

**CIVIL AVIATION AUTHORITY
WINTER INFORMATION GROUP**

**UK WINTER RUNWAY ASSESSMENT TRIAL
2012/2013**

TRIAL PLAN

REFERENCE: CAA/Safety Regulation Group/Aerodrome and Air Traffic Standards

DATE: 1 November 2012 to 31 March 2013

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CONTENTS LIST

PAGE

1	Objective	3
2	Test Programme	3
3	Description of Assessment	4
4	Benefits	4
5	Test Schedule	4
6	Test Results	5
7	Review	5
8	Communication Plan	5
9	Management Plan	5

APPENDICES

A	References	A-1
B	Contacts Details	B-1
C	Task Data Sheet	C-1
D	Assessment Table & Guidance Notes	D-1/4
E	Test Schedule	E-1
F	Pilot Questionnaire	F-1
G	ATCO Questionnaire	G-1
H	Task Difficulty Rating Scale	H-1

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1 OBJECTIVE

- 1.1 The Winter Wash Up meetings held following the severe weather experienced in the UK in 2010 prompted the formation of a Winter Information Group (WIG). This group has met, reviewed all current available information published by the CAA concerning operations, amended it where necessary, and published new guidance in the form of NOTAL, ATSIN, FODCOM and updated AIP and AIC pages. Subsequently, an Information Notice was issued after the second trial.
- 1.2 Feedback from aircraft operators on the group indicated that the work, taking place in North America under the FAA's TALPA ARC, could be adapted for use in the UK and so a trial was commissioned for winter 2010-11. This trial provided only limited information, so the trial was expanded to include 17 aerodromes, geographically spread across the United Kingdom during winter 2011-12. Unfortunately, owing to the mild winter only 52 results were recorded. Although the resulting data set was small there was evidence of correlation between the braking action estimate and the perceived braking action. The WIG has concluded that the proof of concept had been achieved, and the trial has been re-commissioned to increase the data set and confirm the potential benefits.
- 1.3 In view of the fact that part of the TALPA ARC matrix will require changes to aircraft manufacturers flight operations manuals, an abbreviated runway surface assessment tool will be trialled again during winter 2012/13 (See Appendix D).
- 1.4 The trial has three key objectives:
 - a) To see how the quality of data, gathered by UK aerodrome operations staff and passed to airline operators' crews via ATC, can be improved by the adoption of an enhanced assessment format, which uses phraseology to describe estimated braking action. This is obtained by assessing the runway state against a reference table using type of contaminant and its depth;
 - b) To see if aircrew understand the phraseology and whether the reports add value to the runway state report promulgated either by Snowtam, Metar Runway State Group or ATIS;
 - c) To obtain feedback from participating Air Traffic Service Units (ATSUs) concerning the management of data transmission generated by the trial and the usefulness of the data to ATSUs themselves.
- 1.5 It is the intention of the WIG to again produce a report on the findings from the trial.

2 TEST PROGRAMME

- 2.1 The trial will run from 1 November 2012 to 31 March 2013.
- 2.2 Any aircraft operator using a participating aerodrome's runways during the trial may participate. ATC will pass Estimated Braking Action information to any aircraft using RTF when aerodrome operations personnel make a report available.
- 2.3 After each movement participating in the trial, ATC will also request a verbal report from each aircraft on the braking action perceived by the flight crew.

This will comprise the following:

“ (Callsign), were the estimated braking actions as reported?”

- 2.4 Alternatively flight crew may submit a completed pilot questionnaire via their flight operations department or online at www.caa.co.uk/SRG2007. Additionally, questionnaires may be submitted by email to aerodromes@caa.co.uk, or by fax to 01293 573971.

