase in CSC on the road network in Great Britain would reduce the wet road skidding rate from 35.4% to 22.2%.

2 Purpose of the SCRIM Policy Document

- 2.1 To outline the Council's approach to maintaining the appropriate levels of skid resistance on the Scrim Survey Road Network within Wiltshire using a staged prioritisation process to identify sites that require investigation based on Sideway-force Coefficient Routine Investigation Machine (SCRIM) data, Personal Injury Collision (PIC) statistics, police reports, traffic volumes and the road environment.
- 2.2 To demonstrate that skid deficient sites are prioritised and programmed in a consistent manner by the Council whilst taking into account budget, and programme considerations to ensure resources are directed to those sites in most need and of greatest risk without an increase in the Council's highway maintenance costs.
- 2.3 To demonstrate through the procedures outlined in this document that the Council have developed a consistent long term strategy to manage the skid resistance of Wiltshire's road network.
- 2.4 To demonstrate that the Council in developing this policy and strategy have adopted as far as reasonably practical and reflective of existing maintenance budgets funding skid resistance values contained within the Highways Agency Technical Standard HD28/15.
- 2.5 To demonstrate compliance with industry best practice contained within 'Well Managed Highway Infrastructure: A Code of Practice'.
- 2.6 To provide the Council with a section 58 defence for the non repair of the road network.
- 2.7 To outline the Council's approach to the early skid resistance of new surface courses and the monitoring of such sites based on the requirements of HD28/15.

3 HD28/15: Principles

The principles adopted within this document for the identification and prioritisation of investigation and remedial work has been developed from the guidance and advice given in Chapters 5 & 6 of HD 28/15 'Skidding Resistance' issued by the Highways Agency. Chapter 5 'Initial investigation' and Chapter 6 "Detailed site investigation and prioritisation' provides recommendations for identifying and prioritising sites. It identifies considerations needed for treatment selection and comments on the prioritisation phase; and has been considered in the options developed within the strategy stated in Appendices B and C.

- **Clause (5.1)** *All sites where the measured CSC is at or below the IL shall be investigated. The objective is to determine whether a surface treatment is justified to reduce the risk of vehicles skidding, whether some other form of action is required, or whether no action is currently required. If no action is taken, sites will automatically be reviewed again following the next skid resistance measurement if they remain at or below the IL.*
- **Clause (5.2)** *The investigation may be undertaken in two stages: an initial investigation, described in this chapter, to check the data and assess the need for a detailed investigation and, secondly, a detailed investigation to assess the justification and priority for treatment, which is described in Chapter 6.*
- **Clause (5.3)** *The process for initial investigation is outlined in Figure 5.1 split into the following steps:*

1. *Identify sites at or below the IL*
 2. *Identify other sites requiring investigation*
 3. *Data validation*
 4. *Identify sites for detailed investigation*
- **Clause (6.1)** *A detailed investigation is carried out to collate and assess the information available for each site in order to reach a decision about the best course of action. These detailed investigations are carried out on the sites identified from the process described in Chapter 5.*
 - **Clause (6.2)** *The process is outlined in Figure 6.1 and is split into the following four steps:*
 1. *Collate data*
 2. *Plan investigations*
 3. *Carry out investigations*
 4. *Prioritise and programme maintenance*

4 Responsibilities

4.1 The Roads and Bridges Team will be responsible for the following:

- a) Management, development, implementation and regular review of this document 'the policy' and its governance.
- b) The procurement and subsequent management of condition surveys with contractors.
- c) Quality assurance, the Highway Asset Manager assigned to skidding survey procurement will ensure that all testing equipment employed on site survey complies with the appropriate quality assurance procedures and is duly accredited to survey.
- d) Assignment of initial site categories and initial investigatory levels, which would form the basis of the annual skid resistance tests.
- e) Processing, analysis and review of raw SCRIM data received from survey contractor.
- f) Review of the site categories and investigatory levels for the Scrim Survey Road Network using an accredited Pavement Management System (PMS).
- g) Maintaining the appropriate records of site visits and associated documents. This is detailed further in the 'Records' Section 15 of this document.
- h) Informing other departments of any issues affecting the site which may be contributory to skid resistance issues.
- i) Providing a prioritised list of sites in need of remedial works and to make informed decisions to add to the annual highways programme.

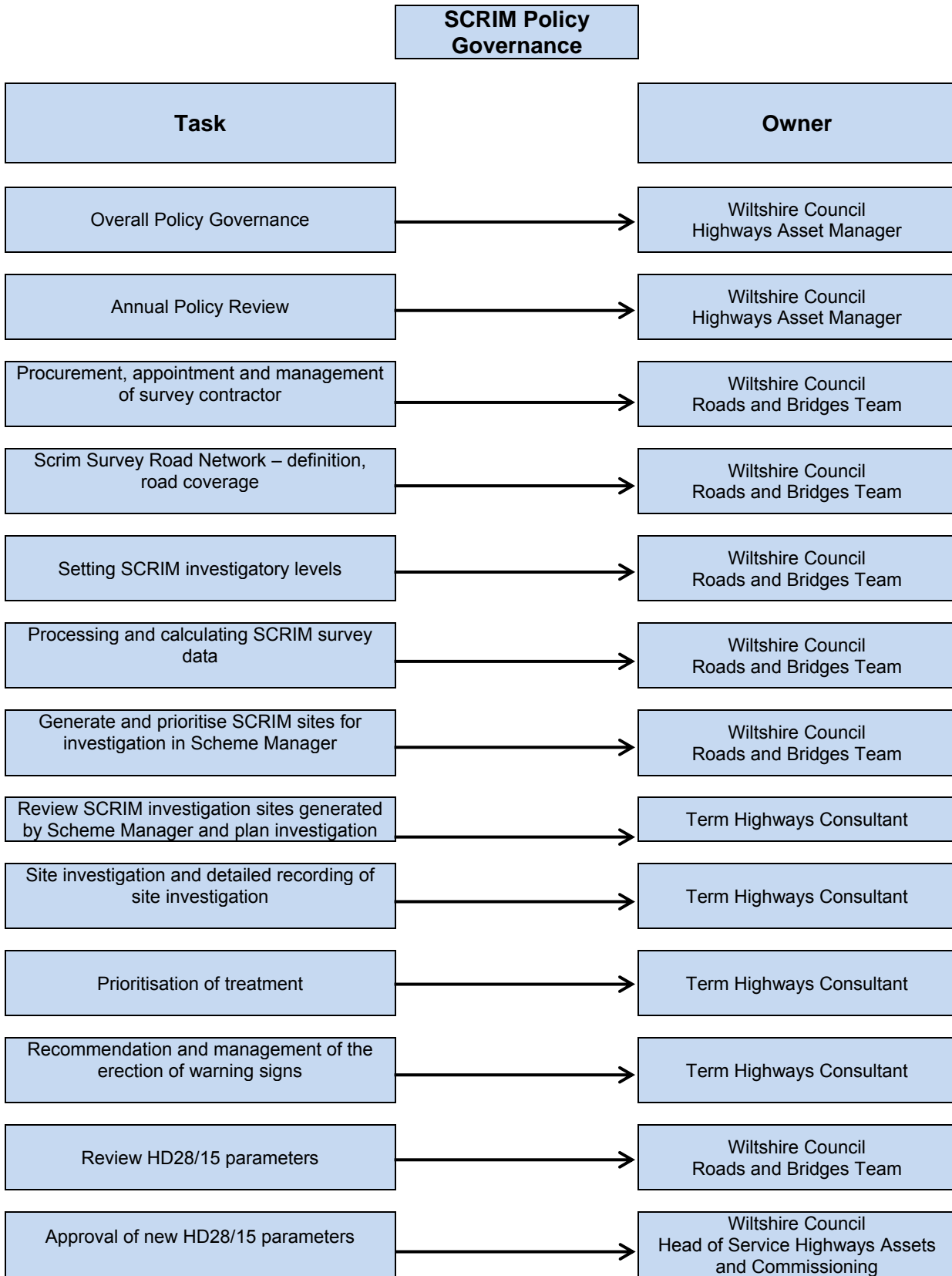


Figure 4.1 SCRIM Policy Governance

5 Methods of Surveying

There are currently three methods of testing skid resistance:

