



NWSRG
NATIONAL WINTER SERVICE RESEARCH GROUP



Section Eleven

Winter Service on Footways and Cycleways

Key check list:

- Have footways and cycleways been selected and prioritised for treatment in accordance with a risk based approach?
- Has consideration been given to footway and cycleways when specifying weather forecast requirements, location of weather stations and sensors?
- Has the footways and cycleways Winter Service delivery policy been clearly communicated to all relevant stakeholders?

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Annex 1 - Case Studies of Footway and Cycleway Prioritisation and Treatment Methods



Cycle and Pedestrian Infrastructure Definitions

The Footways & Cycleways Management Group (FCMG) pedestrian and cycle infrastructure definitions apply to this guidance and are shown below. These definitions are consistent with those presented in the Well-managed Highway Infrastructure Code of Practice and further information, including example photos and diagrams is available in the FCMG section of the UKRLG website.

CYCLE ROUTE A route that cyclists are advised to use to reach certain destinations. The term covers on-carriageway cycle lanes, off carriageway cycle tracks, and any other place where cyclists have the legal right to ride.

CYCLE LANE A part of a carriageway allocated for use by cyclists. Includes both areas delineated by road markings, or by a reserve or other physical barrier.

CYCLE TRACK A track over which the public have a right of way on pedal cycles that does not form part of a carriageway but which can be within a highway that includes carriageway, or a separate highway in its own right.

REMOTE CYCLE TRACK A Cycle Track that is a separate highway in its own right.

CYCLEWAY A part of the highway allocated for use by cyclists, including both cycle lanes and cycle tracks.

FOOTWAY A way within the boundaries of a highway which also includes a carriageway, over which the public has a right of way on foot only.

FOOTPATH A separate way over which the public have a right of way on foot only, which is not a footway

PEDESTRIAN LANE A part of a carriageway allocated for use by pedestrians. Includes both areas delineated by road markings, or by a reserve or other physical barrier.

SHARED FOOTWAY AND CYCLETRACK A way within the boundaries of a highway which also includes a carriageway, over which the public has a right of way on foot and by pedal cycle.

SHARED FOOTPATH AND REMOTE CYCLE TRACK A way within the boundaries of a highway which does not include a carriageway, over which the public has a right of way on foot and by pedal cycle.

PEDESTRIANISED AREA An area that is intended for pedestrians, not vehicles. Typically, busy areas of towns and cities with high public space and street-scene contribution.

SHARED SPACE An area shared by pedestrians and vehicles. The design concept is to minimise the segregation between modes of road user, removing features such as kerbs, road surface markings, traffic signs, and traffic lights, resulting in reduced vehicle speeds and a safer environment.

11.1 Benefits of Treating Footways and Cycleways

- 11.1.1 Delivering an appropriate level of winter service to footways and cycleways can provide several social and economic benefits to the community:
- Maintaining the serviceability and safety of the highway network
 - Improve public safety by reducing rate of injuries from slips and falls
 - Enabling walking and cycling at all times of year in line with an authority's policy, providing an alternative to reliance on private or public transport in severe weather
 - Enabling access by pedestrian and cyclists to the network will have health and mental wellbeing benefits from a more active population
 - Less traffic congestion by reducing number of car journeys leading to a reduction in carbon footprint and potential air quality improvements
 - Reduced social exclusion
- 11.1.2 Providing an appropriate level of winter service on these facilities will be an important aspect of maintaining access at all times of the year. Poor footway and cycleway conditions can deter movement of pedestrians and cyclists, as well as particularly disadvantaging vulnerable users such as the elderly, adults with young children and the disabled.
- 11.1.3 Snow and ice on footways and cycleways can also result in increased healthcare costs and/or third party claims from slips and falls, and one of the aims of this guide is to provide case studies from a variety of highway authorities demonstrating good practice, which can be seen towards the rear of this section of the NWSRG Practical Guide

11.2 The Prioritisation of Footway and Cycleway Treatment Routes

- 11.2.1 In accordance with Well-managed Highway Infrastructure categorisation best practice suggests a risk-based approach.
- 11.2.2 The assessment of risk can be carried out by assessing the likelihood of something happening and the impact if it does occur, an example of which is shown below. It is therefore important to gather accurate data to enable an effective risk assessment to be carried out.

WINTER SERVICE RISK MATRIX					
Likelihood >>	5	10	15	20	25
	4		12	16	20
	3	6	9	12	15
	2	4	6	8	10
	1	2	3	4	5
Potential impact >>					

FIGURE 13.7.1 Change Cycle

- 11.2.3 There are many factors that can be considered when assessing risk and although a number of these may be similar for authorities, local knowledge is essential in identify risks.
- 11.2.4 An example risk assessment approach is provided in Annex 1 of the Planning guidance section.
- 11.2.5 The Well Managed Highways Liability Risk document, published by the IHE, can also be consulted for further detailed guidance on applying a risk and evidence-based approach to winter service delivery.
- 11.2.6 In terms of risk the first step is to determine if the entire network has a high enough risk with the need to be included:

