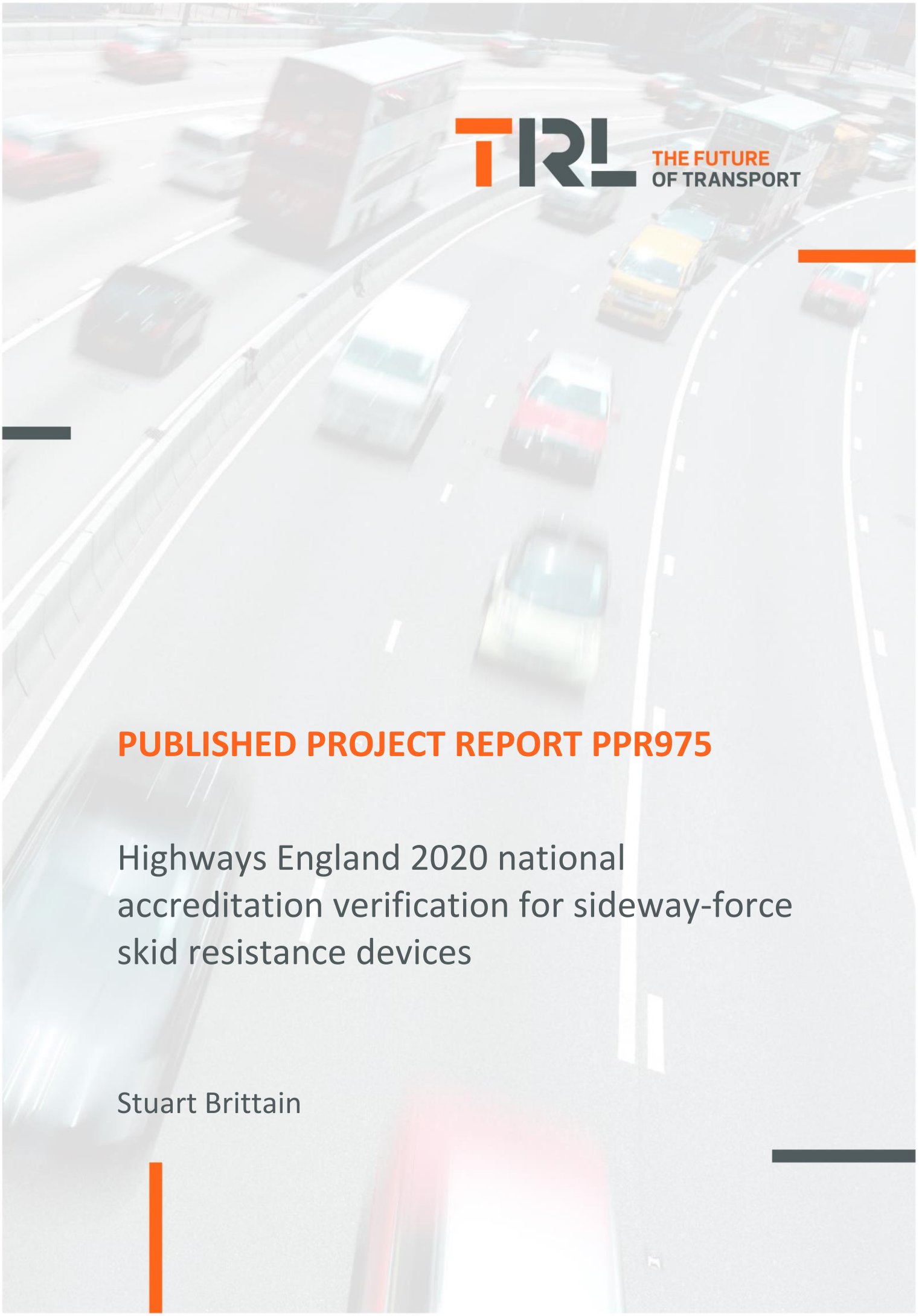

THE FUTURE OF TRANSPORT

PUBLISHED PROJECT REPORT PPR975

Highways England 2020 national accreditation verification for sideway-force skid resistance devices

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Report details

Report prepared for:	Highways England		
Project/customer reference:	SPATS 1-657 PAAQA3		
Copyright:	© Transport Research Laboratory		
Report date:	11/03/2022		
Report status/version:	1.0		
Quality approval:			
Cathy Booth (Project Manager)	**Cathy Booth**	Martin Greene (Technical Reviewer)	**Martin Greene**

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Contents amendment record

This report has been amended and issued as follows:

Version	Date	Description	Editor	Technical Reviewer
1.0	11/03/2022	Converted to published report for historic continuity	SB	MG

Executive Summary

Accreditation of the sideway-force skid resistance devices via accreditation trials are organised annually by TRL, on behalf of Highways England. The purpose of this process is to verify the performance of sideway-force skid resistance devices operating in the UK so that consistency is maintained throughout the fleet. The measurements by these machines are used to monitor the skid resistance of the motorway and trunk road network in support of Highways England skidding resistance standard (DMRB CS 228, 2020). By examining the results from the machines operating on specified test sections it is possible to assess the performance of individual machines and the consistency of the whole UK fleet.

Due to the health implications arising from COVID-19 it was not possible to hold a standard accreditation trial in March/April 2020. It was therefore decided that an amended process would be undertaken to verify the accreditation in 2020.

This amended process began with a reduced 'Accreditation check' process in the week beginning the 27th April, this would provide confidence that devices start the new survey year providing consistent results. This process was limited to devices that had achieved accreditation in the previous two years. The devices that passed this accreditation check, were issued a certificate which covered the Early skid resistance survey period (1st May – 27th June).

Following further discussions with Highways England and the survey contractors, these certificates were then extended to 8th August based on the successful assessment of ongoing QA checks provided by the survey contractors. The Accreditation check process was then repeated in the week beginning the 3rd August which resulted in successful devices gaining a certificate which was valid to 30th April 2021; i.e. for the remainder of the survey year.

Fifteen machines took part in the process in 2020 and the following principal conclusions were drawn in relation to the mandatory tests and assessments.

- All fifteen machines were identified as satisfactory with regards to the machine being in good general mechanical order and test wheel weight.
- All fifteen machines met the criteria for the skid resistance measurements.

The following principal conclusions were drawn in relation to the various additional tests and assessments.

- A number of machines were assessed for measurement of OSGRs and altitude using the data collected from the network route in 2020 combined with the data collected from Longcross for the last accreditation (2019). Two machines had not previously tested the Longcross test site, however they undertook tests of this site separate from this project. For completeness, the results from that testing has been included in this report.
    - During the April Accreditation check 12 devices were assessed
        - For OSGR 11 machines achieved a high performance and 1 a medium performance

        - For Altitude 7 machines achieved a high performance and 5 a medium performance

    - During the August Accreditation 11 of the devices were re-assessed
        - For OSGR 10 machines achieved a high performance and 1 a medium performance
        - For Altitude 5 machines achieved a high performance, 5 machines a medium performance and 1 machine a low performance.

Due to the amended process for 2020, the following criteria were not assessed:

- Measurement of vehicle speed
- Distance measurement
- Water flow rate and direction

Overall, the accreditation verification process in 2020 demonstrated that the UK fleet continues to perform at a level suitable for use in supporting skidding resistance standards.

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1 Introduction

The purpose of the Accreditation process is to verify the performance of sideway-force skid resistance devices operating on the UK road network so that consistency is maintained throughout the fleet. This is important because the results of measurements by these machines are used to monitor the motorway and trunk road network in support of the Highways England skidding standard (DMRB CS 228, 2020).

By examining the results from the machines operating on specified test sections it is possible to assess the performance of individual machines and the consistency of the whole UK fleet.

TRL has been responsible for planning and running the accreditation process since 1995. The process has improved and developed with time but due to the health implications arising from COVID-19 it was not possible to hold a standard accreditation trial in March/April 2020. It was also not apparent at that time how long the restrictions would last. It was therefore agreed with Highways England that an amended process would be undertaken in 2020 to verify the accreditation of the devices at the start of the survey year. This would be a short term certification to allow network surveying to commence on time. As time progressed it was realised that Covid restrictions would be around for some considerable time and that further arrangements would have to be made for fleet certification for the rest of the survey year. It was now apparent that a standard accreditation trial could not be safely conducted at all during 2020. As time progressed further amendments to the process were required to allow for continued accreditation of the fleet throughout the full survey year. This was completed in stages.

The amended process for the whole year consisted of 3 separate parts:

1. An Accreditation Check in the week beginning the 27th April, providing a certificate to cover the early skid resistance survey period.
2. Extension of the certificates to the 8th August based on the successful assessment of their QA data being supplied.
3. A further Accreditation Check in the week beginning the 3rd August, providing a certificate to cover the period until the next planned Accreditation trial (March/April 2021).

1.1 April Accreditation check

The April Accreditation check was conducted in the week beginning the 27th April and this provided devices which took part a certificate (detailing the performance achieved) to cover the early 2020 skid resistance survey period (1st May to 27th June). This process was restricted to devices that had achieved standard accreditation in the past two years. This was because this Accreditation check procedure was not sufficient enough to test all aspects of new devices or devices which have not undergone the full Accreditation process recently.

This Accreditation Check involved the following steps:

- Operators measuring the weight of their own test wheel assembly prior to the testing

- Surveys of the network route north of Nuneaton, as used in previous Accreditation trials
- Processing of data and feedback of results
- Repeat surveys of the site for machines requiring investigation along with a selection of devices to allow comparison with data collected on the first test day

Further details and results from the April Accreditation check are provided in section 4.

1.2 Extension of certificates based on QA data received

As the survey was under way, different options were considered for how to proceed once the certificates expired at the end of the early survey period. The intent was to either hold a trial or undertake other assessments to provide a certificate or certificates for the remainder of the year.

Following this review (and in discussion with Highways England and the survey contractors) it was identified that from a technical and practicality perspective the certificates would be extended for the duration of the mid survey period. This would be based on the successful assessment of their QA data supplied to TRL. To support this work the survey contractors were requested to supply the data from their weekly checks (in addition to the monthly checks that they are already required to provide). The certificates issued were extended to the 8th August under this principle for fourteen of the fifteen machines.

Further details on the extension of certificates based on the QA data is provided in section 5.

1.3 August Accreditation Check

To complete Accreditation for the remainder of the survey year it was deemed that the fleet should complete a further accreditation check. The August Accreditation check was conducted in the week beginning the 3rd August where again the operators were asked to survey the network route north of Nuneaton. When this was completed certificates were extended (detailing the performance achieved) to the 30th April 2021 (i.e. to cover the period until the next Accreditation process).

