

PART 2 – OPERATIONAL ARRANGEMENTS

11. Decision and Carriageway Treatment Matrices

11.1 Clear and efficient decision-making processes, supported by accurate weather prediction and information systems, are critical for the delivery of an effective Winter Service. Policy WS6 sets out the County Council's decision-making procedure. Policy WS7 specifies the carriageway treatment matrix.

Policy WS 8				
Decision Matrix				
Road Surface Temperature	Precipitation	Predicted Road Conditions		
		Wet	Wet Patches	Dry
Expected to fall below 0.5°C	<u>No</u> rain <u>No</u> hoar frost <u>No</u> fog	Salt before formation of ice/hoar frost	Salt before formation of ice (see Note a)	No action likely, monitor weather and carry out inspections as necessary (see Note a)
	<u>Expected</u> hoar frost <u>Expected</u> fog		Salt before formation of ice/hoar frost (see Note b)	
	<u>Expected</u> rain <u>BEFORE</u> freezing	Salt after rain stops (see Note c)		
	<u>Expected</u> rain <u>DURING</u> freezing	Salt before formation of ice, as required during rain and again after rain stops, carrying out inspections as necessary (see Note d)		
	<u>Possible</u> rain <u>Possible</u> hoar frost <u>Possible</u> fog	Salt before formation of ice/hoar frost	Monitor weather conditions and carry out inspections as necessary	
	<u>Expected</u> snow	Salt before snowfall		
General Notes				
1) The timing of precautionary treatments should be such that completion is prior to the forecast time of frost.				
2) The decision to undertake precautionary treatments should be adjusted, if appropriate, to take account of residual salt or surface moisture (see also Policy WS7 Treatment Matrix).				
3) All decisions should be evidence-based, recorded and require monitoring and review.				

Notes to Decision Matrix

- a) It will be necessary to give particular attention to the possibility of water running across carriageways and other running surfaces, for example, off adjacent fields after heavy rain, washing away any salt previously spread.

Such locations should be 'blasted' during initial treatment and then closely monitored, as additional spot treatments may be required at other times.

- b) When hoar frost is predicted, considerable deposits of ice/frozen dew are likely to occur, usually in the early morning. Treatment with dry salt is difficult as its deposition on a dry road surface too soon before the formation of the hoar frost may result in the salt being dispersed before it can become effective. Where practicable, treatment should take place at such a time so routes are completed just prior to the forecast time of hoar frost formation. However, with treated salt the dispersal effects are significantly reduced and should allow an earlier application.
- c) If, under these conditions, rain has not ceased by early morning, crews should be mobilised and action initiated as rain ceases.
- d) Under these circumstances, rain will freeze on contact with running services and full pre-treatment should take place even on dry roads. This is a very serious condition and must be monitored closely and continuously throughout the danger period.

Policy WS 9			
Carriageway Treatment Matrix			
Weather Conditions Road Surface Conditions Road Surface Temperature (RST)	Treatment		
	Treated Salt (g/m ²)	Dry Salt (g/m ²)	Ploughing
Precautionary Treatment			
Forecast hoar frost/ice with RST above -2C	8	10	No
Forecast hoar frost/ice with RST between -2°C and -5C	15	20	No
Forecast hoar frost/ice with RST below -5C	15-30 (dependent on surface state)	20-40 (dependent on surface state)	No
Forecast snow (up to 30mm)	15	20	No
Forecast snow (greater than 30mm)	15-30	20-40	No
Post Treatment			
Hoar frost/ice (See Precautionary Treatment above)	8-30 (dependent on surface temperature and state)	10-40 (dependent on surface temperature and state)	No
Snow where precautionary treatment has taken place	8	10	Plough first if depth >5-15mm (see Note 4)
Snow where precautionary treatment has not taken place	15-40	20-40	Plough first if depth >5-15mm (see Note 4)
Hard-packed snow/ice	Salt and/or abrasive and/or Liquid de-icer	Salt and/or abrasive and/or Liquid de-icer	No

Notes to Carriageway Treatment Matrix

1) *Oversalting and Residual Salt*

During periods with little or no precipitation and overnight sub-zero temperatures, continual salt treatments can create potentially dangerous road surface conditions. Slippery road conditions can arise either as a result of a build-up of loose salt granules or where there has been frost, a build-up of the marl impurity in rock salt on the road surface. During such periods, as there will be little salt wash-off, due regard should be made of residual salt. It may be possible to reduce the treatment or not treat at all where these conditions last for two or more days. Decision makers should ensure that, if necessary, notes be included in Vaisala 'Manager' to clarify their decisions.

