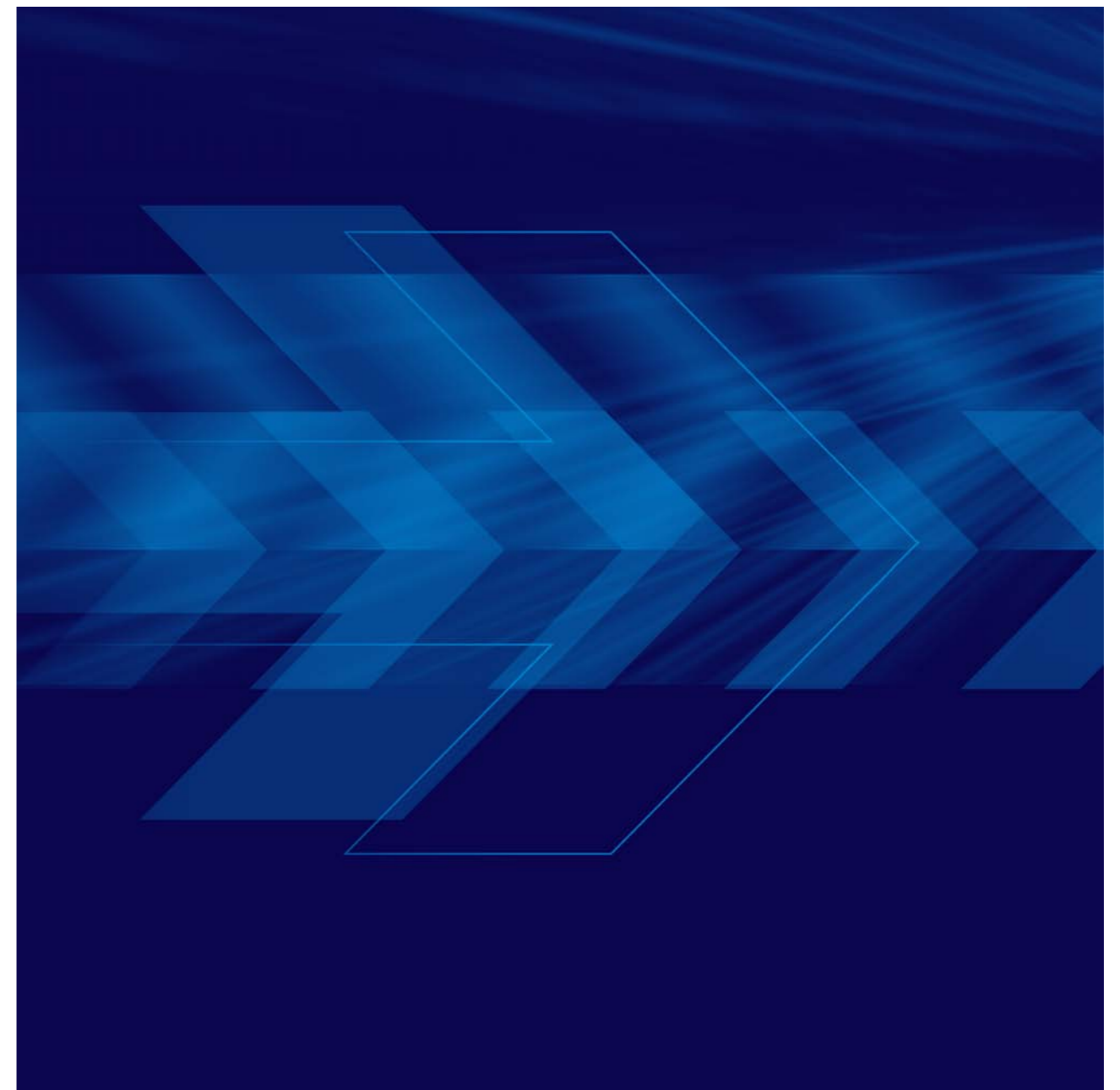




# OpenRoad

Regional forecasting expertise  
to aid critical decision making



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*The Met Office has established a world-class reputation as a leading provider of environmental and weather-related services. This is underpinned by research, science and the application of our knowledge to provide solutions to challenges faced by our customers*

The Met Office was created in 1854 to provide safe sailing advice to mariners. Now, more than 150 years later, Met Office forecasts are used around the globe, every day, in every aspect of life.