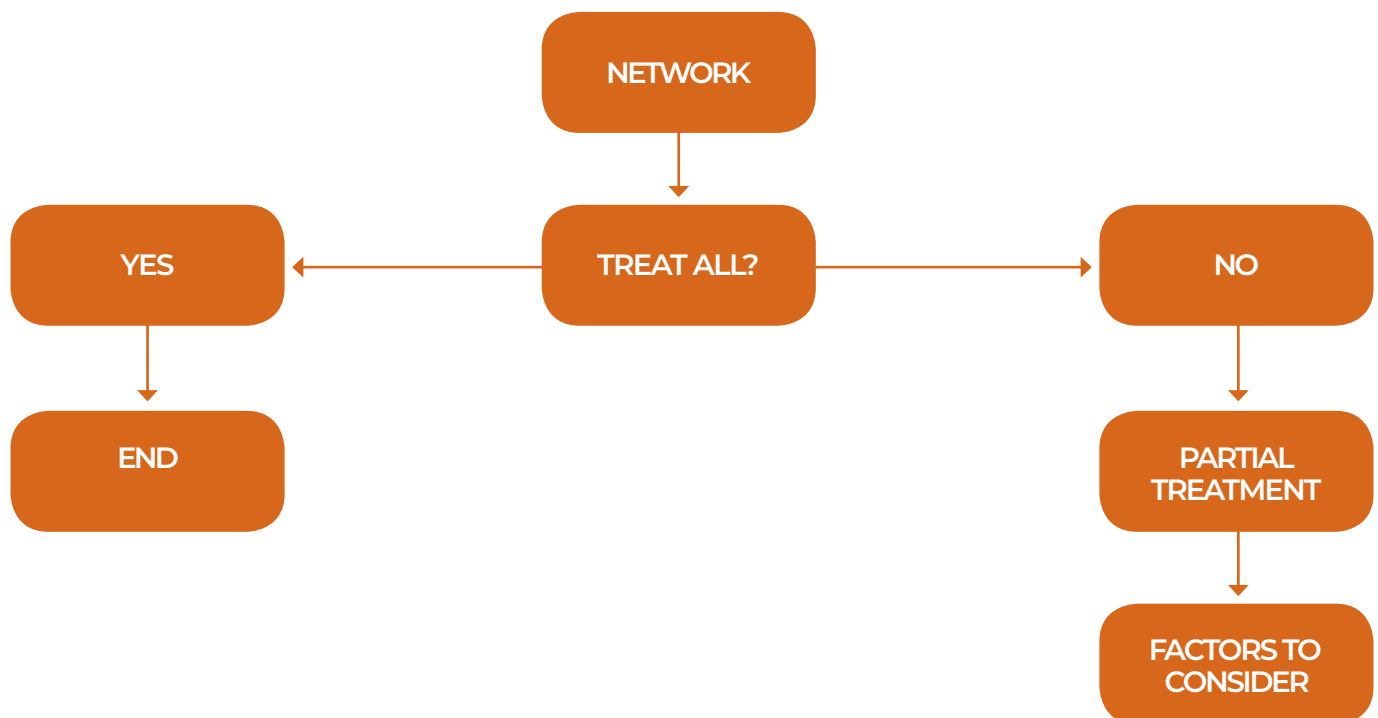


FIGURE 12.2.1

The next stage is what needs to be considered when selecting the network to treat.

The winter service can be broken down into different levels of service and an example of the different categories that might be applied, key factors to consider for each category and references to further guidance in Well-managed Highway Infrastructure and the NWSRG Practical Guide is presented below.

11.2.7 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

Authorities should clearly document and be able to justify:

- a) Criteria for inclusion in each level, definitions of salting network
- b) When and how each level activated
- c) Approval by elected representatives
- d) Equality Impact Assessment

11.2.8 Local knowledge is valuable when designing the routes, non-routes and domains.

With consideration to the factors listed below, individual authorities require evidence to how they have prioritised these factors. Authorities should clearly document the approach taken and be able to provide evidence to back up the decisions made.

Factors that should be considered in selecting which parts of the network to treat will include:

- Network hierarchy
 - Part of a national network (mainly for cycle routes only)
 - Local usage only
 - Link footways
- Level of use (possibly covered in hierarchy depending on the individual authority's approach)
- Access to **key** public services
- Topography
- Climatic variations
- Financial constraints

11.3 Route Selection

- 11.3.1 It is beyond the resources of authorities to treat all highways, footways and cycleways in winter conditions. Therefore, prioritisation of the footway and cycleway network must take place in the same manner as the prioritisation of road carriageways for winter service delivery.
- 11.3.2 A clear plan of the footways and cycleways that are to be treated under different winter conditions will enable authorities to budget for and allocate resources effectively.
- 11.3.3 A clear statement of policy on this issue and its communication to all relevant stakeholders in a timely fashion (usually either shortly in advance of, or at, the commencement of the winter season) can significantly reduce the number of queries and complaints received by the authority regarding its winter service provision.
- 11.3.4 Aims and objectives for the service to be provided on footways and cycleways, as well as the selection of routes and the prioritisation process, should be clearly defined.
- 11.3.5 The policy should be rigorously and consistently applied across the network under the control of the highway authority, and it is recommended that authorities liaise with their neighbours with a view to improving consistency across administrative boundaries.
- 11.3.6 When assessing whether an authority has taken adequate steps to maintain its highway network, courts will often consider the working practices of other authorities, especially those that are in the same geographic region. The practices of an individual authority may therefore impact on a wider scale. For example, if one authority is pre-treating busy routes it may raise the question as to why other authorities are not doing the same. Liaison between highway authorities regarding these issues is therefore important.
- 11.3.7 Due to the predominantly less severe impacts of incidents on cycleways and footways, when compared to those on carriageways, authorities may decide it is reasonable to expend a much greater level of resources in protecting against the loss of control of heavy and fast motor vehicles, than protecting against individual pedestrians or cyclists that may slip or fall over. However, when making these decisions, it is important that the impacts of these types of incidents have on communities, as well as on the provision of healthcare services, is fully considered. Therefore, even if only a limited winter service is provided for footways and cycleways, other options such as self-help schemes, discussed in this guidance, should be considered as part of the appropriate response to the risks.

