



M50 UPGRADE PPP CONTRACT

OPERATION & MAINTENANCE PROCEDURES Winter Maintenance Strategy 2016-2017

QEMS M50OP-313 - Revision 12
31st August 2016

M50 Concession Limited
Lutrellstown Road
Diswellstown, Castleknock
Dublin 15 - IRELAND

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Winter Maintenance Strategy
2016-2017

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Role	Position	Signature	Date
Reviewer	O&M Manager		31/08/16
Checker	Network Manager		31/08/16
Approval	General Manager		31/08/16

REGISTER OF COPIES ISSUED TO RELEVANT PERSONS

This Register highlights the named recipients of this Winter Maintenance Strategy. Hard copies will be issued to the named holders on each revision of the document.

ISSUED TO	COMPANY / ORGANISATION	LOCATION
Winter Maintenance Manager	M50 Concession Ltd	M50 Office
General Manager	M50 Concession Ltd	M50 Office
O&M Manager	M50 Concession Ltd	M50 Office
Works Manager	M50 Concession Ltd	M50 Office
Network Engineer	M50 Concession Ltd	M50 Office
Works Supervisor	M50 Concession Ltd	M50 Office
Kevin O'Rourke	Transport Infrastructure Ireland	Parkgate Street Dublin 8
Sean McDonnell	Authority's Site Representative, Atkins	Swords
Traffic Inspector	An Garda Síochána	Dublin Castle
Traffic Inspector	An Garda Síochána	Blackrock
Traffic Inspector	An Garda Síochána	Terenure
Traffic Inspector	An Garda Síochána	Blanchardstown
Traffic Inspector	An Garda Síochána	Santry
Chief Operating Officer	Egis Road & Tunnel Operation	Dublin Port Tunnel
Chief Ambulance Officer	HSE Ambulance Service	Ambulance HQ Dublin
Chief Fire Officer	Dublin Fire Brigade	Dublin Fire Station
Director of Services	Fingal County Council	County Hall Blanchardstown
Director of Services	South Dublin County Council	County Hall, Tallaght
Chief Executive	Dun Laoghaire Rathdown County Council	County Hall, Dun Laoghaire
Head of Forecasting	Met Eireann	Glasnevin Hill, Dublin 9
Head of Forecasting	Metoegroup UK Ltd	London SW1V 1AE
Manager	Motorway Traffic Control Centre	Dublin Port Tunnel, Dublin 3
General Manager	GSJ Maintenance Ltd	GSJ Office

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1. PURPOSE AND SCOPE

- 1.1 The purpose of this document is to identify the processes, procedures and control measures employed by M50 Concession Ltd, the Company, to ensure that Winter Maintenance and associated elements under the M50 PPP Contract are carried out in accordance with contractual requirements.

2. HEALTH & SAFETY

- 2.1 The Company will ensure so far, as is reasonably practicable:
- Safe and healthy working conditions,
 - Safe equipment and systems of work,
 - Provision of appropriate information, instruction, training and supervision,
 - Provision, where necessary, of a competent person to advise and assist in securing the health, safety and welfare of employees and others.
 - This procedural document should be read in conjunction with the Company's Policies and Procedures for Health & Safety;
 - QEMS M50MP-07. 01 - Safety Statement.
 - QEMS M50MP-07. 02 - Management Responsibilities.
 - QEMS M50MP-07. 03 - Emergency Response Procedures

3. ASSOCIATED RISKS & SAFE WORKING

- 3.1 This document should be read in conjunction with the Company Policy and Procedures for Associated Risk with Activities.

4. ENVIRONMENTAL POLICY

- 4.1 The Company regards environmental protection as an integral and essential part of good business practice. We are committed to achieving and maintaining a high standard of environmental quality in our operations.
- 4.2 This document should be read in conjunction with the Company Environmental Policy, Procedures and Control Measures QEMS M50MP-06.01 - Environmental Operating Plan.

5. PROCEDURE PERSONNEL

- 5.1 In addition to the permanent and temporary employees of the Company, personnel of any relevant subcontractors may also be involved in the procedures and activities described in this document.

6. RESPONSIBILITIES

O&M Manager

6.1 The responsibilities of the O&M Manager are:

- To ensure a Winter Maintenance Manager is nominated.
- To ensure sufficient resources are available to carry out Winter Maintenance Operations efficiently.

Winter Maintenance Manager

6.2 The Winter Maintenance Manager for the 2016/17 Winter Maintenance Season will be Andrew Elliott, M50 Concession Ltd Network Manager. His responsibilities are:

- To ensure a Winter Maintenance Strategy is produced prior to the start of each winter maintenance season.
- To ensure suitably experienced Duty Engineers are placed on a rota to ensure availability of Decision Maker throughout entire Winter Season.
- To ensure suitably trained Gritter Drivers are placed on a rota to ensure availability of labour throughout entire Winter Season.
- To ensure an Ice Prediction System and Weather Forecasting is available throughout the entire Winter season.
- To ensure suitable plant, equipment and salt supplies are available to undertake effective winter maintenance operations for the duration of the Winter Season.

Duty Engineer

6.3 The winter maintenance Duty Engineer's role is carried out by a suitably qualified person within the Operations and Maintenance department with adequate technical ability to understand the forecast information and make the decision to treat the Project Road. Their responsibilities are:

- Receive text forecast and graph site forecasts from forecast provider via the Vaisala Manager system.
- Make an initial decision based on the forecast data and inform the Works Manager of the treatment for that day/night.
- Monitor the weather during the day/night and ensure that any changes to the forecast are identified and instructions communicated to mobilise operatives to commence gritting.
- Communicate with other 3rd parties and M50CL Management.

7. WINTER MAINTENANCE

Objectives

7.1 Winter maintenance operations shall allow the safe movement of users of the M50 Project Road and shall keep to a minimum, delays caused to such users by adverse winter weather (ice and snow) in accordance with the Contract specification as detailed in Schedule 7 of the M50 PPP Contract.

7.2 The purpose of this document is to identify the processes, procedures and control measures employed by M50 Concession Ltd (M50CL) to ensure that all Winter Maintenance Activities associated with the Project Road under the M50 PPP O&M Contract are addressed and managed in accordance with best practice, statutory duty and contractual requirements as outlined in contract Schedule 7, Part 1 and as otherwise defined within the contract document and associated schedules.

Winter Maintenance Strategy

- 7.3 The Winter Maintenance Strategy will contain all the necessary detailed arrangements for all aspects of winter maintenance as set out in the Contract. All members of staff being involved with Winter Maintenance shall be fully acquainted with this Winter Maintenance Strategy and will have access to copies of it.
- 7.4 The timely response by M50CL personnel and its sub-contractors will be vital in protecting the safety of the travelling public and minimising the disruption to Users of the Project Road.

Resources

- 7.5 Adequate resources will be made available to treat the Project Road within the 2 hour requirement.
- 7.6 Resources will be made available to cope both with those winter conditions normally associated with the particular areas of the Motorway and will be identified to manage all the weather conditions, which might apply from time to time. Resources and facilities will be available to enable reactionary salting to be completed within 3 hours of a decision to begin treatment, i.e. 1 hour to commence the operation and 2 hours to completion of gritting. The operational winter maintenance period shall be 1st October 2016 to 15th May 2017 however should extreme conditions demand, this may be extended depending on particular conditions.

Weather Forecasting

- 7.7 A specialist weather forecasting service provider has been appointed to utilise information, initially from the existing ice sensor network, to give detailed forecasts for each identifiable climatic domain within the area. Facilities will also be provided in order that information from Met Eireann and/or Metoffice Weather Radar and thermal mapping if utilised, can be applied to give the best information concerning existing or anticipated conditions. Use will be made of Met Eireann and/or Meteogroup for forecasting services together with Vaisala for ice alert and data collection.

Winter Maintenance Depot

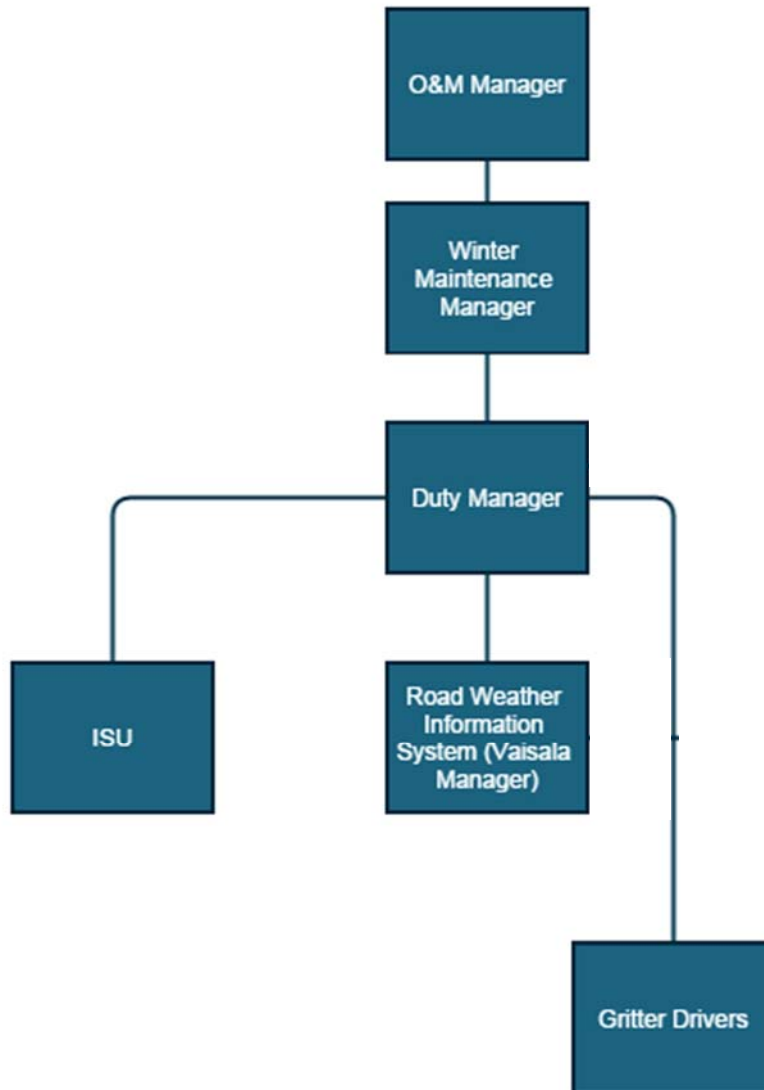
- 7.8 Proposed depot location to enable provision of winter service, emergency response and all other specified services is to be at the Company's Depot at Luttrellstown Road, Diswellstown, Castleknock, Dublin 15.