- Hospital planners trust Met Office reports to plan their admissions and staffing requirements
- We are one of two World Area Forecast Centres (WAFCs) for aviation worldwide
- The armed forces use our weather information and the support of our specialist teams wherever they are in the world
- Governments use our help to understand and tackle what is one of the most pressing issues of our day – climate change and global warming

Our forecasters provide day-to-day and week-to-week assessments of the weather, while our world-leading climate centre looks years and decades into the future. Working as a team, they offer an unparalleled breadth and depth of expertise in climate understanding and customised forecasting.

Met Office road services are tailored to meet the individual needs of local authorities, managing agents, transport companies and Government. Each day (during the winter season) thousands of site-specific road forecasts are made for more than 600 locations nationwide from our regional offices. This detailed analysis provides advance warning to allow our customers to take the appropriate action and ensure public safety on the roads.

## OpenRoad

Efficient winter maintenance of transport systems poses considerable logistical challenges for all those responsible for maintaining the smooth running of the road infrastructure. OpenRoad is a road weather forecast package that helps to plan, manage and minimise the effects of the weather. For more than 15 years, OpenRoad has been delivering key information to road transport and infrastructure decision makers.

OpenRoad forecasts are based on Met Office science combined with data received from a network of specialised road sensors installed on major roads.

### Benefits

- Combines road and transport expertise with the world's leading weather forecasting capability
- Comprises a team of meteorological experts drawing on more than 15 years' road forecasting experience
- Uses some of the most advanced weather models in the world
- Forecasts road state and so minimises the impact of adverse weather on transportation and the provision of essential road services
- Provides quick and easy access to accurate road weather forecasts 24 hours a day
- Encourages improved safety levels by enabling more informed decisions
- Utilises world-leading numerical weather prediction capability that feeds a site-specific forecast model able to take account of the local environment
- Uses the unique Met Office Road Surface Temperature model (MORST)
- Gives peace of mind – acting on the latest regional advice from locally-based experts
- Provides direct telephone access to a forecaster 24 hours a day, seven days a week

OpenRoad provides fast and easy access to accurate road weather forecasts, with information delivered via a password-protected website, fax and email, or a modem link to your ice-prediction system or road weather information service (RWIS).

### Features

- 24-hour text forecasts by single area, climatic domain, or by route to identify relevant factors
- Two-to-five-day forecasts to enable you to plan resource allocation

- Morning summary giving verification of the previous day's forecast, and a preliminary forecast for the forthcoming day
- Evening updates to inform you of any change in forecast conditions
- Rainfall and flood warnings to enable preventative action
- Site-specific ice prediction graphs (options of forecaster-intervened, or direct model output)
- Sensor monitoring to ensure forecast accuracy throughout the night
- Amendments issued if the forecast or event timing changes
- Seasonal statistics to verify the accuracy of the service

Accuracy of OpenRoad forecasts in 2003/04 exceeded targets nationwide:

### ACCURACY OF UK OPENROAD FORECASTS

	Target	2003/4 season
Frost detection	Above 87%	92.8%
False alarms	Below 30%	23%
Overall accuracy	—	91.2%

### Consultancy

Met Office forecasters offer unparalleled expertise in regional road weather forecasting and climate understanding. Through our OpenRoad telephone consultancy service this expertise is at your fingertips 24 hours a day, seven days a week. One phonecall gives you direct access to the Met Office's team of experienced forecasters for updates and the latest information for your area.

# OpenRoad: On the web

## Winter service

Building on our knowledge of delivering services using web-based technology, OpenRoad on the web is designed to offer customers the ability to view their own road weather forecasts in a web-based format. Additional graphical and map-based information is also available using this technology. This web-based service enables decision makers to gain direct access to the information they need around the clock, helping them to work more effectively.

