

# Winter Maintenance: The Role of the “Ice Caster” (Duty Engineer) on ABNORMAL NIGHTS

*Presentation by*

*Tony Buckley, Chartered Engineer, F.I.E.I.  
Westmeath National Roads Office*



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Department of Transport



**RSTG** Annual  
Conference  
2026  
14TH - 15TH MAY | WHITE'S HOTEL, CO. WEXFORD

## Acknowledgements:

❄️ **Transport Infrastructure Ireland (TII):** Stephen Smyth, Owen Smith

❄️ **Vaisala UK:** Colin Walsh, Richard Keep, Nick Johnson, Stuart Onyeche

❄️ **Westmeath County Council:** Damien Grennan, Liam Galvin, Bernard Groenewald,  
Patrick Hunt Patrick Kavanagh

❄️ **Met Éireann:** Liz Walsh & Andrew Doran Sherlock



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# Policy for Winter Maintenance of Public Roads:

Keep major routes safe and as free as possible from hazardous road conditions



### 3.3 Winter Service Duty Engineer

Local authorities shall develop a rota of suitably qualified and experienced Winter Service Duty Engineers who will be responsible for the day to day implementation of the Winter Service Plan.

The Winter Service Duty Engineer's duties include, but are not limited to:

- a) implementing the response required under the Winter Service Plan
- b) obtaining the information from TII's RWIS
- c) undertaking the interpretation of the information from the RWIS, deciding the appropriate response on the network
- d) liaising with the forecast provider to discuss conditions or confirm the forecast
- e) obtaining updated or more detailed road weather forecasts by talking directly to the forecast provider using The Telephone Consultancy Service
- f) using the thermal maps to direct field operatives to the more vulnerable areas with emphasis on Precautionary Salting
- g) recording details of all decisions made and treatments made to the network on the applicable RWIS function
- h) updating the diary and recording of activities, operations and decision making on the RWIS so that a complete picture of decision making and operations can be inspected by TII if required
- i) supplementing the information contained on the RWIS if requested



#### TII Publications



#### Winter Service Manual

AM-PAV-06051  
October 2021

**Winter Service Manual AM-PAV-06051 Date Published Oct 2021**

Page 10



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### 3.3 Winter Service Duty Engineer

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The Winter Service Duty Engineer's duties include, but are not limited to:

*TII Publications  
Winter Service Manual*

*AM-PAV-06051  
August 2022*

- j) liaising and verifying with the Winter Service Manager and seeking direction on strategic issues
- k) communicating Winter Service treatments to the Winter Service Supervisor to implement
- l) liaising with An Garda Síochána, TII and neighbouring managing organisations
- m) continuously monitoring the national road network for any changes in the prevailing conditions and implementing appropriate responses where necessary
- n) monitoring Winter Service plant and vehicle availability, provision of spare parts and vehicle consumables.
- o) monitoring the effectiveness of any responses, and implementing and modifying the responses, or implementing any further responses required
- p) being available and contactable by the Winter Service Manager at all times 24 hours per day, for the rostered period
- q) updating the National Salt Management System (NSMS) on a weekly (or daily) basis
- r) coordinating salt deliveries/collections for their local authority as required

While the Duty Engineer's actions are his/her responsibility, he/she may wish to consider the following:

- a) Every day, including weekends, check forecasted conditions using the RWIS at 2:30 and 4:30 pm
- b) If the forecast temperature is less than 5°C, check the weather station information in the RWIS as necessary until a decision is made (Note: Section 4.3.2 Decision Matrix Guide in the Winter Service Plan Template provides decision making assistance)



TII Publications



Winter Service Manual

AM-PAV-06051  
August 2022

**Winter Service Manual**  
**AM-PAV-06051**  
**Date Published Oct 2021**  
**Revised Aug 2022**



Standards

## Winter Season: Typically 28 weeks: 18<sup>th</sup> Oct to 30<sup>th</sup> April

❄ The aim is to deploy resources prior to the development of hazardous road conditions utilising:

❄ Duty Engineers

❄ Drivers Vehicles & Gritters (with Additional Relief Drivers)

❄ Decision making based on data sources e.g.

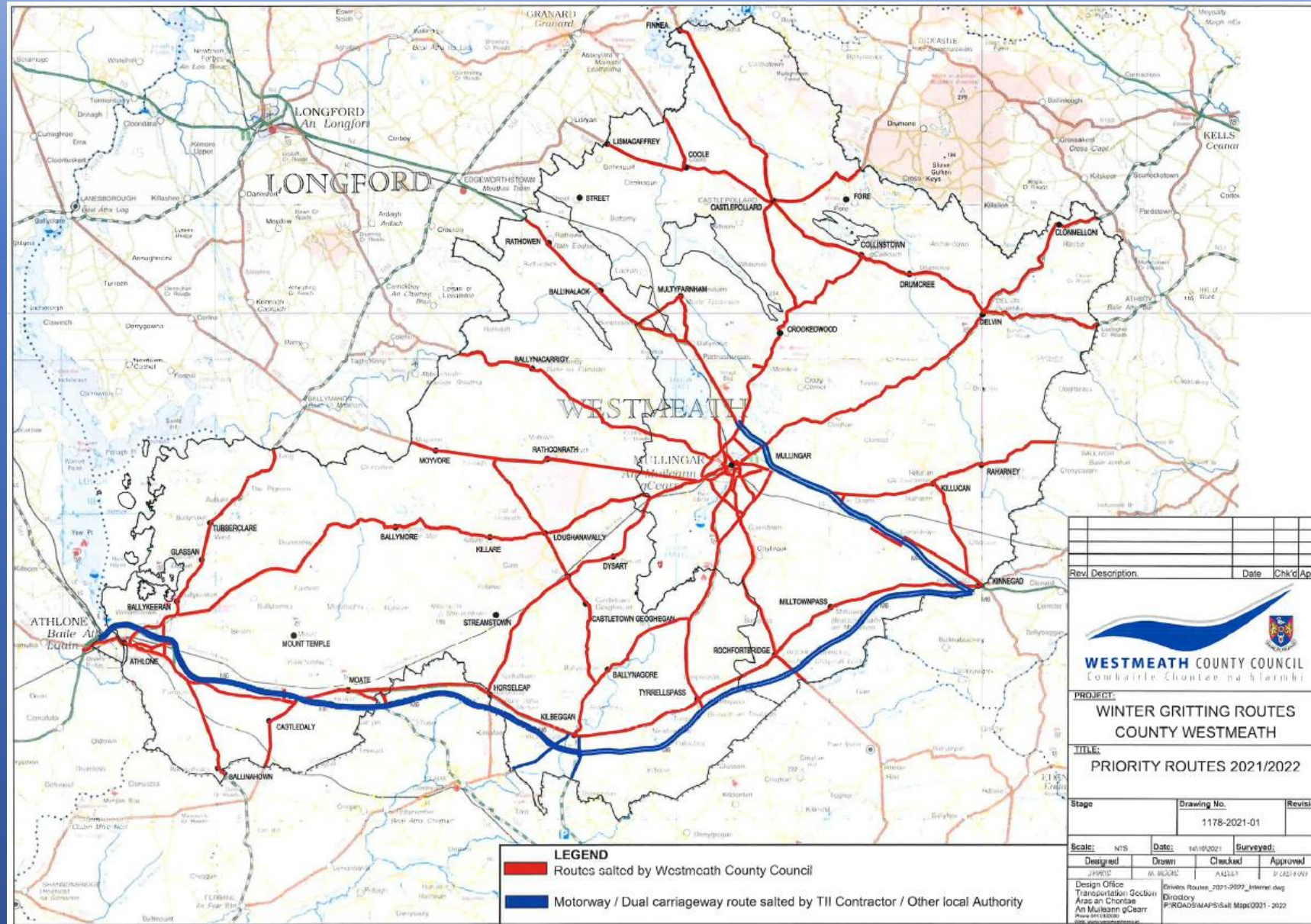
Vaisala Road Monitoring System, METweb, Road Inspections

**MET EIREANN forecasts as updated**

# What weather events are we typically concerned with?

- ❄ Frost
- ❄ Ice
- ❄ Snow
- ❄ COLD DRY formerly known as a Dry frost
- ❄ Flash Frost
- ❄ Freezing rain (very rare occurrence in Ireland)

# Growth in Winter Service Delivery



## Length of Priority Route Schedule

2012/13 = 444 km  
 2015/16 = 504 km  
 2019/20 = 522 km  
**2021/22 = 566km**



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## The Functions of the Ice Cast Duty Engineer:

- ❄ Determines the LA's need to prepare for salting or ploughing
- ❄ Records decisions
- ❄ Instructs loading/salting/ploughing operations
- ❄ Decides on reload/2<sup>nd</sup> treatment

# What equipment do we use from our fleet?



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# Existing salt spreader retrofitted with new brine tanks along the sides

Traditional salt spreader container

Traditional spreader

Brine Tanks





Traditional  
de-mountable truck  
with salt spreader  
The truck is fitted  
with a snow  
plough when snow  
is present

# Introduction of Pre-Wet Application (the addition of brine to winter maintenance operations)

- ❄ **Brine mixed with dry salt prior to application onto the road surface**
- ❄ **Increased longevity on road surface. Approx. reduction in salt of 24%**
- ❄ **Allows for addition of roads to 2021/2022 Winter Service Plan**

# New Equipment 2021



40,000 litre brine storage tank

30,000 litre rain water harvesting tank (black)

40m<sup>3</sup> White Salt Silo

10,000 litre Brine Saturator

## Pre-Wet Application – Benefits

- ❄ Environmental - raw materials reduction, less haulage and less salt in the environment
- ❄ Financial – reduced salt costs
- ❄ Efficiency – reduction in salt outside the target zone and increase in residual salt levels
- ❄ Additional Capacity – potential to increase route lengths which has been done for 2021/2022
- ❄ Climate Change – addresses actions outlined in WCC Climate Adaptation Strategy

An aerial photograph of a dense forest of evergreen trees covered in snow. The trees are scattered across a light-colored, snow-covered ground. A semi-transparent white rectangular box is centered over the image, containing the text. The text is in a bold, blue, sans-serif font.

**What information gathering technology does  
the Duty Engineer use?**

An aerial photograph of a dense forest of evergreen trees covered in a thick layer of snow. The trees are dark against the white snow, creating a textured, high-contrast scene. The perspective is from directly above, looking down on the canopy.