11.3.9 Footway and cycleway prioritisation should be based on a risk based approach and can utilise similar criteria methods as those used for carriageway prioritisation (see the Route Selection section of the NWSRG Practical Guide), potentially including some additions, such as:

- Volume of pedestrians and/or cyclists based on local knowledge or count data (if available)
- Links to key services:
 - Transport hubs such as rail, bus, underground or metro services
 - Medical centres
 - Shopping centres and mall complexes
 - Key employment sites such as industrial estates or districts
 - Schools
 - Police Stations
 - Promoted facilities (bike hire schemes or cycle superhighways for example)
- Needs of vulnerable users
- Footways alongside road / rail bridges or over sections of carriageway
- Links to cross boundary networks

11.3.10 During the prioritisation process it is important to recognise that route usage may change at different times. For example, late night shopping, especially around the Christmas period or because of events at performance and/or sporting venues. Therefore, wider consultation may be beneficial with stakeholders potentially including:

- Cycle groups (Sustrans local groups for example)
- Major employment sites
- Sporting/performance venues

11.3.11 In addition, situations may arise from time to time that cause authorities to consider temporary prioritisation changes on the footway and cycleway network. For example, when restrictions on population movements are in effect and/or changes to the way that the public travel occur because of issues such as pandemics or major incidents within the region etc. When such situations arise, authorities should consider reviewing their winter treatment networks, including footways and cycleways, to ensure that available resources are being appropriately utilised and targeted during these periods.

11.3.12 If, following review, it is considered that temporary changes to the treated network are warranted, authorities should ensure that appropriate procedures are followed before the changes are introduced so that the changes are properly documented and authorised.

11.3.13 Some examples of applying a risk-based approach to the prioritisation of the footway and cycleway network are given in the table opposite.

TABLE 11.3.1 - BASED ON RISK ASSESSMENT AND LEVEL OF USE.
THE RISK IS A COMBINATION OF THE CONSEQUENCES AND PROBABILITY OF AN INCIDENT OCCURRING

<p>Consequence</p> <p>Factors that affect the consequences of an accident include:</p> <ul style="list-style-type: none"> • Separation from carriageway • Character and traffic use of adjoining carriageway • Cycle density • Pedestrian density • Location of route • Disruption caused by accident 	<p>Examples of routes where an incident could have high consequences include:</p> <ul style="list-style-type: none"> • Routes adjacent to water courses • Bridges and routes with adjacent steep falls • Areas near elderly care homes • Steep gradients, steps etc • Routes where a cyclist is at higher than normal risk of falling into an adjacent carriageway and being involved in a road traffic accident. • Footways and cycleways adjacent to busy/fast carriageways
<p>Probability</p> <p>The factors that affect the probability of an accident include:</p> <ul style="list-style-type: none"> • Pedestrian density • Cyclist density • Route users • Surface drainage • Local topography • Cycle track width and presence of street furniture • Crossing/braking points • Traffic density • Traffic speed • Level of exposure • Surface texture 	<p>Examples of routes where the probability of an incident is high may include:</p> <ul style="list-style-type: none"> • High level of usage e.g. main shopping areas • Areas where drainage is poor and there is seepage onto the surface of the footway or cycle route • Pedestrian crossings, waiting points and areas such as bus stops. • Areas that are inclined/sloped • Steps and ramps • High proportion of users are elderly or children • Cycle tracks where: <ul style="list-style-type: none"> • the track crosses a footway or a carriageway where cyclists may have to brake hard • the cycle track is narrow and there is street furniture to negotiate • where pedestrians and cyclists are not segregated

11.4 Resilience Network

11.4.1 It is recommended in the 'Well-managed Highway Infrastructure' Code of Practice that authorities identify a minimum winter/resilience network. This is the network to provide a minimum essential service, to maintain economic activity and access to key services during extreme weather and disruptive events.

11.4.2 Footways and cycleways should be included in this network where considered essential by the authority. When defining this network, it is also important to consult with neighbouring and similar authorities to align as far as possible policy or document the reasons behind differences.

11.5 Benefits of Precautionary Treatments

- 11.5.1 There will be occasions when reactive winter treatments are required on prioritised footways and cycleways. Currently, these typically involve the mechanical removal of snow, either by hand or by machine. The use of de-icers on a prioritised network of footways and cycleways is also relatively widespread during periods of prolonged or particularly severe conditions. However, several UK authorities also undertake precautionary treatments on certain, defined parts of their footway and cycleway networks.
- 11.5.2 The purpose of precautionary treatments is to prevent the formation of ice, or to weaken or prevent the bond of snow to pavement surfaces and help the dispersal of snow by ploughing, trafficking and pedestrian footfall.
- 11.5.3 Spreading in advance of ice or snow forming can help to minimise the amount of de-icer needing to be spread to maintain a bare pavement.

11.6 How to Use Weather Forecasts to Inform Decisions

- 11.6.1 The weather forecast provided for carriageways may be used as a trigger for treatment, but consideration should be given to the thermal behaviour of the footpath/cycleway. Surface temperatures can be colder than carriageways (differences of one or two degrees Celsius have been measured in some circumstances) as a result of factors such as differences in construction, shading effects from adjacent buildings and the lack of heating effects from vehicles.
- 11.6.2 A footpath/cycleway specific forecast (a forecast based on the thermal characteristics of the footpath/cycleway and not on the carriageway which may behave differently) may provide more accurate predictions of footway surface temperatures and the risk of ice, with potential safety benefits.
- 11.6.3 There may also be operational and safety benefits from adopting a route-based approach to treatment, with potential for cold spot treatments and the ability to identify 'at risk' locations.
- 11.6.4 Providing a minimum footway surface temperature value as part of an existing domain forecast may be a cost-effective way to provide operational benefits (reduced cost of forecasting and ability to link treatment decision to the highway network decision).

