Met Office

Weather Services for Building Project Managers

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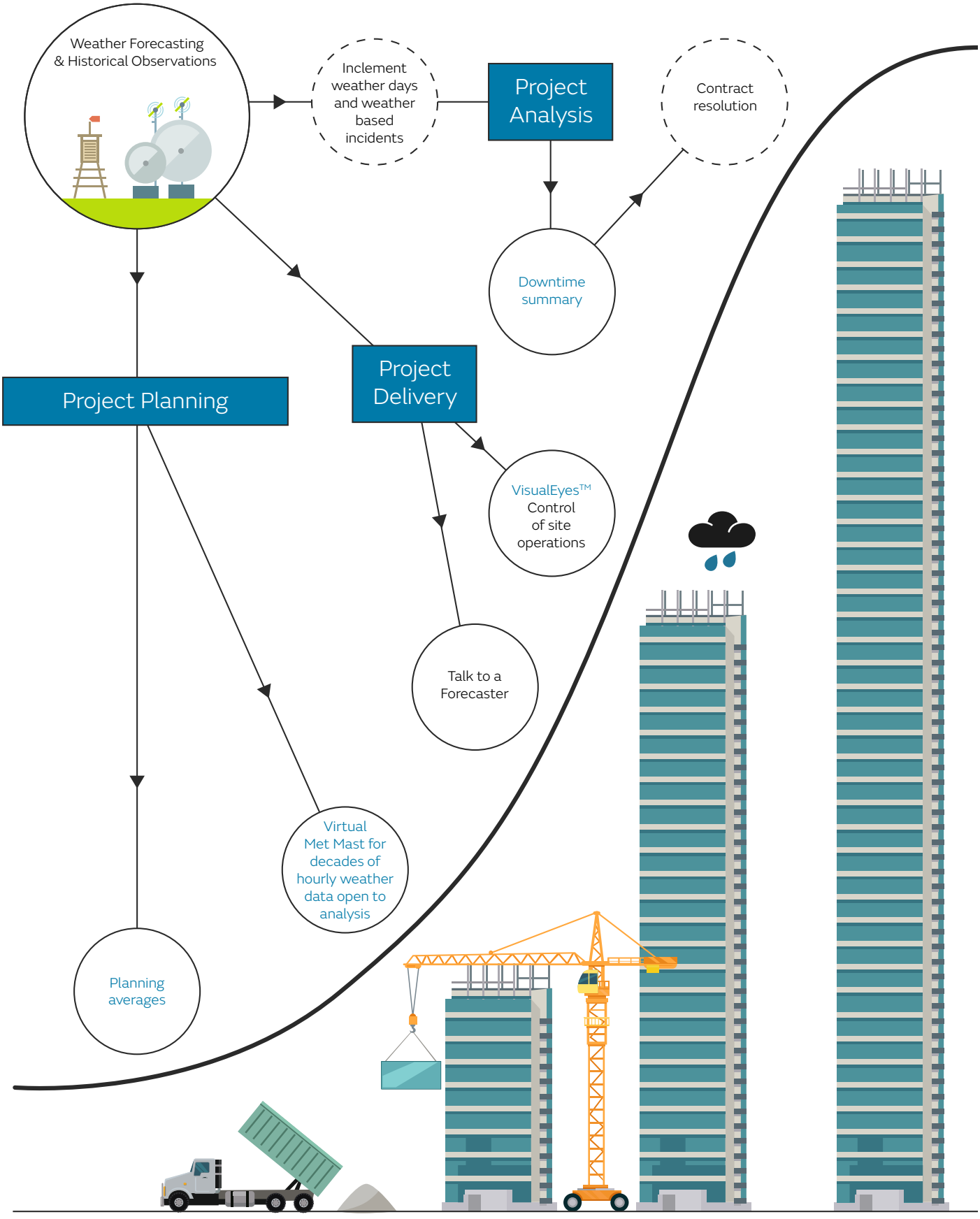
Meteorological information for the Construction Industry



Introduction to the Met Office

The Met Office is the National Meteorological Service for the UK and one of the world's foremost weather and climate service providers.