- **SCRIM**
- **Grip Tester**
- **The Pendulum Test**

- 5.1 SCRIM and Grip Tester are acceptable methods for routine testing on the Scrim Survey Road Network whilst the Pendulum testing is more suited to footway and footpath surveys because of its small sample length. It is also not suited for use on fine or coarse textured surfaces because of operational difficulties (HD28/04, Annex 6.21).
- 5.2 In 2004-2005 Wiltshire Council adopted the single annual survey method as detailed in HD 28/15 Annex 2 and the full adoption of this survey methodology is ongoing. The Council survey only those roads on the Scrim survey road network, as per Appendix D of this policy document, on an annual basis, hence the whole network acts as the benchmark sites to achieve the Characteristic Scrim Coefficient (CSC). In the absence of this method of surveying being available a suitable alternative would be used to survey following a request after a Personal Injury Collision (PIC).
- 5.3 SCRIM was introduced in the 1970s to provide a method for routinely testing the skid resistance of the national road network and works in the following way:
- 5.3.1 The driven machine uses the sideway force principle to measure skid resistance.
- A freely rotating test wheel is fitted with a smooth rubber tyre. This is mounted mid machine in line with the nearside wheel track and angled at a 20° to the direction of travel of the test vehicle. The wheel is applied to the road at a known vertical load, which remains constant.
 - A controlled flow of water wets the road directly in front of the test wheel. When the wheel moves forward this slides in a forward direction, subsequently generating a sideways force. The force generated by the resistance to sliding is related to the wet road skid resistance of the road surface.
- 5.3.2 The measurement recorded of this sideway force allows the Sideway Force Coefficient (SFC) to be calculated. SFC is sideway force divided by the vertical load. These values collected can be recorded continuously along the road to provide skid resistance.
- 5.3.3 Skid resistance varies with vehicle speed. To try and achieve comparable results the survey vehicle attempts to achieve a constant speed throughout Wiltshire; this would be 50 km/h.
- 5.3.4 It is important to note, that due to the angle of the test tyre it is much slower than the speed of the operating vehicle. Subsequently any measurements taken are at a low speed, around 17 km/h.
- 5.3.5 Measurements are recorded as SCRIM readings (SR). A SCRIM reading is the average Sideway Coefficient Force (SFC). A SCRIM reading is the average SFC, multiplied by 100 for a predetermined length of road which is normally 10 metres, recorded as an integer.

5.3.6 SCRIM vehicles are subject to testing procedures to receive accreditation, as with many surveying vehicles. The Council will ensure all vehicles used to survey the network are accredited appropriately.

6 Annual SCRIM Survey Programme

6.1 Skid Resistance is not a constant but is influenced by various factors, such as test speed, temperature, weather conditions and also longer term effects such seasonal weather variations or change of traffic flows. Therefore conditions are controlled as far as possible:

- By measuring the in-service road skid resistance annually in accordance with the criteria below, between the nationally recognised testing periods.
- By specifying a standard testing speed - 50km/h.
- By providing an up to date network plan for the survey contractor to use.

6.2 A defined programme of sites held on Wiltshire Council's Pavement Management System labelled Scrim Survey Road Network shall be tested annually (See Appendix D for roads included and excluded) and in both directions of each single carriageway road and also to include the slow and fast lanes on dual carriageway roads.

6.3 Additional sites may also be selected in accordance with the "Frequent Collision Form" and in liaison with the Traffic Engineering Team. Also the following criteria should be applied in the priority order given below:

- i. Known history of PIC occurrence being more frequent than normal, (i.e. personal injury collisions within a 3 year period) particularly if 33% (one-third) or greater occur in wet conditions.
- ii. Other sites where skidding is reported and where there is notable potential for conflict between road users, particularly where the outcome is likely to have severe consequences including:
 - a) Approaches to pedestrian crossing and other high risk sites where significant numbers of pedestrians cross at a given location.
 - b) Approaches to and across minor and major junctions and approaches to roundabouts, particularly where there is poor advance visibility or the layout is complicated.
 - c) Gradient steeper than 10% for more than 50 metres.
 - d) Bend radii less than 500 metres on single carriageway.

6.4 PIC data will be provided on an annual basis by the Council's Traffic Engineering Team from Stats 19. It will be provided in a database and map format.

6.5 Fatal or serious PIC sites: Where fatal or serious PICs occur, and the skid resistance of the road surface may be a contributory factor, the surface condition and historical data will be assessed within 30 days of the Council receiving notification of the PIC.

7 Site Categorisation and Setting the Investigatory Level

7.1 Setting an investigatory level is essential to monitoring the appropriate level of skid resistance relevant at that specific site. It is important to set the Investigatory Level (IL) at

the correct level to the location. If an IL is too high at a site it can with time and monitoring be lowered to reflect the true situation; however if it is set too low initially then it may be difficult to detect if the skid resistance requires improvement until it has fallen further than an acceptable level. Site visits and local knowledge are important in setting a level and in judging whether it is correct for that site. Site categories can vary in length from a very short section of metres to several kilometres, depending on the nature of the site.

7.2 The Scrim Survey Road Network has been categorised for skidding investigatory levels in accordance with the requirements of HD28/15: Table 4.1 – Site Categories and Investigatory Levels, see Appendix A.

- Wiltshire Council use WDM Ltd PMS Site categorisation software for determining the investigatory levels on site.
- The process to achieve site categorisation has been to conduct a desktop exercise using survey video footage obtained from SCRIM and SCANNER surveys. These are validated and reviewed by the Roads and Bridges Team.
- Where the site Investigatory Level set by the Highways department is below that which is recommended in Table 4.1 of HD28/15. The justification for setting the lower level shall be documented. This process is covered in Appendix C of this document.

7.3 The Council's road network Investigatory Levels shall be reviewed when:

- A significant change to the network is made.
- As part of a regular review of all Investigatory Levels every 3 years.
- During site investigation of SCRIM schemes generated and prioritised by this policy.

In all cases, these changes must be logged in the PMS and the PMS highway network amended as necessary.

8 Processing and Analysis of SCRIM Data

8.1 The accredited survey contractor will be provided with a GIS copy of Wiltshire's road network, network details and an HMDIF format document for the data to be placed onto.

