

Skid Resistance Strategy

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Contents

Contents	2
1. Introduction	3
2. Legislation	4
1. Legislation	4
3. CS 228 Principals.....	5
4. Responsibilities	6
5. Methods of Surveying.....	7
6. Annual Survey Programme	7
7. Site Categorisation and setting the Investigatory Level.....	8
8. Process and Analysis of SCRIM data.....	9
9. Identification for Site Assessment & Investigations	9
10. Site Investigation	10
11. Identification and Prioritisation of Remedial Actions.....	12
12. Use of warning signs.....	13
13. Re-Classification of Site Investigatory Levels	14
14. Records	14
15. Aggregate Specification for Pavement Surfacing.....	15
16. Early Life Skidding Resistance	15
17. References	16
Appendix 1: Table of Investigatory Levels	17
Appendix 2 : Prioritisation of SCRIM sites for treatment	18
Appendix 3: Resilient, Strategic and Main Distributor Network Surveyed Each Year	21
Appendix 4: Site Investigation Flow Chart Process	22
Appendix 5 : Site Investigation Form	23
Appendix 6: Minimum required PSV for chippings/aggregate in bituminous surfacing	25

1. Introduction

- 1.1 An important aspect of asset management is ensuring the road network under the control of the local highway authority is safe for road users by providing adequate skidding resistance of the carriageway surface.
- 1.2 The purpose of this document is to outline Cheshire East Council's approach to maintaining the appropriate levels of skid resistance on the Authority's road network across the Borough and thus minimising accidents directly attributable to skidding.
- 1.3 Due to limited funding a risk-based approach is required in the management of highway skid resistance. Low skid resistant sites may in certain instances be shown to reduce the safety of a section of road; this reinforces the need to eliminate or address these sites in an appropriate manner.
- 1.4 The authority has recognised the need for a staged prioritisation process to identify the sites which may require investigation. The procedure provides a step-by-step approach to identifying and prioritising low skid resistant sites; this is covered briefly in Section 10 and is covered in detail in Appendix 2 of this document.
- 1.5 The procedures outlined in this document will assist in a consistent long-term strategy to manage the skid resistance of the Borough's network to a consistent and safe level. The need to prioritise the sites for treatment or alert following a structured approach is a highly recommended solution under asset management protocols based on: Sideway-force Coefficient Routine Investigation Machine (SCRIM) data, accident statistics, police reports, traffic volumes and road environment.
- 1.6 This process provides a tool to prioritise and treat sites, taking account of budget and programme considerations. This strategy provides the processes to enable Cheshire East Council to prioritise all their possible skid deficient sites.
- 1.7 A documented standard approach helps Cheshire East Council (CEC) to demonstrate that the sites are prioritised and programmed in a consistent manner. This will be achieved by using the best available technical survey data and information collected from site inspections by the Highway Service. Prioritisation will ensure that limited resources are directed to those sites in the most need and of the greatest risk. This demonstrates that the authority is doing all it can to meet its statutory duties and responsibilities.
- 1.8 This strategy is based on Highways England's Technical Standard CS 228 – Skid Resistance published in the Design Manual for Roads and Bridges (DMRB).
- 1.9 In line with the general principles of the Well-Maintained Highways Code of Practice, its successor Well-Managed Highway Infrastructure, and CS 288, this Strategy applies a risk-based approach to the management of skid resistance on our highway network.
- 1.10 The term 'skid resistance' used in this document refers to the frictional properties of a road surface, measured using a specified device, under standardised conditions. Skid resistance testing is carried out on wet or damp surfaces unless stated

otherwise as the skid resistance of a surface can be substantially lower than when the same surface is dry.

- 1.11 Skid resistance measurements are used as an empirical assessment of a road surface's level of grip and as an indication of the potential need for further investigation based on known acceptable limits. However, it should be noted it does not represent the definitive grip available to a road user making a particular manoeuvre at a particular time and at a particular speed.

2. Legislation

- 2.1 This section provides a brief overview of the statutory duties relevant to Cheshire East Council, as a Local Highway Authority (LHA).
- 2.2 Cheshire East Council as the Local Highway Authority for the roads in the Borough has a statutory duty under Section 41 of the Highways Act 1980 to maintain any highways maintainable at public expense.
- 2.3 Section 58 of the Highways Act 1980 does also provide some statutory defence to counter legal actions for negligence. The local authority must be able to prove in a court of law that it has taken 'such care as is in all the circumstances reasonably required to secure that part of the highway to which the action relates was not dangerous for traffic.' This is partly based on the following; however, the following is not exhaustive of the criteria which a court will consider:
- (a) The character of the highway and the traffic which was reasonably to be expected to use it;
 - (b) The standard of maintenance appropriate for a highway of that character and used by such traffic;
 - (c) The state of repair in which a reasonable person would have expected to find the highway;
 - (d) Whether the Highway Authority knew, or could reasonably have been expected to know, that the condition of the part of the highway to which the action relates was likely to cause danger to users of the highway.
 - (e) Where the Highway Authority could not reasonably have been expected to repair that part of the highway before the cause of action arose, what warning notices of its condition had been displayed."
- 2.4 The Highways Act 1980, Section 58 does not stipulate the standard of maintenance applicable to the highway and additionally it does not specify whether the highway authority had in fact provided a competent member of staff to supervise or carry out the maintenance of the highway to which the action relates.
- 2.5 It is accepted by the Courts that different standards of maintenance are applicable to the road network; this is related to vehicle and pedestrian usage as well as speeds of the vehicles using the highway. The court, therefore, takes in to account it would be

unrealistic for the Local Highway Authority to monitor and maintain adequate levels of skid resistance on the whole network and would not be deemed “reasonably practicable”