- 11.6.5 There may be safety and economic benefits from having a site-specific forecast based on the location of footway/cycleway weather stations and sensors (ability to monitor conditions and verify forecast accuracy).

11.7 The Use of Road Weather Stations and Sensors

- 11.7.1 Information from weather stations and roads sensors may provide a range of different benefits, including:
- Operational and economic benefits from having a weather station(s) installed on the footpath/cycleway network (ability to monitor and receive a site-specific forecast)
 - Safety benefits from locating weather stations in a location which is representative of the treated network (to reflect the risk to the network and enable timely treatment)
 - Economic benefits from linking footpath/cycleway sensors to existing weather stations (reduced civils and hardware costs)
 - Economic and safety benefits from using a different type of sensor to measure freezing point and/or level of grip (footpaths and cycleways may not be returned to black in the same way as the highway network and may have more residual de-icing material present and/or snow and ice)
 - Economic benefits from using a reduced specification weather station from those utilised on the highway network

11.8 Types of De-Icer and Spreading Equipment

- 11.8.1 Typically, the choice of de-icer will dictate the type of spreader required and the nature of the routes will also be a main factor in determining equipment.

De-Icer

Footway and cycleway de-icers can be in solid or liquid form. Solid de-icers may comprise or include:

- Dry salt
- Agricultural By-product (ABP) Treated salt
- Pre-wetted salt in which a portion of the salt mixture is supplemented with 20-23% sodium chloride brine
- Other non-chlorides e.g. acetates and formates

- 11.8.2 The constituents of different liquid de-icers vary, and some liquids have more complex chemical components than others. However, the active chemical ingredients of the most commonly available liquid de-icers are either:
- Chloride based: e.g. Sodium chloride brine (NaCl), magnesium chloride (MgCl₂) and calcium chloride (CaCl₂).
 - Or acetate/formate based: e.g. potassium acetate, calcium magnesium acetate, sodium acetate, sodium formate and potassium formate.
- 11.8.3 There are also additives that can be added to these de-icer types which may provide other performance benefits, for example from corrosion inhibition or improved retention after spreading. Acetates, formates, agricultural by-product (ABP) treated salt and other chlorides can be effective down to lower temperatures than sodium chloride.
- 11.8.4 When determining the most appropriate de-icer for use on footways and/or cycleways in any situation practitioners should pay particular attention to the environment in which the de-icer is being applied. For example, de-icers may have to be used in close proximity to watercourses, metal structures or a coated road surface and it is possible that this may necessitate the use of certain specific types of de-icer in order to minimise impact on aquatic life, fauna or corrosion.
- 11.8.5 To different degrees, all de-icers containing chloride have corrosive effects on metal infrastructure. This may be an important consideration where there is vulnerable street furniture/metal work present. Sodium chloride salt and other de-icers may also leave a residue which can be tracked into buildings or public and private vehicles.
- 11.8.6 Before making changes to the type of de-icer used, it is recommended that thorough investigations of the impact on infrastructure and the environment are made, and the appropriate environmental authority should be consulted where necessary.
- 11.8.7 More detailed information on de-icers, performance and other characteristics is included in the De-Icer Types section of the NWSRG Practical Guide.

Spreading Equipment

- 11.8.8 The choice of spreading equipment will depend mainly on the de-icer type. However, other key parameters to consider include: the size of areas to be treated, accessibility, topography (including any obstructions on routes such as bollards), proximity to depot / deicer storage, desired application rate of de-icer and the level of traffic/footfall on the route.
- 11.8.9 The available range of equipment includes push spreaders or sprayers (or backpack sprayers), vehicle mounted or towed spreaders or sprayers.

- 11.8.10 The topography of the footway or cycleway may restrict the size and/or weight of vehicles that footway or cycleway spreading equipment can be mounted to, typically as a result of weight restrictions, width restrictions, sharp bends or gradients. Practitioners may be able to use existing multi-purpose vehicles or may need to hire or purchase new, and the range of vehicle types that can potentially be employed can be wide, and includes those such as Quad Bikes, Multipurpose City Vehicles, Utility Terrain Vehicles, Compact Tractors, Pick Up Trucks or 3.5t Transit / Tipper vehicles.
- 11.8.11 Spread rates are difficult to measure or assess when hand spreading. Application using mechanical means provides a more homogenous and controlled spread of de-icer than hand spreading. This also tends to speed up application, as well as reducing the costs and labour issues associated with treatment, which can be considerable for footway and cycleway treatment when compared to the cost of treating the same length of carriageway.
- 11.8.12 When deciding upon the most appropriate de-icer(s) and spreading equipment, it is important to consider resilience during snow events and prolonged periods of sustained low temperatures.
- 11.8.13 The use of dry or liquid de-icers is enhanced when snow is swept or ploughed from the surface before application. Sweeping off light snow is generally more effective than ploughing but snow ploughs can be fitted to all the vehicle types. For longer routes/larger areas consideration will also need to be given to reloading in the most efficient manner.