8.2 Once the survey has been completed, the data collected will be validated and processed by the survey company. This process involves;

- Correcting factors – i.e. where it was not possible to get the survey vehicle up to the specified test speed.
- Multiplication by the index of SFC applicable to the test wheel when it was surveying.
- Calculation of the CSC.

8.3 Once data has passed through validation and processing, it will then be returned to Wiltshire Council in the HMDIF format in order for the Roads and Bridges Team* to load the data into the PMS and develop the SCRIM deficiencies on the network (see Section 16). This process will highlight any sections which have not been surveyed or which were missing and this can then be addressed by the team and addressed in an appropriate manner e.g. arranging retesting if necessary or if survey data does not exist on the network or there are areas where data has been dropped, the previous year's data shall be used as its replacement.

8.4 No section shall have 2 consecutive years where no measurement has been taken.

- 8.5 SCRIM deficiencies shall be analysed against the relevant Investigatory Level to determine “realistic” scheme lengths (Section 16). This data will be scored, analysed and processed through the prioritisation strategy detailed in Appendix B using the Scheme Manager (SM) module in the PMS. The top 100 schemes prioritised using the criteria in Appendix B as well as all schemes with an average deficiency greater than 0.15 CSC below investigatory level will be investigated on site.
- 8.6 All identified sites shall be prioritised and investigated by the Roads and Bridges Team* to determine if the intervention level is correct and whether treatment to improve the skid resistance is required or an alternative action is appropriate. Any such site visits will be documented using the appropriate forms featured in Appendix C and in accordance with section 9 of this document.

* task may be designated to the Term Highways Consultant

9 Site Investigation

Site visits are essential to establishing, ‘what’s out there’ and the accuracy of the survey results collected. Sites highlighted in the survey analysis, the “Frequent Collision Form”, by routine safety inspections, or by the Traffic Engineering Team, or by any other means will require a detailed logged inspection.

- 9.1 Sites identified will be visited on the basis of the ‘highest risk ranking’ as determined by Scheme Manager. This will not necessarily be the most deficient site however all sites produced by SM, which have an average deficiency **greater than 0.15 below investigatory level** will be assessed on site.

- **Sites where the CSC is greater than 0.15 below the defined Investigatory Level will require a detailed investigation within a 3 month period of receiving the processed survey results. The site visit will then establish if the Investigatory Level is correct and if so, whether surface treatment is necessary to reduce the risk of PICs; particularly if any PICs have occurred in wet conditions or have involved skidding. Site visits will be well documented using, the site visit form detailed in Appendix C.**

- 9.2 Some form of treatment or intervention will be justified if:

- Greater than 50m of the section has a SCRIM deficiency greater than 0.15 below investigatory level.
- Based on PIC analysis, the collision rate per 100 million vehicle/kilometres is higher than those national rates shown in Road Casualties Great Britain (DfT/ONS).
- Based on PIC analysis, the site has a higher than average proportion of PICs in wet conditions or involving skidding for the type of site being considered.
- The nature of individual sites and the demands of road users mean that a higher PIC risk (compared with other sites in the same category) might be expected with the skid resistance at its current value or if it were to fall further before the next measurement. In this case preventative maintenance is justified to address a potential increase in PIC risk.

- 9.3 If none of the above criteria are met, the site will be kept under review. If skid resistance and PIC pattern remain stable for more than 3 years then lowering of the Investigatory Level should be considered, this will also be documented using the Site Investigation

Form, featured in Appendix C.

- 9.4 The most appropriate form of treatment will be identified for each site which is found to require remedial works to restore an adequate level of skid resistance. Generally these will be a surface treatment, however if site investigations should identify different defects or behaviour of road users which an engineering measure may be able to resolve, the relevant department within Wiltshire Council will be notified to decide the best course of action for the site in question.
- 9.5 If the site visit were to find additional routine maintenance issues, such as additional signing required or road markings required or road sweeping required, the appropriate department should also be informed.
- 9.6 If the skid resistance and PIC pattern is stable over an extended period of time i.e. for more than 3 years, it might be advisable to reassess the Investigatory Level and consider lowering it. It is essential that stability of the site is observed and documented before reducing the Investigatory Level. Site investigations will be prioritised based on 5 main categories which are detailed later in this document under Appendix B.

10 Prioritisation of Treatment

Site investigations are essential in this process of identifying the sites most in need of remedial or other works to improve skid resistance. The detailed process of prioritisation is explained in Appendix B however;

- **The first priority for remedial treatment is any site where the average skid resistance is more than 0.15 units of CSC below the defined Investigatory Level (subject to site investigation).** Thereafter, priority must be given to completing remedial treatments where:
 - The skid resistance is substantially below the Investigatory Level (e.g. at least 0.15 units of CSC or below value) and/or
 - Low skid resistance is combined with low texture depth and/or
 - PIC history indicating that there is clearly a risk of wet or skidding PICs.
- 10.1 In other cases, remedial surface treatment will be programmed as a longer- term measure, taking into account other maintenance requirements. Priority for treatment should consider all new treatment lengths and those previously recommended for treatment but where treatment has not yet been carried out or programmed. If a year has elapsed since site investigations the PIC history for the site will be reassessed using the most up to date data.
- 10.2 The investigation level of greater than 0.15 units of CSC below Investigatory Level is a departure from the level set out in HD 28/15 of CSC at or below the Investigatory Level. This figure has been derived from an assessment of the 2009 scrim data. This process identified 100 sites for further investigation and is considered to represent the optimum number to ensure the correct balance between resource availability, budget and programme.

The long term objective of the Council is to comply with limits stated in HD 28/15 through a 10 year strategy; a strategy that will involve the annual review of the parameters stated above and the scrim process stated in section 16 of this policy.

11 Use of Warning Signs

11.1 Signs such as the slippery road sign are essential for notifying road users of any problematic areas of highway ahead, which may require extra care and attention. The use of 'slippery road' sign(s) (Diagram 557 that can be supplemented with a distance plate) used in accordance with the instructions contained in The 'Traffic Signs Regulations and General Directions 2016', shall be considered where;

11.1.1 The skid resistance determined by Scheme Manager is considerably below the Investigatory Level (i.e. >0.15* units of CSC below IL). However, signs will not be erected until the site has been investigated in accordance with section 10 and documented on the Site Visit Form (Appendix C). If deemed necessary signs will be erected within 1 month of the investigation.

11.1.2 The Intervention Level is not breached and the surface is to specification, but PICs still occur as a result of road user behaviour (ref HD28/15-Section 5) - signs will be erected within 1 month of the investigation.

11.1.3 A site investigation and a safety audit have concluded that there is a need for treatment to improve road skid resistance - signs will be erected within 1 month of the investigation.

11.2 If a site has been resurfaced using a Thin Surface Course which exhibits a low skid resistance, as Chapter 12 explores. The appropriate signs will be erected in accordance with The Traffic Signs Regulations and General Directions 2016 and any subsequent amendments as appropriate.

11.3 Slippery road warning signs should be removed from site as soon as they are no longer required. This should be after any remedial treatment has been carried out and the Highways Team, are satisfied that skidding resistance levels have been restored to an appropriate level. This may require skid resistance and texture depth testing to ensure that the necessary level has been achieved. A site visit will be documented and kept on file when signs are both erected and removed this will be documented on the Site Investigation Form (Appendix C).