There is a well-established acceptance that relevant weather and climate information is vital for health and safety and operational efficiency on the UK's building projects. We have a breadth of experience in the building and construction sector and we work with the industry on a daily basis.

Weather can have a huge impact on construction projects from costly delays and risks to personnel. This guide suggests how we can support projects when the weather does not play ball. The Met Office has a range of weather and climate services to support building projects from the project planning stage, throughout project delivery, and even for project analysis.

Recent Met Office research demonstrates that we are seeing extreme weather events, more frequently. With **Met Office weather services**, we can improve your awareness help reduce the impact of such events. According to the **Office of National Statistics** the annual expenditure on construction is now over £99,266 million, so even a small proportional saving could represent huge value.

How can we help?

I am trying to....		
...plan my project and understand...		Page
...expected conditions on site throughout the year	**Planning Average Reports** **Climate Means & Extremes** **Weather Frequency Analysis**	**7** **12** **13**
...expected conditions of the ground on site	**Soil Moisture Data**	**14**
...how often weather has passed a certain threshold in the past	**Weather Frequency Analysis**	**13**
...climate information for suitable heating and cooling systems	**Degree Day Reports**	**15**
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...deliver my project and...		
...to be alerted when my project may be affected by bad weather	**VisualEyes™**	**17**
...make sure I have an expert at to speak to	**Talk to a Forecaster**	**20**
...analyse the project to...		
...make a contractual claim for project downtime	**Downtime Summary Reports**	**21**
...make an insurance claim for an event/accident	**ClaimCheck**	**28**
...make an insurance claim for an event/accident from a significant storm	**Storm Analysis Report**	**29**
...obtain basic weather data...		
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Project Planning & Design Criteria

Planning Averages

Planning Averages Reports provide expected conditions for a given month at a given location. By looking over a thirty-year period you can understand the monthly norms to expect on site. Planning Averages give guidance in developing contingency plans and negotiating contracts.

The two main features of Planning Average Reports

Long-term averages are the conditions observed over the past thirty years. If the weather at any time exceeds this value, you can claim that the weather events are above average.

1-in-10-year value is the worst case scenario one may experience every ten years. If weather at anytime exceeds this value, one can say with confidence the weather events were extreme. This is not an average, but it is in fact a return period calculated from thirty years of data or more.

Where does the data come from?

The Met Office produces Planning Averages Reports with data from two different sources. (Both are suitable for a variety of building contracts including guidance of NEC 60.1 (13)).

Location-based Planning Average Reports use modelled data from one of more than 3,600 locations across the UK. Data is compliant with a wide range of construction contracts.

Station-based Planning Average Reports use observational data from one of 100 physical weather stations across the UK.

What is the difference between 'observational' and 'modelled' data?

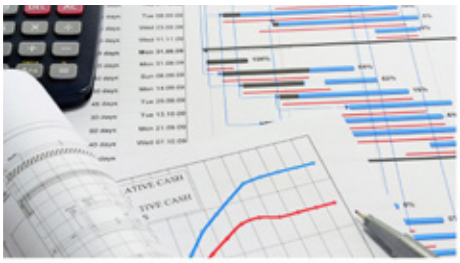
Observed data has been physically acquired from a weather station. To generate Location Based Reports we have used a combination of our scientific systems. These datasets are essentially all data collected from our weather stations over the years, interpolated over the UK onto a 1km grid. Both options are acceptable to calculate downtime. The benefits of location-based reporting are that you can work with data more representative to your site, if by chance there is not a weather station nearby.