Further details and results from the August Accreditation check are provided in section 6.

1.4 Accreditation results

The results from the testing described above are discussed in this report and are provided in the accreditation certificates issued to the trial participants. These certificates are also accessible at:

https://www.ciht.org.uk/ukrlg-home/guidance/road-condition-information/data-collection/skid-resistance/

For convenience, throughout this report machines are referred to using the running number assigned for the accreditation process. For ease of comparison, machines usually retain the same running numbers from one year to the next. To avoid confusion with earlier vehicles, when a machine is replaced or re-built on a new chassis, the new vehicle is assigned a new running number in sequence when it first appears at the trials. Appendix A lists all the

machines, their running numbers (ID) and their operating organisations as they were during the Accreditation verification process in 2020.

2 Preparation before testing and test location

2.1 Test tyres

Small variations in skid resistance measurements can be caused by differences between test tyres fitted to different machines. Therefore, for the normal accreditation trials test tyres are provided by the auditor for the assessment and swapped between participants throughout the trial.

For the 2020 Accreditation check process it was deemed unsuitable to provide tyres for the testing (due to the need for contact between personnel). Therefore, survey crews were asked to use their own test tyres for this testing (a different tyre for each lap).

2.2 Network route to Sheepy Magna

A network route is included in the standard accreditation trial to provide supporting data for the assessment of skid resistance and location referencing. This same route was used for the accreditation checks carried out in 2020.

The first marker of the route is at the entrance of the Horiba-MIRA facility, the route then loops round to Sheepy Magna and returns to MIRA as shown in Figure 2.1. Details of the route are given in Table 2.1.

Fourteen 100m lengths of varying skid resistance levels are selected from the network route for the analysis. These lengths have been selected for homogeneity of skid resistance within the length and low indications of variation due to test line. As parts of the route may be maintained from time to time, the lengths used in the analysis are reviewed for each assessment and modified as necessary. Therefore, the locations of these lengths (and the typical skid resistance values) may vary between trials. For the 2020 Accreditation check process, positions of the assessment lengths were unchanged from the 2019 accreditation trial. However, for the April check, one length was excluded from the analysis due to road works. In the August check four sections were excluded due to recent road maintenance or diversions.

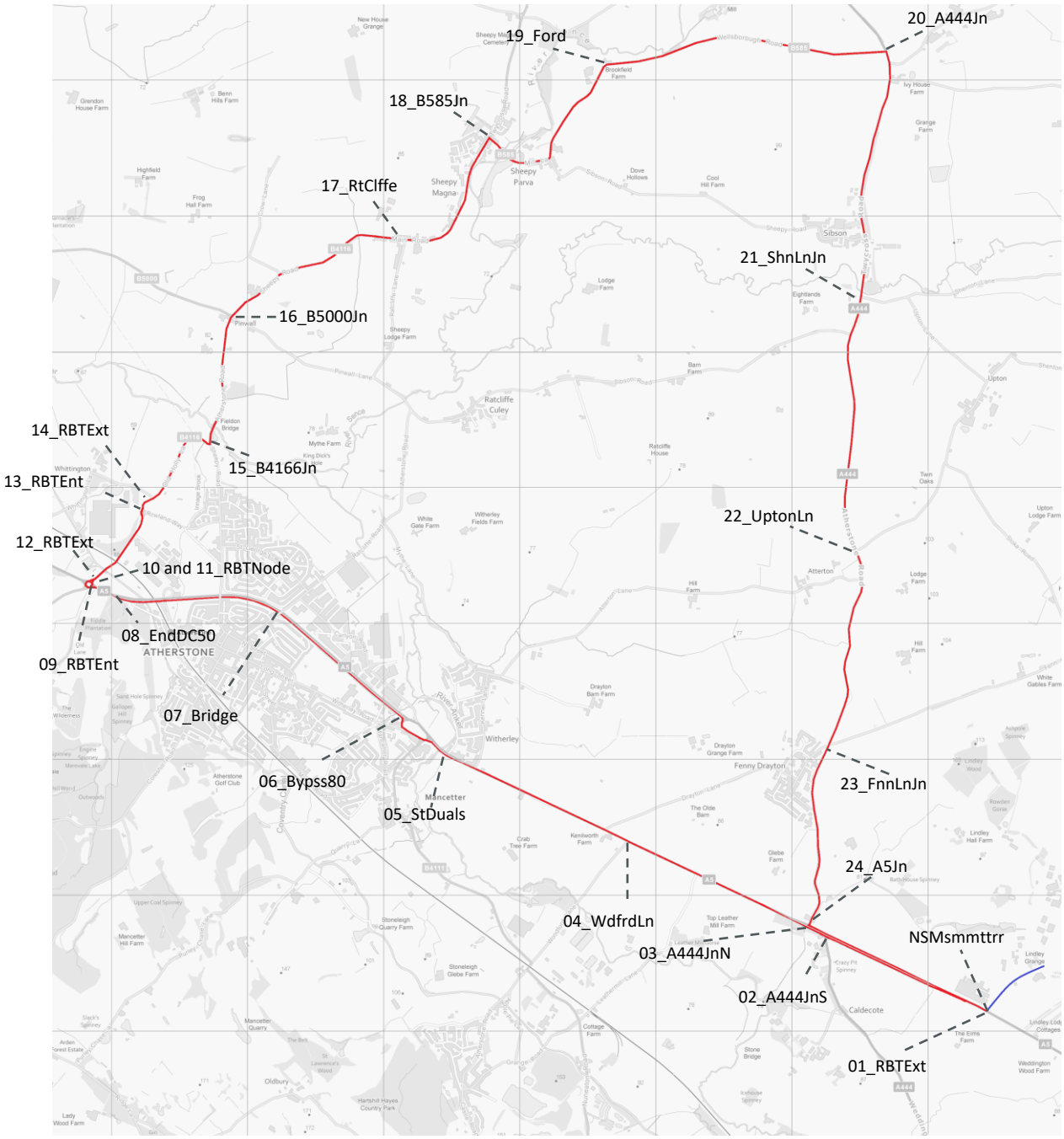

Figure 2.1: Network route to Sheepy Magna (contains Ordinance Survey data © Crown copyright and database right 2020)

Table 2.1: Details of network route, including marker positions

Survey distance (km)	Section length (m)	Markers	Marker position	Driving Instructions
n/a	n/a	**NSMsmmttrr**	Entry to MIRA roundabout	Turn right at the MIRA exit roundabout (A5 WB)
0	1260	**01_RBTExt**	Node at exit of MIRA roundabout	Continue on A5, testing in Lane 1
1.26	192	**02_A444JnS**	Node at entry to gyratory at junction with A444 south	Continue on A5
1.45	1454	**03_A444JnN**	Node at exit of gyratory at Junction with A444 North	Continue on A5
2.91	1379	**04_WdfrdLn**	Node at centre of Junction with Woodford lane (has sign for Dobbie's Garden world)	Continue on A5
4.28	543	**05_StDuals**	Start of duals	Dual carriageway commences. Take right lane and continue to second exit on to A5 Atherstone by-pass towards Tamworth.
4.83	1199	**06_Bypss80**	Mancetter circulatory system exit	Return to testing on Lane 1 for exit of circulatory system on to A5.
6.03	1249	**07_Bridge**	Centre of 1st road bridge going over A5	Continue on A5
7.28	178	**08_EndDC50**	Node at end of dual carriageway	Continue testing for approx. 200m on approach to roundabout
7.45	128	**09_RBTEnt**	Entry to roundabout junction with B4116	Test roundabout as per CS 228
7.58	147	**10_RBTNode**	Roundabout "Node"	Continue survey of roundabout
7.73	111	**11_RbtNode**	Roundabout "Node"	7.73
7.84	640	**12_RBTExt**	Roundabout exit	Take exit, B4116 towards Twycross.
8.48	30	**13_RBTEnt**	Roundabout (access to Aldi distribution depot)	Take second exit (straight on)
8.51	836	**14_RbtExt**	Roundabout exit	Continue testing on B4116
9.35	970	**15_B4166Jn**	At T-junction	Turn left and continue testing on B4116 towards Twycross
10.32	1486	**16_B5000Jn**	Junction with B5000 (on left) at the Red Lion	Continue testing on B4116
11.80	1100	**17_RtClffe**	Centre of junction with Ratcliffe Ln (on right)	Continue on B4116 and enter Sheepy Magana
12.90	1333	**18_B585Jn**	At exit of T-Junction	Turn right on to B585 (Mill Lane) towards Market Bosworth.
14.24	2108	**19_Ford**	Centre of junction with sign post for ford.	Continue on B585
16.34	1847	**20_A444Jn**	At junction with A444	Turn right onto A444 towards Nuneaton.
18.19	1910	**21_ShnLnJn**	At Junction with Shenton Lane (signposted Upper Shenton)	Continue on A444
20.10	1476	**22_UptonLn**	At junction with Upton Lane (on left, is sign posted for Upton)	Continue on A444
21.58	1385	**23_FnnLnJn**	At junction with Fenn Lanes (on left, is sign posted for Bosworth Battlefield)	Continue on A444
22.96	n/a	**24_A5Jn**	Centre of A444/A5 Junction	Turn left on to A5 towards Hinkley. Continue along the A5. On dual carriageway in Lane 1 This marks the end of the route.

3 Machine inspections

3.1 Water flow rate checks

Due to social distancing restrictions from the COVID-19 situation it was decided that checks on the water flow system would not be carried out in 2020. As such the certificates awarded to participants state “not assessed” for this criterion.

3.2 Left test wheel weight checks

Again, due to social distancing requirements TRL could not supervise the measurement of wheel weights during 2020. Therefore, each operator was asked to weigh their test wheel assembly by themselves and provide the data to TRL prior to the first Accreditation check. The results are given in Table 3.1.

