FB Unit
Winter Service Plan
1st October 2018 – 15th May 2019

Controlled Copy No .....

Revision History

This plan shall be reviewed at a minimum of 12 monthly intervals and updated as appropriate. The reviews, including no changes, are noted in the following table.

Revision	Date	Amendment	Content Owner	Authorised By
00	July 2018	Draft Winter Plan	Redacted	Redacted
01	Nov 2018	PAG and TS Comments added	Redacted	Redacted
02	Dec 2018	Further PAG and TS Comments added	Redacted	Redacted

1 Contents

REGISTER OF CONTROLLED COPIES

Ref	Name of Holder	Designation	Organisation
Hard Copy			
1	Redacted	Operating Company Representative	Amey
2	Redacted	Winter Service Manager	Amey
3	Redacted	Operations Manager – South Queensferry	Amey
4	Redacted	Operations Manager - Bilston Glen	Amey
5	Redacted	Operations Manager - Burghmuir	Amey
6	Redacted	Operations Manager - Bargeddie	Amey
7	OCCR	Control Room	Amey
8		Network Manager	Transport Scotland
9			Police Scotland
10			Traffic Scotland
CD Copy			
1	Redacted	Winter Service Manager	Amey - M8DBFO
2	Redacted	Winter Service Manager	Amey – South East
3	Redacted	Winter Service Manager	BEAR - North East Unit
4	Head of Roads		Edinburgh City Council
5	Head of Roads		West Lothian Council
6	Head of Roads		Fife Council
7	Inspector, Operations	Force Control Room	Police Scotland
8	Redacted	Technical Manager	PAG
9	Redacted	Network Impacts Manager	Transport Scotland
10	Redacted	Networks Resilience Manager	Transport Scotland
11			Police Scotland
12			Traffic Scotland

1.INTRODUCTION AND POLICY

1. The Network consists of the A823 (M) from M90 J2 to Pitreavie and A90/M90 from M9 J1A to J3 Halbeath, including Queensferry Crossing and A90 Scotstoun to Dalmeny and A9000 Forth Road Bridge Trunk Roads.

2. Winter Service Operations shall allow the safe movement of all road users throughout the Network and minimise disruption to users arising from adverse winter weather (ice and snow). The incidence and severity of winter conditions vary throughout the season and from year to year and hence the deployed resource requirements fluctuate accordingly.

3. Amey will deliver a level of Winter Service to deal with the winter conditions normally associated with Central Scotland and with the facility to provide additional resources as required to deal effectively with all winter weather conditions which can be expected to arise. The requirements of Amey are provided in Part 2 of Schedule 7.

4. Amey shall provide sufficient resources to ensure that all measures are taken to keep the roads within the contract open to its users at all times and shall prevent snow or ice from remaining on Network in accordance with the requirements of Schedule 7 Part 2.

5. Amey has previous experience of successfully managing both Trunk Road and Local Authority Winter Service Operations within the UK, including over 12 years in South West Trunk Roads and North Lanarkshire and South East Trunk Roads in the 2nd Generation Contract. This valuable experience has assisted in shaping this strategy, which details how the Scottish Ministers' Winter Service requirements will be achieved.

6. This Winter Service Plan is of key strategic importance to the successful operation of the Project and its importance will be reflected in the Plan's ownership by our Operations Manager. While our Operating Company Representative has the overall responsibility for the successful delivery of the Plan he will be assisted in all respects by the Operations Manager (Winter Service Manager) being available to support as required by the prevailing or predicted conditions.

2 MANAGEMENT ARRANGEMENTS

1 Winter Service Manager

1. Name

The Operating Company Representative has the ultimate responsibility for management and delivery of the winter service. He will be assisted by the nominated Winter Service Manager (Redacted) who has the delegated responsibility for all aspects of winter service provision.

2. Qualifications

Redacted is an experienced member of our team who has attended training courses in road meteorology and is a member of the Northern User Group for Vaisala. He is also conversant with The Code of Practice for Winter Maintenance and has a good working knowledge and understanding of both winter maintenance fleet and ice prediction technology.

3. Experience

The WSM has the relevant experience required to fulfil the duties of this post and ensure compliance with the requirements of the Project. He has done Winter Service decision making since 1995 and had been the Winter Service Manager for the south west unit from 2006 to 2013 and has been the winter service manager for the Forth Bridges unit since 2015.

4. Responsibilities

The WSM has delegated and overall responsibility for the provision of the winter service and ensuring compliance with the Project for the following activities:

- Ice prediction and weather forecasting service, including sensor calibration
- Collection and management of weather data
- Winter service decision making
- Plant and communications
- De-icing material stock levels and storage
- Staff and Operative training and rosters
- Inspection and maintenance of winter hardware
- Maintaining records
- Liaison with third parties
- Implementing additional resources where required
- Communicating with Transport Scotland during severe events
- Preparing reports and participating in weekly conference calls with Transport Scotland
- Reporting salt stock levels, as required
- Achieving contractual response times
- Identification and provision of Mutual Aid subject to approval from the Director

The WSM is the owner of the Winter Service Plan (WSP), being responsible for revisions to this plan at least once annually and whenever considered necessary during the Winter Service Season. The WSM is

responsible for submitting the WSP to the Scottish Ministers for written consent no later than 31 July each year.

The WSM is also responsible for the preparation and submission of the Winter Service Annual Report prior to 31 May each year and will attend the subsequent winter service annual review meeting with the Scottish Ministers.

1. Winter Service Duty Officers

1. Names

Redacted, Redacted, Redacted, Redacted, Redacted, Redacted, Redacted, Redacted and Redacted, will undertake the role of Winter Service Duty Officer on a rota basis, being responsible for daily decision making on planned actions.

2. Qualifications

All WSDO's have undertaken suitable training in relation to winter service decision making and weather forecast interpretation, including subjects such as road meteorology and winter service computer systems and software. Refresher training on road meteorology will be undertaken at periods not exceeding three years. These will be Basic Weather Training and Scenario Training.

3. Experience

WSDO's each have previous experience ensuring competent and consistent winter service decision making and the use of both weather forecast information and the computerised road weather information system. Our OCCR staff will also have the basic weather training and will be able to monitor the weather in the control room screens.

4. Responsibilities

The WSDO is authorised by Amey and is responsible for taking decisions, issuing instructions and implementing and directing the Winter Service at all times. If the WSDO is uncertain of conditions and what action to take he should discuss with the Winter Service Manager.

Duty WSDO's will operate on a roster basis. This ensures that two WSDO's are rostered for every week throughout the Winter Service Season. The WSDO will maintain and update winter records including:

- Planned and actual:
  1. Treatment records
  2. Response times
  3. Commencement times
  4. Route times
  5. Spread rates
- Observations and actions taken by the Winter Service Patrols
- Output from Constructional Plant on-board data capture devices

- Constructional Plant down time and software faults
- Constructional Plant deployment records (including Global Positioning System records) and driver/operator logs
- Logs of telephone, electronic mail and two-way communication calls
- Ice prediction system records
- Weather forecasts and actual weather experienced
- Complaints by members of the public and road users
- Accidents resulting from winter conditions
- Road closures due to winter conditions

During the winter period, a Winter Service Control Room, at South Queensferry, will be staffed during Winter Service Operations. With our ability to network fully all communications and to remotely access the Computerised Road Weather Information System (CRWIS), the Control Room can be established at any location and transferred seamlessly at changes in the duty roster.

The WSDO shall be on duty in the control room whenever Winter Service Operations are planned, constantly monitoring weather and road conditions via the CRWIS, Weather Radar and Thermal Maps. The WSDO is able to receive information from and communicate instructions to patrol drivers on a regular basis.

At changes in shift, the outgoing and incoming WSDO will handover and exchange information including:

- 24 hour action plan
- current weather and road conditions including trends
- updates from the Expert Weather Forecasting Service (MetDesk)

The WSDO will be supported by the WSM. The criteria which will determine this support will include guidance and decision-making support during:

- marginal conditions
- periods when low confidence forecasts are issued
- severe weather conditions such as prolonged snow, high winds or freezing rain.

In prolonged periods of severe conditions, the WSM can instruct additional resources to be deployed within the Control Room to deal with the increased monitoring requirement and higher level of ingoing and outgoing communications.

1. Monitoring Arrangements

1. Monitoring arrangements

The duty WSDO will be responsible for monitoring weather forecasts and actual weather conditions throughout the period. There will be an experienced Duty Operations Manager available 24/7. The OCCR will have the Vaisala system showing on a big screen during the Winter Period and alerts set so if any thresholds are broken they will be notified.

2.4 Personnel Resources

Names of staff and labour resources

Winter Service Manager: Redacted

Winter Service Duty Officers: Redacted, Redacted, Redacted, Redacted, Redacted, Redacted, Redacted, Redacted and Redacted.

Duty Operations Managers: Redacted, Redacted, Redacted, Redacted, Redacted and Redacted.

All winter staff are suitably qualified and experienced to competently undertake the respective duties associated with their role.

The DOM on duty will be directly responsible for the co-ordination of winter service operatives and constructional plant to deliver the requirements of the daily winter service action plan.

Prior to the beginning of each winter season, the DOM's will prepare a roster assigning sufficient numbers of trained drivers for each precautionary treatment and patrol route. This roster ensures that on a week to week basis, drivers remain on a shift pattern to respond to treatment or patrol instructions.

A minimum of three trained and experienced operatives will be employed for each precautionary treatment route, to provide around the clock coverage without compromising Drivers Hours Regulations.

Name	Depot	Designation	Training
Redacted	Queensferry	Operative	Winter Maintenance City & Guilds
Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above
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Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above
Redacted	Queensferry	Operative	As above

Table 2.1 Spreader Driver Details.

Additionally, every driver will have a basic knowledge of each precautionary treatment route and will be capable of undertaking treatment on that route if necessary.

In the event of severe weather being forecast in the 5-day advance forecast, additional operatives will be put on standby or shift to ensure adequate resources are available to deal with snow conditions.

During the winter period, detailed rosters will be prepared detailing all staff referred to in 2.4 of this Winter Service Plan. On a weekly basis during the winter period a specific Roster detailing personnel, contact details and specific duty details will be issued to all key staff. This will be distributed electronically and updated on a shared server area each week to ensure key details are constantly kept up to date.

A separate Rota will be drawn up to cover any anticipated attendance at the Multi Agency Response Team (MART) with participants utilised, dependant on Transport Scotland's requirements.

2.5 Call out arrangements

Call out arrangements

The WSDO will implement call out procedures by issuing the daily action plan for winter service operations. Outside this the WSDO will mobilise resources to undertake and complete the required treatment.

Contact arrangements

The WSDO will contact the drivers by mobile telephone to instigate any required action.

Mobilisation times

To ensure that the requirement to mobilise and commence unplanned treatment on route within one hour of a call out is achieved, a shift system will operate. Operatives on shift will be based in Depots, facilitating an immediate response to call outs.

Where the 5-day forecast indicates that severe weather is anticipated, additional operatives may be put onto a shift system.

2.6 Communications Equipment

2.6.1 All winter maintenance vehicles will be fitted with 'hands free' mobile telephones and an integrated satellite tracking and data recording system. All drivers will be trained in the effective use of the system. Any faults in the system of communication will be reported immediately to the WSDO for his action. We will have maintenance support through service level agreements with our Internal Fleet Service and relevant manufacturers to repair or replace communications equipment. The following means of communication will be available throughout the winter period:
Telecommunications – landline, mobile GSM phone, fax and Airwave radio
Exactrack web-based GPS tracking showing vehicle location
Email with a dedicated winter email address
Websites and social media utilising both Traffic Scotland and Forth specific
Variable Message signs – via Traffic Scotland
Hidden Message signs

2.6.2 Winter Service Patrol vehicles shall use an encrypted digital radio communications system, "Airwave". Amey will utilise this equipment as a dedicated communication system between Winter Service Patrol drivers, the Traffic Scotland Control Centre, the Winter Service Duty Officer and the Police.

2.7 Training for Managers and Other Staff

Details of previous training

The proposed Winter Service Manager, WSDO's will have attended training courses covering basic road meteorology and the interpretation of weather forecasts. All operatives performing Front Line and Reserve Winter Service operations will hold an appropriate Class C LGV driving license and be trained and experienced in winter maintenance operations.

Details of proposed training

The Winter Service Manager, WSDO's, will attend and be certified on refresher courses provided by The MetDesk and Vaisala at no more than 4 year intervals. An annual pre-winter internal briefing session will also be held in September.

All operatives performing Front Line and Reserve Winter Service operations will be trained and assessed to meet the requirements of the Winter Maintenance City & Guilds Qualification.

Our WSDO's will assign the resource for Winter Service operations in our Capacity Planner (SAP Planning Board) giving it the highest priority to ensure operative availability for frontline and reserve duties. We will generate a roster that ensures of a base resource at all times, for inclusion in the WSP.

Our WSM will ensure operative familiarisation with the Winter Service routes and plant prior to 1st October each year, recording this in our Management System.

2.8 Winter Service Exercise

Prior to 1st November of each winter service period, Amey will participate in a scenario exercise as provided by the Director, to further enhance the capability of our response to winter conditions.

3.0 WEATHER FORECASTING

3.1 Purpose

The purpose is to provide accurate information for interpretation by our WSDO's enabling them to plan the winter maintenance operations for the following 24-hour period. WSDOs also have 24/7 access to the MetDesk Forecaster for advice or updated information, providing a proactive approach to winter service. Consent has been applied for, for the appointment of Expert Weather forecaster and the CRWIS provided.

3.2 Methodology

Amey will obtain the expert weather forecasting service (EWFS) from the MetDesk who will utilise information from the existing road sensor network, to give detailed forecasts for each climatic domain, using information from Scottish Weather Radar and thermal mapping to inform on existing and anticipated conditions. Weather forecasts will be provided from 1 October to 15 May (inclusive), and will be delivered every day by 1300hrs via the web-based Computerised Road Weather Information System (CRWIS), providing:

2 – 5 day forecast
A general area forecast per day, for the 4 days following the day of issue of the 24hr forecast information.

36 Hour Forecast
Domain specific forecasts, giving a general summary of the weather anticipated. The main features of the forecasts are: -

Readiness colour -

Green	No snow or ice expected
Amber	Risk of snow and/or ice
Red	Snow, ice or drifting snow is expected

Hazards – This section gives detail on the weather conditions such as ice, hoar frost, snow (cms), fog, wind and rain, which give rise to the "readiness colour".

Temperatures – Minimum road surface temperature and time at or below freezing.

This data will be used by our WSDO's that are based within the Control Room during planned winter actions.

<u>Severe Weather Warnings</u>
This service is provided throughout the year. The early warning weather alert provides information regarding heavy snow, high winds and / or heavy rainfall.

<u>24-hour Consultancy Service</u>

This facility is used if there are any doubts about the forecasts or when conditions change significantly. Confirmation of updates will be made by telephone to the WSDO if the forecast has changed significantly. The Forecaster will also be available to the WSDO to discuss any matters of concern or to clarify low confidence forecasts.
The consent of the Scottish Ministers, in writing, will be sought prior to appointing the Expert Weather Forecaster and the Computerised Road Weather Information System provider.

Climatic domains

Given the extent of the Network there will be 2 Climatic Domains listed below with the station that the forecast will be taken from (shown in Fig 1and 2):

Domain Number	Route	Location
1	M90	Halbeath
2	A90	Forth Bridge

Weather radar

The WSDO will have access to a web-based Weather Radar facility provided by the MetDesk, 24 hours a day, seven days a week, throughout the winter season to supplement forecast information. The Radar will help to improve the accuracy of assessing the timing, nature and intensity of precipitation, particularly snowfall.

Ice sensors and weather forecast sites

Ice Sensors located on or close to the Network, as fig 2, will be polled on a regular frequency of 1 hour between 15th May and 1st October; and at 20 minute intervals between 1st October and 15 May inclusive. All data will be collected by the Ice Prediction System's Master Station, accessed by the WSDO via a portable computer. Weather forecast sensors have added functionality to allow the MetDesk to model the temperature characteristics of the road pavement and can be accessed directly by the MetDesk to assist in producing road-specific weather forecasts. The list of these weather stations can be found in Annex WSP 6.

Thermal mapping

Thermal maps comprise digitised thermal fingerprints graphically representing variations in road surface temperatures along a route. By combining thermal map and forecast data, route maps can be produced indicating forecast minimum road surface temperatures along each route.

Digitised thermal mapping provides another useful tool for staff to supplement forecast data and local knowledge thereby aiding the decision-making process regarding winter maintenance action. The maps can also be used to select suitable locations for additional outstations.

For effective use of thermal mapping, the digital map coverage of the Network must be maintained in a complete and up to date state. Where considered appropriate, recommendations on updating of thermal mapping will be made to the Scottish Ministers.

Location plans

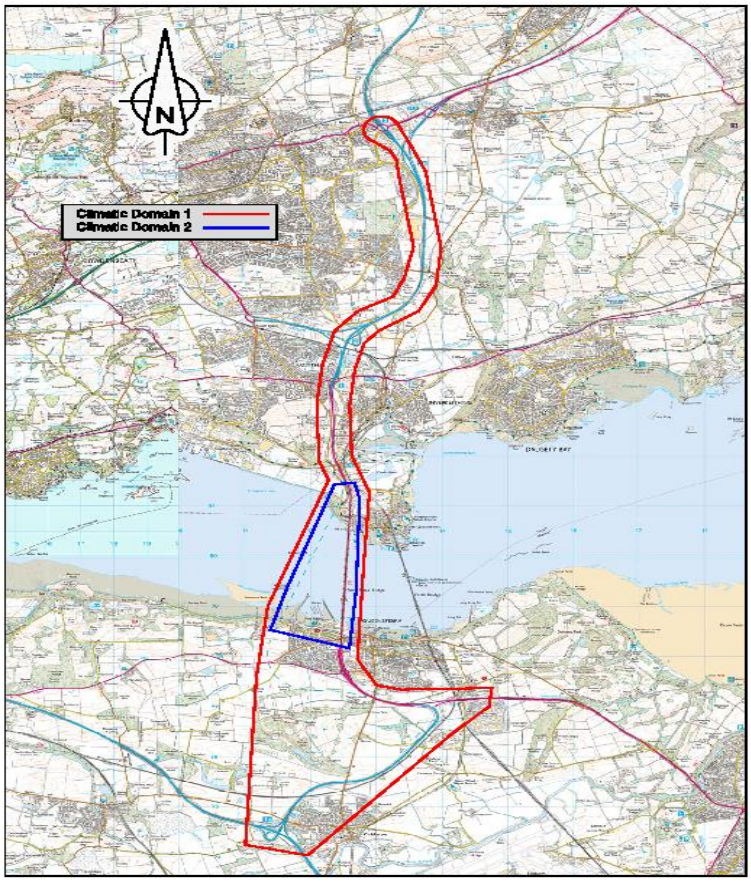

Fig 1. Proposed Climatic Domains.

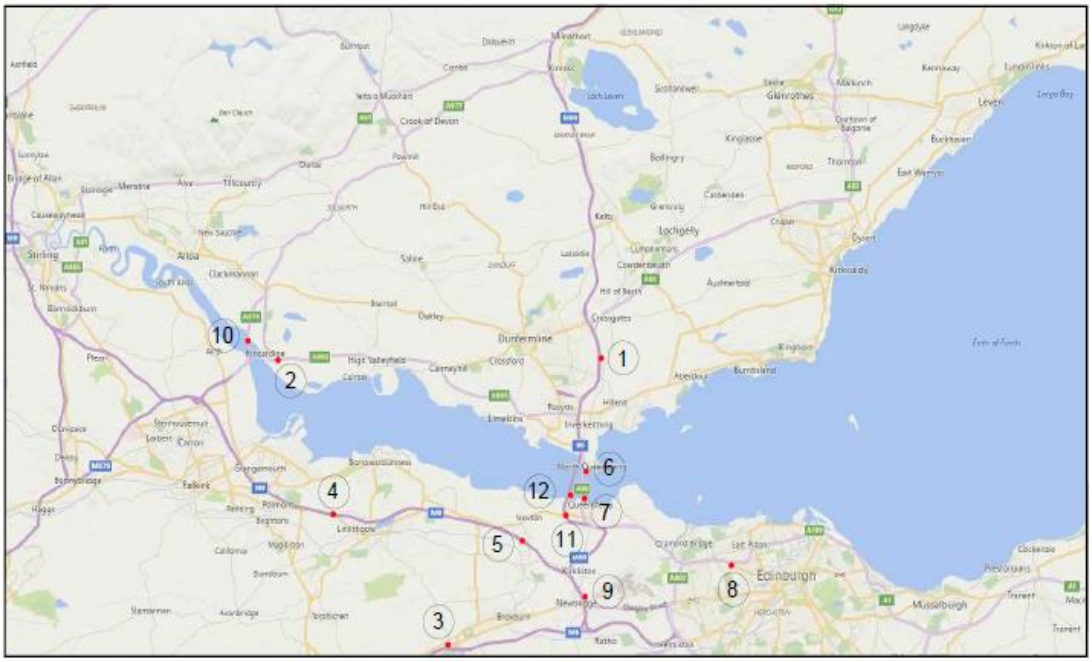

Fig 2. Sensor Location

3.3 Computer Systems

The computerised road weather information system (CRWIS) will be provided by Vaisala. It will obtain, interpret and display the following, in a manner that predicts trends in weather and road conditions:

Road sensor data (forecast & actual)
Thermal maps
Weather data from the MetDesk
Weather Camera images
Frontline Winter Service Plant sensor data (air, RST and spread rates)
A built in audible alert system for the duty staff
An automatic alert has been incorporated, which activates when a road sensor falls to +1 degree centigrade. This alert will be monitored by the WSDO.

