

SKIDDING RESISTANCE STRATEGY

*A Framework for Safer Roads
in
County Durham*

**DURHAM COUNTY COUNCIL
SKIDDING RESISTANCE STRATEGY**

Record of Amendments

Amendment Number	Description of Amendment	Date of Amendment	Amended by

DURHAM COUNTY COUNCIL SKIDDING RESISTANCE STRATEGY

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Note: This document has been produced by the Policy & Development Group of Strategic Highways, Neighbourhood Services, Durham County Council and will be updated as and when required utilising appropriate insert sheets and reviewed annually.

1. CIRCULATION LIST

External

Internal - Durham County Council

Environment Department

Director

Head of Service - Technical Services

Strategic Highways Manager

Section Manager - Assets

Policy & Development Manager

HMIU - Highway Management Information Unit

Civil & Geotechnical Engineering Laboratory

Other Departments

Members Library

Technical Library

2. INTRODUCTION

This document details Durham County Council's policies and procedures for the measurement and maintenance of adequate levels of skidding resistance on carriageways. It should be read in conjunction with the 'Well Maintained Highways - Code of Practice for Highway Maintenance Management' published in July 2005 and the Highways Agency for Trunk Roads, Design Manual for Roads and Bridges, Volume 7, HD 28/04.

The County Council as 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 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 road accident locations. This is particularly pronounced at "difficult" sites i.e. those sites where the geometry or road layout, for example, junctions, steep gradients, and pedestrian crossings increases the risk of skidding accidents.

3. SKIDDING RESISTANCE POLICY

AIMS AND OBJECTIVES

The overall objectives of this strategy document are:

- To ensure Durham County Council meets its duty of care under the Highways Act 1980
- To adopt a set of skidding resistance investigatory levels comparable to those specified by the Highways Agency for Trunk Roads, Design Manual for Roads and Bridges, Volume 7, HD 28/04 and Well Maintained Highways - Code of Practice for Highway Maintenance Management
- To adopt and specify appropriate standards for highways to minimise potential skidding situations
- To arrange for and analyse skid resistance surveys to identify potentially deficient sites
- To make the most cost effective improvement to wet skid resistance by prioritising potentially deficient sites within the resources available.
- To investigate deficient sites to establish whether remedial treatment is necessary or warning signs should be erected

4. ORGANISATION

Responsibility for the measurement of skidding resistance, interpretation of results, investigation of potentially deficient sites, erection of warning signs and remedial works rests with the Policy & Development office and in particular the Skid Manager.

The Skid Manager will appoint persons who can:-

- Assign, re-assess and amend Investigatory levels as necessary
- Carry out site investigations on potentially deficient sites
- Recommend whether warning signs should be erected
- Recommend remedial works to deficient sites.

Skidding Resistance surveys will be undertaken by the Civil & Geotechnical Engineering Laboratory.

Implementation of any remedial works or sign erection will be undertaken by the appropriate Operations Group

A list of current authorised personnel is given at Appendix A to this document

The activities listed above will be undertaken in accordance with the Environment Quality System.

All documentation generated by this Strategy will be filed and retained for 12 years in the Assets Office.

The documentation shall include:-

- A copy of this Strategy
- Survey results
- Records of decisions made in detailing Investigatory Levels
- Record of Site Investigations
- Record of Remedial Works Required
- Records of Remedial Works undertaken

5. SURVEY NETWORKS

The network to be surveyed will be assessed using the carriageway hierarchy as set out in 'Well Maintained Highways - Code of Practice for Highway Maintenance Management' and repeated below:-