Table 3.1: Test wheel weights – April Accreditation check

Machine	Average static wheel weight (kg)							
	“Un-bounced”				“Bounced”			
	Check 1	Check 2	Check 3	Mean	Check 1	Check 2	Check 3	Mean
1	203.5	201.5	202.4	202.5	203.7	202.8	202.8	203.1
3	198.0	198.5	198.0	198.2	201.0	201.0	201.0	201.0
13	198.0	198.0	199.0	198.3	200.0	200.5	200.0	200.2
16	204.0	201.0	202.0	202.3	206.0	204.0	205.0	205.0
17	199.0	199.5	199.0	199.2	201.0	201.0	201.0	201.0
19	198.0	198.0	198.0	198.0	201.0	201.0	201.0	201.0
21	199.0	198.0	198.5	198.5	199.0	199.0	199.0	199.0
22	200.2	200.9	200.9	200.7	200.9	201.2	201.1	201.1
23	199.5	200.0	200.0	199.8	201.5	201.5	201.5	201.5
24	198.0	198.0	198.0	198.0	199.0	199.5	200.0	199.5
25	197.5	198.0	197.5	197.7	201.0	200.5	201.0	200.8
26	198.5	198.5	198.5	198.5	201.5	201.5	201.5	201.5
28	198.4	198.4	198.4	198.4	200.8	201.0	201.2	201.0
29	205.4	205.8	205.8	205.7	206.2	206.2	206.2	206.2
31	200.0	200.5	200.0	200.2	200.5	201.0	201.0	200.8

It can be seen in Table 3.1 that all of the “bounced” mean weights of the machines fell within the tolerances given in appendix D.1.

In 2009, British Standards published a CEN Technical Specification for these devices (BSI, 2009). This is a Draft for Development (DD) document that can be used voluntarily over a period so that experience can be gained before being accepted and introduced (if appropriate) as a full EN (European Norme). This is one of a series of documents for skid resistance measurement devices intended to encourage consistent standards in the use of similar machines in different European countries. It is envisaged that the requirements in this document will eventually supersede those in the current British Standard (BSI, 2006).

This DD was developed from BS 7941-1 so it is already largely consistent with current UK practice. However, some aspects were revised to take account of wider experience of use of similar devices in Europe and one of these is the reduction of the tolerance for static wheel weight to ±1 kg.

All of the machines were within the current ±8 kg tolerance. However, had the CEN TS requirement been applied to the fleet this year, six machines would have been outside the ±1 kg tolerance. In future trials it may be appropriate to review this aspect more closely, both in terms of how the weight is measured and the tolerances that are practicably achievable (or necessary where dynamic vertical load is measured), so that the British Standards Committee that deals with these matters can be advised of the practical experience and take this into account in their deliberations and their discussions when the CEN document is due for review.

Each operator was asked to repeat the weighing of their test wheel assembly prior to the August Accreditation check and the results are presented in Table 3.2. Note: some operators only reported one value for this assessment (which is the 'mean' value in the table below).

Table 3.2: Test wheel weights -August Accreditation check

Machine	Average static wheel weight (kg)							
	"Un-bounced"				"Bounced"			
	Check 1	Check 2	Check 3	Mean	Check 1	Check 2	Check 3	Mean
1	194.9	195.0	194.8	194.9	201.8	201.5	200.8	201.4
3	-	-	-	196.5	-	-	-	197.5
13	-	-	-	199.0	-	-	-	202.0
16	204.3	204.7	204.8	204.6	204.5	205.3	204.6	204.8
17	-	-	-	182.5	-	-	-	200.5
19	-	-	-	197.5	-	-	-	201.0
21	197.5	197.5	197.5	197.5	199.0	199.5	199.5	199.3
22	201.3	201.5	201.4	201.4	201.5	201.5	201.9	201.6
23	-	-	-	200.5	-	-	-	202.0
24	-	-	-	199.5	-	-	-	200.0
25	-	-	-	197.5	-	-	-	200.5
26	-	-	-	190.0	-	-	-	200.0
28	198.4	198.4	198.4	198.4	201.6	201.6	201.6	201.6
29	205.2	205.5	205.4	205.4	206.3	206.3	206.2	206.3
31	-	-	-	201.5	-	-	-	202.0

It can be seen from Table 3.2 that all of the "bounced" mean weights of the machines fell within the tolerances given in appendix D.1. In addition, the "bounced" mean weights are on the most part consistent with the values obtained from the April Accreditation Check (Table 3.1). The exceptions to this are machines 1, 3, 13, 26 and 31 which all vary by more than 1kg. As these devices continue to fall with the current tolerances set (and operate with a vertical load system) they continue to be deemed suitable with regards to wheel weight.

3.3 Vertical and horizontal load calibration

Operators were asked to carry out vertical and horizontal calibrations prior to attending the Accreditation Check.

3.4 Distance calibration

Operators were asked to carry out a distance calibration prior to attending the Accreditation Check.

3.5 Speed

Due to social distancing restrictions from the COVID-19 situation it was decided that checks on the speed (the attainment of the target speed and the accurate recording of speed in the survey data) would not be carried out in 2020. As such the certificates awarded to participants state “not assessed” for this criterion.

4 April Accreditation Check

4.1 Skid resistance

Fifteen machines took part in the April Accreditation check and were asked to conduct 3 surveys of the network route on Tuesday 28th April using their own test tyres (a different tyre for each lap). Due to social distancing requirement no staff from the TRL accreditation team were present on the network route site during testing. All data was e-mailed to TRL for processing.

Wednesday 29th April was assigned a data processing day and no surveys were required to be carried out.

Thursday 30th April was used to conduct additional tests of the network route for machines that required investigation.

Roadworks were present on section 14, during the testing on Tuesday and as such this section has been excluded from the analysis.

4.1.1 Tuesday 28th April tests

Machine 3 was unable to complete three laps on this day due to damage sustained at the start of the third lap and as such is shown in italics and grey text in the table below.

The between run standard deviation data for these surveys is given in appendix B.1, and the average values for each section are shown in Table 4.1.

At the base of Table 4.1 is the average of the devices indicated as “Trial mean”, and the Between Equipment Standard Deviation indicated as “Trial BESD”.

Two machines (13 and 21) were not accredited during 2019 (one did not attend and the other suffered computer problems meaning they could not test). As such these two machines have been excluded from the reference dataset. Therefore, the tables below also show the mean and BESD for the reference set of machines (those that participated in the 2019 Accreditation trial).

Machine SR values are highlighted in green if they lie within 2 times the BESD criterion (see appendix D.1) of the reference mean, in orange if they lie between 2 and 3 times the BESD criterion, and in red if they are greater than 3 times the BESD criterion.

The “Ref BESD” and “Trial BESD” values are highlighted in green if they are below the BESD criterion, in orange if they are below 1.5 times the BESD criterion and in red if they exceed this value.

Table 4.1: Average SR from the network route surveys on Tuesday 28th April

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	62.0	91.8	85.1	90.9	93.4	65.1	79.5	92.5	82.0	59.1	81.6	57.5	50.5	-	76.2
3	*58.9*	*84.4*	*80.9*	*83.9*	*84.5*	*61.0*	*71.7*	*82.6*	*75.0*	*58.6*	*79.7*	*52.6*	*47.7*	*-*	*70.9*
13	61.9	87.9	83.1	85.0	85.9	63.4	71.6	83.7	79.8	58.8	82.1	56.3	50.3	-	73.1
16	64.0	93.1	83.1	88.9	90.1	64.4	78.5	91.8	80.0	60.1	77.9	60.8	47.9	-	75.4
17	57.7	82.6	79.2	82.5	82.0	60.9	69.2	80.6	73.6	57.9	76.3	55.0	47.7	-	69.6
19	55.4	79.8	75.9	77.1	78.7	57.2	65.8	77.3	71.2	53.7	75.5	49.5	42.4	-	66.1
21	61.9	87.5	82.4	85.2	87.3	64.8	75.2	86.9	79.3	62.1	82.0	57.4	53.8	-	74.3
22	57.1	83.7	79.0	82.1	82.1	61.8	73.6	82.1	73.1	55.5	77.6	53.1	42.3	-	69.5
23	56.4	80.9	76.8	78.5	80.7	59.1	69.2	79.3	74.0	57.2	75.4	52.1	48.5	-	68.3
24	53.4	77.5	72.3	74.0	75.7	58.2	65.4	76.3	67.6	53.1	71.1	50.1	43.1		64.4
25	54.9	81.9	74.1	77.8	77.1	57.3	66.5	76.0	70.8	54.7	73.3	50.1	45.7	-	66.2
26	55.6	82.1	77.6	79.2	80.1	58.4	66.9	77.2	72.2	54.6	73.9	50.0	43.3	-	67.0
28	55.7	82.2	76.6	80.0	80.9	62.3	71.5	81.5	75.4	58.1	76.8	55.3	49.0	-	69.6
29	64.0	95.2	84.0	88.6	89.3	65.5	80.9	89.9	76.5	58.2	81.3	55.2	46.4	-	75.0
31	56.0	82.7	78.5	81.5	81.3	60.6	68.9	81.3	74.7	57.0	77.1	55.1	50.6	-	69.6
Ref mean	57.8	84.5	78.7	81.9	82.8	60.9	71.3	82.2	74.3	56.8	76.7	53.6	46.6	-	69.8
Ref BESD	3.44	5.41	3.79	5.03	5.25	2.85	5.33	5.71	3.79	2.20	3.03	3.37	2.95	-	3.73
Trial mean	58.3	84.9	79.3	82.3	83.3	61.3	71.6	82.6	75.0	57.2	77.4	54.0	47.3	-	70.4
Trial BESD	3.51	5.14	3.79	4.79	5.05	2.88	5.03	5.43	3.96	2.49	3.38	3.33	3.40	-	3.71

It can be seen that the trial BESD (3.71) is outside of the target of 2.8 (see appendix D.1). In order to meet the criteria, Machines 1, 16, 21 and 29 would need to be removed. If these machines are excluded then the criteria is met for the average of the site, and for the majority of the individual sections.

On examination of the data from Machine 21 it was found that one run produced values consistently higher than the other two runs which resulted in a high Between Run Standard Deviation (BRSD) (see appendix B.1). If this run was excluded, then the results are consistent with the rest of the fleet and the BRSD reduces down to suitable levels. As such the operators of this machine were asked to investigate this variation and informed they would be required to conduct 4 laps of the site on Thursday 30th April.

The operator for Machines 1, 16 and 29 was notified of the performance of their devices. After investigation they identified that the incorrect calibration factors had been implemented on these devices following a recent upgrade to their computer systems. It was deemed possible to reprocess the data from these machines with the correct calibration factors and this was supplied for assessment. The results from this updated data is shown in Table 4.2.

Table 4.2: Reprocessed average SR from the network route surveys on Tuesday 28th April

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	55.8	85.5	79.0	84.7	87.2	57.1	72.8	86.3	73.9	53.4	78.1	51.5	39.9	-	69.6
16	57.8	86.4	77.1	82.6	83.8	57.7	72.0	85.7	73.8	55.9	79.5	54.7	41.9	-	69.9
29	60.2	91.3	80.3	85.0	85.7	61.0	77.1	86.6	72.5	54.8	77.7	51.7	41.6		71.2

To help confirm that this fix had correctly resolved the performance for these devices, the survey contractor was also asked to resurvey the site with at least one of these machines on the Thursday (machine 29 was selected). In addition, the survey contractor was also asked to survey their Contractors calibration site, for all three of these machines along with Machine 22 (also owned by the same contractor) as soon as possible (and all on the same day). The conclusions from this further analysis are provided in section 4.1.4.