## Benefits

- 24-hour access to site-specific forecasts and real-time weather information to assist decision-making and planning
- Reliable information to help decide when to pre-salt roads or take remedial action – reducing wastage
- Online help to get the most from the information available

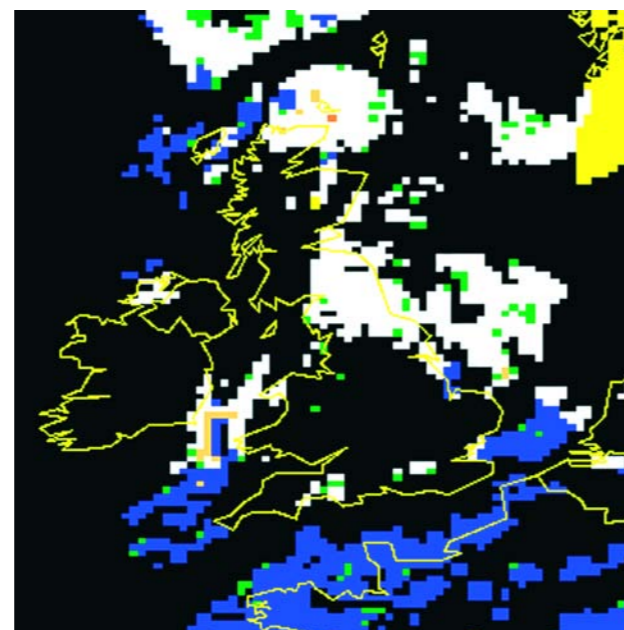
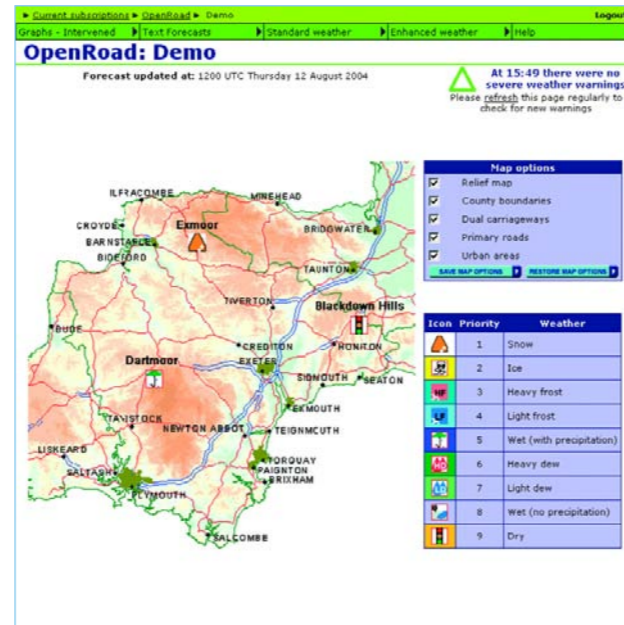
## Features

- Online access to text forecasts as soon as they are issued
- Map-based visualisation of the region, with icons indicating the worst state at forecast sites
- Access to site-specific forecast graphs for key weather elements, updated where appropriate in line with agreed amendment criteria
- Visualisation of animated sequences of UK rainfall radar data, satellite images, lightning risk and synoptic charts
- Optional enhanced visualisation giving animations of forecast distribution and intensity of precipitation, and precipitation type
- Actual road surface temperature data overlaid on forecast graphs
- Help pages – a full explanation and handy tips are available online
- Severe weather warnings are displayed if they affect the local area

## Map

Within the map, icons at each of the forecast sites summarise the predicted worst weather state expected during the forecast period. Roll-overs display further information about the site.

The interactive map allows the user to turn off a number of layers within the backdrop, including a relief map, county boundaries and the various classes of roads.



## Graphs

Customers who subscribe to the service can choose either automated graphs or forecaster-intervened graphs.