- 2.6 CEC has developed this skid resistance strategy to ensure a suitably structured procedure and strategy is implemented on the highway under its care and adequate levels of skid resistance maintained within reasonable expectations of an LHA outlined in the Highways Act 1980.
- 2.7 Importantly, having a skid resistance strategy in place will provide evidence if required that this strategy is actively used in a responsible, well documented and structured manner.

3. CS 228 Principals

- 3.1 In 2019 the Highways Agency (now National Highways) published a comprehensive methodology for managing carriageway skid resistance on motorways and trunk roads and this is set out in their design bulletin, CS 228.
- 3.2 The broad principles of CS 228 are as follows:
 - (a) Skid resistance surveys will be undertaken annually on defined parts of the highway network (see Appendix 3).
 - (b) The defined network will be assigned “investigatory levels” depending on a range of factors such as the speed limit and geometry of the road. This is detailed in Chapter 7 and Appendix 1.
 - (c) Skid resistance data obtained from the surveys and the investigatory levels can be recorded and managed within the authority’s asset management system (Confirm, etc).
 - (d) Skid resistance data for a particular section of road will be scrutinised and compared against its investigatory level.
 - (e) The further investigation will consider other factors such as whether there is a wet skid-related road traffic accident history at the site.
 - (f) Where remedial treatment is deemed to be of benefit, sites will be prioritised using a risk assessment approach and inserted into a work programme for action if necessary.
- 3.3 The above principles are applied on an ongoing basis so that skid resistance across the selected network within this strategy is continually monitored and managed appropriately.

4. Responsibilities

4.1 This section sets out the various roles and responsibilities for the management of the Skid Resistance Strategy (see below).

4.2 The authority is responsible for the following:

- a) Management, development, implementation and regular review of the authority's Skid Resistance Strategy.

The external provider is responsible for the following:

- c) The assignment of site categories and investigatory levels with agreement from the authority
- d) The procurement and management of the skid resistant survey.
- e) Processing, analysis and review of skid resistance data received from survey contractor.
- f) Maintaining the appropriate records of site visits and associated documents. This is detailed further in the 'Records' section of this strategy.
- g) Collaboration between highways departments of any issues affecting the site which may be contributory to skid resistance issues. For example, faded road markings or traffic signs will be reported to the appropriate Highways team.
- h) Providing a prioritised list of sites that would benefit from improvement works and making informed decisions about how these are integrated into annual and future carriageway programmes.
- i) Review of the site categories and investigatory levels for the road network subject to skid resistance surveys. This review will be carried out every 3 years.

4.3 The authority and external provider will ensure that the most appropriate remedial action is taken at sites which have been identified through the prioritisation process.

Some examples of the options available are;

- Erection of warning signs
- Re-apply the road markings
- Retexturing of the road surface e.g. surface dressing
- Resurfacing of the carriageway with appropriate asphalt material.

5. Methods of Surveying

- 5.1 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 Principal, Resilient, Strategic and Main Distributor Network.
- 5.2 Pendulum testing is more suited to footway and footpath surveys, as it is hand operated and would hence be unsuitable to testing large areas.
- 5.3 SCRIM is the surveying method adopted by Cheshire East Council for surveying the network.
- 5.4 Cheshire East like most other authorities has adopted the single annual survey method. This method produces corrected CSC (Characteristic SCRIM Coefficient) values which are used in the monitoring of the highway network.
- 5.5 The full adoption of this survey methodology has meant that Cheshire East survey 100% of their Principal Resilient, Strategic and Main Distributor Network on a yearly basis.
- 5.6 SCRIM vehicles are subject to testing procedures to receive accreditation, as with many surveying vehicles. The Service Provider will ensure all vehicles used to survey the network are accredited appropriately.

6. Annual Survey Programme

- 6.1 A defined programme of sites held on Cheshire East's Asset Management System shall be tested annually and in both directions of each carriageway as identified in Appendix 3.
- 6.2 Skid Resistance is not a constant but is influenced by various factors, such as test speed, temperature, weather conditions and longer-term effects such seasonal weather variations or change of traffic flows. It is important to try and ensure conditions are as controlled as far as possible:
- Measurements of road skid resistance shall be carried out annually. The timing of the testing is to be varied within the seasons on a rotating 3-year rolling basis in accordance with the following criteria between:
 - Year 1 - Early Season
 - Year 2 - Mid Season
 - Year 3 - Late Season
 - Specifying a standard testing speed
 - By providing an up-to-date network plan for the survey contractor to use.

6.3 Additional sites will also be selected through consultation with the Road Safety Team. The following prioritisation criteria to establish a testing programme on the Non-Principal Road Network.