As previously noted, Machine 3 was unable to complete three laps of the route on Tuesday 27th April. They were therefore asked to return on the Thursday (following repairs) so that they could produce a full dataset for analysis.

In addition to the machines discussed above, Machines 22, 23 and 28 were asked to survey on the Thursday to provide reference data to allow the data from the two days to be compared.

4.1.2 Thursday 30th April tests

Examination of the data from machine 21 found that as with the testing on the Tuesday one of the laps had values higher than the others. On the Tuesday it was the first lap, and on Thursday it was the last (fourth) lap; as such the potential for a "warm-up" factor causing this difference could be excluded. It was however identified that the same tyre was used for both of the anomalous laps and it was assumed that this was the cause. The survey contractor was therefore notified that they should not use that tyre for any future testing.

The between run standard deviation data for these surveys (excluding lap 4 for Machine 21) is given in appendix B.1, and the average values for each section are shown in Table 4.3 . The cells have been shaded using the same criteria as before, and the Ref mean and Ref BESD is calculated from Machines 22, 23 and 28.

Table 4.3: Average SR from the network route surveys on Thursday 30th April

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
3	57.9	79.2	75.4	75.9	76.8	56.0	71.5	78.3	68.9	52.3	71.3	49.6	44.0	-	65.9
21	58.6	83.8	79.7	80.7	81.9	61.0	76.0	82.1	73.3	56.9	76.0	52.6	49.4	-	70.1
22	60.0	83.6	81.0	81.6	83.4	62.6	77.9	83.7	75.2	56.1	77.0	52.0	43.2	-	70.6
23	58.5	80.8	76.6	77.7	78.7	59.5	74.7	81.1	70.2	53.6	73.3	50.2	46.3	-	67.8
28	63.8	84.7	80.1	81.6	82.6	62.0	76.5	83.0	73.9	57.4	75.4	58.2	48.7	-	71.4
29	69.7	91.6	83.6	87.6	88.2	63.5	83.4	88.0	74.7	59.1	80.0	57.9	50.8	-	75.2
Ref mean	60.8	83.0	79.2	80.3	81.6	61.4	76.4	82.6	73.1	55.7	75.2	53.5	46.0	-	69.9
Ref BESD	2.73	2.00	2.28	2.25	2.52	1.66	1.62	1.33	2.58	1.88	1.88	4.17	2.75	-	1.88
Trial mean	61.4	83.9	79.4	80.9	81.9	60.8	76.7	82.7	72.7	55.9	75.5	53.4	47.0	-	70.2
Trial BESD	4.60	4.28	2.96	4.02	3.99	2.72	3.97	3.21	2.55	2.51	3.03	3.75	3.07	-	3.20

It can be seen that the Trial BESD (3.20) of the testing from the Thursday exceeded the target value. However, this criteria tends to be more difficult to achieve with fewer machines. Therefore, to assess these devices robustly it is necessary to consider this data in parallel with the data from the Tuesday testing. This is discussed further in section 4.1.3.

4.1.3 Combined data

In previous years, data collected from different sessions has been compared by calculating the ratio of the average of the reference devices on the first set of tests to the second set (for each section) and then applying this ratio to the devices being assessed to estimate the results they would have provided in the current configuration. This process has been repeated for this assessment and the ratio between the two days for the reference devices (22, 23 and 28) is shown in Table 4.4.

Table 4.4: Average SR for the reference devices and the ratio

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
Day 1	56.4	82.3	77.5	80.2	81.2	61.1	71.4	81.0	74.2	56.9	76.6	53.5	46.6	-	69.1
Day 2	60.8	83.0	79.2	80.3	81.6	61.4	76.4	82.6	73.1	55.7	75.2	53.5	46.0	-	69.9
Ratio	0.93	0.99	0.98	1.00	1.00	1.00	0.93	0.98	1.01	1.02	1.02	1.00	1.01	-	0.99

From this analysis it can be seen that the reference devices produced reasonably consistent results between the two days (the ratio was close to 1 in most cases). The estimated average SR for Machines 3 and 21 (Tuesday estimate based on Thursday data) along with the data collected from the other devices on Tuesday are shown in Table 4.5. This table also shows the corrected data for Machines 1, 16 and 29 (collected on Tuesday with revised calibration factors applied). The performance for Machines 1, 16 and 29 is discussed further in 4.1.4.

Table 4.5: Average SR for the combined dataset from the network route surveys

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	55.8	85.5	79.0	84.7	87.2	57.1	72.8	86.3	73.9	53.4	78.1	51.5	39.9	-	69.6
3	53.7	78.4	73.8	75.7	76.5	55.7	66.8	76.7	69.9	53.5	72.5	49.6	44.5	-	65.2
13	61.9	87.9	83.1	85.0	85.9	63.4	71.6	83.7	79.8	58.8	82.1	56.3	50.3	-	73.1
16	57.8	86.4	77.1	82.6	83.8	57.7	72.0	85.7	73.8	55.9	79.5	54.7	41.9	-	69.9
17	57.7	82.6	79.2	82.5	82.0	60.9	69.2	80.6	73.6	57.9	76.3	55.0	47.7	-	69.6
19	55.4	79.8	75.9	77.1	78.7	57.2	65.8	77.3	71.2	53.7	75.5	49.5	42.4	-	66.1
21	54.4	83.1	77.9	80.5	81.6	60.7	71.0	80.4	74.4	58.1	77.4	52.6	50.0	-	69.4
22	57.1	83.7	79.0	82.1	82.1	61.8	73.6	82.1	73.1	55.5	77.6	53.1	42.3	-	69.5
23	56.4	80.9	76.8	78.5	80.7	59.1	69.2	79.3	74.0	57.2	75.4	52.1	48.5	-	68.3
24	53.4	77.5	72.3	74.0	75.7	58.2	65.4	76.3	67.6	53.1	71.1	50.1	43.1		64.4
25	54.9	81.9	74.1	77.8	77.1	57.3	66.5	76.0	70.8	54.7	73.3	50.1	45.7	-	66.2
26	55.6	82.1	77.6	79.2	80.1	58.4	66.9	77.2	72.2	54.6	73.9	50.0	43.3	-	67.0
28	55.7	82.2	76.6	80.0	80.9	62.3	71.5	81.5	75.4	58.1	76.8	55.3	49.0	-	69.6
29	60.2	91.3	80.3	85.0	85.7	61.0	77.1	86.6	72.5	54.8	77.7	51.7	41.6	-	71.2
31	56.0	82.7	78.5	81.5	81.3	60.6	68.9	81.3	74.7	57.0	77.1	55.1	50.6	-	69.6
Ref mean	56.1	82.7	76.9	80.0	80.9	59.0	69.7	80.5	72.5	55.3	75.8	52.1	44.7	-	68.2
Ref BESD	1.80	3.60	2.39	3.36	3.42	2.09	3.52	3.84	2.17	1.75	2.44	2.27	3.34	-	2.14
Trial mean	56.4	83.1	77.4	80.4	81.3	59.4	69.9	80.7	73.1	55.8	76.3	52.4	45.4	-	68.6
Trial BESD	2.30	3.59	2.73	3.36	3.42	2.27	3.32	3.65	2.77	1.96	2.81	2.35	3.64	-	2.35

It can be seen from Table 4.5 that the trial BESD is met for these devices and the fleet performance (2.35) appears to be acceptable. However, some additional investigation is required to confirm the performance for Machines 1, 16 and 29 which is discussed in 4.1.4.

4.1.4 Additional investigation of Machines 1, 16 and 29

As previously discussed, the initial data provided by Machines 1, 16 and 29 were inconsistent with the rest of the fleet. The owner of these three machines investigated the devices and found that the incorrect calibration factors had been implemented on these devices following a recent upgrade to the computer systems. After reprocessing the data with the correct calibration factors, it was found that the devices were consistent with the rest of the fleet (see previous sections).

However, it was necessary to confirm that this fix was suitable and repeatable. Therefore, one of the machines (Machine 29) returned to resurvey the network site on the Thursday. All three of these machines along with Machine 22 (also owned by the same contractor) conducted a survey on their Contractor's Calibration Site and provided this data to support the analysis.

The data collected by Machine 29 on the Thursday corrected back to the Tuesday using the approach discussed in section 4.1.3, is shown in Table 4.6 along with the updated reference mean and BESD and the corresponding Trial values.

Table 4.6: Data from Machine 29 collected on Thursday 30th April corrected back to Tuesday and corresponding fleet statistics

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
29	64.7	90.7	81.7	87.4	87.9	63.2	78.0	86.2	75.8	60.4	81.5	58.0	51.4	-	74.4
Ref mean	56.5	82.7	77.1	80.2	81.1	59.2	69.7	80.5	72.8	55.8	76.1	52.6	45.4	-	68.4
Ref BESD	2.80	3.48	2.58	3.70	3.72	2.34	3.70	3.79	2.35	2.23	2.87	2.77	3.68	-	2.63
Trial mean	56.7	83.0	77.5	80.6	81.4	59.6	69.9	80.7	73.3	56.1	76.5	52.9	46.0	-	68.8
Trial BESD	3.02	3.49	2.86	3.64	3.66	2.44	3.47	3.60	2.85	2.28	3.10	2.74	3.79	-	2.72

When comparing Table 4.6 to Table 4.5 it can be seen that although the BESD criteria is met in both cases, the values produced by Machine 29 are higher for the corrected Thursday tests in comparison to the updated data for Tuesday.

The data collected from the Contractor's Calibration Site (11th May 2020) for these devices is shown in Table 4.7 (10 sub-lengths of 100m each were extracted from the site). In this table, the average SR values are shown along with the difference between the SR for the device and the value from Machine 22.