12 Early Life Skid Resistance of New Wearing Courses

12.1 HD28/04 recommends that consideration should be given to the use of slippery road signs on new thin surface course treatments that may exhibit a lower skid resistance in the first period of service, than after a period of trafficking.

12.2 For Engineering purposes Wiltshire Council generally does not use thin surface course treatments (such as SMA) on the road network and therefore do not monitor early life skid resistance.

13 Re - Classification of Site Investigatory Levels

13.1 Re-classification and amendments to the Investigatory Levels should only be undertaken with the approval of the Highways Asset Manager. The criteria for amending a site are:

- Incorrect site classification (HD28/15 Table 4.1).
- Changes to the network (classification usage alignment) resulting in a need to amend the site category.

- Amendments to or the addition of site categories/investigatory levels after a 3 year review, 1/3rd per year is assessed, in compliance with this document and documented using the SCRIM Category Editor module in the PMS. This review is not a detailed review and is used primarily to ensure the SCRIM site categories are correct. Investigatory levels may be raised as a result of this procedure but in most cases the recommended Investigatory Level will be used (see Appendix A)
- Re-classification due to the level of PICs.
- Re-classification due to site investigation brought about by this policy.

13.2 Any such change to the Investigatory Level must be applied to the records held on the PMS System. Where site investigation forms have been completed (Appendix C) these must also be held on record.

14 Policy Records

14.1 Where any verbal or written enquiries regarding skidding matters are recorded onto Wiltshire Council's Customer Enquiries or Highway Claims Systems, details of these will be passed to the Roads and Bridges Team.

14.2 An initial investigation will be carried out by the Road and Bridges Team* within 3 months to determine the nature of the problem, e.g. spillage, loose chippings, surface fretting, loss of surface texture or polishing of surface aggregate, etc.

* task may be designated to Highways Term Consultant or Local Highways Office

14.3 Where polishing is considered to be the cause of the problem the Highway Asset Manager will arrange for the following to be undertaken:

- To determine whether it is already a known problem site based on PIC data and whether skid testing has already been requested.
- To obtain any available skid testing data for the site (tested within last 3 years) and if not, to arrange for testing to take place.
- To arrange for a one-off skid resistance test or inclusion of the site in the next round of annual testing programmes whichever is deemed appropriate to the site.

14.4 After testing, if the CSC for the site is below the defined Investigatory Level a site investigation will be arranged in accordance with Section 9.

14.5 Details of the actions proposed will be recorded on the trace form and held on the customer enquiries system in accordance with the procedures specified in this document.

14.6 The following records shall be maintained to demonstrate implementation of this policy; these shall be maintained by the Roads and Bridges Team:

- Setting of Investigatory Levels for the Scrim Survey Road Network, including justification for any deviation from the recommendations of HD28/15.
- Setting of Investigatory levels for selected sites on the Scrim Survey Road Network, including justification for any deviations from the recommendations of HD28/15, see details in section 7 of this document.

- Quality Assurance documentation and certification from any survey contractors engaged.
- Skid testing results and data analysis since the introduction of this policy.
- Site investigation findings for any sites assessed.
- A database of sites where and when slippery road warning signs have been erected showing subsequent removal dates where appropriate shall be maintained by the Roads and Bridges Team.
- Priority lists of sites for remedial treatment to restore an adequate level of skid resistance.
- Details of completed works programmes, relating to remedial treatment for substandard skid resistance.
- A Register of enquiries regarding skidding matters and actions taken.

15 Delegations and Authorised Officers

- 15.1 The responsibility for implementation of this policy and Procedures document is delegated to the Head of Highways Asset Management and Commissioning.
- 15.2 For practical day-to-day delivery, the authorised persons to carry out the various stages necessary to implement the above policy and procedures are shown in Section 4.

16 The Procedure for Defining SCRIM Sites

The procedure for assessing SCRIM survey data in Wiltshire for the Scrim Survey Road Network is outlined in figure 16.3 and is a modification of Figure 2.1 found in HD 28/15.

In general terms the process will follow the procedure below;

1. Define the network which the SCRIM policy document will relate to.
2. Survey the network in accordance with the new annual survey method.
3. Run the data through the PMS system to develop the SCRIM deficiency on the network.
 - If data does not exist on the network or there are areas where data has been dropped, the previous year's data shall be used.
 - If no data is available then it shall be backfilled with the average reading for the previous road section.
 - **No section shall have 2 consecutive years where no measurement has been taken.**
4. SCRIM deficiencies shall be analysed against the relevant Investigatory Level to determine "realistic" scheme lengths based upon a minimum length of 50m using WDM's Scheme Manager as outlined below.
5. The data will be scored and analysed, and processed through the prioritisation strategy.

Scheme Manager uses the following condition metric to determine the SCRIM deficient sites:

The SCRIM survey data is calculated in the PMS in 10m lengths and provides individual readings for each side of the carriageway as described in Section 6. Each 10m length contains a SCRIM deficiency reading. Scheme Manager will generate individual schemes for each side of the carriageway. The site needs to be deficient by -0.03 CSC. The *Minimum Scheme Length* is 50m, with a *Maximum Join Distance* between defective areas of 20m. This will develop 50m length deficient schemes with an average deficiency. Figure 16.1 below is a screen print from Scheme Manager.

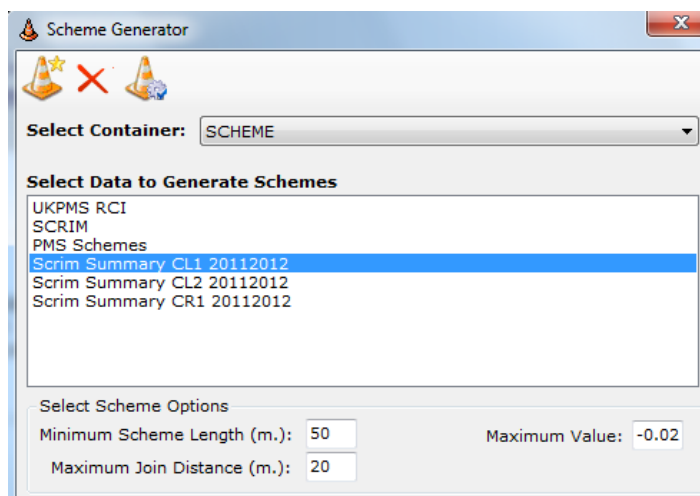


Figure 16.1 – SCRIM Scheme Creation Parameters
*Maximum Value is calculated as >-0.02

The functionality to create a scheme is in essence to merge the condition over a known length between known thresholds. The *Maximum Join Distance* is the length the system searches to find another defect length which is below the *Maximum Value*.

If the system finds another defective length lower than the *Maximum Value* then it shall continue to merge the defect lengths together until it meets the *Minimum Scheme Length*. An illustration of this procedure is shown in figure 16.2.