3 DESCRIPTION OF ASSESSMENT METHODOLOGY

- 3.1 A task data sheet has been produced to help aerodrome operations staff carry out a runway inspection and obtain all the necessary data to pass on to ATC (see Appendix C).
- 3.2 An assessment table is provided for use in contaminated runway conditions to help enable aerodrome operations staff assess conditions and derive an estimate of runway friction (see Appendix D). Note: The words are the same as those used in reports of estimated braking action on compacted snow and ice as detailed in the UK AIP AD1-2-4 para 5.4.1 but it has to be emphasised that the meanings of these words are not directly related to any numerical values of friction.
- 3.3 Should one or more thirds of the runway not be affected by contamination, the standard phraseology for runway state should be used, e.g. Dry, Damp, Wet or Wet with de-icer fluid.
- 3.4 In the case of a PIREP being communicated from an aircraft during periods of runway contamination, a hierarchy of validity is to be employed. Any PIREP that reports the runway as worse than the current Estimated Runway Friction will prompt a downgrading to that state and trigger a reassessment of the runway condition. Any PIREP suggesting better than reported conditions will not upgrade the Estimated Runway Friction but will trigger a reassessment of the runway state.
- 3.5 SNOWTAMs should be issued and updated, for significant changes, in accordance with AIC Yellow 86 / 2009. Notwithstanding the AIC, if sleet or snow is falling, or clearing in progress, reports are usually provided every 30 minutes, but must be provided hourly.
- 3.6 Runway State Groups appended to the METAR should be issued in accordance with CAP 782. When different states are reported for the three portions of the runway the one that equates to the worst condition will be reported.

4 BENEFITS

- 4.1 The main benefit that could result from the trial is validation of a methodology whereby greater clarity and accuracy, in terms of passing data from operations staff to ATC who then promulgate runway states to aircraft operators, may lead to improved safety and a reduction in weather diversions due to winter contamination of runways.

5 TEST SCHEDULES (INCLUDING OPERATIONAL TRIALS)

- 5.1 The Test Schedule for the evaluation is presented in tabular form at Appendix E.
- 5.2 Outcomes related to perceived risks will be achieved through post-evaluation analysis of recorded data. Identified sensitivities will be addressed by specific operational tests. Appropriate metrics will be applied to obtain quantitative data.

6 TEST RESULTS (DATA)

- 6.1 Data obtained for every element of the Test Schedule, including Flight Data Monitoring data where supplied, will be presented at the end of the evaluation. The data will be presented such that the documented information can be readily related to the requirements of the Test Schedule. The Airport Trial Manager is responsible for data collection.

7 REVIEW (DATA ANALYSIS AND FINAL REPORT)

- 7.1 An Evaluation Report will be produced by the WIG that describes the outcome of the evaluation, presents the data obtained and offers an analysis of that data, with particular reference to the stated objectives of the evaluation. Conclusions will be drawn and where appropriate recommendations will be made.

8 COMMUNICATION PLAN

- 8.1 Each Airport Trial Manager will be responsible for developing the Communication Plan and providing briefs for operators Air Traffic Control and airport operations staff.

9 MANAGEMENT PLAN

- 9.1 Day to day management of the trial will be the responsibility of the Airport Trial Managers named in the document. Each will issue instructions to their respective duty staff as required.

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APPENDIX A - REFERENCES

- A. CAP 168 Licensing of Aerodromes
- B. UK AIP AD 1-1-1 Aerodrome Availability
- C. UK AIP AD 1-2-1 UK Snow Plan
- D. AIC Yellow 86/2007
- E. AIC Pink (126) 86/2009
- F. AIC118/2006
- G. AIC 106/2004

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APPENDIX B - CONTACT DETAILS

1. Winter Information Group

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APPENDIX C - TASK DATA SHEET

Runway State Assessment Task Sheet

For those participating in the trial, the objective of this task sheet is to set out those actions Aerodrome Operations personnel may find necessary to carry out an inspection of a potentially contaminated runway, during winter, and pass data gathered during such an assessment to Air Traffic Control. Equipment likely to be required:

1. Suitable transport permitted to enter a runway;
2. Appropriately trained personnel;
3. Means of recording data;
4. Means of measuring depth of contaminant;
5. Means of measuring either surface or air temperature;
6. Means of passing data.

Regardless of air traffic movements, the assessment should cover the promulgated runway length. Account should be taken of the cleared width of the runway in the case of contamination.

The assessed area should be divided up into equal thirds and reported as Touch Down, Mid Point and Stop End. The Runway State Assessment Table provided for the trial (see Appendix D) should be referred to in order to assign an estimated runway friction word or phrase to the conditions observed.

The parameters for the assessment are:

General

- Date and Time of observation;
- Operations mode (CAT I, LVPs or RWY closed);
- Air Temperature (surface temperature may be collected but will be used for comparison purposes only);
- Dew Point;
- If present, restrictions to cleared width;
- If present, restrictions to cleared length; and
- If present, height of any snow banks.

