



NWSRG
NATIONAL WINTER SERVICE RESEARCH GROUP



Section Two

Planning for Winter Service Delivery

Key check list:

- Have you assessed your plans against the winter self-assessment questions in Section 2.4?
- Can you provide evidence for adopting a risk based approach in accordance with the 'Well-managed highway infrastructure' Code of Practice?
- Have you considered how the safety and welfare of staff is managed?

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Key

Text in this colour indicates warnings or especially important information

Text in this colour indicates particular recommendations or key advantages to consider

2.1 Introduction

- 2.1.1 Good planning before the winter season commences is crucial to the success of the service. This includes ensuring that agreed and appropriate policies have been developed, service levels have been defined, an effective management and decision making system is in place, sufficient resources are available, and that all relevant staff are aware of, and familiar with, their roles and responsibilities.
- 2.1.2 This section of the NWSRG Practical Guide will help authorities to review their current policies and practices, as well as providing references to further relevant information within other sections of the guidance.
- 2.1.3 Local circumstances, including authority risk appetites, financial and other resource constraints, vary widely across the country. The guidance is designed to assist authorities in making decisions and developing their winter service plans based on their local needs by adopting a risk and evidence based approach in accordance with the 'Well-managed highway infrastructure' Code of Practice.

2.2 Key Considerations for Winter Policy

- 2.2.1 Important considerations:
- Legislative background
 - Wider policies and objectives of authority
 - Client and service provider risks and responsibilities
 - Partnership or shared risks and responsibilities
 - Decision making responsibilities
 - Liaison and communication arrangements with other authorities and other public services
 - Winter risk periods – Overall and Core
 - Resilience standards
- 2.2.2 It is recognised that authorities cannot be reasonably expected to protect against ice and snow at all times on all parts of the network. Instead policies and plans must be developed, in accordance with best practice, to address the risks in a reasonable and practically manageable way.

2.2.3 The flow down from statutory duty through Policy to operational planning can be summarised as Statutory Duty → Best Practice → Local Policy → Operational planning.

Authorities should formally approve and adopt policies and priorities for winter services that are coherent with wider objectives for transport, integration, accessibility and network management, including strategies for public transport, walking and cycling. These policies should also take into account and support the wider strategic objectives of the authority.

Some of the issues that need to be considered in developing winter service policies can be controversial and will require consultation and 'buy-in' from stakeholders and the wider community. Importantly, they should also be based on the principles of risk assessment. For example, 'exposure' to the risks should be taken into account by considering issues such as traffic flow and winter weather accident risk across the network, in addition to wider resilience issues.

2.2.4 Winter Service policies developed in this way will then shape the operational arrangements for delivering the service to the agreed service levels. Examples of key questions when determining Winter Service policies will include:

1. What are the overall and core winter periods?
2. What parts of the network will be treated?
3. What treatments should be carried out?
4. When is treatment necessary?
5. What target response and treatment completion times are appropriate?

2.2.5 The answers to these questions should be considered in the context of reasonably typical winter weather conditions but also with regard to unusual and exceptional situations, when network resilience issues are of high importance.

2.2.6 It is also important to consult with neighbouring and/or similar authorities so as to share good practice and, as far as practical and policy considerations allow, to develop Winter Service Plans that provide consistent levels of service to road users travelling across authority boundaries. For example, liaison should take place regarding the extent of the treated network, any 'reciprocal arrangements' whereby, for reasons of practicality, sections of routes close to authority boundaries are treated by the adjacent authority, and may also include other issues such as developing a regional consensus on the potential proactive treatment of footways etc.

2.2.7 The responsibility for the authority is to demonstrate that their policy is reasonable and meets their statutory duties in respect of the risks to road users posed by snow and ice. Authorities should clearly document the approach taken and be able to provide evidence to back up the decisions made.

2.2.8 The Code of Practice and the NWSRG Practical Guide will assist authorities in meeting their responsibilities in this regard and an example is given in Annexe 1 of how an authority might review their current treated network against these documents, including the types of evidence used to inform the review process.

2.2.9 The Well Managed Highways Liability Risk document, published by the IHE, should also be consulted for further detailed guidance on applying a risk and evidence based approach to winter service delivery.

Statutory Duty	Best Practice	Local Policy	Operational Plan
<p>In England and Wales:</p> <ul style="list-style-type: none"> Section 41 (1A) of the Highways Act on the 31st October 2003, by Section 111 of the Railways and Safety Transport Act 2003. Traffic Management Act 2004 Section 150 of the Highways Act 1980 <p>In Scotland:</p> <ul style="list-style-type: none"> Section 34 of the Roads (Scotland) Act 1984. <p>In Northern Ireland:</p> <ul style="list-style-type: none"> Roads (NI) Order 1993 SI 1993/3160 (NI 15) provides, in Article 10, a duty for the Department for Infrastructure to “remove snow, soil etc which has fallen on a road”. 	<ul style="list-style-type: none"> Well-managed Highway Infrastructure NWSRG Practical Guidance for Winter Service IHE Well Managed Highway Liability Risk 	<ul style="list-style-type: none"> Network resilience Treatment of facilities for public transport users Treatment of facilities for road users Treatment of facilities for walking and cycling Treatment of transport interchanges Treatment of promoted facilities such as community or leisure centres Extent of priority for key public services and critical infrastructure Extent of priority for vulnerable users Resilience of winter service resources Other local circumstances 	<ul style="list-style-type: none"> Statement of policies and responsibilities Route planning for carriageways, footways and cycle routes Determine treatments Treatment of facilities for walking and cycling Organisational arrangements and personnel Facilities, plant, vehicles and equipment Salt and other de-icing materials Operational communications Contingency plan Information and publicity Quality Management