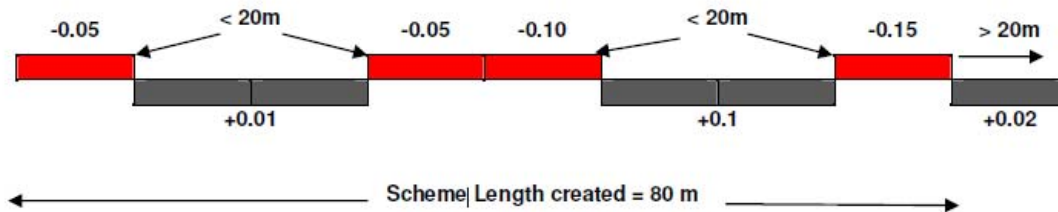


Figure 16.2 – Scheme Creation example

Figure 16.2 shows how the scheme would be created completing the scheme length where it cannot find a defect length lower than the *Maximum Value* within the *Maximum Join Distance*. Scheme Manager then creates a length weighted average deficiency for the scheme. In this example the average deficiency is calculated as:

$$\frac{(-0.05 \times 10) + (+0.01 \times 20) + (-0.05 \times 10) + (-0.10 \times 10) + (+0.1 \times 20) + (-0.15 \times 10)}{80}$$

The average deficiency in this example is -0.01.

This process will highlight sites with an average deficiency greater than -0.15. All schemes generated using the criteria in Section 16, regardless of their average deficiency will also be prioritised using the methods in Appendix B. Please see section 18 for an example of this process.

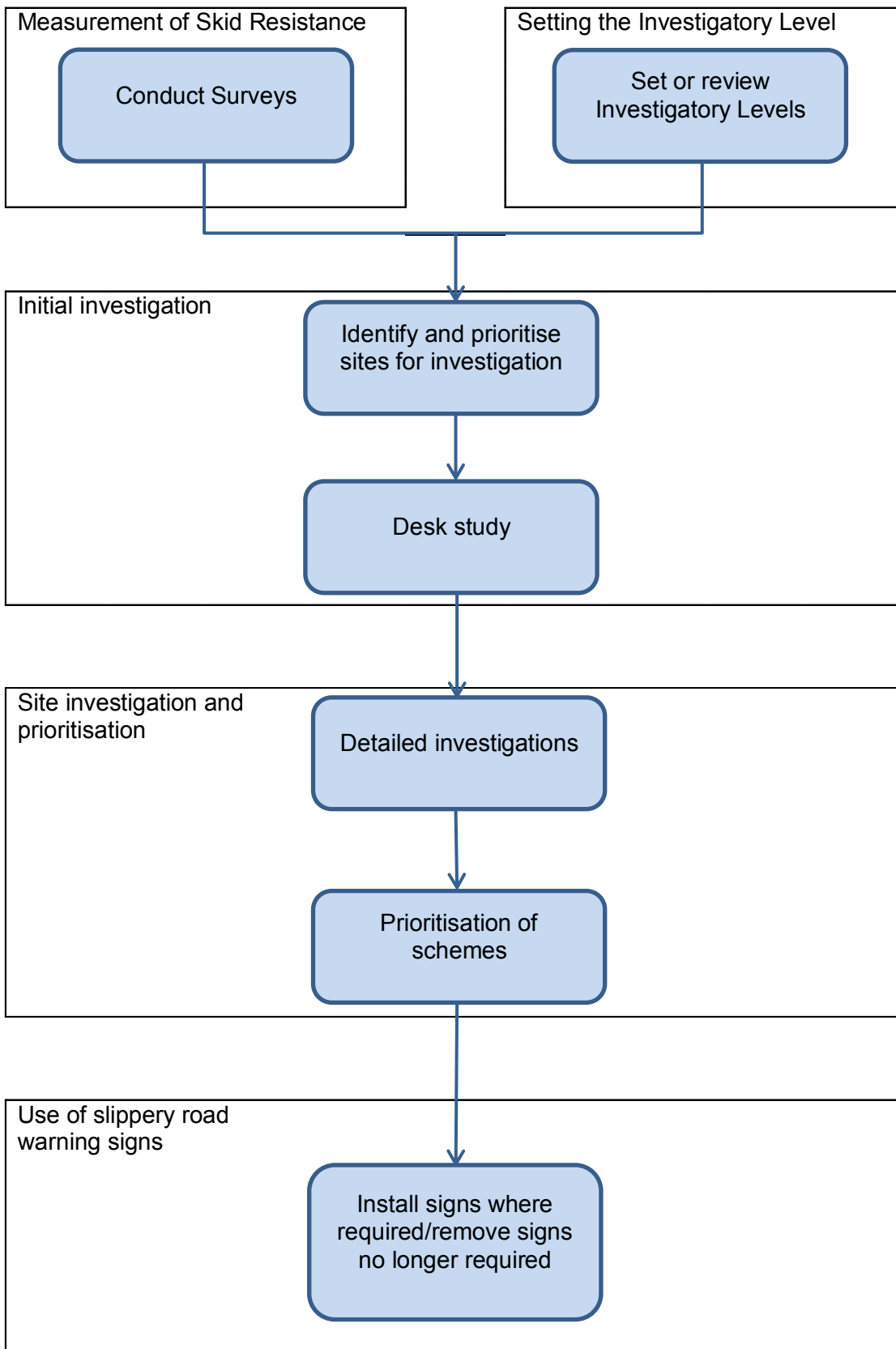


Figure 16.3 – Overview of process

17 References:

17.1 Design Manual for Roads and Bridges

- HD28 (DMRB Volume 7 Section 3 Part 1) Skidding Resistance
- HD36 (DMRB Volume 7 Section 5 Part 1) Surfacing Materials for New and Maintenance Construction
- HD36 (DMRB Volume 7 Section 5 Part 2) Bituminous Surfacing Materials and Techniques.

17.3 Roads Liaison Group

- The Traffic Signs Regulations and General Directions 2016

17.4 Statutory Documents

- Highways Act 1980
- Well Managed Highway Infrastructure: A Code of Practice

Appendix A: Table of Investigatory Levels

Site Category and definition	Investigatory Levels at 50km/h							
	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
A Motorway >50mph		X						
B Dual Carriageway non event >50mph		X						
C Single Carriageway non event >50mph			X					
B-1 Dual Carriageway non event <50mph	X							
C-1 Single Carriageway non event <50mph		X						
Q Approaches to and across minor and major junctions, approaches to roundabouts >40mph					X			
Q-1 Approaches to and across minor and major junctions, approaches to roundabouts ≤ 40mph				X				
K Approaches to pedestrian crossings and other high risk situations >40mph						X		
K-1 Approaches to pedestrian crossings and other high risk situations ≤ 40mph					X			
R Roundabout					X			
G1 Gradient 5-10% longer than 50m					X			
G2 Gradient 10% longer than 50m						X		
S1 Bend radius <500m – dual					X			
S2 Bend radius <500m – single carriageway >50mph						X		
S1-1 Bend radius <500m - dual carriageway <50mph				X				
S2-1 Bend radius <500m – single carriageway <50mph					X			

Table A.1 Wiltshire Site Categories and Investigatory Levels – Adapted from HD28/15
Notes: X denotes the Investigation Level (IL) which is to be used in Wiltshire

Appendix B: Prioritisation of SCRIM Sites for Treatment

The Prioritisation of “Hazard Attributes” Approach

It is important that the initial selection of hazard attributes and respective weightings should be considered by all relevant stakeholders. There should be no ad hoc changes made to the procedure and it should be reviewed annually to ensure it is still in line with the Asset Management Plan and meet the needs of the Stakeholders.