Table 4.7: Data from Contractor's Calibration site for machines 1, 16, 22 and 29

	Average SR				Difference from Machine 22		
	1	16	22	29	1	16	29
Sub-length 1	61.1	61.3	61.7	63.3	-0.6	-0.4	1.6
Sub-length 2	61.3	62.1	61.3	62.6	0.1	0.9	1.4
Sub-length 3	63.9	63.7	64.6	64.1	-0.8	-1.0	-0.5
Sub-length 4	63.0	63.4	63.1	63.9	-0.2	0.3	0.8
Sub-length 5	62.9	63.4	63.8	63.3	-0.8	-0.3	-0.5
Sub-length 6	62.5	62.3	63.0	63.1	-0.5	-0.6	0.1
Sub-length 7	60.8	62.3	62.3	62.8	-1.6	0.0	0.5
Sub-length 8	65.7	66.7	67.2	67.7	-1.5	-0.5	0.5
Sub-length 9	82.0	82.3	80.1	82.6	2.0	2.2	2.6
Sub-length 10	54.4	52.9	55.2	52.3	-0.8	-2.3	-2.9
Average	63.8	64.0	64.2	64.6	-0.5	-0.2	0.4

The data from the Contractor's calibration site for these machines shows that the machines appear to be consistent with Machine 22. Therefore, the variation in the performance in Machine 29 between the two Network route tests is likely due to natural variation in the results (e.g. slight variations in the setup between each day) rather than additional issues not resolved by the correction of the calibration factors (e.g. faults with the load cells or other issues with the equipment).

4.1.5 Skid resistance summary

Following the analysis undertaken, it was identified that all 15 machines are performing satisfactorily.

4.2 Location referencing – Distance

As the April Accreditation check testing did not incorporate a closed test track section it was not possible to accurately assess the distance measurement of these devices. Therefore, the accreditation certificates issued following the April Accreditation Check stated "not assessed" against the distance criteria.

4.3 Location referencing – OSGR and altitude

Twelve of the fifteen machines provided OSGR data from the April Accreditation check. The criteria for the OSGR assessment (see Appendix D) is split into two parts, an assessment on a live traffic route, and an assessment on a closed test section. For the April Accreditation check, a test on a closed test section (i.e. test track) was not undertaken. Therefore, the machines were assessed based on the performance from the network route survey in combination with their performance on the Longcross test track in the 2019 Accreditation trial. Two machines (Machine 3 and 13) did not take part in the Longcross assessment in 2019 and undertook a test of this site in April 2020. This additional testing had separate funding, but the results are reported here for completeness.

The results from the OSGR and altitude assessments and the criteria applied are given in Appendix C.1and are summarised in Table 4.8 and Table 4.9.

Table 4.8: April check - Summary of OSGR assessments

ID	Performance on Network route 2020 (OSGR fitted)	Performance at Longcross in 2019		Awarded Performance in 2020
		OSGR fitted	Marker entry	
3[1]	High	High	High	High
13[1]	High	High	Medium	Medium
17	High	High	High	High
19	High	High	High	High
22	High	High	High	High
23	High	High	High	High
24	High	High	High	High
25	High	High	High	High
26	High	High	High	High
28	High	High	High	High
29	High	High	High	High
31	High	High	High	High

[1] The Longcross data collected for Machines 3 and 13 was collected in 2020 and was funded by a separate project but the results are reported here for completeness.

Table 4.9: April check - Summary of Altitude assessments

ID	Performance on Network route 2020 (OSGR fitted)	Performance at Longcross in 2019 (OSGR fitted)	Awarded Performance in 2020
3[1]	Medium	High	Medium
13[1]	Medium	High	Medium
17	Medium	High	Medium
19	High	High	High
22	Medium	High	Medium
23	High	High	High
24	High	High	High
25	High	High	High
26	High	High	High
28	High	High	High
29	High	Medium	Medium
31	High	High	High

5 Extension of certificates based on QA data

Following the April Accreditation check, devices were provided certificates which were valid up until 27th June 2020. This date was selected so that the certificate would cover the early skid resistance survey period (1st May to 27th June). It was decided that these certificates would be extended to August 2020 based on the successful assessment of QA data received from the survey contractors.

To support this work the survey contractors were asked to provide data from their weekly checks (not normally requested) in addition to the data from their monthly Contractor's Calibration check.

During the period between the April and August, the machine owned by DRDNI (Machine 3) was not in use and therefore the certificate was not extended to cover the period between the end of June and beginning of August. The other 14 devices were in use and provided valid QA data and therefore the certificates for these devices were extended.

On examination of the weekly QA data it was found that although the data served the need there was some variation in the approach, and not always consistent with the approach detailed in the Accreditation and QA specification. It is therefore recommended that the Auditor for the 2021 survey season, continues this investigation to identify best practice and potential improvements to the description of the weekly check in the Accreditation and QA specification.

6 August Accreditation Check

6.1 Skid resistance

Fifteen machines took part in the August Accreditation check (the same machines that took part in the April Accreditation check). Each machine undertook 3 surveys of the network route on Monday 3rd August using their own test tyres (a different tyre for each lap).

As with the April check, a data processing day (Tuesday 4th April) and a reserve testing day (Wednesday 5th August) was scheduled. After processing of the data from the Monday it was identified that no additional tests were required.

6.1.1 Monday 3rd August tests

The between run standard deviation data for these surveys is given in appendix B.2, and the average values for each section are shown in Table 6.1.

At the base of Table 6.1 is the average of the devices indicated as "Trial mean", and the Between Equipment Standard Deviation indicated as "Trial BESD". All of the machines took part and met the April Accreditation check and are therefore all included in the reference dataset for August.

Machine SR values are highlighted in green if they lie within 2 times the BESD criterion (see appendix D.1) of the reference mean, in orange if they lie between 2 and 3 times the BESD criterion, and in red if they are greater than 3 times the BESD criterion.

The "Trial BESD" values are highlighted in green if they are below the BESD criterion, in orange if they are below 1.5 times the BESD criterion and in red if they exceed this value.

During this testing a diversion was in place between marker 16 and 17 (see Figure 2.1 and Table 2.1 for details of the route). As such data collected between these points was excluded from the analysis (test section 9 and data for the OSGR assessment).

In addition, significant road maintenance has been undertaken on the early parts of the route (parts of the A5). Therefore, some of the early test sections have been excluded from the assessment of skid resistance measurements due to variations in the data caused by inconsistent wearing of the surface across the width of the lane and surface changes. These sections were identified in part by the larger between run standard deviations seen for the majority of devices (shown in appendix B.2). In addition, the identification of changes was also supported by a drive-over of the route prior to testing and feedback from the survey contractors after they completed the route.

In Table 6.1 and appendix B.2, sections excluded from the analysis are shown in a lighter shade and in italics (data from section 9 is removed as most devices raised the wheel during the diversion). It is likely that the variability of the data of these sections will improve between now and the 2021 accreditation process. However, as part of the ongoing monitoring of the network route, the test sections used for the assessment should be reviewed and updated as necessary.

Table 6.1: Average SR from the network route surveys on Monday 3rd August

ID	Average SR for network route sections														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	47.9	75.2	68.6	61.7	57.6	52.6	62.4	69.7	-	50.2	66.9	47.7	43.7	60.1	57.6
3	56.0	81.5	76.7	69.0	69.5	56.3	68.4	80.1	-	54.4	71.0	52.9	47.8	61.7	63.0
13	52.8	76.4	70.8	59.9	60.3	54.6	66.2	73.2	-	48.2	67.6	46.5	40.9	56.0	58.2
16	57.4	88.7	84.3	69.0	70.7	58.1	71.7	84.5	-	59.2	77.1	51.1	43.7	59.5	65.1
17	56.4	78.5	74.5	55.0	43.9	55.7	70.8	75.7	-	52.2	67.9	51.5	46.4	64.1	61.9
19	50.9	74.0	69.3	57.1	60.4	51.9	63.8	73.7	-	49.3	68.2	45.4	39.9	53.4	57.1
21	54.5	78.6	76.2	62.4	64.3	54.9	68.1	74.7	-	54.2	69.1	49.7	45.5	60.7	61.0
22	55.5	77.5	74.7	62.4	61.5	52.5	63.6	74.5	-	52.9	68.2	50.9	41.5	56.7	59.4
23	55.7	80.5	72.2	63.8	60.6	57.7	67.2	74.4	-	49.1	68.0	50.0	43.3	63.3	60.9
24	56.6	79.1	70.0	62.2	52.3	52.2	66.0	75.2	-	52.5	67.7	53.0	47.2	60.8	61.0
25	56.1	81.3	75.6	59.3	58.6	57.2	66.2	75.3	-	53.9	69.2	51.8	45.7	62.6	61.9
26	53.0	79.9	73.1	61.7	60.8	55.4	70.3	77.2	-	52.7	69.7	47.7	44.0	55.2	60.5
28	48.7	71.9	68.8	51.7	50.1	50.0	61.4	72.1	-	49.2	65.9	48.0	45.4	55.0	56.8
29	48.9	77.6	65.9	45.7	55.1	48.4	59.4	69.4	-	48.1	64.7	40.9	37.0	54.8	54.9
31	59.0	81.7	77.2	69.2	65.7	59.1	70.5	78.8	-	50.0	70.9	52.4	48.2	61.8	63.2
Trial mean	54.0	78.8	73.2	60.7	59.4	54.4	66.4	75.2	-	51.7	68.8	49.3	44.0	59.1	60.2
Trial BESD	3.45	3.93	4.60	6.46	7.08	3.09	3.71	3.86	-	3.01	2.84	3.31	3.14	3.52	2.80

It can be seen that the BESD for the site is within the criteria set (the value is 2.799 if an additional decimal place is used). One machine deviates from the trial mean by more than 3 times the BESD criterion on more than one section (Machine 16 on sections 2 and 8). However, section 2 is within the area of recent maintenance work and both this section and section 8 had higher levels of between run standard deviation (although not as high as the excluded sections). Given these factors and the fact the machine is within 2 times the BESD on the majority of the other sections this machine was deemed acceptable with regards to skid resistance. Therefore, all fifteen machines have been identified as acceptable with regards to skid resistance.

6.2 Location referencing – Distance

As this testing did not incorporate a closed test track section it was not possible to accurately assess the distance measurement of these devices. Therefore, the accreditation certificates issued following the August Accreditation Check stated “not assessed” against the distance criteria.

6.3 Location referencing – OSGR and altitude

Eleven of the fifteen machines provided OSGR data from the August Accreditation check. As previously noted (see section 4.3), the criteria for the OSGR assessment is split into two parts. The devices were assessed using their latest visit to Longcross (2019 for most devices, 2020 for Machines 3 and 13) in combination with the data collected in the August Accreditation check.

The results from the OSGR and altitude assessments and the criteria applied are given in Appendix C.2 and are summarised in Table 6.2 and

Table 6.3.

