# Skid Resistance Policy Statement

# May 2022

**CONTENTS**

## 1. INTRODUCTION

1.1. This document details Stockport Council's policy and procedures for the measurement and maintenance of adequate levels of skidding resistance on classified carriageways and identified key routes with higher levels of usage and potential risk. The objectives of the Skid Resistance Policy are to:

- Outline the Council's role as a Highway Authority and formalise the processes for monitoring skid resistance across the authority's road network on an ongoing basis.
- Identify parts of Stockport's road network where lack of grip is a potential issue for skidding.
- Prioritise grip deficient sites for improvement works based on where the greatest risks lie.
- Ensure improvements to grip deficient sites are factored into the capital funded highway maintenance works programme or other necessary maintenance is arranged where appropriate.

1.2. The policy should be read in conjunction with the 'Well Managed Highway Infrastructure - Code of Practice' (WMHI) especially section B5.6. The WMHI identifies skid resistance on the highway as a very important aspect of network safety, especially for cyclists, motorcyclists and equestrians. The Design Manual for Roads and Bridges CS 228 should also be referred to for more detailed guidance on process.

1.3. The Council (as a Highway Authority) has a duty under the Highways Act 1980 to maintain the highway in a condition that is safe and fit for purpose. An important aspect of maintaining the road network in a safe condition is to provide adequate road skidding resistance, specifically on wet roads. Studies have shown that accident rates can be substantially reduced by improving skidding resistance at known wet accident locations, particularly at "difficult" sites. These are sites where the geometry or road layout (e.g. junctions, steep gradients, and pedestrian crossings) increases the risk of skidding accidents.

## 2. AIMS AND OBJECTIVES

2.1. The overall objectives of this policy document are:

- To ensure Stockport Council meets its duty of care under the Highways Act 1980
- To adopt a set of updated skidding resistance investigatory levels comparable to those specified in the recommended guidance CS 228
- To adopt and specify appropriate standards for highways to minimise potential skidding situations or risks
- To procure and analyse skid resistance surveys to identify potentially deficient sites
- To make the most cost-effective improvements to wet skid resistance by prioritising potentially deficient sites within the resources available

- To investigate deficient sites and establish if remedial treatment is necessary and the actions required

## 3. MEASUREMENT OF SKIDDING RESISTANCE

3.1. Skid resistance measurements are taken as an empirical assessment of a road surface's level of grip, and as an indication of the need for potential further investigation based on the set investigatory levels. 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.

3.2. Different standards of maintenance are applicable to the various sections of road network. Consideration needs to be given to vehicle usage and the speed of the vehicles using the highway. It would be unrealistic for the Council to monitor and maintain adequate levels of skid resistance on the whole network as this would not be considered "reasonably practicable".

3.3. All classified carriageways identified for monitoring will be tested in accordance with CS 228 using the calculations in Appendix 2. Skid resistance testing of roads can be undertaken by using a SCRIM machine (Sideway force coefficient routine investigation machine, originally developed by TRL) or a Grip Tester machine which is towed behind a car or van. This records the "grip" of the road surface. Over a three year period the whole of our surveyed network will be assessed once per year in early, mid and late summer. A CSC (Characteristic skid coefficient) value is calculated using the previous three years measurements. The CSC is the corrected, seasonally adjusted measurement of the skid resistant properties of the surface of the carriageway.

## 4 METHOD OF SURVEY

4.1. Stockport Council will be using a SCRIM machine and the Single Annual Skid Survey (SASS) method to calculate the CSC for each section of carriageway. This requires Stockport to survey the whole classified network each year, but each consecutive survey will be undertaken at a different time within the summer season (early, mid or late season). This enables seasonal and between-year variation to be accounted for.

4.2. The machine operators providing the measurements shall have appropriate procedures to ensure that they comply with the principles for calibration, testing and reporting specified in the British Standard (currently BS7941-1) and the 'Accreditation and Quality Assurance of Sideway-Force Skid Resistance Survey Devices' document and are undertaken safely and to a suitable standard.

4.3. In each direction of travel, the lane carrying the greatest number of heavy vehicles shall be tested. For most roads, this will be the inside lane.