2.3 Winter Service Planning

- 2.3.1 Winter service policies and practices should be documented in a Winter Service Plan.
- 2.3.2 The Winter Service Plan should be designed and drafted for use by relevant staff at all levels and can comprise a single document or a number of separate documents. For example, many authorities produce a document that discusses policy, service levels and other 'higher level' matters, and a separate 'Operational Manual', providing more detailed information such as staff rotas, depot locations and salt storage capacities, plant and material allocation etc.
- 2.3.3 Other examples of approaches taken might include cross referencing the Winter Service Plan with other emergency and response plans a local authority may hold.
- 2.3.4 The Winter Service Plan should be a 'Controlled Document' and be reviewed on an annual basis before the commencement of the winter season.
- 2.3.5 The principal areas for consideration during the development of Winter Service Plans include the following, and it is recommended that the scope of all authority Winter Service Plans include:
- Statements of Policy and Standards of Service
 - Extent and priorities of treated networks
 - Resilience and contingency planning
 - Weather forecasting and winter service decision making information
 - Organisational arrangements and personnel
 - Facilities, plant, vehicles and equipment
 - Salt and, if appropriate, other de-icing materials
 - Operational communications
 - Information and publicity
 - Quality management
- 2.3.6 Some key questions to guide an authority through a review of current practices are included below in Section 2.4, with reference to relevant sections of the NWSRG guidance.
- 2.3.7 More detailed information relating to particular aspects of Winter Service Plans, along with some case studies, is provided in subsequent sections.

2.4 Winter Self-Assessment Questions

Statutory Duty	Reference to Guidance
<p>1. How is salt being managed to ensure it is being maintained within its optimum range?</p> <ul style="list-style-type: none"> • Salt Storage • Salt management and moisture content 	<p>Section 4: Salt Storage</p>
<p>2. How is the salt spreading equipment being calibrated and maintained to ensure that its spreading characteristics and capability are known and adequate?</p> <ul style="list-style-type: none"> • Plant capacity • Calibration and checking • Maintenance 	<p>Section 5: Spreader Management</p>
<p>3. How has the issue of resilience been considered with regard to winter service?</p> <ul style="list-style-type: none"> • Minimum winter network • Salt stocks • Contingency for resource shortage - salt, staff, fuel, plant etc 	<p>Section 2: Planning for Winter Service Delivery Section 4: Salt Storage Section 13: Route Selection</p>
<p>4. How has the most appropriate treatment type for your authority been considered?</p> <ul style="list-style-type: none"> • Dry, pre-wet, treated, liquids • Cost benefit analysis • Invest to save 	<p>Section 5: Treatment Methods and Technologies</p>
<p>5. How have the treatment rates been determined and justified?</p> <ul style="list-style-type: none"> • Considering the 10 factors affecting spread rates • Risk assessment • Treatment matrices 	<p>Section 7: Spread Rates</p>
<p>6. How do those involved in the different aspects of winter service demonstrate that they have been adequately trained?</p> <ul style="list-style-type: none"> • Winter service managers • Decision makers • Drivers and supervisors • Supporting staff (plant maintenance, customer service staff etc) 	<p>Section 2: Planning for Winter Service Delivery</p>
<p>7. How is the level of winter service determined and how are the criteria justified? You should consider the following issues:</p> <p>a. Which of the five levels of winter service have you defined:</p> <ul style="list-style-type: none"> i. Precautionary salting network ii. Secondary or community routes iii. Snow response iv. Minimum winter network v. Community self-help 	<p>Section 13: Route Selection</p>

Statutory Duty	Reference to Guidance
<p><i>(Part 7 continued...)</i></p> <ul style="list-style-type: none"> b. Criteria for inclusion in each level, definitions of salting network, based on risk and evidence based approach c. When and how level activated d. Is it approved by elected representatives? e. Equality Impact Assessment 	
<p>8. How do you ensure that you have appropriate information to support the action decision making?</p> <ul style="list-style-type: none"> • Weather forecast service • Weather stations • Thermal profiling/route based forecasting • Network data 	<p>Section 12: Weather Forecasting and RWIS</p>
<p>9. How do you ensure that the salting network is kept as free from running or standing water as is reasonably practicable?</p> <ul style="list-style-type: none"> • Drainage policies • Managing reports and claims • Signage policy 	<p>Section 2: Planning for Winter Service Delivery</p>
<p>10. How do you ensure that information about your winter service is adequately communicated, internally, to stakeholders and to the public?</p> <ul style="list-style-type: none"> • Robust communication of actions internally • Engaging and informing stakeholders and the public • Pre-planning, operational and post winter • Public perception and feedback 	<p>Section 2: Planning for Winter Service Delivery</p>
<p>11. How do you monitor and manage the performance of the winter service?</p> <ul style="list-style-type: none"> • Winter seasonal statistics • End of winter review • Reviewing claims and collisions • Value for money • Continuous improvement 	<p>Section 2: Planning for Winter Service Delivery</p>
<p>12. How do you ensure that adequate records are retained and accessible to defend claims and improve the service?</p> <ul style="list-style-type: none"> • What records are kept, and are they accurate and relevant records? • Are actions from records followed up? • Are they accessible and for how long are they retained? • Are they audited? • Tracking systems 	<p>Section 2: Planning for Winter Service Delivery</p> <p>Section 8: Decision Making</p>
<p>13. How is community self-help arranged and is it effective?</p> <ul style="list-style-type: none"> • Community self-help schemes (e.g. Snow wardens, parish and town councils) • Grit bins • Resource availability (e.g. farmers, contractors) 	<p>Section 2: Planning for Winter Service Delivery</p>