- Accident data: This is provided from the Road Safety Team and converted to a shape file format for the rest of Cheshire East Highways.
- Fatal or serious accident sites: Where fatal or serious accidents occur, and the skid resistance of the road surface may be a contributory factor, the surface condition and historical survey data will be assessed by the Road Safety Team within 30 days of the Council receiving notification of the accident.

7. Site Categorisation and setting the Investigatory Level

7.1 Setting an investigatory level is essential to monitoring the appropriate level of skid resistance for a site. It is important to set the Investigatory Level (IL) at the correct level for the location. Where site conditions have changed it may be appropriate to revise the IL.

7.2 All A roads that form the Resilient, Strategic and Main Distributor Network have been categorised for skidding investigatory levels in accordance with the requirements of CS228: Table 4.1 – Site Categories and Investigatory Levels of CS228, see Appendix.

The process to achieve site categorisation has been to conduct a combined desktop exercise and an on-site validation process.

Where the site Investigatory level set by the Highways Service is below that which is recommended in Appendix 1. The justification for setting the lower level shall be documented.

7.3 The Borough's Road network Investigatory Levels shall be reviewed when:

- A significant change to the network is made.
- Or as part of a regular review of all Investigatory Levels every 3 years.
- &
- There is an increase in the level of wet skid related accidents/incidents.
- The site IL has been incorrectly assigned.

7.4 In all cases, these changes must be undertaken and logged by a competent highways engineer in the site reclassification spreadsheet and the UKPMS highway network amended as necessary.

8. Process and Analysis of SCRIM data

- 8.1 Once the survey has been completed, the data collected will be validated and processed.

This process will involve:

- 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 Sideways Force Coefficient applicable to the test wheel when it was surveying
 - Calculation of the CSC.
- 8.2 Once data has passed through validation and processing, it will then be analysed using the Asset Management System.
- 8.3 This process will also highlight any sections which have not been surveyed. Retesting will be carried out where necessary, or where survey data does not exist, the previous year's data shall be used as a replacement.
- 8.5 No section shall have 2 consecutive years where no measurement has been taken.
- 8.6 SCRIM deficiencies shall be analysed against the relevant Investigatory Level to determine “realistic” scheme lengths.
- 8.7 The data will be scored and analysed and processed through the prioritisation strategy. This strategy is detailed in Appendix 2.
- 8.8 All such sites shall be prioritised and investigated by the Road Safety and Asset Management 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 5.

9. Identification for Site Assessment & Investigations

- 9.1 All locations on the SCRIM Network where the CSC is equal to or below the corresponding IL shall be considered for in-situ investigations. These sites will be prioritised based on hazard attribute risk factors, including the magnitude of skid resistance deficiency (See Appendix 2)
- 9.2 The process for analysis of SCRIM survey data is as follows:
- Import/update SC and IL data in UKPMS system.
 - Import CSC data into UKPMS and determine SCRIM Deficiency.
 - Import three-year accident data into the relevant GIS software.

- Undertake data analysis by desktop study of all sites at which the CSC is at or below IL to allow identification and prioritisation of sites at which a more detailed site investigation is warranted.
 - Prioritise sites using a risk-based scoring system as set out in Appendix 2. This allows prioritisation of sites to be investigated.
- 9.3 The identification of SCRIM deficient sites will be undertaken within 8 weeks of receipt of all relevant processed SCRIM survey, accident and traffic data.
- 9.4 For sites with a texture depth less than 0.6mm, a review of available works history records should be undertaken to identify sections where materials have low or negative texture by design.
- 9.6 To account for possible inaccuracies in the recording of accident locations, analysis will extend overall length of road extending 100m buffer in each direction from recorded accident locations. Inaccuracies may arise due to:
- Accident locations are often recorded where the vehicle(s) came to a stop, and it may therefore not be possible to accurately locate the point of accident.
 - Vehicles may have been moved before the recording of the accident so that an approximation of the location has to be made.
- 9.7 All road traffic collision incident data will be validated before being used for analysis to ensure there is no duplication.
- 9.8 Other factors which relate to risk such as speed limit, road classification and traffic levels are reconsidered when defining SC's and IL's, as detailed in the corresponding sections above.
- 9.9 Following this initial risk assessment, sites will be ranked in order of descending risk. Detailed site investigations will be carried out at all sites with a risk score of 19 or greater, as determined by the scoring criteria set out Appendix 2. This threshold is to account for the limited resources available to a local authority, while still balancing safety risks. This approach was determined by assessing various scenarios using potential combinations of the criteria in Appendix 2: Table 2. For example, a site with a "serious/fatal" likely crash impact and a skid resistance difference of between -0.10 and -0.15 would be assigned a risk rating of 10.

10. Site Investigation

- 10.1 All sites selected for detailed investigations following the initial risk assessment process will be passed on to the person(s) responsible for coordinating these investigations.
- 10.2 A schedule of investigations will be planned out in such a way as to undertake the work in as timely and efficient a manner possible – investigations should be carried out according to initial risk assessment:

- High risk (≥ 19): high-priority site investigation, to be carried out as soon as possible following initial risk assessment.
- Medium risk (6 – 18): investigate on a risk-prioritised basis, as resources and funding allow.
- Low risk (≤ 5): no further investigation required.