Management Structure – during working hours

- 7.9 Members of the Winter Maintenance Team based at the M50 depot in Castleknock will carry out the management of the Winter Maintenance Service provision.
- 7.10 The information gathering and decision making process will be managed by the O&M Network Manager who will assume the role of Winter Maintenance Manager having specific responsibility for service provision.
- 7.11 A roster of Duty Engineers to give 24-hour coverage will be agreed to manage information from the forecaster and Vaisala. The Duty Engineer will have authority to instruct treatment as required. Consultation with the Winter Maintenance Manager will be carried out as necessary.
- 7.12 The Duty Engineer will also ensure plant and personnel are mobilised. The Duty Engineer will instruct the Works Manager when a decision to treat has been made. The Works Manager will

ensure the drivers are instructed and ready to treat the road at the time required. The Works Manager will take instruction from the Duty Engineer.

7.13 The management and reporting structure will be as the following flowchart:



Management Structure – Out with working hours

7.14 In order to provide the required response to weather conditions, operational staff required to drive the gritters will operate a combination of standby at home, standby at compounds, normal dayshifts, nightshifts and continuous shifts. Manning arrangements are defined as follows:

- Call Out - available off-duty personnel if demand arises, contacted by the Duty Engineer.
- Standby - personnel available at home or at a compound for immediate duty outside normal working hours or shifts, contacted by the Duty Engineer.
- Normal Shifts - maintenance compounds manned during normal working hours.
- Continuous Shifts - 24 hour manning at the maintenance compound.

- 7.15 The Duty Engineer will confirm to the Works Manager the particular manning arrangements required each day by 15:00 hours.

Monitoring of Weather Conditions

- 7.16 It is the responsibility of the Duty Engineer to ensure that forecast and information from the Weather Stations are monitored at all times. The Duty Engineer working a dayshift (08:30 to 18:00 hours Monday to Friday) will monitor the weather conditions in the M50 Office from the 1st October to 15th May. During the night (18:00 hrs to 08:30 hrs) and at weekends the task of monitoring the road temperatures will be given to the GSJ Control Room who have the ability to monitor the weather constantly. It will remain the responsibility of the Duty Engineer to review the forecast and data available and make the initial decision on the action for that day or night and to ensure that the GSJ Control Room is aware of the decisions and pending weather. The Vaisala Navigator system will be available to the GSJ Control Room and the GSJ Control Room will monitor the actual temperatures. If temperatures are deviating from the forecast or temperatures are falling towards zero unexpectedly then the GSJ Control Room will call the Duty Engineer and will inform of the change in circumstances. The Duty Engineer who will have access to a lap top and internet connection will access the updated information and take the appropriate action. If adverse weather conditions are forecast the Duty Engineer will report to the M50 Office.
- 7.17 Monitoring of actual road conditions during adverse weather will be carried out by a driver in a loaded gritter. Areas susceptible to ice will be monitored closely.
- 7.18 The Vaisala Navigator system which is available in the GSJ Control Room will be set up with an alarm which will give an audible warning & text/email message function. When preset parameters are breached the system will warn the user. This gives a further level of monitoring to ensure human error is minimised.
- 7.19 The Duty Engineers will work to a roster system, the list of Duty Engineers and contact numbers is provided below in list of contacts and in Appendix 4.
- 7.20 In all cases a Duty Engineer and sufficient labor resources will be provided to ensure that treatment of the Project Road will be completed within 2 hours of work starting on salting runs. The Duty Engineer will record the response times achieved for reactionary treatment or snow ploughing.
- 7.21 In the event of severe winter weather being forecast a decision will be made and the Duty Engineer will be present in the Castleknock Depot to co-ordinate all operations. Operatives will be put on continuous 12 hour shifts of to ensure an immediate response on a 24 hour basis.

Reaction Time for Call Outs

- 7.22 The requirement of the contract is to commence gritting within 1 hour of a call to treat being received. To improve the reaction time if a call out was to be made out of hours a gritter will be available fully loaded in the depot. This will be done when forecast temperatures are forecast to be below +1°C.

List of contact numbers with post names/locations/tel. no. (24 hours)

7.23 M50CL Supervisory and Management Contacts:

Name	Position	Location	Contact Numbers		
			Office	Fax	Mobile
Fraser Boyd	O&M Manager	Castleknock Depot	01 823 5888	01 823 5890	086 851 1401
Andrew Elliott	O&M Network Manager	Castleknock Depot	01 823 5888	01 823 5890	086 049 5504
Declan Murphy	Works Manager	Castleknock Depot	01 823 5888	01 823 5890	087 754 3795
James McPadden	Network Engineer	Castleknock Depot	01 823 5888	01 823 5890	086 044 1952
Sean Hollywood	Technical Engineer	Castleknock Depot	01 823 5888	01 823 5890	086 174 5782
Alan Lynch	Works Supervisor	Castleknock Depot	01 823 5888	01 823 5890	086 044 1950

7.24 M50CL Operatives Contacts:

Name	Position	Route	Contact Numbers
			Mobile
Alan Lynch	Works Supervisor	All Routes	086 044 1950
Larry Gaynor	M50 Concession Operative	All Routes	087 747 6842
Andrzej Wierzbicki	M50 Concession Operative	All Routes	087 054 8087
Chris Devereaux	M50 Concession Operative	All Routes	087 697 9826
Damian Labuz	M50 Concession Operative	All Routes	086 774 4824
Kevin Lackey	M50 Concession Operative	All Routes	086 044 1949
Chris Pop	M50 Concession Operative	All Routes	086 049 5501
John Tran	M50 Concession Operative	All Routes	087 762 2177
Brian Fallon	M50 Concession Operative	All Routes	086 044 1953
Michael McLoughlin	M50 Concession Electrician	All Routes	086 776 4339
Adam Flis	M50 Concession Operative	All Routes	086 020 5583
David Tucker	M50 Concession Operative	All Routes	086 042 5723
Dievidas Petras	M50 Concession Operative	All Routes	087 908 3453
John Mongey	M50 Concession Operative	All Routes	086 770 8287

Liaison with other parties:

Liaison with Adjoining Local Councils / Maintaining Agents

7.25 Contact will be made by telephone, fax or e-mail with the Winter Maintenance Duty Engineers of adjacent authorities if the need arises. Copies of the agreed Winter Maintenance Strategy will be provided to the Local County Councils, MMaRC Contractor and other emergency services.

7.26 The Duty Engineer will advise the Winter Maintenance Duty Engineers of local authorities by email of M50CL decisions regarding precautionary treatment on a daily basis.

Across Boundary Contacts:

Authority	Contact	Location	Telephone Nos.		
			Office	Email	Mobile/24Hr
Fingal County Council	Billy McLean	Blanchardstown	01 890 5811	Billy.mclean@fingalcoco.ie	087 221 2579
South Dublin County Council	Tony O'Grady	Tallaght	01 414 9000	togradys@dublincoco.ie	086 856 0552
Dun Laoghaire Rathdown County Council	Ivan Blanker	Dun Laoghaire	01 205 4700	iblanker@dlrcoco.ie	086 383 7290
Dublin Port Tunnel (Egis Road & Tunnel Operation)	Derek Lydon	Dublin Port Tunnel	01 884 8438	derek.lydon@egis.ie	087 328 6523
MMaRC Area A (GSJ Maintenance)	Damien Breen	Castleknock	01 891 3302	dbreen@gsj.ie	086 077 2785

Liaison with the Garda Siochana:

7.27 The Duty Engineer will advise the Garda Siochana at Dublin Castle Traffic Control by email/fax and a phone call on receipt of severe weather forecasts.

7.28 In the event of severe weather conditions Gardai assistance may be requested when moving winter maintenance equipment, arranging for any required road closures or for dealing with any abandoned vehicles.

7.29 Copies of the agreed Winter Maintenance Strategy will be provided to the Garda Siochana and other emergency services.

7.30 Garda Traffic Patrols on the network will be requested to report any local adverse conditions to the service provider in order that appropriate action can be taken and resources deployed.

7.31 Prior to the start of the winter season the Winter Maintenance Manager will invite the relevant Traffic Inspector and / or Sergeant to a meeting to review the detailed liaison and communication systems for the impending winter season.

7.32 In difficult conditions and when requested, a Garda presence may be requested to accompany the snow clearing or gritting plant until a reasonable passage for traffic has been obtained. The Duty Engineer will make requests for Garda presence to the appropriate Garda Control Room. The Garda Traffic Patrol will be advised of any commencement of snow ploughing operations.

Gardai Contacts:

Name / Position	Location	Contact Numbers
		Office
Traffic Inspector	Dublin Castle	01 666 9800
Traffic Inspector	Santry	01 666 4000
Traffic Inspector	Blanchardstown	01 666 7000
Traffic Inspector	Terenure	01 666 6400
Traffic Inspector	Blackrock	01 666 5200

8. WEATHER FORECAST PROVIDER

Provider Contact Details

8.1 24 hour weather forecast updates will be provided by the Forecast Provider, namely:

Met Eireann Glasnevin Hill Dublin 9 Ireland Tel No: 01 806 4200 Fax No: 01 806 4247	and/or	Meteogroup UK Limited 292 Vauxhall Bridge Road London SW1V 1AE Tel No: +44(0)20 7963 7575 Fax No: +44(0)20 7963 7579
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8.2 The Meteogroup forecasting service was trialled between March 2015 and May 2016. An analysis between Met Eireann and Meteogroup’s performance was completed and it was concluded that Meteogroups forecasting was slightly more accurate than Met Eireann at the Final Forecasts (typically the forecast available by 8:00 pm for following overnight period). This was mainly due to the fact that Met Eireann usually provided just one forecast before 3pm each day, while Meteogroup were providing regular forecast updates all along the day and night. In terms of 2016/17 season, Met Eireann will be requested to provide at least one extra revised Forecasts every day before 6pm as part of their service. If Met Eireann is not capable of this, then M50CL will consider to select Meteogroup as the M50CL forecaster for the season.

8.3 Facilities will also be provided on site for the display of weather radar from Met Eireann

8.4 A full forecast service shall be available throughout the period 1st October to 15th May, although outside this period a road danger warning system service shall be utilised. The provider shall be Met Eireann, Dublin.

Description of Service Received

8.5 Met Eireann and/or Meteogroup also provide on a daily basis, to be delivered to the internet-based Ice Prediction System, the following:

- Site specific ice prediction graphs
- 24 hour text forecasts for operational areas within the network including expected minimum road surface temperatures and weather hazards, issued by 1500 hours daily
- Routine updates for operational areas including expected minimum road surface temperatures and weather hazards, issued by 20:00 hours daily.