The weather stations on the Forth Road Bridge unit incorporate an automatic alert that activates when the sensor falls below +1 degree centigrade. This will also be the case for the new stations on the Queensferry crossing and approach roads. This alert will be monitored by the WSDO to allow early identification on the formation of ice on either structure (Refer to Section 22). In the event of ice formations forming on the structure, these will be monitored by staff under the guidance of the

WSDO to ensure that any shedding ice risk is understood and that where reasonably practical the formations can either be removed or restrictions imposed to mitigate falling risks to the public.

In the event of power failure in the Control Room, non-electrical means of heat and light will be utilised pending the switching on of mobile generators from the depot emergency vehicle. Manual records will be maintained and transferred into electronic records on the restoration of the power supply.

In the event of a communications failure, mobile phones will be used to maintain contact with vehicle drivers, police, Vaisala and the MetDesk. Vaisala will monitor the CRWIS for Amey in this situation.

In the unlikely event that the CRWIS fails for any reason then the WSDO will contact the 24 hour CRWIS helpdesk and / or the MetDesk 24-hour consultancy service for assistance, until the system is restored.

4 MONITORING ARRANGEMENTS FOR AREAS REQUIRING SPECIAL ATTENTION

The Forth Bridge unit has one known area requiring special attention on the Network, which is listed below, where:

- frost is prone to occur,
- a significant build-up of snow has the potential to happen
- extreme low temperatures could occur

In addition to the Winter Service Patrols detailed in Section 8 of this document, the WSDO has the authority to instruct the mobilisation of any front-line winter constructional plant to patrol any part of the Network at any time. This action may be necessary to enable the WSDO to receive accurate real time visual information such as road surface state observations, surface water run-off and precipitation type/intensity. This information, combined with data within the CRWIS and Weather Radar allows the WSDO to monitor affected areas along with other areas on the Network and to make appropriate treatment planning decisions.

AREAS REQUIRING SPECIAL ATTENTION SCHEDULE	
Reference Number: ARSA/FB – M90	
Location	A9000 Forth Road Bridge
Grid Reference	312462,678185 to 312605,681143
Problem	2.5 Km of the carriageway over the Forth Road Bridge where traffic flows have substantially reduced due to the change in use of the bridge as becoming part of the Public Transport Corridor.
Has this site experienced problems before or is it an identified risk?	The site has experienced extreme low temperatures and high snow build up that has created, not only a risk to the few vehicles that use the bridge, but also the bridge itself, due to the weight of snow building up on the structure.
Detailed Mitigation Measures	
	Significant Snow fall
Optional Mitigation Primary Measure	To close the Forth Road Bridge to all traffic when either the road surface temperature gets below the threshold level, or that the snow build up has exceeded the threshold level. This would stay in place until the weather event had passed or that temperatures were high enough to ensure that frost and Ice would not be present.
When enacted	When the North-West Weather station has identified that the surface temperature has gone down below -10 deg C, or that there is lying snow present on the carriageway.
Who enacts	Winter Service Duty Officer
Who will manage the response	Winter Service Duty Officer supported by Depot Duty Supervisor

Are diversion routes to be used?	Diversion route would be on to Queensferry Crossing for motorway legal traffic and to local authority routes, for non-motorway traffic, and would be dependent on the condition at that time.
Use of VMS	Notification of the Closure will be made using VMS at the following locations (subject to availability): M9 westbound at Newbridge M9 Eastbound from Junction 4 M90 northbound from junction 1A M90 southbound from junction 5
Other measures put in place	Any available plough resource would be requested to remove any snow to avoid weight build up on the structure.
Assistance from OC resources	The use of additional plant, from Rosyth depot, would be examined, as a reactionary measure, to assist in the clearance of snow.
Assistance from additional Transport Scotland resources	Assistance from Transport Scotland Communications to put message out to media.
Assistance from External Sources	Assistance from Police to close road.

5.0 DECISION MAKING

5.1 Role of the Winter Service Manager

The role of the WSM is strategic, and he has ultimate responsibility for the provision of the Winter Service. The Winter Service Duty Officer is delegated the responsibility of producing the daily winter maintenance action plan in conjunction with the treatment matrices shown in Appendix A. The WSDO then informs the WSM of the proposals. Where possible the proposal on the rates of spread of de-icing material, the time of commencement of the routes and the routes to be covered will be made by the WSDO before 14:00 hours. The Winter Service Manager will be available at all times to enable the WSDO to seek advice regarding any aspect of the Winter Service.

Full use will be made of the MetDesk and CRWIS to determine the optimum time to commence precautionary treatments, to ensure that these are completed within two hours of commencement and in advance of sub-zero road surface temperatures.

Within the CRWIS there is access to 5 weather stations on the Forth Road bridge network and 6 weather sites surrounding the Forth Bridges Unit. Use can also be made of the mobile weather station which is fixed to a patrol gritter, together with all the mobile sensors on the front line vehicles. The weather stations on the Forth Road Bridge and Queensferry crossing will be closely monitored in cognisance of the fact that the elevated and exposed bridge deck temperatures can be lower than adjoining roads.

5.2 Role of the Winter Service Duty Officer

The WSDO will have at his disposal robust procedures, detailed weather forecast information, actual road condition information including information from mobile surface temperature sensors and a communication system to the Winter Service Patrols and operations teams across the Network.

Following receipt of the daily Winter Service action plan, the WSDO will contact all Winter Service drivers informing each of the decision and timing of any treatment in the forthcoming 24hr period. They will also upload the Daily Action Plan to the CMS.

5.2.1 Winter Service Patrol Mobilisation.

Amey will carry out Winter Service Patrols from 1 November to 31 March inclusive on those sections of Trunk Roads identified in Schedule 7 Part 2, annex 7.2/C of the Project. These patrols can be extended at the instruction of Transport Scotland, should hazardous conditions be forecast.

5.2.2 Proposals for Precautionary and Additional De-icing Treatments when Low Confidence Forecasts shall be issued for Variable Road and Weather Conditions

The minimum requirements for de-icing material spread rates for precautionary treatment shall be as provided in Tables 1, 2 and 3 of Appendix A.

When low confidence weather forecasts are issued by the MetDesk, and during marginal conditions, the WSDO's will monitor conditions using the CRWIS. Amey's decision making process accounts for low confidence forecasts received and the WSDO will follow this process when considering the original and updated forecasts.

During marginal conditions the WSDO will always take a conservative approach. It is essential that during these periods the WSDO receives reports and information from the Winter Service Patrols. The WSDO shall instruct patrols to monitor conditions and, if necessary, initiate immediate precautionary treatments in accordance with the proposed de-icing material spread rates detailed in Table 2 of Appendix A.

Any high risk areas will be monitored closely by the Winter Patrols and all decisions to grit will take these areas into account and decide treatment based on the worst locations. This will allow roads to remain as safe as possible on marginal nights.

Patrol drivers will call the WSDO during his patrol to report the conditions of the high-risk areas.

5.2.3 Proposals for Monitoring the Effectiveness of De-icing Materials

Following any precautionary treatment, the WSDO will continue to monitor the weather forecasts and the actual weather conditions including but not limited to reports from Winter Service Patrols and data from the CRWIS. This information will be used to assess the effectiveness of the treatment and to instruct further treatment when considered necessary; in consideration of forecast conditions.

This is particularly important in situations where precipitation is forecast or has occurred resulting in a potential dilution of the amount of salt present and inherent reduction in the effectiveness of the treatment.

The presence and concentration of salt solution can be detected by Forecast and Road Sensors and displayed within the CRWIS as 'Actual Freezing Temperature'. Actual Freezing Temperature is the theoretical Road Surface Temperature at which ice will form and the salt solution will cease to be effective. The detection of residual salt through the CRWIS, however, depends upon the salt being in solution.

Where there is any doubt as to the on-going effectiveness of any treatment undertaken, due to either dilution of salt from precipitation, or uncertainty of residual salt levels, the WSDO will err on the side of caution and will instruct further action to be undertaken. Amey has also fitted 2 mobile weather stations to patrol vehicles within the Forth unit which will allow us to monitor the conditions within that unit and if required these vehicles will be redeployed to other areas, if they are experiencing poorer conditions.

In extreme conditions when sodium chloride becomes less effective, Amey will consider the use of alternative de-icing materials, either pure or blended, in accordance and in compliance with the table below, which has been compiled

from the UK Roads Board publication *Treatments for Extreme Cold* and *Guidance on the use in Scotland of five alternative De-Icers to Salt suitable for use in lower temperatures*, which will be drawn from stock held at Rosyth Depot.

Temperature (Road Surface Temperature)	Conventional Treatment Salt / Sodium Chloride Brine	Alternative Treatment Salt / Alternative Pre-Wetter*
RST down to -7°C	Standard treatment	Reduced spread rate possible
RST between -7°C and down to -10 °C	Increased spread rate	Reduced spread rate possible
RST between -10°C and down to -12°C	Not effective	Standard treatment
RST below -12°C	Not effective	Increased spread rate
*Alternative Pre-Wetter;- Mag Chloride Brine Sodium Chloride Brine / ABP blend Sodium Chloride Brine / ABP / Mag or Calcium Chloride Brine blend		

5.2.4 Road Closure Operational Procedures

Any decision to close a road will be taken by the Police.

When the Police, in consultation with the WSDO, consider that weather conditions have made a road unsafe to vehicular traffic, arrangements will be made with the police to close the road. The WSDO will liaise with the WSM during such actions.

Having decided on the need to close a road, or section of road (including either the Forth Road Bridge or Queensferry Crossing), the Police will issue instructions to the Operating Company to close the road. Amey will liaise and co-operate with the Police to man each end of the closed section of road, if applicable, until a search of the section of road affected has been undertaken to ensure no vehicles or pedestrians are trapped within the length of the closure. The WSDO will closely monitor the situation from the Control Room using the CCTV systems. Regular contact between the WSDO and frontline staff will be maintained throughout to enable regular updates to be provided to Traffic Scotland Control Centre.

When a road is required to be closed, or other major problems encountered within the Network due to winter weather conditions; the WSDO will immediately inform The Winter Service Manager and Traffic Scotland Control Centre by telephone. A written report will be submitted to the Scottish Ministers within 12 hours (or if outside working hours then the morning of the next working day) of the Police instructing road closure.

The Police will normally notify the other Emergency Services of any road closures and in liaison with Traffic Scotland will arrange for the provision of advance warning signs and/or activate variable message signs or arrange media coverage where appropriate. Traffic Scotland control room and Forth Bridge control rooms will be updated with all relevant information regarding the closures.

The WSDO will also notify the local Roads Authorities of any relevant road closures.

Once it has been ascertained that no-one has been trapped within the closure length, the closure will be secured and as long as it is considered safe to do so (5.2.6), snow clearance will be progressed as rapidly as possible.

The WSDO will liaise with the Police on the progress of snow clearing and when considered safe, the Police will request the road to be re-opened. The re-opening of the road will involve removal of any advance warning signs and the WSDO liaising with the Traffic Scotland Control Centre to update any variable message signs and arrange for media notification where appropriate. This will be done in as timeous a manner as is reasonably possible to allow traffic to access the road.

The WSDO shall immediately inform Traffic Scotland Control Centre and the Scottish Ministers of the reopening of the road and the Local Roads Authorities.

5.2.5 Activation of Snow and Ice and Hidden Message Signs

There are currently no hidden message signs within the Forth Bridge unit but this will be kept under review

5.2.6 Processes and Procedures for Deciding when it is Unsafe to Continue with, or Commencing Clearing Operations

If in exceptionally severe conditions, such as blizzards resulting in reduced visibility and deep drifting snow and the Winter Service Manager decides that it is unsafe for operational personnel to clear snow or ice, operations will be suspended until conditions improve. Such instances are likely to be extremely rare and the Winter Service Manager will liaise with the police, the Director, the expert weather forecaster and Traffic Scotland prior to making such a decision.

Notification of roads closed as a result of being unsafe to continue clearing operations will be notified as 5.2.4 above.

5.2.7 Manual for the Management of the Risk of Unplanned Disruption

The Winter Service Plan is a controlled item of the Quality Plan and forms part of the O&M Manual. The Winter Service Plan forms part of the Disruption Risk Management Plan and shall be reviewed at no greater than 12 monthly intervals.

6.0 LIAISON

6.1 Scottish Ministers

Effective liaison with the Scottish Ministers prior to, during and after the winter service season is essential to the successful delivery of the service. The Scottish Ministers will be consulted during the preparation, approval and review of the Winter Service Plan on an annual basis. Prior to each winter service season Amey will assist the Scottish Ministers in the preparation and distribution of an annual winter service publicity leaflet.

The Scottish Ministers and PAG will have the capability of remotely accessing electronic winter service records in real time.

Amey will continually review the need for snow fences and shelter belts on the Network and, where it considers that such provisions are necessary; will notify the Scottish Ministers in writing.

Prior to the commencement of the Winter Service Period, the Scottish Ministers will receive one controlled paper copy and one controlled electronic copy of the Winter Service Plan.

6.2 Police

In preparing the Winter Service Plan, Amey will consult with Police Scotland. The Police shall receive, from Amey, one controlled paper copy and one controlled electronic copy of the Winter Service Plan. Police Scotland will be notified, by the WSDO, of all proposed treatments and patrols once known, but not normally later than 14:00 each day.

Amey will liaise closely with the Police to monitor adverse winter weather and travelling conditions. During periods of Severe Weather, the Winter Service Manager and WSDO will work closely with the Police who may supply information to the media regarding travelling conditions on the Network.

Any decision to close a road will always be taken by Police Scotland. Amey will liaise with the Police regarding road closures as detailed in Section 5.2.4 of this document.

6.3 Traffic Scotland Operator

Amey will, prior to the commencement of each winter service season, issue the Traffic Scotland Operator one controlled paper copy and one controlled electronic copy of the Winter Service Plan.

During the Winter Service Period, the Operating Company shall report the known effect of adverse weather and travelling conditions to the Traffic Scotland Operator

Traffic Scotland will be notified by the WSDO of all planned treatments and patrols by 14:00 each day. In addition, should messages be required to be

displayed on electronic warning systems and variable message signs, Traffic Scotland Control Centre will be notified by the WSDO. The WSDO will upload daily planned actions to the TSOIS website.

During periods of severe weather the WSDO will undertake regular reviews, at no less than hourly intervals, of the information published within the severe weather bulletin board, and update this information via the Traffic Scotland Roadwork's diary terminal:

(i) if he is aware of any change in the situation at any location logged on the bulletin board and

(ii) if he is aware of any other locations where severe weather is affecting driving conditions or traffic movements on the Trunk Road network.

6.4 Adjacent Road and Highway Authorities

In preparing the Winter Service Plan, Amey will consult with all adjacent Local Roads Authorities. They will receive, from Amey, one controlled paper copy and one controlled electronic copy of the Winter Service Plan. Adjacent Local Roads Authorities will be notified by the WSDO of all planned treatments and patrols by 14:00 each day.

Winter issues shall also be an item on the agenda at liaison meetings with all adjacent road and highway authorities

Amey will liaise closely with all adjacent Local Roads Authorities to monitor adverse winter weather and travelling conditions

6.5 Adjacent North East & South East Units

A consistent level of service at boundary interfaces with adjacent Trunk Road Operating Companies is essential to allow the safe movement of road users and to minimise delays and disruption caused by snow and ice conditions.

During the annual preparation and review of the Winter Service Plan, Amey will consult with adjacent Trunk Road Operating Companies. They shall receive one controlled paper copy and one controlled electronic copy of the Winter Service Plan. The WSDO will notify adjacent Trunk Road Operating Companies of all proposed treatments and patrols once known, but not normally later than 14:00 each day.

During periods of severe weather, the WSDO will liaise and update the adjacent Trunk Road Operating Companies regarding the current status of the prevailing weather conditions and Amey's winter service operations.

6.6 Network Rail

As there are no railway level crossings, liaison with Network Rail will not be appropriate.

6.7 Communication

We will ensure we communicate with all parties who have an input to the Winter Service. Our WSM will work with our Media and Communications Officer (MCO) to develop our Communication Plan which will be vital for the effective management of Winter Services. The WSP will include contact details for relevant stakeholders and communication arrangements, including those for notification of events such as road closures. Relevant updates on the daily planned actions will be provided through twitter account redacted. Our daily action plan will be submitted to Traffic Scotland and will be available on their website.

7.0 MUTUAL AID

Mutual aid will only be executed by agreement from Transport Scotland. A list of contacts for adjacent Operating Companies and Local Authorities will be held by the WSM to allow offers of mutual aid to be made, subject to the availability of resources. This aid may take the form of providing salt stocks or operated winter service plant. Whenever such a request is received, we will endeavour to make this aid available at the earliest opportunity, without compromising the level of service being provided on the Network.

8.0 WINTER SERVICE PATROLS

From 1 November to 31 March inclusive, when the forecast minimum road surface temperature for the Network is less than or equal to 3°C, or when the forecasts indicate that snow or ice conditions could cause an increased risk of disruption, the WSDO will instruct the relevant Winter Service Patrols covering the routes detailed in Schedule 7 Part 2 Annex 7.2/C. Patrol route cards and maps can be found in Appendices B and C respectively.

Winter Service Patrols will:

- patrol all carriageways of Trunk Roads, excluding slip roads, identified in Annex 7.2 of Schedule 7 Part 2.
- report on road conditions encountered to, and take instruction on treatments from, the Winter Service Duty Officer,
- provide an immediate response when instructed to carry out treatments or other de-icing Operations by the Winter Service Duty Officer,
- deal with any situation on the Winter Service Patrol route requiring immediate attention,
- pay particular attention to Areas Requiring Special Attention identified in Section 4 of the Winter Service Plan.
- undertake short stops for minor maintenance such as clearing grips and removing debris, and
- provide daily reports.

Category A Winter Service Patrols shall operate from 02:00 to 10:00 at two hourly intervals as described in Schedule 7, Part 2. The routes will be designed such that each Winter Service Patrol alternates between a one hour patrol and a one hour standby on each route. All patrol routes shall be completed within one hour of commencement.

The routes shall be further designed so that a patrol vehicle, when working, is able to attend any location on the route within 30 minutes of receiving a call from the Winter Service Duty Officer.

Category A Winter Service patrols shall operate out with the specified times when forecasts indicate an increased risk of delays and disruption to users caused by snow and ice conditions.

Operating periods for Winter Service Patrols shall be between 02:00hrs and 04:00hrs, 04:00hrs and 06:00hrs, 06:00hrs and 08:00hrs and 08:00hrs and 10:00hrs.

A list of all Patrols and their category are listed below

.

Road	Category
M90	A
A9000	A
A90/M90	A
A823 (M)	A

9.0 WINTER SERVICE PLANT AND REPORTING

9.1 Winter Service Plant Provided by Amey for Winter Service Patrols.

Winter Constructional Plant for Winter Service Patrols, as detailed in Annex WSP 1 of Appendix D, will be:

- fully loaded with de-icing material to provide an immediate response to carry out precautionary treatments or other de-icing Operations for carriageways,
- equipped with on board data logging equipment to record actions taken by Winter Service Patrols,
- be fitted with RST probes that link back to the OCCR,
- Vehicles YF63 HVA and YF63 HVB are fitted with a Vaisala DSP310 mobile road condition sensors that feed live information to the WSDO to enable real time monitoring.
- equipped with on board global positioning system, and route guidance will be added to the newer fleet capable of taking it.
- a front line service independent and separate to precautionary treatment resources which will not be diverted to other de-icing operations or emergencies.