4.4. Measurements are generally carried out with the test wheel in the inside (left) wheel path of the test lane.

4.5. When inspecting a roundabout, a minimum of one complete circuit will be tested.

4.6. Mini roundabouts and small island roundabouts that are physically too small to test with the parameters detailed above shall be tested as part of the main carriageway and do not need to be tested separately.

4.7. All speed limits, either temporary or permanent, must be obeyed regardless of the target survey speed. The safety of the machine and other road users shall take priority at all times and so lower speeds than these limits may be necessary as decided by the driver.

4.8. The survey machine operator will produce a survey coverage report outlining the network intended to be surveyed, lengths with missing or invalid data, and an explanation for the missing or invalid data.

4.9. The survey provider is required to demonstrate a suitable level of competency which includes driver training.

4.10. Measurements should not be undertaken where the air temperature is below 5 degrees C.

4.11 Testing should be avoided in heavy rainfall or where there is standing water on the road surface.

## 5. INVESTIGATORY LEVELS

5.1. The higher risk a site, the higher the Investigatory Level is set (i.e. less tolerance for loss of surface friction). The investigatory levels are recorded in the Council's information management system (QGIS). SCRIM survey data is downloaded into the Council's system and can be viewed with other key asset information such as general highway condition for reporting purposes as required.

5.2. Investigatory levels have been set in accordance with the recommendations of CS 228. An investigatory level (IL) shall be assigned for every part of the network, by determining the most appropriate site category for each location and then selecting an appropriate IL from the range indicated in the table below.

| Site category and definition | | IL for CSC data (skid data speed corrected to 50km/h and seasonally corrected) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.3 | 0.35 | 0.4 | 0.45 | 0.5 | 0.55 | 0.6 | 0.65 |
| A | Motorway | LR | ST | | | | | | |
| B | Non-event carriageway with one-way traffic | LR | ST | 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 | | | |
| S2 | Bend radius <500m – carriageway with two-way traffic | | | | LR | ST | ST | | |

Notes:

- The CSC value, calculated for the appropriate averaging length, should be compared against the IL.
- The appropriate averaging length is normally 100m or the length of a feature if it is shorter, except for roundabouts, where the averaging length is 10m.
- The averaging length will be shorter where the site category is less than 100m long or at the end of a site category longer than 100m.
- Residual lengths less than 50% of a complete averaging length may be attached to the penultimate length, providing that the Site Category and IL is the same.
- ‘ST’ in the above table indicates the range of ILs that should generally be used for roads carrying significant levels of traffic.
- ‘LR’ in the above table indicates a lower IL, appropriate in lower risk situations such as low traffic levels or where the risks present are mitigated by other means, providing this aligns with the crash history.

Notes applicable to specific site categories:

- ILs for site categories Q and K are based on the 50m approach to the feature and, in the case of approach to junctions, through to the extent of the junction. The approach length shall be extended when justified by local site characteristics.

- Categories G1 and G2 should not be applied to uphill gradients on carriageways with one-way traffic.

- Categories S1 and S2 should be applied only to bends with a speed limit of 50 mph or above, except if the radius of the bend is <100m, where the S1 and S2 categories shall be applied at all speeds.

5.3. These investigatory levels will be reassessed routinely on a three year cycle and earlier if there are a significant number of accidents at a particular site. Accident and traffic flow data should be obtained on a yearly basis from the appropriate data capture authority, currently Transport for Greater Manchester (Tfgm) and considered during the process of identifying sites for further investigation. Accidents should not be considered if they have been identified as not having factors related to surface quality (such as alcohol influence).

5.4. Where fatal or serious accidents occur and the skid resistance of the road surface may be a contributory factor, the surface condition and historical data will be assessed. In cases where Stockport Council is approached by the Police to investigate, the Council shall endeavour to analyse the data within 30 days.

5.5. The Investigatory Levels may be revised if:

- The site IL has been incorrectly assigned
- Changes to the network are made e.g. reclassification, increased usage, change of alignment etc.
- After a 3 year review the site can have a reduced IL if deemed appropriate.
- There is an increase in the level of wet skid related accidents.

5.6. Changes to investigatory levels, due to accidents, will be made following discussion with Officers in the Road Safety team.

## 6. SITE INVESTIGATIONS

6.1. Site investigations should be carried out on all sites where the skid resistance is at or below the investigatory level. The objectives of this site investigation are-

- To determine whether a surface treatment is justified to reduce the risk of accidents, specifically wet skidding accidents.
- To determine whether some other form of action is required.
- To determine whether the site should be kept under review.
- To determine whether the Investigatory Level is appropriate. If the Investigatory level is not appropriate it should be amended.