- Non routine amendments to the text forecasts as required.
- 8.6 The forecaster shall telephone the M50CL Duty Engineer and shall issue non-routine amendments to the site specific forecasts graphs and revisions to the 24 hour text forecast if:
- there is, or the forecaster expects there to be, deterioration in the forecast road surface state i.e. a change from no-frost to frost, on either the 24 hour text forecast or any of the site specific forecast graphs.
 - there is, or the forecaster expects there to be, an improvement in the forecast road surface state i.e. a change from frost to no-frost, on either the 24 hour text forecast or on any site specific forecast graphs.
 - there is, or the forecaster expects there to be, a difference of at least 1 hour between the original forecast onset of freezing conditions and the revised onset of freezing conditions, except where a precautionary salting has already been carried out, or is planned to be carried out prior to the onset of freezing conditions, and no precipitation is forecast for the intervening period.
 - Snow, ice, hoarfrost or freezing rain which were in the original forecast and are now not expected, but only if the relevant Service Providers nominated out of hours personnel can be contacted before 24:00 hours.
 - The timing of rainfall changes such that rain is now expected after the planned time for precautionary gritting, but only if relevant Service Providers nominated out of hours personnel can be contacted before 24:00 hours.
 - The amount of snow changes from light to moderate or from moderate to heavy.

Light = less than 3cm
Moderate = 3 to 10cm
Heavy = greater than 10cm
- 8.6 Notwithstanding the above, the forecaster shall immediately telephone the Duty Engineer, to advise them of a deterioration in the prevailing weather and surface conditions when the actual road surface temperature on any site specific forecast graph falls to zero degrees Celsius or lower and this has not been forecast beforehand.
- 8.7 The Duty Engineer will record the receipt of verbal updated forecast information provided by forecaster.
- 8.8 Met Eireann shall prepare and issue severe weather warnings of heavy rain, as necessary, to M50CL Duty Engineers. This service shall be provided throughout the year.
- 8.9 Met Eireann shall prepare and issue severe weather warnings of gales, as necessary, to the M50CL Duty Engineers. This service shall be provided throughout the year.
- 8.10 Gale warnings shall be issued up to 24 hours in advance when gusts of 50 miles per hour or more are expected. The warning will detail the expected wind speeds and the validity time.
- 8.11 Meetings will be held as necessary between M50CL and the forecasting agency to discuss the forecast accuracy and level of service provided. An annual meeting will be held each year during the summer to discuss the forecasting during the previous winter season and to discuss problems and issues and to look at improvements or changes to the service in the coming season.

9. ICE PREDICTION SYSTEM

Sensor Locations

9.1 Road Sensors and Ice Stations are installed at the following locations

- M1/M50 Interchange (non-Project Road)
- Blanchardstown, Between N3 and N4 Junctions
- Sandyford, at J13.

Highlight Forecast Sites

9.2 The location of the existing sensor locations with forecast sites is detailed in **Appendix 1**

Road Weather Information System Arrangements

9.3 An Ice Prediction System will be supplied by:

Vaisala TMI Ltd
Vaisala House
349 Bristol Road
Birmingham
B5 7SW

Tel No: +44 (0)121 683 1200

Fax No: +44 (0)121 683 1299

9.4 The server for the network Ice Prediction System will be housed at the Vaisala office in Birmingham

9.5 The Ice Prediction System will poll the outstations on the network at maximum intervals of one hour. This may be reduced to shorter intervals depending on conditions during the winter season.

9.6 Any faulty sensors detected by the forecaster shall be notified to M50CL on the morning summary and a member of the O&M team will arrange for sensor repairs.

9.7 Access to the Vaisala Manager website will be available to all the responsible Duty Engineers. Access to the Vaisala Manager website is available from any computer with internet access.

Weather Radar

9.8 Access to weather radar information is available to the Duty Engineer through the Eireann met.ie and/or Metoffice.gov.uk Web Site to assist in response arrangements and to give maximum warning of the arrival time of inclement weather to permit resource mobilisation.

Existing Thermal Map Coverage

9.9 Existing thermal mapping will not be used as route based forecasting is not carried out and all three routes are treated when a decision is made to treat.

9.10 Updating and upgrading will take place as required if and when new products and technologies are available.

Thermal Map Usage

9.11 Thermal mapping can be used as an additional tool in the decision making process in relation to Precautionary Salting. Thermal mapping, if available, will be used to highlight potentially

hazardous areas or cold spots on the Project Road requiring additional or specific treatment. The thermal mapping system can be designed to be driven from the forecast minimum temperatures from out station data with an updated thermal map produced at the time of each revised forecast.

10. DECISION MAKING

Roles and responsibilities related to management structure

10.1 The Duty Engineer at the M50 Office or at home will be responsible for:

- Receiving and disseminating weather forecast information
- Keeping the Winter Maintenance Manager informed with current status
- Liaison with the Gardai
- Maintaining records of all messages and movements of all operational plant
- Keeping records of road conditions and of any blocked lanes
- Providing factual information concerning the network to the Gardai for onward distribution to the press, local radio, RTE, AA and giving a response to any public enquiries
- Dealing with any difficulties or complaints from the general public which may arise
- Receiving and disseminating information from the appointed specialist forecast analyst
- Keeping all other records as required.

10.2 The Duty Engineer will maintain a log of all messages from patrol vehicles or vehicles engaged on snow clearing.

10.3 The Winter Maintenance Manager will be responsible for ensuring delivery of the specified winter maintenance operations and will appoint Duty Engineers who will work to an agreed roster to ensure that full time cover is provided in the event of inclement weather. The Duty Engineer will issue instructions for required winter maintenance based on specialist forecasts and local information.

10.4 Duty Engineers, also working to an agreed roster will arrange for mobilisation of resources at the maintenance depot and also have overall responsibility for monitoring progress and managing change.

10.5 A report on the Winter Maintenance operations undertaken will be submitted to TII each year within the PPP Co's Annual Report and 5 Year Management Plan.

Decision Making Procedure

10.6 The decision to carry out treatment will be made by the Duty Engineer who will instruct the Works Manager to mobilise resources. The Works Manager will then instruct/telephone the required operatives to give them their instructions.

10.7 Provisional Arrangements to commence Winter Maintenance Operations will be made during each afternoon based on information from the forecaster augmented by information from the Weather Bureau Service (Vaisala). Decisions will be regularly monitored to include for variations in the forecast weather or to reflect actual conditions on site and confirmed at the latest by 20:00 hours daily. These decisions will be reviewed on receipt of non-routine weather forecast updates. The decisions will be recorded on the salting decisions form which will form the basis of the action plan.

10.8 Forecasted information to be utilised will include weather radar to give the Duty Engineer maximum warning of the arrival time of inclement weather to permit resource mobilisation.

- 10.9 Detailed information will be available from Winter Patrols when operating on the Project Road 24 hours per day during adverse weather.
- 10.10 The exact time at which precautionary salting will take place, to all, or part of the Project Road will be determined from forecast and local information available. A roster for the operatives will be held at the M50 Office, and will be updated by the Works Manager as appropriate.
- 10.11 On receipt of a forecast of abnormal weather/snow the decision will be taken to implement the prolonged snowfall strategy. Operational staff will be instructed to commence 12 hour shifts and be on a 24 hour rota to cover the period of the adverse weather.

Record of events

- 10.12 The following list identifies typical records required:

- Decisions taken when and by whom
- Treatment Records
- Ice detection records
- Weather forecasts and actual weather experienced
- Response times achieved
- For each depot quantities of de-icing materials used in stock and on order
- Plant and equipment deployment records and driver / operator logs
- 'Dry Run' Records

- 10.13 These records will be stored on the Vaisala Manager system. It is the responsibility of the Duty Engineer to ensure details of decisions, treatment records, quantities of salt used, etc. are entered into Vaisala Manager on a daily basis, and of the Winter Maintenance Manager to ensure records are up to date.
- 10.14 For each treatment undertaken the operator will log the details of the treatment on Standard Form **QEMS M50OP-313 F.77** Operator Daily Plant & Equipment Log & Times.
- 10.15 Within 24 hours of the next working day of completing each precautionary salting operation, or other snow or ice removal, a report will be completed and held electronically and these will be available for inspection by any interested party.
- 10.16 Records will be held at the M50 Office by the Winter Maintenance Manager and can be contacted on 01 823 5888 or by fax on 01 823 5890 or by e-mailing andrewelliott@m50concession.com

Notification

- 10.17 TII shall be notified immediately by telephone of any major incident arising on the Project Road as a result of winter conditions and in particular of any parts of the Project Road closed to traffic followed up with written confirmation.
- 10.18 During normal working hours the Authority's Site Representative Sean McDonnell will be contacted on 086 383 1244. For out of normal working hours or if for any reasons the above contact cannot be made then the Authority's Site Representative will be emailed directly at Sean.McDonnell@atkinsglobal.com.

Accuracy of forecast, justification for changing decisions

- 10.19 Monitoring of the actual road surface temperatures in relation to the forecast road surface temperatures will determine the accuracy of the forecast and will provide the necessary information for the Duty Engineer to amend the treatment requirements.

Arrangements for continuous monitoring of forecasts

- 10.20 Winter Maintenance operations will be administered from the M50 Office situated on Luttrellstown Road, Diswellstown, Castleknock, Dublin 15.
- 10.21 Weather conditions during the winter maintenance period will be continuously monitored.
- 10.22 This will be achieved by:
- The duty forecaster.
 - Expert weather forecast providers will regularly access ice sensors / ice prediction system to monitor road and weather conditions.
 - The Duty Engineer will also access the ice sensors / ice prediction system to monitor road and weather conditions.
 - Feedback of road condition information from patrol vehicles, Gardai reports and calls from members of the public.

Spread rates

Precautionary Salting

- 10.23 The philosophy behind Winter Maintenance operations is, wherever possible, to carry out pre-salting before ice forms or snow settles on the road. To enable this to be undertaken effectively depends on a mixture of local knowledge and experience, good local weather forecasts, thermal mapping and knowledge of the state of the road at the time through patrols (i.e. is it wet or dry, salt covered or not etc.).
- 10.24 If no forecast is available for whatever reason and the temperature has fallen to +1°C, then precautionary salting shall take place unless:
- No moisture is or is expected on the road
 - There is enough residual salt on the road to deal with the expected conditions.
 - There is enough cloud cover to suggest that temperatures will not fall any further.