### Automated graphs

With automated graphs, Met Office forecasts out to 36 hours ahead are displayed for each forecast site. These forecasts are updated every six hours.

The parameters available are:

- road surface temperature and road state;
- air temperature and dewpoint;
- precipitation;
- wind – speed and direction, including gusts;
- visibility.

The actual data for road surface temperature, road state, air temperature and dewpoint collected from road sensors are presented at least every hour and can be compared with the forecast.

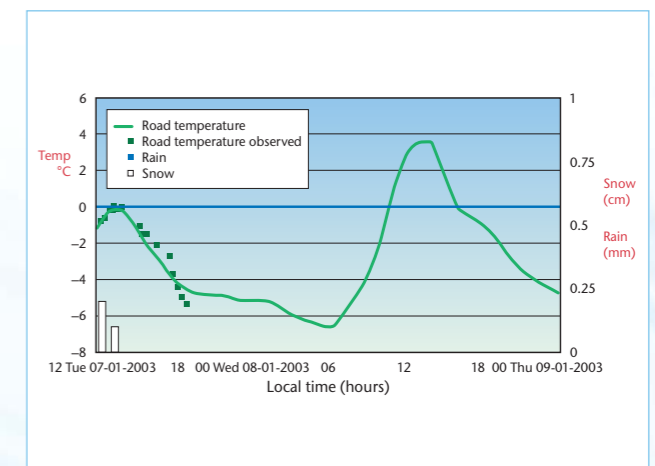
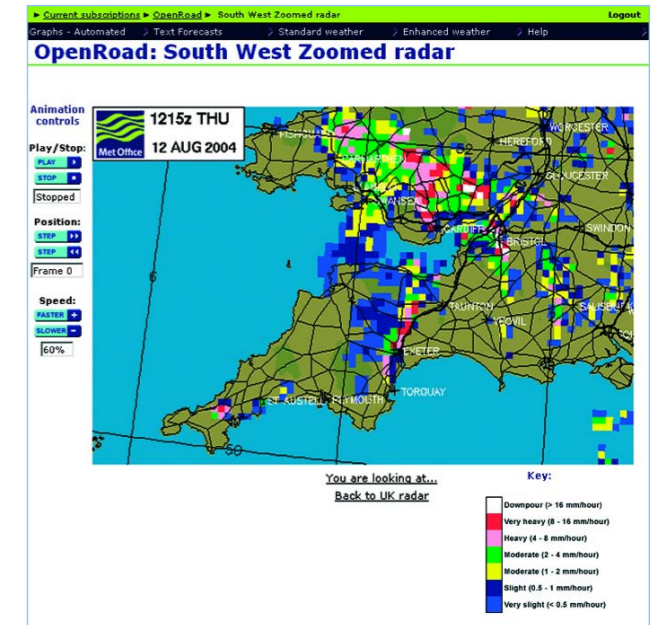
### Forecaster-intervened graphs

With forecaster-intervened graphs, Met Office 24-hour forecasts are reviewed and enhanced by an experienced forecaster with knowledge of the region and forecast sites.

The forecasts are issued once a day. Customers may also subscribe to a graph amend service where graphs will be updated if there is a change in the forecast and specified amend criteria are crossed.

The parameters available are:

- road surface temperature and road state;
- air temperature and dewpoint;
- precipitation type;
- wind speed.



## OpenRoad: On the web

### Visualisation of additional weather information

Two other valuable subscription options are available to customers to aid their decision-making process.

The standard weather package includes:

- synoptic charts presented as an animation, in 12-hour steps, out to 60 hours ahead;
- UK satellite images — single frame visible image, and an animation loop of infrared;
- UK rainfall radar images — historical precipitation information at least every 30 minutes;
- hourly observed information from more than 60 observation sites across the UK, giving air temperature, visibility, wind speed and direction.

### The enhanced weather package contains:

- 0–6 hour precipitation forecasts, including rate and type;
- regionally zoomed rainfall radar;
- lightning — as actual data and an animation in five grades of forecast risk.