CARRIAGEWAY HIERARCHY

Category	Hierarchy Description	Type of Road General Description	Detailed Description
1	Motorway	Limited access Motorway regulations apply	Routes for fast moving long distance traffic. Fully grade separated and restrictions on use.
2	Strategic Route	Trunk and some Principal 'A' roads between primary destinations	Routes for fast moving long distance traffic with little frontage access or pedestrian traffic. Speed limits are usually in excess of 40mph and there are few junctions. Pedestrian crossings are either segregated or controlled and parked vehicles are generally prohibited.
3a	Main Distributor	Major Urban Network and Inter-Primary links. Short – Medium distance traffic	Routes between Strategic Routes and linking urban centres to the strategic network with limited frontage access. In urban areas speed limits are usually 40mph or less, parking is restricted at peak times and there are positive measures for pedestrian safety.
3b	Secondary Distributor	Classified Road (B and C Class) and unclassified urban bus routes carrying local traffic with frontage access and frequent junctions	In rural areas these roads link the larger villages and HGV generators to the Strategic and Main Distributor Network. In built up areas these roads have 30mph speed limits and very high levels of pedestrian activity with some crossing facilities including zebra crossings. On street parking is generally unrestricted except for safety reasons.
4a	Link Road	Roads linking between the Main and Secondary Distributor network with frontage access and frequent junctions.	In rural areas these roads link the smaller villages to the distributor roads. They are of varying width and not always capable of carrying two way traffic. In urban areas they are residential or industrial inter-connecting roads with 30mph speed limits, random pedestrian movements and uncontrolled parking
4b	Local Access Road	Roads serving limited numbers of properties carrying only access traffic	In rural areas these roads serve small settlements and provide access to individual properties and land. They are often only single lane width and unsuitable for HGV. In urban areas they are often residential loop roads or <i>culs de sac</i>

The A1(M) Motorway and A66 Trunk Road are maintained by A-one on behalf of the Highways Agency and not by Durham County Council and as such will not be included in any skidding resistance surveys.

Similarly the A19 Trunk Road is maintained by Autolink on behalf of the Highways Agency and not by Durham County Council and will not be included in skidding resistance surveys.

NETWORK TO BE SURVEYED

The total highway network within County Durham currently stands at 3,720km. The network to be routinely surveyed for skidding resistance in Durham County will be all carriageways in category 2 & 3a from the table above and covers a total carriageway length of 770km. This network will be surveyed in both directions giving a total survey length of 1,540km

In general terms this equates to those carriageways shown in the list below:-

SKIDDING RESISTANCE TESTING AND MONITORING **Cat 2 and 3A Roads to be Tested**

Road No.	Start Location	End Location
A1018	A19 Slip Road	County Boundary
A1052	A183 Houghton Gate	County Boundary
A1086	A19 Slip Road	County Boundary
A167	County Boundary (Darlington)	A1(M) Blind Lane
A167	A693 (North Lodge)	County Boundary (Birtley)
A177	County Boundary (Thorpe Larches)	A689 (Sedgefield)
A177	A689 (Sands Hall)	A688 (Metal Bridge)
A177	A1(M) (Bowburn)	A167 (Cock 'o' the North)
A179	A19 O'Bridge (Sheraton)	County Boundary (Hartlepool)
A181	A690 (Gilesgate)	A19 (Wellfield)
A182	B1283/A19 Rbt (Easington)	County Boundary (South Hetton)
A182	A19 (Murton)	North Terrace Rbt (Seaham)
A183	A1(M) (Blind Lane)	County Boundary
A6072	County Boundary (Shildon)	A688 (Tindale)
A6076	A691 (Lanchester)	A693 (Annfield Plain)
A6076	A693 (Stanley)	County Boundary
A67	A66 (Bowes)	County Boundary
A68	County Boundary (Royal Oak)	County Boundary (Allensford)
A688	A67	A1(M) (Bowburn)
A689	County Boundary	A688 (South Church)
A689	A688 (Coundon)	County Boundary (Wynyard)
A690	A689 (Crook)	County Boundary (Rainton Gate)
A691	A694	A692 (Villa Real)
A691	A692 (Leadgate)	A690 (Milburngate)
A692	A68	County Boundary (Burnopfield)
A693	A692	A1(M) (Blind Lane)
A694	A691	County Boundary (Lintzford)
B1198	A177 (Shincliffe)	A181 (Sherburn House)
B1278	A177 (Sedgefield)	A181 (Wheatley Hill)
B1279	A181 (Thornley)	B1280 (Shotton)
B1280	A19 (Sheraton)	BBA Haswell
B1281	EBA Castle Eden	A1086 (Blackhall)
B1283	A181 (Sherburn)	A1086 (Horden)
B1284	A167 (Ropery Lane)	A1052 (Fencehouses)
B1285	County Boundary (Hetton)	A1018 (Seaham Grange)
B1287	B1285 (Dalton)	County Boundary
B1320	A19 (Peterlee)	A1086 (Horden)