6.2. The results of these investigations and any actions arising should be recorded on the site investigation form, see appendix 1. Documents are retained in line with guidance from the Council's Insurance team.

6.3. The following records must be maintained in order to demonstrate the ongoing operation of this policy:

- Investigatory levels for the surveyed road network, including justification for any deviation from the recommendations of CS 228.
- SCRIM skid testing results and skid resistance difference.
- Site investigation findings for sites assessed.
- A record of sites where and at what date slippery road warning signs have been erected showing subsequent removal dates where appropriate.
- Priority lists of sites for remedial treatment to restore an adequate level of skid resistance.
- Details of completed works programmes, relating to remedial treatment at identified sites.
- A register listing relevant enquiries regarding skidding matters and any work orders raised.

6.4. The authority and/or external provider(s) will ensure that remedial repairs are prioritised and the most appropriate action is taken at sites that are identified as at or beyond investigatory levels. Some examples of the options available are:

- Erection of warning signs
- Re-applying the road markings
- Retexturing of the road surface e.g. high friction surfacing
- Resurfacing or surface treatment of the carriageway
- Drainage maintenance and repair
- Cleaning of carriageway surface
- Monitoring of sites

## 7. WARNING SIGNS

7.1. Where the skid resistance difference is 0.20 or more below investigatory level and there have been >3 wet skidding accidents at this location, slippery road signs should be installed while further action is planned (if appropriate).

7.2. Slippery road signs will also be erected where a site investigation has shown a need for treatment to improve the skidding resistance and there have been 3 or more wet skidding accidents. Signage is to be in accordance with the current edition of the Traffic Signs Regulations and General Directions and the Traffic Signs Manual. These signs will be removed once they are no longer required either due to remedial action or due to skidding resistance levels returning within acceptable levels.

## 8. REVIEW OF ROAD MARKINGS AND SIGNAGE

8.1. Worn, obscured road markings or redundant markings and signs can add to the risk of skidding as can the misplacement of roadside objects. Cleansing and re-marking/signing should be considered as a response to skid issues.

## 9. ROAD SURFACE IMPROVEMENT

9.1. Where sites of investigation show signs of polishing, fatting, stripping, or fretting then surface treatment options should be considered as part of the response to skid issues.

## 10. MONITORING

10.1. When a site has been identified for investigation but there is no clear remedial work to be taken it should be monitored for further issues. Repeated monitoring would trigger a move to a different investigatory level.

## 11. REMEDIAL WORKS

11.1. Where skidding resistance levels are below Investigatory Level and there are clear indications (taking into consideration advice from Road Safety Officers and available incident data) that improving the condition of the surfacing or other actions will significantly reduce the risk of accidents, remedial treatment should be considered based on the following priority order:

1. Approaches to pedestrian crossings and other higher risk locations
2. Gradients greater than 10% longer than 50m
3. Approaches to and across minor and major junctions, approaches to roundabouts, approaches to Traffic signals (non-pedestrian), bends, gradients up to 10% (over 30mph limits)
4. Roundabouts
5. Approaches to and across minor and major junctions, approaches to roundabouts, approaches to Traffic signals (non-pedestrian), bends, gradients up to 10% (within 30mph limits)
6. Resilient Network Roads
7. Strategic Roads
8. Main Distributor Roads
9. Secondary Distributor Roads
10. Local Links Roads
11. Local Access Roads (where visual inspection has confirmed an issue)

11.2. Where there is more than one site in any single category 1 to 5, the order of priority should reflect that of categories 6 to 11.

11.3. Stockport's Road Hierarchy has been reviewed in line with the national code of practice. Skid resistance treatments should always take in to account the

Councils most up to date road hierarchy.