Statutory Duty	Reference to Guidance
<p>14. How do you ensure that snow plans can be delivered effectively?</p> <ul style="list-style-type: none"> • Activation • Resources • Collaboration with other emergency responders • Collaboration with other authorities 	<p>Section 9: Treatments for Snow and Ice</p>
<p>15. Contractual arrangements</p> <ul style="list-style-type: none"> • Are the responsibilities of all parties clear, agreed, communicated and documented 	<p>Section 2: Planning for Winter Service Delivery</p>

2.5 Resilience and Contingency Planning

- 2.5.1 Resilience and contingency planning are crucial considerations for authorities when developing their winter service policies and, as well as potentially including other matters, it is recommended that the scope of these considerations should include the following:
- Contingency arrangements for winter service delivery such as salt supply, drivers, fuel vehicles etc.
 - Arrangements for implementing minimum winter networks
 - Mutual Aid e.g. resources available from adjacent authorities
 - Liaison with Category 1 and Category 2 responders (reference Civil Contingencies Act 2004)
- 2.5.2 Authorities should consider, consult on and formally adopt local service levels for resilience of their winter service based on a pre-determined number of days' continuous salting during prolonged severe conditions on a defined network for the overall winter period and for the core winter period.
- 2.5.3 In deciding on winter resilience standards, highway authorities should adopt a risk-based approach in accordance with local needs, priorities, risk appetite and available funding. The assessment should take account of restocking arrangements and likely lead in times for supply, including during periods of extreme weather where the pressure on the salt suppliers will be greatest.
- 2.5.4 Establishing a local winter service level of resilience requires consideration of the number of days' resilience to be adopted, definitions of the overall winter period and core winter period, and the extent of the network to be treated during those conditions. For example this could incorporate the network that is routinely subject to precautionary treatments throughout the winter period, or it could be restricted to a smaller, locally determined, minimum winter network.

- 2.5.5 Clearly, authorities must ensure that they have sufficient salt and/or other de-icing materials to meet their resilience standards and, whilst fuel supply has not historically been a widespread threat to the delivery of the winter service, authorities should also ensure that they have sufficient fuel stocks as well. Additional arrangements for fuel and salt can be put in place to give surety of supply.
- 2.5.6 Authorities should develop plans to treat a subset of the network in extreme weather
- A 'resilient network' should be identified to focus maintenance in extreme weather conditions and other major incidents.
 - A 'minimum winter network' should be defined for winter service, which may relate to the 'resilient network' and determines the priority routes to be kept open in the event of a prolonged snow emergency when resources are limited.
- 2.5.7 Mutual aid arrangements are an important part of winter service planning. Even with the best planning, unexpected events can and do occur, and these can necessitate the provision of assistance from and/or to neighbouring authorities.
- 2.5.8 An example is provided in Annexe 2 for how authorities could express and apply their winter service resilience standard and further guidance is provided in Salt Storage Section 4.5.
- 2.5.9 A Case Study is presented in Annexe 3 on how East Riding Council has addressed the issue of salt resilience.
- 2.5.10 An example of mutual aid arrangements put in place by Kent County Council is presented in Annexe 5.
- 2.5.11 The Route Selection section of the NWSRG Guidance provides further information on minimum winter networks.

2.6 Route Planning for Carriageways, Footways and Cycle Routes

2.6.1 When developing their treated networks and routes, authorities should consider a range of important factors, including:

- Carriageway routes assessed by risk level
- Response and treatment times for all carriageway treatments
- Routes for footbridges, subways and other high risk pedestrian areas
- Response and treatment times for footway and cycle route treatments
- Routes for other footway and cycle route treatment by risk level
- Allocation of plant, vehicles, equipment and materials to routes
- Location and maintenance of salt bins and grit heap
- Special sites or features (e.g. near railways or traffic calming)
- Consistency with neighbouring authorities

2.6.2 It is beyond the resources of authorities to treat the entire network in winter conditions, and therefore the prioritisation of routes must take place.

2.6.3 Historically, winter service has always followed a risk based approach with the network prioritised for treatment. The levels of winter service provided across the network can typically be classed as:

1. Precautionary salting network
2. Secondary or community routes
3. Snow response
4. Minimum winter network/Emergency response scenarios
5. Community self-help

2.6.4 Authorities should clearly document and be able to justify:

- a. Criteria for inclusion in each level, and the defined extent of the treated networks at each level
- b. Criteria that will be used to determine when and how each level is activated

It is recommended that the above criteria are approved at the highest level by the authority's elected representatives and it is important that other factors such as Equality Impact Assessments are appropriately considered during this process.

- 2.6.5 Where self-help schemes are in place, important considerations will include:
- The underlying purpose of the scheme, such as whether this is to assist in managing a localised trouble spot or a route that would otherwise not receive treatment etc
 - The resources that are available to deliver the scheme
 - The responsibilities of the authority in assisting local people in delivering the scheme. For example, this could potentially include the provision of suitable training, Personal Protective Equipment (PPE), spreading equipment and materials such as salt and/or grit etc
 - Competency and training of resource, with emphasis on health and safety issues.
- 2.6.6 Further guidance on the selection of treated routes is provided in the NWSRG Practical Guidance sections covering Route Selection and Treatments for Footways and Cycleways.