9.2 Winter Service Patrol Report

Winter Service Patrols will report on road conditions encountered to, and receive instructions from, the WSDO. Winter Service Patrols will provide daily reports to the WSDO using a Patrol Report Record Form (see appendix B)

9.3 Welfare Kits

Amey will hold welfare kits, which will be carried by each Winter Service vehicle, during times of severe forecasts, and will be distributed in the event of an incident involving stranded vehicles. Each welfare kit shall include 24 space blankets, 24 bottles of water and 24 energy bars.

10 TREATMENT ROUTES

10.1 Precautionary treatment routes, including sections shared with Scottish Minister's Trunk Road North East and South East Units and adjacent road authorities;

The precautionary treatment routes listed in appendix C have been separated into two distinct categories:

- Carriageway precautionary treatments not exceeding 40g/m²
- Sections of footways, footbridges and cycleways.

All precautionary treatment routes have been designed to enable completion of treatment routes, including contiguous laybys but excluding remote laybys, within two hours of commencement of the treatment. Precautionary treatment routes will mobilise, commence and complete before snow and ice conditions are forecast to occur. Immediate responses for unplanned treatments will mobilise and commence within one hour of the WSDO's instruction. All routes will be driven prior to the winter season to allow drivers to be familiar with them.

The Forth Road Bridge and Queensferry crossing will be treated with Potassium Acetate liquid by a combination vehicle.

De-icing vehicles and drivers will be assigned to specific routes to promote route ownership and knowledge, but all drivers will have a basic knowledge of every precautionary treatment route and will be capable of undertaking any such route if necessary. Treatment routes will be pre-programmed into the Schmidt Autologic spreader control system, once the Queensferry crossing and all associated roads are completed.

Precautionary treatment spread rates, specified by the WSDO on the daily action plan, will be in accordance with Table 2 of appendix A of this document.

Additional care will be taken at roadwork locations, where areas are currently being trafficked, all other areas, including contraflows, likely to be opened to traffic are treated. Traffic management equipment, including cones and cylinders, may disrupt distribution of salt, and liaison with engineering staff responsible for roadwork sites is essential if complete and robust treatment is to be ensured. Where more extensive traffic management measures prevent adequate precautionary treatment application, separate treatment will be carried out in advance of the carriageway being re-opened to traffic. Regular attendance will be undertaken with any contractor engaged on works within FBU, to ensure all live traffic lanes will be treated.

No Winter Constructional Plant will be driven above the legal speed limit at any time or at a speed greater than 40mph during precautionary treatment operations on de-restricted dual carriageways or motorways. On single carriageway roads de-icing material will be spread across the full width of the

road in a single pass with the Winter Constructional Plant travelling at a speed no greater than 30mph.

10.2 Contingency plans for alternative access to precautionary treatment routes where normal access is prevented due to weather related or other incidents.

Amey have put in place arrangements and resources which will ensure that carriageway precautionary treatments will be provided for sections of the Network where normal access is prevented due to weather or other related incidents.

These contingency arrangements provide resources for precautionary treatments using an alternative access. Front Line Winter Constructional Plant will carry out treatment from an alternative access, should, for whatever reason, precautionary treatment not be able to be carried out in accordance with the Route Cards shown in WSP 2 of Appendix D.

For the majority of the Network there are alternative routes available to enable treatment routes to be completed by the de-icing vehicle allocated to that particular route. Network areas that Amey consider are most at risk from restricted access, due to weather or other related incidents, are those with no local suitable alternative routes.

10.3 Locations of De-icing Material Loading and Mixing Points.

De-icing materials will be stored in Amey Depots at Rosyth Depot, which will be the loading point for the Project.

10.4 Details of Cycling Facilities in Urban Areas.

These facilities are identified in section 11.1.8 below.

11 SNOW AND ICE CLEARANCE

11.1 Snow Clearing

11.1.1 Description of Arrangements and Resources for Snowfall

Amey will, so far as is reasonably practicable, ensure sufficient resources are available to prevent snow or ice from remaining on the Network ,and put into place specific arrangements to ensure that these resources will be mobilised.

The WSDO, in discussion with the Winter Service Manager, will determine, from the 2-5 day weather forecast, the requirements to mobilise additional resources and fit ploughs. Winter Service shifts and the preparation of de-icing and ploughing equipment will be instructed by the WSDO, subject to prior approval by the WSM.

All Front Line, Reserve and Additional Winter Constructional Plant, apart from snow blowers, will be equipped with snow ploughs to effectively clear ice and snow. Non-salting vehicles fitted with ploughs, will also be mobilised to aid echelon ploughing on dual carriageways and motorways. We have a fast trak machine from our supply-chain which will be able to operate Transport Scotland's Raiko Icebreaker.

Conditions and de-icing spread rates for snow and ice clearance of carriageways are detailed in Appendix A Table 4 with Snow Clearance requirements shown in Appendix A Table 5. Each depot will also have a stock of Eco-thaw or Safecote which can be used instead of or mixed with Brine that will allow more extreme temperatures to be treated. The table in para 5.2.3 shows what temperatures these materials are suitable for.

Details of Constructional Winter Plant are provided in Section 13 of this document and Annex WSP 4.

The clearance procedure for dual carriageways and motorways will be echelon ploughing (2 or more vehicles moving in the same direction, one behind each other on different lanes). Ploughing techniques to be adopted are shown in Figures 11/1 and 11/2.

The clearance procedure for the removal of snow from the Forth Bridge deck, would be that ploughs would be set to a level above the surface, due to the presence of the protruding metal bridge deck joints, and echelon ploughing would be carried out across the bridge, with snow being directed as outlined in Figure 11/2. Further continuous treatment with potassium acetate would then be carried out, together with the application of grit, if required.

Snow requiring to be cleared from the Viaduct sections of the Forth Road Bridge would be tackled by directional ploughing from the carriageway to the footway, and from the footways from where the snow would be either transported off site or deposited in a safe location at the ends of the structure. Forth Road Bridge footways would be closed during snow clearing operations and transport provided, similar to high wind footway closures.

Where hard packed snow and ice not exceeding 20mm thick has formed, and the air temperature is above minus 5°C, removal will be achieved by successive spreading of de-icing material. Below minus 5°C or where the snow or ice is more than 20mm thick, a single sized abrasive aggregate of particle size of 6mm, or 5mm sharp sand and having low fines content will be added to the de-icing material on a 1:1 ratio. Reversion to the use of de-icing material only will be made as soon as possible. Abrasive aggregates will be considered as a supplement on footway sections where de-icing material alone would provide an unacceptably slippery surface.

Ploughing Techniques (Road surfaces)
2 Lane Dual Carriageway Roads without Hardshoulders: The method of clearance, on both carriageways, should be: (a) plough the left hand lane to the verge; (b) plough the right hand lane to the central reservation
2 Lane Dual Carriageway Roads with Hardshoulders: The method of clearance, on both carriageways, should be: (a) plough the left hand lane to the hardshoulder; (b) plough the right hand lane to the central reservation.; (c) plough the hardshoulder to the verge
3 Lane Dual Carriageway Roads without Hardshoulders: The method of clearance, on both carriageways, shall be: (a) plough the centre lane to the left hand lane; (b) plough the left hand lane to the verge; (c) plough the right hand lane to the central reservation
3 Lane Dual Carriageway Roads with Hardshoulders: The method of clearance, on both carriageways, shall be : (a) plough the centre lane to the left hand lane; (b) plough the left hand lane to the hardshoulder; (c) plough the right hand lane to the central reservation; (d) plough the hardshoulder to the verge

Figure 11/1: Ploughing Techniques – Road Surfaces

Ploughing Techniques – Forth Road Bridge
Viaduct. And up to 50 metres before Side Span*
The method of clearance, on both carriageways, should be by echelon ploughing: (a) plough the right hand lane to the left hand lane; (b) plough the left hand lane to the footway / verge
Side Span (including suspended span).
The method of clearance, on both carriageways, should be by echelon ploughing: (a) plough the left hand lane to the grillage / verge; (b) plough the right hand lane to the grillage / central reservation
Viaduct. From 50 metres beyond Side Spans*
The method of clearance, on both carriageways, should be by echelon ploughing: (a) plough the left hand lane to the footway / verge; (b) plough the right hand lane to the grillage / central reservation

**Over the 50 metres prior to and beyond the Suspended Span, drivers require to alter the angle of the snow plough blade from ploughing to the left to ploughing to the right.*

Figure 11/2: Ploughing Techniques – Forth Road Bridge.

Ploughing Techniques – Queensferry Crossing Bridge
Viaduct. And up to 50 metres before Side Span*
The method of clearance, on both carriageways, should be by echelon ploughing: (a) plough the right hand lane to the left hand lane; (b) plough the left hand lane to the hardshoulder
Side Span (including suspended span).
The method of clearance, on both carriageways, should be by echelon ploughing: (a) plough the right hand lane to the left hand lane; (b) plough the left hand lane to the hardshoulder
Viaduct. From 50 metres beyond Side Spans*
The method of clearance, on both carriageways, should be by echelon ploughing: (a) plough the right hand lane to the left hand lane; (b) plough the left hand lane to the hardshoulder

**if significant snow builds up in edge of hardshoulder in sections over the shoreline of north and south Queensferry, this shal be pushed, using the V ploughs to the verges off the bridge structure. If the snow builds up on sections over the river Forth, then a snow blower shall be used to move this build up.*

Figure 11/3: Ploughing Techniques – Queensferry Crossing Bridge.

During prolonged periods of snowfall at locations where the use of salt for de-icing is prohibited, ploughing will be continuous followed by repeated applications of de-icing chemical. If snow becomes hard packed, consideration will be given to applying 5mm sharp sand to aid traction while snow clearing operations are being carried out.

Ploughing routes will mirror the precautionary treatment routes and this activity will be carried out utilising the Echelon Ploughing technique.

Forth Road Bridge – Loading effects of snow

The critical structural area of the Forth Road Bridge (with respect to snow accumulation and associated loading effects) is the area where the viaduct footway flares to form the side span / suspended span footway. At this location the overall footway width flares from 6.172m (4.648m footway plus 1.524 verge) to 9.144m (4.648m footway plus 4.496 verge / reserve) over a distance of 54m. The critical loading criterion at this point is due to the underdeck stringer beams that are capable of supporting 2 No. 3.5T vehicles passing in either direction eg total imposed weight of 7T over circa 3No. stringer beams. This is equivalent to circa 130mm deep snow across the panel width.

11.1.2 Road Closure Procedure including use of Snow Gates

There are currently no snow gates on the Forth Bridge unit. This will be continually reviewed. Paragraph 5.2.4 (Road Closure Operational Procedures) defines the procedure for closing roads.

11.1.3 Prolonged Snowfall Strategy

During prolonged periods of snowfall, ploughing will be continuous from the onset of snow to prevent a build-up of snow and compaction by traffic. Ploughing will continue until the Network is clear of snow and ice. Reserve and Additional Winter Constructional Plant will be used, as necessary, to supplement Front Line Winter Constructional Plant in snow conditions. The WSDO will liaise with Scottish Ministers Multi Agency Response Team (MART) throughout this period ensuring the provision of a coordinated response.

When planning and carrying out snow clearance, Amey will pay particular attention to the layout of the carriageway in terms of the overall number of lanes and the location of entrance and exit slip lanes. Snow clearance of slip roads will

be co-ordinated with main carriageway clearance, and a clear path kept open between those entry and exit points where frequent lane changes are necessary.

For dual carriageways and wide single carriageway roads, echelon ploughing will be carried out utilising two snow plough vehicles moving in the same direction, one behind the other in adjacent lanes.
Irregular windrows caused by ploughing passes, especially those that weave from one lane to another are dangerous, and will be avoided, as they may tempt drivers to overtake by squeezing into the partly cleared lane. Lanes will be completely cleared, such that any windrows of snow remaining form a smooth and continuous line with no sudden encroachments into the cleared path.
Clearance of snow from contiguous and remote laybys will be carried out once the main carriageway, junction areas and crossovers have been cleared of snow.

Care will be taken to avoid damage to road surfaces, road studs, roadside furniture, bridge deck joints and structures. At roadworks, traffic management equipment must not be disrupted. An accumulation of ploughed snow creating a ramp adjacent to safety fences and concrete barriers will be avoided.

Where conventional ploughing or snow ploughing is not possible, for example:
in exceptional circumstances when the snow on the road is deep and cannot be removed by conventional ploughing or snow blowing
when de-icing treatment over packed snow is likely to provide an unacceptable surface, or
when the traffic is insufficient to disperse the snow,

Amey will lift, remove and dispose of snow and ice and/or utilise snow blowers, with the snow being directed onto adjacent land (where Amey has obtained the prior agreement of the landowner and the Scottish Environmental Protection Agency). Such operations will be followed by de-icing treatment.

When snowploughing or snow blowing operations are undertaken care will be taken that snow does not build up across:

- railway tracks or against gates
- bridges
- parapets
- fences and safety fences
- walls and other boundaries

Speeds of ploughing vehicles will be regulated, particularly at features such as underbridges where snow could be thrown over the bridge parapet, and adjacent to the central reserve where snow could be pushed into the opposing carriageway. When ploughing snow, other vehicles will not be overtaken unless stationary.
We recognise that additional resources will be required for echelon ploughing in snow conditions. Winter Service operations will accord the highest priority and additional operatives will be rostered to crew additional shifts. Ploughing routes, will mirror our precautionary treatment routes, which are shown in Appendix D.

11.1.4 Arrangements for Safe Clearance of Snow and Ice from Wide Single Carriageways.

When clearing wide single carriageway roads, particularly those having more than two lanes, snow clearance operations must avoid the build-up of snow in the centre of the road. The detail of the ploughing strategy to be adopted is shown in Figure 11/1.

11.1.5 Arrangements for Safe Clearance of Snow or Ice Adjacent to Vertical Concrete Barriers.

Echelon ploughing operations will be coordinated to achieve clearance in one pass of at least all running lanes initially to the hard shoulder and then subsequently to the verge. An accumulation of ploughed snow creating a ramp adjacent to vertical concrete barriers will be avoided.

11.1.6 Treatment Strategy for Footways, Footpaths and Cycle Facilities to be Detailed Including Location of Salt Bins where Applicable

All CAT A Footways and footbridges shall be cleared of all snow and ice by 08:00 or within two hours of snow ceasing to fall during the period 06:00 to 18:00 hours.

Cycling facilities shall be cleared of all snow and ice by 08:00 or within two hours of snow ceasing to fall during the period 06:00 to 18:00 hours.

A list of Salt bins is located in section 17.

For reactive snow and ice clearance of all categories of footways, footbridges and cycleways the following spread rates will apply:

- During snow clearance 20g/m2
- Following clearance of ice and snow 20g/m2

11.1.7 Treatment of Freezing Rain

Freezing rain will be dealt with in line with the best practice below.

Guidance on dealing with 'Freezing Rain'

This advice has been prepared to assist service providers in developing procedures for taking the necessary actions both in advance of and during an occurrence of freezing rain. The advice is not intended to prescriptively define how freezing rain should be dealt with, as this is an issue for the individual service provider and is dependent on local circumstances.

It is recognised that the prediction of freezing rain is difficult and the action necessary to deal with it is problematic but service providers need to consider and plan actions to be taken when such events occur. It is important that all details of

the actions intended for dealing with the phenomenon of freezing rain are documented in Winter Service Plans.

Considering the limits in the effectiveness of treatments in dealing with freezing rain it is essential that all practical measures be implemented to provide warning to road users of the hazardous conditions.

Measures for dealing with freezing rain fall into three main areas: advance planning, operational arrangements, and hazard mitigation. These measures are considered in further detail as follows:

Advance Planning

Advance planning includes consideration of the potential impact of freezing rain and development of contingency arrangements to mitigate the effects. These contingency arrangements should be documented in the Winter Service Plan. Other aspects of advance planning include training and exercises.

Specific measures that should be considered include:

Prior to the commencement of the winter season, agreement should be reached with the local police authorities and, where applicable, the Regional Control Centres (RCCs) on procedures for dealing with occurrences of freezing rain and any incidents that may occur during or following such conditions.

Outline operational arrangements should be developed and documented within the Winter Service Plan. Although the adverse effects of freezing rain can impact across any part of the network particular consideration should be given to those parts where the impact may be more significant such as on gradients or difficult alignments.

Operational Arrangements

Operational arrangements should include details of treatment regimes. In general, freezing rain should be treated in a similar manner to snow, i.e. treatment in advance of and during the event and then treatment following as required.

Specific measures that should be considered include:

If the condition of freezing rain is anticipated, contact with the Police, RCC, adjoining service providers and Local Authorities is to be made to acquaint them of the possibility and the proposed action.

Prior to the arrival of the freezing rain a pre-treatment is to be made in the same manner as would be made prior to snow falling.

Constant monitoring of the situation is to be made and an additional treatment is to be carried out immediately the rain commences and continued until such time that the rain has ceased or the temperature of the road has risen above freezing.

Freezing rain usually occurs along the line of an incoming warm front. If possible, to ensure maximum effectiveness of the salt, the advance treatment should be

made in the same direction and immediately in advance of the weather front. Use should be made of weather radar where available, to help determine the timing of treatment. Consideration should be given to stationing vehicles at the point on the route where the weather front will first hit in order that timely treatments can be undertaken.

Some salt will inevitably be lost during and following treatment and therefore careful consideration needs to be given to the requirement for continued successive treatments.

Hazard Mitigation

The very nature of freezing rain means that treatments will have virtually no effect initially and ice will form on the carriageway. Mitigation of the hazard is therefore a significant aspect of the actions taken in response to freezing rain. The main action is to inform road users of the hazard but more pro-active measures might be required. For example, consideration should be given to closing the road as the rain arrives and holding the traffic (rather than diverting) until such times as it is deemed safe to proceed. Such considerations will need to be made on a local basis taking into account local circumstances.

Specific measures that should be considered include:

Where available fixed or mobile Variable Message Signs should be used to warn road users of the hazard. The existing established procedures for requesting VMS settings to be made should be followed well in advance. The following legend is currently the most appropriate for use in these circumstances:

SKID RISK SLOW DOWN

Press officer should be contacted in order that the local media can be advised as necessary.

Where available, use of variable mandatory speed limits should be considered. This will require arrangements and protocols to be established with the appropriate Police Control Office (PCO) or RCC as part of the advance planning procedures.

Consideration should be given to the use of rolling blocks and convoy arrangements to either hold or slow traffic down both just prior to and during the event. This will require arrangements and protocols to be established with the appropriate police authorities or RCC Operations Managers as part of the advance planning procedures

In addition to the arrangements made in respect of advance planning, operational procedures and hazard mitigation it will be necessary to consider the arrangements to be implemented should any incidents occur as a result of the freezing rain. This may, for example, include liaison with PCOs or RCCs to provide advance warning to recovery companies. Procedures for giving such advance warning would need to

be established in advance with PCOs and RCCs and documented within the Winter Service Plan.

11.1.8 Location of the Footways Footbridges and Cycle Facilities.

Below is a list and designated category of each footway, footbridge or cycle facility within the Network area and tables showing what treatment they should receive. This will be kept under review pending the completion of the Queensferry Crossing works.

Route	Location	Name of street	Details of Footway		Route Centreline Length (m)
			Start	Finish	Cat A
A90	Plaza		Forth Bridge	Echline S/B off slip	60
A90	Echline		S/B off slip from A90	Echline roundabout	300
A90	Echline		Echline roundabout N/B on slip	Plaza	230
A90	Echline		Plaza	Forth Bridge	170
A90	Forth Bridge		South end of Bridge	North end of Bridge	2500
A90	Welldean		North end of Bridge	N/B off slip to Ferrytoll	750
A90	Ferrytoll		Start of N/B off slip at Ferrytoll	End of slip at roundabout	200
A90	Ferrytoll roundabout		Roundabout section		220
A90	Ferrytoll		Start of S/B on slip at Ferrytoll	Top of S/B on slip to A90	130
A90	Ferrytoll		S/B A90 from Ferrytoll on slip	A90 S/B at north end of Bridge	850
A90	Forth Bridge		North end of Bridge	South end of Bridge	2500
A90	Plaza		South end of Bridge	Plaza area	200
A90	Plaza Area	Steps up and down to south underpass and underpass	South end of bridge	Plaza area	40

A90	North Queensferry	Steps up and down to north abutment	North end of bridge		30
A90	Car Park	Ramp and steps from Car Park to A90 (Toll Plaza)	Plaza Area	Plaza area	15
A90	Echline	Link path from A90	Ferrymuir Gait		10
A90	Forth Bridge Office Compound	Car Park area	Viewing area including office entrance		30
A90	Forth Bridge Office Compound	Footpath adjacent service road	South abutment		300
A90	Ferrymuir Gait		Ferrymuir Gait		375
A90	Carpark Footways		North end of bridge		Treated by spreader

Categories	**Requirements**
A and B	Apply de-icing treatment before 08.00 hours each morning to any ice which has formed.
C	Clear all ice by 17.00 hours on the same day the ice formed excluding Saturdays and Sundays when the area shall be cleared by 17.00 hours on the Monday immediately following.
A, B and C	Following clearance of ice or if ice has melted naturally during the day, spread anti-icing materials to prevent ice formation on the cleared surfaces in accordance with paragraph 3.1.17 of this Part.
D	These footways, footbridges and cycleways shall receive treatment when required by the Director.