**Met Eireann public weather broadcast (RTÉ)**

**Met Eireann daily forecast to Vaisala**

**Vaisala:**

- **Roads DSS Programme**
- **Wx HORIZON**

In addition to  
Met Éireann  
weather stations  
**TII** have circa  
**140+** weather  
stations around  
the network



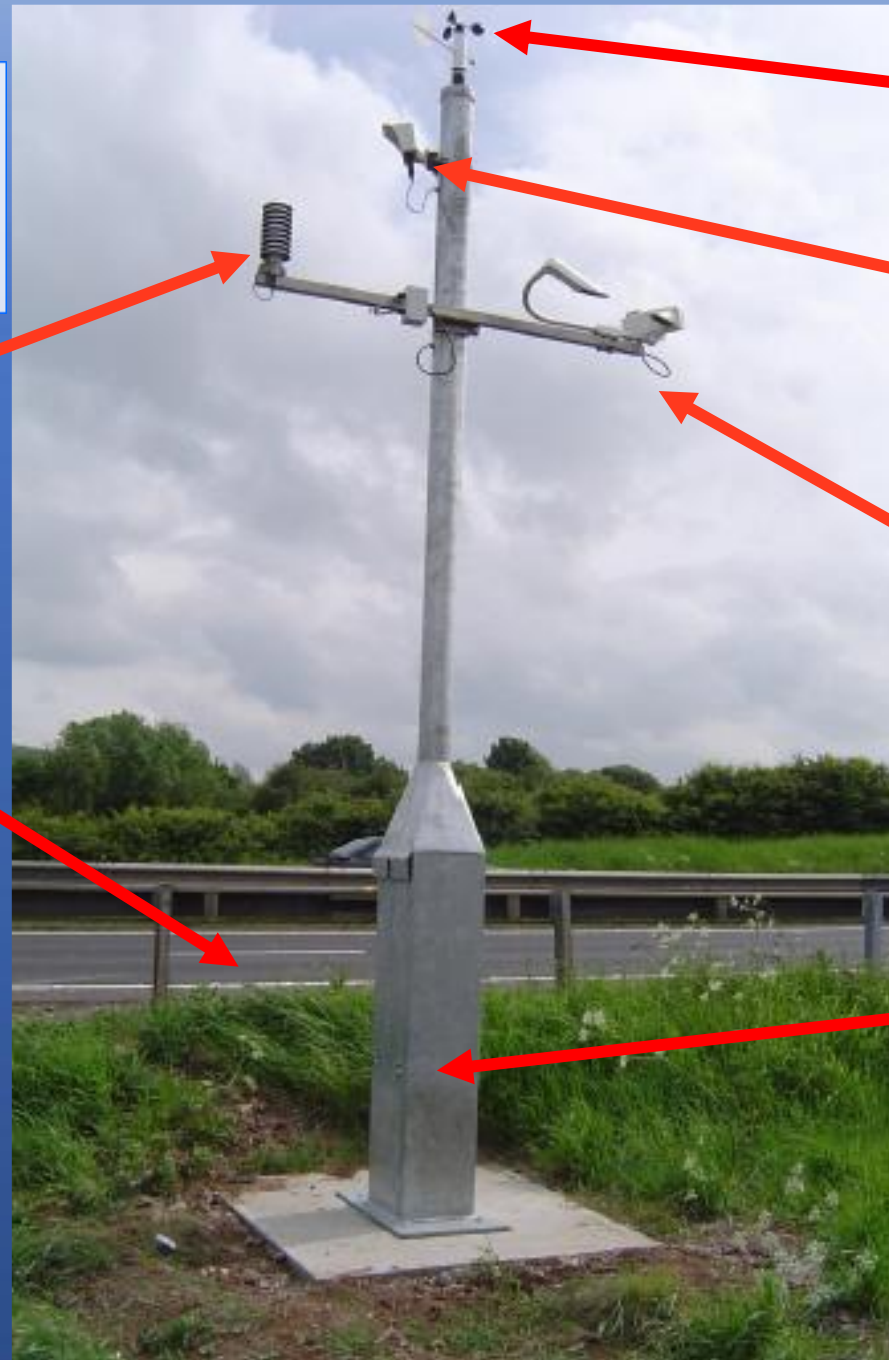
# Vaisala Weather Station

Atmospheric Sensor

Road Sensor

## Vaisala Embedded Road Sensors

### Key parameters



Wind Sensor

Camera

Present  
Weather  
Detector

CPU  
&  
Telephone

Mostly  
mobile SIM  
nowadays

# Thermal Maps

Status Layer

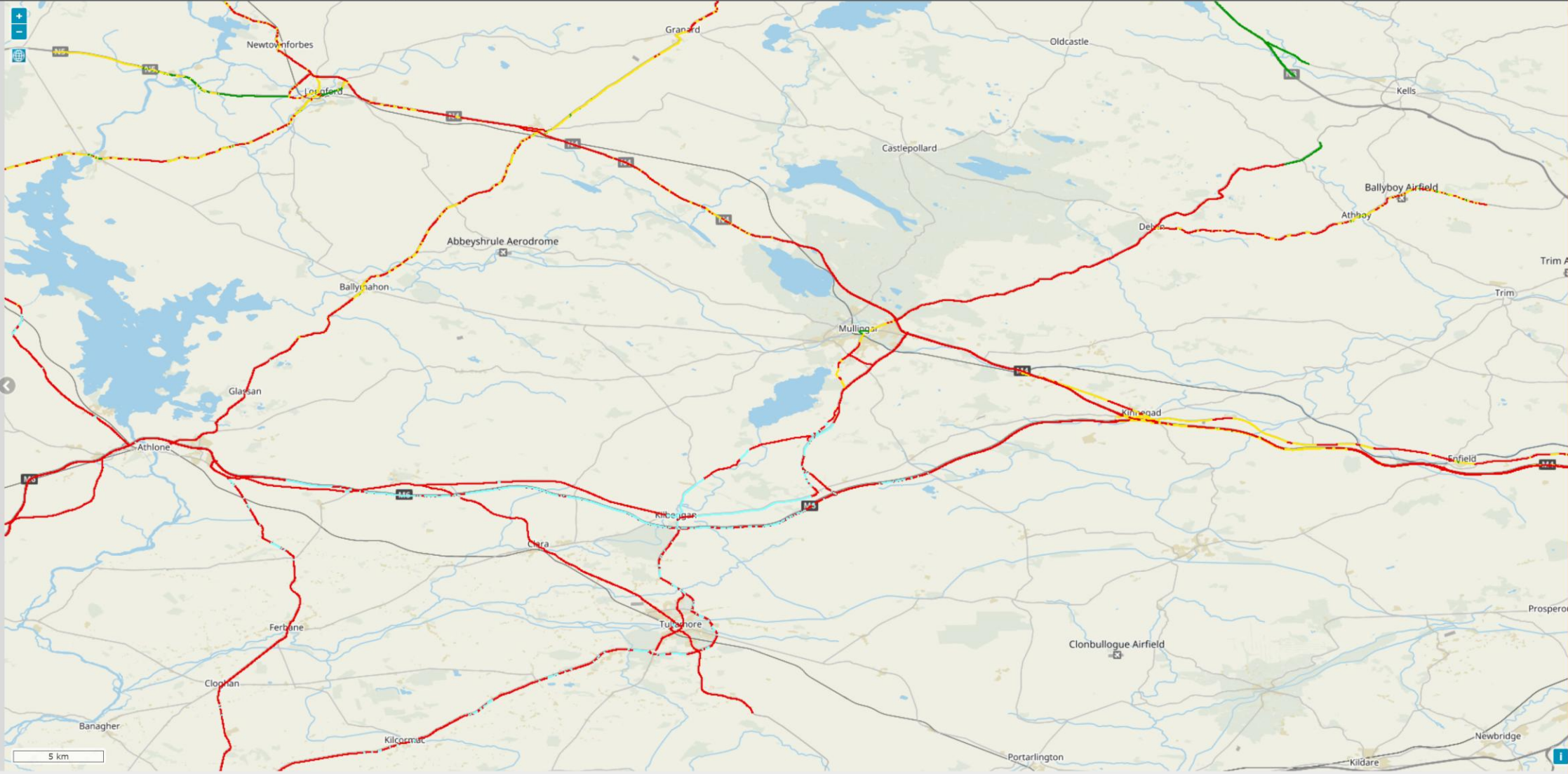
### Thermal maps

Thermal Map & Domain Data Viewed In Archive Mode Is Based On The Latest Configuration

Forecasts  
04.01.2019 18:59

- Forecast minimum
  - Above 2.0°C
  - 1°C ... 2°C
  - 2°C ... 1°C
  - 5°C ... -2°C
  - 7°C ... -5°C
  - Below -7°C
  - Data missing

- Forecast time step
- Observed time step
- Thermal map domains
- Satellite
- Radar
- Terrain



# Condensation - Dew

- The dew temperature tells us the temperature at which water held as a gas will turn to a liquid.
- When the air temperature is cooled to the dew temperature, the process of condensation occurs
- Moisture will form on a surface when the surface temperature falls below the dew temperature



VAISALA

2020-07-07 © Vaisala

# Dew Formation



Surface State = Dry

Road Surface  
Temperature = 12°C  
Dew Temperature = 6°C



Surface State = Moist

Road Surface  
Temperature = 3°C  
Dew Temperature = 6°C

Ireland\_Westmeath Co...