2.7 Decision Making Process

- 2.7.1 Winter Maintenance Plans should include details of the winter service decision making process that the authority will utilise to determine the necessity, extent and timing of treatments, as well as the treatment rates to be applied.
- Important considerations include:
- Weather forecasting service
 - Road weather information bureau service
 - Road weather stations, including their calibration and maintenance
 - Thermal profiling
 - Extent and nature of potential treatments, including spread rates and, if appropriate, a decision making matrix providing guidance to decision makers
 - Decision making staff and, if appropriate, decision checking/review staff, as well as their training/experience requirements
 - Timing and circulation of information
 - Reporting information and procedure
- 2.7.2 As well as ensuring sufficient trained and experienced decision makers for normal routine winter operations, it is important that authorities ensure that trained and experienced decision makers are available to support contingency arrangements, and training additional reserve staff should be considered. It is important that reserve staff are routinely exposed to operational decision making to ensure their knowledge is current and they have sufficient experience to meet the requirements of the winter plan.
- 2.7.3 See the 'Decision Making' section of the NWSRG Practical Guidance for further information.

2.8 Organisational Arrangements & Personnel

2.8.1 Winter service plans should explain the roles and responsibilities of the various key staff involved in managing and delivering the winter service, and important considerations include such issues as:

- Command, control and operational organisation
- Arrangements with other authorities
- Arrangements with other public services
- Decision making personnel/team
- Operational record keeping and reporting staff
- Plant and vehicle manning arrangements, including management of drivers' hours regulations
- Materials management
- Training and development arrangements
- Schedules of Contract and Voluntary Personnel (CVP)
- Employee roles and responsibilities
- Contact and commissioning arrangements for CVP
- Employee duty schedules, rotas and standby arrangements
- Standard operating procedures
- Escalation and emergency operating procedures
- Operational monitoring
- Health and safety procedures
- Welfare of staff
 - Monitoring of working hours
 - Risk assessment before sending personnel out on the network.
 - Buddy systems or other methods to maintain regular contact with personnel
- Contingency arrangements
- Utilising additional resources, including
 - Parish and town Councils
 - Farmers
 - Plant contractors
 - Agency staff
 - Contractors / service suppliers
 - Other local authorities
 - Snow wardens
 - Self-help schemes

2.9 Facilities, Plant, Vehicles and Equipment

2.9.1 Information relating to the facilities, plant, vehicles and equipment involved in delivering the winter service should be documented by authorities or their winter service contractors. Some authorities choose to include this information within the Winter Service Plan, whereas others include it within separate documentation, such as a Winter Service Operations Manual, for example. In the latter instance, it is recommended that the authority's Winter Service Plan includes a reference to the document containing this information.

When considering these issues, important factors include:

- The number and location of winter service compounds and facilities, and the location of plant, vehicles, snow-blowers and other equipment
- Fleet inventory including licence requirements and capacity
- Calibration procedures
- Garaging, servicing and maintenance arrangements
- Fuel stocks and locations
- Contingency arrangements
 - Power supply failure
 - IT failure etc
- Contract and hire arrangements for contract plant
- Additional resources for snow removal
 - Tractors, excavators, loading shovels etc.
 - Contractors / service suppliers
 - Other local authorities
 - Snow wardens
 - Self-help schemes

2.10 Salt and Other De-Icing Materials

2.10.1 Winter Service Plans should include reference to the salt and, where appropriate, other de-icing materials that are used by the authority in delivering the winter service. Important considerations include:

- Location and capacity of stocks for salt and other materials
- Contracts and purchasing arrangements for supplies
- Minimum pre-season and in-season stock levels
- In season re-stocking arrangements
- Testing arrangements
- Stock level monitoring and forecasting procedures
- Loading arrangements
- Operational communications
- Technical systems information
- Reporting arrangements and protocols
- Inventory and allocation, including back up

See the 'Salt Storage' section of the NWSRG Practical Guidance for further information.

2.11 Operational Communications

2.11.1 Systems need to be in place to ensure that the decision to carry treatment actions is effectively communicated to drivers and other key stakeholders.

2.11.2 Key information to be communicated will include the timing of proposed treatments, spread rates and weather forecast.

2.11.3 Systems should include confirmation of actions carried out.

2.11.4 It is also important that the operational communications system allows any potentially important network observations from salting crews/inspectors/patrols, as well as any other problems encountered and/or experienced during the operations to reach the relevant staff for consideration so that any potentially appropriate alternative or additional action can be instructed and carried out in an efficient and timely manner.

2.11.5 An example is provided in Annexe 4 of Winter Service message templates used by the Borough of Poole for recording decisions.

2.12 Information and Publicity

- 2.12.1 The provision of accurate, timely and useful information to key stakeholders such as the public, local press and other media, the emergency services, public transport operators, elected members, other authority departments and neighbouring authorities etc is becoming increasingly important as information technology and the general public's appetite to be kept informed develops. Clearly, this is also a crucial factor in assisting people to make informed decisions regarding their travel arrangements during the winter months. Important considerations include:
- Elected members' briefing
 - Local press and broadcast contact information
 - Public communication including
 - Website
 - Social media
 - Public information leaflets
 - Other key local and national contact information
 - Responsibilities and guidance for providing information
 - Timing and circulation of information
 - Notification arrangements for failure to maintain the published network
 - Reporting procedure
- 2.12.2 Authorities should work with their communications teams to develop their communications strategy. Website, social media, public information leaflets all provide a useful means of providing information to drivers on travelling in winter conditions and roles and responsibilities of an authority in delivering the winter service. Some authorities have produced short videos to provide information to the public.
- 2.12.3 Consideration could be given to providing information on appropriate websites and social media during a snow event to direct traffic to the treated and passable sections of the network. **It is important to keep information up to date in order not to exacerbate problems or cause the drivers to distrust the information being output.** Initiatives such as providing public access to live tracking of gritters are increasingly being used.
- 2.12.4 Communications must include the organisation's internal departments e.g. schools and social services, so that suitable arrangements can be made for service continuity and delivery.
- 2.12.5 Methods of cascading information down to staff should be considered, for example text messages to staff phones. These types of arrangements may already exist in the authority's Business Continuity Plan.