Storage Requirements

- 11.8.14 When considering the storage requirements for de-icers used for footway and cycleway treatment, the main factors are the quantity of materials required to be stored to ensure resilience targets are met; the shelf life of the materials and any particular specific storage requirements to maximise that shelf life; and where it needs to be stored in order to be deployed and utilised most effectively, which is likely to be during periods of harsh weather conditions.
- 11.8.15 Some of these de-icer types can be corrosive and adequate containment is required and should be considered. De-icing liquids can be supplied in jerry can, Intermediate Bulk Container (IBC) or bulk tanker. Materials such as Polypropylene and Glass Reinforced Fibre-Plastic (GRP) are widely used to store de-icing liquids. Transfer of this material by a suitably rated pump is also important to avoid faults and downtime, when required.
- 11.8.16 Further guidance on de-icer storage is available in the 'Salt Storage' and 'Treatments for Extreme Cold' sections of the NWSRG Practical Guide.
- 11.8.17 It may be more cost effective to produce de-icers, at site. Buying in the raw components like salt and adding water and additives as required, practitioners can make batches of de-icer on demand. Dumfries and Galloway Council use a mini saturator to produce a sodium chloride brine for use on their footway / cycle network.



FIGURE 11.8.1 Mini brine saturator in use at Dumfries and Galloway Council



FIGURE 11.8.2 De-mountable liquid sprayer and snow plough mounted onto a Multipurpose City Vehicle



FIGURE 11.8.1 Mini brine saturator in use at Dumfries and Galloway Council

11.8.18 In addition, it is important that 'self-help' schemes are considered. 'Snow Wardens' and items such as grit bins, push spreaders, snow shovels and additional PPE are all useful in these circumstances. More information on the Snow Warden Scheme is provided later in this guide.

11.9 Factors To Consider When Selecting De-Icers and Spreading Equipment

Cost benefit considerations

- 11.9.1 Several factors should be considered when comparing the cost-benefits of different de-icers, including:
- The effectiveness of the de-icer for the likely range of conditions
 - How much needs to be spread to effectively prevent ice formation and melt ice and snow – how does this affect equipment requirements, route lengths, times and costs to treat
 - The purchase and maintenance cost of the facilities and plant required to store and spread the de-icers
 - The impact on infrastructure and the environment
 - Is new spreading equipment required or can existing fleet be utilised?

Effectiveness over the likely range of conditions

- 11.9.2 Solid de-icers must dissolve to form a solution before they become effective, the crushing action of traffic speeding up this process. The crushing effect from foot and cycle traffic will be less effective compared to vehicle traffic.

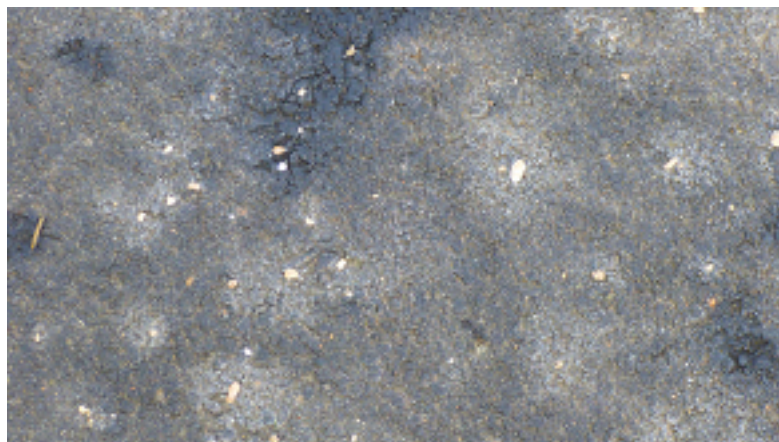


FIGURE 11.9.1 Uncrushed salt particles on footway surface, showing limited area of de-icing around each particle

- 11.9.3 Liquid de-icers can become effective as soon as they are spread and are not dependent on the action of traffic to crush the salt and distribute it across the target area.



FIGURE 11.9.2 Image shows a sodium chloride brine penetrating formed ice

- 11.9.4 Consideration should be given to the type of surfacing. For example, liquids can be lost through more porous surfacing types. An additional surface treatment or coating may also require consideration as some de-icers could degrade.
- 11.9.5 The choice of a solid or liquid de-icer may depend on the type of treatment (anti-icing or de-icing) and the surface conditions at time of spreading. For example, spreading liquids on dry or damp surfaces before freezing may provide an effective preventative treatment, but spreading liquids on very wet surfaces or layers of snow or ice may result in dilution and refreezing of the liquid.
- 11.9.6 Consideration should be given to the effects on skid resistance when using any de-icers. Too much of a dry de-icer could be hazardous to cyclists. Undispersed liquid de-icers could potentially have a similar effect.

11.10 Spread Rates and Treatment Guides

Spread rates

- 11.10.1 **Table 11.1** shows some indicative spread rates for commonly used de-icers on footways and cycleways. Required spread rates will depend on numerous factors including the accuracy of the spreading equipment being used (or if spreading by hand), the surface type and weather conditions, repeat treatment frequency and other localised features.

11.10.2 In addition, there is considerably less peer reviewed published scientific research available regarding the treatment of UK footways and cycleways when compared to the treatment of carriageways. This, in combination with the widely differing trafficking levels on footways and cycleways, leads to a situation where the guidance regarding spread rates on these routes cannot currently be as precise as that provided for carriageway treatments.