Jan 9, 2026 21:16

24h 72h Reset

21:16 UTC+1 Alerts User

Dashboard

Map

Forecast

Station summary

Operations

Alerts

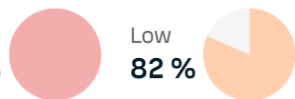
Settings

7 weather events



% of network impacted

High 100% Low 82%



Min. surface temperature

-4.9 °C

Jan 9, 2026 23:20

Next crossing 0 °C

↑ above 0 °

Jan 10, 2026 12:00

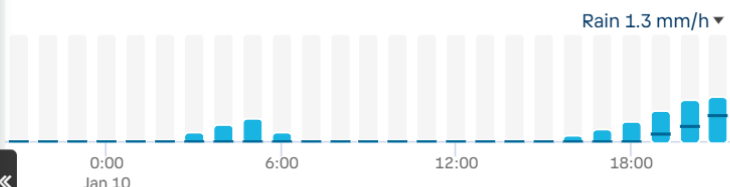
Min. grip



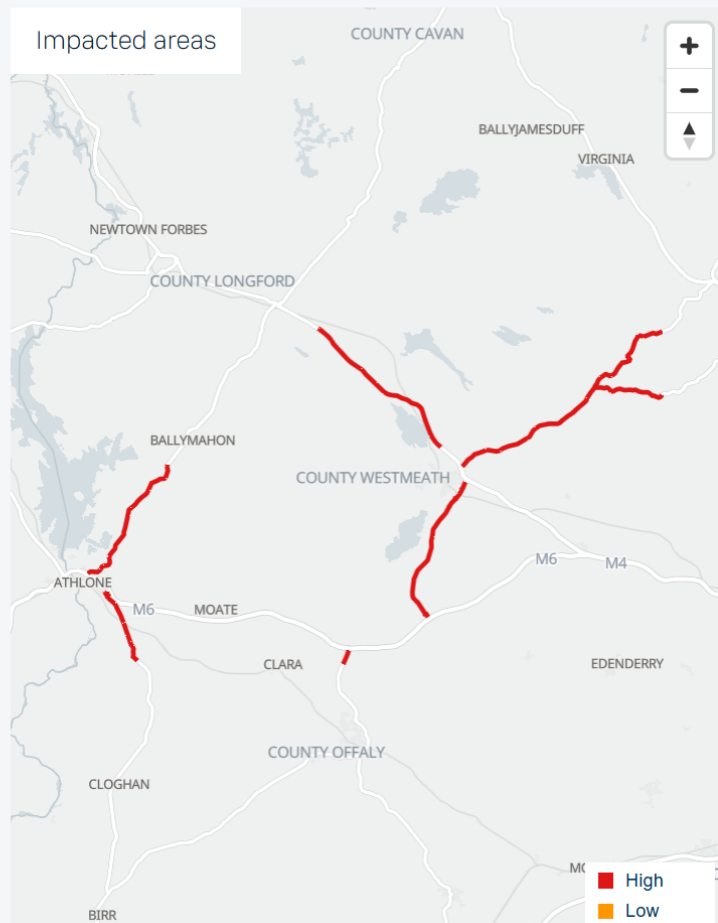
Jan 10, 2026 5:30

Hourly min. and max. precipitation

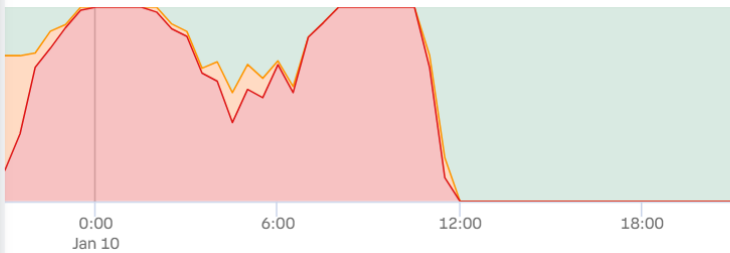
Snow Rain



Impacted areas



Weather events



Risk of ice

From Jan 9, 2026 16:30 To Jan 10, 2026 0:10. Duration 7 h 40 min. Min. Surface temperature -1.5 °C. Max. impact Jan 9, 2026 21:00. Network 76 % / 76 km.

Time Max. precip. Max. wind km/h Min. surface temp. °C Most severe state

Table with 5 columns: Time, Max. precip., Max. wind km/h, Min. surface temp. °C, Most severe state. Rows show weather data for 21:00, 22:00, 23:00, and 00:00-02:00 on Jan 10, 2026.