- 10.3 Site investigations must be undertaken by a competent person in highway maintenance, using the Site Investigation Form in Appendix 2 which is designed with reference to CS 228, and referring to the detailed guidance notes. Initially, this will be part of a desktop exercise.
- 10.4 Site investigations may be carried out on foot or from a vehicle – the decision shall be made based on factors such as assessed site skid risk, resources and/or time available, health and safety risks to inspectors, and prior knowledge of the site. In general, it is preferable for the investigator to walk the site to get the most detailed results, especially if skid risk is high.
- 10.5 In rare circumstances, detailed site investigations may be carried out without physically going on site, however this must be robustly justified – for example, due to health and safety risks. In these cases, the investigator should use (recent) photos/videos of the site wherever possible.
- 10.6 The health and safety of personnel conducting site investigations, maintenance operatives and other road users is paramount. As such, site investigations shall be undertaken in a manner that minimises risk to these groups. Health and safety risks should be managed in accordance with the Council's usual procedures.
- 10.7 During on-site investigations, the investigator(s) should take photos to illustrate/record key information where relevant and include these in the investigation report. A camera with geo-referencing should be used when possible.
- 10.8 As a result of the investigation, remedial actions to address skid resistance risk at the site may be recommended by the investigator(s). These will be clearly noted on the Site Investigation Form and addressed according to the approach set out in the following section.
- 10.9 Records of all site investigations will include sites at which remedial works are required, sites where other action is required, and sites at which no further action is considered necessary. Sites at which no further action is required will be reviewed the following year to monitor the performance of the road surface and to review the level of risk.
- 10.10 Site investigations may result in the need for various actions. These may include actions to reduce skid resistance risk (e.g.: carriageway works, improving signage, etc.).
- 10.11 The inspector may also recommend changes to the site IL and/or risk rating (as per Appendix 2) based on risk factors observed at the site. In these cases, a review will be undertaken, considering the site investigation report and inspector

recommendations, to determine whether the site IL and/or risk rating should be changed, and to what value(s).

- 10.12 Site investigations may also result in an outcome of “no action required”. These sites should be picked up by the process in the following year since they will have $SD \leq 0$ – in this way their skid risk will be continually monitored.
- 10.13 All such reviews will be documented, and records maintained. Where the site risk rating is changed following any review, this post-investigation risk rating will be applied for the purposes of determining the priority of remedial actions, as described in Section 11. Note that a change to the IL may affect site risk rating whether or not the risk rating is changed directly.
- 10.14 All site investigation outcomes will be reviewed and approved by a suitably qualified and experienced person – this person will sign off the investigation form.

11. Identification and Prioritisation of Remedial Actions

- 11.1 If, following detailed site investigation, the condition of the road surface is a contributory factor to unacceptable skid resistance at the site, it may be necessary to plan works to remedy this. These works will generally fall into one of two categories:
- Surface improvement: involving the addition of a thin surface layer on top of the existing pavement surface.
 - Resurfacing: involving the removal of surface/binder course material to a given depth and laying new material.
- 11.2 The type of treatment (and extent, depth, etc.) will be decided by suitably qualified and experienced personnel, taking into consideration any recommendations from the site investigator(s). Scheme design is not covered in this document. Scheme design will follow all the usually applicable Council processes and conform to all applicable standards and guidance.
- 11.3 The programming and prioritisation of remedial works will be risk-based (using post-investigation site risk scores) as follows:
- High risk (≥ 19): High priority implementation. Any necessary remedial works to be added to the current/next network maintenance works programme as high-priority schemes.
 - Medium risk (6-18): Implement as soon as reasonably practical, as far as resources will allow (See Appendix 2).
 - Low risk (≤ 5): Implement only if/when resources allow, and only if cost-effective as part of a wider programme.
- 11.4 Subject to the conditions above, works will be prioritised where necessary in order of descending skid risk in accordance with their post-investigation risk score. Works will be programmed in as part of the usual works programming processes – this will allow potential efficiencies to be identified where synergies are available between

works to improve skid resistance and general maintenance works to improve road condition.

11.5 Non-Invasive Remedial Actions

In addition to/as an alternative to pavement condition improvement, several non-invasive options for reducing skid risk may be recommended following site investigation. These include:

- Signage: removing redundant/confusing signs, cleaning/replacing signs, etc.
- Road markings: removing redundant/confusing markings, renewing markings, etc.
- Driver visibility: cutting back/removing vegetation, removing street clutter, etc.
- Pedestrian safety features: installing pedestrian barriers, crossing islands, etc.
- Traffic speeds: reduce speed limits, install traffic-calming measures, etc.
- Road cleansing: removal of debris, sweeping, etc.

11.6 Any sites that require resurfacing works must be added to a works programme and Slippery Road Warning Signs should be erected along the extent of the location and immediately remove once works are completed, in accordance with CS 228.

11.7 Any resurfacing works must be designed with reference to CD 236 and specifications. Refer Appendix 6 for more details.

11.8 Sites at which surface treatments are required to improve skid resistance will be added to the programme of works for the current year and prioritised according to the associated risk.