For each runway third

- Type of contaminant;
- Percentage of cover (greater than 25%);
- Mean depth of contaminant per runway third.

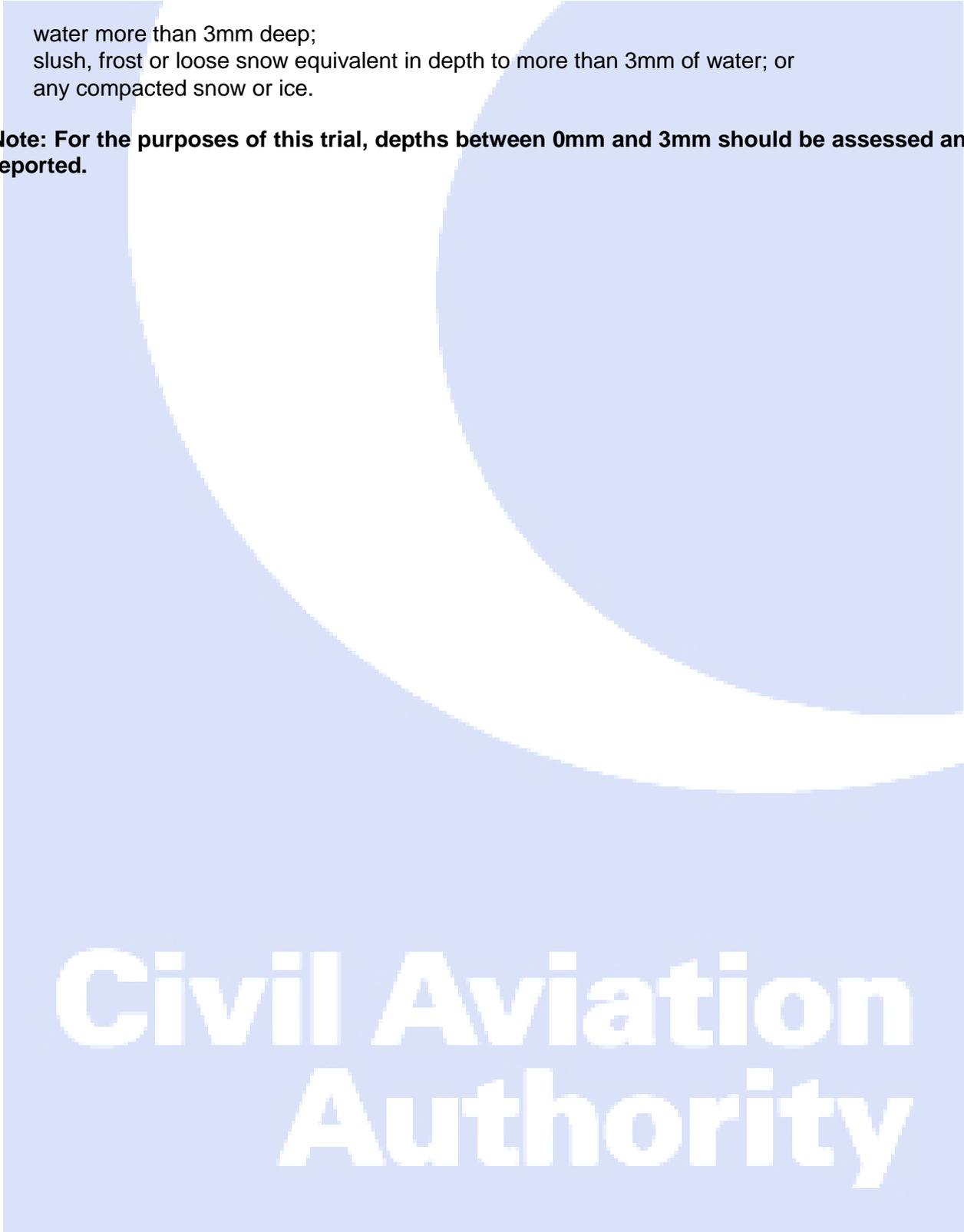
Assessments should be repeated whenever conditions change and in any case 15 minutes before the first movement following any closure. A task difficulty rating form should be completed the first time personnel conduct an assessment and at regular intervals thereafter, or after any subsequent change in procedure.