11.10.3 When formulating a treatment plan, authorities should follow a risk-based approach. Given the lack of available research in this area, establishing the application rates of de-icer may be challenging and it is recommended that the following factors are considered:

- Predicted and/or actual footway/cycleway temperatures, where available and/or road surface temperatures
- Surface wetness at forecast event
- De-icer manufacturer's recommended application rates and interval between applications
- Spreading equipment type and condition
- Presence of formed ice or lying snow

11.10.4 Familiarisation with the other sections of guidance may also assist decision making, including the determination of appropriate spread rates. For example, Table 8.3.3 in Section 8 of the NWSRG Practical Guide for Winter Service shows the amount of salt required at any time to prevent ice from forming on damp and wet roads.

11.10.5 The spread rates provided in **Table 11.1** below have been accepted as a good general guide by the NWSRG Technical Advisory Group Members who manufacture and distribute de-icers in the UK. However, it is recommended that authorities seek further guidance on specific spread rates and application methods to utilise on footways and cycleways from their de-icer suppliers and equipment manufacturers, taking into account the precise nature, use and location of the routes being treated.

TABLE 11.10.1 TYPICAL SPREAD RATES

DE-ICER PRODUCT	Spread rate g/m ²	
	Precautionary	Reactive
RockSalt (Dry, pre-wet and mixed with additives)	10-20 g/m ²	20-40 g/m ²
Brine	20 ml/m ²	30-60 ml/m ²
Sodium acetate (solid)	15-30 g/m ²	40-60 g/m ²
Potassium acetate (liquid)	15-25 ml/m ²	25-50 ml/m ²
Calcium magnesium acetate (Solid)	20 g/m ²	40 g/m ²

Note: The concentration of liquid de-icers affects performance and the rates provided in Table 11.1 above relate to 'standard' concentrations. For example, the 'standard' concentration of Potassium acetate de-icer is 50% but it can be purchased at other concentrations, such as 65% and 35%. This therefore must be properly taken into consideration when deciding upon the appropriate spread rate to use in any situation.

- 11.10.6 Spread rates at the lower end of the ranges are for higher surface temperatures and/or drier surface conditions. Spread rates at the higher end of the range are for lower temperatures and/or wetter surfaces, with possible snow and ice present.
- 11.10.7 Higher spread rates might also be used to reduce treatment frequency during prolonged conditions, especially at remote or difficult to access locations.

Longevity

- 11.10.8 Establishing how long a footway or cycleway treatment will last can be challenging. Rainfall; surface temperature; the presence of ice, snow, leaves or other detritus; trafficking/footfall; and whether the treatment was precautionary or reactionary in nature are all factors that impact on the potential longevity of a treatment.
- 11.10.9 It is generally accepted that, in favourable conditions, typical treatments should normally remain effective for 24 hours. However, de-icer suppliers may be able to provide more specific guidance relating to the longevity of treatments using their products and, in certain situations, i.e. spreading on a dry surface with no subsequent precipitation, some de-icers can potentially achieve several days protection. In these circumstances, applications can be made when resources are available without incurring additional costs through overtime payments or affecting other work tasks unrelated to delivery of the winter service.

Snow clearance

- 11.10.10 When more than a few millimetres of lying snow is present, it is recommended that de-icing treatments are supplemented by snow removal through other means. Effective brushing and/or ploughing will:
- Move as much snow as possible away from the surface
 - Reduce the likelihood of snow becoming compacted and bonded to the surface
 - Reduce the amount of de-icer needed for subsequent treatments (such treatments may not be effective if significant snowfall has occurred and it has not been removed)
- 11.10.11 Clearing snow from footways and cycleways can assist and encourage users to utilise these routes during periods of inclement winter weather, thereby providing significant benefits to local communities. However, routes cleared from snow can still be adversely affected by ice, and authorities may therefore need to consider treating snow cleared routes with de-icer.
- 11.10.12 As part of a snow clearance plan, authorities should consider where snow can be safely cleared to without blocking access to properties, other routes or carriageways. The cleared snow should be moved to verges or other areas away from the pavements (low points). It should not be deposited in the carriageway (unless coordinated with carriageway ploughing) or be allowed to block drainage gullies increasing the risk of refreezing.

11.11 Additional Resource For Winter Service

- 11.11.1 When necessary, authorities should consider the use of additional resources to keep footways and cycleways clear of snow and ice. For example, staff may be available from other teams whose normal activities may be curtailed in winter weather.
- 11.11.2 Many authorities have also set up volunteer schemes to help local communities. Snow Wardens or Snow Champions can be recruited to provide a community resource to help clear snow and ice in their neighbourhood. Councils will typically provide training, de-icing materials and equipment. Some examples of such schemes are highlighted below.
- 11.11.3 The City of York Council Snow Warden Scheme was launched following several severe winters which left residential pavements covered in snow and ice for several days. To implement the scheme, volunteers were requested from residents through a publicity campaign, with over 200 volunteers registered.

To get the scheme started and for ongoing management the following activities and resources are required:

- Delivery of training sessions
- Provision of kit, including high vis vest, warm hat and gloves, snow shovel
- Provision of public liability insurance
- Periodic ordering and delivery of salt and equipment
- Inductions for all volunteers
- Risk Assessments and record keeping via electronic system
- Annual letters / email
- General Data Protection Regulation (GDPR) considerations
- Daily / targeted email weather alerts
- Daily Facebook weather alerts / sharing information
- Publicity – posters / social media
- Training up further volunteers

STANDARD RISK ASSESSMENT FORM
Volunteer Snow Warden

RISK ASSESSMENT DETAILS

Work area: Environment and Community Officer
Site: City Road
Location of activity: Dependent on volunteer
Reference: CH/SJ/01812
Risk rating: 13