Rates of Spread for Precautionary Salting

- 10.25 For precautionary salting the preference will be for pre-wet treatment. Pre-wet treatment involves spraying the de-icing salt with a brine solution before the salt is applied to the road surface. This is more effective than traditional dry salting as the wet salt adheres to the road surface instead of bouncing off or being swept off by traffic. The other benefit is that salt requires moisture to be effective as a de-icing agent. By pre-wetting the salt this ensures moisture is always present and that it is effective as a de-icer immediately.
- 10.26 For pre-wet treatment the quoted spread rate is the combined weight of dry rock salt and brine, combined in a 70:30 ratio of dry salt to brine. The brine is composed of water and marine salt, with a salt concentration of 20 to 23%.
- 10.27 Spread rates for precautionary treatment are described in the table below.
- 10.28 If freezing conditions are expected after rain salting will be delayed as long as possible to reduce loss of salt by run off, unless freezing conditions coincide with rainfall. If freezing conditions coincide with rainfall then the salting will be timed to be complete prior to freezing but with an increased spread rate.
- 10.29 If continuous snow is forecast, salt shall be spread at 20-40g/m² according to the anticipated severity of the snowfall. Every effort will be made to ensure enough salt is applied before snow starts to stick to the road to melt the initial snowfall and to provide a wet surface.

- 10.30 Elevated sections of road, including bridges and sections lying in low ground or where the local topography channels windborne cold air are more prone to freezing and may need special treatment. These areas will be identified through local knowledge and real time reports from the winter maintenance patrol drivers.
- 10.31 It is intended that Precautionary Action forms the major part of winter operations.
- 10.32 A matrix showing the proposed levels of treatment is shown below. These treatments are only a guide and actual conditions and information from forecasters, patrol drivers and real time data may mean that a different treatment may be applied.

Weather conditions	Definition	Spread Rates	
		Salt (gram /square metre)	Pre-wetted salting (gram /square metre) (see Note 1)
Light	Frost and/or light snow	10	10
Moderate	Freezing conditions after rain	20 to 30	20 to 30
Severe	Continuous snow	30 to 40	30 to 40

Note 1: Spread rates for pre-wetted salting are the combined weight of dry salt and brine combined in proportion 70:30 by weight with brine of concentration 20 to 23%.

Winter Maintenance Precautionary Treatment Spread Rates

- 10.33 A matrix showing the proposed levels of treatment between 10g/m² and 40g/m² is shown below. These treatments are only a guide and actual conditions and information from forecasters, patrol drivers and real time data may mean that a different treatment may be applied.

Road Surface Conditions	Air Temp	Treatment			
		Spreading gram/square metre	Spreading gram/square metre	Ploughing	Blowing
		Salt	Pre-wetted Salting		
Ice formed	less than minus 5°C and stable	20 to 40	20 to 40	No	No
Snow covering exceeds 30 to 50 millimetres thick	less than minus 5°C and stable	10	10	Yes	No
Snow covering exceeds 30 to 50 millimetres thick	less than minus 5°C and dropping	10 to 40	10 to 40	Yes	No

Snow accumulations due to prolonged falls	less than minus 5°C and stable	20 to 40	20 to 40	Yes (continuous)	Where applicable
Hard packed snow/ice less than 20 millimetres thick	greater than minus 5°C	30 (successive)	30 (successive)	No	No
<p>Note 1: Spread rates for pre-wetted salting are the combined weight of dry salt and brine combined in proportion 70:30 by weight with brine of concentration 20 to 23%.</p>					

Note: Wet / moist road conditions will be determined by weather forecast interpretation supplemented by information obtained from winter patrols, gritting operations, other operational crews and inspection teams.

Treatment of ice already on the Road

- 10.34 If ice has already formed on the road, salt shall be spread up to 40g/m² depending on the amount of ice present and the air temperature to ensure a rapid melt. Particular attention will be paid to lengths of the Motorway, which are known to be susceptible to poor run-off.
- 10.35 **Application of salt at 40g/m² will be made in severe conditions where road surface temperatures falls to below -5°C or where hard packed snow is present on the network.**

Treatment of snow already on the road after Precautionary Salting

- 10.36 Snow ploughs will be fitted to vehicles when snow is forecast and ploughing shall commence as soon as snow depths allow or as directed by the Duty Engineer.
- 10.37 Each pass of the plough shall be supplemented by an application of salt at a rate of 20-40g/m² depending upon the temperature trend and prevailing condition. Information from the Ice Prediction System together with temperature measurements at the depot will be available.
- 10.38 Special salting may be necessary to deal with melted water from snow, which may freeze at night, and a watch will be kept for such conditions.
- 10.39 Snow ploughing routes will be as the precautionary salting routes for simplicity of driver training.

Treatment of Hard-Packed Snow and Ice

- 10.40 If the above procedures are carried out successfully then the formation of hard-packed snow and ice should be rare. However, should these conditions occur provided that the ice is no more than 20mm thick and the air temperature is below -5°C, then removal shall be carried out by successive salt applications of 20-40g/m².
- 10.41 The use of salt spread at the upper limits of 40g/m² is however applied selectively in the following circumstances:

- 10.42 Precautionary salting of the Project Road in those areas where continuous heavy snow is forecast. The intention is to melt the initial snowfall to make operation of snow ploughing more effective.
- 10.43 Treatment of ice formed on relatively lightly trafficked sections of the Motorway when the temperature is sustained and below -5°C.
- 10.44 Successive treatment for areas of hard packed snow or ice less than 20mm thick with temperatures above -5°C. Local observations and local experience will essentially identify these areas. A timely application of precautionary treatment should make the formation of hard packed snow/ice a rare event.
- 10.45 When temperatures fall below -10°C or where snow is more than 20mm thick a single sized abrasive aggregate of particle size up to 6mm shall be added as necessary to the salt. A reversion to the use of salt only is to be made at the earliest opportunity to avoid the possibility of blocked drains or gullies.

11. SALTING ROUTES

Routes for Precautionary Salting

- 11.1 To complete precautionary salting on the Project Road within the contract requirements three routes have been proposed.
- 11.2 There are three routes designed to treat the Project Road within the contractual requirements.
- Route 1: J10 Ballymount (Chainage 20+700) to J14 N31 (LUAS overbridge)
 - Route 2: Castleknock Depot J7 to J10 Ballymount
 - Route 3: J3 M1 to Castleknock Depot J17
- 11.3 The detailed drawings and descriptions of these routes are in **Appendix 2**.

Routes for Reactive Salting

- 11.4 In the event of prolonged snowfall and the necessity to complete 40g/m² dry salt treatments then the 3 routes used for precautionary treatment will be utilized. The 3 routes are as per Appendix 2.

Philosophy for Reactive Salting

- 11.5 Following the route optimisation exercise it has been decided that only one set of reactive routes will be implemented at this stage.
- 11.6 Due to the necessity to potentially carry out a 40 g/m² salting exercise and this being the most onerous to achieve in the timescale because of the implications for possible re-loading, these routes should be considered as the primary reactionary salting routes.
- 11.7 Reactionary salting at 10 - 20 g/m² will be carried out on these routes which will obviously mean that they can be completed quicker and without re-loading.

'Dry Runs'

- 11.8 Prior to 1st October each year a 'dry run' and route familiarisation of each route will be carried out which will include the fitting and removal of plough to every vehicle. Records will be kept of these dry runs detailing times taken to traverse the route, fit the plough, and any other relevant comments.

12. PATROLS & PATROL ROUTE

Policy for Patrolling in adverse weather.

- 12.1 Patrolling of the Project Road will be carried out during the period 1st October to 15th May when adverse weather is being experienced or is predicted. Periods of adverse weather are those when the Project Road is likely to be affected by snow or severe frost/freezing conditions.

Patrolling when Very Low Temperatures and Hoar Frost Predicted

- 12.2 During adverse weather the Company will put out one patrol vehicle for the entire route when a forecast is predicting temperatures lower than -4^{oC} or severe hoar frost. The Patrol will be undertaken in a loaded gritter to enable timely spot treatment of potentially hazardous conditions as opposed to full blanket precautionary salting.

Patrolling when Snow or Freezing Rain is Predicted

- 12.3 During adverse weather the Company will put out one patrol vehicle per route (3 gritters in total) when a forecast is predicting snow or freezing conditions after rain. Patrols will be undertaken in loaded gritters with ploughs fitted to enable timely commencement of treatment of potentially hazardous conditions when they occur.
- 12.4 Patrols shall be carried out to ensure that the whole route or individual routes are covered at intervals not exceeding 4 hours.
- 12.5 Priority on patrol runs will be given to main carriageways; slip roads will be patrolled where their condition cannot be assessed from the main carriageway and where they are found to be abnormally prone to icing.
- 12.6 Patrol drivers will report on conditions to the Control Room and Duty Engineer if conditions require a gritter to be actioned.

13. SNOW CLEARING STRATEGY

Description of arrangements and resources for snowfall

- 13.1 To assist in route familiarity for operations it is intended that snow ploughing will be carried out on the same routes as for reactionary salting. This readily enables ploughing and salting.
- 13.2 Ploughing of snow will normally commence at a snow depth of 30mm and will be accompanied by salt applications at 20 g/m². Should snow depth on the carriageway exceed 100mm then salting may be suspended with ploughing carried out by a laden vehicle to aid traction. The application of salt shall be recommenced as soon as practicable.
- 13.3 In consideration of carriageway lanes, traffic volumes and the incidence of slip roads, salting vehicles fitted with ploughs will double up to enable echelon ploughing (two or more vehicles moving in the same direction, one behind each other, each on different lanes). Care will be taken to coordinate slip road clearance with main carriageway clearance. Where echelon ploughing is deployed salting will take place over the full carriageway width by the trailing vehicle but where ploughing over a single lane width salt will normally be spread only on the ploughed width.