2.12.6 When implementing different levels of response, additional communication arrangements may be required including radio, TV, social media, elected members, neighbouring authorities including trunk road operators, parish councils etc.

2.13 Records and Document Management

2.13.1 Adequate documentation and record keeping is important for a number of reasons but is particularly important when an authority is called upon to demonstrate that its Winter service policies are reasonable and appropriate and that the service is being delivered fully in accordance with those policies.

It is important that authorities are able to defend themselves in respect of any litigation arising from incidents that occur during the winter months and this will necessitate the authority disclosing all relevant documents and records of their policies, the information that was available to them, their decision making and their winter service actions pertinent to the time in question, which may well have been some considerable time (many years) before the litigation and the need to disclose the documentation is apparent to the authority. Important considerations include:

- Document approval by elected members
- Quality management and service audits
- Document control procedures
- Electronic record keeping
- Distribution of documents
- Operational record keeping and reporting
- Information recording and analysis
- Arrangements for performance monitoring, audit and updating
- Procedure for deviation from the Winter Service Plan
- Service review following significant events and at the end of season
- Evidence production for court – proof of activity for claim
- Evidence of activity to enable payment of contractor
- Retention of documents and records within a defined retention period

2.13.2 Record keeping is important to demonstrate adherence to agreed policies and plans.

2.13.3 See the 'Decision Making' section of the NWSRG Practical Guidance for further information

2.14 Exercises

- 2.14.1 It is good practice to carry out some form of training exercise in advance of each winter season to test arrangements in an environment where lessons can be safely identified and subsequent improvements made. The structure of these exercises can vary significantly and the delivery of these need not be costly.
- 2.14.2 Some key aims of exercises include:
- Target all levels of the winter service from senior management and decision makers through to operatives delivering the service.
 - It is vitally important to regularly test the decision making and escalation approach, particularly given that this is a subjective matter and that there is no formal qualification for decision makers.
- 2.14.3 To minimise costs and also to increase the opportunity for learning, authorities could consider collaborating to deliver joint exercises. The scenario should then be written to test cross boundary issues in addition to the standard response within each respective Authority's boundary.

Annex 1

Example Risk Assessment to Review Salting Route Criteria

For this example, the Authority has defined its winter service delivery at five levels:

1. Primary salting network – This network will be subject to routine precautionary treatment throughout the winter season in accordance with the authority’s winter service policies and decision making processes. However, it should be noted that even the Primary Salting network cannot be guaranteed to be free from winter hazards.
2. Secondary salting network – This network typically extends the primary salting network in conditions where prolonged periods of ice or snow are expected, generally a minimum of 24 hours. The treatment will be in advance of the freezing wherever possible.
3. Snow Plan – This will be implemented across part or all of the authority’s area when snow or ice is expected to cause widespread disruption to travel. The purpose of the Snow Plan is to appropriately restore the highway network on a priority basis based on need, typically starting with the primary and secondary networks but then extending into other parts of the network.
4. Minimum winter network – This is a network that will be treated as a minimal network during periods of prolonged severe winter weather and/or when resources are scarce, for example salt, fuel or personnel, and will be as consistent as possible with the minimum winter networks of other adjoining authorities.
5. Self-help – This is a network of local locations where individuals or authorised groups wish to treat parts of the highway in more extreme conditions to aid local mobility, at locations which are locally important.

Risk Analysis

Risk is considered in terms of likelihood or probability and impact or severity.

In this example:

- Likelihood has been considered as that of having an injury on part of the untreated network as opposed to the treated network and makes extensive use of the collision analysis as well as other factors.
- Impact has been considered in terms of financial impact largely based on insurance claim data, (which recognises that more serious injuries would have a greater financial impact), reputation, stakeholder and customer impacts.
- The impacts are averaged and multiplied together to form a risk as identified in the table below. Risk values over a score of 20 are very high, over 12 are high, over 8 are medium and below 8 are low

Winter Service Risk Matrix					
Likelihood >>	5	10	11	20	25
	4	8	15	16	20
	3	6	9	12	15
	2	4	6	8	10
	1	2	3	4	5
Potential Impact >>					

Using evidence-based practice, this assessment considers the requirements of the users, best available data, and professional judgement.

In this example, methods of reviewing the requirements of users included questionnaires to town and parish councils and a review undertaken by a scrutiny committee task group.

Best available data included:

- Information and estimates of traffic flow on differing parts of the network
- Categorisation of population centre and population size by settlement
- Collision data and analysis
- Winter related highway insurance claims

Conclusion

This example risk analysis considers areas highlighted in the Code relevant to winter route criteria, determined potential 'gaps' between the current policy and relevant factors that should be considered, and scored the risks of those 'gaps'.

These assessments should be as objective as possible using the available data, but professional judgement must also be used where there is lack of specific evidence, and this may include the involvement of a group of professionals covering a number of perspectives and disciplines.

In this example, some of the results from the gap analysis undertaken are shown in the table below.

The highest additional risks not currently included in the winter criteria were identified as:

- Information and estimates of traffic flow on differing parts of the network
- Information and estimates of traffic flow on differing parts of the network

Neither of these risks rated above 10, so they are not considered to be particularly high and mitigation measures are also in place to minimise the impact of these risks. For example, the individual bus operators will make a decision not to operate the routes should they consider the weather conditions dangerous, hence the risks will be ameliorated, albeit with some inconvenience to bus passengers. The length of the network that would require to be treated would be significant and therefore it was considered that the current criteria are therefore still the most appropriate for making best use of the limited resources available.