11.9 Where such actions are recommended in a Site Investigation report, they should be implemented according to the post-investigation risk rating:

- High risk (≥ 19): Implement with high priority
- Medium risk (6-18): Implement as soon as reasonably practical, as far as resources will allow
- Low risk (≤ 5): Implement only if/when resources allow, and preferably as part of a wider programme

11.10 Actions can be prioritised within categories by descending risk rating where necessary. A record of any works instigated due to Site Investigations must be archived along with the related Site Investigation forms.

12. Use of warning signs

12.1 Signs such as the slippery road sign are essential for notifying road users of any problematic areas of highway, which may require extra care and attention.

12.2 This document concerns itself mainly with the 'slippery road' sign to be used in accordance with the instructions contained in The Traffic Signs Regulations and General Directions 2016.

- 12.3 Where the skid resistance is considerably below the Investigatory Level consideration will be given to the erection of slippery road warning signs as a matter of urgency. This will be within 30 days of the appropriate form being completed.
- 12.4 Signs will not be erected unless there is clear evidence the skid resistance of the site is below the assigned Investigatory Level. This will be documented in the Site Investigation Form, featured in Appendix 5.
- 12.5 Should the step be taken to erect slippery road surface signs; they will be used in accordance with the guidelines and instructions in The Traffic Signs Regulations and General Directions 2016 and any subsequent amendments as appropriate.
- 12.6 In other cases, consideration to erecting slippery road warning signs as soon as practicable at all locations where a site investigation and a road safety audit has concluded. Signs will be erected within 60 days of the appropriate report being completed.
- 12.7 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 Service is 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.
- 12.8 A site visit will be documented and kept on file when signs are both erected and removed.

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 authority and the service provider. The criteria for amending a site are:
- Incorrect site classification (CS 228 Table 4.1)
 - Changes to the network (classification usage alignment) resulting in a need to amend the site category.
 - Lowering of site category/investigatory level after a 3-year review in compliance with this document and fully documented using the form in Appendix 5
 - Re-classification due to the level of accidents.

14. Records

- 14.1 The following records shall be maintained to demonstrate implementation of this strategy; these shall be maintained within a database for the highway service:

- Setting of Investigatory Levels for the Resilient, Strategic and Main Distributor Network, including justification for any deviation from the recommendations of CS 228.
- Setting of Investigatory levels for selected sites on the Non-Principal Road Network if required, including justification for any deviations from the recommendations of CS 228.
- Documentation and certification from any survey contractors that the scrim machine has been tested against the criteria specified in Accreditation and Quality Assurance of Sideways Force Skid Resistance Survey Devices.
- Skid testing results and data analysis.
- Site investigation findings for any sites assessed.
- 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.

15. Aggregate Specification for Pavement Surfacing

- 15.1 Choosing the correct aggregate for road surfacing works is vital in the role of providing safe roads, meeting road users' needs, reducing the environmental impact and providing value for money.
- 15.2 CD 236 provides a summary of the different types of bituminous and concrete surfacing materials and techniques, providing advice and recommendations regarding the appropriate material for each situation. It is recommended that Cheshire East Council utilise the guidance from these documents when designing schemes.
- 15.3 Aggregate is graded depending on size and Polish Stone Value (PSV); an aggregate with a low PSV will polish quicker when compared to an aggregate with a higher PSV. PSV testing must be carried out in accordance with BS EN 1097-8:2000.
- 15.4 Due to the nature and risk of the Cheshire East Council Road network, different PSV aggregates can be used in different locations based on guidance from the CD236. Appendix 6 is the minimum PSV requirements depending on the Site Category/Risk Factor and Daily Traffic Flows.

16. Early Life Skidding Resistance

- 16.1 After much publicity regarding the early life dry skidding resistance of thin surfacing materials, the Highways Agency published IAN49/03 Use of Warning Signs for New

Asphalt Road Surfaces. IAN 49/03 was introduced to address concerns of potential increase skidding risk on new thin surfaces, pending finding from further research.

- 16.2 IAN 49/03 has been superseded by IAN 49/13 which is guidance based on further research, which concluded that the increases in accident risks effects all new asphalt surfaces and not just thin surfaces. Additionally, the overall increase in accident numbers over the initial six months is also accompanied by a significant decrease in the number of fatal incidents.
- 16.3 IAN 49/13 indicates that the increase in risk tends to occur on low-risk sites, not high-risk areas as had previously been envisaged.
- 16.4 Based on the national guidance provided by IAN 49/13, Slippery Road Warnings Signs will no longer be required along the length of new Thin Surfacing sites.

17. References

The Design Manual for Roads and Bridges Department For Transport

www.gov.uk/guidance/standards-for-highways-online-resources#thedesign-manual-for-roads-and-bridges

CS 228 on Skidding Resistance Department for Transport

<https://www.standardsforhighways.co.uk/ha/standards/dmrb/vol7/section3.htm>

Well-Managed Highway Infrastructure Roads Liaison Group

<http://www.ukroadsliaisongroup.org/en/codes/index.cfm>

Horses and Highway Surfaces British Horse Society/ADEPT (formerly County Surveyors Society)

<https://www.bhs.org.uk/go-riding/riding-out-hacking/common-incidents/slippery-roads/>

Manual of Contract Documents for Highway Works Department For Transport

www.gov.uk/guidance/standards-for-highways-online-resources#themanual-of-contract-documents-for-highway-works

Traffic Signs Regulations and General Directions Department for Transport

[The Traffic Signs Regulations and General Directions 2016](#)

NB: all referenced in this document may be retrieved from the location provided for the Design Manual for Roads and Bridges. The direct location is provided for CS 228 only given its significance for this document.