Road No.	Start Location	End Location
B1404	County Boundary (Seaton)	B1285 (Seaton)
B1404	B1285 (Seaham)	B1287 (Seaham)
B1432	A1086 (Easington)	B1283 (Easington)
B1432	B1283 (Easington)	A19 (Murton)
B6168	A693/A6076 (Annfield Plain)	A692 (Tantobie)
B6173	A6076 (Stanley)	A692 (Pickering Nook)
B6277	EBA Middleton in Teesdale)	BBA Romaldkirk
B6278	A67 (Barnard Castle)	B6282 (Eggleston)
B6282	B6277 (Middleton in Teesdale)	B6278 (Eggleston)
B6282	District Boundary (Toft Hill)	BBA Shildon
B6284	B6282 (Etherley Lane)	A689 (Newton Cap)
B6286	A689 (Toronto)	A690 (Willington)
B6288	B6287 (Kirk Merington)	A167 (Croxdale)
B6290	A167 (Chester Le Street)	A693 (North Lodge)
B6291	A1(M) (Bowburn)	A181 (Thornley)
B6296	C86 (Drover Road)	B6301 (Lanchester)
B6298	A689 (Crook)	B6299 (Billy Row)
B6299	A68 (Tow Law)	C95 (Tanners Hall)
B6300	EBA Browney	A167 (Croxdale)
B6301	A68 (Tow Law)	B6296 (Lanchester)
B6302	C18a (Esh Winning)	A690 (Stonebridge)
B6308	A692 (Delves)	B6310 (Medomsley)
B6309	B6308 South Junc	A694 (Ebchester)
B6310	C131 (Shotley Bridge)	A692 (Burnopfield)
B6312	A691 (Witton Gilbert)	A167 (Plawsworth)
B6313	B6532 (Craghead)	A167 (Chester Le Street)
B6314	B6310 (Burnopfield)	County Boundary (Rowlands Gill)
B6322	B6308 (Consett)	A691 (Blackhill)
B6443	A167 (Aycliffe School)	A167 (Aycliffe Ind Est)
B6444	District Boundary (Heighington)	A167 (Aycliffe Village)
B6532	A691 (County Hall)	A693 (Stanley)
C10	A692 (Leadgate)	C126 (Annfield Plain)
C10	A6076 (Maiden Law)	A691 (Langley Park)
C100	A167 (Sniperley)	A167 (Pity Me)
C10a	A692 Rbt (Safeways Consett)	B6309 (Leadgate)
C11	B6168 (Annfield Plain)	A693 (South Moor)
C11	A693 (Oxhill)	C91 (Waldridge)
C113	A689 (Leasingthorne)	B6287 (Kirk Merington)
C12	B6532 Rbt (Blackie Boy)	C12a (Low Cocken)
C124	A692 (Pickering Nook)	B6310 (Burnopfield)
C12a	A177 (Bowburn)	A690 (Rainton Gate)
C12a	C8b (Leamside)	C12 (Low Cocken)
C13	A690 (Gilesgate)	Unc 27.6 (Carrville)
C130	A688/A6076 Rbt	A688/A689 South Church
C145	B1320 (Peterlee)	A1086 (Littlethorpe)
C146	C44 (East of Barnard Castle)	C165 (West of Rokeyby Grange)
C147	B6444 (Aycliffe)	C35 (Middridge)
C15	B1280 (Shotton Colliery)	A19 (Peterlee)
C152	A688 (Binchester)	B6288 (Tudhoe)
C16a	C58a (Delves)	A692/B6308 (Consett)
C183	C184 (Chester Le Street)	C5 (Pelton)