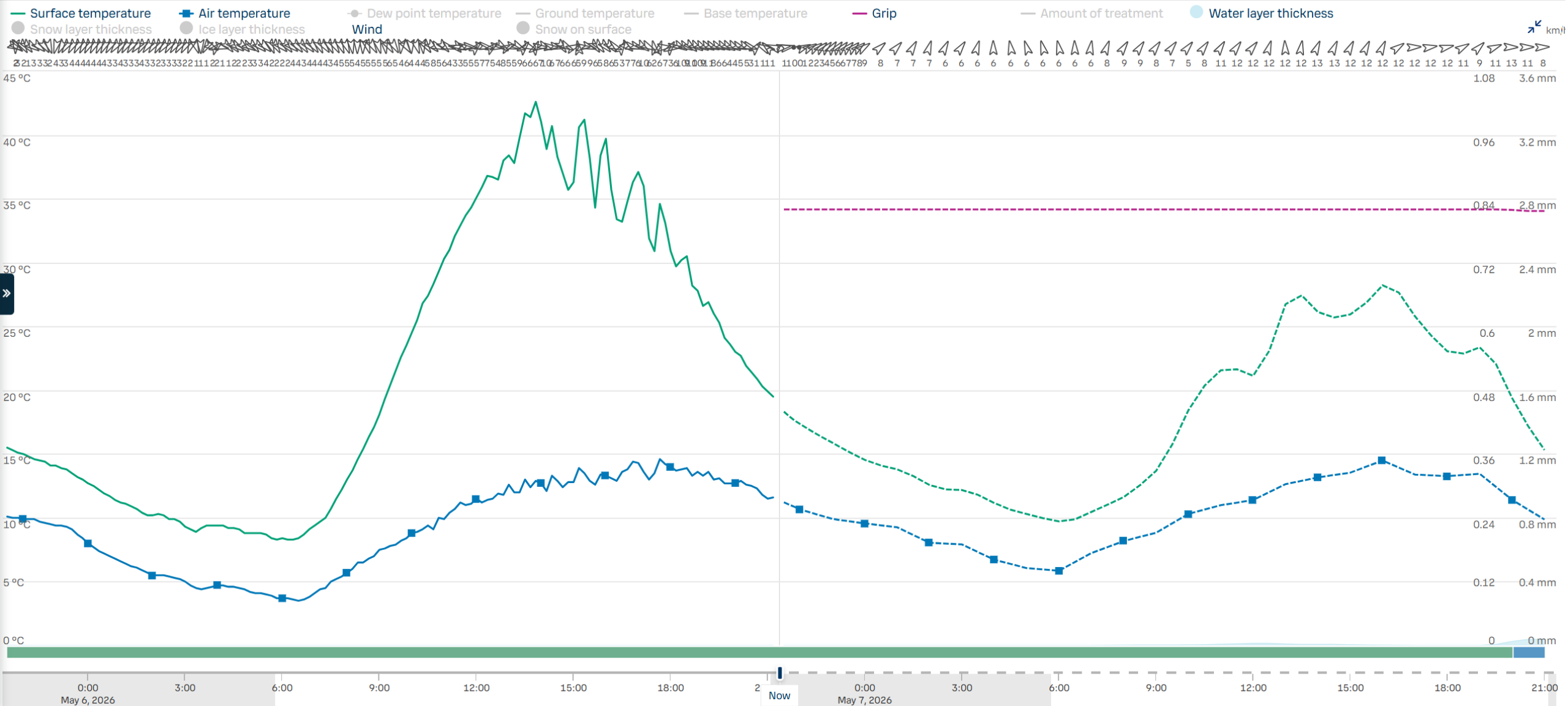
Weather events on routes

No regions or routes configured. Contact us

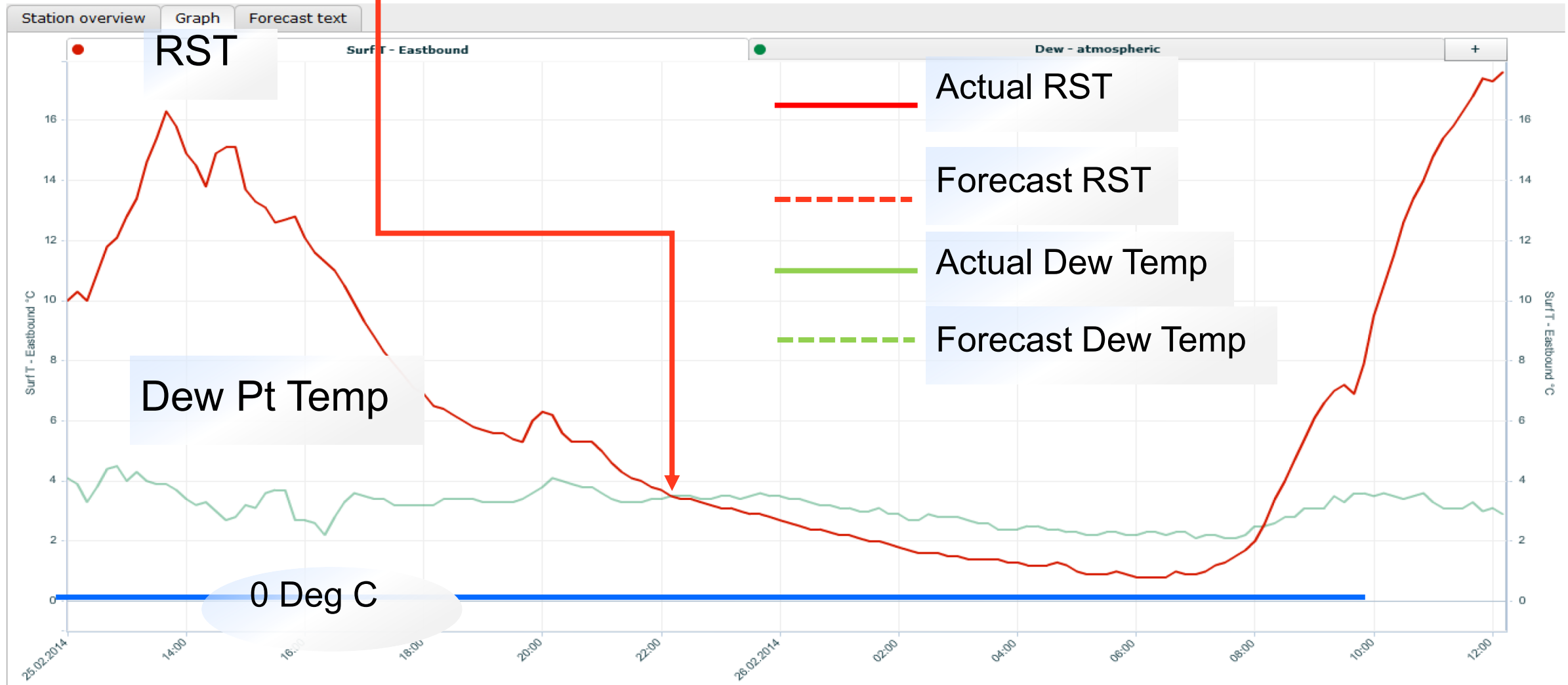
User guide

Contact us

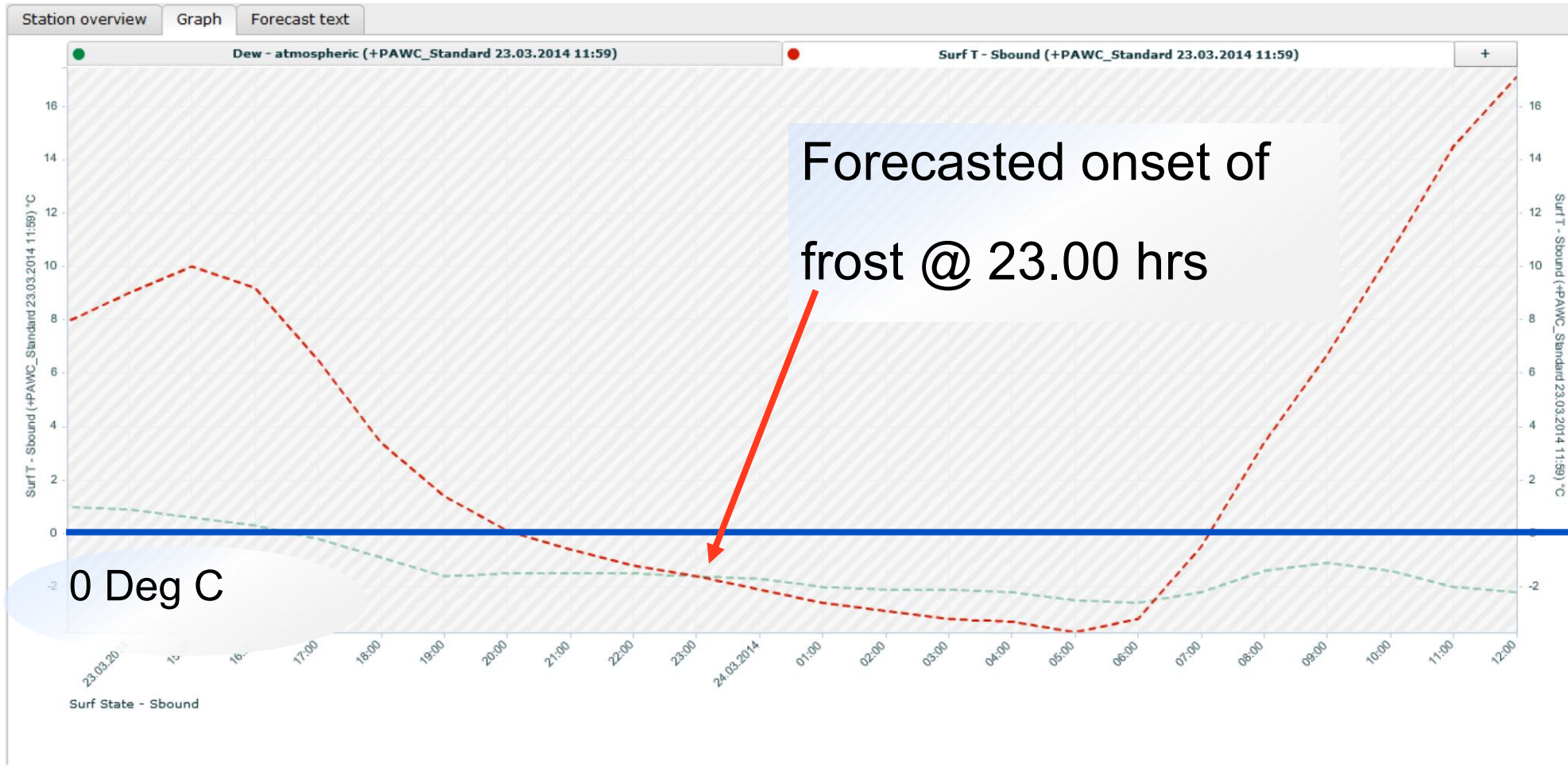
R446 Kilbeggan Forecast initialised at May 6, 2026 21:00 [Open graph in a new window](#)



## Dew Formation



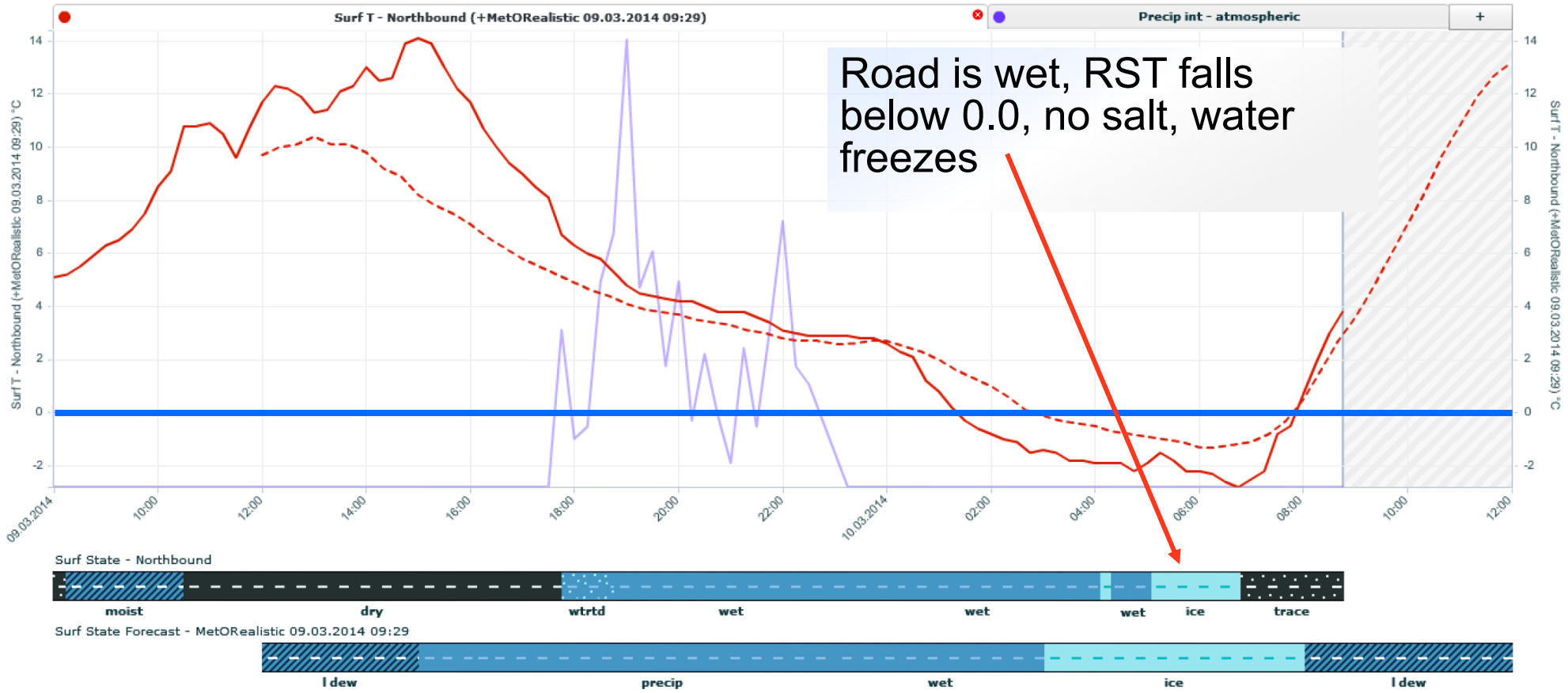
# Frost Formation



# Ice Formation

A822 Amulree (Show station on map)

Station overview Graph Forecast text



## DUTY ENGINEERS WORK:

- ❄ Records must be kept & entered into the Roads DSS manager for TII
- ❄ **Decisions:** 2<sup>nd</sup> Treatment required?
  - ◆ Because of v. low temps
  - ◆ Because of timing of 1<sup>st</sup> run
  - ◆ Because of rain or other weather phenomenon expected?
- ❄ The following weather phenomenon need to be monitored through the night:  
Rain, Dispersion of cloud, further temperature drops

# Abnormal Nights

(aka when the weather doesn't behave as you'd expect)

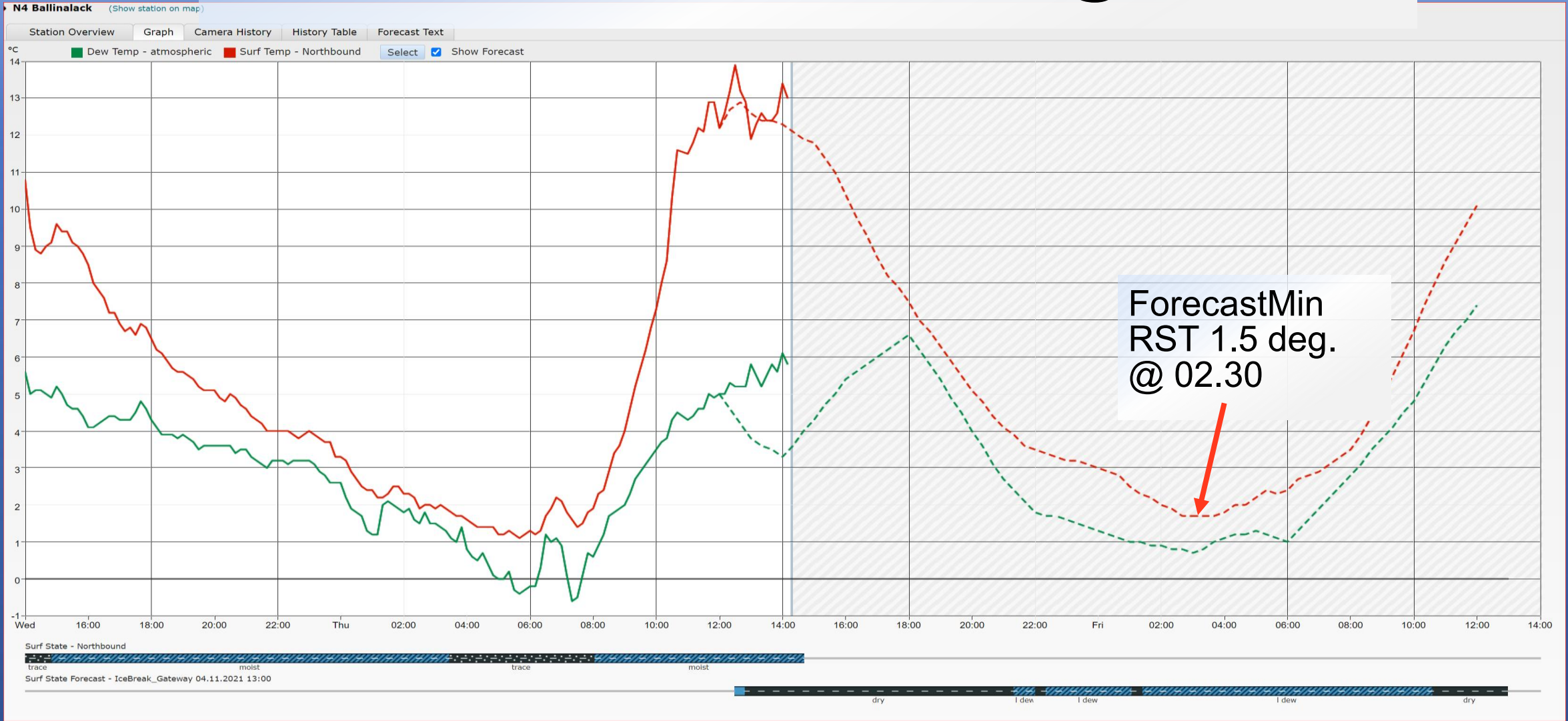


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# N4 Ballinalack Thurs 04.Nov.2021@ 14.15hrs

