



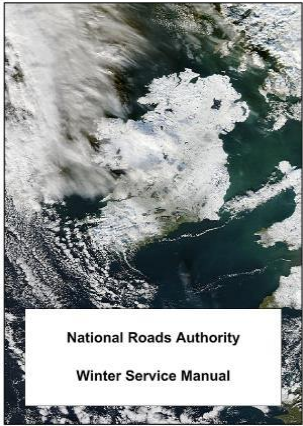
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Winter Maintenance Manual

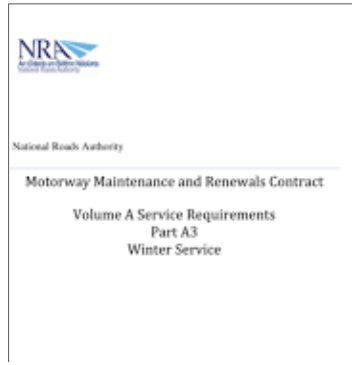
Stephen Smyth
Transport Infrastructure Ireland

TII Standards Training 2022
19th May 2022

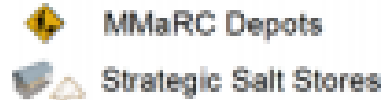
Winter Service Specification Development – 2010 to 2021



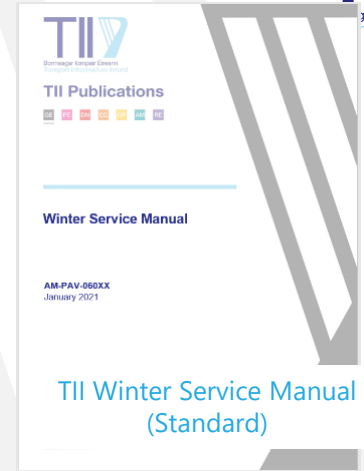
NRA Winter Service Manual (Draft)



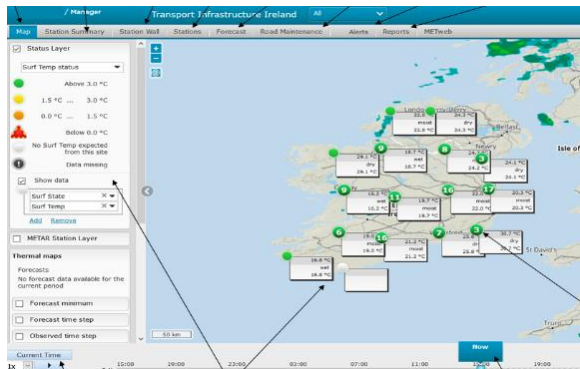
MMARC Gen. 1 Service Requirements – Part A3 Winter Service



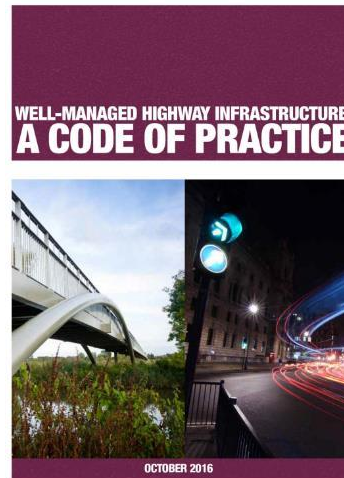
MMARC Gen 2. Service Requirements – Part A3 Winter Service



TII Winter Service Manual (Standard)



UK ROADS LIAISON GROUP



Section	Description	Published
Using the Guide	Purpose of the Practical Guidance and how to use the guide effectively	18-Mar-21
Planning	Policy development, service levels, management and decision making systems, resources, roles and responsibilities etc.	18-May-20
Salt Storage	Optimum salt moisture contents and storage methods; calibration, adjustment and spread rates for non-optimum conditions.	19-Mar-19
Treatment Methods	Treatment methods and technologies	19-Mar-19
Spreader Management	Requirements and methods for calibrating spreaders to maintain optimum safe and economical salting.	19-Mar-19
Decision Making	Guidance relating to the winter service treatment decision making process	01-Dec-20
Spread Rates	Spread rates for precautionary salting operations undertaken in response to predictions of frost and ice formation in normal winter weather conditions	19-Mar-19
Treatments for Snow & Ice	Using snow ploughs effectively; where to plough; treatments before snow and during snow; treatments for slush, thin layers of ice, compacted snow and ice	19-Mar-19
Treatments for Extreme Cold	Storage and use of alternative de-icer materials to replace or increase the effectiveness of sodium chloride at temperatures below -7oC	13-Mar-19
Weather Forecasting & RWIS	Suitability of different types of forecast for local circumstances; practical guidance on issues including location and installation considerations for weather stations and sensors.	14-Sep-20
Route Selection and Optimisation	Winter service route network categorisation; how individual treatment routes are selected, reviewed and amended using a consistent and transparent process	01-Dec-20