Prolonged snowfall strategy

- 13.4 In the event that extreme weather conditions are forecast or experienced, a dedicated 'snow' control room will be established at the M50 Office.
- 13.5 All Winter Maintenance Operations on the Project Road would be controlled by the Winter Maintenance Manager or by allocated staff to ensure that the optimum use is made of dedicated and any externally resourced plant items on the Project Road. Gardai attendance at this control room would be encouraged to ensure that actions taken are carried out in full knowledge of all present circumstances.
- 13.6 Routine and Cyclical works will cease. All operational staff will commence a 12 hour shift rota to allow 24 hour working and will be maintained until the adverse weather has finished. In the event that the adverse weather is prolonged then extra resources will be brought in from external contractors.
- 13.7 The three routes will be precautionary treated with salt in accordance with the above spread rates. The routes will be patrolled throughout the period of the forecasted adverse weather and otherwise be on standby at J4 Ballymun, Castleknock O&M Depot, J9 N7 and J13 Ballinteer / Sandyford.
- 13.8 All other resources on the Project Road including any reserve vehicles will be utilised with the main efforts directed at key areas to enable traffic flows to be maintained, or in the event of road closure, to be recommenced at the earliest opportunity. Resources will be deployed to areas of high importance separate from other areas of the Project Road should conditions permit. Plant will only be reallocated on a temporary basis by agreement with the Winter Maintenance Manager.
- 13.9 The roster of Duty Engineers will be available to give continual management presence in periods of extreme weather. The appointed drivers of winter maintenance equipment will be available to operate the equipment on a 24-hour operation should conditions require. Stocks of salt and winter quality fuel will be maintained at sufficient levels in the depots over the winter period to permit full-scale operations for an extended period.
- 13.10 During severe weather conditions the Winter Maintenance Manager will liaise directly with the Gardai to ensure that up to date information is available regarding travel conditions and blocked highways. All media enquiries will be directed to the Company's General Manager.
- 13.11 The Winter Maintenance Manager will, where considered to be appropriate, make suggestions to TII in relation to the broadcasting of information during or in response to forecast severe winter weather conditions and shall advise winter controllers of adjacent authorities or agents accordingly.
- 13.12 Where extreme conditions persist and road closures or partial closures have to be considered, then the Winter Maintenance Manager will contact the TII and advise them accordingly.
- 13.13 Where appropriate and after consultation with the Gardai the Duty Engineer shall arrange for installation of signs that clearly show the road closure, with reason for the closure and where appropriate, diversion routes.
- 13.14 The TII shall be notified immediately by telephone of any major incident arising on the Project Road as a result of winter conditions and in particular of any parts of the Project Road closed to traffic followed up with written confirmation the next working day.
- 13.15 During normal working hours the Authority's Representative on Site, Sean McDonnell, will be contacted on 086 383 1244. For out of normal working hours or if for any reasons the above contact cannot be made then the Authority's Representative on Site will be emailed directly at Sean.McDonnell@atkinsglobal.com .

Arrangements for procurement of additional resources in severe conditions

- 13.16 Loading shovels and trucks as appropriate will be utilised from local quarry operators, local contractor operations and haulage companies and external plant hirers.

- 13.17 Contact and negotiations with a number of plant suppliers will be made to ensure that equipment can be made available at short notice to respond to emergency situations or to protracted periods of inclement weather.
- 13.18 Arrangements will be made with local contractors to supply suitably qualified and trained labour to ensure continuity of service when the adverse weather is prolonged.

14. LABOUR

Numbers Available

- 14.1 The required resources are based on 2 trained and qualified drivers per spreading vehicle. Drivers are trained to the standards required by City & Guilds (Winter Maintenance Operations).

Training

- 14.2 Training of Winter Maintenance Operatives will consist of informal 'Tool Box' talks, formal training courses (City & Guilds Winter Maintenance Operations, or equivalent), and hands on experience.

'Tool Box' Talks

- 14.3 'Tool Box' talks consisting of Specific Procedures, Method Statements, Risk Assessments, and other related information. This will be given by the operatives Supervisor on a regular basis to insure Operatives are aware of relevant information and hazards. The patrolling in loaded gritters when adverse weather conditions are being experienced or predicted will emphasised to ensure all operators are aware of when to treat the road and also to communicate the conditions to the Control Room Operator.
- 14.4 Records of these informal 'Tool Box' talks will be kept to insure compliance.

Hands on Experience

- 14.5 Dry runs of salting routes will take place in the autumn for driver training in route familiarisation and to demonstrate compliance with the specified response times.

Formal Training

- 14.6 All operatives' formal training will conform to the following training matrix:

	Gritter Operator	Snow Plough Operator	Telehandler Operator
City & Guilds Winter Service – Spreader (fixed/demount)	Yes	Yes	
City & Guilds Winter Service – Snowplough (angle/vee)	Yes	Yes	
RTITB Telescopic Handler – Forks/Bucket			Yes

Call Out Procedures

- 14.7 Call out of the required level of resources will be coordinated by the Duty Engineer and Works Manager.
- 14.8 The decision to carry out treatment will be made by the Duty Engineer who will instruct the Works Manager to mobilise resources and give the instruction to carry out the appropriate treatment at the specified time. The Works Manager will then contact the required operatives who will proceed to the depot to start the treatment.

Adverse Weather

- 14.9 When snow or adverse weather is forecast a 12 hour rota will be introduced where there is cover 24 hours a day with 4 men on each 12 hour shift. This will ensure that each route can be patrolled and treated immediately.

15. PLANT, EQUIPMENT AND DEPOTS

- 15.1 The fleet size and disposition will be reviewed after each Winter Maintenance season and any recommendations put into practice.
- 15.2 A brine saturation plant is located in the Castleknock Depot and is capable of generating the correct brine solution and storing 28,000 litres (18,000 litres in main saturation tank and 10,000 litres in 2no. 5000 liter tanks). The plant is manually filled with white marine salt and the brine making process is automatic and shuts down when the tank is full.

Number, capacity and location of vehicles available for precautionary salting

- 15.3 The following tables give an indication of the plant absolutely dedicated to the Project Road however in extreme conditions more plant could be deployed from local plant hire, haulage and quarry companies.
- 15.4 Location and Type of Loading Shovel

Location	Type / Capacity	Number
Castleknock Depot	Manitou 732 Telescopic Handler / 3.2T	1

Number, capacity and location of vehicles available for snow conditions

- 15.4 Location and Type of Spreading Vehicles

Location	Vehicle Type	Snowplough	Capacity	Number Snowploughs	Number of Gritters
Castleknock Depot	32T HGV with Permanent Mounted Gritter	Yes	12m ³	2	2
Castleknock Depot	26T HGV with Demountable Gritter	Yes	9m ³	2	2
Castleknock Depot	18T Traffic Management Wagon	Yes	0	1	0
Total:				5	4

Number, capacity and location of vehicles available for winter maintenance patrols

- 15.5 Patrol vehicles will be the ISU which is available to patrol at any time 24 hours per day.
- 15.6 In adverse weather conditions one of the 9/12m³ gritters loaded with salt will patrol the road.
- 15.7 When adverse weather is forecast and snow is likely then 4 gritters will patrol the Project Road during the timing that the adverse weather is forecasted. The plough will be fitted to the 18T TM Wagon in preparation for a snow event.

Additional equipment/plant/labour

- 15.8 In the event that extreme conditions are experienced, sufficient trained labour will be available within the scope of the operation to operate all plant and further resources.
- 15.9 M50CL have trained operatives from selected subcontractors and have arrangements in place to call on these operatives when adverse weather conditions are forecasted.

Vehicle servicing and maintenance

- 15.10 Servicing and maintenance will be co-ordinated by the Works Manager.
- 15.11 Gritting vehicles will be mechanically maintained by the manufacturer's agents who will call on local resources. Drivers will be responsible for daily maintenance and for vehicle washing after each salt operation. Qualified motor fitters will be on call at all times during the Winter Maintenance period. The Works Manager will be responsible for calling out fitters and will have contact numbers.

Calibration of equipment

- 15.12 Calibration checks will be carried out on the spreading equipment of winter maintenance vehicles at the final service before the winter maintenance season of each winter maintenance period. Schmidt or other suitable contractor will carry out the calibrations. Calibration records for all gritters to be utilised will be held at the M50 Office.
- 15.13 Spot checks will be carried out on the calibration at least three times during the season. Once prior to the start of the season (after Schmidt has carried out calibration), once at the beginning of December and once at the beginning of February.
- 15.14 The Company will appoint Vaisala Ltd to carry out annual detailed inspections and calibration checks on all ice sensors in accordance with the manufacturer's recommendations (Aug/Sept). Repairs and re-calibration of faulty equipment will be carried out within 14 days of defect notification.

On board data capture equipment

- 15.15 All salt spreading vehicles are fitted with data loggers which will provide an accurate record of driver time distance traveled when salting / not salting, rate of spread, and width of spread. Data logger information is kept by and accessed through the GPS tracking company's web portal and is available for inspection.
- 15.16 In the event of a GPS/data logger malfunction, equivalent manual records will be produced.
- 15.17 The data collected will help in the salt reconciliation system which is developed and based on information from the on board data collection equipment, individual driver logs and controls on material deliveries.

Communication equipment

- 15.18 All Winter Maintenance vehicles and patrol vehicles will carry a two way radio system and operatives will be trained in the effective use of the provided system. During the course of normal daily usage, any faults in the communication system will be reported to the Duty Engineer who will instigate any repairs necessary.
- 15.19 Contact with maintenance staff during and outside normal work hours will be made by the cellular telephone system. Staff will operate on a roster basis.

Depots and storage facilities

- 15.18 Depot location to enable provision of winter service, emergency response and all other specified services are to be located at M50 Concession Ltd, Luttrellstown Road, Diswellstown, Castleknock, Dublin 15.

16. DE-ICING MATERIALS

Salt stock quantities

- 16.1 The rock salt will be stored at the Castleknock Depot. Salt is delivered from Salt Sale Co in Belfast.
- 16.2 Marine Salt will be stored at GSJ's Balbriggan Depot. Salt will be delivered/collected to Castleknock when required. Five tonnes will be stored at Castleknock as back up.
- 16.3 Details of the proposed stock level for the Winter Maintenance Operations at the Castleknock Depot is as below:

Period	Minimum Stock Level (T) – Rock Salt	Minimum Stock Level (T) – Marine Salt
Location	Castleknock	Balbriggan
1 st October	898	88
Oct – Feb	513	51
April & May	256	25

Salt testing

- 16.4 Rock salt supplied will be compliant with BS 3247.
- 16.5 Salt Sales Co. who supply the Company with salt for spreading on highways are BS 3247:2011 compliant and a letter of conformity from Salt Sales Co. is held with the winter maintenance records.
- 16.6 An accredited testing laboratory will be used to provide chemical analysis and grading of salt supplied. A sample will be taken from one of the deliveries and sent for testing. Details of testing will be kept in the winter maintenance file.

Salt management strategy

- 16.7 Prior to the commencement of the season on 1st October M50CL will ensure there is sufficient salt in stock to complete 63 no. 25g/m² runs as per TII advice note. Each treatment requires 14.25 Tonnes of 6mm rock salt, equating to 898 Tonnes. During the winter maintenance season this will not be allowed to drop below the stock required to complete 36 no. 25g/m² runs, 513 tons, except in April and May when that may drop to 18no. runs which is equal to 256 tons.

- 16.8 M50CL will order stock on a regular to replenish what has been used, this will keep stock at a high level and mitigate the effects of any supply problems during periods of exceptionally high demand.
- 16.9 Salt storage areas will be maintained to ensure the following:
- It is stored in dry conditions
 - No sheer faces left in stock piles
 - Salt stockpiles do not become contaminated.
 - Salt stockpiles or adjacent operations do not affect the environment.
 - Salt Storage

The salt will be stored at the Castleknock Depot in a purpose build storage facility with hard standing to ensure the salt pile is kept dry. This is capable of storing up to 1700T.