Categories	Requirements			
	General	Between 06.00 and 18.00 hours	Between 08.00 and 17.00 hours	Treatments out with daytime hours
A and B	Between the hours of 06.00 and 18.00, commence snow clearing as soon as practicable to prevent compaction by traffic. Ploughing should be continuous thereafter to prevent a build up of snow.	Clear all snow within 2 hours of snow ceasing to fall. On wide Routes, 1.2 metre minimum width shall be cleared initially.		Clear snow when required by the Director.

Categories	Requirements			
C	Between the hours of 08.00 and 17.00, commence snow clearing as soon as practicable to prevent compaction by traffic. Ploughing should be continuous thereafter to prevent a build up of snow.		Clear all snow by 17.00 hours on the day the snow first fell excluding Saturdays and Sundays when the area shall be cleared on the Monday immediately following. On wide Routes, 1.2 metre minimum width shall be cleared initially.	Clear snow when required by the Director.

A,B and C		Following clearance of snow, spread anti-icing materials to prevent ice formation on cleared surfaces in accordance with paragraph 3.1.17 of this Part. Note brine shall not be used as the anti-icing agent where compacted snow or ice lenses remain on the surface of the Route.	Following clearance of snow, spread anti-icing materials to prevent ice formation on cleared surfaces in accordance with paragraph 3.1.17 of this Part. Note brine shall not be used as the anti-icing agent where compacted snow or ice lenses remain on the surface of the Route.	
D	These footways, footbridges and cycleways shall receive treatment when required by the Director.			

12 DE-ICING MATERIALS

Details

Salt used for de-icing, including that used for the manufacturing of brine used in pre-wetting will be 6.3mm grading particle size and comply with the following:

6.3mm grading particle size to BS 3247:1991 treated with an anti-caking agent,

Salt storage areas will be maintained to ensure the following:

Salt is stored in dry conditions, such that moisture content does not exceed 4%.
No sheer faces left on stockpiles.
Salt stockpiles do not become contaminated.
Salt stockpiles or adjacent operations do not affect the environment.
Moisture content at existing salt stocks will be measured at monthly intervals throughout each Winter Period. The results will be recorded within the Traffic Scotland portal. Should the moisture content of salt used for de-icing exceed 4%, spread rates will be increased by 100% for spread rates up to and including 20gm/m2.

Within 10 days of new salt deliveries, salt will be tested in accordance with BS 3247 at a UKAS accredited laboratory and results recorded to ascertain:
Moisture content (1 test per 500 tonnes)
Particle size distribution (1 test per 500 tonnes)
Chloride content (1 test per 1500 tonnes)
Soluble sulphate compounds (1 test per 1500 tonnes)

For pre-wetting salt, the percentage of salt brine added to salt for spreading Operations will be 30% of the total weight of spread material, and the saturated salt in the brine solution before combination will be between 20% and 23%. These saturators will automatically produce and store brine of the correct concentration and transfer it to storage tanks. Digital read outs are fitted to brine production facilities, but in addition, checking of brine concentration in the saturators will be carried out by Depot Supervisors by means of a refractometer, and records held at the depot.

Amey has developed a long-standing agreement with national de-icing material suppliers detailed below:

Cleveland Potash	Salt Union Ltd.	Salt Sales Co.
Boulby Mine	Astbury House	Fort Road
Saltburn by the Sea	Bradford Road	Kilroot
Redcar	Winslow	Carrickfergus
Teesside	Cheshire	County Antrim
TS 12	CW7 2PA	BT38 9BT

A list of salt stock can be found in Annex WSP 3 of Appendix D.

Our salt will be supplied by Cleveland Potash. An agreement for an automatic restocking arrangement to ensure that adequate quantities of salt are always available locally, will be put in place.

Potassium Acetate used for de-icing locations identified in table 7.2.I.1 will be Safecote SUPAMIX as agreed with Transport Scotland.

De-Icing Material. A list of materials can be found in Annex WSP 3 of Appendix D. This includes Safecote or Eco-thaw.

Details of de-icing materials stocks are provided in Annex WSP 3 of Appendix D and take account of the minimum stock levels to be maintained as required by the Project.

13 WINTER SERVICE PLANT

Front Line Winter Service Plant permanently available for the Winter Service

Front Line Winter Constructional Plant will undertake Winter Service Patrols, precautionary treatments and snow and ice clearance to the total width of carriageways including slip roads, hard strips, turning lanes, central reserve crossovers, lay-bys, bus bays and the like.

All front line plant will be fitted with brine saddle tanks to allow the use of pre-wetted salt.

The Company's front line Winter Service Plant for carriageways is detailed in Annex WSP 4, Table 1 of Appendix D.

Details of our front line Winter Service Plant for footways footbridges and cycling facilities shall be as referred to in Annex WSP 4, Table 2 of Appendix D.

Reserve Winter Service Plant

Reserve Winter Service Plant will be used to supplement front line plant during snow conditions and arising from breakdowns of front line plant.

All reserve carriageway plant will be fitted with brine saddle tanks to allow the use of pre-wetted salt.

Details of reserve winter plant are included in Annex WSP 4, Table 3 of Appendix D.

Additional Winter Service Plant

Details of additional Winter Service Plant available through the wider Amey business, sub-contractors and supply chain are included in Annex WSP5, Table 4 of Appendix D.

Additional Winter Service Plant available through contingency arrangements for the Winter Service for carriageways, footways, footbridges and cycling facilities is included in Annex WSP 4. This includes 24/7 contact details made available to the WSDO.

Loading Winter Service Plant

Details of all loading Winter Service Plant available within the Unit is included in Annex WSP 4, Table 5 of Appendix D and includes that available for:

front line; reserve; and additional winter service plant.

Calibration of Winter Service Plant

All calibration and re-calibration shall be independently carried out and certified. Calibration records for all salting vehicles will be held in the Central Office in accordance with our documented Quality Management System.

Calibration checks will be carried out at the final service before the winter maintenance season in September, and in January of each winter maintenance period.

Dynamic calibration will be carried out in accordance with the National Salt Spreading Research Document 'Best Practice Guidance for Salt Spreading' and BS 1622:1989 Test B and C.

Additional calibration and testing will be carried out after repairs to the spreading equipment and at other times when necessary to ensure the accuracy of de-icing material spreading.

All calibration will be undertaken to comply with the requirements of Schedule 7, Part 2.

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14 COMPOUNDS, DEPOTS AND FACILITIES

Details of our office and depot facilities covering the network within the Unit are provided in Annex WSP 5, Table 6 of Appendix D.

15 MAPS DRAWINGS AND GEOGRAPHICAL INFORMATION

The Winter Service Plan includes maps showing:

- precautionary treatment Routes for carriageways, including on/off slips and depots,
- precautionary treatment Routes for footways, footbridges and cycling facilities,
- reactive treatment Routes for footways, footbridges and cycling facilities,
- Winter Service Patrol Routes, N/A
- ploughing Routes for carriageways, including on/off slips and depots, as precautionary treatment routes
- road sensors including sensor types and where these sites are equipped with weather cameras, (map to differentiate between single and bi-directional cameras),
- snow gates, N/A
- snow fences, N/A
- shelter belts, N/A
- snow poles, N/A
- snow or ice and hidden message signs, N/A
- salt bins,
- vertical concrete barriers, N/A
- other facilities, and
- where route based forecasting is not used,.

16 COMPILING AND MAINTAINING RECORDS

Records of decisions, amendments to decisions, actions taken and patrol communications will all be entered in an electronic log by the Winter Service Duty Officer. The Winter Service Duty Officer shall ensure that all winter service records (electronic and paper copies) are referenced, filed securely and maintained.

The spreader vehicle data logger reports will be reviewed for completeness of data and effectiveness of applied treatment. A daily report on the previous 24 hours' winter service operations will be prepared by the Winter Service Duty Officer and submitted to the Winter Service Manager, highlighting any aspects where action may be required.

The following typical records will be held electronically;-

(i) decisions taken, when and by whom,

(ii) planned and actual treatment Records,

(iii) planned and actual response times achieved,

(iv) planned and actual commencement times,

(v) planned and actual Route times,

(vi) planned and actual spread rates,

(vii) output from Winter Service Plant on-board data loggers,

(viii) Winter Service Plant down time and software faults,

(ix) Winter Service Plant deployment Records (including vehicle location Records) and driver and operator logs,

(x) logs (both manual and electronic) for telephone, electronic mail and two way communication calls,

(xi) loading point de-icing stocks and replenishment orders,

(xii) ice prediction system Records,

(xiii) weather forecasts and actual weather experienced,

(xiv) complaints by members of the public and Trunk Road users,

(xv) accidents during winter conditions,

(xvi) road closures due to winter conditions,

(xvii) weights and volumes as appropriate for amount of de-icing material(s) spread on each Route for each treatment,

(xx) pre- and mid-season road sensor calibration systems,

(xix) Winter Service Plant calibration Certificates, and

(xx) actual salt stocks held.

(xxi) number of days (capability) of each de-icing material available for each depot based on 6 treatments per Route per day at 20 grammes per square meter for pre-wetted salt and 6 treatments per Route per day at 0.0156 litres per square meter for potassium acetate

Amey will maintain accurate salt stock monitoring records and will submit monthly salt stock reports to the Scottish Ministers on the first working day of each month during the Winter Service Period – and at such other times and frequencies as requested. The form below will be used for monitoring the salt stock and the stocks will be updated on the IBI Portal in line with the timescales provided.

Operating Company	**Reporting Month**
Salt used during reporting period	
Actual salt stocks held at the end of the reporting period	
Salt orders placed and deliveries received during reporting period	
Salt orders expected during next reporting period (include imports, dates deliveries expected & tonnage expected)	
Forecast usage during next reporting period	
Any other items to report (such as reduced treatment networks, any notable arrangements with local authorities, etc.)	

Each day during the Winter Service Period the WSDO will produce planned and actual reports for each precautionary treatment route; these will be held electronically and will typically include;-

- Summary forecast and actual weather data
- Planned and actual spread rates
- Planned and actual commencement times
- Completion times for each route
- Amount of de-icing material spread for each route and the cumulative amount spread during the current Winter Service Period
- Snow plough usage
- Number of treatment days (capability) of de-icing material available from stock based on six treatments per route per day at 20 grammes per sq m for pre-wet Salt and 0.0156 litres per sq m for Potassium Acetate
- The weather forecast accuracy
- Spreading vehicle's data logging and reporting system output
- Any other relevant information

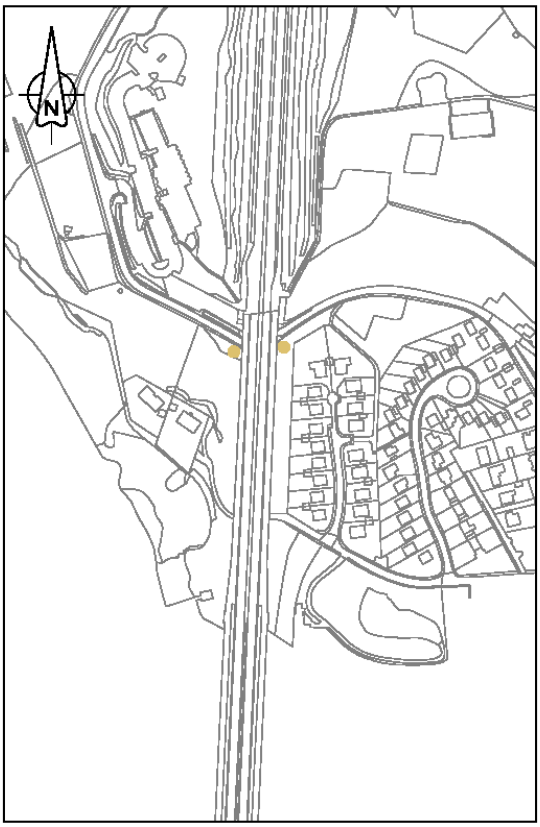
Prior to 31 May each year the Winter Service Manager will submit a Winter Service report to the Scottish Ministers prepared for the immediately preceding Winter Service period ending 15th May. This report will review the previous Winter Service Operations and shall help inform the requirements for the subsequent Winter Service Plan.

17 SALT BINS

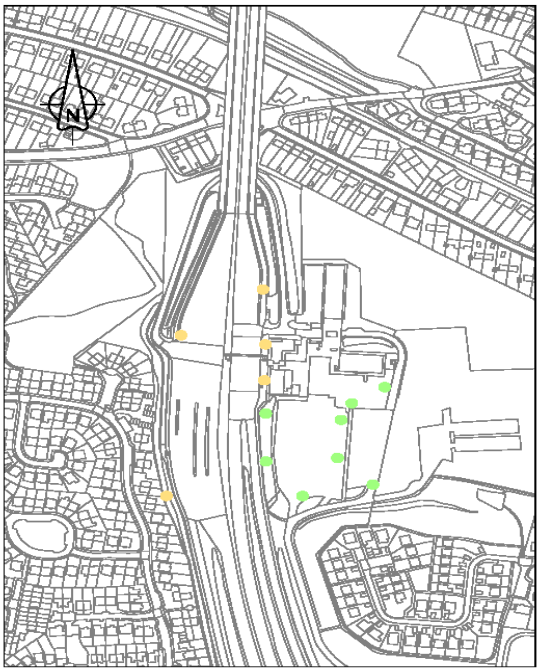
Several salt bins are required on the Network, we intend to continue using existing locations at present. This will be updated and reviewed at the end of each season and pending the completion of the Queensferry Crossing works.

These will be stocked prior to 30th September each year and stock levels monitored and replenished as required throughout the period. Any damaged salt bins will be replaced within 2 days. At the end of each year salt bins will be taken back to depots and stored.

Salt bin location plans



North Queensferry locations



Located on A90

Located in Car Park area

South Queensferry locations

18 SNOW GATES AND SNOW FENCES (currently none on unit)

There are currently no snow gates or snow fences on the Forth Bridge unit and this will be kept constantly under review.

19. VARIABLE MESSAGE SNOW AND ICE AND HIDDEN MESSAGE SIGNS

There are currently no hidden message signs on the Forth Bridge unit and this will be kept constantly under review

20. VERTICAL CONCRETE BARRIERS

The construction of the new Queensferry crossing has incorporated the use of centre reserve concrete barrier on the M90 from Scotstoun bend through to the junction 1 off slip at Admiralty junction.

21. SALT MEASUREMENT APPARATUS

The weighing facilities presently located in all depots will be calibrated and utilised to weigh spreaders before and after deployment. These will be printed out at the start and end of each gritting run and attached to the Operator log and filed in the central office

22. SNOW AND ICE BUILD UP ON BRIDGES

The main issue to be resolved, if snow accretion occurs, is in assessing the risk to the public. To eliminate risk to the public would involve closing the bridge completely and waiting until all the snow has melted. This course of action would cause significant disruption to traffic, therefore, the balance of risk against disruption will have to be assessed if the event occurs.

- During any period of significant snow fall, relative humidity, wind speed and temperature should be closely monitored by the WSDO. If the following parameters are met during a snowfall event then snow accretion may occur.
  Relative Humidity exceeds 90 degrees.
  Wind Speed exceeds 8m/s
  Temperature is between -1.5 and +1.5 degrees Celsius
  (Note: these are guidelines only and snow accretion could occur when conditions occur that are outside these parameters).

- The main cables, cable bands, main tower faces and tower top lifting beams should be monitored for snow / ice accretion. This can be done by inspection teams using binoculars from the footways or if conditions allow, from the tower tops and cables – and reported to the WSDO. The WSDO will take advice, where required, from the WSM. Records shall be produced and retained in respect of any such accumulations.

- Overhead ice accumulations will wherever reasonably practical and safe to do so be removed using traditional mechanical operations. This will be undertaken using the constraints of chapter 8 of the traffic signs manual to mitigate risks to either the public or operational staff. If it is deemed unsafe for operational staff to access any areas where ice accumulation formations have occurred, yet are considered to pose a fall risk to the public then the bridge will be closed until such time that the accumulations fall through natural detachment. Any closure of the bridge in such instances shall be undertaken through liaison with the Police, Traffic Scotland, and Transport Scotland following the principles of the procedure defined in Paragraph 5.2.4 (Road Closure Operational Procedures).

- If significant snow accretion starts to occur, then the bridge should be closed by the Control Room to all traffic, including cyclists and pedestrians, for a short period in order to establish the extent of the problem and condition of the snow by inspection teams reporting to the WSDO. The protocol for closing the bridge is described in Paragraph 5.2.4.

- If the snow is considered soft enough such that when if falls it will not impact on vehicles then the bridge could be reopened to all traffic. The protocol for opening the bridge is described in Paragraph 5.2.4.

- If the snow looks dense and is hard and icy, then it is likely that the decision would have to be to keep the bridge closed; the WSM should liaise with the Police in this regard. However, it may be that one carriageway could be reopened depending on the location of the accretion and the wind direction. During such scenario's the WSDO will maintain regular contact with the Traffic Scotland Control Centre to allow variable message signs to reflect network conditions, and where appropriate the media.

- Dependent upon the prevailing wind conditions there may be situations where the accretion is located on the external face of a tower leg, with the impact unlikely to affect vehicles if it fell. Under such circumstances the WSDO would in consultation with the WSM allow the bridge to re-open to traffic but retain the footway closures until such time that the accretions dissipated.

- As the weather conditions in the Forth are extremely variable, it is important that continual monitoring and inspection by the WSDO and inspection teams (which may be limited to the footways depending on conditions) is carried out if snow accretion occurs in order to react to any change in snow conditions.
  It is not practical to define every scenario that could be concurrently or conceivably be encountered with respect to potential snow or ice build up on the bridge. During the aforementioned scenario's, or similar, the primary objective shall be to ensure public and employee safety. Any such instances shall be documented and recorded by the WSDO to allow continual improvement in the management and delivery of services.

APPENDIX A

DECISION MAKING
&
TREATMENT MATRICES

Table 1 – Decision Making Process for Winter Service

<table>
<tr><th colspan="4">Decision Matrix</th></tr>
<tr><td></td><td colspan="3">Predicted Road Conditions</td></tr>
<tr><td>Road Surface Temperature</td><td>Wet</td><td>Wet Patches</td><td>Dry</td></tr>
<tr><td>May fall below 1°C</td><td rowspan="2">Salt before frost</td><td>Spreading before frost (See note A)</td><td>No action likely, monitor weather (See note A)</td></tr>
<tr><td rowspan="4">Expected to fall below 1°C</td><td colspan="2">Spreading before frost (see note B)</td></tr>
<tr><td colspan="3">Spreading after rain stops</td></tr>
<tr><td colspan="3">Spreading before frost and after rain stops (see note C)</td></tr>
<tr><td colspan="2">Spreading before frost</td><td>Monitor weather conditions</td></tr>
<tr><td>Expected snow</td><td colspan="3">Spreading before snow</td></tr>
<tr><td rowspan="3">Freezing Rain</td><td colspan="3">Spreading before rainfall (see note C)</td></tr>
<tr><td colspan="3">Spreading during rainfall (see note C)</td></tr>
<tr><td colspan="3">Spreading after rainfall (see note C)</td></tr>
<tr><td colspan="4">The decision to undertake precautionary treatments should, if appropriate, be adjusted to take account of residual salt or surface moisture.
All decisions should be evidence based, recorded and require continuous monitoring and review.</td></tr>
</table>

A. Particular attention should be given to any possibility of water running across carriageways and such locations should be monitored and treated as required.
B. When a weather warning contains reference to expected hoarfrost considerable deposits of frost are likely to occur and close monitoring will be required. Particular attention should be given to the timing of precautionary treatments due to the possibility that salt deposited on a dry road may be dispersed before it can become effective.
C. Under these circumstances rain will freeze on contact with running surfaces and full pre-treatment should be provided even on dry roads. This is a most serious condition and should be monitored closely and continuously throughout the danger period.