APPENDIX D - ESTIMATED BRAKING ACTION - ASSESSMENT TABLE (See over for guidance notes)

A runway is contaminated when more than 25% of the runway surface area (whether isolated or not) within the reported length and width being used is covered by:

- water more than 3mm deep;
- slush, frost or loose snow equivalent in depth to more than 3mm of water; or
- any compacted snow or ice.

Note: For the purposes of this trial, depths between 0mm and 3mm should be assessed and reported.

The logo of the Civil Aviation Authority (CAA) is a large, stylized white 'C' shape on a light blue background. The 'C' is composed of two concentric, slightly offset curves that do not meet at the top or bottom, creating a sense of motion or a protective shield. The text 'Civil Aviation Authority' is written in a bold, white, sans-serif font across the bottom of the blue area.

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Depth	Water	Slush	Snow (Wet)	Snow (Dry)	Compacted Snow (any depth)	Ice/Rime	Frost
↑ >19mm	Flooded	STOP	STOP	STOP	Warmer than -15C Medium -15C and Colder Good to Medium	Poor	N/A
19mm >13mm	Flooded	STOP	STOP	STOP			
13mm >3mm	Medium To Poor	Medium to Poor	Medium	Medium			
3mm 0mm	Good	Good	Good	Good			Good
	See over for cautionary note ref 3 Kelvin Spread Rule						
Dry	The runway is not affected by Water, Slush, Snow, Ice or Frost						

Caution:

The Norwegian Accident Investigation Board has recently published a report on 'Winter Operations, Friction Measurements and Conditions for Friction Predictions'. The report is based on findings from 30 incidents that have occurred on contaminated runways over the last 10 years in Norway. The report highlights a number of safety indicators from its findings, one of these is the '3-Kelvin-Spread Rule'¹. The rule states that at air temperatures of +3°C and below, with a dew point spread of 3°C or less, the runway surface condition may be more slippery than anticipated on snow and ice. The narrow dew point spread indicates that the air mass is relatively close to saturation which is often associated with actual precipitation, intermittent precipitation, nearby precipitation or fog. How these atmospheric conditions affect braking action is not considered by the rule, however, many of the incidents highlighted in the Norwegian report which relate to insufficient friction were linked to precipitation or deposition of water, liquid or frozen. The validity of the rule may depend on its correlation with precipitation but it may also, at least in part, depend on the exchange of water at the air-ice interface. The rule was observed in 21 out of the 30 incidents related to braking action on ice and snow investigated by Norway. Due to the other variables involved such as surface temperature, solar heating and ground cooling or heating, a small spread does not always mean that the braking action will be poor. The rule may be used as an indicator of slippery conditions but not as an absolute. When these conditions exist it may be appropriate to factor the landing distance above and beyond those factors.

NOTE: For the purposes of this trial, the surface condition may be passed as Good when wet with de-icing fluid, as there should be no difference in braking action to that when the runway is wet with water.

DEFINITIONS

Dry runway: For airplane performance purposes and use of this Table, a runway can be considered dry when no more than 25% of the runway surface area within the reported length and the width being used is covered by visible moisture or dampness.

Wet Runway: For airplane performance purposes and use of this Table, a runway is considered wet when more than 25% of the runway surface area within the reported length and the width being used is covered by any visible dampness or any water up to 3 mm deep.

Contaminated Runway: For airplane performance purposes and use of this Table, a runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following:

- (i) surface water more than 3 mm (0,125 in) deep, or by slush, or loose snow, equivalent to more than 3 mm (0,125 in) of water;
- (ii) snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or
- (iii) ice, including wet ice.

Dry Snow: Snow that can be blown if loose, or that will not stick together to form a snowball using gloved hands.

Wet Snow: Snow that contains enough water content to be able to make a well-compacted, solid snowball, but water will not squeeze out.

Slush: Snow that is so water saturated that water will drain from it when a handful is picked up. Slush will splatter if stepped on forcefully.

¹ For clarification 1 Kelvin (K) equals 1 degree Celsius/Centigrade (C)

Compacted Snow: Snow that has been compressed into a solid mass such that the airplane tyres, at operating pressures and loadings, will run on the surface without significant further compaction or rutting of the surface. Compacted snow may include a mixture of snow and embedded ice; if it is more ice than compacted snow, then it should be reported as either ice or wet ice, as applicable. A layer of compacted snow over ice should be reported as compacted snow.

Water: Water in a liquid state.