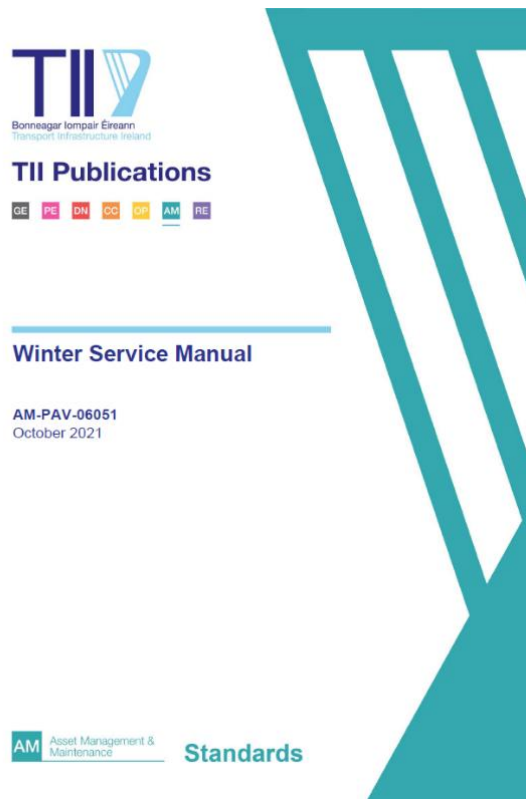


Winter Service Manual 2021



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- a. New TII Standard.
- b. New Winter Service Plan Template.





Winter Service Manual 2021



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Organisations and Functions



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The Department of Transport

- Development of the Government's roads safety strategy.
 - Provision of grant aid to local authorities for regional and local roads.
-



Organisations and Functions



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Transport Infrastructure Ireland (TII)

- Overall responsibility for the planning and supervision of construction and maintenance works on the national road network.
- Provides funding for Winter Service infrastructure and operations.
- Procures the Road Weather Information System (RWIS).
- Procures Strategic Salt Supplies.
- Provides technical advice and standards.
- Procures private companies for maintenance, including Winter Services, under PPP or MMarC contract.
- Assist Dept Transport on the National Emergency Coordination Group (NECG).



Organisations and Functions



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Local Authorities

- The management and provision of Winter Service on sections of the national road network.
- Provision of all necessary resources and decision-making capability.
- Carry out anti-icing, de-icing and snow removal winter maintenance activities on national roads.
- Provision of trained staff.
- Storage and maintenance of Winter Service materials and equipment.
- Strategic and operational management of winter service.
- Advising the general public.
- Reporting to the general public through their elected council



Organisations and Functions



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Other TII Contracted Organisations

- Operate and maintain sections of the national motorway and dual carriageway network.
- Contractor is responsible for their sections of the national motorway and dual carriageway network.
- Responsibilities, including Winter Service, defined in their individual PPP and MMarC contractual agreements



Roles and Responsibilities



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Winter Service Roles and Responsibilities

Winter Service Manager.

- Responsible for the delivery and day to day management of Winter Service.

Winter Service Duty Engineer.

- Rota of Duty Engineers (decision makers) responsible for implementation of WSP.

Winter Service Supervisor.

- Responsible for day to day delivery at the Depot.

Winter Service Operatives.

- Responsible for day to day delivery of the WSP.



Winter Service Requirements



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General Requirements

- Local authorities are responsible for ensuring that the total width of carriageways on the national road network within their administrative area are kept free of frost, ice and snow as far as reasonably practicable.