Issue to be considered	Current policy	Possible gap for consideration	Likelihood	Impact Financial	Reputational	Stakeholder	Customer	Rating Average	Risk
Treatment of facilities for public transport users	Bus routes > 15 min frequency (30 min on secondary)/Airport, Railway, P&R	Less frequent bus routes	Collision data, claim data, bus companies coping with policy	Could be significant	Coach crash will be newsworthy	Impact would be significant	Possible significant injury	4.75	9.5
Treatment of facilities for road users	Major roads, 1000 vch/day in Feb. Treat to 80% population (500 people)	Minor roads, remote communities	Collision data, claim data	Less likely to be as serious on minor roads	Some reputational impact	Care using network, difficulty at times	Some impact	2.75	5.5
Treatment of facilities for walking and cycling	Reactive only on major footways and cycleways	Proactive treatment and lesser used facilities	Collision data, claim data	Unlikely to be a significant impact	Little impact from past experience	Cyclists can often use treated network as an alternative	Extra care exercised. Self regulation	2.5	7.5
Treatment of transport interchanges	Bus routes > 15 min frequency (30 min on secondary), which includes bus station approaches, Airport access, railway access, as far as public highways and P&R	Bus stations which are not DCC or public highway. Do not treat or have legal responsibility for private land.	Claims and collision data. Fewer cyclists in icy conditions (self limiting)	Unlikely to be a significant impact	Little impact from past experience	Cyclists can often use treated network as an alternative	Cyclists can often use treated network as an alternative or different form of travel	2.5	7.5
Treatment of promoted facilities	Park & Ride sites	Cycleways	Very small numbers and no real problem identified	Unlikely to be a significant impact	Little impact from past experience	Emergency services content with situation	Small impact on customers	2	4
Extent of priority for emergency services	24 hour emergency service premises access treated as primary	Part-time emergency premises and coastguard etc	Only likely to be issues in very severe winters	Little evidence of problems in past reviews, as major issues addressed	Little evidence of problems in past reviews, as major issues addressed	Little evidence of problems in past reviews, as major issues addressed	Little evidence of problems in past reviews, as major issues addressed	2	4
Extent of priority for key public services and critical infrastructure	Hospitals, Dcc level 1 properties addressed in primary and secondary. Other critical infrastructure addressed in snow plans	Other public services not included in policy	Self-limiting as will not often venture out in icy conditions	Unlikely to be a significant impact	More newsworthy	Some desire to include those not on salting network	May feel isolated in prolonged conditions	2.75	5.5
Extent of priority for vulnerable users including elderly	DCC level 1 properties, cottage and community hospitals. Challenge to target effectively when not covered by other criteria. Encourage local self-help.	Other vulnerable users	Generally local journeys and often able to walk. Generally near or on salted networks	Unlikely to be a significant impact (claims)	Children are more newsworthy	Some customers would like to see more done, but many accept limited resources and many more primary schools than secondary	Some customers would like to see more done, but many accept limited resources and many more primary schools than secondary	2.75	5.5
Level of service resilience required	Exceed the basic resilience requirements for code	Primary schools	Exceeded the basic resilience requirements for code	Unlikely to be a significant impact (claims)	Children are more newsworthy	Some customers would like to see more done, but many accept limited resources and many more primary schools than secondary	Some customers would like to see more done, but many accept limited resources and many more primary schools than secondary	0	0
Other local circumstances	Secondary schools	Primary schools	Generally local journeys and often able to walk. Generally near or on salted networks	Unlikely to be a significant impact (claims)	Children are more newsworthy	Some customers would like to see more done, but many accept limited resources and many more primary schools than secondary	Some customers would like to see more done, but many accept limited resources and many more primary schools than secondary	2.75	5.5

Note that this table is an extract to show the principle. Further tables considered the risk of the existing policy criteria for a comparison.

Annex 2

Example Salt Resilience Standard

Overall Winter Period	1st October to 30th April
Core Winter Period	1st November to 1st March
Days Resilience (Overall Winter Period)	3 days
Days Resilience (Core Winter Period)	6 days

For the purpose of this example it has been assumed that in heavy snow conditions there would be 6 successive treatments at 20g/m² each day.

The minimum in season stocks are the minimum to which stocks should be allowed to fall, i.e. restocking should take place well before the minimum is likely to be reached.

The early season and end of season minimum resilience stock should not be confused with the stocks likely to be required to ensure full pre-season stocks are achieved for the current or for the subsequent winter season.

Consider timing of restocking arrangements to determine stock levels to maintain minimum stock levels.

Consider strategic stock and or mutual agreements arrangements with other authorities.

MINIMUM SALT STOCKS					
Routes	Normal Salting Network (tonnes/run)	Minimum Winter Network (tonnes/run)	Minimum Stock		
			Full Pre-season stock Normal Salting Network (12 days/ 48 runs)	Core Winter Period Minimum Network (6 days/ 36 runs)	Overall Winter Period Minimum Network (3 days/ 18 runs)
Carriageways	200	120	9600	4320	2160
Footways, cycle routes & salt bins (1 per day)	16	16	192	96	48
Total			9792	4416	2208

The minimum salt stock rounded up to the nearest 5 tonnes is therefore:

1 October to 30 October	= 2210 tonnes (at all times)
1 November	= 9795 tonnes
1 November to 1 March	= 4420 tonnes (at all times)
1 March to 30 April	= 2210 tonnes (at all times)

Case Study - East Riding Council Salt Stock Resilience

Background

The East Riding of Yorkshire covers a geographical area of some 1,000sq miles with features including a long coast line, higher ground of the Yorkshire Wolds, the Vale of York and the Humber corridor. The variable nature of the weather in these discrete areas allows us to use four 'domains' for winter treatment purposes.