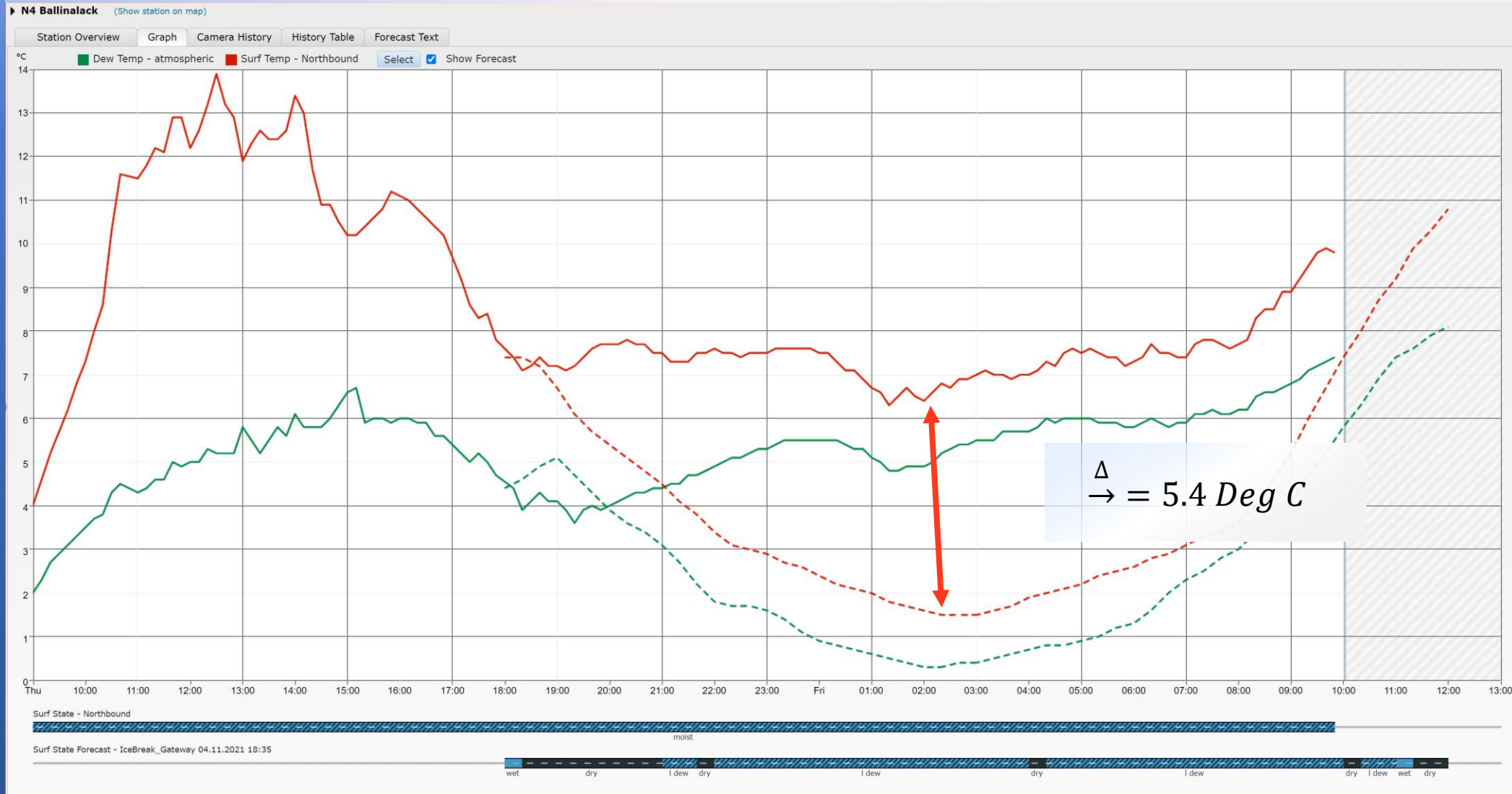


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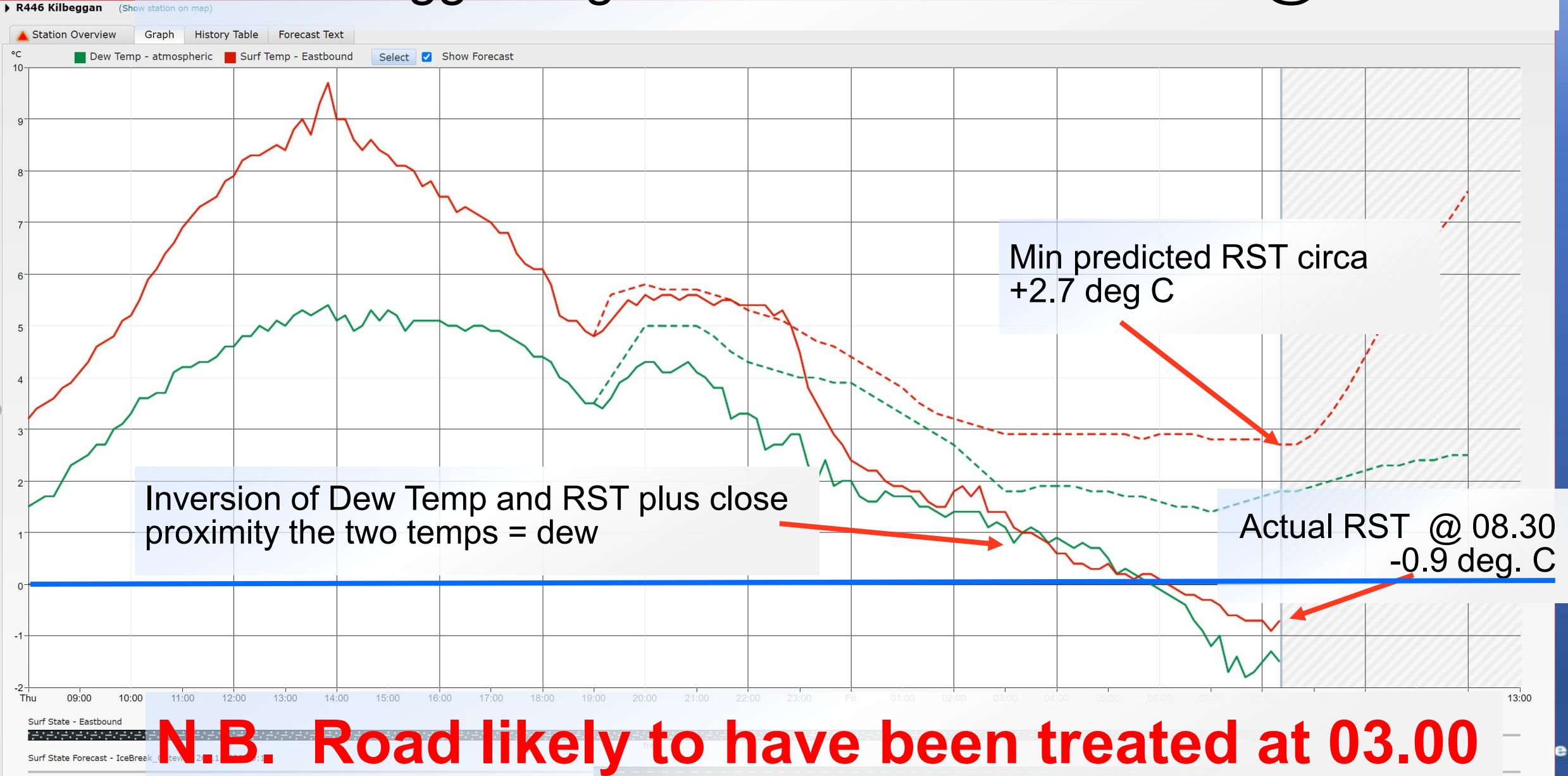


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# N4 Ballinalack Fri 05.Nov.2021 @ 10.00 hrs



# R446 Kilbeggan night of 26<sup>th</sup> / 27<sup>th</sup> Nov. 2020 @ 08.30

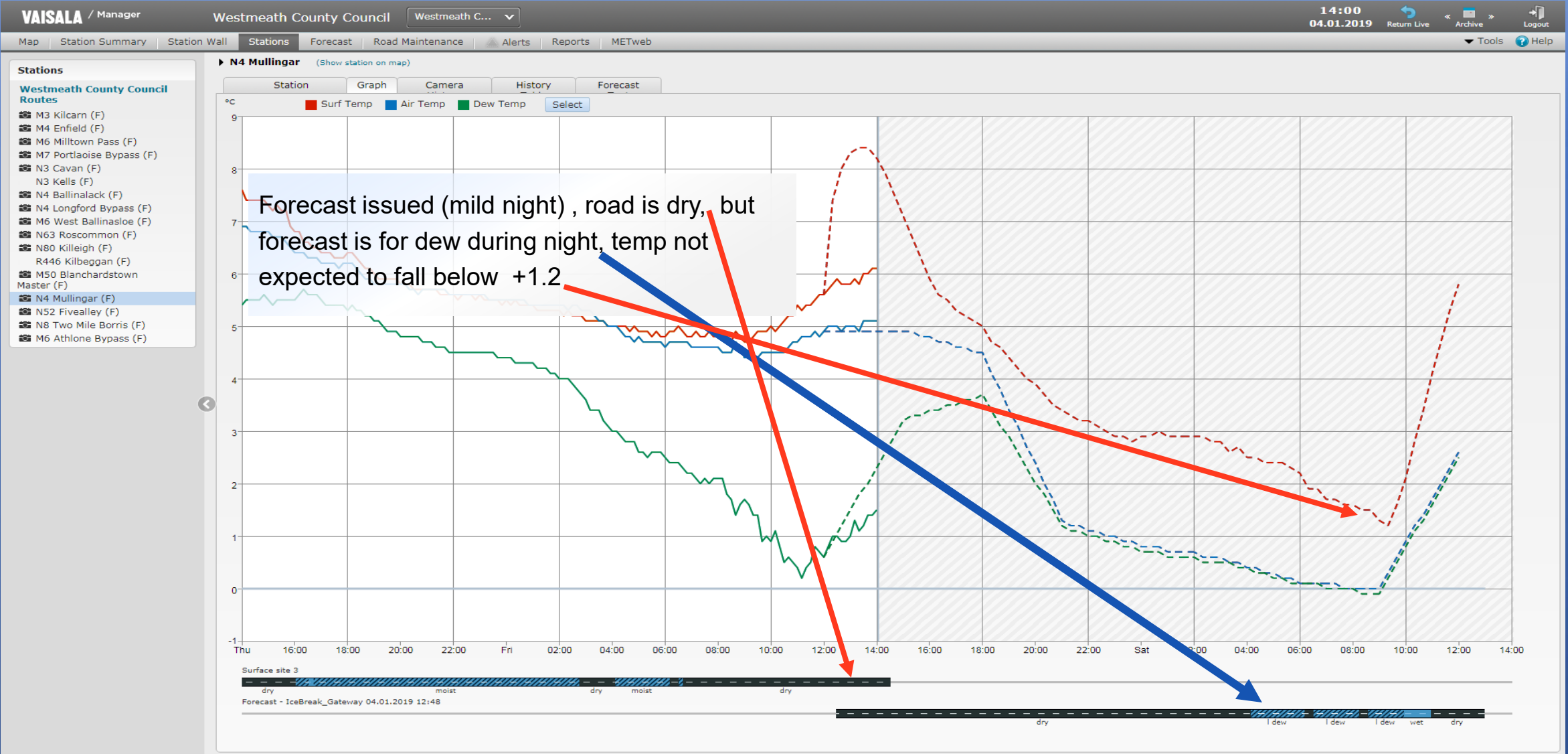


# Abnormal Nights

## Two Scenarios

- An unforecasted treatment - serious situation averted
- A “saved” treatment (circa €10,000 saved)