Table 2: Treatment Matrix

Treatment Matrix **Spread rates for precautionary treatments**		
Forecast weather condition	Frost Susceptible/surface water run-off area (grammes/square metre)	Road Surface Wet (grammes/square metre)
A. RST higher than plus 1°C	*0*	*0*
B. RST lower than or equal to plus 1°C but higher than minus 2°C	*10 to 20*	*10 to 20*
C. RST lower than or equal to minus 2°C but higher than minus 5°C	*10 to 20*	*10 to 20*
D. RST lower than or equal to minus 5°C	*20*	*20*
E. RST lower than or equal to plus 1°C but higher than minus 2°C following rain	*20*	*30*
F. RST lower than or equal to minus 2°C but higher than minus 5°C following rain	*30*	*40*
G. RST lower than or equal to minus 5°C following rain	*40*	*40*
H. Hoar Frost	*20*	*20*
I. Freezing Fog	*10*	*20*
J. Freezing Rain	*40* *(See table 1)*	*40* *(See Table 1)*
K. Snow Accumulations up to 30mm	*30*	*40*
L. Snow Accumulations over 30mm	*40*	*40*
M. Hard Packed Snow/Ice	*See Table 4*	*See Table 4*
Note A. RST means road surface temperature. Note B. Refer also to paragraph 5.4 of this part		

Table 3 –Precautionary Treatment Potassium Acetate Spreading Rates (Other alternative de-icing agent spreading rates to be in accordance with manufacturers recommendations)

Proposed spray rate matrix for use with Potassium Acetate SUPAMIX ULTRA

Precautionary treatments

Conditions	Forecasted Temperature	Spray Rate (g/m2)	equivalent Lit/sq.m
dry and Temp falling	+1 deg to below zero	10	14
wet and due to fall below 0	below zero	10	14
rain due to fall on surface forecast to be below zero	below zero	15	21
light snow fall	below zero	12	17
heavy snow fall expected	below zero	25	35
prolonged snow fall expected	below zero	40	56
freezing rain expected	below zero	25	35

De-icing spray rates

Conditions	Existing ground Temperature	Spray Rate (g/m2)	equivalent Lit/sq.m
Frost	Above -5	8	11
Black Ice	Above -5	18	25
packed snow up to 10mm	Above -5	25	35
packed snow over 10mm	Above -5	use 40gms dry salt	

Conditions	Existing ground Temperature	Spray Rate (g/m2)	equivalent Lit/sq.m
Frost	below -5	10	14
Black Ice	below -5	25	35
packed snow up to 10mm	below -5	35	49
packed snow over 10mm	below -5	use 40gms dry salt	

Table 4: Snow or Ice Clearance Salt Spreading Rates

Clearance Matrix					
Minimum Salt Spread rates for Snow or Ice Clearance					
	Treatment				
Road Surface Condition	**Spreading (grams/square metre)**	**Ploughing**	**Blowing**	**Alternative De-icer**	**Ice Breaker**
Ice Formed	20 to 40	No	No	Where applicable	No
Snow covering of less than 30mm	20	Yes	No	No	No
Snow covering exceeds 30mm	20 to 40	Yes	No	No	No
Snow accumulations due to prolonged snowfall	20 to 40	Yes (continuous)	Where applicable	No	No
Hard packed snow/ice less than 20mm thick	20 to 40 (successive treatments)	No	No	Yes	Where applicable
Hard packed snow/ice	salt/abrasive (successive treatments)	No	No	Yes	Yes

Table 5 – Snow Clearance

Condition Criteria	Category A Patrol Routes		Non Category A Patrol Routes	
	Dual carriageways and Motorways		Dual carriageways	Wide Single 2+1 (WS2+1) & Single carriageways
	Number of Existing Lanes		Number of Existing Lanes	
	2	3 or more	2	1 or 2 (WS2+1)
	Minimum number of lanes in each direction free from ice and snow as far as is reasonably practical		Minimum number of lanes in each direction free from ice and snow as far as is reasonably practical	
Snow at any time	1	2	1	1
Following clearance of minimum lanes of the cessation of snow fall all lanes are to be clear of snow	6 hours	6 hours	12 hours	12 hours

APPENDIX B

PATROL ROUTES

Category (A/B)	Route	Depot	Route Description	Depot to Route (km)	Time to Route (mins)	Patrol Length (km)	Average Speed (kph)	Route Time	Route to Depot (km)
A1	M90, A92	Rosyth	(Depot – Ferrytoll) M90 Ferrytoll – M9 jct 1A via Queensferry crossing. M9 jct 1A – M90 jct 3 Halbeath via Queensferry crossing. M90 jct 3 – M90 jct 2 Admiralty M90 jct 2 – A92 Cowdenbeath A92 Cowdenbeath to Ferrytoll	2	5	44	64	41	2
A2	A90, A9000, M90, A823 (M)	Rosyth	(Depot – Ferrytoll)) M90 Ferrytoll – M823 Pitreavie M823 Pitreavie – A90 Dalmeny via Forth Road bridge. A90 Dalmeny to Ferrytoll via South Queensferry roundabout and Forth Road Bridge	2	5	42	58	43	2

Winter Service Patrol Report Record

Patrol Route…… Date…… Information checked by……

Winter Service Patrol start and end time	**Weather conditions for Winter Service Patrol route**		**Assessed road condition (by driver) (X)**				**Assessed residual salt level (by driver) (X)**			**Action implemented (use symbols provided below)***						**Route salted prior to patrol (X)**		
	Air (°C)	Road Surface temperature (°C)	Snow	Icy	Wet	Dry	High	Medium	Low	Action code	Treatment Type	Spread rate (g/m^2)	Approximate location of salting or other action	Treatment Start Time	Treatment End Time	Yes	No	Time of salting

*Action symbols:

1 Spot treatment as instructed by the Winter Service Duty Officer.

2 Spot treatment as determined by driver.

3 Route treatment as advised by the Winter Service Duty Officer.

4 Route treatment as determined by driver.

5 Attend to runoff or seepage on surface.

6 Remove obstruction (eg dead dog, fallen tree, and other obstructions.) from surface.

7 Pre-wetted Salt

8 Dry Salt

9 Potassium Acetate

APPENDIX C

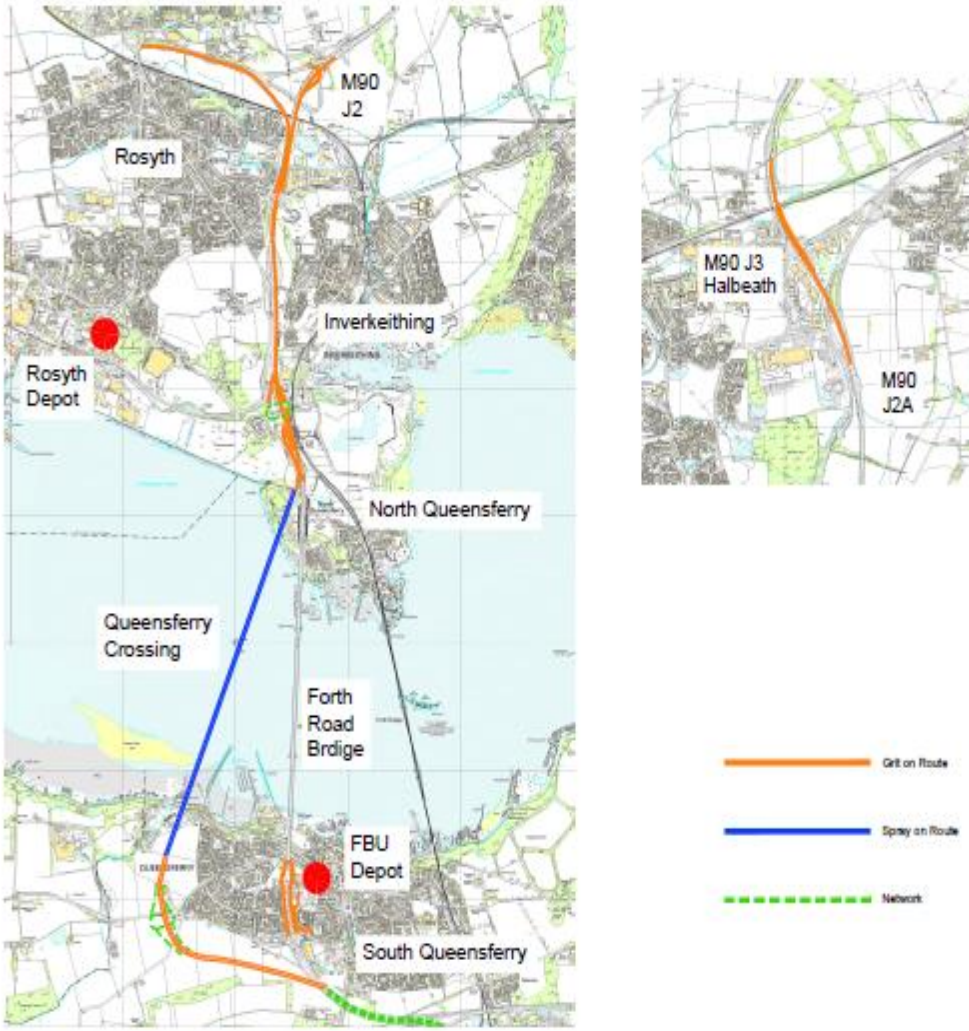
MAPS

TREATMENT ROUTES

&

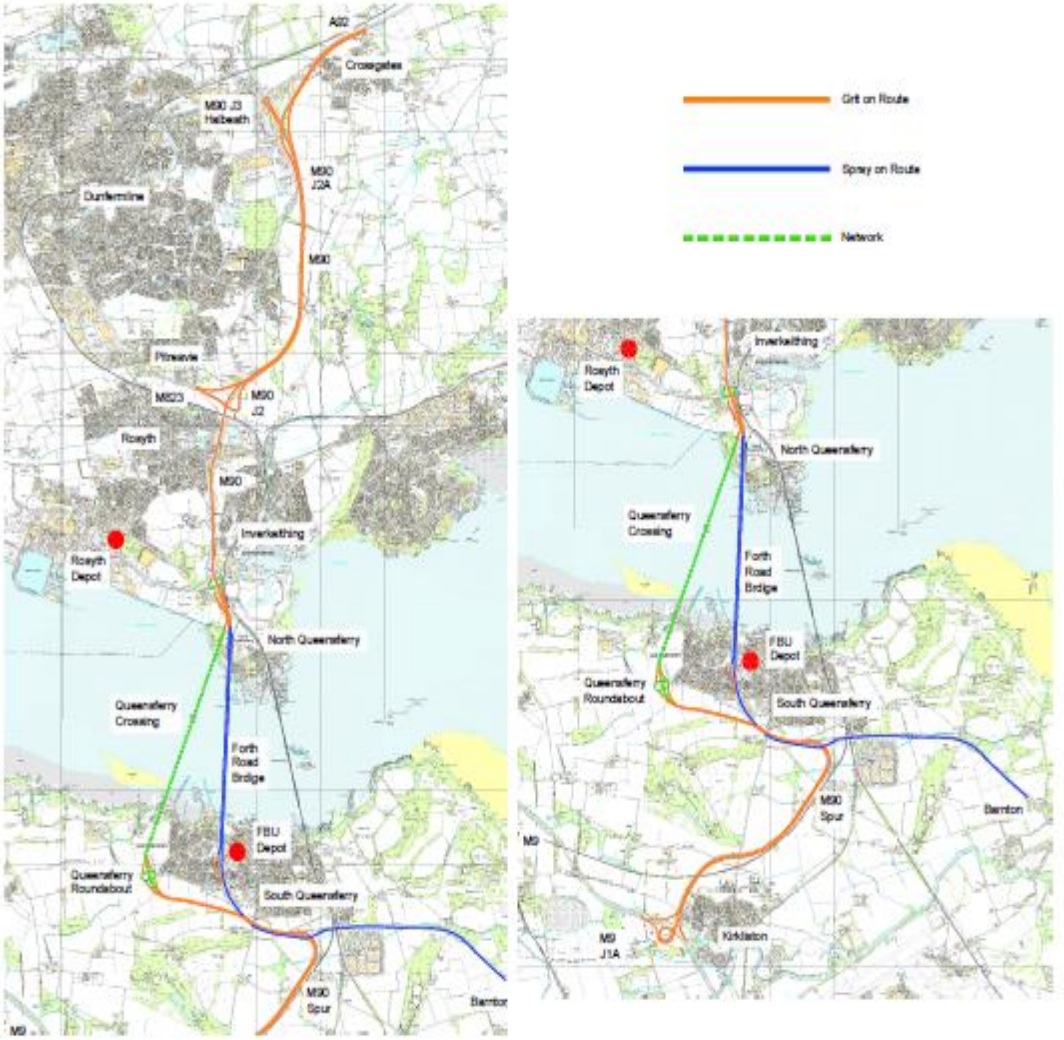
PATROLS

Precautionary Treatment Route 1



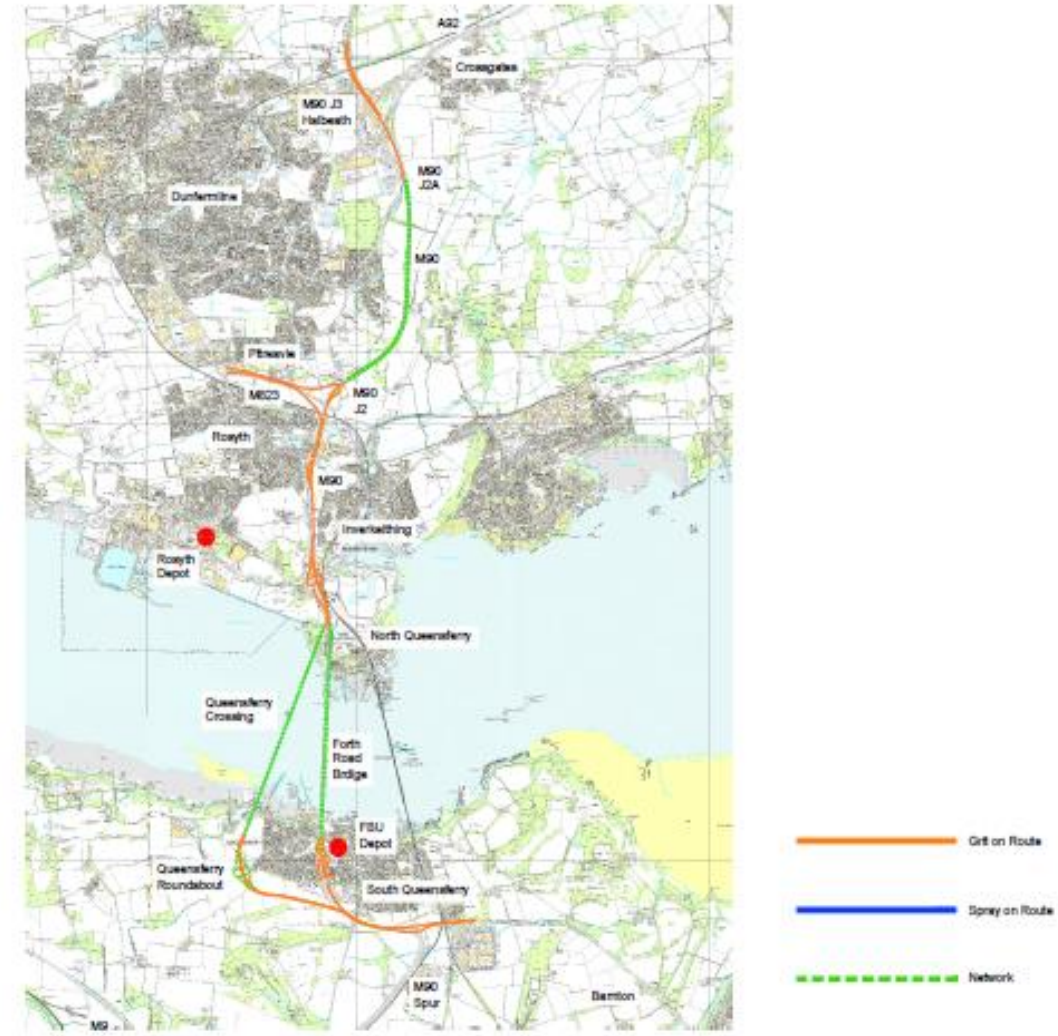
Route 1

Precautionary Treatment Route 2



Route 2

Precautionary Treatment Route 3

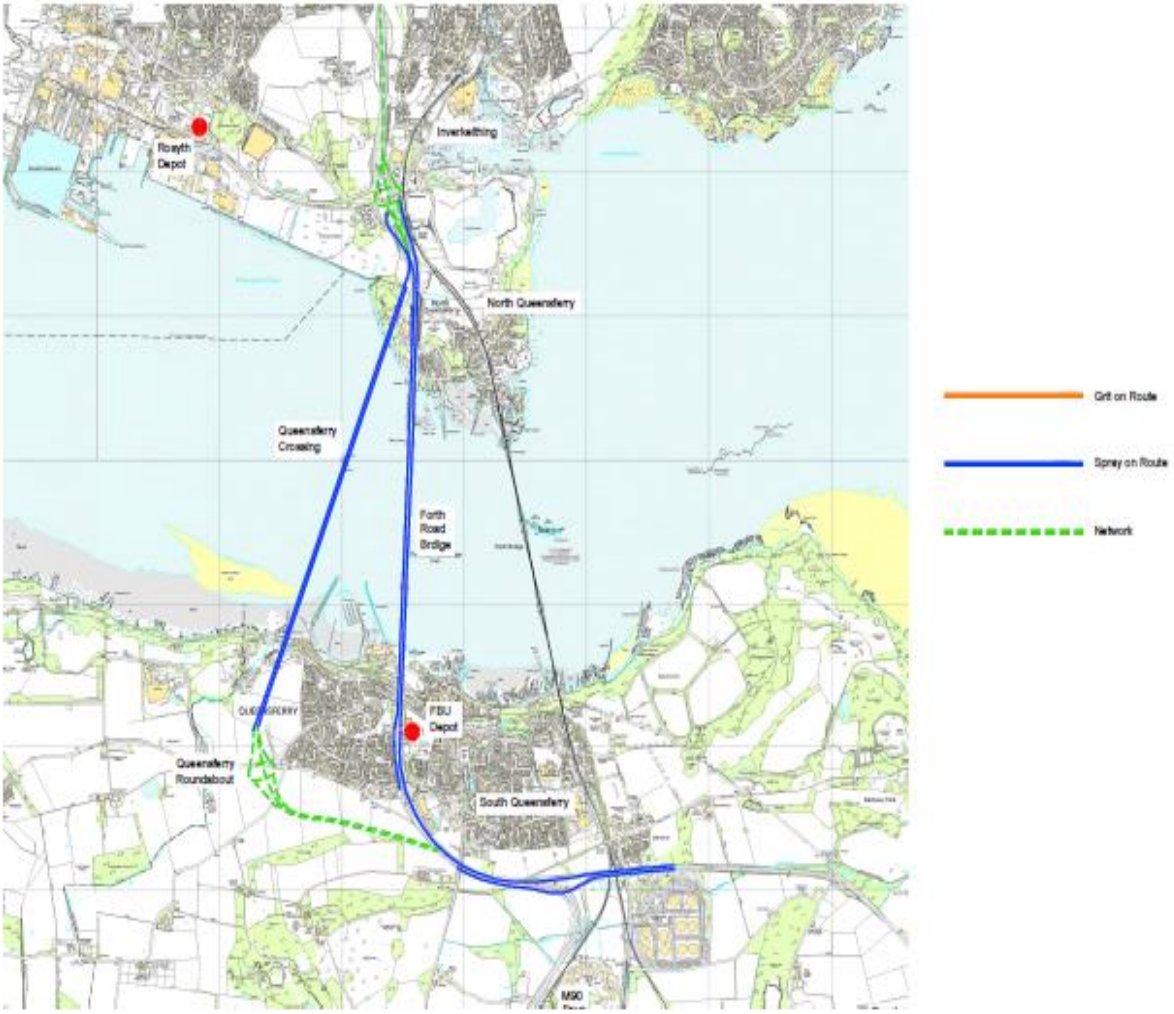


Route 3

Precautionary Treatment Route 4

Route 4

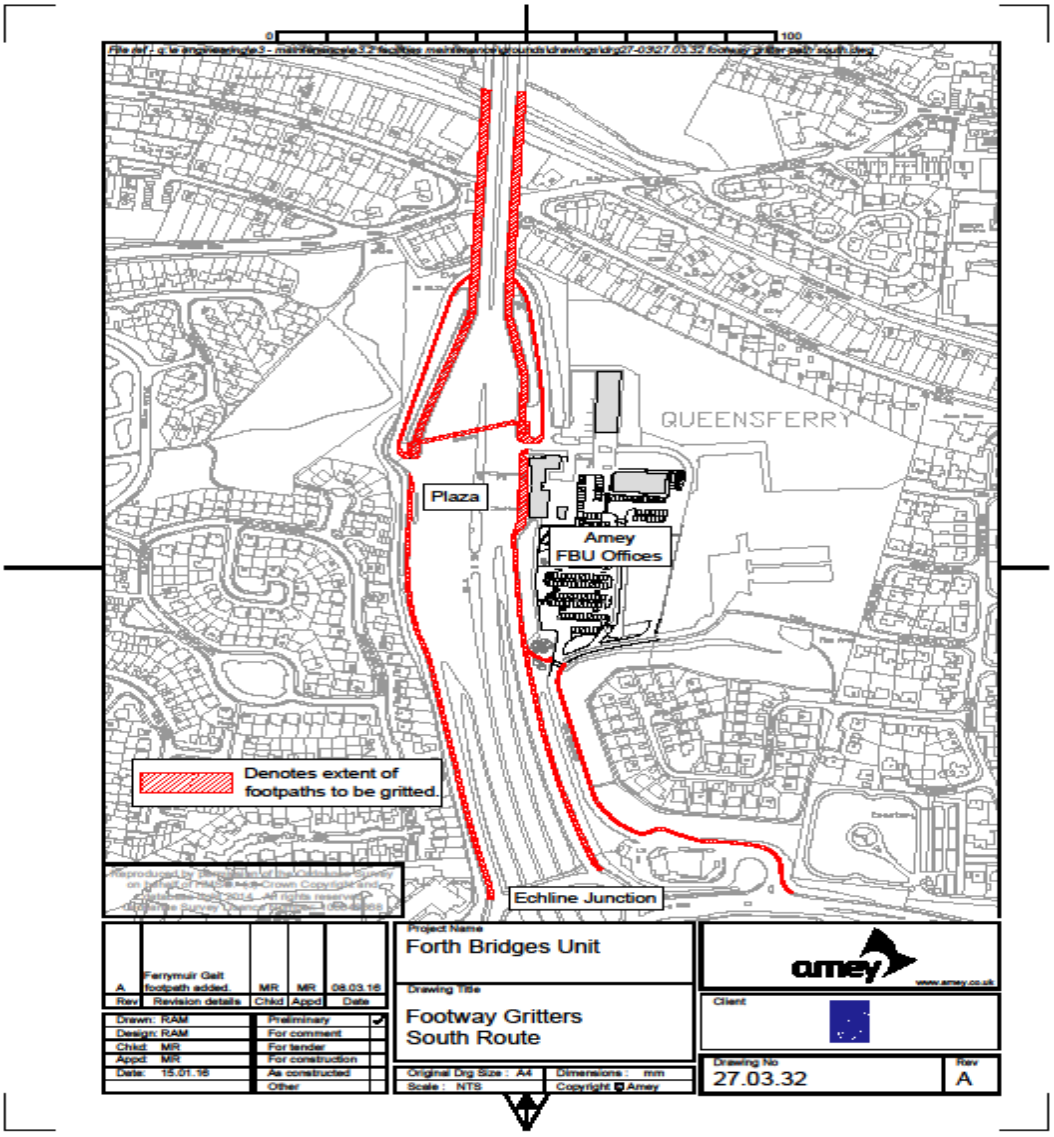
Precautionary Treatment Route 5

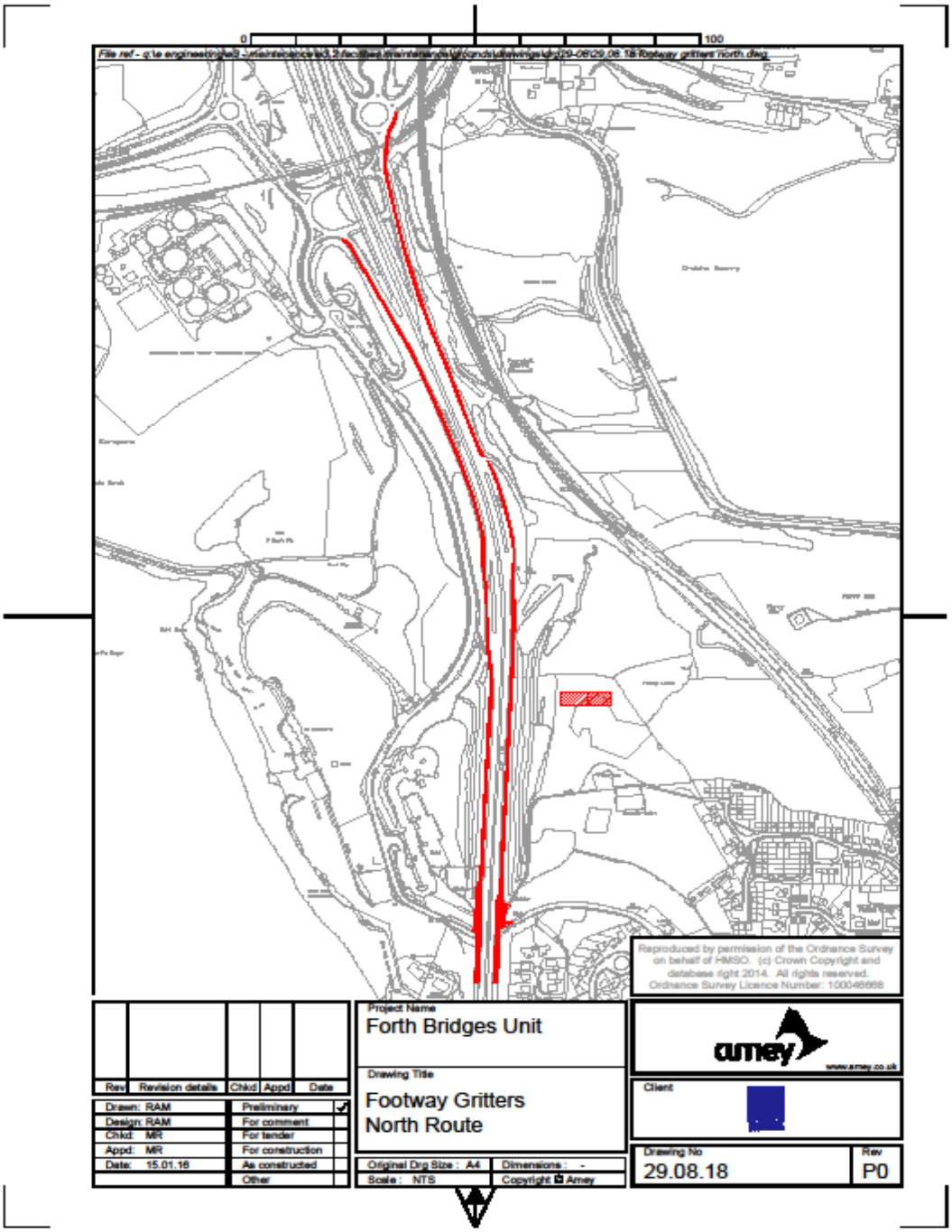


Route 5

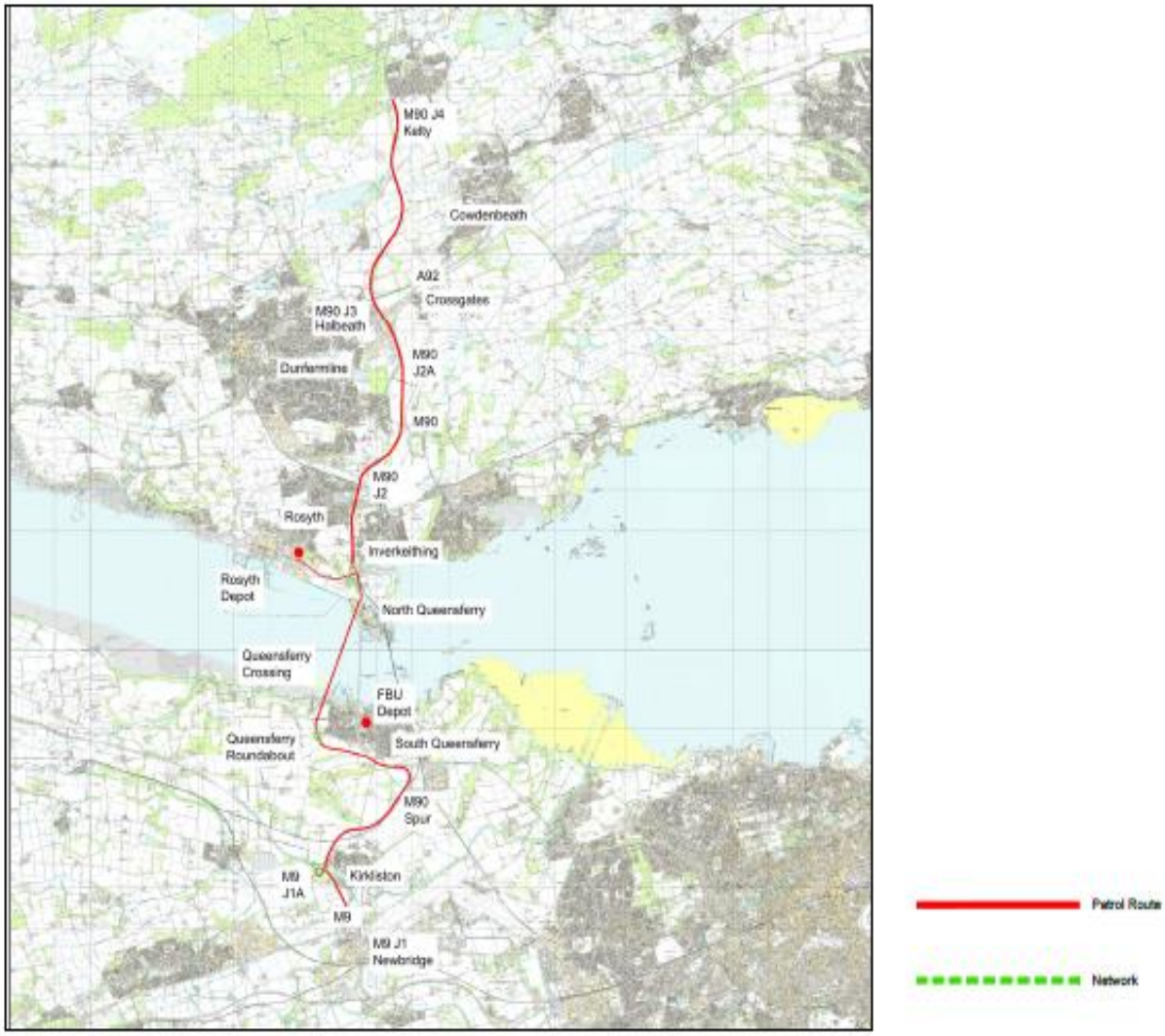
Precautionary Treatment Route 6 (FRBFC-20)

(Paragraph 11.1.8 provides footway details)





Winter service Patrol - 1



Patrol Route 1

Winter service Patrol – 2

Patrol Route 2

APPENDIX D

ANNEX WSP 1

WINTER SERVICE PATROLS

Appendix WSP 1

Table 7.2.J.1 – Winter Service Plant for all Winter Service Patrols

Type and Registration No	Depot Location	Specification including Capacity	Quantity
18 tonne 4x2, **YF63 HVA, YF63 HVB**	Rosyth	6 cubic metre pre-wet spreader.	2

Table 7.2.J.2 – Winter Service Patrol Routes

Category (A/B)	Route	Depot	Route Description	Depot to Route (km)	Time to Route (mins)	Patrol Length (km)	Average Speed (kph)	Route Time	Route to Depot (km)
A1	M90, A92	Rosyth	(Depot – Ferrytoll) M90 Ferrytoll – M9 jct 1A via Queensferry crossing. M9 jct 1A – M90 jct 3 Halbeath via Queensferry crossing. M90 jct 3 – M90 jct 2 Admiralty M90 jct 2 – A92 Cowdenbeath A92 Cowdenbeath to Ferrytoll	2	5	44	64	41	2
A2	A90, A9000, M90, A823 (M)	Rosyth	(Depot – Ferrytoll)) M90 Ferrytoll – M823 Pitreavie M823 Pitreavie – A90 Dalmeny via Forth Road bridge. A90 Dalmeny to Ferrytoll via South Queensferry roundabout and Forth Road Bridge	2	5	42	58	43	2

Table 7.2.J.2 Winter Service Patrol Routes

ANNEX WSP 2

PRECAUTIONARY SALTING ROUTES

Precautionary Treatment Routes (20 gramme routes)

Route	Depot	Description	Depot to Route (km)	Time to Route (mins)	De-icing Length (km)	Average Speed (kph)	Route Time (mins)	Route to Depot (km)	Average Width of Route (m)	Alter-native Access	Route Tonnage at 20 g/sq m (tonne) and 0.01562 lit/m2	Treatment Type
1	Rosyth	A90, M90, A823(M), Queensferry Crossing and Bus link	21.9	25	31	40	108	27	8.1	Burghmuir	2.1 and 868 lit	Pre-wet and Pot Acetate
2	Rosyth	M90, A92, A823(M), Forth Road Bridge and Bus link	32.9	30	45.5	54	106	32.5	7.0	Burghmuir	5.6 and 830	Pre-wet and Pot Acetate
3	Rosyth	A90, M90, A823(M)	21.9	25	24.8	40	103	27	7.6	Burghmuir	2.1	Pre-wet
4	Rosyth	M90, A92, A823(M)	32.9	30	34.8	54	75	32.5	7.0	Burghmuir	5.5	Pre-wet
5	Rosyth	Queensferry Crossing and Forth Road Bridge	1.9	5	18	54	42	1.8	7.8	Burghmuir	1956 lit	Pot Acetate
Footway	Queensferry	A9000 Forth Road Bridge Footpath/ Cycleways	1.0	2	11.2	19	99	0.2	3.6	Rosyth	710 litres	Pot Acetate and brine

Precautionary Treatment Route 1.

Depot: Rosyth		Vehicle: **WX65 WFD** (12cu.m Combi)	
	From	Distance (KM)	Time (Mins)
Travel	Depot to start of route on A90 at Dalmeny	21.9	25
grit	A90 n/b to M90 merge at scotstoun bend	1.4	2
Grit	M90 n/b fom scotstoun bend to start of Queensferry crossing n/b gritting lanes 2 and 3	2.2	3
spray	Spray approach to Queensferry crossing and bridge to end of viaduct	3.1	5
Travel	M90 n/b from end of viaduct to the off slip to admiralty roundabout	1.8	2
grit	M90 n/b off slip to admiralty roundabout and the n/b on ramp to M90	0.6	1
grit	n/b on slip to M823 w/b to pitreavie roundabout	1.6	2
grit	M823 e/b from pitreavie to M90 s/b on slip	1.3	2
grit	M90 s/b on slip from M823 to s/b M90	0.6	0.5
grit	M90 s/b lane 1 to off slip to Admiralty	0.6	0.5
Travel	Admiralty roundbout to s/b on slip	0.2	0.5
grit	S/b on slip from Admiralty to s/b M90	0.3	0.5
grit	M90 bus lane s/b to ferrytoll	1	2
grit	S/b bus lane off slip to ferrytoll park and ride	0.4	1
grit	circulatory Ferrytoll roundabout	0.5	0.5
grit	M90 s/b on slip from Ferrytoll interchange	0.5	0.5
Travel	M90 south over Queensferry crossing bridge to South Queensferry roundabout and then via A904 to Echline roundabout	5	7
grit	Echline roundabout n/b on slip to service rd junction	1	1

grit	service rd under A9000 to front of FBU office	1	1
grit	Plaza area from top of service road to s/b off slip to Echline roundabout	0.5	3
grit	s/b off slip from forth bridge plaza area to echline roundabout	0.4	0.5
Travel	Echline to Ferrymuir Gait road	0.2	0.5
grit	Ferrymuir Gait to car park	0.5	1
grit	car park	0.5	4
travel	service rd to Ferrytoll n/b off slip	4	5
grit	Ferrytoll n/b off slip	0.5	1
grit	M90 N/b on slip to M90	0.4	1
Travel	M90 n/b to boundary at junction 2A off slip	5.6	5
grit	M90 n/b to boundary at junction 3, Halbeath. (netherbeath overbridge) (hardshoulder and lane 1 @2)	0.9	2
Travel	M90 n/b to junction 4 and turn and return to netherbeath overbridge)	10	10
grit	M90 S/B to point where slip road merges from jct 3	0.7	2
Travel	from merge of jct 3 on M90 s/b to merge where jct 2 leaves	4	4
grit	M90 s/b from where jct 2 splits to start of QC Bridge	3.3	10
Spray	M90 s/b from viaduct over Queensferry crossing and on to point level with off slip to Queensferry roundabout	3.1	4
Grit	M90 s/b from off slip under QC roundabout to Off slip to A90 Dalmeny gritting lane h/s and lane 1 and 2	2.2	3
grit	Take off slip and grit A90 to boundary after N/b gantry	1.4	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Travel	w/b bus link to B800	0.6	1
travel	from B800 road to Echline roundabout roundabout	1.1	2
grit	Southbound on slip from echline roundabout to eastbound bus link	0.5	2
Travel	End of route travel to depot	27	31

Total time from start to finish of precautionary treatment (Mins)	: 108
Total length of carriageway salted (km)	: 31.0
Average width of carriageway (m)	: 8.1
Total tonnage used at 20 gm/m2	: 2.1
Potassium Acetate used at 14 lit/m2	: 868

Precautionary Treatment Route FRB - 2.

Depot: Rosyth (12cu.m Combi)		**Vehicle: WX65 WFE**	
	Road	Distance (KM)	Time (Mins)
Travel	Depot to M90 s/B then on spur to M9 w/b to junction 3, Burghmuir, and return to M90 n/b on slip	32.9	30
grit	M90 n/b on slip from M9 e/b	0.75	1
Grit	M90 spur n/b from slip road merge to Scotstoun bend	3.6	4
Grit	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout, gritting H/S and lane 1	1.3	2
Grit	M90 n/b off slip to Queensferry roundabout	0.4	0.5
Travel	Queensferry roundabout to n/b on slip to M90	0.3	0.5
Grit	M90 n/b on slip to Queensferry crossing	0.4	1
Travel	M90 n/b over Queensferry crossing to end of structure	3	3
Grit	M90 from end of bridge structure to n/b off slip to A92 Cowdenbeath	5.6	5
Grit	M90 jct 2A off slip to A92 e/b to B981 overbridge	2.5	3
Travel	B981 overbridge to Cowdenbeath junction and return	5.6	5
Grit	A92 slip on to M90 s/b and grit to end of lane 1 of slip road merge on to M90 s/b	2.4	3
Grit	Continue gritting M90 S/B to off slip to M823 Pitreavie w/b	3.3	3
Grit	S/B off slip to M823 from M90 to merge where n/b on slip meets	1.3	2
Travel	M823 to Pitreavie roundabout and return M823 e/b to n/b on slip to m90	2.6	3
grit	N/B on slip to M90 from e/b M823	0.4	1
Travel	M90 north to junction 3 n/b off slip	4.1	4

Grit	M90 junction 3 n/b off slip to Halbeath roundabout	0.3	0.5
Travel	Halbeath roundabout to S/B on slip to M90	0.4	1
Grit	Halbeath jct 3 s/b on slip to M90 s/b then continue on main carriageway	0.4	0.5
Grit	M90 s/b from end of on slip to end of merge lanes from Jct 2A	0.8	1
Travel	S/B on slip towards Queensferry crossing	0.3	0.5
Travel	s/b on slip to Queensferry crossing from Ferrytoll interchange	0.3	0.5
Travel	M90 s/b over the Queensferry crossing bridge to s/b off slip at Queensferry roundabout	0.2	0.5
grit	M90 s/b off slip to Queensferry roundabout	0.7	1
Travel	Queensferry roundabout to s/b on slip to M90	0.2	0.5
grit	M90 s/b on slip from Queensferry roundabout to s/b M90	0.7	1
grit	M90 s/b from off slip to scotstoun bend, gritting lane 2 and 3	2.1	2
Grit	M90 southbound from scotstoun bend to start of of slip to M9 s/b at Jct 1A	3.6	3
Grit	Off slip from M90 spur to M9 southbound. Grit to river Almond bridge	1	1
Travel	M9 s/b to Newbridge and turn and return M9 n/b to river bridge	3	5
Grit	M9 n/b slip road on to M90 spur n/b from river Almond bridge to merge with s/b on slip from M9	2	2
Travel	M90 spur n/b from slip road merge to Scotstoun bend	3.6	3
Travel	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout	1.3	2
Travel	M90 n/b off slip to Queensferry roundabout	0.4	0.5

travel	South Queensferry roundabout to Echline Roundabout and take the n/b on slip towards Forth Road Bridge	1.5	2
Spray	from service rd junction to start of FRB contraflow and northbound over FRB	2.9	3
spray	N/B from end of FRB to start of Ferrytoll off slip	0.6	0.5
grit	N/B off slip from FRB to Ferrytoll interchange	1	1
Travel	Ferrytoll interchange to s/b on slip to FRB	0.6	1
grit	S/B on slip from Ferrytoll interchange to top of slip road	0.6	1
Spray	from top of slip road to start of S/B FRB	0.5	1
Spray	S/B FRB to start of n/B off slip to Echline R/B	2.9	3
Spray	continue on A9000 under echline interchange and travel on bus link towards A90 Dalmeny	1.6	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Spray	w/b bus link to B800	0.6	1
travel	from B800 road to South Queensferry roundabout	2.1	3
Travel	Queensferry roundabout to s/b on slip to M90	0.3	1
travel	M90 s/b to off slip to M9 w/b towards Falkirk	5.5	6
grit	M90 off slip to M9 w/b	1.2	1
Travel	End of route. Return to Rosyth depot	32.5	30

Total time from start to finish of precautionary treatment (Mins) : 106
Total length of carriageway salted (km) : 45.5
Average width of carriageway (m) : 7.0
Total tonnage used at 20 gm/m2 : 5.6
Potassium Acetate used at 14 lit/m2 : 830

Precautionary Treatment Route 3.