Details of activity
Volunteers are trained to clear snow from, and grit areas covered / lay, footpaths not covered by the City of York Council defined gritting network.
Date of assessment: 18/01/2019
Review date: 23/01/2020
Assessor carrying out risk assessment: Kristina Davy
Name of employee whom first: Steve Daniels
Authoriser: Jennifer Abell
Risk register ref:

POTENTIAL HARM

Catastrophic
Major: Fatal injury
EDCOR reportable
Severe/Injurious
Disability/Dangerous
Consequence

Moderate
Serious injury likely to result in a EDCOR reportable 7 day injury

Minor
Multiple minor injury

Insignificant
Individual minor injuries

EDCOR RATING

Catastrophic	27	22	27	24	25
Major	11	20	19	15	15
Moderate	6	15	14	14	14
Minor	1	6	9	10	11
Insignificant	1	1	4	5	7

COLOUR

Blue	1 - 5	Very Low	Nil
Green	6 - 10	Low	Nil
Yellow	11 - 15	Medium	Minor
Orange	16 - 21	High	Minor
Red	22 - 28	Critical	Major

* Seek advice from the H&S Team

RISK RATING MATRIX

LIKELIHOOD

Highly Probable
The event is extremely foreseeable
The event is very foreseeable

Possible
The event is foreseeable
The event is not very foreseeable

Remote
The event is unforeseeable

Less likely to occur

Snow Warden Induction

Topic	Signature	Date
• Snow Scoop		
• Grit supply		
Looking after your health (PPE)		
Checking in policy		
What to look for when assessing work area		
Dealing with sharps and dog fouling		
Manual Handling		
Keeping safe		
Sign for equipment given out		
Contact details for Environment and Community Officer		

I have received the training outlined above and read and understood the Risk Assessment provided.

Volunteer Name: _____

Address: _____

Phone number: _____

Email: _____

Environment and Community Officer: _____

11.11.4 Aberdeenshire Council has introduced a Volunteer Snow Warden Scheme to actively support members of the local community to manually clear snow from publicly adopted footways and footpaths. The scheme runs from approximately 1st November to 31st March.

11.11.5 Snow warden teams are invited to be formed, whether as part of an existing voluntary group e.g. Community Council, or as an informal group of neighbours and friends. The Snow Warden comprises a Team Leader and a Deputy Team Leader, Team Members and the Local Roads Office. Roles and responsibilities are clearly laid out in the Snow Warden Scheme welcome pack.

Some important aspects of the running of the scheme include:

- Training for volunteers is provided in a written format and gives guidance on minimising stress and strain on the body during snow clearing activities as well as best practice for snow clearing techniques. YouTube videos and photographs provide guidance on correct shovelling technique and how to spread salt. In addition, the Snow Code is detailed which outlines the behaviours expected of volunteers to enable them to be covered by Aberdeenshire Council's or the Public Liability Insurance for the constituted group to which they belong.

- Aberdeenshire Council's Public Liability Insurance can extend to any team of volunteers that are not applying from a constituted group e.g. groups of friends and/or neighbours can be covered. Teams comprising volunteers from Community Councils and other constituted groups e.g. Resident Associations, are not covered by the Council's insurance and have to ensure that their Public Liability Insurance extends to snow-clearing activity as defined by Aberdeenshire Council and provides sufficient financial cover. The use of mechanical snow clearing/ gritting equipment is not covered by this Scheme.

Annex 1 - Case Studies of Footway and Cycleway Prioritisation and Treatment Methods

CASE STUDY – GLASGOW CITY COUNCIL

Glasgow City Council's Winter Service priority 1 footway network is pre-treated based on metrological domain and criteria such as: pedestrian precincts/shopping areas; pedestrian flow; designated routes to schools and steepness usage, proximity to city centre, shopping centres access routes to schools and gradients. The segregated cycle ways and the National Cycle Network (NCN) 75 are also priority 1 and are pre-treated as they are the busiest cycling commuter routes in the City.

To promote cycling during winter, pre-treatments are undertaken if ice, hoar frost or snow are forecast as likely to be present on the surface. The timing of treatment is dependent on the specialised roads weather forecast (updated 3 times each day). The material used on the priority 1 segregated cycle way network is a Sodium Chloride Brine mixed in with a corrosion inhibitor. The road surface temperature and surface condition determine the brine spread rate which will vary between 10ml/m² and 30ml/m². The liquid brine is applied from a multi-purpose narrow gauge vehicle with a detachable sprayer. In the event of freezing rain or snow, a snow plough attachment can be mounted along with a demountable gritter on the multi-purpose narrow gauge vehicle to remove lying snow and spread rock salt. The NCN 75 and on road cycle routes are gritted with rock salt at the same time as the adjacent carriageway.

CASE STUDY – RHONDDA CYNON TAF COUNCIL

Rhondda Cynon Taf historically did not treat footways on a precautionary basis, as the pedestrian distribution is spread widely across the footway network and the network does not include the type of very high footfall pedestrianised locations where precautionary footway salting was thought to be justified. Recent guidance has encouraged Highway Authorities to revisit such decisions so an exercise was undertaken by the County Borough to review the current policy.

Using a combination of pedestrian counts, public transport usage statistics, school numbers and local knowledge, the busiest sections of the footway network during the time of highest risk for pedestrians (06.00 to 09.00) were identified. Perhaps not as expected, the busiest footways at this time were identified to be outside secondary schools, followed by accesses to public transport, primary schools and finally town centres. (This even though Rhonda Cynon Taf has the 7th and 8th busiest Train Stations in Wales, footfall was only around 350/hr for the stations and 150/hr for town centres between 08.00 and 09.00.)