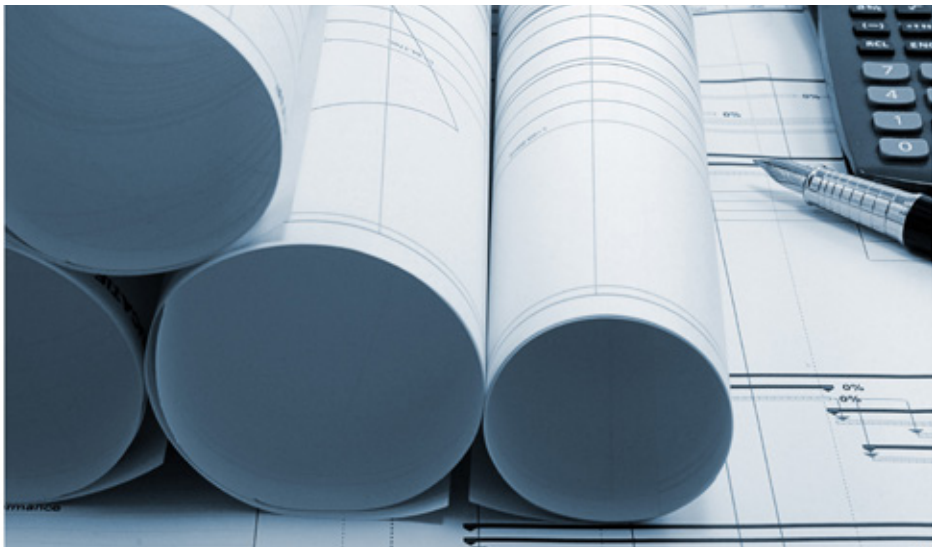
What data is more accurate?

Our modelled data has undergone extensive scientific investigation, analysis, and verification to ensure accuracy. This **technical report** explains the benefits of using location-specific data.

Why are there different types of Planning Averages Reports?

Different projects work on different contracts, with slightly different takes on the weather. So you will see within the reports the various weather parameters based on user need and data availability.





Planning Averages Comparison Table

	Station Based Monthly Planning Averages	Station Based Monthly Planning Averages (with Wind)	Station Based Monthly Planning Averages (Daytime)	Location Based Monthly Planning Averages (includes wind as standard)
Example report	Page 11	Page 11	Page 11	Page 9/10
Features				
Greater representation of actual onsite weather conditions				✔
Over 3,600 locations available				✔
100 weather observation stations	✔	✔		
55 weather observation stations			✔	
Includes wind		✔		✔
Reports over 24 hours	✔	✔		✔
16 different weather elements, 11 with Long Term Averages (LTAs) and 1-in-10 year values				✔
Makes it immediately clear if compensation event reached				✔
Volume discounts available	✔			✔
Advantages				
Can be used across a variety of construction contracts including JCT & NEC contracts	✔	✔	✔	✔
Suitable for NEC clause 60.1 (13)	✔	✔		✔

Where is my nearest location to derive data?

This **link** will take you to the map to assist you in finding the nearest location to your site where data for Planning Average reports can be derived from. Both Location and Station-based Planning Average are available. A summary version is on **page 23**.

Met Office

Location based planning averages

Prepared for: Example Location Based Planning Averages
Site: Exeter, Postcode EX1 3PB
Weather Data from: Latitude 50.7242, Longitude -3.5047

Issued on Monday 2 March at 12:06:50

1-in-10 Year Values (1971-2010)

Month	Daily Rainfall Total (mm)	Days of Rain > 5mm	Days of Snow	Days with Snow Lying at 0900 UTC	Days of Freezing
January	149	11	5	4	2
February	137	10	5	3	1
March	100	7	3	1	0
April	93	7	2	0	0
May	104	7	0	0	0
June	97	7	0	0	0
July	79	6	0	0	0
August	102	7	0	0	0
September	114	8	0	0	0
October	141	10	0	0	0
November	135	10	1	0	0
December	156	11	3	2	0

Month	Minimum Ground Temperature (Deg C)	Days of Ground Frost	Minimum Air Temperature (Deg C)	Days of Air Frost	Mean Wind Speed (mph)	Sunshine Total (hours)
January		22	-7.8	15	13.0	78
February		20	-6.2	14	13.0	95
March		18	-4.9	8	12.5	146
April		16	-2.8	4	11.6	200
May		7	-0.6	1	10.7	238
June		2	3.1	0	10.3	256
July		0	5.9	0	10.1	258
August		0	4.6	0	10.1	240
September		3	2.3	0	10.1	172
October		9	-2.1	3	10.5	122
November		17	-5.2	8	11.2	93
December		21	-7.1	13	12.8	69

