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  - Environmental Sensor Sites (ESS)
  - Forecast Provision
  - Sever Weather Information Service (SWIS)
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  - ROC Structure and Treatment Decision Process
- Opportunities for Closer Working with Local Authorities
Approach – legislation & Policy

- Highways Act 1980 Section 41 (1A) duty to ensure, so far as reasonably practicable, that safe passage along a highway is not endangered by ice or snow
- Highways England policy expands upon this to include alert procedures and actions to minimise risk posed by
  - Fog
  - High temperatures
  - Heavy rain
  - High winds
Severe Weather Plan

- Describes policy, procedures & operational arrangements
- Specific purposes
  - Contract Document
  - Quality Plan
  - Contingency Plan
  - Operational Manual
  - Reference Document
- Set to a national template
- Reviewed & improved annually
- Developed collaboratively
  - Asset Support
  - Asset Delivery
Severe Weather Plan Cont’d

1. Reporting
   Central reporting via Severe Weather Information Service (SWIS) – LIVE
   - Treatment actions
   - Salt capability
   - Fuel resilience
   - Vehicles (incl. location)

2. Resources

3. Winter service route planning

4. Exercises and briefings

5. Performance requirements
Severe Weather Plan Cont’d

Vulnerable Locations

- Detailed lists of locations vulnerable to severe weather including
  - Fog
  - High temperatures
  - Heavy rain
  - High winds
  - Snow & Ice

- Collaboration with Traffic Officer Service/Vehicle Recovery and winter fleet
  - Operations Traction & Side-line
Plan, Prepare, Deliver, Review

Pre Winter Period
- Severe Weather Plan template incorporating best practice nationally populated and in place 1st October
- Pre season dry runs – to test route changes and familiarise drivers

During Winter Period
- Severe Weather Desk Exercise
- Stakeholder briefing
- Continual improvement through debriefs and lessons learnt

Post Winter Period
- End of season review, recording key issues, and lessons learnt
- Provide feedback through end of season questionnaires, and operational assessment reports
- Feeding in to development of new Severe Weather Plan
Performance Requirements Snow Response

Snow Clearance Plan
Red, Amber and Green route status
Defines lane availability during snow
Reduced lanes kept open during snow
Defines resource deployment
Full clearance following cessation

<table>
<thead>
<tr>
<th>Snow clearance requirement</th>
<th>Red</th>
<th>Amber</th>
<th>Green</th>
<th>Slip and link roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route classification:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of existing lanes</td>
<td>1 or 2</td>
<td>3 or more</td>
<td>1 or 2</td>
<td>3 or more</td>
</tr>
<tr>
<td>Criteria</td>
<td>minimum number of lanes to be kept clear of snow, as far as reasonably practicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between the hours of 06:00 - 20:00</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Between the hours of 20:00 - 06:00</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Following the cessation of snow all lanes are to be clear of snow within</td>
<td>12 hours</td>
<td>18 hours</td>
<td>24 hours</td>
<td>In accordance with route classification</td>
</tr>
</tbody>
</table>
Service Delivery Times

Asset Delivery Areas / Maintenance & Response:
- Mobilisation = 1hr
- Treatment time = 2hrs

Asset Support - Maintenance & Operational Requirements (AMOR)
- Mobilisation = 1hr
- Treatment & turnaround time = 3 hrs
Organisation

- 13 Areas

- Operated as Asset Support Contracts (ASC) or Asset Delivery Areas

- Areas 1, 2, 7, 13 & 14 Asset Delivery Areas

- Asset Delivery - directly manage assets and network operations rather than contracting the responsibility to a ASC
Serves major cities: Nottingham, Leicester, Northampton and Derby

- 940 miles of motorway & trunk road
- 1,413 structures
- 13,702 street lighting columns
- 4,299 illuminated signs
- 10 Depots
- Winter Fleet 47 spreaders, 2 snow blowers.
- 32 winter precautionary routes

Head Office: Stirling House, Nottingham

Routine and capital maintenance had previously been carried out through a Managing Agent Contract.