The resources required to treat these highest use footways were then quantified and a cost estimate produced. This gave an estimated treatment cost per user of £0.12. To give context to this figure and to consider financial reasonableness, this was then compared to an estimated cost per user of carriageway salting, calculated from actual costs, actual length salted and traffic counts. The carriageway salting cost per user calculated was less than half a penny per user, 24 times more cost effective.

In addition to this cost factor, claims for footway slips on ice over the last 5 years were considered. During this period, 17 claims were received, only 2 of which were in areas which would have conceivably been treated under a footway salting regime. At the time of the review all closed claims had been successfully defended.

As such, the County Borough took the decision it is not reasonably practicable to salt footways on a precautionary basis and will continue to undertake footway salting on a reactive basis only, at times when settled snow / ice is present. Low use cycleways are treated on an ad-hoc basis using either 6mm rock salt or non-corrosive liquid de-icer depending on the prevailing weather conditions and local circumstances.

CASE STUDY – TRANSPORT FOR LONDON

Transport for London (TfL) is responsible for maintaining the strategic road network in London, the Transport for London Road Network (TLRN). The remainder of roads in London are maintained by the London boroughs and the motorways by the Highways England. The TLRN network represents approx. 5% of the roads in London but carries over 25% of vehicles, cycles and pedestrians.

Policy

TfL's policy is to treat both our footways and cycleways to keep them free of snow and ice as reasonably practical. To achieve this TfL have categorised (response time in brackets) our footways and adjacent cycleways as: prestige (4hr), primary (4hr), secondary (24hr), link and local access (48hr). Categorisation was developed by considering footfall, proximity to transport hubs, hospitals, schools, subway steps and footbridges etc.

Footway

Treatment with 6mm rock salt may be undertaken prior to the formation of ice or snowfall. In this case prestige and primary footways will be treated first, the contractor is required to respond and complete the treatment within four hours. Further treatments (including clearance) may be carried out post snow, again in order of priority.

Cycleway on carriageway

Cycleways on the TLRN are located on or off carriageway. If on carriageway they are treated at the same frequency as the carriageway using 6mm rock salt. This will normally be undertaken as part of the pre-cautionary treatment for the carriageway.

Cycleway off carriageway

Cycleways that are off carriageway are categorised as either numbered cycleways which are the former Cycle Superhighways or lower use cycleways.

High use cycleways are normally segregated in part or for their whole length. These are treated with non-corrosive liquid de-icer. These treatments are applied using two dedicated narrow bodied gritters and at the same frequency as the adjoining carriageway.

Low use cycleways are treated on an ad-hoc basis using either 6mm rock salt or non-corrosive liquid de-icer depending on the prevailing weather conditions and local circumstances.

CASE STUDY – NORFOLK COUNTY COUNCIL

Footway prioritisation and treatment

Snow clearance will be carried out initially on the priority footways as detailed in the winter plan, as resources permit. Some traffic restricted routes are included in P1/P2 route plans as outlined in Priorities for Treatment. When priority footways have been treated satisfactorily, resources may be directed to other locations at local discretion. Partners, contracted suppliers and District Councils can be contacted to seek additional resources for deployment if required.

Cycleway prioritisation and treatment

Cycleway's are treated as resources permit and on a priority basis, having first established reasonable conditions on the designated higher priority road and footway network.

The decisions to treat the footway and cycleway network are taken in conjunction with the authority's normal carriageway treatment (using lunchtime forecast).

The de-icer used is rock salt with ABP additive as a dry treatment using spread rates that are the same as for the carriageway network. The exception to this is for Norwich priority routes (see explanation below)

Norfolk County Council has identified some busy footways in the pedestrianised areas of central King's Lynn, central Great Yarmouth and central Norwich for priority treatment. The assessment of which footways to include for priority treatment was based on factors including:

- An analysis of the number of incidents or insurance claims received on routes related to snow and ice
- The footfall of each route
- The timing of when the peak footfall occurred i.e. are the routes busy during the risk periods for freezing conditions (morning and evening periods)

SUBJECT	NORFOLK CC PRIORITIES	SITUATIONS WHEN TREATED
Footways	Important traffic restricted routes within King's Lynn, Great Yarmouth and Norwich.	When frost is predicted or after snow.
	Main shopping areas and busy urban areas including footways leading to essential industrial establishments, hospitals, important bus routes and schools, and known trouble spots.	Reactive treatment after prolonged frost or snow.
	Other remaining footways.	Reactive treatment after snowfall as resources permit, having first established reasonable conditions in clearing higher priority roads and footways.
Cycleways	On - road cycleways.	Treat as part of relative road priority.
	Off - road cycleways.	To treat as resources permit, having first established reasonable conditions in clearing priority roads, footways and on-road cycleways

Norwich City Centre Priority route

Following feedback from local business and residents regarding the appearance and effects of spreading solid salt, for example tracking of salt residue into buildings, treatment on priority routes in Norwich city centre is now carried out using an all liquid de-icer treatment (Sodium chloride brine mixed with ABP type de-icer).

The liquid de-icer is spread using a small custom-built brine sprayer vehicle (small utility vehicle with a brine tank and spray bar mounted on the back). The vehicle provides for improved health and safety for the operatives, with an enclosed cab, radio and location tracking capability.

The vehicle carries two operatives, with one person carrying out de-icing of areas that are inaccessible to the vehicle using a backpack sprayer e.g. for treatment of steps and pedestrian overbridges. The liquid de-icer is purchased as a ready mixed product and stored in IBC containers in a bunded area.

An important consideration for when carrying out footway treatments is the potential conflict between pedestrians and winter service operations.



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