Met Office

Location based planning averages

Prepared for: Example Location Based Planning Averages
Site: Exeter, Postcode EX1 3PB
Weather Data from: Latitude 50.7242, Longitude -3.5047

Issued on Monday 2 March at 12:06:50

Long Term Averages (1981-2010)

Month	Daily Rainfall Total (mm)	Days of Rain > 5mm	Days of Snow	Days with Snow Lying at 0900 UTC	Days of Freezing
January	85	6	2	1	0
February	68	5	3	1	0
March	61	4	1	0	0
April	57	4	0	0	0
May	59	4	0	0	0
June	50	3	0	0	0
July	46	3	0	0	0
August	55	3	0	0	0
September	59	4	0	0	0
October	88	6	0	0	0
November	88	6	0	0	0
December	94	6	2	1	0

Month	Minimum Ground Temp (Deg C)	Days of Ground Frost	Minimum Air Temp (Deg C)	Days of Air Frost	Mean Wind Speed (mph)	Sunshine Total (hours)	Solar Radiation (kWh/m^2)
January		15	-4.0	8	9.8	58	26
February		15	-3.5	8	9.8	76	42
March		13	-2.4	4	10.1	111	80
April		11	-0.9	2	9.2	166	121
May		3	2.1	0	8.7	192	154
June		0	5.5	0	7.8	198	164
July		0	7.8	0	8.3	197	154
August		0	7.0	0	7.8	184	134
September		1	4.9	0	7.6	144	96
October		4	0.8	1	8.7	101	57
November		10	-2.0	4	8.5	73	31
December		15	-4.1	8	9.4	53	20

Station-based Planning Averages (with daytime data)

METBUILD LONG-TERM AVERAGES

EXAMPLE STATION

PAGE 1 **TEMPERATURE AND HUMIDITY**

Number of hours in the period 07 to 17GMT

MONDAY to FRIDAY	with Temperatures less than (°C)								with Relative Humidity
	0	1	2	3	4	5	8	15	over 90%
January	22	30	44	60	77	96	153	210	57
February	17	27	39	57	74	93	142	200	42
March	2	5	10	16	27	42	113	226	36
April	0	0	1	3	6	12	55	190	13
May	0	0	0	0	0	1	5	126	13
June	0	0	0	0	0	0	0	61	9
July	0	0	0	0	0	0	0	15	8
August	0	0	0	0	0	0	0	18	13
September	0	0	0	0	0	0	0	57	17
October	0	0	0	1	1	2	11	150	37
November	3	6	11	17	27	39	94	211	52
December	10	17	27	41	58	78	142	230	70
ALL	54	85	132	195	2 70	363	715	1694	367

Number of hours in the period 07 to 17GMT

MONDAY to SATURDAY	with Temperatures less than (°C)								with Relative Humidity
	0	1	2	3	4	5	8	15	over 90%
January	27	38	55	74	95	118	189	260	71
February	21	32	47	68	89	112	170	240	50
March	3	6	11	19	32	49	133	266	42
April	0	0	1	3	7	14	65	225	16
May	0	0	0	0	0	1	7	156	17
June	0	0	0	0	0	0	0	72	11
July	0	0	0	0	0	0	0	18	10
August	0	0	0	0	0	0	0	22	15
September	0	0	0	0	0	0	0	67	20
October	0	0	1	1	1	3	14	185	46
November	4	7	13	21	32	46	111	249	62
December	12	20	31	48	68	91	166	270	82
ALL	67	103	159	234	3 24	434	855	2030	442

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Station-based Planning Average Reports

Monthly Planning Averages for xxxx, xxxx (Lat=xx.xxN Long=x.xxW)

1-in-10 year values - based on station data between 1970 and 2010

Month	Daily rainfall total (mm)	Days with rainfall >5mm	Days with air frost	Days with snow lying at 0900 UTC
January	121.0	9	17	9
February	94.4	7	16	7
March	93.8	6	13	6
April	88.6	6	8	6
May	90.4	6	3	6
June	89.4	6	0	6
July	115.7	7	0	7
August	99.5	7	0	7
September	117.7	7	0	7
October	139.8	9	4	9
November	144.7	9	11	9
December	118.5	7	16	7