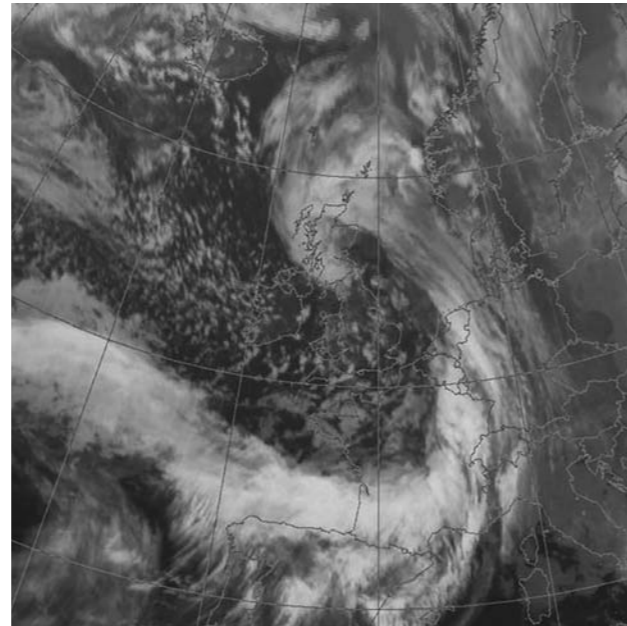
### Help facility, glossary and user information

A help facility supplies information to enable the user to make the most of both the information supplied and the functionality of the website. A comprehensive glossary of terms used in OpenRoad is also included.

### Browser and screen specification

Best viewed in: Internet Explorer 5.5 or above, screen resolution of 1024 x 768.

Minimum requirements: Internet Explorer 4.0/Netscape 4.0, screen resolution 800 x 600. Cookies need to be enabled. Where Macromedia Flash is installed, users will see enhanced graphical displays.



## OpenRoad: Training

### Are you prepared for the winter maintenance season?

Training is an important element of any organisation's drive to improve service, quality and results. Met Office weather-training courses are a key tool for your staff to enable them to do their job better and feel confident they are making full use of the weather forecasting services available to monitor operations.

Once completed, OpenRoad training will have provided you with certified knowledge, training and confidence that will prepare you and your staff for possible courtroom appearances.

### Benefits

Initial training and regular refresher courses give you a better understanding of weather forecasting and related issues, so you are able to:

- implement better working practices, making your operation more efficient;
- deal with weather-related issues with greater confidence;
- speak authoritatively and demonstrate understanding if called on to give evidence;
- reduce costs through improved decision-making skills.

### Features

- Certificated courses developed in conjunction with the Highways Agency
- Courses presented by experienced road weather forecasters
- Interactive approach to training (including practical lessons, quizzes and discussion sessions)
- Comprehensive handout notes for all delegates
- Can be run on customer's premises or hosted by the Met Office
- A range of courses to meet the needs of all abilities

### Basic course

Our one-day basic course is for staff who have not received weather training for more than two years and those new to winter road maintenance who will be expected to make decisions regarding salting and snow clearance.

- Course aim: to provide engineers with suitable knowledge to interpret forecast services and make relevant decisions with respect to winter road maintenance
- Course objective: delegates will be able to differentiate between various weather information sources and be confident in making the correct decisions
- Course content: basic meteorology, infrastructure, forecast confidence, road temperatures and hazards



### Refresher course

Our one-day refresher course is for established engineers who last attended a basic course more than a year ago.

- Course aim: to provide engineers with an update on basic road weather and to keep them abreast of the latest ideas on climate change and flooding
- Course objective: delegates will be able to differentiate between various weather-information sources and be confident in making the correct decisions
- Course content: the same as the basic course, but also examining climate change and probabilities

### Introduction course

We also offer bespoke half-day introduction courses for other staff, such as gritter drivers and administrative staff.