Note: It is important to remember that this process will be used once the schemes have been identified using the criteria in Section 16. Table 1 below shows the five hazard attributes and weightings used in this prioritisation process in Wiltshire.

Hazard Attributes	Weighting (%)
Personal Injury Collisions	15
Skid Deficiency	35
Speed Environment	20
Investigatory Level	20
Road Hierarchy	10

Table 18.1 - Weighting of Attributes

18.1 Personal Injury Collisions – (15%)

This attribute accounts for all PICs that occur within the scheme extent.

Calculating Score:

- Total of all PICs over the last three years.
- One or more fatal PICs shall have a maximum score of 15.

No. of PICs	Score
0	0
1 - 2	3
3 - 4	6
5 - 7	9
8 - 10	12
>10	15

Table 18.2 – PIC Categories

18.2 Skid Deficiency – (35%)

This attribute accounts for the condition of the surface. The latest seasonally corrected information should be used. For each site there will be a value for each 10-metre lane section as below:

Skid Deficiency Value = CSC – IL

CSC = Characteristic SCRIM Coefficient

IL = Investigatory Level

Calculating Score:

- a. Every 10 metre lane section within each SCRIM site defined in Section 16.0 will have a score based upon the table below:

Skid Deficiency	Score
>0	0
Between 0.00 & -0.03	7
Between -0.04 & -0.06	14
Between -0.07 & -0.09	21
Between -0.10 & -0.15	28
Greater than -0.15	35

Table 18.3 – Skid Deficiency Categories

18.3 Speed Environment – (20%)

This attribute accounts for the signed speed of the road section

Calculating Score:

Note: The actual speed limit shall be used but this doesn't necessarily represent the speed of vehicles.

Speed Environment (miles/hr)	Score
30 mph	8
40 mph	12
50 mph	16
Greater than 50mph	20

Table 18.4 Speed Environment Categories

18.4 Investigatory Level (IL) – (20%)

This attribute accounts for the importance of the site in terms of skid resistance need. A higher value indicates that the surface requires a higher demand for skid resistance as motorists will be required to either stop or slow down quickly or negotiate sensitive road alignments such as bends, gradients, crossfall. (See Appendix A)

Calculating Score:

Investigatory Level	Score
0.30	4
0.35	8
0.40	12
0.45	16
Greater than 0.50	20

Table 18.5: Investigatory Categories

18.5 Road Hierarchy – (10%)

This attribute accounts for the importance of the site in terms of road classification which is reflective of vehicular trafficking levels and associated risk factors.

Calculating Score:

Description	Road Hier.	Score
Unclassified Roads	U	4
C Class Roads	C	6
B Class Roads	B	8
A Class Roads	A	10

Table 18.6: Road Hierarchy Categories

18.6 Score Calculation

Scheme Manager (SM) creates a length weighted *hazard score* for each of the attributes above (with the exception of PICs) using the values set out in the score column of each attribute table. The PIC *hazard score* is not length weighted and is calculated by counting the number of PICs within the scheme polygon and then applying the score to it. The example below shows how SM calculates a *hazard score* for Skid Deficiency. It does this by taking the skid deficiency reading over each 10 metre section and applying it to the score values set out in table 18.3.

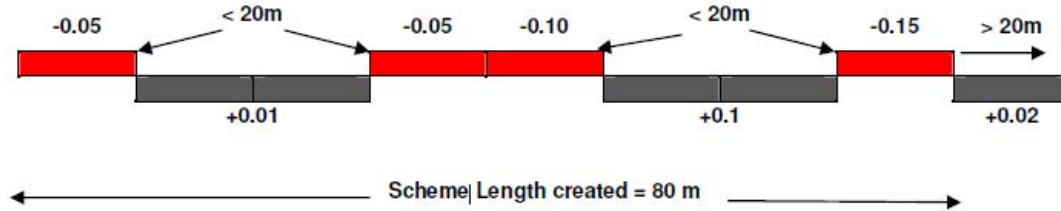


Figure 18.1 – Calculation of hazard scores

$$\frac{(14 \times 10) + (0 \times 20) + (14 \times 10) + (28 \times 10) + (0 \times 20) + (28 \times 10)}{80}$$

The Skid Deficiency attribute score in this example is 10.5.

SM then combines all five attribute scores *to create a Total Hazard Score with a maximum score of 100*. The sites are then ordered from highest to lowest with the highest priority ranking allocated to the site with the highest total (see Table 18.7 below).

Total Hazard Score = PIC Hazard Score + Skid Deficiency Hazard Score + Speed Environment Hazard Score + Investigatory Level Hazard Score + Road Hierarchy Hazard Score

Table 18.7 is purely illustrative of the overall “Prioritisation of Hazard Attributes Approach” and is not an extract from Scheme Manager.

Weighting (%)	15	35	20	20	10	Total Hazard Score	Priority Rank
	HAZARD ATTRIBUTE SCORES						
Site Name	PICs	Skid Def.	Speed Env.	IL	Road Hier.		
Site 1	12	28	20	4	2	66	1
Site 2	3	28	20	4	4	59	2
Site 5	3	14	20	4	4	45	3
Site 6	3	10.5	20	4	4	41.5	4

Table 18.7: Prioritisation of Hazard Attributes Approach (Example)

Appendix C – Site Investigation Form

SITE INVESTIGATION FORM - SITES IDENTIFIED IN ACCORDANCE WITH SCRIM POLICY	
Road Name:	
Location:	
Date of Site Inspection:	
Carried out by:	
Weather Conditions	
PAVEMENT CONDITION DATA	
Is the lowest skid resistance in areas where road users need to stop or manoeuvre?	
Rutting:	
Delaminating:	
Cracking:	
Fattening up:	
Cross trenches:	
Gradients:	
Vegetation:	
Surfacing Material:	
VISUAL ASSESSMENT	
Kerbs:	If yes, face depth (mm):
Footway:	
Drainage:	
Positive gullies:	
Positive side entries:	

Grips:
Ditches:
None evident:
Is a visual inspection of the surface condition consistent with the available survey data?
Is the general surface condition consistent with that of the nearside wheel path (where skid resistance and texture depth is usually measured) or are there localised areas of the following that could give rise to uneven skid resistance, and so increase the risk of road traffic collisions occurring?
Polished surface:
Low texture depth:
Patching:
Areas of different surfacing materials:
Is the area of the maintained pavement surface free from debris and other sources of contamination?
Is water known to drain adequately from the carriageway during heavy rain?
Is the pavement free from other defects such as potholes?
Is there any evidence that road users have had difficulty in negotiating the site successfully (e.g. tyre tracks in verge, tyre deposits on carriageway due to heavy braking)?

ROAD LAYOUT

Is the road design appropriate for the speed and volume of traffic?

Is the layout unusual or likely to be confusing to road users?

Is the carriageway particularly narrow?

Is the road layout appropriate for the number and type of vulnerable road users (e.g. pedestrians, cyclists, motorcyclists)?

Are junction sizes appropriate for all vehicle movements?

Are priorities at junctions clearly defined?

Are traffic signals clearly visible and operating correctly?