Appendix 1: Table of Investigatory Levels

In the table below sets the Authority's Investigatory Levels and is based upon the Department of Transport's CS228.

ST denotes the initial Investigatory Level (IL) used for the relevant site category.
LR 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.

Further guidance on the acceptable IL for each category is given in CS 228 and the IL shown in **bold** are the levels which have been set for Cheshire East.

Site category and definition		IL for CSC data (skid data speed corrected to 50km/h and seasonally corrected)							
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
B	Non-event carriageway with one-way traffic	LR	ST						
C	Non-event carriageway with two-way traffic		LR	ST	ST				
Q	Approaches to and across minor and major junctions, approaches to roundabouts and traffic signals				ST	ST	ST		
K	Approaches to pedestrian crossings and other high risk situations					ST	ST		
R	Roundabout				ST	ST			
G1	Gradient 5-10%, longer than 50m				ST	ST			
G2	Gradient >10%, longer than 50m				LR	ST	ST		
S1	Bend radius <500m – carriageway with one-way traffic				ST	ST			
S2a	Bend radius <250m – ≥40 mph carriageway with two-way traffic				ST	ST	ST		
S2b	Bend radius <100m – ≥30 mph carriageway with two-way traffic ⁽³⁾				LR	ST			

1 Mini roundabout should be excluded from this Site Category. Category Q should be applied for the approach to and across mini roundabouts.

2 Categories G1 and G2 are not applicable to uphill gradients on carriageways with one-way traffic.

3 Where category S2 applies, and speed limit is ≤30 mph, the site may be classified as "Low" risk when setting the IL, unless other risk factors apply.

Appendix 2 : Prioritisation of SCRIM sites for treatment

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.

Risk assessment will be carried out using the risk-based site scoring system in table below which was taken from the previous version of the skid resistance document HD 28/15. The table must be used in conjunction with the accompanying guidance notes.

Other factors which relate to risk such as speed limit, road classification and traffic levels are considered when defining Site Categories and IL's, as detailed in the corresponding sections above.

The risk-based site scoring system below shows the criteria and scoring used in this prioritisation process.

	Scores and Criteria				
Number of crashes ¹	0	1	2	3+	
Score	0	4	8	12	
Likely impact of a crash ²	Slight	Slight/Serious	Serious	Serious/fatal	
Score	1	2	3	4	
Skid resistance Difference (SD) ³	>0	>-0.05 and ≤0	>-0.10 and ≤-0.05	>-0.15 and ≤-0.10	≤-0.15
Score	0	1	3	6	12
Site has SD≤ and poor texture at the same point ⁴	No	Yes			
Score	0	1			

¹ This refers to the total number of personal injury crashes in the last 3 years. Wet and wet skid crash counts are not considered separately here and should be investigated during the detailed investigation of the site. To account for possible inaccuracies in the recording of collision locations, analysis will extend over a length of road extending 100m in each direction from recorded collision locations. All road traffic collision incident data will be validated before being used in analysis to ensure there is no duplication.

² The likely impact of a crash shall be assessed on an individual site basis where required.

³ SD = CSC – IL. Where the site has multiple SD values the lowest value should be used

⁴ Poor texture is defined as ≤0.6 mm. 0.6mm is considered to be more applicable to local networks due to differences in traffic speeds and types and is the upper threshold value used for the 'amber' band of the SCANNER Road Condition Index [RCI] performance indicator which is nationally applicable to classified roads). For sites with texture depth ≤0.6mm, a review of available works history records should be undertaken to identify sections where materials have low or negative texture by design – if this is the case, a score of zero shall be applied for this criterion.

Table 1: Indicative likely impact of a crash by Site Category

Site Category Code & Description		Likely impact of a crash
B	Non-event carriageway with one-way traffic	Slight
C	Non-event carriageway with two-way traffic	Serious/fatal
Q	Approaches to and across minor and major junctions. Approaches to roundabouts and traffic signals.	Serious/fatal
K	Approaches to pedestrian crossings and other high-risk situations.	Serious/fatal
R	Roundabouts	Slight
G1	Gradient of 5-10% longer than 30m	Slight/serious
G2	Gradient of >10% longer than 30m	Serious
S1	Bend radius <500m – ≥50 mph carriageway with one-way traffic	Serious/fatal
S2a	Bend radius <250m – ≥40 mph carriageway with two-way traffic	Serious/fatal
S2b	Bend radius <100m – ≥30 mph carriageway with two-way traffic	Serious/fatal

Note: The likely crash impacts given in this table are indicative only. Where the characteristics of individual site warrant it, a specific assessment of likely impact should be undertaken.

Some key risk-based steps are summarised in Table 1 below, using site risk scores as described above.