Depot: Rosyth		Vehicle: **WX65 WFD** (12cu.m Combi)	
	From	Distance (KM)	Time (Mins)
Travel	Depot to start of route on A90 at Dalmeny	21.9	25
grit	A90 n/b to M90 merge at scotstoun bend	1.4	2
Grit	M90 n/b fom scotstoun bend to start of Queensferry crossing n/b gritting lanes 2 and 3	2.2	3
Travel	Queensferry crossing N/B to end of viaduct	3.1	3
Travel	M90 n/b from end of viaduct to the off slip to admiralty roundabout	1.8	2
grit	M90 n/b off slip to admiralty roundabout and the n/b on ramp to M90	0.6	2
grit	n/b on slip to M823 w/b to pitreavie roundabout	1.6	2
grit	M823 e/b from pitreavie to M90 s/b on slip	1.3	2
grit	M90 s/b on slip from M823 to s/b M90	0.6	1
grit	M90 s/b lane 1 to off slip to Admiralty	0.6	1
Travel	Admiralty roundbout to s/b on slip	0.2	1
grit	S/b on slip from Admiralty to s/b M90	0.3	1
grit	M90 bus lane s/b to ferrytoll	1	2
grit	S/b bus lane off slip to ferrytoll park and ride	0.4	1
grit	circulatory Ferrytoll roundabout	0.5	1
grit	M90 s/b on slip from Ferrytoll interchange	0.5	1
Travel	M90 south over Queensferry crossing bridge to South Queensferry roundabout and then via A904 to Echline roundabout	5	7
grit	Echline roundabout n/b on slip to service rd junction	1	3

grit	service rd under A9000 to front of FBU office	1	3
grit	Plaza area from top of service road to s/b off slip to Echline roundabout	0.5	5
grit	s/b off slip from forth bridge plaza area to echline roundabout	0.4	1
Travel	Echline to Ferrymuir Gait road	0.2	1
grit	Ferrymuir Gait to car park	0.5	1
grit	car park	0.5	4
travel	service rd to Ferrytoll n/b off slip	4	5
grit	Ferrytoll n/b off slip	0.5	1
grit	M90 N/b on slip to M90	0.4	1
Travel	M90 n/b to boundary at junction 2A off slip	5.6	5
grit	M90 n/b to boundary at junction 3, Halbeath. (netherbeath overbridge) (hardshoulder and lane 1 @2)	0.9	2
Travel	M90 n/b to junction 4 and turn and return to netherbeath overbridge)	10	10
grit	M90 S/B to point where slip road merges from jct 3	0.7	10
Travel	from merge of jct 3 on M90 s/b to merge where jct 2 leaves	4	
grit	M90 s/b from where jct 2 splits to start of QC Bridge	3.3	10
Travel	M90 s/b from viaduct over Queensferry crossing and on to point level with off slip to Queensferry roundabout	3.1	4
Grit	M90 s/b from off slip under QC roundabout to Off slip to A90 Dalmeny gritting lane h/s and lane 1 and 2	2.2	3
grit	Take off slip and grit A90 to boundary after N/b gantry	1.4	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Travel	w/b bus link to B800	0.6	1
travel	from B800 road to Echline roundabout roundabout	1.1	2
grit	Southbound on slip from echline roundabout to eastbound bus link	0.5	2
Travel	End of route travel to depot	27	31

Total time from start to finish of precautionary treatment (Mins)	: 103
Total length of carriageway salted (km)	: 24.8
Average width of carriageway (m)	: 7.6
Total tonnage used at 20 gm/m2	: 2.1

Precautionary Treatment Route FRB - 4.

Depot: Rosyth (12cu.m Combi)		**Vehicle: WX65 WFE**	
	Road	Distance (KM)	Time (Mins)
Travel	Depot to M90 s/B then on spur to M9 w/b to junction 3, Burghmuir, and return to M90 n/b on slip	32.9	30
grit	M90 n/b on slip from M9 e/b	0.75	1
Grit	M90 spur n/b from slip road merge to Scotstoun bend	3.6	4
Grit	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout, gritting H/S and lane 1	1.3	2
Grit	M90 n/b off slip to Queensferry roundabout	0.4	0.5
Travel	Queensferry roundabout to n/b on slip to M90	0.3	0.5
Grit	M90 n/b on slip to Queensferry crossing	0.4	1
Travel	M90 n/b over Queensferry crossing to end of structure	3	3
Grit	M90 from end of bridge structure to n/b off slip to A92 Cowdenbeath	5.6	5
Grit	M90 jct 2A off slip to A92 e/b to B981 overbridge	2.5	3
Travel	B981 overbridge to Cowdenbeath junction and return	5.6	5
Grit	A92 slip on to M90 s/b and grit to end of lane 1 of slip road merge on to M90 s/b	2.4	3
Grit	Continue gritting M90 S/B to off slip to M823 Pitreavie w/b	3.3	3
Grit	S/B off slip to M823 from M90 to merge where n/b on slip meets	1.3	2
Travel	M823 to Pitreavie roundabout and return M823 e/b to n/b on slip to m90	2.6	3
grit	N/B on slip to M90 from e/b M823	0.4	1
Travel	M90 north to junction 3 n/b off slip	4.1	4

Grit	M90 junction 3 n/b off slip to Halbeath roundabout	0.3	0.5
Travel	Halbeath roundabout to S/B on slip to M90	0.4	1
Grit	Halbeath jct 3 s/b on slip to M90 s/b then continue on main carriageway	0.4	0.5
Grit	M90 s/b from end of on slip to end of merge lanes from Jct 2A	0.8	1
Travel	S/B on slip towards Queensferry crossing	0.3	0.5
Travel	s/b on slip to Queensferry crossing from Ferrytoll interchange	0.3	0.5
Travel	M90 s/b over the Queensferry crossing bridge to s/b off slip at Queensferry roundabout	0.2	0.5
grit	M90 s/b off slip to Queensferry roundabout	0.7	1
Travel	Queensferry roundabout to s/b on slip to M90	0.2	0.5
grit	M90 s/b on slip from Queensferry roundabout to s/b M90	0.7	1
grit	M90 s/b from off slip to scotstoun bend, gritting lane 2 and 3	2.1	2
Grit	M90 southbound from scotstoun bend to start of of slip to M9 s/b at Jct 1A	3.6	3
Grit	Off slip from M90 spur to M9 southbound. Grit to river Almond bridge	1	1
Travel	M9 s/b to Newbridge and turn and return M9 n/b to river bridge	3	5
Grit	M9 n/b slip road on to M90 spur n/b from river Almond bridge to merge with s/b on slip from M9	2	2
Travel	M90 spur n/b from slip road merge to Scotstoun bend	3.6	3
Travel	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout	1.3	2
Travel	M90 n/b off slip to Queensferry roundabout	0.4	0.5
Travel	Queensferry roundabout to s/b on slip to M90	0.3	1

travel	M90 s/b to off slip to M9 w/b towards Falkirk	5.5	6
grit	M90 off slip to M9 w/b	1.2	1
Travel	End of route. Return to Rosyth depot	32.5	30

Total time from start to finish of precautionary treatment (Mins) : 75
Total length of carriageway salted (km) : 34.8
Average width of carriageway (m) : 7.9
Total tonnage used at 20 gm/m2 : 5.5

Precautionary Treatment Route FRB - 5.

	Road	Distance (Km)	time (mins)
Travel	Depot to Ferrytoll roundabout and then on s/b on slip to top of slip road at start of Queensferry crossing	1.9	4
Spray	M90 s/b from viaduct over Queensferry crossing to start of the S/B off slip to Queensferry roundabout	3.5	4
travel	M90 s/b off slip to South Queensferry roundabout	0.5	1
travel	South Queensferry roundabout to start of the northbound on slip to M90	0.3	1
travel	M90 Northbound on slip from south queensferry roundabout to M90 n/b before Queensferry crossing	0.5	1
spray	Spray approach to Queensferry crossing and n/b over bridge to top of the n/b off slip to Ferrytoll interchange	3.8	5
Travel	M90 N/b off slip to Ferrytoll roundabout and then circulate roundabout to the southbound on slip to M90	0.8	2
Travel	southbound on slip to split where Forth bridge slip deviates from Queensferr crossing slip road	0.2	0.5
Spray	S/B on slip from Ferrytoll interchange to top of slip road	0.6	1
Spray	from top of slip road to start of S/B FRB	0.5	1
Spray	S/B FRB to start of n/B off slip to Echline R/B	2.9	3
Spray	continue on A9000 under echline interchange and travel on bus link towards A90 Dalmeny	1.6	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Spray	w/b bus link to B800	0.6	1

travel	from B800 road to Echline roundabout	1	2
Spray	northbound on slip to A9000 (FRB) and northbound over FRB	2.9	3
spray	N/B from end of FRB to start of Ferrytoll off slip	0.6	0.5
Spray	N/B off slip from FRB to Ferrytoll interchange	1	1
Travel	End of route. Return to Rosyth depot	1.8	2

Total time from start to finish of precautionary treatment (Mins) : 42
Total length of carriageway salted (km) : 18.0
Average width of carriageway (m) : 7.8
Potassium Acetate used at 14 lit/m2 : 1956

Precautionary Treatment Route 6 (FRBFC 20)

Depot: South Queensferry			**Vehicle:** Transit Pick-up.			
	Road	From	To	Distance (KM)	Average Speed (km/hr)	Time (Mins)
Spray brine	Service Road/ Ferrymuir Gait	B800 Junction Footpath/ Cycleway	Junction with B800 Footpath/ Cycleway	1.0	15	2.0
TF	B800	Junction with Ferrymuir Gait	Start of FRB NB Footpath/ Cycleway	0.5	30	1.0
Spray pot acetate	West Footpath/ Cycleway	Start of FRB NB Footpath/ Cycleway	End of FRB NB Footpath/ Cycleway	2.5	15	10
Spray brine	Steps to North Abutment	Steps down to underpass	Steps up from underpass	0.2	15	10
TF		Southbound footway	Northbound footway	0.2	15	5
Spray pot acetate	A9000 NB	End of FRB NB Footpath/ Cycleway	Ferrytoll Roundabout Footpath/ Cycleway	1.5	15	5
Spray brine	Ferrytoll Roundabout	Ferrytoll Roundabout Footpath/ Cycleway	Ferrytoll Roundabout Footpath/ Cycleway	0.7	15	1.8
Spray brine	A9000 SB	Ferrytoll Roundabout Footpath/ Cycleway	North End FRB Footpath/ Cycleway	1.5	15	5
Spray brine	Steps North of bridge	Steps down from footway to north anchorage	Steps up n/b side fom north anchorage	0.5	1.5	10
Spray pot acetate	East Footpath/ Cycleway	Start of FRB SB Footpath/ Cycleway	End of FRB SB Footpath/ Cycleway	2.5	15	10
Spray brine	Steps south of bridge	Steps down from footway to south anchorage	Steps up n/b side fom south anchorage	0.5	1.5	10

Spray brine	A9000SB Slip and B800 Road Footway/ Cycleway	End of FRB SB Footpath/ Cycleway	Junction with Ferrymuir Gait and B800	0.5	15	2
Spray brine	Stairs from A9000 SB to Ferrymuir Gait	End FRB	Ferrymuir Gait Car park	0.2	5	5
Spray brine	Stairs from Plaza to pedestrian underpass	Steps down from plaza to underpass	Steps up from underpass	0.2	5	10
Spray brine	Link path	From s/b off slip at Echline	Ferrymuir Gait	0.1	10	2
Spray brine	Viewing area	Car park	Viewing area and office entrance	0.2	10	10

Total time from start to finish of precautionary treatment (Mins) : 99 mins
Total length of footway sprayed (km) : 11.2
Average width of footway (m) : 3.6
Total volume Potassium Acetate at 0.0156 litre/m2 : 710 litres

Precautionary Treatment Routes determined by the Operating Company (40 gramme routes)

Route	Depot	Description	Depot to Route (km)	Time to Route (mins)	De-icing Length (km)	Average Speed (kph)	Route Time (mins)	Route to Depot (km)	Average Width of Route (m)	Alter-native Access	Route Tonnage at 40 g/sq m (tonne)	Treatment Type
1	Rosyth	A90, M90, A823(M), Queensferry Crossing and Bus link	21.9	25	31	40	108	27	8.1	Burghmuir	4.2 and 2170 lit	Pre-wet and Pot Acetate
2	Rosyth	M90, A92, A823(M), Forth Road Bridge and Bus link	32.9	30	45.5	54	106	32.5	7.0	Burghmuir	11.2 and 2075	Pre-wet and Pot Acetate
3	Rosyth	A90, M90, A823(M)	21.9	25	24.8	40	103	27	7.6	Burghmuir	4.2	Pre-wet
4	Rosyth	M90, A92, A823(M)	32.9	30	34.8	54	75	32.5	7.0	Burghmuir	11.0	Pre-wet
5	Rosyth	Queensferry Crossing and Forth Road Bridge	1.9	5	18	54	42	1.8	7.8	Burghmuir	4888 lit	Pot Acetate
Footway	Queensferry	A9000 Forth Road Bridge Footpath/ Cycleways	1.0	2	11.2	19	99	0.2	3.6	Rosyth	1420 litres	Pot Acetate and brine

Precautionary Treatment Route 1.

Depot: Rosyth		Vehicle: **WX65 WFD** (12cu.m Combi)	
	From	Distance (KM)	Time (Mins)
Travel	Depot to start of route on A90 at Dalmeny	21.9	25
grit	A90 n/b to M90 merge at scotstoun bend	1.4	2
Grit	M90 n/b fom scotstoun bend to start of Queensferry crossing n/b gritting lanes 2 and 3	2.2	3
spray	Spray approach to Queensferry crossing and bridge to end of viaduct	3.1	5
Travel	M90 n/b from end of viaduct to the off slip to admiralty roundabout	1.8	2
grit	M90 n/b off slip to admiralty roundabout and the n/b on ramp to M90	0.6	1
grit	n/b on slip to M823 w/b to pitreavie roundabout	1.6	2
grit	M823 e/b from pitreavie to M90 s/b on slip	1.3	2
grit	M90 s/b on slip from M823 to s/b M90	0.6	0.5
grit	M90 s/b lane 1 to off slip to Admiralty	0.6	0.5
Travel	Admiralty roundbout to s/b on slip	0.2	0.5
grit	S/b on slip from Admiralty to s/b M90	0.3	0.5
grit	M90 bus lane s/b to ferrytoll	1	2
grit	S/b bus lane off slip to ferrytoll park and ride	0.4	1
grit	circulatory Ferrytoll roundabout	0.5	0.5

grit	M90 s/b on slip from Ferrytoll interchange	0.5	0.5
Travel	M90 south over Queensferry crossing bridge to South Queensferry roundabout and then via A904 to Echline roundabout	5	7
grit	Echline roundabout n/b on slip to service rd junction	1	1
grit	service rd under A9000 to front of FBU office	1	1
grit	Plaza area from top of service road to s/b off slip to Echline roundabout	0.5	3
grit	s/b off slip from forth bridge plaza area to echline roundabout	0.4	0.5
Travel	Echline to Ferrymuir Gait road	0.2	0.5
grit	Ferrymuir Gait to car park	0.5	1
grit	car park	0.5	4
travel	service rd to Ferrytoll n/b off slip	4	5
grit	Ferrytoll n/b off slip	0.5	1
grit	M90 N/b on slip to M90	0.4	1
Travel	M90 n/b to boundary at junction 2A off slip	5.6	5
grit	M90 n/b to boundary at junction 3, Halbeath. (netherbeath overbridge) (hardshoulder and lane 1 @2)	0.9	2
Travel	M90 n/b to junction 4 and turn and return to netherbeath overbridge)	10	10
grit	M90 S/B to point where slip road merges from jct 3	0.7	2
Travel	from merge of jct 3 on M90 s/b to merge where jct 2 leaves	4	4
grit	M90 s/b from where jct 2 splits to start of QC Bridge	3.3	10
Spray	M90 s/b from viaduct over Queensferry crossing and on to point level with off slip to Queensferry roundabout	3.1	4

Grit	M90 s/b from off slip under QC roundabout to Off slip to A90 Dalmeny gritting lane h/s and lane 1 and 2	2.2	3
grit	Take off slip and grit A90 to boundary after N/b gantry	1.4	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Travel	w/b bus link to B800	0.6	1
travel	from B800 road to Echline roundabout roundabout	1.1	2
grit	Southbound on slip from echline roundabout to eastbound bus link	0.5	2
Travel	End of route travel to depot	27	31

Total time from start to finish of precautionary treatment (Mins) : 108
Total length of carriageway salted (km) : 31.0
Average width of carriageway (m) : 8.1
Total tonnage used at 40 gm/m2 : 4.2
Potassium Acetate used at 35 lit/m2 : 2170

Precautionary Treatment Route 2.

Depot: Rosyth		**Vehicle:** **WX65 WFE** (12cu.m Combi)	
	Road	Distance (KM)	Time (Mins)
Travel	Depot to M90 s/B then on spur to M9 w/b to junction 3, Burghmuir, and return to M90 n/b on slip	32.9	30
grit	M90 n/b on slip from M9 e/b	0.75	1
Grit	M90 spur n/b from slip road merge to Scotstoun bend	3.6	4
Grit	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout, gritting H/S and lane 1	1.3	2
Grit	M90 n/b off slip to Queensferry roundabout	0.4	0.5
Travel	Queensferry roundabout to n/b on slip to M90	0.3	0.5
Grit	M90 n/b on slip to Queensferry crossing	0.4	1
Travel	M90 n/b over Queensferry crossing to end of structure	3	3
Grit	M90 from end of bridge structure to n/b off slip to A92 Cowdenbeath	5.6	5
Grit	M90 jct 2A off slip to A92 e/b to B981 overbridge	2.5	3
Travel	B981 overbridge to Cowdenbeath junction and return	5.6	5
Grit	A92 slip on to M90 s/b and grit to end of lane 1 of slip road merge on to M90 s/b	2.4	3
Grit	Continue gritting M90 S/B to off slip to M823 Pitreavie w/b	3.3	3
Grit	S/B off slip to M823 from M90 to merge where n/b on slip meets	1.3	2
Travel	M823 to Pitreavie roundabout and return M823 e/b to n/b on slip to m90	2.6	3
grit	N/B on slip to M90 from e/b M823	0.4	1
Travel	M90 north to junction 3 n/b off slip	4.1	4
Grit	M90 junction 3 n/b off slip to Halbeath roundabout	0.3	0.5
Travel	Halbeath roundabout to S/B on slip to M90	0.4	1

Grit	Halbeath jct 3 s/b on slip to M90 s/b then continue on main carriageway	0.4	0.5
Grit	M90 s/b from end of on slip to end of merge lanes from Jct 2A	0.8	1
Travel	S/B on slip towards Queensferry crossing	0.3	0.5
Travel	s/b on slip to Queensferry crossing from Ferrytoll interchange	0.3	0.5
Travel	M90 s/b over the Queensferry crossing bridge to s/b off slip at Queensferry roundabout	0.2	0.5
grit	M90 s/b off slip to Queensferry roundabout	0.7	1
Travel	Queensferry roundabout to s/b on slip to M90	0.2	0.5
grit	M90 s/b on slip from Queensferry roundabout to s/b M90	0.7	1
grit	M90 s/b from off slip to scotstoun bend, gritting lane 2 and 3	2.1	2
Grit	M90 southbound from scotstoun bend to start of of slip to M9 s/b at Jct 1A	3.6	3
Grit	Off slip from M90 spur to M9 southbound. Grit to river Almond bridge	1	1
Travel	M9 s/b to Newbridge and turn and return M9 n/b to river bridge	3	5
Grit	M9 n/b slip road on to M90 spur n/b from river Almond bridge to merge with s/b on slip from M9	2	2
Travel	M90 spur n/b from slip road merge to Scotstoun bend	3.6	3
Travel	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout	1.3	2
Travel	M90 n/b off slip to Queensferry roundabout	0.4	0.5
travel	South Queensferry roundabout to Echline Roundabout and take the n/b on slip towards Forth Road Bridge	1.5	2
Spray	from service rd junction to start of FRB contraflow and northbound over FRB	2.9	3
spray	N/B from end of FRB to start of Ferrytoll off slip	0.6	0.5
grit	N/B off slip from FRB to Ferrytoll interchange	1	1

Travel	Ferrytoll interchange to s/b on slip to FRB	0.6	1
grit	S/B on slip from Ferrytoll interchange to top of slip road	0.6	1
Spray	from top of slip road to start of S/B FRB	0.5	1
Spray	S/B FRB to start of n/B off slip to Echline R/B	2.9	3
Spray	continue on A9000 under echline interchange and travel on bus link towards A90 Dalmeny	1.6	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Spray	w/b bus link to B800	0.6	1
travel	from B800 road to South Queensferry roundabout	2.1	3
Travel	Queensferry roundabout to s/b on slip to M90	0.3	1
travel	M90 s/b to off slip to M9 w/b towards Falkirk	5.5	6
grit	M90 off slip to M9 w/b	1.2	1
Travel	End of route. Return to Rosyth depot	32.5	30

Total time from start to finish of precautionary treatment (Mins) : 106
Total length of carriageway salted (km) : 45.5
Average width of carriageway (m) : 7.0
Total tonnage used at 40 gm/m2 : 11.2
Potassium Acetate used at 35 lit/m2 : 2075

Precautionary Treatment Route 3.