Road No	Start Location	End Location
C184	A167 (Hermitage)	A693 (North Lodge)
C186	A1(M) (Blind Lane)	County Boundary (Picktree)
C187	A167 (Aycliffe Village)	B6444 (Aycliffe Village)
C188	A689 (Toronto)	C130 (Bishop Auckland)
C18a	A689 (Howden Le Wear)	A690 (Helmington)
C22	A19 (Hutton Henry)	B1281 (Castle Eden)
C23	A177 (Coxhoe)	A689 (Old Acres Lodge)
C26	B6287 (Ferryhill)	C70 (Ferryhill)
C26	C69 (Thrislington)	A177 (East House)
C30a	A688 (Evenwood Gate)	B6282 (Toft Hill)
C34	A688	B6282 (South Church)
C34	B6282 (South Church)	B6443 (Aycliffe)
C35	A6072 (Shildon)	C34 South junc (Cobblers Hall)
C35	C34 North junc (Cobblers Hall)	A689 Rushyford
C37	County Boundary (Stillington)	C38 North junc (Mordon)
C37	A689 (Bradbury)	C36 (Chilton Lane)
C37	C70 (Ferryhill)	C24 (Metal Bridge)
C38	County Boundary (Stainton)	C37 South junc (Mordon)
C38	C37 North Junc (Mordon)	A689 Sands Hall)
C42	EBA Butterknowle	A688 (West Auckland)
C5	C4 (Pelton)	County Boundary (Birtley)
C58a	A691 (Woodside)	C16a (Delves)
C59	A690 (Rainton Gate)	County Boundary (West Rainton)
C60	EBA Pittington	B1283 (Sherburn Hill)
C62	C17 (Cornsay)	A691 (Langley Park)
C65	B1279 (Thornley)	C60 (Hallgarth)
C67	Unc 35.14	A177 (Cornforth)
C67	C23 (Coxhoe)	C22 (Kelloe)
C69	C26 (Ferryhill)	C24 (Cornforth)
C85	C4 (High Urpeth)	C5 (Low Urpeth) Including one way system
C8a	B1284	BBA Great Lumley
C8a	C8b (Morton Grange)	County Boundary (Chilton Moor)
C8b	C12a (Leamside)	C8a (morton Grange)
C91	Osborne Rd rbt (Chester Le Street)	A167 Ropery Lane
C93	B6282 (Etherley Grange)	A689 (High Grange)
C94	B6313 (Chester Le Street)	C5 (Newfield)
C95	B6299 (Tanners Hall)	A690 (Brancepeth)
C95	EBA Spennymoor	B6288
C96	A688 (Binchester)	A690 (Willington)
C98	A690 (Stonebridge)	A690 (New Elvet)
C98a	A690 (Crossgate)	C98 (New Inn)
C98b	A177	C98 (Dunelm)

This list is subject to change without prior notice and will be reviewed annually in line with hierarchy policy.

6. MEASUREMENT OF SKIDDING RESISTANCE

All carriageways mentioned in Chapter 5 will be tested in accordance with HD28/04 using the Annual Survey regime currently in use by the Highways Agency for the Trunk Road network. Over a three year period the whole of our surveyed network will be assessed once per year in early, mid and late summer. A Characteristic Gripnumber Coefficient (CGC) is calculated using the previous three years measurements, using similar methodology to the calculation of a Characteristic Scrim Coefficient.