# Scenario 1 Un-forecasted treatment: Time: 14:00 on 4<sup>th</sup> January 2018



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# Time 23:00 on 4<sup>th</sup> January 2019 note new forecast has issued at 18.50



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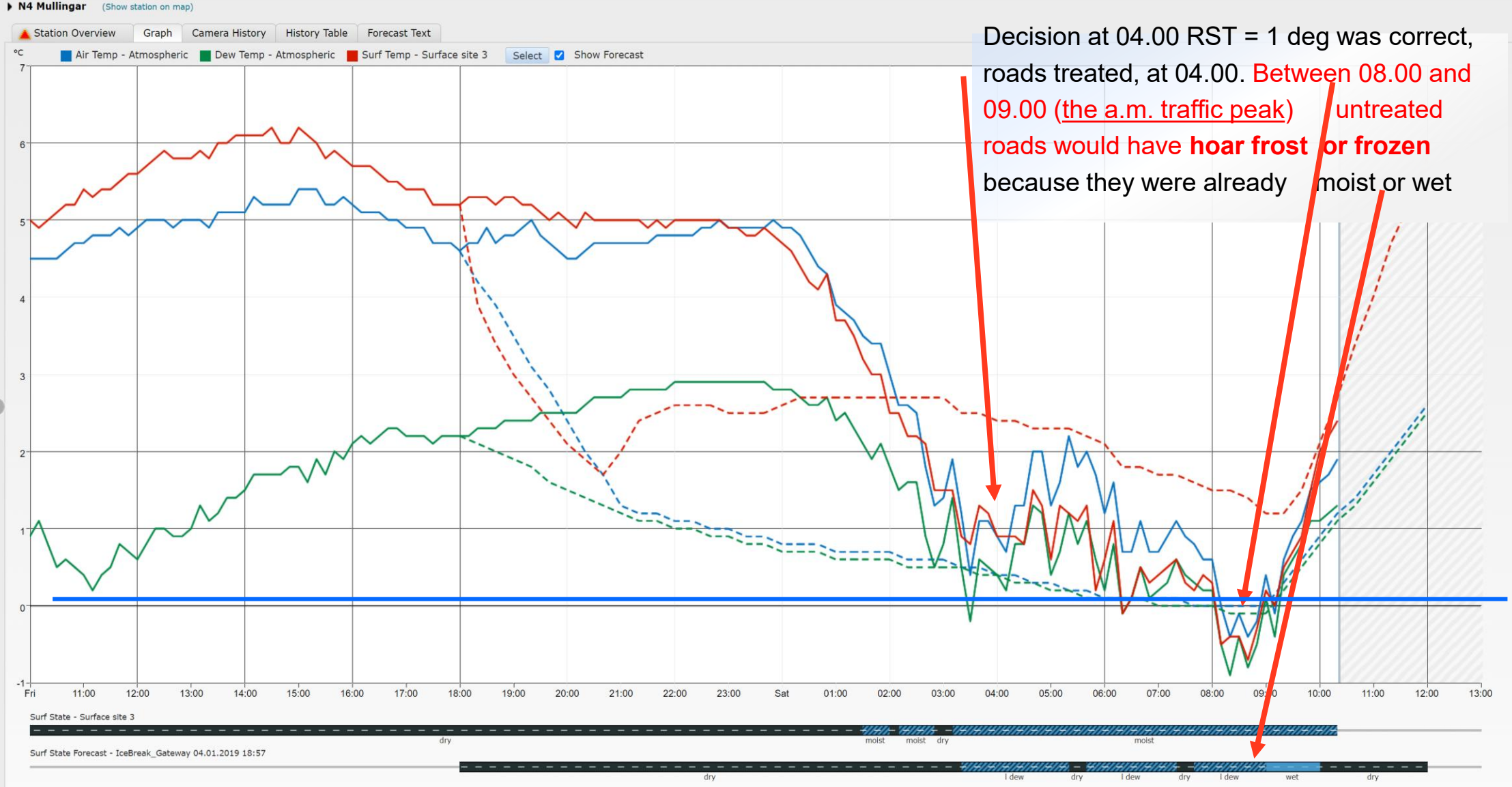
# Time 00.30 to 04:00 5<sup>th</sup> January 19/20 (note new forecast issued at 18.00)

- Stations**
- Westmeath County Council Routes
- M3 Kilcarn (F)
  - M4 Enfield (F)
  - M6 Milltown Pass (F)
  - M7 Portlaoise Bypass (F)
  - N3 Cavan (F)
  - N3 Kells (F)
  - N4 Ballinalack (F)
  - N4 Longford Bypass (F)
  - M6 West Ballinasloe (F)
  - N63 Roscommon (F)
  - N80 Killeigh (F)
  - R446 Kilbeggan (F)
  - M50 Blanchardstown Master (F)
  - N4 Mullingar (F)**
  - N52 Fivealley (F)
  - N8 Two Mile Borris (F)
  - M6 Athlone Bypass (F)



# OUTCOME :5th January 2019 @ 10.20

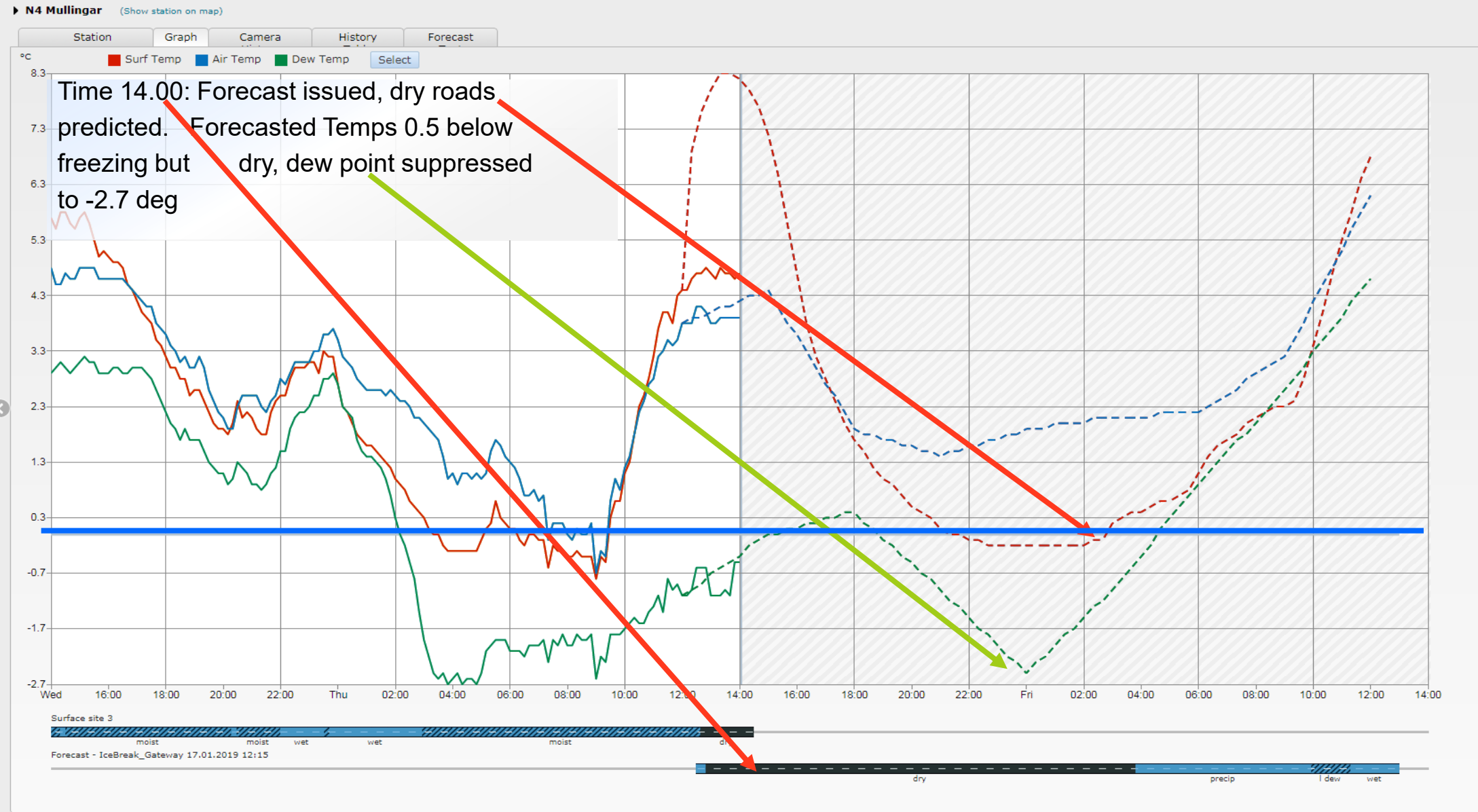
- Stations**
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  - M4 Enfield (F)
  - M6 Milltown Pass (F)
  - M7 Portlaoise Bypass (F)
  - N3 Cavan (F)
  - N3 Kells (F)
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  - N4 Longford Bypass (F)
  - M6 West Ballinasloe (F)
  - N63 Roscommon (F)
  - N80 Killeigh (F)
  - R446 Kilbeggan (F)
  - M50 Blanchardstown Master (F)
  - N4 Mullingar (F)**
  - N52 Fivealley (F)
  - N8 Two Mile Borris (F)
  - M6 Athlone Bypass (F)



Decision at 04.00 RST = 1 deg was correct, roads treated, at 04.00. **Between 08.00 and 09.00 (the a.m. traffic peak) untreated roads would have hoar frost or frozen** because they were already moist or wet

# Scenario 2 : Forecasted Treatment saved: 17/18<sup>th</sup> Jan 2019

- Stations**
- Westmeath County Council Routes**
- M3 Kilcarn (F)
  - M4 Enfield (F)
  - M6 Milltown Pass (F)
  - M7 Portlaoise Bypass (F)
  - N3 Cavan (F)
  - N3 Kells (F)
  - N4 Ballinalack (F)
  - N4 Longford Bypass (F)
  - M6 West Ballinasloe (F)
  - N63 Roscommon (F)
  - N80 Killeigh (F)
  - R446 Kilbeggan (F)
  - M50 Blanchardstown Master (F)
  - N4 Mullingar (F)**
  - N52 Fivealley (F)
  - N8 Two Mile Borris (F)
  - M6 Athlone Bypass (F)



# Time 18.00 17<sup>th</sup> Jan 2019 NEW SERIOUS situation

VAISALA / Manager

Westmeath County Council

Westmeath C...