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Performance Levels

Location	Main carriageway, slip road, hard shoulder, hard strip, turning lane, circulatory carriageways, link roads, central reservation crossovers, overbridge roads, underbridge roads, lay-bys, bus bays	Footways, cycleways and footbridges.
Frost	All national routes to be kept free of frost at all times as far as reasonably practicable	
Ice (including Freezing Rain)	All national routes to be kept free of ice at all times as far as reasonably practicable.	Clear of ice within 12 hours.
Snow	All national routes to be kept free of snow at all times as far as reasonably practicable.	Clear of snow within 48 hours of cessation.
Reactionary treatment time for routes/lanes abandoned due to snow or ice.	<p>24 hours to restore all surfaces following cessation of snow.</p> <p>24 hours to restore all surfaces after the formation of ice.</p>	

Table 4.1 Winter Service Performance Levels



Winter Service Requirements



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Performance Levels

4.4.2 Winter Response Time

The Winter Response Time is defined as the time taken from the decision to begin the Winter Service response or snow clearance until the Winter Service vehicles are loaded, manned and ready to leave the Depot.

- The Winter Response Time for Precautionary Treatment on national routes shall be a maximum of 1 hour.
- The Winter Response Time for Reactionary Treatment, including snow and ice clearance on national routes shall be a maximum of 1 hour.

The Winter Response Time shall not apply when the decision to mobilise is taken in advance as part of a Precautionary Treatment but in any case, shall not exceed one hour.

4.4.3 Winter Treatment Time

The Winter Treatment Time is defined as the time taken from leaving the Depot through to returning to the Depot after completion of the Precautionary Treatment routes.

- The Winter Treatment Time for Precautionary Treatment shall be a maximum of 2.5 hours.



Winter Service Requirements



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Performance Levels

4.4.4 Winter Response and Treatment Times for Footways and Cycleways in Urban Areas

The Precautionary Treatment of footways and cycleways in urban areas, defined as those areas subject to a speed limit of 60 km/h or less that are adjoining the national road pavement, shall be undertaken within a response time of 2.5 hours between the hours of 06.00 hrs and 18.00 hrs. The maximum treatment time shall be 4 hours.

The removal of snow and ice from footways and cycleways in urban areas, shall comply with the performance levels outlined in Table 4.1.



Winter Service Requirements



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Performance Levels

4.5 Patrols

From 1st October to 30th April inclusive, if deemed necessary by the winter service Duty Engineer, local authorities shall carry out patrols on all parts of the national road network within their administrative area where ice, snow or frost is present or forecast.

Records of all patrols including the route taken, beginning and end times, vehicle used, patrol driver and observations made are to be included in the local authority's Daily Action Reports and recorded on the RWIS diary function.

If deemed necessary, patrols may be undertaken using a spreading vehicle while carrying out spot-treatments as required. A Precautionary Treatment or Reactive Treatment may also be deemed to be a patrol.



Winter Service Requirements



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Performance Levels

- Operational Salt Stock Pile.
- 63 runs @ 25 g/m² for length of national road in area.
- Reduced to 18 runs @ 25 g/m² for month of April.
- Calculate salt tonnage, weekly salt returns on NSMS, ordering from strategic stores.

Winter Service Requirements

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Salt Stockpile

- 63 runs @ 25 g/m² for length of national road in County.
- 18 runs @ 25 g/m² for month of April.
- Relates to National Road treatment only

County	Total Length (m)	Average of Paved Width (m)	Total Paved Area (sq.m)	63 runs at 25g/sq.m Stock (tonnes)	18 runs at 25g/sq.m Stock (tonnes)
CARLOW	54,334	9	468,530	738	211
CAVAN	122,887	8	1,018,876	1,605	458
CLARE	181,785	7	1,320,556	2,080	594
CORK	397,392	12	4,640,878	7,309	2,088
CORKCC	18,026	16	280,134	441	126
DCC	5,600	26	143,451	226	65
DLR	15,294	17	265,396	418	119
DONEGAL	303,279	9	2,850,812	4,490	1,283
FINGAL	1,200	19	22,276	35	10
GALWAY	310,812	10	3,256,385	5,129	1,465
GALWAYCC	19,266	14	265,286	418	119
KERRY	415,629	8	3,472,529	5,469	1,563
KILDARE	16,920	14	233,928	368	105
KILKENNY	104,868	11	1,158,572	1,825	521
LAOIS	101,255	9	894,161	1,408	402
LEITRIM	48,700	11	548,340	864	247
LIMERICK	153,454	10	1,530,635	2,411	689
LONGFORD	97,952	10	935,892	1,474	421
LOUTH	49,064	9	457,289	720	206
MAYO	398,765	8	3,306,451	5,208	1,488
MEATH	103,400	10	1,015,549	1,599	457
MONAGHAN	91,535	10	901,129	1,419	406
OFFALY	101,302	10	1,035,549	1,631	466
ROSCOMMON	225,046	9	2,098,585	3,305	944
SLIGO	142,918	9	1,269,985	2,000	571
STHDUB	12,900	13	167,781	264	76
TIPPERARY	209,823	8	1,634,425	2,574	735
WATERFORD	95,290	10	932,148	1,468	419
WESTMEATH	100,793	9	918,356	1,446	413
WEXFORD	109,306	11	1,185,675	1,867	534
WICKLOW	39,299	8	311,213	490	140
Totals	4,048,095		38,540,773	60,702	17,343



Winter Service Requirements



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Performance Levels

- Requirements are no longer guidelines.
- Standard is mandatory.
- Performance levels are mandatory.