MARKINGS, SIGNS & VISIBILITY

Are all road markings and traffic signs appropriate and effective at all times (i.e. day and night)?

Are there any redundant traffic signs which cause confusion?

Are signs adjacent to high speed roads adequately protected vehicle impact?
Is visibility adequate for drivers to see the correct path?
Are sightlines at side road junctions/accesses adequate?
Does any landscaping affect visibility?
If vehicle queuing is likely, is the back of the queue visible to approaching motorists?
SUGGESTED TREATMENT
ANY OTHER RELEVANT INFORMATION

Appendix D – Scrim Survey Road Network

Roads included within the Wiltshire Scrim Survey Road Network

Road No.	Description
A27	JUNCTION A36 (WHITEPARISH) EAST TO HAMPSHIRE BOUNDARY
A30	DORSET BOUNDARY TO HAMPSHIRE COUNTY BOUNDARY
A3026	JUNCTION A338 TIDWORTH TO JUNCTION A342 LUDGERSHALL
A3028	A345 DURRINGTON TO A303 BULFORD
A3094	JUNCTION A36 NETHERHAMPTON TO A338 HARNHAM
A3098	SOMERSET BOUNDARY EASTWARDS TO A350 WESTBURY
A3102	A350 MELKSHAM NE TO ECC RBT CALNE MARSH
A3102	A4 CALNE TO PRINCE WALES RBT WOOTTON BASSETT
A3102	PRINCE OF WALES RBT TO AND INCLUDING JUNCTION 16 M4
A3102	A3102 (JUNCTION 16 TO WILTS/SWINDON BOUNDARY)
A338	HAMPSHIRE BOUNDARY NORTH TO BERKSHIRE BOUNDARY
A342	A4 SOUTHEAST TO HAMPSHIRE BOUNDARY
A343	JUNCTION A30 TO HAMPSHIRE BOUNDARY
A345	CASTLE ROAD RBT (A36) NORTH TO A4 MARLBOROUGH
A346	A342 NORTH TO SWINDON BOUNDARY
A350	DORSET COUNTY BOUNDARY NORTH TO M4 JUNCTION 17
A354	HAMPSHIRE BOUNDARY NORTHEAST TO JUNCTION A338 SALISBURY
A360	ST PAULS RBT SALISBURY NORTH TO DEVIZES
A361	SOMERSET BOUNDARY NE TO A4 BECKHAMPTON ROUNDABOUT
A362	COUNTY BOUNDARY WEST TO JUNCTION A36
A363	BANES/WILTSHIRE BOUNDARY SOUTHEAST TO A350 YARNBROOK
A365	A4 BOX TO A361 SEEND FORK
A366	COUNTY BOUNDARY TO TRINITY RBT TROWBRIDGE
A4	COUNTY BOUNDARY EAST TO BERKSHIRE BOUNDARY
A420	COUNTY BOUNDARY EAST TO A4 CHIPPENHAM
A429	M4 JUNCTION 17 NORTH TO COUNTY BOUNDARY
A4361	BECKHAMPTON RBT NORTHWARDS TO C121 SALTHROP FARM
B3052	GEORGE LANE (A345 EAST TO A346) MARLBOROUGH
B3079	COUNTY BOUNDARY NORTH TO A36 LANDFORD
B3080	A338 DOWNTON EAST AND SOUTH TO COUNTY BOUNDARY
B3081	BOUNDARY SOUTHEAST TO TOLLARD ROYAL TO BOUNDARY
B3083	A36 STAPLEFORD NORTH TO A303 NORTH TO A360 SHREWTON
B3085	A345 EAST THROUGH DURRINGTON TO A3028
B3086	A360 (SHREWTON) NORTH EAST AND SOUTH A344 AIRMANS CORNER
B3087	A345 PEWSEY TO A346 RBT BURBAGE
B3089	A303 WILLOUGHBY HEDGE EAST TO A30 BARFORD ST MARTIN
B3092	B3095 MERE NORTH TO COUNTY BOUNDARY
B3095	COUNTY BOUNDARY (MERE) NORTHEAST TO A350 LONGBRIDGE DEVERILL
B3097	HAYNES ROAD WESTBURY N AND E TO YARNBROOK RBT & HAWKERIDGE LINK
B3098	A350 WESTBURY EAST TO A342 WEDHAMPTON
B3099	COUNTY BOUNDARY EAST TO A3098 WESTBURY
B3101	A361 (CAEN HILL) TO A342 (ROWDE)
B3105	A363 (BRADFORD ON AVON) TO A350 (WEST ASHTON)
B3106	BYTHESEA MINI TROWBRIDGE TO B3107 HOLT
B3107	A363 BRADFORD-ON-AVON EAST TO A350 MELKSHAM
B3108	COUNTY BOUNDARY LIMPLEY STOKE EAST TO A363 BRADFORD
B3109	SOMERSET/WILTSHIRE BOUNDARY TO A4 RUDLOE
B3353	A365 SHAW NORTH TO A4 CORSHAM
B3414	A36 RBT EAST THROUGH WARMINSTER TO A36 RBT HEYTESBURY
B390	A36 HEYTESBURY EAST TO A360 SHREWTON