Depot: Rosyth		Vehicle: **WX65 WFD** (12cu.m Combi)	
	From	Distance (KM)	Time (Mins)
Travel	Depot to start of route on A90 at Dalmeny	21.9	25
grit	A90 n/b to M90 merge at scotstoun bend	1.4	2
grit	M90 n/b fom scotstoun bend to start of Queensferry crossing n/b gritting lanes 2 and 3	2.2	3
Travel	Queensferry crossing N/B to end of viaduct	3.1	3
Travel	M90 n/b from end of viaduct to the off slip to admiralty roundabout	1.8	2
grit	M90 n/b off slip to admiralty roundabout and the n/b on ramp to M90	0.6	2
grit	n/b on slip to M823 w/b to pitreavie roundabout	1.6	2
grit	M823 e/b from pitreavie to M90 s/b on slip	1.3	2
grit	M90 s/b on slip from M823 to s/b M90	0.6	1
grit	M90 s/b lane 1 to off slip to Admiralty	0.6	1
Travel	Admiralty roundbout to s/b on slip	0.2	1
grit	S/b on slip from Admiralty to s/b M90	0.3	1
grit	M90 bus lane s/b to ferrytoll	1	2
grit	S/b bus lane off slip to ferrytoll park and ride	0.4	1
grit	circulatory Ferrytoll roundabout	0.5	1
grit	M90 s/b on slip from Ferrytoll interchange	0.5	1
Travel	M90 south over Queensferry crossing bridge to South Queensferry roundabout and then via A904 to Echline roundabout	5	7
grit	Echline roundabout n/b on slip to service rd junction	1	3
grit	service rd under A9000 to front of FBU office	1	3

grit	Plaza area from top of service road to s/b off slip to Echline roundabout	0.5	5
grit	s/b off slip from forth bridge plaza area to echline roundabout	0.4	1
Travel	Echline to Ferrymuir Gait road	0.2	1
grit	Ferrymuir Gait to car park	0.5	1
grit	car park	0.5	4
travel	service rd to Ferrytoll n/b off slip	4	5
grit	Ferrytoll n/b off slip	0.5	1
grit	M90 N/b on slip to M90	0.4	1
Travel	M90 n/b to boundary at junction 2A off slip	5.6	5
grit	M90 n/b to boundary at junction 3, Halbeath. (netherbeath overbridge) (hardshoulder and lane 1 @2)	0.9	2
Travel	M90 n/b to junction 4 and turn and return to netherbeath overbridge)	10	10
grit	M90 S/B to point where slip road merges from jct 3	0.7	10
Travel	from merge of jct 3 on M90 s/b to merge where jct 2 leaves	4	
grit	M90 s/b from where jct 2 splits to start of QC Bridge	3.3	10
Travel	M90 s/b from viaduct over Queensferry crossing and on to point level with off slip to Queensferry roundabout	3.1	4
grit	M90 s/b from off slip under QC roundabout to Off slip to A90 Dalmeny gritting lane h/s and lane 1 and 2	2.2	3
grit	Take off slip and grit A90 to boundary after N/b gantry	1.4	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Travel	w/b bus link to B800	0.6	1
travel	from B800 road to Echline roundabout roundabout	1.1	2
grit	Southbound on slip from echline roundabout to eastbound bus link	0.5	2
Travel	End of route travel to depot	27	31

Total time from start to finish of precautionary treatment (Mins) : 103
Total length of carriageway salted (km) : 24.8
Average width of carriageway (m) : 7.6
Total tonnage used at 40 gm/m2 : 4.2

Precautionary Treatment Route 4.

Depot: Rosyth		**Vehicle:** **WX65 WFE** (12cu.m Combi)	
	Road	Distance (KM)	Time (Mins)
Travel	Depot to M90 s/B then on spur to M9 w/b to junction 3, Burghmuir, and return to M90 n/b on slip	32.9	30
Grit	M90 n/b on slip from M9 e/b	0.75	1
Grit	M90 spur n/b from slip road merge to Scotstoun bend	3.6	4
Grit	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout, gritting H/S and lane 1	1.3	2
Grit	M90 n/b off slip to Queensferry roundabout	0.4	0.5
Travel	Queensferry roundabout to n/b on slip to M90	0.3	0.5
Grit	M90 n/b on slip to Queensferry crossing	0.4	1
Travel	M90 n/b over Queensferry crossing to end of structure	3	3
Grit	M90 from end of bridge structure to n/b off slip to A92 Cowdenbeath	5.6	5
Grit	M90 jct 2A off slip to A92 e/b to B981 overbridge	2.5	3
Travel	B981 overbridge to Cowdenbeath junction and return	5.6	5
Grit	A92 slip on to M90 s/b and grit to end of lane 1 of slip road merge on to M90 s/b	2.4	3
Grit	Continue gritting M90 S/B to off slip to M823 Pitreavie w/b	3.3	3
Grit	S/B off slip to M823 from M90 to merge where n/b on slip meets	1.3	2
Travel	M823 to Pitreavie roundabout and return M823 e/b to n/b on slip to m90	2.6	3
grit	N/B on slip to M90 from e/b M823	0.4	1
Travel	M90 north to junction 3 n/b off slip	4.1	4
Grit	M90 junction 3 n/b off slip to Halbeath roundabout	0.3	0.5
Travel	Halbeath roundabout to S/B on slip to M90	0.4	1

Grit	Halbeath jct 3 s/b on slip to M90 s/b then continue on main carriageway	0.4	0.5
Grit	M90 s/b from end of on slip to end of merge lanes from Jct 2A	0.8	1
Travel	S/B on slip towards Queensferry crossing	0.3	0.5
Travel	s/b on slip to Queensferry crossing from Ferrytoll interchange	0.3	0.5
Travel	M90 s/b over the Queensferry crossing bridge to s/b off slip at Queensferry roundabout	0.2	0.5
grit	M90 s/b off slip to Queensferry roundabout	0.7	1
Travel	Queensferry roundabout to s/b on slip to M90	0.2	0.5
grit	M90 s/b on slip from Queensferry roundabout to s/b M90	0.7	1
grit	M90 s/b from off slip to scotstoun bend, gritting lane 2 and 3	2.1	2
Grit	M90 southbound from scotstoun bend to start of of slip to M9 s/b at Jct 1A	3.6	3
Grit	Off slip from M90 spur to M9 southbound. Grit to river Almond bridge	1	1
Travel	M9 s/b to Newbridge and turn and return M9 n/b to river bridge	3	5
Grit	M9 n/b slip road on to M90 spur n/b from river Almond bridge to merge with s/b on slip from M9	2	2
Travel	M90 spur n/b from slip road merge to Scotstoun bend	3.6	3
Travel	M90 n/b from Scotstoun bend to Northbound off slip at Queensferry roundabout	1.3	2
Travel	M90 n/b off slip to Queensferry roundabout	0.4	0.5
Travel	Queensferry roundabout to s/b on slip to M90	0.3	1
travel	M90 s/b to off slip to M9 w/b towards Falkirk	5.5	6
grit	M90 off slip to M9 w/b	1.2	1
Travel	End of route. Return to Rosyth depot	32.5	30

Total time from start to finish of precautionary treatment (Mins) : 75
Total length of carriageway salted (km) : 34.8
Average width of carriageway (m) : 7.9
Total tonnage used at 20 gm/m2 : 11.0

Precautionary Treatment Route 5.

	Road	Distance (Km)	time (mins)
Travel	Depot to Ferrytoll roundabout and then on s/b on slip to top of slip road at start of Queensferry crossing	1.9	4
Spray	M90 s/b from viaduct over Queensferry crossing to start of the S/B off slip to Queensferry roundabout	3.5	4
travel	M90 s/b off slip to South Queensferry roundabout	0.5	1
travel	South Queensferry roundabout to start of the northbound on slip to M90	0.3	1
travel	M90 Northbound on slip from south queensferry roundabout to M90 n/b before Queensferry crossing	0.5	1
spray	Spray approach to Queensferry crossing and n/b over bridge to top of the n/b off slip to Ferrytoll interchange	3.8	5
Travel	M90 N/b off slip to Ferrytoll roundabout and then circulate roundabout to the southbound on slip to M90	0.8	2
Travel	southbound on slip to split where Forth bridge slip deviates from Queensferr crossing slip road	0.2	0.5
Spray	S/B on slip from Ferrytoll interchange to top of slip road	0.6	1
Spray	from top of slip road to start of S/B FRB	0.5	1
Spray	S/B FRB to start of n/B off slip to Echline R/B	2.9	3
Spray	continue on A9000 under echline interchange and travel on bus link towards A90 Dalmeny	1.6	2
Travel	A90 to Barnton and turn and return to w/b Bus link	13	13
Spray	w/b bus link to B800	0.6	1
travel	from B800 road to Echline roundabout	1	2

Spray	northbound on slip to A9000 (FRB) and northbound over FRB	2.9	3
spray	N/B from end of FRB to start of Ferrytoll off slip	0.6	0.5
Spray	N/B off slip from FRB to Ferrytoll interchange	1	1
Travel	End of route. Return to Rosyth depot	1.8	2

Total time from start to finish of precautionary treatment (Mins) : 42
Total length of carriageway salted (km) : 18.0
Average width of carriageway (m) : 7.8
Potassium Acetate used at 35 lit/m2 : 4888

Precautionary Treatment Route 6 (FRBFC 40)

Depot: South Queensferry			**Vehicle:** Transit Pick-up.			
	Road	From	To	Distance (KM)	Average Speed (km/hr)	Time (Mins)
Spray brine	Service Road/ Ferrymuir Gait	B800 Junction Footpath/ Cycleway	Junction with B800 Footpath/ Cycleway	1.0	15	2.0
TF	B800	Junction with Ferrymuir Gait	Start of FRB NB Footpath/ Cycleway	0.5	30	1.0
Spray pot acetate	West Footpath/ Cycleway	Start of FRB NB Footpath/ Cycleway	End of FRB NB Footpath/ Cycleway	2.5	15	10
Spray brine	Steps to North Abutment	Steps down to underpass	Steps up from underpass	0.2	15	10
TF		Southbound footway	Northbound footway	0.2	15	5
Spray pot acetate	A9000 NB	End of FRB NB Footpath/ Cycleway	Ferrytoll Roundabout Footpath/ Cycleway	1.5	15	5
Spray brine	Ferrytoll Roundabout	Ferrytoll Roundabout Footpath/ Cycleway	Ferrytoll Roundabout Footpath/ Cycleway	0.7	15	1.8
Spray brine	A9000 SB	Ferrytoll Roundabout Footpath/ Cycleway	North End FRB Footpath/ Cycleway	1.5	15	5
Spray brine	Steps North of bridge	Steps down from footway to north anchorage	Steps up n/b side fom north anchorage	0.5	1.5	10
Spray pot acetate	East Footpath/ Cycleway	Start of FRB SB Footpath/ Cycleway	End of FRB SB Footpath/ Cycleway	2.5	15	10
Spray brine	Steps south of bridge	Steps down from footway to south anchorage	Steps up n/b side fom south anchorage	0.5	1.5	10

Spray brine	A9000SB Slip and B800 Road Footway/ Cycleway	End of FRB SB Footpath/ Cycleway	Junction with Ferrymuir Gait and B800	0.5	15	2
Spray brine	Stairs from A9000 SB to Ferrymuir Gait	End FRB	Ferrymuir Gait Car park	0.2	5	5
Spray brine	Stairs from Plaza to pedestrian underpass	Steps down from plaza to underpass	Steps up from underpass	0.2	5	10
Spray brine	Link path	From s/b off slip at Echline	Ferrymuir Gait	0.1	10	2
Spray brine	Viewing area	Car park	Viewing area and office entrance	0.2	10	10

Total time from start to finish of precautionary treatment (Mins) : 99 mins
Total length of footway sprayed (km) : 11.2
Average width of footway (m) : 3.6
Total volume Potassium Acetate at 0.0156 litre/m2 :1420 litres

ANNEX WSP 3

SALT STOCK LEVELS

Operational Salt Stock Levels

Operating Company	Minimum Salt Stock Level at Start of Season (tonnes)
Forth Bridge Unit	3,200

De-icing Material (i.e. Dry salt/ABP/Potassium Acetate)	Location	Type (barn/open)	Min (tonnes) 1st Oct
3,200 Dry Salt	Rosyth	Barn	3,200 tonnes
10,000lit ABP	Rosyth	IBC Tanks	10,000 litres
2,000 litres Potassium Acetate	Queensferry	IBC Tanks	2,000 litres
120,000 Litres Potassium Acetate	Rosyth	Tank	120,000 litres

Brine Production and Storage

Location	Type (saturator/storage only)	Capacity (L)	Min (L)
Rosyth	Saturator / Storage	20,000	3,200

ANNEX WSP 4

WINTER SERVICE PLANT

Table 1: Frontline Winter Service Plant permanently available and located in the Unit for the Winter Service for carriageways

Type of Winter Service Plant & registration number #	Depot location	Vehicle capacity	Number of vehicles	Plant use* (i), (ii), (iii)
32 tonne 8x4 Combi-spreader **WX65 WFD, WX65 WFE**	Rosyth	12 cub m 5000 litre	2	(i) & (iii)
26 tonne 6x4 spreader **YC64 OFB, YC64 OFD**	Rosyth	9 cub m	2	(i) & (iii)
18 tonne 4x2 spreader **YF63 HVA, YF63 HVB**	Rosyth	6 cub m	2	(ii)
Westa 650 Snow Blower Attachment	Queensferry		1	(iii)
Fastrac snow blower attachment	Queensferry		1	(iii)
80hp 4wd Tractor & mounted spreader/sprayer	Queensferry	1 cub m	1	(iii)
JCB Fastrac (capable of mounting Raiko Icebreaker)	Gorebridge	-	1	(iii)
Telehandler	Queensferry	1.5 cu.m	1	

Key:

(i) precautionary treatments and clearance of snow or ice with a depth up to 100 millimetres
(ii) Winter Service Patrols
(iii) Other arrangements to comply with the requirements of this Part.

Table 2: Frontline Winter Service Plant permanently available and located in the Unit for the Winter Service for footways footbridges and cycling facilities

Type of Winter Service Plant & registration number	Depot location	Vehicle capacity	Number of vehicles	Plant use* (i), (ii), (iii)
Transit pick-up, mounted sprayer (Potassium Acetate) **LJ65 DKX**	Queensferry	600 litre sprayer.	1	(i), (ii)
Pedestrian Snow Blower	Queensferry		1	(ii)

Key:

(i) precautionary treatments for Category A response
(ii) snow clearance and ice clearance for Category A response
(iii) snow or ice clearance for Category B, Category C, and Category D response.

Table 3: Reserve Winter Service Plant permanently available and located in the Unit for Winter Service for carriageways, non-motorised user facilities

Type of Winter Service Plant & registration number	Depot location	Vehicle capacity	Number of vehicles	Plant use* (i), (ii), (iii)
Transit pick-up, mounted sprayer (Potassium Acetate) **LJ65 DLO**	Queensferry	600 litre sprayer.	1	(i), (ii)
IBS Vehicle **VA62 AEU**	Rosyth	9 cu.m	1	(i) & (iii)

Key:

(i) precautionary treatment and clearance of snow with a depth up to 100 millimetres
(ii) Winter Service Patrols.
(iii) Other arrangements to comply with the requirements of this Part.

Table 4: Additional Winter Service Plant

Type of Winter Service Plant & registration number	Depot location or third party operator and location	Number of vehicles	Mobilisation time in hours
Raiko Icebreaker. (Extreme conditions)	Transport Scotland, Burghmuir	2	4
32 tonne 8x4 tipper	Redacted	2	2
32 tonne 8x4 tipper	Redacted.	2	2
IPV and Plough	Bargeddie	1	2
IPV and Plough	Bilston Glen	1	2
TM Truck and Plough	Burghmuir	1	2
Fast Track and snow blower	Ritchie	1	4
Rolba Snow Blower	Redacted	1	2
Rolba Snow Blower	Redacted	1	2
4wd Tractor with Plough and 2 cu m Mounted Salt Spreader	Redacted	2	2
4wd Tractor with Plough	Redacted	1	4
Toyota Hilux Type 2 ISU 4x4 with snowplough blade	Redacted	1	2
Toyota Hilux Type 2 ISU 4x4 with 400 litre sprayer	Redacted	1	2
Schmidt KLV Wedge snowplough	Queensferry / Rosyth	2	1

Table 5: Loading Winter Service Plant permanently available and located in each loading point.

Type of Winter Service Plant & registration number	Depot location	Vehicle capacity	Number of vehicles
JCB Telescopic Loader (or similar)	Queensferry	1.5 cu m	1
JCB Telescopic Loader (or similar)	Rosyth	1.5 cu m	1
80hp 4wd Tractor with Loading Shovel	Queensferry	0.7 cu.m	1

Note: Vehicle registration numbers to be confirmed.

ANNEX WSP 5

COMPOUNDS AND DEPOT

Table 6: The Operating Company's Compounds, Depots and Facilities

Compound, Depot or Facility Name	Owner	Postal Address	Purpose	Access Arrangements	Contact Details	Facilities
Queensferry	Scottish Ministers	Forth Road Bridge Admin Office, South Queensferry, West Lothian. EH30 9SF	Central Office & Main Depot	Unlimited	Redacted	Operational Depot
Europarc, Rosyth *	Redacted	Unit 5, Barham Rd, Forties Campus, Rosyth, Europarc. KY11 2XB	Secondary Depot & Store	Unlimited	Redacted	Operational Depot & Storage

ANNEX WSP 6

LOCATION OF ICE SENSORS & WEATHER STATIONS

Table 1: Location of Ice Sensors

Route	Location	Altitude	Type
A985	Kincardine ELR	15	Vaisala
M8	Livingston (J3)	140	Vaisala
M9	Linlithgow	63	Vaisala
M9	Newbridge	50	Findlay Irvine
M9	J2 to 1A (Wind Only)	50	Vaisala
A876	Clackmannanshire Bridge (Wind Only)	20	Vaisala
M90	Halbeath	120	Vaisala
A90	Dolphinton		Vaisala
A90	Forth Bridge	40	Vaisala
M90	Dundas Farm		Vaisala
M90	Queensferry Crossing gantry		Vaisala

Related documents

Document Reference	Document Title
Salting Route Dry Run Sheet Form 9	FBUnit-Plans-FO-011
Operator Record Log Form 8	FBUnit-Plans-FO-012
Constructional Plant and Equipment Mechanical Downtime	FBUnit-Plans-FO-013
Response Time Achieved	FBUnit-Plans-FO-014
Winter Patrol Form FB Unit	FBUnit-Plans-FO-015
Proposed Action Form 1	FBUnit-Plans-FO-016
Communications Log Form 2	FBUnit-Plans-FO-017
Trunk Road Blockages Form 3	FBUnit-Plans-FO-018
Accidents Resulting from Weather Conditions Form 4	FBUnit-Plans-FO-019
Complaints Record Sheet Form 5	FBUnit-Plans-FO-020