Primarily a rural environment with a number of key towns and more densely populated areas such as Beverley, Bridlington, Goole and the conurbation to the West of Hull, the road network traverses significant lengths of unpopulated countryside and is quite exposed to the elements, yet these roads are important connectors and commuter routes. Of the 3,200 miles some 38% are treated under precautionary treatments rising to 47% when the secondary network is also treated. In addition, when heavy snow is lying, day time operations are switched to support local communities with grounds staff and road-workers being deployed to undertake localised treatments.

The area is subjected to harsher weather conditions when faced with fronts from the East and or North. Some protection is offered from Westerlies by the Pennines and from the South by the Humber.



The winter of 2010

In late November snow arrived on the back of a bitterly cold wind from the north and north east, lasting for two weeks affecting many of the northern and easterly facing authorities. Temperatures struggled to get above freezing with lows well below minus 10. The impact was to bond the snow to surfaces making it difficult to remove. Across the East Riding there was an almost total coverage of snow at variable depths demanding round the clock services. Of itself this was 'winter' and part of the day job.

The Council's aim was (and remains) to hold as much salt in store as possible coming up to the Christmas close down period. These two weeks of action depleted our reserves and so new supplies were needed to provide resilience across the Christmas period.

Following a very short respite of a day or two in early December, the intensity picked up again with more snow on the back of Arctic weather from the north and again, very low temperatures. This lasted unabated until around Boxing Day before some much needed relief finally arrived. In total across the period there were some 26+ days of 'heavy' winter conditions, bringing a lot of snow, further freezing conditions and causing considerable disruption to the locality and for commuters. During this period operations were continuous with up to four full treatments daily.

The depletion of salt stocks, limited capacity to replenish stocks in a timely manner and the continuing round the clock activity into the Christmas period (when no supplies were available) severely challenged the Council's ability to maintain service and became a very stressful period for the team.

Response and issues



At the commencement of the winter season our total pre-season holding of salt, across our four operational depots, was around 12,000t, maximum capacity and sufficient for around 24 'resilient' days, twice that recommended by the Quarmby review. The operational plan would have these stock levels maintained up until the Christmas break.

The Christmas break effectively creates some two weeks where new supplies are unavailable (or very limited) and self-sufficiency is critical to ensure services can be maintained with any degree of confidence.

Practically, in 2010 the last salt order day under normal circumstances was Thursday 16 December for delivery on the 23 December (5 day lead time), the same day weather conditions deteriorated again. 24 December tends not to be a full day service with few drivers guaranteeing deliveries on the afternoon of Christmas Eve. Thus the timing and length of severe weather could not have come at a more difficult time. Traditionally when some degree of restocking would take place to meet our 'Plan', the industry was under duress and the supply chain was unable to match demand. The earliest time for delivery after the Christmas close down could be expected around the 4 January, causing not 14 days of self-sufficiency but 18 days on this occasion.

When the severe weather commenced at the end of November, (it was unclear at the time how long it would last) we held 6,000t of salt, 12 days of resilience and sufficient for a typical November/December with scheduled restocking. However because conditions had now worsened across the Country, the supplier was under pressure nationally for salt. The condition of the road network was challenging and transport logistics were stretched, all meaning in effect that there was a limit on the rate at which salt could be produced and transported to us. Subsequently despite our repeated demands for more salt, we were only receiving some 50% of our daily usage and some days no supplies were coming through at all.

An assessment was undertaken as to how long we could sustain services at the current rate of attrition. This indicated that without some intervention we would run out of salt by Christmas Day. A forecasting spread sheet was revised daily and used to report to the Council's Cabinet. An unprecedented campaign began to try and source salt from alternative sources (to supplement what our supplier could deliver) and we were very thankful to a number of other suppliers and the Highways Agency who were able to offer limited but nevertheless welcome supplies. In total we were able to secure an extra 9,000t of salt which saw us through the difficult period with limited impact on service delivery.



One other issue, aside from the supply chain, that was difficult to manage and account for was the day time operational use of salt (away from the precautionary network). Despite its issues in getting hold of salt to fulfil its Policy position the Council was still expected to be seen out and about doing something to help restore normality; treatment of community areas and residential roads and paths for example. The enthusiastic use of salt by employees not used to this type of work armed only with shovels at a time when every tonne was precious was to say at the least somewhat alarming!

Key learning points

From the experience, the fragility of the supply network was very clearly exposed: Production and transport limitations, close down periods, weather related delivery issues and spikes in demand all caused supply breakdowns and are risk impacts, the likelihood of which rises in parallel with need.

Prior to this experience it had been felt with the storage capacity available (circa 12,000t) and a contractual arrangement for supply we could meet all situations head on. This winter pushed us to the limit and had the weather not abated when it did there was a potential that services would have had to have been reduced – something the Council was keen not to do.

The salt supply contract was satisfactory for normal business situations but could only stand so much stress before it would fall down!

Regardless of clear delivery policies, when the area is covered in snow there is an expectation that the Council will work all available hours on snow clearance for which salt is integral to the process reducing stocks very quickly. Having some form of control on this extracurricular activity is important when salt supplies are limited.

To assure service continuity could be maintained at all times further consideration would have to be given to our own stock holdings.

Given the difficulty of getting salt in a timely manner and the extent of the close down period, something in excess of the Quarmby resilience levels (12 days or 48 runs) would be required. For us, they did not reflect the practical reality we had been faced with.

What we did as a consequence

The Council was very clear that it wished to be able to deliver its Winter Service and avoid the stresses to business (and personnel) that were a consequence of what had been faced.