The marine salt will be stored at the Balbriggan depot and collected when required and has access to at least 100 tonne at any time. A stock of 5 tons will be kept at Castleknock as backup. Rock salt can be used to create brine if marine salt is not available. The brine solution generated from the marine salt is kept in a 28,000 liter tank and pumped into the brine tanks on the gritters.

Other materials – Fuels

- 16.9 Fuel is stored at the Castleknock depot in a 10,000 litre bunded tank and a computerised delivery system. A minimum level of 5000 litres of fuel will be stocked to ensure continuity of operations in severe weather conditions.

17. PUBLICITY

Arrangements for informing media and public

- 17.1 The Company will work closely with the Gardai who may supply information to the media regarding traveling conditions during periods of adverse weather.
- 17.2 The Duty Engineer will be responsible for providing factual information concerning the network to the Gardai for onward distribution to the press, local radio, RTE, AA, and giving a response to any public enquiries

18. LOCATIONS FOR SPECIAL TREATMENT

Ice susceptible areas- Inclines/Declines

- 18.1 During heavy periods of snow and with freezing conditions the action of the vehicles can turn the snow into ice. On areas of the Project Road where there are steep inclines and declines the formation of ice will cause traction problems either preventing vehicles from gaining grip and unable to climb the gradient or losing grip and being unable to stop.
- 18.2 A number of these locations exist on the Project Road. When snow is forecast and during snow fall these areas will be given priority and the spread of salt will be increased to ensure there is adequate application of salt.
- 18.3 Extra salt will be placed in bins or bags at these locations to allow hand spreading of salt.
- 18.4 These areas include
- Exit Slips at J13 Ballinteer/Sandyford, J9 N7, J7 N4 and J6 N3
 - Entry Slips at J13 Ballinteer/Sandyford
 - Inclined Carriageway between J14 N31 and J13 Ballinteer northbound and between J12 Firhouse and J13 Ballinteer/Sandyford heading southbound.

- Sheltered areas between J14 N31 and J12 Firhouse and in particular where the camber falls to the median
- J6 N3 slip roads with steep incline/decline and crossfall.
- Areas liable to seepage from double skinned concrete barrier particularly at J14 N31 northbound, between J13 Ballinteer/Sandyford and J12 Firhouse, at J5 N2 and J3 M1.

Frost susceptible areas

18.5 Areas susceptible to frost shall be identified by inspectors/patrols and reported to the Duty Engineer for inclusion in the daily action plan, and precautionary gritting routes:

18.6 These areas include:

- Elevated sections of trunk roads or bridges
- Exposed sections of trunk road
- Frost hollows

18.7 An Appendix detailing such sections will be developed in light of experience.

19. KNOWN SURFACE WATER RUN OFF LOCATIONS

19.1 Areas susceptible to surface run off shall be identified by inspectors/patrols and reported to the Duty Engineer for inclusion in the daily action plan and precautionary gritting routes.

19.2 These areas include:

- Sections of Project Road in low ground
- Areas susceptible to water run-off from side roads
- Known drainage problem areas

20. OTHER COMMENTS

Movement of Abnormal Loads

20.1 When conditions due to ice and snow become too severe for the safe movement of heavy or abnormal loads and it is known that a movement is imminent or in progress, the Duty Winter Manager will inform the appropriate Gardai Control Room.

20.2 A request will be made for Gardai co-operation in advising the driver of the abnormal load of the road conditions in order to encourage him to cease traveling until the road is considered safe. If the movement has not commenced or is due on the network within 24 hours the Network Manager will inform the haulage contractor of problems on the network.

Salt Usage Prohibitions

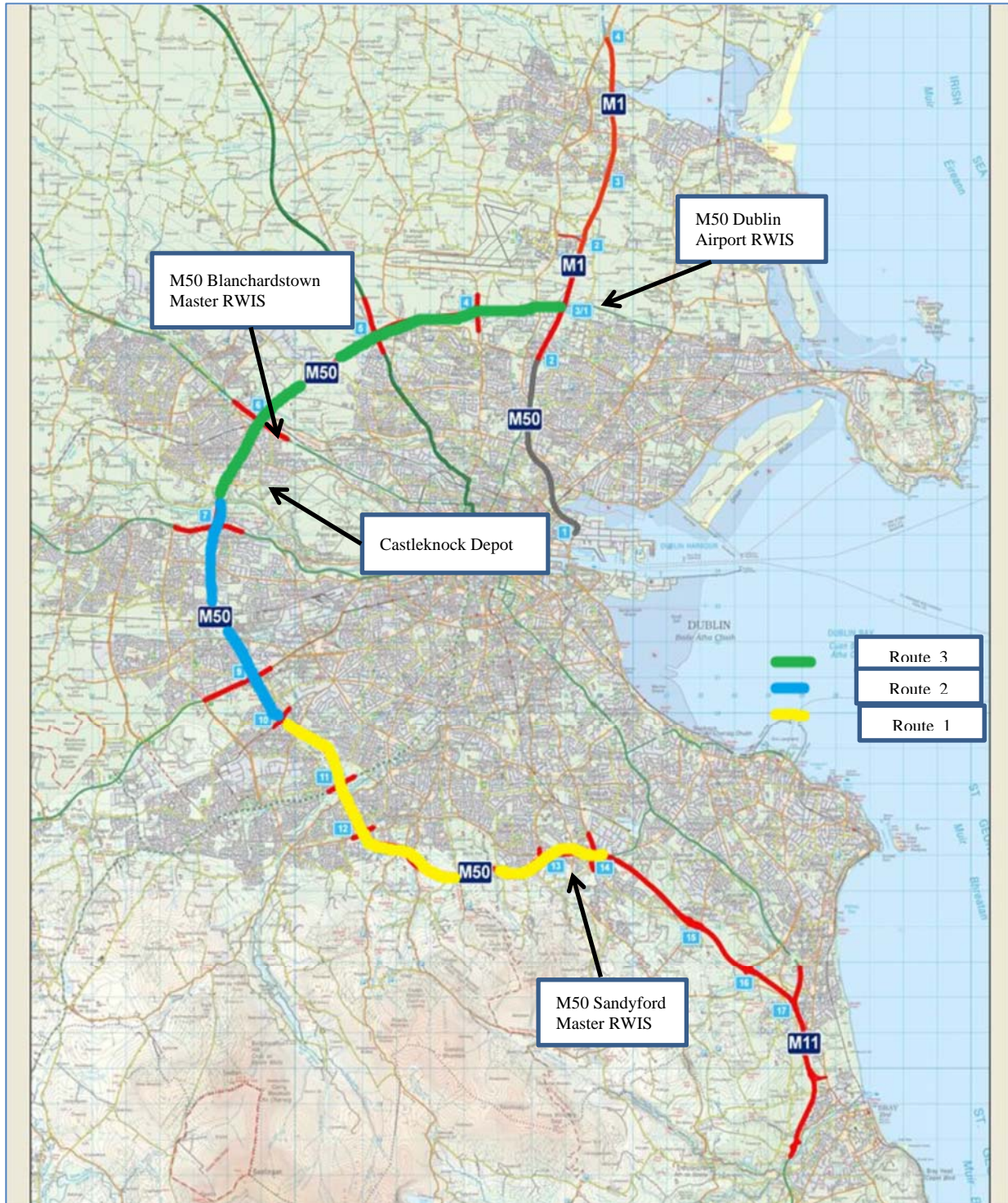
20.3 There are no salt prohibitions on the Project Road.

Annual Review

20.4 A report on the winter maintenance management Operations and winter maintenance Operations for the period ending 31st December will be prepared and submitted as part of the Annual Performance Report and the 5 Year Management Plan.

20.5 An annual review of the previous winter maintenance season will take place midsummer. All interested parties will be invited to forward their comments and to participate. Minutes of the review will be written and any actions carried out prior to the season commencement.

APPENDIX 1 - Map of M50 Project Road, Depot and Weather Stations



M50 PPP CONTRACT – PROJECT ROAD
ROUTES, DEPOT and WEATHER STATIONS

APPENDIX 2 Treatment Routes

Route 1

<u>Depot</u>	CASTLEKNOCK	<u>Average Salting Speed (km/hr)</u>	50
<u>Route No:</u>	1	<u>Route time to end salting (hr)</u>	59mins
<u>Rate of Spread</u>	10 - 40g/m ²	<u>Average route width (m)</u>	9.39
<u>Depot to Route (km)</u>	9.2	<u>Route tonnage (10g, 15g & 20g)</u>	2.06T/3.10T/4.13T
		<u>Route Tonnage (10g, 15g & 20g)</u>	0.20T/0.31T/0.41T
		<u>Marine Salt in Brine</u>	
<u>Time to Route (min)</u>	7	<u>Brine Volume (10g, 15g & 20g)</u>	885l/1,327l/1,770l
<u>Treated Length (km)</u>	31.4	<u>Route to depot (km)</u>	7.2
<u>Dead Running (km)</u>	32.4		