2) *Altitude Related Forecasts*

Weather forecasts are often qualified by altitude. In this case, differing action may be required from each depot, and in some cases differing action on routes from the same depot.

3) *Hard Packed Ice and Snow*

Exact details of treatment will depend on location and local conditions.

4) *Ploughing*

Para 4.33 refers. Ploughing down to the road surface is preferred. Moderate / heavy snowfalls are equivalent to more than 1mm of water. Generally, there is approximately 1mm of water in 5mm depth of wet snow, 10mm depth of 'normal' snow and 15mm depth of dry, powdery snow. Ploughing should take place in both directions and the snowplough height must be set to avoid damage to the plough, the road surface, street furniture and level crossings.

12. **Snow Clearance**

12.1 Section 150 of the Highways Act 1980 imposes a duty upon highway authorities to remove any obstruction of the highway resulting from the accumulation of snow. Snow clearance of carriageways will be in accordance with the Priority Road Network hierarchy set out in Policy WS3. 'Treatment Time' has little relevance when snow accumulation is significant and ploughing is required. The County Council considers that prescriptive guidance is not appropriate for snow situations where the Council may have to deploy labour and plant resources more flexibly in order to achieve optimum effectiveness. Gritters, for example, can operate in tandem with the lead vehicle snow ploughing (with a full salt payload for traction) and the second vehicle spreading salt.

12.2 Guidance issued in December 2010 considers it impractical to spread sufficient salt to melt anything other than very thin layers of snow and ice, and that ploughing is the only economical, efficient, effective and environmentally acceptable way to deal with all but very light snow. This will minimise salt usage and make salt treatments more effective. A spread rate of 40g/m² of salt is the highest practicable; when combined with the action of traffic this is sufficient to melt snow depths equivalent to 1mm of water at temperatures down to -2C.

12.3 Where hard-packed snow and ice have formed and cannot be removed by ploughing, spreading of a 50:50 salt/sand mix will aid traction and act to break up the snow and ice. Following the difficulties associated with a combination of compacted snow and very low temperatures experienced in December 2010, the County Council purchased 30,000 litres of liquid de-icer for future use in circumstances where temperatures fall below the threshold for effective salt use and compacted snow proves resistant to snow ploughing. However, this is a relatively expensive product and is for use on the Priority Road Network only.

13. Secondary Road Network

13.1 The County Council will consider other roads for post-salting treatment and snow clearance in periods of continuous icing and snow. Continuous icing may arise due to excessive surface moisture, usually following heavy precipitation or compacted/melting snow. Decision-making will take account of all relevant factors such as weather forecast data, topography, experience and local knowledge and the availability of salt. When salt is not available the County Council will consider using grit sand to aid traction.

Policy WS 10

Secondary Road Network Treatment

Once the defined Priority Road Network is maintained clear, where persistent ice and/or snow are present or forecast to be present on the defined Secondary Road Network during the current 24 hour period (midnight to midnight) and are forecast to remain for the succeeding 24 hour period (midnight to midnight), treatment of the Secondary Road Network will commence as soon as possible using all available resources, but only during daylight hours.

13.2 The County Council's defined Secondary Road Network for Winter Service is viewable on both MapZone and MARIO, the latter accessible by the public. Treatment of the remaining road network will only commence on a priority basis once the defined Priority Road Network, the defined Secondary Road Network and the defined Priority Footway Network are all maintained clear, but only during daylight hours. Some minor roads and cul-de-sacs will inevitably have to thaw naturally.