18:00  
17.01.2019

Return Live << Archive >> Logout

Map Station Summary Station Wall Stations Forecast Road Maintenance Alerts Reports METweb

Tools ? Help

## Stations

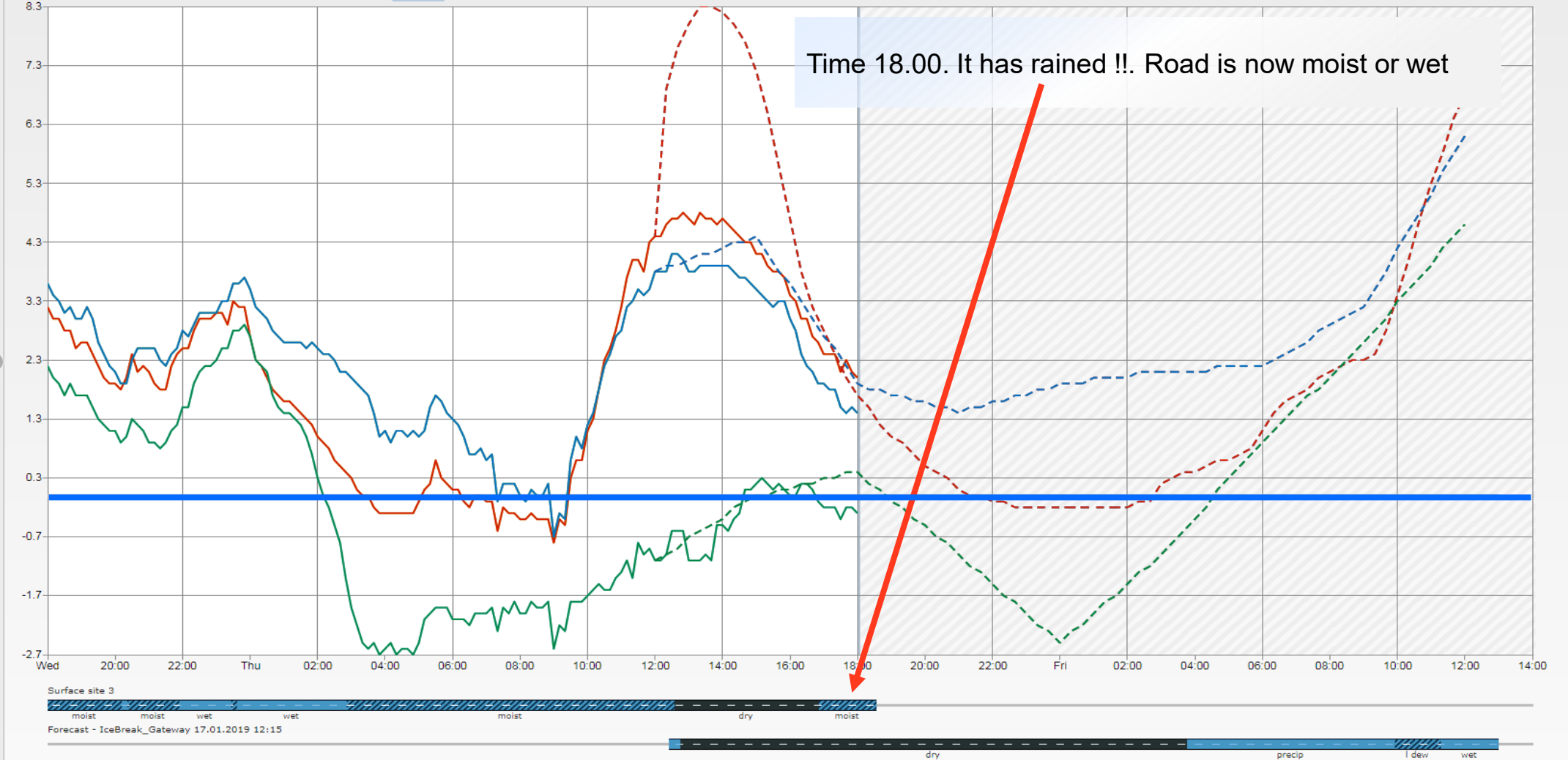
### Westmeath County Council Routes

- M3 Kilcarn (F)
- M4 Enfield (F)
- M6 Milltown Pass (F)
- M7 Portlaoise Bypass (F)
- N3 Cavan (F)
- N3 Kells (F)
- N4 Ballinalack (F)
- N4 Longford Bypass (F)
- M6 West Ballinasloe (F)
- N63 Roscommon (F)
- N80 Killeigh (F)
- R446 Kilbeggan (F)
- M50 Blanchardstown Master (F)
- N4 Mullingar (F)
- N52 Fivealley (F)
- N8 Two Mile Borris (F)
- M6 Athlone Bypass (F)

### N4 Mullingar (Show station on map)

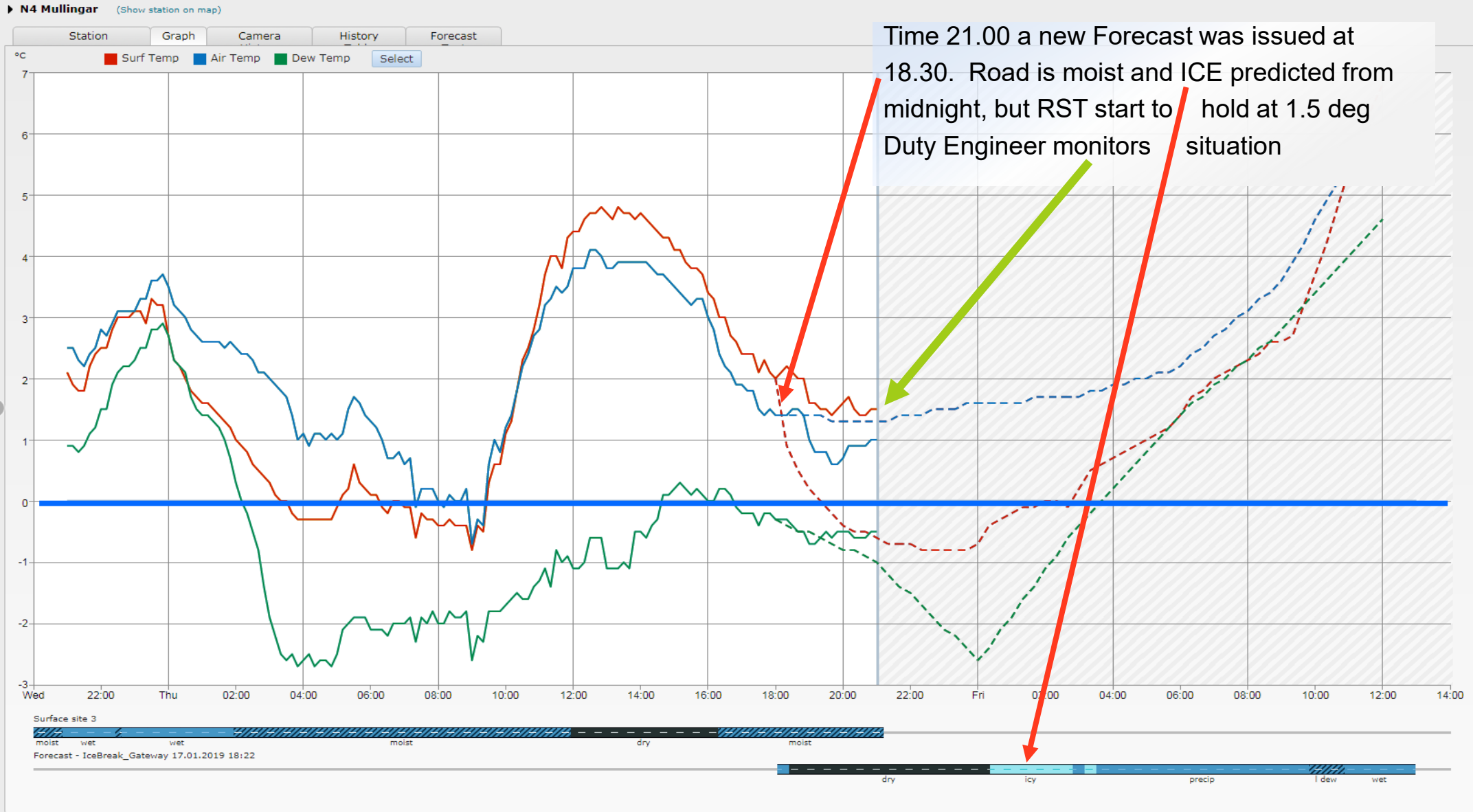
Station Graph Camera History Forecast

Surf Temp Air Temp Dew Temp Select



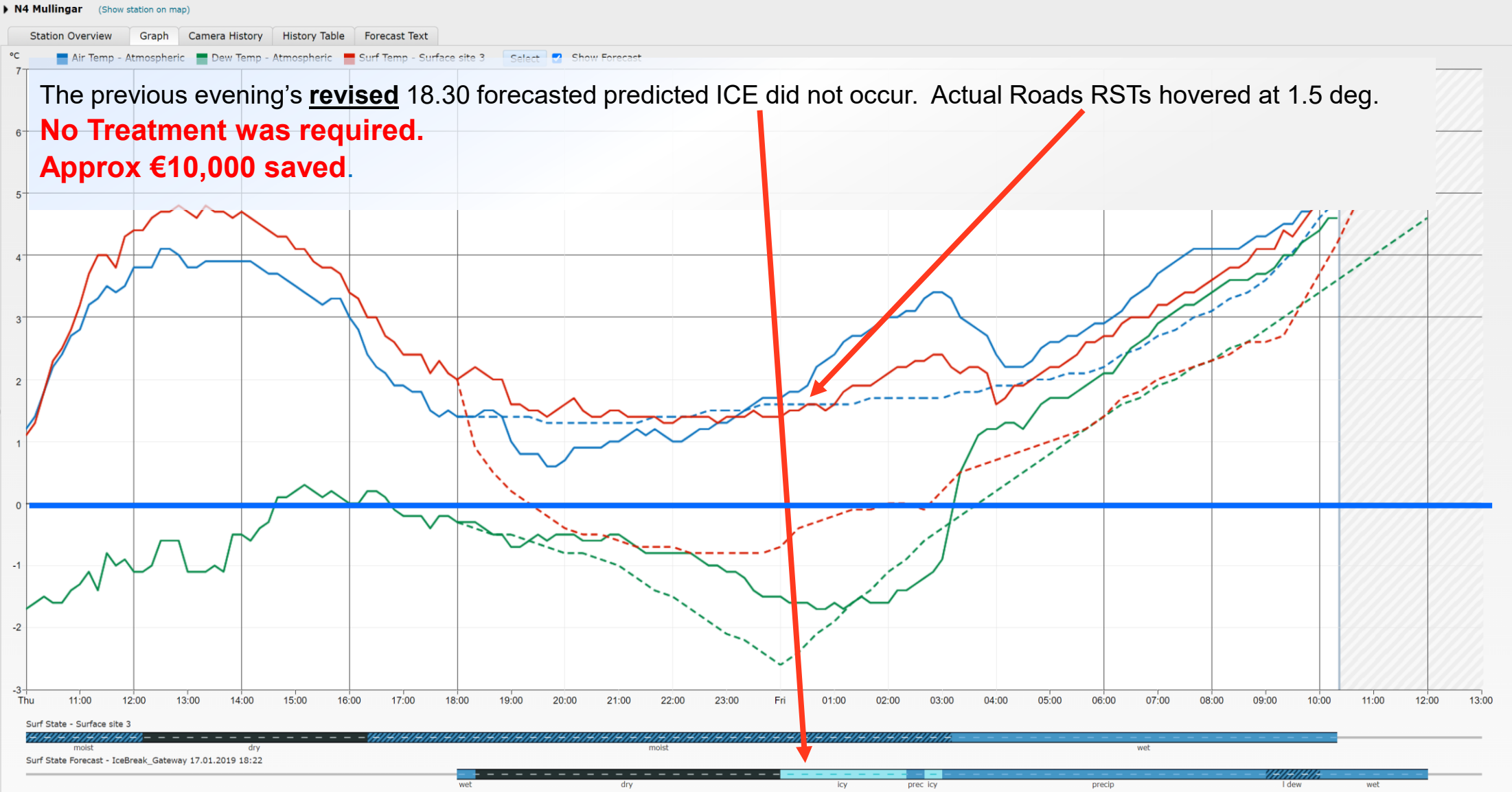
# Time 21.00 17<sup>th</sup> January 2019 @ NEW FORECAST ! 18.30