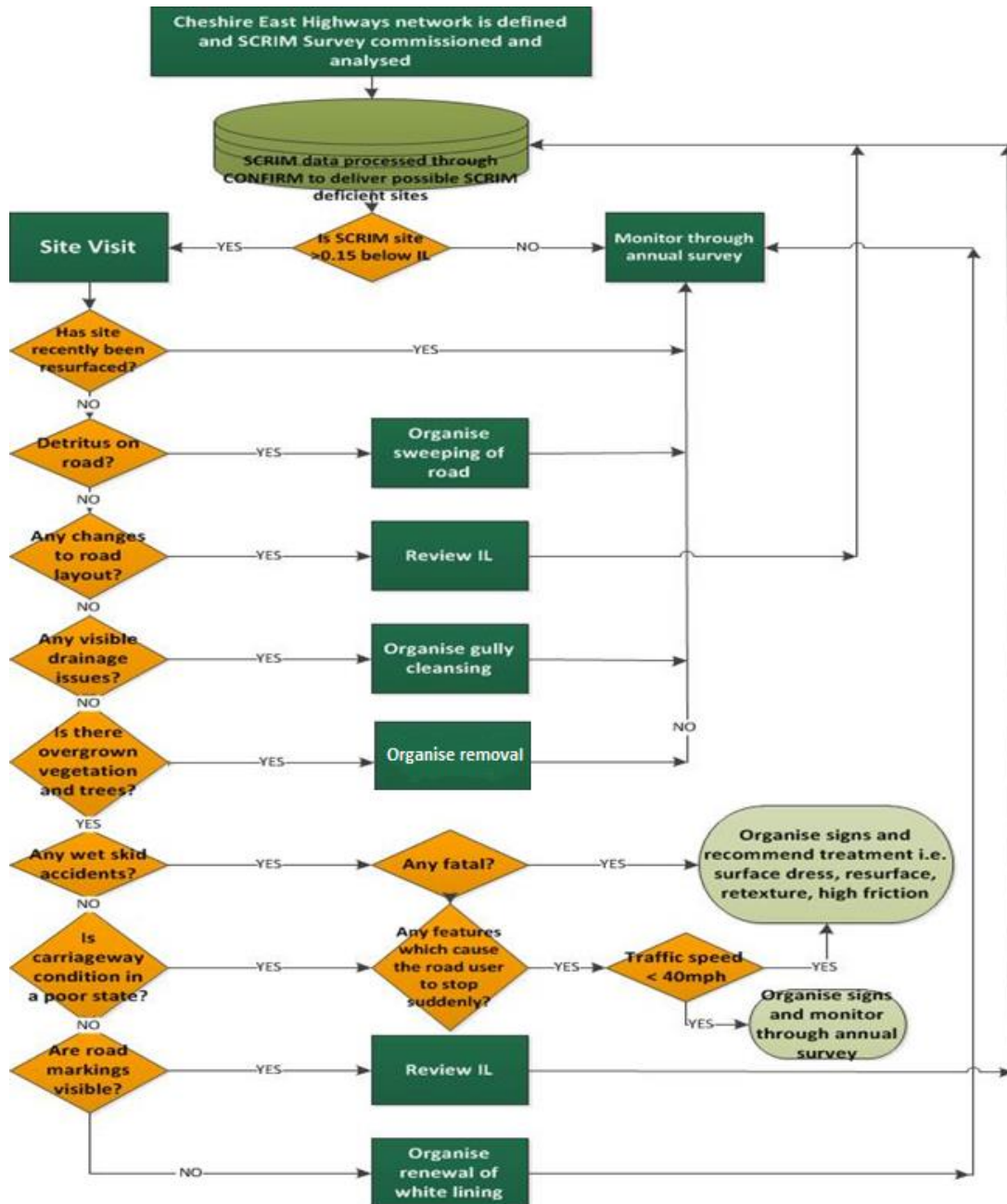
	Low Risk	Mid Risk	High Risk
Risk Score	< 5	6-18	≥ 19
Site Investigations (see Section 13)	No further investigation required	Investigate on a risk-prioritised basis, as resources allow, as soon as is reasonably practical following initial risk assessment	High-priority site investigation, to be carried out as soon as possible following initial risk assessment
Warning Signs (see Section 12)	None required	To be installed at identified locations as soon as is reasonably practical following site investigation	To be installed at identified locations as a matter of urgency following site investigation
Remedial Actions (see Section 11)	Implement only if/when resources allow, and only if cost effective as part of a wider programme	Implement as soon as is reasonably practical, and as far as resources will allow, and targeting completion within 2 years of completion of site investigation	Works to be added to the current/next network maintenance works programme as high-priority schemes

If any segment within the site has a score greater than or equal to 19 then the whole site should have a detailed investigation. Segments are continuous lengths with the same Site Category and IL. Segments should also have similar levels of skid resistance.