Winter Service Plan Template

Winter Service Manual and Plan Template.

- a. **New TII Standard.**
- b. New Winter Service Plan Template.

General Requirements

- Outlines the scope of the services provided.
- Responsibilities for provision of those services.
- Details the extent of the national road network on which the service is provided.



Sample Winter Service Plan

[INSERT TII Ref. No.]

Winter Service Plan
Template

Local Authority Logo &
Technical Advisor Logo

Date: xx/xx/20xx



Winter Service Plan Template



Winter Service Manual and Plan Template.

- a. [New TII Standard.](#)
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Policy

- Shall ensure that total width of carriageways on the national road network within administrative area are kept free of frost, ice and snow as far as is reasonably practicable.
- Shall prevent frost, ice or snow forming on or bonding with the pavement surface using precautionary (anti-icing) treatments.
- In the event of failing to prevent ice or snow forming on or bonding to the pavement surface, reactionary (de-icing) treatments shall be undertaken.



Winter Service Plan Template



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Performance Levels

- Discussed previously in presentation.



Winter Service Plan Template



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- a. [New TII Standard.](#)
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Winter Service

Weather	Definition
Heavy Snow	More than 4cm per hour of snow for at least 2 hours
Blizzards/drifting snow	a. Moderate or heavy snow combined with winds of 50kph or more with visibility reduced to 200 metres or less or: - b. Drifting snow giving rise to similar conditions
Very heavy snowfall, blizzards or drifting snow	Expected to give depths of 15cm or more potentially resulting in widespread dislocation of communications. Blizzards are severe when visibility is reduced to near zero.
Freezing rain or fog / widespread icy roads	Any atmospheric condition or state which gives rise to the accretion of ice on road surfaces
Heavy rain	Expected to persist for at least 2 hours and to give more than 6mm of rain per hour
Strong Gales	Repeated gusts of 110kph or more over inland areas, with a risk to high-sided vehicles being blown over.
Storms	Repeated gusts of 130kph or more over inland areas, which could cause cars to be blown out of their lane on the carriageway.
Fog	The official definition of fog is visibility of less than 1000 metres. Whereas for a motorist; visibility of less than 200 metres is more realistic. Severe disruption to transport occurs when the visibility falls below 50 metres.

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- a. [New TII Standard.](#)
- b. [New Winter Service Plan Template.](#)

Treatment Methods

Treatment type	Details
Dry Treatment	De-icer, most commonly sodium chloride salt, is spread in a dry form. Traditionally, this has been the main method utilised in the UK and Ireland for many years and this is still the method currently utilised by the majority of Local Authorities.
Pre-wetted Treatment	Granular de-icer, most commonly sodium chloride salt, is mixed with a brine solution at the point of spreading. A treatment additive may be included in either or both of the brine and dry components. Pre-wetted treatment is a development that is now in relatively wide use across the UK and Ireland. In certain situations and conditions, it can offer benefits over dry treatments, including reduced spread rates.
Treated Salting	Sodium chloride salt in granular form is mixed with a treatment additive. Commonly, the treatment additive comprises an Agricultural By-Product (ABP), either used alone or mixed with other chemicals. Treated salting is also a development that is now in wide use across the UK. Again, in certain situations and conditions, it can offer benefits over dry treatments, including reduced spread rates.
Direct Liquid Application (DLA)	Liquid de-icer is applied directly to the road surface, usually by spraying. This method has been used for many years in the UK to treat short sections of the network, such as certain bridge decks, that are particularly susceptible to infrastructure damage through corrosion. DLA on larger sections of the network is much less common practice in Ireland than the other treatment types discussed above. However, this technique is currently the subject of research and a number of on-going trials.