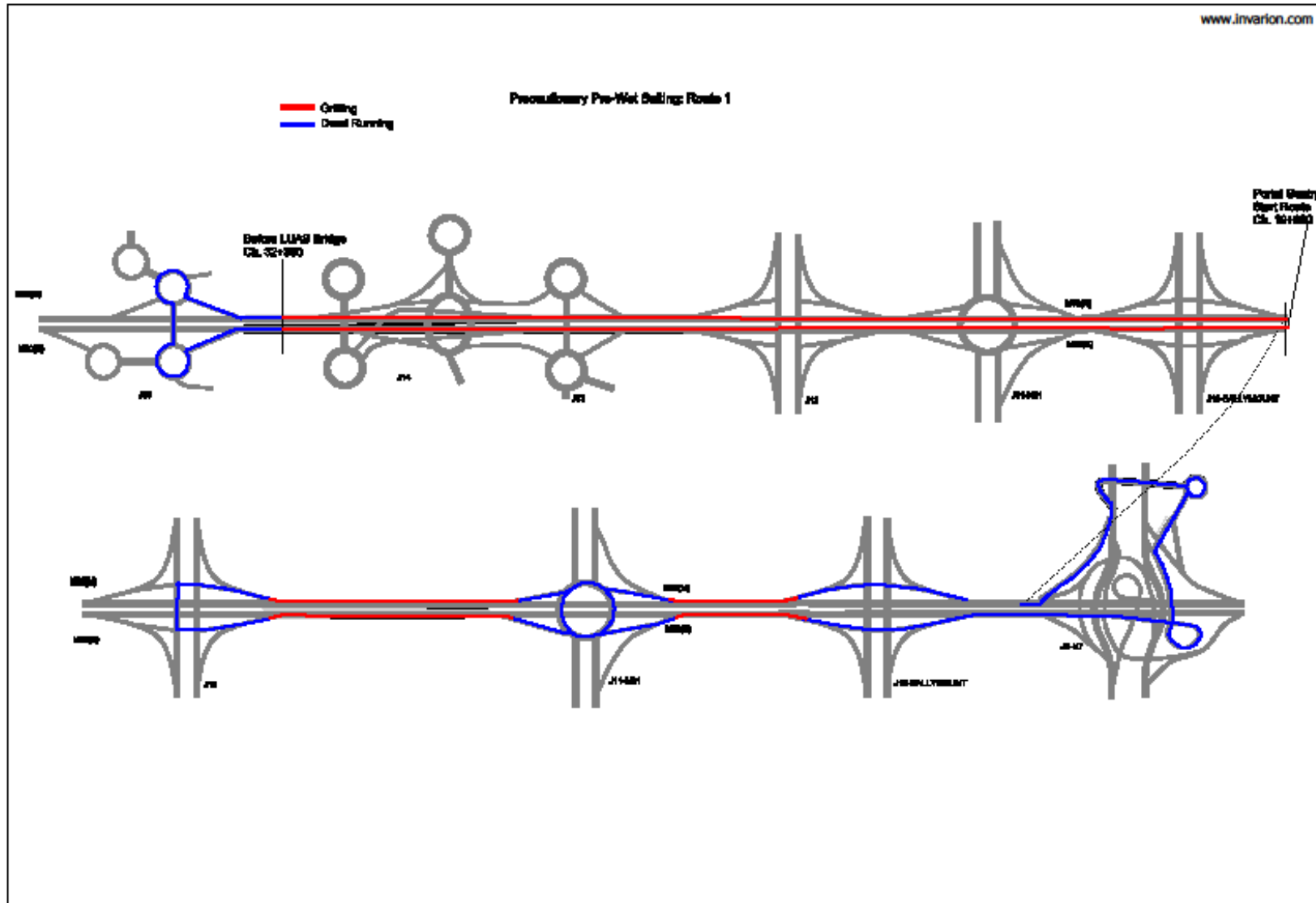
Start	End	Distance(km)	Dead/Live
Depot	J10 (19/6)	9.2	Dead
J10(19/6)	J11(22/4)	2.8	Live
J11 (22/4)	J12(24/6)	2.2	Live
J12 (24/6)	J13(30/0)	5.4	Live
J13(30/0))	J14(32/1)	2.1	Live
J14 (23/1)	End of PR @ 32360	0.26	Live
32360	J15	1.8	Dead
J15 SB exit slip		0.6	Dead
Roundabout		0.2	Dead
Link Rd		0.1	Dead
Roundabout		0.1	Dead
J15 NB entry slip		0.6	Dead
J15	Start of PR 32360	3.84	Dead
32360	J14(32/1)	0.26	Live
J14(32/1)	J13(30/0)	2.1	Live
J13(30/0)	J12(24/6)	5.4	Live
J12(24/6)	J11(22/4)	2.2	Live
J11(22/4)	J10 (19/6)	2.8	Live
J9 NB/WB exit slip		0.7	Dead
N7 WB		1.2	Dead
Newlands Cross		0.3	Dead
N7 EB		0.9	Dead
J9 EB/SB Entry Slip		0.5	Dead
J9	J10	0.56	Dead
J10 SB exit slip		0.5	Dead
J10 entry slip		0.5	Dead
J10 Aux(20/6)	J11 Aux(22/5)	1.9	Live
J11 SB Exit Slip		0.5	Dead
J11 SB entry slip		0.5	Dead
J11 AUX(23/2)	J12 Aux(24/2)	1	Live



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J12 SB exit slip		0.6	Dead
J12 SB entry slip		0.5	Dead
J12 NB entry slip		0.5	Dead
J12 Aux(24/2)	J11 Aux(23/2)	1	Live
J11 NB exit slip		0.5	Dead
J11 NB entry slip		0.5	Dead
J11 Aux(22/6)	J10 Aux(20/6)	2	Live
J10 NB Exit Slip		0.3	Dead
J10 NB Entry Slip		0.3	Dead
J10	Depot	6.6	Dead
ROUTE COMPLETE	Total Distance	63.82	

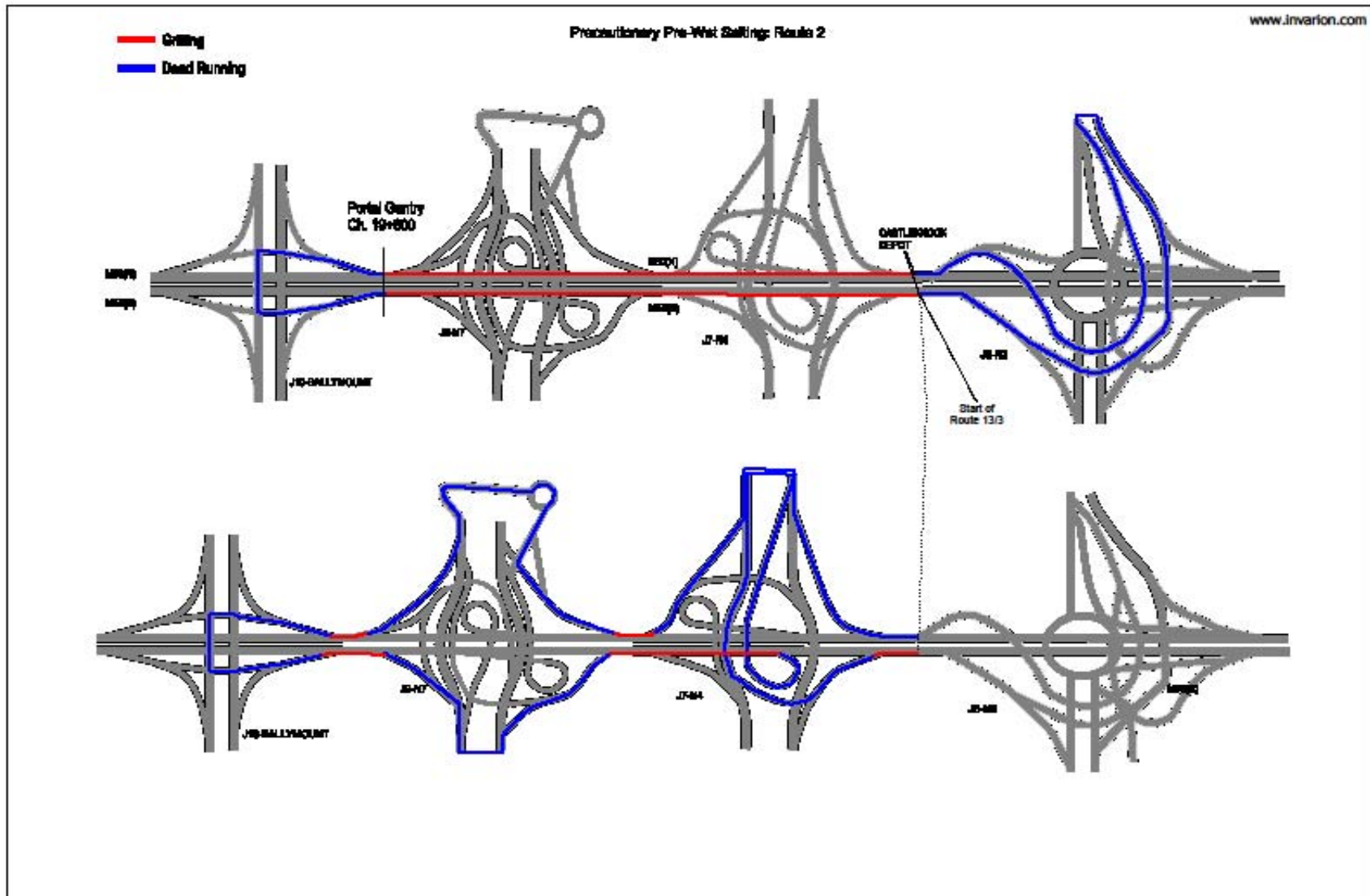


Route 2

<u>Depot</u>	CASTLEKNOCK	<u>Average Salting Speed (km/hr)</u>	50
<u>Route No:</u>	2	<u>Route time to end salting (hr)</u>	45mins
<u>Rate of Spread</u>	10 – 40g/m ²	<u>Average route width (m)</u>	7.51
<u>Depot to Route (km)</u>	0	<u>Route tonnage (10g/15g/20g)</u>	1.22T/1.83T/2.44T
		<u>Route Tonnage (10g, 15g & 20g) Marine Salt in Brine</u>	0.12T/0.18T/0.24T
<u>Time to Route (min)</u>	0	<u>Brine Volume (10g/15g/20g)</u>	523l / 784l / 1046l
<u>Treated Length (km)</u>	23.2	<u>Route to depot (km)</u>	3.8

Start	End	Distance(km)	Dead/Live
Depot (13/3)	J7 (14/3)	1	Live
J9(18/9)	J9(18/9)	4.6	Live
J9(18/9)	J10 (19/6)	0.7	Live
J10 SB exit slip		0.5	Dead
Link Road		0.1	Dead
J10 entry slip		0.5	Dead
J10 (19/6)	J9(18/9)	0.7	Live
J9(18/9)	J7 (14/3)	4.6	Live
J7 (14/3)	Depot (13/3)	1	Live
Depot (13/3)	Castleknock Rd Bridge	1.9	Dead
J6 NB / WB exit slip		1.8	Dead
N3 WB		0.7	Dead
Snugborough Int exit slip		0.3	Dead
Snugborough Road		0.2	Dead
Snugborough Int entry slip		0.3	Dead
N3 EB		1.3	Dead
J6 EB / SB entry slip		1	Dead
J6	Depot (13/3)	2	Dead
Depot (13/3) Aux	J7 (Aux) (14/1)	0.8	Live
J7 SB/WB exit slip		0.6	Dead
N4 WB		0.8	Dead
N4 exit slip		0.3	Dead
Roundabout @ Liffy Valley		0.1	Dead
Link Road		0.1	Dead
Roundabout		0.1	Dead
N4 entry slip		0.1	Dead
N4 EB		0.7	Dead

J7 EB/SB entry slip		0.8	Dead
J7 Aux (14/2)	J9 Aux (18/5)	4.3	Live
J9 SB/EB exit slip		0.7	Dead
R110 EB		0.9	Dead
Turn on Nass Road TL's		0.3	Dead
R110 WB		0.9	Dead
J9 WB/SB entry slip		0.9	Dead
J9 Aux(19/2)	J10 Aux(20/1)	0.9	Live
J10 SB exit slip		0.5	Dead
Link Road		0.1	Dead
J10 entry slip		0.5	Dead
J10 Aux(20/0)	J9 Aux(19/2)	0.8	Live
J9 NB/WB exit slip		0.7	Dead
N7 WB		1.2	Dead
Newlands Cross Turn at TL's		0.3	Dead
N7 EB		0.9	Dead
J9 EB/NB entry slip		0.5	Dead
J9 Aux(18/4)	J7 Aux(14/6)	3.8	Live
J7 NB/WB exit slip		0.6	Dead
N4 WB		0.8	Dead
N4 exit slip		0.3	Dead
Roundabouts at Liffy Vally		0.3	Dead
N4 entry slip		0.1	Dead
N4 EB		0.4	Dead
J7 EB/NB entry slip		0.6	Dead
J7 Aux	Depot (13/3) Aux	0.7	Dead
ROUTE COMPLETE	Total Distance	49.6	