Asset Delivery commenced on 1st July 2016. There were 150 staff TUPE transferred from the previous service provider.
**Winter & Severe Weather Service Asset Delivery**

<table>
<thead>
<tr>
<th>National</th>
<th>Regional</th>
<th>Supply Chain</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Weather Plan Template (Policy)</td>
<td>National &amp; Area Weather Forecasting (WFIS)</td>
<td>Development of Severe Weather Plan</td>
<td>COLLABORATION</td>
</tr>
<tr>
<td>National &amp; Area Weather Forecasting (WFIS)</td>
<td>Roads Weather Information (ESS)</td>
<td>Treatment Plan Development (Decision)</td>
<td>Decision</td>
</tr>
<tr>
<td>Roads Weather Information (ESS)</td>
<td>Severe Weather Information (SWIS)</td>
<td>Procurement of Salt</td>
<td></td>
</tr>
<tr>
<td>Severe Weather Information (SWIS)</td>
<td>Observation &amp; Review</td>
<td>Observation &amp; Review</td>
<td>Delivery</td>
</tr>
</tbody>
</table>

- **Severe Weather Plan Template (Policy)**
- **National & Area Weather Forecasting (WFIS)**
- **Roads Weather Information (ESS)**
- **Severe Weather Information (SWIS)**
- **Development of Severe Weather Plan**
- **Treatment Plan Development (Decision)**
- **Procurement of Salt**
- **Observation & Review**
- **Depot and fleet maintenance**
- **Delivery of Treatment Plans**
- **Management of salt stocks**
- **Maintenance Resources**

**Performance Metrics**
Severe Weather Desk

Purpose
- Operated by each Area (specific arrangements)
- Requirement of the Severe Weather Plan
- Enhanced management process to provide support
- Provides additional resources
- Tactical management
- Preplanning
- Communication hub

Established prior to the forecast commencement of severe weather, that could cause network disruption, or as soon as possible in the event of un-forecast severe weather

3 escalation stages being
- Level 1 - Pre-activation – planning / alert
- Level 2 - Lower impact event confined area.
- Level 3 - High impact event effecting majority of Area

May be activated at any level as conditions dictate
Technology and Organisation
Winter Fleet

- 437 vehicles (47 in East Midlands)
- Dry/Pre-wet/Liquid/Combi
- 4x4 and 6x4
- 2 suppliers
- 2 chassis types
- 2 body designs
- Manual treatment operations
Other Plant & Equipment

- 23 Snow Blowers - 2 in East Midlands
- Salt Saturators - 8 in East Midlands
- Loading Shovels (Service Provider)
Salt Stocks

- 280,000t + operational salt stocks at start of winter (34,000t in East Midlands – 22days capability)
- Operational stock managed through SWIS
- Storage arrangements for local authority salt now included as a protocol (National Salt Reserve) in Annex C of the Highways England Framework Agreement
- 380,000t strategic salt stocks (National Reserve)
- 280,000 tonnes stored for local authority use – 6 ports
- Regular inspections
- 100,000 tonnes stored for Highways England use
- 3 HE barns for HE reserve stocks inc Misterton:
  - M1 Leics completed 2015, capacity 55000 tonnes
Environmental Sensor Stations (ESS)

256 Environmental Sensor (Weather) Stations (26 in East Midlands)
- Real-time data feed through the NRTS network
- Feeds into the Severe Weather Information Service
- Feeds into the weather forecasting service
- 50+ parameters including RST, Dew, Surface State
- Some sites shared with Local Authorities

Forecasters
- Met Office
- Met Desk
- Meteo Group
Weather Forecasting Arrangements

National Forecasting Service
- Embedded Forecasters in Quinton
- National Forecast
- Severe Weather Alerts
- Weather Advisories

Area Forecasting Service
- Each Area procures their own forecasting service
- 13 Area contracts
- 10 DBFO contracts

Partnerships:
- Met Office
- MetDesk
- MeteoGroup

New Weather Forecasting Contract
- Integration of forecasting contracts
  - National Forecast Service
  - AD Areas 1, 2, 7, 13 & 14
  - Opportunity to include ASCs, MACs & DBFOs

Benefits
- Driving forward innovation
- Consistent message across the SRN

July 2016
July 2017
Area Forecasting Service

(SWP Requirement)

24hr Forecast
Delivery - 06:00, 12:00, 18:00

Domain Based Forecasting

Route Based Forecasting

Morning Summary
Delivery - 07:00

Route Based Forecast Mapping
Delivery - 12:00 & 18:00

2-10 Day Forecast
Delivery - 12:00

Site Specific Forecast
Delivery - 12:00 & 18:00
Severe Weather Information Service (SWIS)

The Severe Weather Information Service (SWIS) system combines information formerly associated

- HAWCS central weather information system
- WRF1 reporting and compliance
- Vehicle treatment management information

Together these form a single source of truth for all winter service information, decision reporting, journey/treatment information and compliance
SWIS Typical Site Specific Graph
Driver Navigation

- Driver navigation fitted to winter fleet
- Based upon Exactrak system
- Data provided through SWIS
- Adherence to winter routes
- Audio visual route guidance
- Any driver can drive any route
- Ensures delivery of salt as designed
- Compliance reporting
The Regional Operations Centre (ROC) & The Severe Weather Officer
Roles & Responsibilities

The Regional Operations Centre Provides
- 24/7 availability
- Hub for decision making and monitoring
- Access to a range of technology & communications systems

Severe Weather Officer (SWO)
- Receiving and reviewing the 24hr weather forecast
- Developing treatment plans & instructing the Service Provider
- Reviewing observational data and ensuring treatment plans remain valid
- Communicating with stakeholders
- Receiving and reviewing treatment data to ensure successful delivery

Severe Weather Verifier (SWV)
- Reviews 24hr weather forecast
- Independently develops treatment plan
- Reviews treatment plan with SWO to obtain consensus (verification)
- Verification is a process hold point!