METHOD OF SURVEY

Skidding resistance will be measured using the Griptester 2 testing equipment in accordance with BS 7941 Part 2 which allows for continuous measurements to be taken following a single line, typically within the nearside wheelpath. For multiple lane carriageways, the lane carrying the greatest number of heavy vehicles should be surveyed or, if heavy vehicles are only a small proportion of the total traffic, then the lane carrying the highest traffic flow should be surveyed.

7. INVESTIGATORY LEVELS

Investigatory levels have been set in accordance with the guidance given in the Highways Agency's design Manual for Roads and Bridges, Volume 7, Section 3 for the whole of the tested network within County Durham.

These investigatory levels will be reassessed routinely on a three year cycle and/or earlier if there are a significant number of accidents at a particular site.

As a result of Durham County Council using Griptester 2, and surveys being undertaken on relatively low speed roads, Table 4.1 of HD28/04 will be amended using Grip Numbers as follows:-

Site Category and definition		Investigatory Level at 50 km/h							
		0.35	0.41	0.47	0.53	0.59	0.65	0.71	0.76
A	Motorway								
B	Dual carriageway non-event								
C	Single carriageway non-event								
Q30	Approaches to and across minor and major junctions, approaches to roundabouts, approaches to Traffic Signals (non pedestrian), bends, gradient up to 10% (within 30mph limits)								
Q	Approaches to and across minor and major junctions, approaches to roundabouts, approaches to Traffic Signals (non pedestrian), bends, gradient up to 10%								
K	Approaches to pedestrian crossings and other high risk situations								
R	Roundabout								
G	Gradient greater than 10% longer than 50m								

Notes:

1. Investigatory Levels are for the mean skidding resistance within the appropriate averaging length
2. Investigatory Levels for site categories A, B, C and G are based on 100m averaging lengths or the length of the feature if it is shorter
3. Investigatory Levels and averaging lengths for site categories Q and K are based on the 50m approach to the feature but shall be extended when justified by local site characteristics.
4. Investigatory Levels for site category R are based on 10m lengths
5. Residual lengths less than 50% of a complete averaging length may be attached to the penultimate full averaging length, providing the site category is the same.
6. As part of site investigation, individual values within each averaging length should be examined and the significance of any values which are substantially lower than the mean value assessed.

Dark shading indicates the range of Investigatory Levels that will generally be used for all County Roads. In general the lower Investigatory Level within the range will be used but each site has been individually assessed and assigned an Investigatory Level.

A full list of all surveyed carriageways together with their assigned Investigatory level are available from the Assets Office.

8. SITE INVESTIGATIONS

Site investigations should be carried out on all sites where the skid resistance is at or below the investigatory level. They should be carried out in accordance with the guidance laid down in HD28, in priority order, by personnel from within the Policy & Development office as detailed in Appendix A.

Initially the priority for investigations will be as detailed for Remedial works in Section 10 but this priority can change as further information is forthcoming.

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 amended.

The results of these investigations and any actions arising should be recorded on the form as shown at Appendix B

9. WARNING SIGNS

Where the skid resistance is 0.20 or more CGC units below investigatory level and there has been 3 or more wet skidding accidents at this location slippery road signs should be erected as a matter of urgency.

In all other cases slippery road signs will only be erected where a site investigation has shown a need for treatment to improve the skidding resistance and there has been 3 or more wet skidding accidents.

The sign used will be the slippery road warning sign (Diagram 557, Traffic Signs Manual, Chapter 4) in connection with the appropriate supplementary plate (Diagram 570), to cover the extent of the slippery road.

They should be removed as soon as they are no longer needed either as a result of remedial action and/or due to skidding resistance levels returning to an acceptable level.

USE OF WARNING SIGNS FOR NEW ASPHALT ROAD SURFACINGS

Newly laid asphalt surfacings can exhibit lower skid resistance than the same surfacings after a period of trafficking, which could be because of the binder film that initially coats the aggregate particles.