Table 6.2: August check - Summary of OSGR assessments

ID	Performance on Network route 2020 (OSGR fitted)	Performance at Longcross in 2019		Awarded Performance
		OSGR fitted	Marker entry	
3[2]	High	High	High	High
13[2]	High	High	Medium	Medium
17	High	High	High	High
19	High	High	High	High
22	High	High	High	High
23	High	High	High	High
24	High	High	High	High
25	High	High	High	High
26	High	High	High	High
28	High	High	High	High
31	High	High	High	High

Table 6.3: August check - Summary of Altitude assessments

ID	Performance on Network route 2020 (OSGR fitted)	Performance at Longcross in 2019 (OSGR fitted)	Awarded Performance
3[2]	High	High	High
13[2]	Low	High	Low
17	Medium	High	Medium
19	High	High	High
22	Medium	High	Medium
23	Medium	High	Medium
24	High	High	High
25	Medium	High	Medium
26	Medium	High	Medium
28	High	High	High
31	High	High	High

[2] The Longcross data collected for Machines 3 and 13 was collected in 2020 and was funded by a separate project but the results are reported here for completeness.

7 File formats

All of the machines that took part in the accreditation verification process supplied suitable ".S10" and ".loc" files. There is a mandatory requirement that any device that is to be used on the central Highways England contract shall provide RCD and BCD data.

The following machines provided RCD files:

- Machine 3
- Machine 13
- Machine 17
- Machine 19
- Machine 22
- Machine 23
- Machine 24
- Machine 25
- Machine 26
- Machine 28
- Machine 29
- Machine 31

The following machines provided BCD files:

- Machine 13
- Machine 17
- Machine 19
- Machine 22
- Machine 23
- Machine 24
- Machine 25
- Machine 26
- Machine 28
- Machine 29
- Machine 31

Examination of the supplied RCD and BCD found that the data formatting was in general suitable.

8 Conclusions

Due to the health implications of COVID-19 it was not possible to undertake an Accreditation trial in 2020. It was therefore agreed with Highways England that an amended process would be undertaken in 2020 to verify the accreditation of the devices. This was developed as the COVID situation evolved.

The amended process was split into 3 parts:

1. An Accreditation Check in the week beginning the 27th April, providing a certificate to cover the early skid resistance survey period
2. Extension of the certificates to the 8th August based on the QA data supplied.
3. An Accreditation Check in the week beginning the 3rd August, providing a certificate to cover the period until the next planned Accreditation trial (March/April 2021)

In all Fifteen machines took part in the process and the following conclusions were drawn in relation to the various mandatory tests and assessments:

(i) Skid resistance measurement

All fifteen of the machines met the criteria for the measurement of skid resistance.

(ii) Left test wheel weight

All fifteen of the machines met the current ±8 kg tolerance for test wheel weight. It is noted that there is a draft for development CEN technical specification for these devices which would tighten the tolerance to ±1 kg. Nine of the fifteen machines meet this tighter tolerance in the April measurement, and six in the August measurement.

The following conclusions were drawn in relation to the various additional tests and assessments (note: OSGR is mandatory for machines operating on the central Highways England survey contract and optional for others):

(iii) Measurement of OSGRs

A number of machines fitted with 3-dimensional spatial coordinate systems were assessed for the measurement of OSGRs. In the April Accreditation check 12 devices were assessed, and in the August Accreditation check 11 machines were assessed:

- In April, 11 machines achieved a high performance and 1 a medium performance.
- In August, 10 machines achieved a high performance and 1 a medium performance.

(iv) Measurement of Altitude

A number of machines fitted with 3-dimensional spatial coordinate systems were assessed for the measurement of altitude. In the April Accreditation check 12 devices were assessed, and in the August Accreditation check 11 machines were assessed:

- In April, 7 machines achieved a high performance and 5 a medium performance.
- In August, 5 machines achieved a high performance, 5 machines a medium performance and one a low performance.

(v) File formats

All fifteen machines supplied suitable .s10 and .loc files. Twelve machines provided suitable RCD files and eleven machines provided suitable BCD files.

Due to the amended process for 2020, the following criteria were not assessed:

- measurement of vehicle speed
- distance measurement
- water flow rate and direction

During the August Accreditation check it was identified that significant lengths at the beginning of the network route (along the A5) had recently undergone maintenance. This meant that there was increased variability in some of the selected test sections (whilst the surface wears in) leading to them being omitted from the assessment. It is likely that the variability of the skid resistance for these sections will improve between now and the 2021 accreditation process. However, as part of the ongoing monitoring of the site, the test sections used for the assessment should be reviewed and updated as necessary.

A summary of the machines that took part in the 2020 Accreditation verification process and the criteria that they met can be found in Appendix A.

References

BSI. (2006). *BS 7941-1. Methods for measuring the skid resistance of pavement surfaces - Sideway-force coefficient routine investigation machine.* London: BSi.

BSI. (2009). *DD CEN/TS15901-6:2009. Road and airfield surface characteristics. Procedure for determining the skid resistance of a pavement surface by measurement of the sideway force coefficient (SFCS).* BSi.

DMRB CS 228. (2020). *Design Manual for Roads and Bridges, CS 228 Skidding resistance [online]. [Accessed 3rd April 2020]*. https://www.standardsforhighways.co.uk/dmrb/: The Stationery Office.

TRL. (2020). *Accreditation and Quality Assurance of Sideways Force Skid Resistance Survey Devices v4.1 [online]. [Accessed 30th June 2020].* Available from World Wide Web: http://www.ukroadsliaisongroup.org/en/asset-condition/road-condition-information/data-collection/skid-resistance/index.cfm.

Appendix A Machine identification and performance

Table A.1: Machine identification and performance summary

ID	Current Owner	Registration number	Performance Summary										
			Skid resistance	Speed	Distance travelled	Weight and vertical cal.	OSGR		Altitude		S10 and loc file	RCD file	BCD file
							April	August	April	August			
1	PTS Ltd	W965 SVG	Pass	*Not tested*	*Not tested*	Pass	-	-	-	-	Satisfactory	-	-
3	DRDNI	IKZ 2203	Pass	*Not tested*	*Not tested*	Pass	High	High	Medium	High	Satisfactory	Satisfactory	-
13	WDM Ltd	S7 WDM	Pass	*Not tested*	*Not tested*	Pass	Medium	Medium	Medium	Low	Satisfactory	Satisfactory	Satisfactory
16	PTS Ltd	S66 HSL	Pass	*Not tested*	*Not tested*	Pass	-	-	-	-	Satisfactory	-	-
17	WDM Ltd	S800 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	Medium	Medium	Satisfactory	Satisfactory	Satisfactory
19	WDM Ltd	S900 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	High	High	Satisfactory	Satisfactory	Satisfactory
21	Surrey CC	KX07YXH	Pass	*Not tested*	*Not tested*	Pass	-	-	-	-	Satisfactory	-	-
22	PTS Ltd	KX07YVH	Pass	*Not tested*	*Not tested*	Pass	High	High	Medium	Medium	Satisfactory	Satisfactory	Satisfactory
23	WDM Ltd	S11 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	High	Medium	Satisfactory	Satisfactory	Satisfactory
24	WDM Ltd	S12 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	High	High	Satisfactory	Satisfactory	Satisfactory
25	WDM Ltd	S13 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	High	Medium	Satisfactory	Satisfactory	Satisfactory
26	WDM Ltd	S14 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	High	Medium	Satisfactory	Satisfactory	Satisfactory
28	Operated by TRL on behalf of Highways England	WX60 AXN	Pass	*Not tested*	*Not tested*	Pass	High	High	High	High	Satisfactory	Satisfactory	Satisfactory
29	PTS Ltd	YD02 XSN	Pass	*Not tested*	*Not tested*	Pass	High	-	Medium	-	Satisfactory	Satisfactory	Satisfactory
31	WDM Ltd	S16 WDM	Pass	*Not tested*	*Not tested*	Pass	High	High	High	High	Satisfactory	Satisfactory	Satisfactory

Appendix B Between run standard deviation

Values that are within the BRSD criteria (see appendix D.1) are shaded in green. Values up to 1 standard deviation greater than the criteria are shaded in orange, values greater than this are shaded in red.

B.1 April accreditation check

Table B.1: Machine repeatability for the Network route (Tuesday 28th April) – original data

ID	Between run SD														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	1.59	3.43	2.03	0.82	2.97	1.76	3.85	3.21	3.63	1.36	4.98	0.79	8.90	-	2.67
3[3]	*2.26*	*0.71*	*0.11*	*0.20*	*0.80*	*0.37*	*0.26*	*0.49*	*1.06*	*0.06*	*1.37*	*0.56*	*1.07*	-	*0.89*
13	4.08	1.77	2.78	2.08	2.17	2.06	4.26	2.64	2.02	0.87	1.31	1.84	0.74	-	2.66
16	1.27	1.84	1.84	3.34	3.77	0.62	1.52	2.22	1.89	2.07	14.80	0.52	2.38	-	2.22
17	0.22	2.60	2.79	1.51	2.37	3.40	3.07	1.08	1.35	0.32	1.00	2.63	1.93	-	2.16
19	3.04	1.43	0.85	2.72	2.46	2.53	3.79	3.11	2.91	2.57	2.67	2.89	2.94	-	2.66
21	2.46	5.09	4.90	5.87	5.18	4.40	3.06	6.20	4.74	3.65	4.36	4.74	4.12	-	4.69
22	2.06	1.37	0.75	1.63	1.41	2.25	2.15	2.92	3.35	2.98	3.24	1.61	1.49	-	2.23
23	2.59	0.59	2.12	1.87	0.31	0.67	2.03	3.38	2.12	2.30	2.24	1.60	1.75	-	2.02
24	2.56	4.72	3.00	4.17	3.04	0.72	1.64	2.10	1.33	1.91	1.53	1.16	0.84	-	2.79
25	1.11	1.95	1.07	2.80	1.18	0.63	0.48	0.86	0.39	1.12	0.50	0.79	1.23	-	1.35
26	1.98	0.83	2.11	1.66	1.39	1.40	1.61	1.71	2.45	1.34	2.52	2.80	4.01	-	1.70
28	1.75	2.28	0.24	1.37	1.38	2.45	3.27	1.75	1.83	1.06	1.45	2.92	1.84	-	1.91
29	3.89	2.71	2.19	1.83	1.65	3.92	2.06	3.77	1.79	0.58	0.85	1.93	3.64	-	2.66
31	0.67	1.93	3.06	3.13	2.60	1.86	3.97	2.68	1.38	1.27	0.72	0.86	3.92	-	2.45
Avg	2.28	2.14	2.03	2.33	1.92	1.91	2.74	2.26	2.01	1.68	1.88	1.98	2.26	-	2.15

Table B.2: Machine repeatability for the Network route (Tuesday 28th April) – reprocessed data

ID	Between run SD														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	1.63	3.35	1.91	0.63	2.81	0.47	3.86	3.16	0.71	0.61	0.74	0.51	0.99	-	2.28
16	1.31	1.84	1.77	3.41	3.88	1.11	1.54	2.06	2.04	1.18	1.65	0.59	2.20	-	2.20
21[4]	*1.69*	*2.06*	*0.75*	*0.58*	*1.03*	*0.95*	*2.60*	*3.28*	*0.96*	*1.34*	*1.87*	*0.38*	*0.23*	-	*1.74*
29	3.91	2.82	2.08	1.95	1.65	4.76	2.05	4.21	1.91	0.46	0.49	1.69	2.41	-	2.87

[3] Machine 3 was only able to conduct 2 laps of the network route instead of the specified 3 laps.