Roads included within the Wiltshire Scrim Survey Road Network

Road No.	Description
B4001	B4192 TO COUNTY BOUNDARY
B4003	JUNC A4 WEST KENNET NORTHWEST TO A4361 (AVEBURY)
B4005	THAMESDOWN BOUNDARY TO M4 JUNCTION
B4014	COUNTY BOUNDARY SOUTHEAST TO A429 MALMESBURY
B4039	A420 LANHILL NORTHWEST TO COUNTY BOUNDARY
B4040	COUNTY BOUNDARY NE TO A419 SLIP ROAD CRICKLADE
B4042	B4040 MALMESBURY TO COPED HALL RBT WOOTTON BASSETT
B4069	A420 CHIPPENHAM NE TO A3102 RBT LYNEHAM
B4122	B4069 NORTH TO M4 JUNCTION 17
B4158	A420 LITTLE GEORGE TO GOLF COURSE RBT
B4192	SWINDON BOUNDARY SOUTHEAST TO COUNTY BOUNDARY CHILTON FOLIAT
B4528	PHEASANT RBT NORTH TO MALMESBURY ROAD (CHIPPENHAM)
B4553	SWINDON BOUNDARY NORTHWARDS TO B4040 CRICKLADE
B4696	B4042 BALLARDS ASH TO COUNTY BOUNDARY TO A419 (LATTON BYPASS)
C10	C360 ELM HILL TO BOREHAM ROAD WARMINSTER
C10	30MPH DITCHAMPTON TO JUNCTION A30 WILTON
C12	C64 FIFIELD BAVANT TO JUNCTION A338
C146	SWINDON BOUNDARY SOUTHEAST TO COUNTY BOUNDARY (BAYDON)
C156	PRIORY STREET (A4 TO C86) CORSHAM
C189	A346 OGBOURNE ST GEORGE TO C190 MARLBOROUGH
C20	A360 BLACK DOG TO A365 REDSTOCK
C227	C234 SOUTHWICK TO WHITE HORSE ROUNDABOUT (NORTH BRADLEY)
C234	GOOSE STREET/WINSOME STREET (SOUTHWICK)
C25	C43 CROSSROADS TO JUNCTION A30
C295	B3081 CROSSROADS NORTH TO A30 LUDWELL
C30	HIGH STREET (GREAT BEDWYN)
C325	RANDELLS CROFT ROAD TO C63 SOUTH STREET WILTON
C328	C12 Odstock North to A354 BOUVERIE RBT
C360	A36 RBT THROUGH WARMINSTER TO A350 UPTON SCUDAMORE
C362	A36 RBT NORTHEAST TO B3414 WARMINSTER
C365	AVENUE LE FLECHE SE TO PEWESHAM WAY RBT
C373	MANLEY ROAD/SEYMOUR ROAD (B3106 SHAILS LN TO B3106 CANAL RD MINI)
C374	C46 NORE MARSH ROAD TO A3102 RBT (WOOTTON BASSETT)
C381	A350 RBT MELKSHAM NORTH TO AND INCLUDING MARKET PL RBT (MELKSHAM)
C382	MARKET PLACE RBT SOUTHEAST TO BOWERHILL RBT (MELKSHAM)
C394	A4 TO OXFORD ROAD RBT (CALNE)
C414	PRINCE OF WALES RBT WOOTTON BASSETT NORTH TO B4553 PURTON
C415	A3102 WOOTTON BASSETT SOUTHEAST TO A4361 BROAD HINTON
C43	C25 XRDS (BECKFORD ARMS) TO A303 TRUNK ROAD (CHICKLADE)
C46	C415 STATION ROAD TO C374 BINCKNOLL LANE
C48	COUNTY BOUNDARY TO A365 (SOUTH OF BOX)
C49	WEST ASHTON ROAD (A350 TO A361 RBT) TROWBRIDGE
C50	A361 NORTH TO A4 QUEMERFORD (CALNE)
C502	SPA HILL RBT TO A3102 BOWERHILL (MELKSHAM)
C503	A342 NORTH TO A361 (DEVIZES)
C504	A361 NORTH TO B3105 (HILPERTON)
C56	A345 BEEHIVE RBT NORTHEAST TO A338 RBT (WINTERBOURNE)
C57	A36 (WILTON RBT) NORTHEAST TO JUNCTION A360
C6	A346 HERD STREET TO B4192 (RAMSBURY)
C63	BULBRIDGE ROAD NORTH TO A30 WILTON
C74	A4 (LITTLE FIRTH) SOUTHEAST TO A338
C7	HAWKERIDGE ROAD (YARNBROOK)
C8	A361 HORTON ROAD RBT EAST TO A345 PEWSEY
C86	PRIORY STREET NORTH TO A420 (CORSHAM)

094402	THE PACKWAY (LARKHILL)
142837	ROWBARROW (SALISBURY)

Classified and other Roads not included within the Wiltshire Scrim Survey Road Network due to survey difficulty and speed limit

Road No.	Description
C18	THE COMMON (MARLBOROUGH)
C32	RBT 2 SOLSTICE PARK TO RBT 3 PORTON ROAD (AMESBURY)
C329	ST PAUL'S RBT NORTHEAST TO A30 ST THOMAS BRIDGE (SALISBURY)
C360	THE CLOSE (WARMINSTER)
C361	FROME ROAD (TROWBRIDGE) BRADLEY ROAD TO THE SHIP
C361	FORE ST/CASTLE ST (LONGFIELD RBT TO B3106 WICKER HILL) TROWBRIDGE
C363	NEWTOWN (TROWBRIDGE) THE SHIP TO TRINITY RBT
C365	MARKET PLACE SE TO PEWSHAM WAY RBT INCLUDING SPURS
C366	A4 ROWDEN HILL NORTH TO A420 CHIPPENHAM
C367	C365 NEW ROAD TO EASTERN AVENUE CHIPPENHAM
C368	A3094 TO HIGH STREET SALISBURY
C369	CASTLE STREET RBT SE TO A338 RBT SALISBURY
C370	CATHERINE STREET AND QUEENS STREET SALISBURY
C372	CHURCH ST/MARKET ST/ROUNDSTONE ST TROWBRIDGE
C377	SIDMOUTH ST/MARYPORT ST/MONDAY MARKET (DEVIZES)
C387	SNUFF STREET (DEVIZES)
C395	HAMPTON PARK RBT TO SEMINGTON ROAD RBT (MELKSHAM)
C500	SLIP ROAD AND RBT TO WAITROSE (SALISBURY)
006113	MARKET PLACE (DEVIZES)
006115	ST JOHNS STREET (DEVIZES)
006116	HIGH STREET (DEVIZES)
006118	SHEEP STREET (DEVIZES)
006123	WINE STREET (DEVIZES)
006125	TESCO CARPARK (DEVIZES)
006126	RENDELLS COURT (DEVIZES)
093108	KINGSBURY SQUARE (WILTON)
142908	IVY STREET (SALISBURY)
142929	BUTCHER ROW (SALISBURY)
142930	FISH ROW (SALISBURY)
142931	LINK FISH ROW TO NEW CANAL (SALISBURY)
143006	SCOTS LANE (SALSIBURY)
143007	BEDWIN STREET (SALISBURY)
143011	SALT LANE (SALISBURY)
143012	CHIPPER LANE (SALSIBURY)
143013	ENDLESS STREET (SALISBURY)
143016	CHEESE MARKET (SALISBURY)
143031	BOURNE HILL (SALISBURY)
143032	ESTCOURT ROAD (SALISBURY)
143035	BUTTS ROAD (SALISBURY)
143037	ASHLEY ROAD (SALISBURY)
826009	CHURCH STREET (BRADFORD ON AVON)
855201	HEADQUARTERS ROAD (WESTBURY)
855301	LINK ROAD (WESTBURY TRADING ESTATE)
855302	QUARTERMASTER ROAD (WESTBURY)
855303	BROADWAY NORTH (WESTBURY)
855304	VICTORY ROAD (WEST WILTS TRADING ESTATE)
855835	FORE STREET (TROWBRIDGE)
855839	BROAD STREET (TROWBRIDGE)
865206	STORRIDGE ROAD (WESTBURY)
867023	BEECHFIELD ROAD (CORSHAM)

867024	PAUL STREET (CORSHAM)
875114	HIGH STREET (WESTBURY)
877002	THE TYNINGS (CORSHAM)
877009	NEWLANDS ROAD (CORSHAM)
877010	POST OFFICE LANE (CORSHAM)
906337	CHURCH STREET (MELKSHAM)
917323	MONKTON HILL (CHIPPENHAM)
917324	FOGHAMSHIRE (CHIPPENHAM)
927319	TIMBER STREET (CHIPPENHAM)
927320	LORDS LANE (CHIPPENHAM)
927321	CHAPEL LANE (CHIPPENHAM)
927322	ST MARY'S STREET (CHIPPENHAM)
927325	EMERY LANE (CHIPPENHAM)
927328	RIVER STREET (CHIPPENHAM)
997016	CHURCH STREET (CALNE)
997122	HIGH STREET (CALNE)
997123	THE PIPPEN (CALNE)
093104	NORTH STREET (WILTON)
093108	KINGSBURY SQUARE (WILTON)
093109	MARKET PLACE (WILTON)