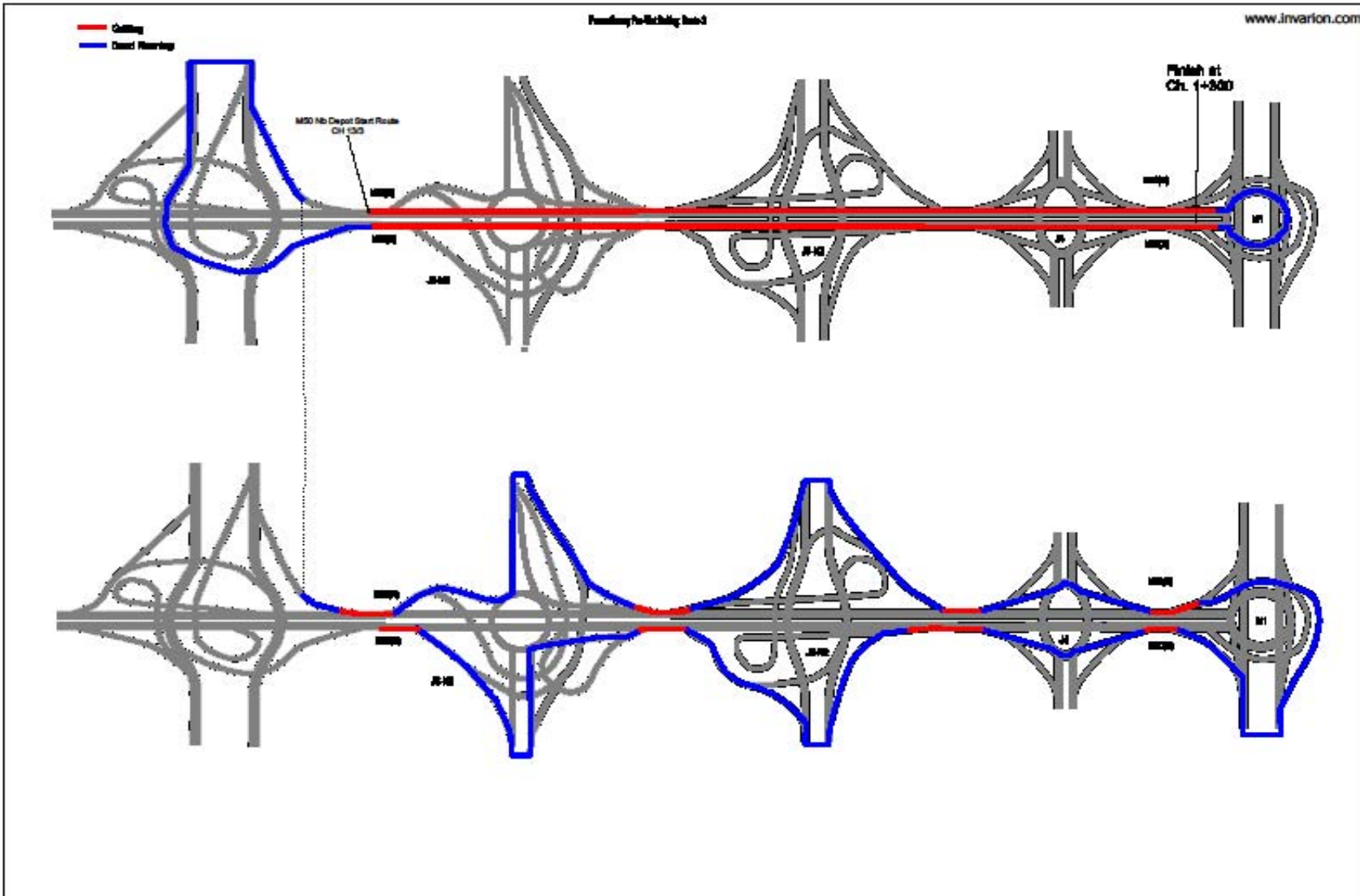


Route 3

<u>Depot</u>	Castleknock	<u>Average Salting Speed (km/hr)</u>	50
<u>Route No:</u>	3	<u>Route time to end salting (hr)</u>	1hr 10mins
<u>Rate of Spread</u>	10 - 40g/m ²	<u>Average route width (m)</u>	7.89
<u>Depot to Route (km)</u>	0	<u>Route tonnage (10g, 15g & 20g) Rock Salt</u>	2.41T/3.62T/4.83T
		<u>Route Tonnage (10g, 15g & 20g) Marine Salt in Brine</u>	0.24T/0.36T/0.48T
<u>Time to Route (min)</u>	0	<u>Brine Volume (10g, 15g & 20g)</u>	1,035l / 1,552l / 2,069l
<u>Treated Length (km)</u>	44.8	<u>Route to depot (km)</u>	0

Start	End	Distance	Dead/Live
Depot N/b 13/3	Castleknock Rd Bridge	2	Live
Castleknock Rd Bridge	J5	5.2	Live
J5	J4	3.1	Live
J4	J3	2	Live
J3 Roundabout		0.4	Dead
J3	J4	2	Live
J4	J5	3.1	Live
J5	J6	4.3	Live
J6	J7	3.8	Live
J7 SB/WB exit slip		0.6	Dead
N4 WB		0.8	Dead
N4 exit slip		0.3	Dead
Roundabout		0.1	Dead
Link Road		0.1	Dead
Roundabout		0.1	Dead
N4 entry slip		0.1	Dead
N4 EB		0.4	Dead
J7 EB/NB entry slip		0.6	Dead
J7(14/0)	J6 Aux(11/3)	2.7	Live
J6 SB exit slip		0.5	Dead
J6 SB/WB exit slip		0.7	Dead
N3 WB		0.7	Dead
Snugborough Int exit slip		0.3	Dead
Snugborough Road		0.2	Dead
Snugborough Int entry slip		0.3	Dead
N3 EB		1.3	Dead
J6 EB/NB entry slip		1	Dead
J6 Aux(10/4)	J5 Aux(7/2)	3.2	Live

J5 NB/OB exit slip		0.6	Dead
N2 OB		0.7	Dead
North Road		1.2	Dead
N2 IB		1.7	Dead
J5 N2 IB/NB entry slip		0.9	Dead
J5 Aux(6/3)	J4 Aux(4/1)	2.2	Live
J4 NB exit slip		0.4	Dead
Roundabout		0.6	Dead
J4 NB entry slip		0.4	Dead
J4 Aux(3/2)	J3 Aux(1/3)	1.9	Live
J3 NB/SB exit slip		1	Dead
J3	J2	0.8	Dead
J2 SB exit slip		0.4	Dead
Roundabout Coolock Int		0.3	Dead
J2 NB entry slip		0.3	Dead
J2	J3	0.8	Dead
J3 NB/SB entry slip		0.4	Dead
J3 Aux(1/3)	J4 Aux(3/2)	1.9	Live
J4 SB exit slip		0.5	Dead
J4 SB entry slip		0.5	Dead
J4 Aux(4/1)	J5 Aux(6/2)	2.1	Live
J5 SB/IB exit		0.8	Dead
N2 IB		0.8	Dead
Roundabout on North Road		0.2	Dead
N2 OB		0.8	Dead
J5 WB/SB entry slip		0.7	Dead
J5 Aux(7/2)	J6 Aux(10/5)	3.3	Live
J6 NB exit slip to Rdbt		0.6	Dead
Rdbt		0.3	Dead
Dunsink Link Rd		0.2	Dead
N3 WB		0.2	Dead
J6 WB/SB Entry Slip		0.3	Dead
J6 Aux (11/3)	Depot 13/3	2	Live
ROUTE COMPLETE	Total Distance	69.7	



Appendix 3 - Winter Maintenance Duty Engineers' Roster for the Period 1st October 2016 to 15th May 2017

M50 CONCESSION LTD DUTY ENGINEER ROTA WINTER 2016/17

Please see below for details for M50CL Duty Engineers for Winter 2014/15. Duty Engineers hand over each Tuesday at 08:30hrs.

Date	Duty Engineer	Date	Duty Engineer	Date	Duty Engineer
01/10 – 03/10	Sean Hollywood	13/12 – 19/12	Fraser Boyd	28/02 – 06/03	Andrew Elliott
04/10 – 10/10	Declan Murphy	20/12 – 26/12	Sean Hollywood	07/03 – 13/03	Fraser Boyd
11/10 – 17/10	Alan Lynch	27/12 – 02/01	Declan Murphy	14/03 – 20/03	Sean Hollywood
18/10 – 26/10	James McPadden	03/01 – 09/01	Alan Lynch	21/03 – 27/03	Declan Murphy
25/10 – 31/10	Andrew Elliott	10/01 – 16/01	James McPadden	28/03 – 03/04	Alan Lynch
01/11 – 07/11	Fraser Boyd	17/01 – 23/01	Andrew Elliott	04/04 – 10/04	James McPadden
08/11 – 14/11	Sean Hollywood	24/01 – 30/01	Fraser Boyd	11/04 – 17/04	Andrew Elliott
15/11 – 21/11	Declan Murphy	31/01 – 06/02	Sean Hollywood	18/04 – 24/04	Fraser Boyd
22/11 – 28/11	Alan Lynch	07/02 – 13/02	Declan Murphy	25/04 – 01/05	Sean Hollywood
29/11 – 05/12	James McPadden	14/02 – 20/02	Alan Lynch	02/05 – 08/05	Declan Murphy
06/12 – 12/12	Andrew Elliott	21/02 – 27/02	James McPadden	09/05 – 15/05	Alan Lynch

Duty Engineer	Office	Mobile	Email
Declan Murphy	01 823 5888	087 754 3795	dmurphy@m50concession.com
Alan Lynch	01 823 5888	086 044 1950	alynch@m50concession.com
Andrew Elliott	01 823 5888	086 044 1952	andrewelliott@m50concession.com
James McPadden	01 823 5888	086 049 5504	Jmcpadden@m50concession.com
Fraser Boyd	01 823 5888	086 851 1401	fboyd@m50concession.com
Sean Hollywood	01 823 5888	086 174 5782	shollywood@m50concession.com

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