A report investigating the issues with a view to limit the risks posed to the Council took the Opportunity to commend a strategic salt holding of around 6,000t in addition to our operational needs. The proposal was approved and we are in the fortunate position now that we have an extra two salt barns and hold around 6,000t as a reserve bringing our total capacity up to 17,500t.



In addition to the above we reviewed our resilience levels and set these as: barns full at the start of year, an absolute minimum of 16 days resilience at the start of Christmas break and, once in the New Year, to retain 12 days resilience as a minimum. This data is logged in our support system 'Winlogix' which uses a RAG assessment to advise when new stocks need ordering.

Annex 4

Case Study - Borough of Poole Winter Service Message Templates

WINTER SERVICE - MESSAGE TEMPLATES			
When 'Action' message posted state: Precautionary Network or Resilience Network			
		Lunchtime Forecast	Evening Update Forecast (if decision deferred from lunchtime, or forecast amended)
	Above 3°C	Road surface temperature remaining well above zero. No Winter Service hazard. No Action Required.	No message unless forecast change to lower threshold – Orange and below.
3°C	Down to 3°C	Road surface temperature remaining above zero. No Winter Service hazard. No Action Required. Or Road surface temperature remaining above zero. Mention specific Winter Service hazards if present e.g. risk of wintry showers. No Action Required. Or Road surface temperature remaining above zero. Detail specific Winter Service hazards if present e.g. risk of wintry showers. Action Required	No message unless forecast change to lower threshold – Orange and below.
1°C	Down to 0°C	Road surface temperature remaining above zero. No Winter Service hazards or Mention specific Winter Service hazard(s) present e.g. risk of wintry showers. Action decision postponed until evening forecast received. Or Road surface temperature remaining above zero. Detail specific Winter Service hazards if present e.g. risk of wintry showers. Action Required	MESSAGES NOT TO BE USED FOLLOWING LUNCHTIME FORECAST Road surface temperature remaining above zero. No Winter Service hazards. No Action Required. Or Road surface temperature remaining above zero. Detail specific Winter Service hazards if present e.g. risk of wintry showers. Action Required Or Red threshold message
0°C	Down to -5°C	Road surface temperature falling below zero. No Winter Service hazard forecast. Action decision postponed until evening forecast received. Or Road surface temperature falling below zero. Winter Service hazards forecast. Action decision postponed until evening forecast received. Or Road surface temperature falling below zero. Detail specific Winter Service hazards if present e.g. risk of wintry showers. Action Required.	MESSAGES NOT TO BE USED FOLLOWING LUNCHTIME FORECAST Road surface temperature falling below zero. No Winter Service hazards. No Action Required. Or Road surface temperature falling below zero. Detail specific Winter Service hazards if present e.g. risk of wintry showers. Action Required. Or Road surface temperature falling below zero. Due to the following conditions/rationale e.g. Winter Service Plan 8.20. Residual salt. Full details must be fully recorded. No Action Required. Or Orange threshold message
-5°C	And below	Red threshold message	Red threshold message

Annex 5

Case Study - Kent County Council Mutual Aid and Working with Neighbour Authorities

Kent is in the south east region of England and consists of inland and coastal areas with differing climatic properties. It is bordered by East Sussex, Surrey and London, and has Medway Unitary authority in the north of the county. There are four motorways running through the county, M20, M2, M25 and the M26. The local government administrative grouping for the region is called the South East 7 (SE7) and consists of Kent, Medway, Hampshire, East Sussex, West Sussex, Surrey and Brighton and Hove. Over the past few years meetings have been convened with winter practitioners from the SE7 to discuss winter plans, procurement options, mutual aid, community engagement, budgets etc. These meetings have included the MAC contractors for Area 4.

Kent County Council (KCC) has over many years had arrangements in place with the MAC contractor, currently Aone Plus, for mutual aid and stock sharing. For over 10 years salt stocks at two depots – one in the north of the county and the other in the east – were shared by the council and the contractor. Weighbridge tickets were utilised to monitor salt usage and stocks replenished as needed. This provided flexibility for KCC to access Highways England (HE) salt (and vice versa) and thereby increase its resilience.

Due to operational reasons, KCC moved its operation out of these depots, but arrangements remain in place to utilise stocks from these depots in the event of a salt shortage or delivery/logistics problems experienced mid-season. Additionally, were it ever needed, HE have spare salt spreaders and drivers and access to the national resource and these can be made available to KCC.

KCC like many other authorities is affected by the national problems with lack of hauliers to move salt around the country in a snow event when salt supplies are quickly utilised, and resources stretched. In February 2018, when snow fall affected large parts of the UK, close working with HE was critical to KCC as pre-ordered salt was delayed coming into the county. Due to existing relationships and arrangements, and with the agreement of the DfT, talks were held and plans put in place for mutual aid to be provided from HE to KCC at short notice. Conference calls were conducted at various times of day and night to assess the need, including how quickly the salt that had been ordered would be received in Kent and how salt would be moved from the HE depots to KCC depots. The depots were close by and lorries were able to collect the salt and transport it with few problems. It was critical that the salt obtained for mutual aid was returned to the HE as soon as practicable. This was achieved by diverting the KCC supplies coming from the salt mines directly to the HE depot and within a few weeks this was completed.

Mutual aid arrangements are a critical part of winter service planning. Even with the best planning, unexpected events can and do occur necessitating assistance from close neighbours. Accessing the DfT strategic salt stock is not straightforward and there are steps that must be taken before that last resource can be used. All authorities finding themselves in a position where they need mutual aid will be expected by the DfT to have sought mutual aid from their neighbours before approaching them.



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