- Stations**
- Westmeath County Council Routes**
- M3 Kilcarn (F)
  - M4 Enfield (F)
  - M6 Milltown Pass (F)
  - M7 Portlaoise Bypass (F)
  - N3 Cavan (F)
  - N3 Kells (F)
  - N4 Ballinalack (F)
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  - N4 Mullingar (F)**
  - N52 Fivemiletown (F)
  - N8 Two Mile Borris (F)
  - M6 Athlone Bypass (F)



# OUTCOME: 18<sup>th</sup> January 2019 @ 10.00

- Stations
- Westmeath County Council Routes
- M3 Kilcarn (F)
- M4 Enfield (F)
- M6 Milltown Pass (F)
- M7 Portlaoise Bypass (F)
- N3 Cavan (F)
- N3 Kells (F)
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- R446 Kilbeggan (F)
- M50 Blanchardstown Master (F)
- N4 Mullingar (F)
- N52 Fivealley (F)
- N8 Two Mile Borris (F)
- M6 Athlone Bypass (F)



## Summary:

**A professionally supervised service by the duty engineer can:**

- ❄ Save lives by instructing intervention when actual weather does not follow the forecasts
- ❄ Save state funds by avoiding unnecessary intervention when forecasts suggest treatment.

Ireland\_Westmeath Co...

Jan 9, 2026 21:16

24h 72h Reset

21:16 UTC+1

Alerts

User

Dashboard

Map

Forecast

Station summary

Operations

Alerts

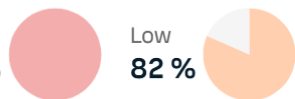
Settings

7 weather events



% of network impacted

High 100% Low 82%



Min. surface temperature

-4.9 °C

Jan 9, 2026 23:20

Next crossing 0 °C

↑ above 0 °

Jan 10, 2026 12:00

Min. grip



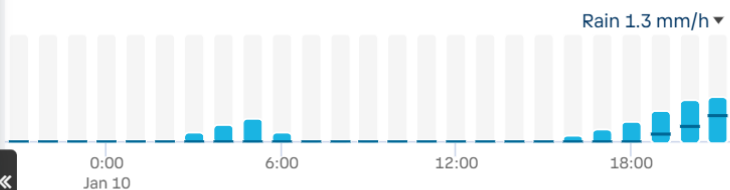
Jan 10, 2026 5:30

Time Max. precip. Max. wind km/h Min. surface temp. °C Most severe state

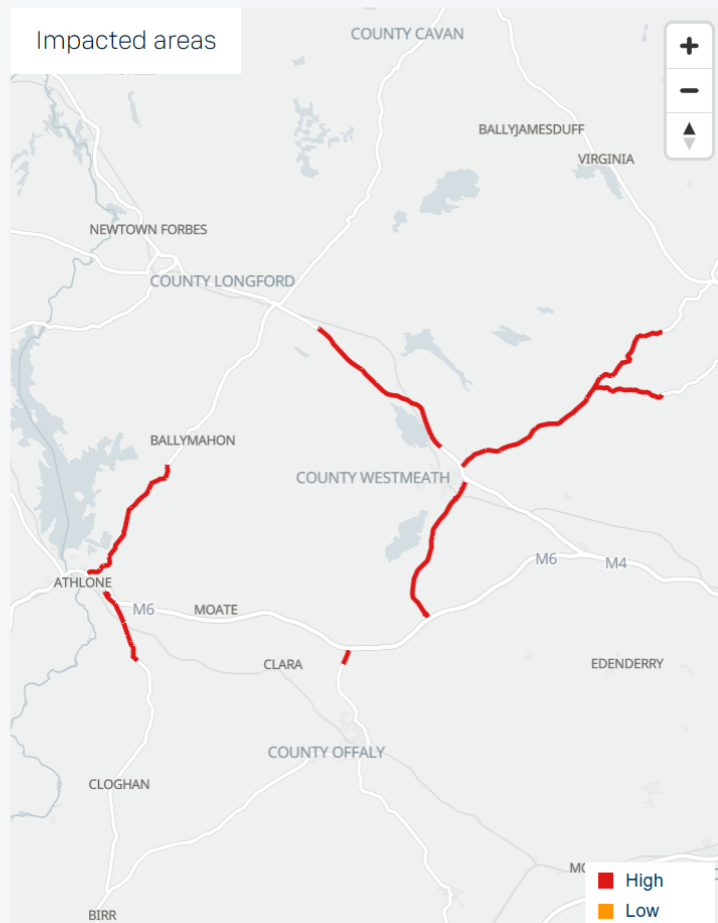
21:00		0 mm/h	6.7	-4	Ice
22:00		0 mm/h	7.6	-4.8	Ice
23:00		0 mm/h	8.7	-4.9	Ice
<b>Jan 10, 2026</b>					
0:00		0 mm/h	9.4	-4.8	Ice
1:00		0 mm/h	9.8	-4.4	Ice
2:00		0.1 mm/h	9.9	-3.8	Freezing rain

Hourly min. and max. precipitation

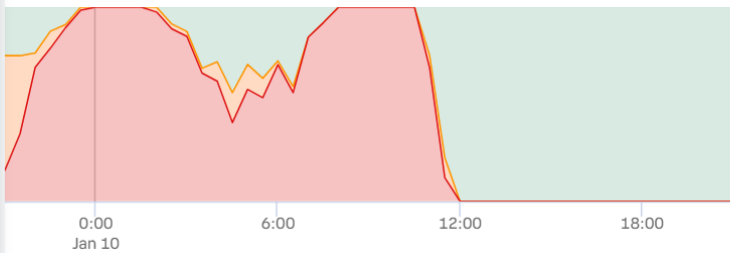
Snow Rain



Impacted areas



Weather events



Risk of ice

From **Jan 9, 2026 16:30** To **Jan 10, 2026 0:10**

Duration **7 h 40 min**

Min. Surface temperature **-1.5 °C**

Max. impact **Jan 9, 2026 21:00**

Network **76 % / 76 km**

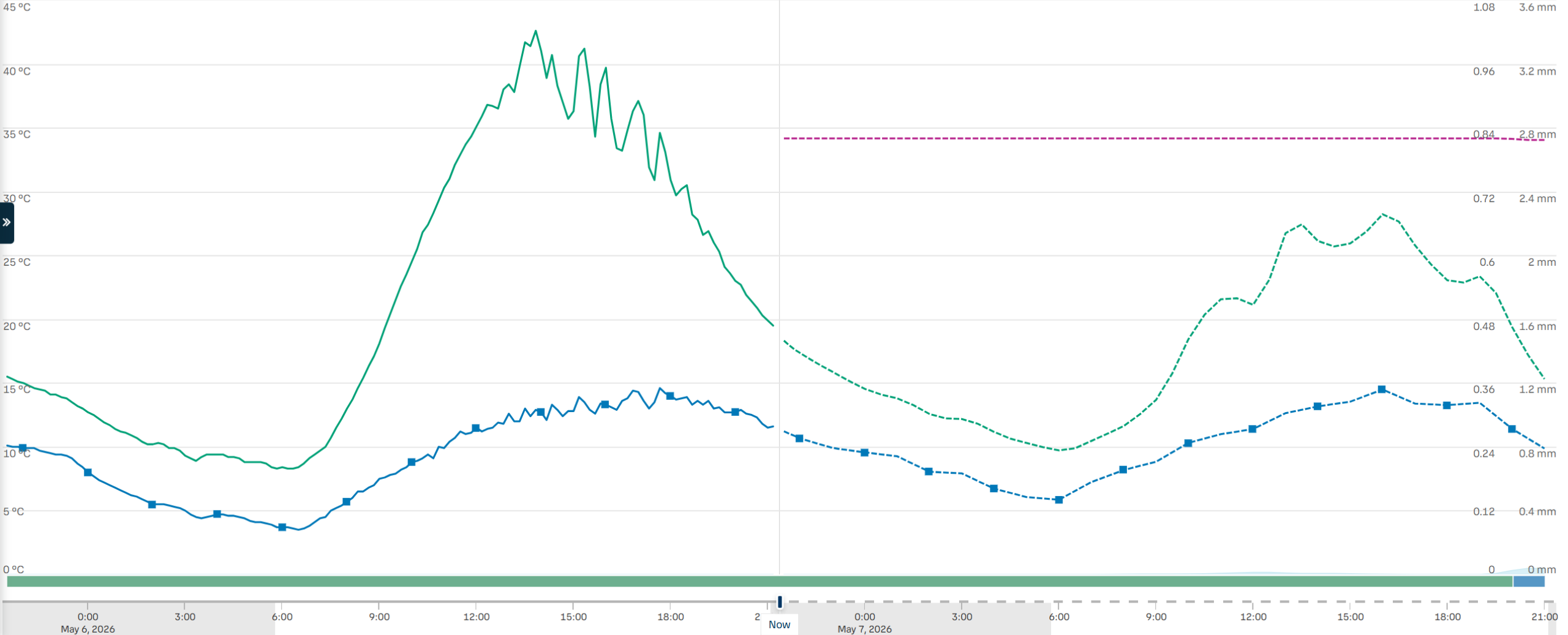
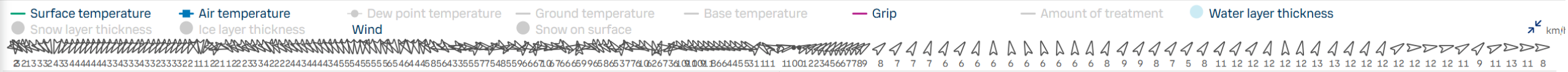


Low

User guide

Contact us

R446 Kilbeggan Forecast initialised at May 6, 2026 21:00 [Open graph in a new window](#)



# Thank you for your time and attention

## Questions?

**Tony Buckley, Westmeath National Roads Office**

**Westmeath County Council [abuckley@westmeathcoco.ie](mailto:abuckley@westmeathcoco.ie) 0872248973**



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Comhairle Leath-Bailte agus Bailte Comhcheangailte  
County and City Management Association

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# END



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