[4] The data for Machine 21 was not reprocessed, instead this table shows the BRSD if the anomalous run is excluded.

Table B.3: Machine repeatability for the Network route (Thursday 30th April)

ID	Between run SD														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
3	1.59	1.44	0.23	0.57	0.47	2.17	2.02	2.34	0.50	0.59	0.38	0.13	2.03	-	
21[5]	0.14	2.08	1.29	1.12	1.48	1.43	1.45	3.52	0.95	0.69	0.75	0.64	1.30	-	
22	2.63	1.28	0.48	0.99	0.28	2.64	1.78	3.06	2.44	3.05	2.73	1.75	3.09	-	
23	0.70	0.74	0.52	0.93	0.37	1.92	0.45	1.05	0.49	0.68	0.96	1.20	2.31		
28	1.51	0.37	0.70	0.07	0.57	1.92	1.34	0.23	0.04	0.24	0.30	1.11	1.36		
29	4.62	3.39	2.40	2.23	1.84	2.45	3.19	3.02	3.42	2.52	1.88	2.43	4.31		

B.2 August Accreditation check

Table B.4: Machine repeatability for the Network route (Monday 3rd August)

ID	Between run SD														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	Avg
1	3.17	2.87	1.73	2.68	11.38	2.56	1.34	2.37	-	0.61	0.20	1.93	1.36	2.89	2.33
3	2.75	1.55	3.88	1.21	0.60	0.73	0.76	3.67	-	3.32	1.05	0.72	4.00	1.24	2.43
13	1.60	2.02	1.29	6.60	3.15	3.68	3.77	3.57	-	0.43	1.51	3.02	1.63	1.69	2.81
16	1.62	2.97	3.29	9.34	9.12	1.71	2.98	1.74	-	0.83	1.16	1.21	1.71	0.48	2.12
17	3.81	3.94	3.48	5.31	4.00	3.99	7.40	4.63	-	2.10	2.62	0.80	0.24	0.90	4.59
19	2.47	2.98	4.44	4.35	3.22	2.93	3.98	5.09	-	1.44	3.64	1.58	3.45	2.65	3.35
21	2.10	2.67	1.53	7.23	6.69	2.27	2.87	0.24	-	1.61	0.44	0.37	1.54	2.16	2.14
22	1.49	2.04	2.54	3.80	1.00	0.35	2.09	0.61	-	1.17	1.69	0.71	2.44	2.50	1.45
23	1.30	2.19	4.77	1.67	2.22	4.06	3.49	2.59	-	1.03	0.27	0.63	3.62	1.09	2.67
24	2.22	4.89	4.32	3.67	8.96	1.49	5.97	0.77	-	0.59	1.38	2.54	1.31	4.46	3.36
25	2.71	4.04	7.87	6.68	8.44	2.40	1.55	2.64	-	1.58	2.68	1.63	2.25	3.75	2.62
26	2.19	2.93	5.31	6.48	8.25	1.41	1.17	0.36	-	2.03	1.21	0.59	3.33	2.10	1.87
28	2.52	3.83	4.22	7.72	7.35	3.40	2.27	2.15	-	2.12	3.12	1.33	0.82	0.62	2.79
29	1.37	3.44	2.29	5.31	2.60	2.49	3.20	1.38	-	2.36	3.46	1.09	2.38	2.49	2.50
31	2.41	2.54	3.14	2.48	4.86	2.83	0.82	1.93	-	3.21	0.47	0.55	1.23	1.80	2.41
Avg	2.35	3.12	3.96	5.48	6.35	2.65	3.43	2.67	-	1.85	2.01	1.45	2.34	2.33	2.73

[5] The data for Machine 21 excludes lap 4 of the route.

Appendix C Assessment of 3 dimensional spatial coordinates data

C.1 April accreditation check

Table C.1: OSGR measurements against the reference: Network route – April Accreditation check (OSGR fitted data)

ID	10m data points Network route: % within							Performance level
	3m	6m	12m	17m	20m	25m	30m	
3	95%	100%	100%	100%	100%	100%	100%	High
13	99%	100%	100%	100%	100%	100%	100%	High
17	100%	100%	100%	100%	100%	100%	100%	High
19	99%	100%	100%	100%	100%	100%	100%	High
22	96%	100%	100%	100%	100%	100%	100%	High
23	100%	100%	100%	100%	100%	100%	100%	High
24	99%	100%	100%	100%	100%	100%	100%	High
25	100%	100%	100%	100%	100%	100%	100%	High
26	99%	100%	100%	100%	100%	100%	100%	High
28	98%	99%	100%	100%	100%	100%	100%	High
29	98%	100%	100%	100%	100%	100%	100%	High
31	99%	100%	100%	100%	100%	100%	100%	High

Table C.2: Altitude measurements against the reference: Network route – April Accreditation check (OSGR fitted data)

ID	10m data points on Network route Section start and end points on test track: % within					Performance level
	2m	4m	5m	6m	20m	
3	63%	95%	99%	100%	100%	Medium
13	88%	100%	100%	100%	100%	Medium
17	70%	100%	100%	100%	100%	Medium
19	97%	100%	100%	100%	100%	High
22	87%	100%	100%	100%	100%	Medium
23	94%	100%	100%	100%	100%	High
24	93%	100%	100%	100%	100%	High
25	90%	100%	100%	100%	100%	High
26	92%	100%	100%	100%	100%	High
28	100%	100%	100%	100%	100%	High
29	94%	100%	100%	100%	100%	High
31	95%	100%	100%	100%	100%	High

C.2 August Accreditation check

Table C.3: OSGR measurements against the reference: Network route – August Accreditation check (OSGR fitted data)

ID	10m data points Network route: % within							Performance level
	3m	6m	12m	17m	20m	25m	30m	
3	91%	96%	98%	100%	100%	100%	100%	High
13	92%	99%	100%	100%	100%	100%	100%	High
17	97%	100%	100%	100%	100%	100%	100%	High
19	95%	99%	100%	100%	100%	100%	100%	High
22	93%	100%	100%	100%	100%	100%	100%	High
23	96%	99%	100%	100%	100%	100%	100%	High
24	94%	96%	99%	100%	100%	100%	100%	High
25	94%	97%	100%	100%	100%	100%	100%	High
26	93%	96%	98%	99%	99%	100%	100%	High
28	92%	98%	100%	100%	100%	100%	100%	High
31	92%	97%	100%	100%	100%	100%	100%	High

Table C.4: Altitude measurements against the reference: Network route – August Accreditation check (OSGR fitted data)

ID	10m data points on Network route Section start and end points on test track: % within					Performance level
	2m	4m	5m	6m	20m	
3	90%	100%	100%	100%	100%	High
13	62%	73%	93%	100%	100%	Low
17	76%	96%	100%	100%	100%	Medium
19	94%	100%	100%	100%	100%	High
22	76%	100%	100%	100%	100%	Medium
23	87%	98%	99%	100%	100%	Medium
24	92%	100%	100%	100%	100%	High
25	82%	100%	100%	100%	100%	Medium
26	83%	100%	100%	100%	100%	Medium
28	94%	100%	100%	100%	100%	High
31	100%	100%	100%	100%	100%	High

Appendix D Assessment criteria

The accreditation trial criteria are specified in "Accreditation and Quality Assurance of Sideways Force Skid Resistance Survey Devices" (TRL, 2020). This document is a live document (i.e. is subject to change) and the February 2020 version of the document was used for the 2020 Accreditation process. The relevant section of the document is reproduced verbatim below (section D.1). Note in the text below:

- "Equipment" is a defined term and refers to the overall machine being assessed, incorporating the measuring systems and the survey vehicle.
- "System" refers to an individual measurement system installed on the Equipment, e.g. the sideway-force measurement system, GPS, distance measurement system, etc.
- "Employer" refers to the organisation that commissions the Survey Contractor to complete a survey and will generally be the final user of the data provided.
- "Owner" refers to the organisation or individual to which Equipment belongs and to whom Accreditation Certificates are awarded.

D.1 Trial criteria from the Accreditation and QA document

E.3 Equipment inspection

E3.1 Equipment shall be inspected to ensure that they are in a suitable condition to conduct the tests. Contractors should be provided with an inspection check sheet to complete and provide to the Auditor in advance of the Trial.

E3.2 Inspections shall include:

- Water flow System (including verification of flow rate, nozzle alignment and general condition).
- Verification of the test wheel weight.
- Verifying that the Equipment is in good general mechanical order.

E3.3 During the trial the Auditor should confirm that the Contractors have undertaken the following calibrations:

- Vertical load System
- Horizontal load System

E.4 Running Trials

E4.1 Overview

E4.1.1 As detailed in Appendix B, trials shall be carried out on a test site separated into test stations, and laid out such that laps of the set of test sections can be undertaken by the Fleet for the purposes of repeating the measurements.

E4.2 Skid resistance testing – Mandatory Requirement

E4.2.1 The assessment for skid resistance measurements is described below, and a worked example is provided in Appendix C.

E4.2.2 Some Equipment may have skid resistance measurement Systems fitted to both the nearside and offside of the Equipment. If fitted then these systems should be assessed independently and given independent Accreditation results. This requires that suitable reference data is collected for both wheel paths or that the Equipment test on offset driving lines so that the test wheel traffics the same part of the test surface. The Auditor may specify that only one side of the Equipment will be assessed.

E4.2.3 The Equipment shall undertake laps so that the following criteria are met:

- At least 3 laps are undertaken that comply with the requirements for Reference Data (see Appendix B, App B.3).
- Survey data is collected at the target test speed.