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Decision Matrix

		Predicted Road Conditions		
		Wet	Damp	Dry
Road Surface Temperature	Precipitation etc			
May fall below 1°C	<u>No</u> rain <u>No</u> hoar frost <u>No</u> fog <u>No</u> rain <u>No</u> hoar frost <u>No</u> fog	Salt before frost	Salt before frost (see note A)	No action likely, monitor weather (see note A)
	<u>Expected</u> hoar frost <u>Expected</u> frost		Salt before frost (see note B)	
Expected to fall below 1°C	<u>Expected</u> rain BEFORE freezing	Salt after rain stops (see note C)		
	<u>Expected</u> rain DURING freezing	Salt before frost and after rain stops (see note D)		
	<u>Possible</u> rain <u>Possible</u> hoar frost <u>Possible</u> fog	Salt before frost		Monitor weather conditions
Expected snow		Salt before snow fall		
Freezing Rain	Before rain	Salt before rainfall (see note D)		
	During rain	Salt during rainfall (see note D)		
	After rain	Salt after rainfall (see note D)		

The decision to undertake Precautionary Treatments shall, if appropriate, be adjusted to take account of surface moisture. *[Local Authority]* shall plan and mobilise precautionary treatments so as to complete the treatment as close to the forecasted time of freezing as possible.
All decisions shall be evidence based, recorded and require careful monitoring and review.

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Spread Rates – Dry Salting, Treated, Pre-Wet, Brine

Target Spread Rates – Dry Salting (g/m ²) Treatment Matrix				
Road Surface Temperature (RST) when frost/ice is predicted	Spreader Capability			
	Fair		Good	
	Dry/Damp Road	Wet Road	Dry/Damp Road	Wet Road
At or above -1.0°C	8	8	8	8
-1.1°C to -2.0°C	8	11	8	8
-2.1°C to -3.0°C	9	17	8	13
-3.1°C to -4.0°C	12	23	9	17
-4.1°C to -5.0°C	14	28	11	21
-5.1°C to -7.0°C	20	39	15	30
-7.1°C to -10.0°C	27	54	20	40
-10.1°C to -15.0°C	38	75	28	56

Target Spread Rates – Pre-Wetted Salting (g/m ²) Treatment Matrix				
Road Surface Temperature (RST) when frost/ice is predicted	Spreader Capability			
	Fair		Good	
	Dry/Damp Road	Wet Road	Dry/Damp Road	Wet Road
At or above -1.0°C	8	8	8	8
-1.1°C to -2.0°C	8	10	8	8
-2.1°C to -3.0°C	8	16	8	12
-3.1°C to -4.0°C	11	21	9	17
-4.1°C to -5.0°C	14	27	11	21
-5.1°C to -7.0°C	19	37	15	30
-7.1°C to -10.0°C	27	53	21	42
-10.1°C to -15.0°C	n/a	n/a	n/a	n/a

Target Spread Rates – Treated Salting (g/m ²) Treatment Matrix				
Road Surface Temperature (RST) when frost/ice is predicted	Spreader Capability			
	Fair		Good	
	Dry/Damp Road	Wet Road	Dry/Damp Road	Wet Road
At or above -1.0°C	7	7	7	7
-1.1°C to -2.0°C	7	8	7	7
-2.1°C to -3.0°C	7	12	7	10
-3.1°C to -4.0°C	9	17	7	13
-4.1°C to -5.0°C	11	21	8	16
-5.1°C to -7.0°C	15	29	11	22
-7.1°C to -10.0°C	20	40	16	31
-10.1°C to -15.0°C	26	55	22	43

Brine spread rates for frost events		
Road Surface Temperature (RST) when frost/ice is predicted	Target Spread Rates – Brine Spreading (ml/m ²)	
	Dry/Damp Road	Wet Road
At or above -2.0°C	10	20
-2.1°C to -5°C	20	30
-5.1°C to -7.0°C	30	N/A

Key notes:

- Spread rates are for road surface wetness up to 0.1mm thick, i.e. a road on which traffic produces fine spray.
- Roads can remain wet after rain for significant periods (2-3 hours) before effective brine treatments are possible.
- Brine concentration must be monitored and kept within acceptable agreed ranges (typically 20-23% but saturator technology may enable tighter tolerances)
- All brine spreaders must be calibrated; this includes monitoring the discharge rate and carrying out a visual check of the distribution.

Requirements for Treating Footpaths

- Based on recent feedback from counties, treatment requirements and performance levels will be reviewed and changed.

Vaisala RoadDSS Manager

- MX Horison – Vaisala working on an upgrade to the RoadDSS Manager system that will introduce significant changes.