As a result an Interim Advice Note (IAN 49/03) has been developed which outlines the procedure to be followed when new surfacing has taken place.

The recommendations contained in the above advice note can be summarised as follows:-

- a) Sites with an IL of 0.47 (Gripnumber) or lower - no action required.
- b) Sites with an IL of 0.53 (Gripnumber)
 - i) Where the treatment was triggered to increase the skid resistance - erect warning signs
 - ii) Where the treatment was triggered for other reasons, and the skid resistance before treatment was above 0.59 (Gripnumber) or not known - erect warning signs.
- c) Sites with an IL of 0.59 (Gripnumber) or above - erect warning signs.

Signs will normally be erected at the time of resurfacing before the new surface is opened to traffic and will normally be removed after six months or when the skidding resistance has been shown to be above the IL (See advice Note)

The procedure for erection and removal will be as per laid down in the Advice Note. Documentation of these actions will follow similar lines to those outlined in IAN 49/03

10. REMEDIAL WORKS

Where skidding resistance levels are 0.10 below Investigatory Level (Gripnumber) and there are clear indications that improving the condition of the surfacing will significantly reduce the risk of accidents, then remedial treatment should be carried out on a priority basis as follows.

Priority	Site Category	Site Description
1	K	Approaches to pedestrian crossings and other high risk situations
2	G	Gradient greater than 10% longer than 50m
3	Q	Approaches to and across minor and major junctions, approaches to roundabouts, approaches to Traffic signals (non pedestrian), bends, gradients up to 10%
4	R	Roundabout
5	Q30	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	B & C	Dual and Single carriageway non-event

Where the use of Calcined Bauxite is recommended, the current County Council policy is to utilise Chinese (BUFF coloured) aggregate to provide a contrast between carriageway and anti skid surfacing. However this is becoming increasingly difficult to source therefore it is more likely that grey Guyanan Calcined Bauxite will be used.

11. TIMETABLE AND RESPONSIBILITIES

Overall responsibility for delivery of the Skid Resistance Strategy lies with the Skid Manager, however a table giving details of individual responsibilities and a timetable is given below and will be adhered to wherever possible.

Activity	Responsibility	Timetable
Assign and Delivery of Investigatory Levels to Laboratory for Testing	HQ Maintenance Office	By end of March Year 1
Survey of Network using Griptest 2	Civil & Geotechnical Engineering Laboratory	April to September Year 1
Delivery of Survey Results to HQ Maintenance Office	Civil & Geotechnical Engineering Laboratory	By end of November Year 1
Assessment of Survey Results and Production of List of potentially deficient sites	Policy & Development Office	By end of December Year 1
Site Investigation of potentially deficient sites	Policy & Development Office	By end of March Year 2
Erection of Slippery Road Signs (where required)	Highway Operations	By end of March Year 2
Remedial Works (where required)	Highway Operations	April to September Year 2

APPENDIX A

Personnel

Durham County Council Skid Manager

Brian Kitching

List of persons authorised to re-assess and re-assign investigatory levels and carry out site investigations on potentially deficient sites

Policy & Development Office
Ian Raine
Gerry Jones
Sarah Hutchinson

APPENDIX B

SITE INVESTIGATION SURVEY SHEET

Road No Location

Investigatory level Measured skid resistance

Extent of Failure AADT

Number of wet skidding accidents within the last ten years

Date of Site Inspection

Inspected by

Other Parties Consulted

Recommendations

Is Surface Treatment justified

Yes/No

Surface Treatment required

Calcined Bauxite

Resurface with Higher PSV stone

Surface dressing

Retexture

Date surface treatment completed

Other form of action

Yes/No

Specify

Review site after

1 month

3 months

Re-assess and amend Investigatory level

New Investigatory Level

Justification for New Investigatory Level

Erect Warning Signs

Date Warning Signs Erected

Signed

Date