## 12. POLICY REVIEW

12.1. This policy statement will be reviewed in 2027 unless major changes mean that it is required earlier.

# APPENDIX 1 - SITE INVESTIGATION REPORT TEMPLATE

| **Skid site investigation report** | | | **Survey year:** | *year* |
|---|---|---|---|---|
| **Unit** | **Route** | **Site ID** | | **Location** |
| *Name of Managing Organisation* | *Road code / name* | *Reference no.* | | *Section(s)* |
| **Site location and use** | | | | |
| Location and nature of site: | | | | |
| *State the limits of and nature of the site including speed limit and environment*<br>*List hazards e.g. junctions, lay-bys, other accesses, crossings, bends or steep gradients* | | | | |
| Current site category and IL: | | | | |
| *State current site category and investigatory level.*<br>*Are these consistent with current guidance?* | | | | |
| **Pavement condition data** | | | | |
| Skid resistance and texture depth: | | | | |
| *Skid resistance and other data if relevant.*<br>*State here if low skid resistance 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 vehicle handling or drainage of water from the carriageway.* | | | | |

## Crash data

| **Period** | | **Number of crashes** | | | **Analysis length** | |
|---|---|---|---|---|---|---|
| From: | To: | Total: | Wet: | Wet skid: | Length (km) | Traffic (AADF) |
| | | | | | | |

| | **Site data** |
|---|---|
| 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* | |
| **Markings 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 lines / visibility of queues / vegetation | | *Consider 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: |
| | | |

*General format taken from CS 228.*

# APPENDIX 2 - SINGLE ANNUAL SKID SURVEY (SASS) APPROACH TO CALCULATION OF CSC

### Overview of SASS approach

This approach is based upon a single annual survey of the network. The method uses measurements from the preceding 3 years to characterise the long-term skid resistance of the network. This value is used, with the mean network skid resistance in the current year, to calculate a correction factor which is applied to the current year's data to make current values consistent with the long-term average.

### Benefits of SASS approach

The SASS approach only requires one survey for each road section in each year. It is therefore economically viable to survey the whole classified network each year and produce annual CSC values.

Variation of skid resistance between years can be taken into account by using the SASS approach.

It is possible to determine the correction factors (and therefore supply CSC values) after the end of each survey period.

### Shortfalls of SASS approach

The processing of the survey data in order to determine the correction factors can be labour intensive.

The SASS approach takes account of yearly variation and therefore the calculations are affected by maintenance carried out in recent years. As such, sections which have been resurfaced in the last four years are to be identified and removed from the calculation procedure for the correction factors.

Surveys need to be carefully planned to take place during specific parts of the season.

**SASS approach calculation procedure**

The effect of seasonal variation will vary in different geographical areas (e.g. due to different amounts of rainfall). Larger networks should be split into smaller localities and the correction factor will be determined and applied separately within each locality.

The whole network shall be surveyed once during the test season in each year. Surveys shall be planned such that in successive years each road length is tested in the early, middle and late parts of the season.

For example, a route tested in the early part of the season in year 1 could be tested in the late part of the season in year 2 and in the middle part of the season in year 3. In year four, it should be tested in the early part of the season again, etc.

Each site on the network shall be allocated to a locality. A locality is a collection of road sections or routes for which a correction factor will be determined. A locality should be small enough so that similar weather conditions would normally be experienced within it and large enough so that a stable value can be calculated to represent the long-term skid resistance. This approach is based on the assumption that the climatic effects leading to seasonal variation influence all the roads in a local area in a similar way.

All the road sections within each locality shall be surveyed within the same part of the test season.

By surveying all road sections within a locality at the same time, this method can remove a component of the within-year seasonal variation as well as the variation between years.

The Local Equilibrium Correction Factor (LECF) is the correction factor determined within each locality to bring the current year data to a level consistent with the long-term average.

The Local Equilibrium SC (LESC) is determined to represent the average skid resistance level for the locality over recent years. The LESC is the average SC, calculated for all valid 10m sub-section measurements in the defined locality over the 3 years that precede the current testing season. This should contain surveys from each of the three parts of the test season. Valid measurements are those that were made in the required part of the test season, on the required test line, on road surfaces that were at least 12 months old at the time of testing. This means that if a length of road has been resurfaced within the last 4 years then that length should be excluded from the LECF calculation.

The Local Mean SC (LMSC) is determined for the current survey. The LMSC is the average of all valid 10m sub-sections in the locality in the current year survey.

The LECF is determined by dividing the LESC by the LMSC, i.e.:

LECF = LESC/LMSC

The CSC for each 10m sub-section shall be determined by multiplying the corrected SC by the LECF.

*Taken from CS 228*