- Course aim: to improve understanding of weather forecasts and provide better feedback mechanisms within authorities
- Course objective: delegates will be able to differentiate between weather types (frost, black ice, etc.) and understand why certain decisions are made
- Course content: weather types and forecast confidence

### Advanced course and Winter Road Desk exercise

Our two-day advanced course and Winter Road Desk exercise focuses on the application of weather information to decision making.

#### Day one: advanced road weather training

- Course aim: to enable participants to recognise how weather factors may hinder operations and safety, and interpret all forecast information (including satellite and radar imagery) accurately, in order to make informed and cost-effective decisions at an early stage

#### Day two: Winter Road Desk exercise

- Course aim: to enable participants to interpret regional weather and apply it to winter road maintenance via an interactive exercise. To work in teams and deal effectively with any road-related outcomes of the weather, including serious incidents, while making sure actions comply with their area network contingency plans



## Met Office OpenRoad Index — MOORI

The Met Office was asked to develop an index to measure the severity of a winter (in terms of winter road maintenance). This enables a year-by-year comparison of the weather by detailing the number of actions that would have been taken in an average year. More actions than this would indicate a more severe winter, fewer actions a milder one.

### Data sources

More than 600 road sensors have been progressively installed around the UK since the 1980s and provide the most obvious source of data. The coverage of these sensors is now excellent and as winter maintenance decisions are taken based in part on information from these sensors, there is a high degree of relevance. However, there are a number of problems with using data from these road sensors.

- The data are not quality controlled
- The record is short (generally less than 10 years)
- Some of the data are missing
- There is, as yet, no national archive
- Not all meteorological parameters are recorded
- Availability of the data can be delayed

Thus, the decision was taken to use data from the National Climatological Database. These data are quality controlled, are for longer time periods (usually over 20 years) and most have meteorological parameters available. Unlike road sensor data, there is no direct link to winter maintenance activities. Therefore, statistical methods were required to link the climatological data and winter-maintenance activities.

### Format of the index

It was decided that the most user-friendly way to present the index was to show monthly nights of salting actions. Hence, if the index showed a value of six in a given month, this would imply that six nights of salting actions would have taken place, assuming that current ice prediction methodologies were in use. This is a very important difference and would enable current winters to be compared against past winters whilst eliminating changes due to improved technology.

### Weather sensitivity analysis

In order to link meteorological information to the number of nights of salting actions, the Met Office used a technique known as Weather Sensitivity Analysis (WSA). The following climatological elements were tested:

- days of rain (>0.2 mm);
- days of sleet/snow falling;
- days of snow lying at 0900;
- day maximum air temperature;
- night minimum air temperature;
- concrete slab minimum temperature;
- days of ground frost (over grass);
- hours of sunshine.

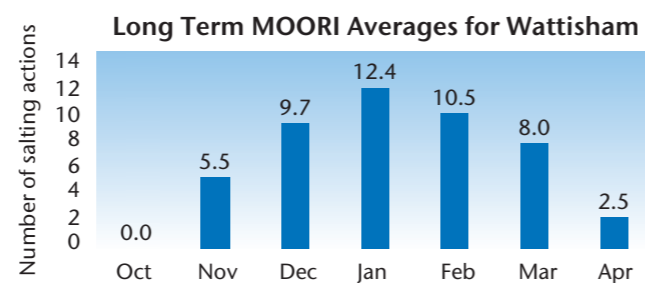
### How the MOORI is presented

*The MOORI is presented in four ways:*

1. Long term averages of the nights of salting actions
2. Month-by-month differences from the average
3. Least squares regression line to determine any long-term trends
4. Whole winter differences from average