E4.2.4 The Contractor shall supply the skid resistance measurements for their Equipment from each test lap in the file formats specified by the Auditor.

E4.2.5 The Auditor shall calculate:

- The mean values for the Equipment for each 100m length test section or the length of the test section if shorter (averaging together the repeat measurements).
- The standard deviation of these mean values for the Fleet and for all of the Equipment at the trial, referred to as the Fleet between-Equipment standard deviation (BESD) and the Trial BESD. These values shall be used to assess the consistency of the Equipment at the Trial.
- The standard deviation of the skid resistance values between runs for the Equipment for 100m lengths (or the length of the test section if shorter). This data is referred to as the between-run standard deviation (BRSD). These values shall be used to assess the repeatability of each individual Equipment.

E4.2.6 The BRSD assessment criterion is given in Table 1. Where the BRSD criterion is exceeded, the data shall be examined for any obvious error, for example as a result of significant variation in test line, and if necessary individual runs on that section may be excluded from subsequent analysis. If Equipment consistently records data with unacceptable between-run standard deviation, the data from that Equipment shall be regarded as unacceptable.

E4.2.7 The Trial BESD shall be acceptable if it is below the criterion given in Table 1. If the Trial BESD exceeds this criterion then the data shall be further examined to identify outlying Equipment. This should include examining the fleet BESD and data from individual Equipment. Outlying Equipment shall be rejected and the data reassessed until the performance is acceptable.

E4.2.8 In addition, any Equipment that deviates by more than 3 times the BESD criterion from the Fleet mean shall be rejected. Any Equipment that is between two and three times the BESD criterion from the all-Equipment mean shall be subject to further investigation.

E4.2.9 The data from any Equipment rejected due to the BRSD, BESD or otherwise identified as an outlier shall not be used in the calculation of the Reference Data (App B.3.1).

Table 1 – Acceptance Criteria for Skid resistance measurements

Parameter	Acceptability Limit
Between run standard deviation (BRSD)	Investigate if >3 SR on 100m lengths
Between Equipment standard deviation (BESD) on closed site (e.g. test track)	≤2.7 SR
Between Equipment standard deviation (BESD) on live site (e.g. network route)	≤2.8 SR

E4.2.10 The Auditor should also review the vertical load Parameter in the data collected at the trial with the aim to identify anomalies and to develop tests for this Parameter to be included in future specifications. If the Auditor identifies anomalies in this data, this may lead to additional testing of Equipment, Accreditation for Equipment being withheld and/or issuing of Improvement Notices (see Section H).

E4.2.11 In addition to the above assessments the Auditor should review the profiles of the Survey Data over the site for each Equipment and investigate any anomalies. Based on the results of the investigation the Auditor may withhold Accreditation for Equipment and/or issue an Improvement Notice as detailed in Section H.

E4.3 Vehicle Speed – Mandatory Requirement

E4.3.1 The assessment of vehicle speed is split into two parts:

- The speed recorded by the Equipment compared with the independently measured speed
- The speed recorded by the independent measure compared with the required target survey speed.

E4.3.2 The test shall be carried out on at least 3 test laps at each target survey speed.

E4.3.3 The acceptance criteria for vehicle speed measurement are given in Table 2.

Table 2 – Acceptance Criteria for Vehicle Speed Measurement

Parameter	Acceptability Limit
Vehicle Speed recorded by the Equipment compared to independent measure	≥80% within ± 1km/h of the independently measured speed
Vehicle speed recorded by the independent measure compared to the target speed	≥80% within ± 3km/h of required target speed

E4.4 Location Referencing – Distance Criteria

E4.4.1 The Accreditation of distance measurement shall be carried out using at least 6 measurements of distance made using the Equipment.

E4.4.2 There are three mechanisms for recording location referencing points in the survey data:

- Push button entry relies on the survey operator pushing a button to enter the location of the point manually.
- Automatic marker uses a system which automatically detects the markers.
- OSGR fitted utilises the coordinate data to identify the elapsed chainage of the location reference points within the survey data.

E4.4.3 The push button entry approach will include some operator error and therefore it is expected that Equipment using this approach will be less accurate than the other methods. The criteria applied to the test measurements for the push button and automatic markers are given in Table 3.

Table 3 – Criteria for measurement of distance travelled for repeatability and reproducibility

Parameter	Push button entry	Automatic markers (where available)
Distance measured	≥80% within 5m	≥80% within 2m

E4.4.4 If the Survey Contractor will be supplying data to a Customer with OSGR fitted location reference points then the original survey data for these Equipment (i.e. not OSGR fitted) shall be assessed on the automatic markers criteria (regardless of the marker entry method used during the survey).

E4.5 Test wheel weight

E4.5.1 The Accreditation of test wheel weight shall be carried out using at least 3 measurements. There can be a tendency for the shaft bearings to stick slightly when the wheel is first lowered (without the shaking action that would be experienced on the moving vehicle at the start of a survey run). For this reason, the assessment shall be carried out after the bearings have been released (achieved by applying foot pressure to the wheel arm bearing and "bouncing" the back-plate against the suspension damper and spring).

E4.5.2 For this assessment the test wheel shall be raised/lowered and the "un-bounced" measurement taken. The System shall then be bounced and the "bounced" measurement taken. This process shall be repeated until at least 3 sets of measurements have been taken. The Auditor should review the differences between the bounced and un-bounced values and the ranges for the three sets of measurements. The "bounced" measurements made shall be averaged together and the criteria applied are given in Table 4.

Table 4 – Criteria for test wheel weight

Parameter	Acceptability Limit
"Bounced" test wheel weight	200±8kg

E4.6 Water flow

E4.6.1 The water delivery system shall be inspected and checked to confirm that the Equipment is delivering water at an acceptable rate and to the correct position on the road surface. The water flow delivery system is required to achieve a target water film thickness of 0.5mm at 50km/h. Due to differences in design (e.g. position of the nozzle) the target flow rate to achieve this will differ between Equipment. The target flow rate for each Equipment shall be determined (through consultation between the Auditor and the Developer). Each Equipment shall be tested to confirm that the flow rate supplied is within the criteria given in Table 5. In the cases where the Equipment incorporates a speed controlled water flow system, the flow rate will be assessed using both 50km/h and 80km/h test pulses.

Table 5 – Criteria for water flow rate

Parameter	Acceptability Limit
Water flow rate	Within 10% of the target flow rate

E.5 Additional Tests

E5.1 Overview

E5.1.1 This sub-section describes the additional criteria which may be assessed to provide additional information on the capabilities of the Equipment. These criteria are assessed as High, Medium and Low levels of performance. These criteria typically include the assessment of Systems not fitted to all Equipment and/or tests which are not as mature as the mandatory assessments. In future revisions to this document some or all of these criteria may become mandatory criteria.

E5.1.2 Some Employers may require a specific level of performance in some or all of these additional tests to carry out Accredited Surveys on their Network.

E5.2 Location Referencing – OSGR data

E5.2.1 As noted in E4.4.2 there are three mechanisms for recording the location of location referencing points. The differences in these approaches result in different criteria for OSGR assessment. However, it is noted that automatic marker detection is normally not possible on a network route test and as such no automatic marker criteria are given for the network route.

E5.2.2 OSGR Systems shall be assessed using both the OSGR fitted criteria and the marker entry criteria (Push or Automatic) matching the method used during the survey. The criteria applied shall be noted on the Accreditation certificate. If the Survey Contractor does not supply OSGR fitted data, then the data will be fitted by the Auditor and noted as such on the Accreditation Certificate.

E5.2.3 OSGR data collected from the closed test sections shall be assessed using the criteria given in Table 6.

Table 6 – Closed test section: Criteria for OSGR data of individual 10m data points

Performance level	Push button entry	Automatic markers (where available)	OSGR fitted
High	90% within 5m 95% within 7m 100% within 20m	90% within 2m 95% within 4m 100% within 20m	90% within 2m 95% within 4m 100% within 20m
Medium	80% within 5m 90% within 7m 100% within 20m	80% within 2m 90% within 4m 100% within 20m	80% within 2m 90% within 4m 100% within 20m
Low	80% within 8m 100% within 20m	80% within 5m 100% within 20m	80% within 5m 100% within 20m
Not suitable	Otherwise	Otherwise	Otherwise

E5.2.4 OSGR data collected from a live traffic route shall be assessed using the criteria given in Table 7

Table 7 – Live traffic route: Criteria for OSGR data of individual 10m data points

Performance level	Push button entry	OSGR fitted
High	90% within 12m 100% within 25m	90% within 6m 100% within 20m
Medium	90% within 17m 100% within 25m	90% within 12m 100% within 25m
Low	100% within 25m	100% within 25m
Not suitable	Otherwise	Otherwise

E5.2.5 The OSGR performance recorded on the Accreditation Certificate shall correspond to the lowest performance of all of the test sites used and the criteria applied, unless it is identified that some data should be disregarded. If any data is disregarded then this should be recorded on the Accreditation Certificate along with the reasons.

E5.3 Location Referencing – Altitude data

E5.3.1 Altitude data collected shall be assessed using the criteria given in Table 8.

Table 8 –Criteria for Altitude data of individual 10m data points

Performance level	Criteria
High	90% within 2m 95% within 5m 100% within 20m
Medium	80% within 4m 90% within 6m 100% within 20m
Low	100% within 20m
Not suitable	Otherwise

E.6 Checking of file formats

E6.1.1 Some Employers require the production of data in specific data formats, for example Highways England requires data to be produced as Raw Condition Data (RCD) and Base Condition Data (BCD). Where required, Owners shall be asked to deliver accreditation data files in the required format.

Highways England 2020 national accreditation verification for sideway-force skid resistance devices

A key element in the successful maintenance of a road network is the availability of accurate, reliable and consistent survey data. To this aim, Highways England commission annual accreditation trials for Sideways Force Skid Resistance devices supported by ongoing QA for the devices. In order to undertake accredited surveys, the survey devices are required to meet the mandatory criteria of the trial.

This report covers the amended 2020 accreditation process run by TRL in light of COVID-19.

Other titles from this subject area

PPR1020	Highways England 2019 national accreditation trial for sideway-force skid resistance devices. S Brittain. 2022
PPR935	Highways England 2018 national accreditation trial for sideway-force skid resistance devices. S Brittain. 2020
PPR936	Highways England 2017 national accreditation trial for sideway-force skid resistance devices. S Brittain. 2020
PPR935	Highways England 2016 national accreditation trial for sideway-force skid resistance devices. S Brittain. 2020

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ISSN 2514-9652

ISBN 978-1-913246-95-2

PPR975