Frost: Frost consists of ice crystals formed from airborne moisture that condenses on a surface whose temperature is below freezing. Frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture. Heavy frost that has noticeable depth may have friction qualities similar to ice and downgrading the runway condition code accordingly should be considered. If driving a vehicle over the frost does not result in tire tracks down to bare pavement, the frost should be considered to have sufficient depth to consider a downgrade of the runway condition code.

Rime: Deposit of ice generally formed by the freezing of super cooled fog or cloud droplets on objects whose surface temperature is below or slightly above 0 Deg C.

Ice: Frozen water.

Wet Ice: Ice with a layer of water on top of it or ice that is melting.

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APPENDIX E - TEST SCHEDULE

Parameter	Test Description	Metric	Owner
Runway Assessment	Report runway surface conditions as per NOTAL 2010/09	Percent covered Type Depth	Aerodrome Ops
Ease of use	Operations staff and ATCOs use Task Difficulty Rating Scale (Annex G)	Human Factors	Aerodrome Ops / ATC
Estimated Braking Action	Use Assessment table at Appendix D	Good Medium Good Medium Medium Poor Poor	Aerodrome Ops
Pilot Feedback	Pilots to provide PIREPs in a standard format	Qualitative & Quantitative	Air Crew / Airline
ATCO Feedback	ATS to report and record; Date Time RVR / Meteorological Visibility Precipitation Runway State Group Estimated Braking Action Seek PIREP	Update rate of METAR / SNOWTAM Usefulness of data to ATC	ATC
Aerodrome Trial Managers will collect above data and forward to CAA Trial Co-ordinator			

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APPENDIX F – CAA WINTER OPS TRIAL PILOT QUESTIONNAIRE

Please tick to agree for FDR data to be used confidentially

LOC: EG__	DATE:	TIME:	FLT No:
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Q1. ATC supplied data

Comments

ATIS LETTER / TIME		
MET VIS / RVR		
TEMP / DEW POINT		
QNH		
PRECIPITATION	Y / N	
PRECIPITATION TYPE		

Q2. If runway was contaminated

	TD	MP	SE
PERCENT COVERED			
TYPE OF DEPOSIT			
DEPTH OF DEPOSIT			

Q3. What estimate of braking action was passed to you by ATC?

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Q4. What was your estimate after landing?

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Q5. Compared with the previous winter, was the information?

SIGNIFICANTLY BETTER	
SLIGHTLY BETTER	
THE SAME	
SLIGHTLY WORSE	
SIGNIFICANTLY WORSE	

Q6. Based on your participation in the trial do you believe that inclusion of an estimated braking action phrase is an improvement?

YES	
POSSIBLY	
NO	

Q7. Any other relevant comment,

Please return completed form to your Flight Ops Dept - Thank you

APPENDIX G – ATCO QUESTIONNAIRE – Winter 2012/13

Use this section to record periods of contaminated runway operations

DATE	WATCH
------	-------

Q1 ATC supplied data

ATIS LETTER/TIME		
MET VIS / RVR		
TEMP / DEW POINT		
QNH		
PRECIPITATION	Y / N	
PRECIPITATION TYPE		

Comments

Q2 If Runway was contaminated

	TD	MP	SE
PERCENT COVERED			
TYPE OF DEPOSIT			
DEPTH OF DEPOSIT			

Q3 Compared with the previous winter, was the information?

SIGNIFICANTLY BETTER	
SLIGHTLY BETTER	
THE SAME	
SLIGHTLY WORSE	
SIGNIFICANTLY WORSE	

Q4 Based on your participation in the trial do you believe that inclusion of an estimated braking action phrase is an improvement?

YES	
POSSIBLY	
NO	
TASK DIFFICULTY	

Use this section per a/c landing – a separate record to the first section may be used

Q5a What estimate of braking action was passed to the aircrew?

Flt Number				
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Note "Callsign, were the estimated braking actions as reported"

Q5b What was their response to the question?

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Q6. Any other relevant comments?

APPENDIX H – TASK DIFFICULTY RATING SCALE

The runway state assessment trial is intended to improve the quality of information passed to pilots.

Please use the Task Difficulty Rating Scale to indicate how, overall, you rate the difficulty of the task when using the guidance provided by standard procedures compared with using the table to assist you. To make your response please tick the Scale descriptors below that best describes your assessments.