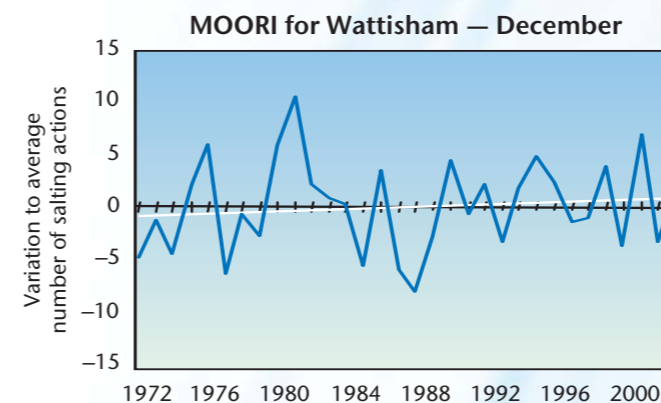
### Long-term averages

These are not long-term averages of nights of salting actions that actually occurred, but rather long-term averages of nights of salting actions that would have occurred if current working practices were in use. The record length varies, depending on which climatic station is used, but is typically around 20 to 25 years. It is produced by averaging the MOORI for each month over the whole time period.



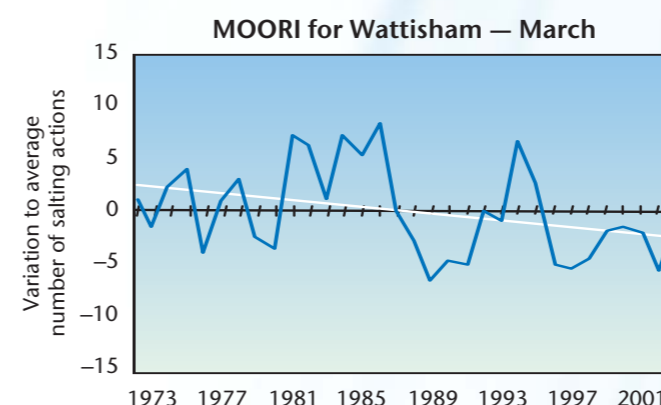
### Month-by-month differences from the average

This is produced by subtracting the long-term average from each value of the MOORI. Graphs can then be produced, which are normalised around zero. They show the year-to-year variability, and it can be seen at a glance whether the month has had more or fewer gritting runs than the average.



### Least squares regression

Included on the monthly graphs, least squares regression is produced by linear regression of all the points on the graph, and attempts to show any longer term trends.



### Whole winter differences from average

This is similar to the month-by-month differences from average, except that values are summed for the whole winter, allowing a season-to-season comparison.

### What the MOORI does not show

As the MOORI is derived data (produced by regression) and not actual data, care should be taken in its use. The following points should be considered when using MOORI:

- The numbers that MOORI produces are the number of nights with turn-outs. They are NOT the number of actual turn-outs. Hence, if three salting runs were made on one night, this would only count as one night in the MOORI calculation. In most cases, multiple turn-outs are due to snow situations. This is estimated by using the number of days of snow lying in the area.
- MOORI takes no account of groundwater seepage. One of the variables used is rainfall greater than 0.2 mm. This was to account for salt wash-off. In the mild winters of the 1990s, salt usage was above the long-term average, because of salt wash-off as the winters were very wet. However, it is not possible (without a hydrological model) to estimate seepage from rainfall that may have fallen more than 24 hours previously. Hence, for areas where seepage is a problem, some factoring may be necessary.



## Additional services

### Legal consultancy

Legal consultancy services from the Met Office are available to provide expert legal advice to the road industry:

- legal reports and certified statements of weather for specific incidents;
- site inspections by experts who can advise how the weather has affected certain situations;
- specialist meteorological advice for all those involved in civil or criminal litigation;
- expert witness testimony in court and on weather matters;
- weather data for enquiries, crash investigations and other incidents.

### Summer dressing

The Met Office offers a summer dressing forecast that is used by local authorities and highways agency contractors when surfacing roads. A 24-hour text forecast gives critical weather forecasts for this activity including:

- rainfall;
- strong winds;
- road surface temperature;
- timings of weather events.

## Further information

To find out more about our services for the road industry or for pricing information:

Email: [openroad@metoffice.gov.uk](mailto:openroad@metoffice.gov.uk)

Visit: [www.metoffice.gov.uk/roads](http://www.metoffice.gov.uk/roads)

Telephone our 24-hour Customer Centre on +44 (0)1392 885680

Fax us on +44 (0)1392 885681