Appendix 3: Resilient, Strategic and Main Distributor Network Surveyed Each Year



Appendix 4: Site Investigation Flow Chart Process



Appendix 5 : Site Investigation Form						
Skid Site Investigation Report				Survey Year:		
Unit	Route	Site ID		Location		
Name of Managing Organisation and Overseeing Organisation's area/region designation	Road Code	Reference No.		Section(s)/Chainage		
Site Location and Use						
Location and nature of site:						
<ul style="list-style-type: none"> State the limits of ad nature of the site including speed limit and environment. List hazards e.g. junctions, lay-bys, other accesses, crossings, bends or steep gradients. 						
Current site category and IL:						
<ul style="list-style-type: none"> State current site category and Investigatory Level. Are these consistent with current guidance? 						
Pavement Condition Data						
Skid resistance and texture depth:						
Attach plot or spreadsheet showing the skid resistance, texture depth and other data if relevant. State here if low resistance or texture depth occurs where road users need to stop or manoeuvre.						
Other aspects of pavement condition:						
Note if there are any extreme values of rut depth or longitudinal profile variance that could affect the handling or drainage of water from the carriageway. Attach data if relevant.						
Crash Data						
Period		Number of Crashes			Analysis Length	
From:	To:	Total:	Wet:	Wet Skid:	Length (km):	Traffic (AADF):
		Site Data	Control Data			
			Similar Sites	Route Data	National Data	
Crashes/year						
Crashes/year/100km						
Crashes/10 ⁸ veh-km						
Crashes linked to surface condition?		Y / N	Does the position of wet or wet-skid crashes coincide with the lengths with low skid resistance?			
Other comments on crash data:						

Site Investigation		
Date:	Inspected by:	Method:
	Name	On site / desk study
Visual Assessment		
Type and condition of surfacing:	Consider variations across whole carriageway width	
Any inconsistencies with survey data:		
Presence of debris or other contamination:	Consider likely route taken by different road users	
Local defects (potholes fatting-up etc.):	Indicate position, extent and severity of defects	
Is drainage adequate?	List any indications that road does not drain adequately	
Road Users		
Volume and type of traffic:	Consider heavy vehicles and vulnerable road users	
Traffic speeds in relation to road layout:	Consider peak, day time and night time	
Type of manoeuvres and consequences of driver error:	Evidence of crash damage or near miss e.g. tyre tracks in the verge	
Road Layout		
Does it appear to meet current design specification?	Note unusual or confusing layouts	
Is layout appropriate for vulnerable road users?	Consider volume and type of vulnerable road users expected	
Are junctions appropriate for turning manoeuvres?	Note if junction sizes are appropriate for all vehicle movements and right turning vehicles are adequately catered for. Note whether traffic signals are operating correctly and are clearly visible.	
Marking Signs and Visibility		
Are markings and signs clear and effective in all conditions?	Sometimes old pavement markings have not been removed properly or there are redundant signs that could cause confusion.	
Roadside objects protected from vehicle impact?		
Clear sight line / visibility of queues / vegetation	Consider if sight lines through junctions / accesses. Is the end of likely vehicle queues visible? Will vegetation growth affect visibility or obscure signage?	
Additional information and other observations		
Please indicate if any:	Are any other sources of information available, such as reports or visual evidence of damage only crashes, or reports from the police?	
Recommendation		
Is treatment required?	Y / N	State why treatment is justified
What type of treatment?	Y / N	State if surface treatment is required or if any other treatment/actions can be applied instead to mitigate the existing risk.
Change IL?	Y / N	State reasons for changing IL
Other action required?	Y / N	State what other action should be considered and why
Approval		
Print name:	Signature:	Date:

Appendix 6: Minimum required PSV for chippings/aggregate in bituminous surfacing

Site Category	Site Description	IL	PSV required for given IL, traffic level and type of site					
			Traffic (CV/Lane/Day) at design life					
			1-250	251-500	501-750	751-1000	1001-2000	2001-3000
A	Motorway	0.30	50	50	50	50	50	55
		0.35	50	50	50	50	50	60
B	Non-event carriageway with one-way traffic	0.30	50	50	50	50	50	55
		0.35	50	50	50	50	50	60
		0.40	50	50	50	55	60	65
C	Non-event carriageway with two-way traffic	0.35	50	50	50	55	55	60
		0.40	55	60	60	65	65	68+
		0.45	60	60	65	65	68+	68+
Q	Approaches to and across minor and major junctions, approaches to roundabouts and traffic signals	0.45	60	65	65	68+	68+	68+
		0.50	65	65	65	68+	68+	68+
		0.55	68+	68+	HFS	HFS	HFS	HFS
K	Approaches to pedestrian crossings and other high risk situations	0.50	65	65	65	68+	68+	68+
		0.55	68+	68+	HFS	HFS	HFS	HFS
R	Roundabout	0.45	50	55	60	60	60	65
		0.50	68+	68+	68+	68+	68+	68+
G1	Gradients 5-10% longer than 50m	0.45	55	60	60	65	65	68+
		0.50	60	68+	68+	HFS	HFS	HFS
G2	Gradients $\geq 10\%$ longer than 50m	0.45	55	60	60	65	65	68+
		0.50	60	68+	68+	HFS	HFS	HFS
		0.55	68+	HFS	HFS	HFS	HFS	HFS
S1	Bends radius $\leq 500\text{m}$ - carriageway with one-way traffic	0.45	50	55	60	60	65	65
		0.50	68+	68+	68+	HFS	HFS	HFS
S2	Bends radius $\leq 500\text{m}$ - carriageway with two-way traffic	0.45	50	55	60	60	65	65
		0.50	68+	68+	68+	HFS	HFS	HFS
		0.55	HFS	HFS	HFS	HFS	HFS	HFS