M&R Contractor (Service Provider)
- Supervisor will receive notification from the SWO verbally, via SMS text and through Asset Management System. Responsible for delivery of the treatment plan
# Treatment Matrix

- **Severe Weather Plan Template**
- **Used to develop Treatment Plans**
- **Defines precautionary treatment based upon**
  - Weather conditions (Hazards)
  - Road Surface Conditions
  - Road Surface Temperature
- **Pre-wet and dry options 8g/m² to 20g/m²**
- **Preferred treatment is pre-wet**
- **Provides additional guidance for**
  - Wet conditions,
  - Residual salt
  - Temperatures below -7deg
- **Treatment threshold – may fall below +1deg**

## Weather Conditions
<table>
<thead>
<tr>
<th>Road Surface Conditions</th>
<th>Road Surface Temperature (RST)</th>
<th>Air Temp</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dry Salting (g/m²)</td>
</tr>
</tbody>
</table>

Spread rates for pre-wetted salt are the combined weight of dry rock salt and brine combined at 70:30 proportions by weight respectively with a brine concentration between 20% and 45%

## Weather Conditions

<table>
<thead>
<tr>
<th>Weather Conditions</th>
<th>Air Temp</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost or forecast frost RST at or above -2°C</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Frost or forecast frost RST below -2°C and above -5°C and dry or damp road conditions</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Frost or forecast frost RST below -2°C and above -5°C and wet road conditions</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Frost or forecast frost RST at or below -6°C and above -10°C and dry or damp road conditions</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Frost or forecast frost RST at or below -6°C and above -10°C and wet road conditions (existing or anticipated)</td>
<td>2 x 15</td>
<td>2 x 15</td>
</tr>
<tr>
<td>Light snow forecast &lt;10 mm</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Medium/heavy snow or freezing rain forecast</td>
<td>2 x 20</td>
<td>2 x 18</td>
</tr>
</tbody>
</table>

When ice has formed or snow is lying dry salting is the preferred treatment unless the road is closed to traffic when pre-wetted salting may be used. Pre-wetted salting is the preferred treatment in advance of such conditions.

For snow covering forecast to exceed 30mm ploughing should be conducted early enough to ensure snow accumulations do not exceed 10mm. The rates in the table are for precautionary salt treatment prior to snowfall which is essential to form a debonding layer and aid snow clearance.

## Treatment Threshold

<table>
<thead>
<tr>
<th>Ice formed (minor accumulations)</th>
<th>Hard packed snow/ice</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; -5°C</td>
<td>&gt; -8°C</td>
</tr>
<tr>
<td>20</td>
<td>20 (successive)</td>
</tr>
<tr>
<td>-5°C</td>
<td>-8°C</td>
</tr>
<tr>
<td>2 x 20</td>
<td>salt/abrasive (successive)</td>
</tr>
</tbody>
</table>
Closer Working With Local Authorities

- Highways England recognises the need to collaborate with Local Authority Partners (Quarmby report 2009/2010)
Closer Working With Local Authorities

Closer working can take several forms including

- Sharing of facilities
- Cross boundary treatment arrangements - ensure a consistent service
- Sharing of Treatment Plans – SWIS, online platforms, email
- Sharing of salt stocks and storage
- Provision of weather forecast data
- Access to Weather Stations (ESS)
- Snow clearance arrangements – ensure road users can transit between networks
- Full winter service to parts of other networks
- Treatment / snow clearance to support key services (police, hospitals)
Closer Working With Local Authorities

Examples of collaboration

- Area 7 cross boundary treatment arrangement with Derbyshire CC
- Sharing of depot facilities in Cornwall
- Sharing of depot facilities in Hereford
- Working with Lincolnshire (One Public Estate) facilities sharing opportunities
- Consideration of treatment of diversion routes in East Midlands
- Snow clearance arrangements with Devon CC – A38 Haldon Hill
- Treatment of A229 & A249 in Kent as a resilience measure
Closer Working With Local Authorities

- Highways England operates a Mutual Aid Process
- Used to provide or obtain support from local authorities
- Available to deal with immediate requests during stress (Severe Weather)
- Also longer term requirements
- Make contact with your Highways England Region to discuss
Thank You For Listening