Long term averages - based on station data between 1981 and 2010

Month	Daily rainfall total (mm)	Days with rainfall >5mm	Days with air frost	Days with snow lying at 0900 UTC
January	65.0	4	10	3
February	52.2	3	10	4
March	55.4	3	6	2
April	54.7	3	3	0
May	56.0	3	1	0
June	60.9	3	0	0
July	60.9	3	0	0
August	57.6	4	0	0
September	64.7	4	0	0
October	90.9	6	1	0
November	88.3	5	5	1
December	71.4	4	11	4

Above is an example of one page of the report.

Climate Means & Extremes

A Means and Extremes Report can be seen as the next step up in detail to a Planning Averages Report, and an alternative view to a Frequency Analysis Report.

NAME OF LOCATION HERE
WMO no: xxxxx
Pos: xx°xx'N xx°xx'E
Alt: 29 metres AMSL
Period: 1991 to 2015

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Global Climatological Means and Extremes

Temperature (deg c)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Absolute maximum	27.9	30.5	36.6	39.3	41.1	40.0	38.5	38.4	37.5	37.0	33.1	29.5	**41.1**
Average daily max	18.1	18.3	20.3	23.4	26.2	28.9	30.8	31.6	30.5	28.0	23.7	19.9	**25.0**
Average daily min	11.6	11.4	12.9	15.5	18.5	21.7	24.1	25.0	24.0	21.1	16.7	13.1	**18.0**
Absolute minimum	3.1	3.5	1.2	7.6	12.6	17.2	19.0	22.0	15.0	13.7	8.9	-1.4	**-1.4**
Days of air frost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lowest maximum	9.3	8.9	10.5	9.8	16.2	22.5	28.0	n/a	25.7	16.7	12.3	9.4	**8.9**
Highest minimum	18.8	19.1	22.5	26.7	27.3	25.7	28.6	28.3	30.0	28.2	25.8	19.0	**30.0**

Precipitation (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Average rainfall	193	146	84	37	11	1	4	0	18	71	113	159	**836**
Wettest month	409.0	330.6	218.7	133.7	40.2	7.0	62.7	2.0	123.0	229.4	294.8	325.8	**1367.2**
Driest month	8.8	46.2	11.4	1.7	0.0	0.0	0.0	0.0	0.0	2.2	0.0	51.4	**630.7**
Max rain in 24hr	141.0	99.0	46.0	63.0	25.0	30.0	62.7	1.0	66.0	117.0	133.0	111.0	**141.0**
Days of rain >= 0.2mm	14.9	13.0	10.5	7.7	5.0	1.7	1.1	0.2	1.7	7.0	8.7	12.5	**84.1**
Days of rain >= 1.0mm	12.7	10.9	7.4	4.6	1.6	0.2	0.2	0.1	1.4	5.3	7.0	10.4	**61.9**
Days of rain >= 5.0mm	8.8	7.9	4.6	2.1	0.7	0.1	0.0	0.0	0.8	3.5	4.8	7.7	**41.2**
Days of rain >= 25.0mm	2.4	1.6	0.9	0.2	0.0	0.0	0.0	0.0	0.2	0.6	1.3	1.7	**9.1**

Wind speed (knots)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Mean wind speed	4.9	5.3	5.4	5.6	5.1	5.5	5.8	5.1	4.9	4.2	4.5	4.7	**5.1**
Days of wind >=15kt	3.2	4.6	4.2	3.5	1.8	2.1	2.9	1.7	1.1	0.9	2.6	2.8	**31.5**
Days of wind >=25kt	0.6	0.5	0.9	0.6	0.1	0.1	0.0	0.0	0.0	0.1	0.5	0.5	**3.9**
Max wind recorded	31	38	40	43	41	33	23	40	33	40	37	37	**43**
Days of gale	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	**0.5**

Misc weather	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Days of fog observed	0.1	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.8**
Days of snow falling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Days of thunder heard	4.8	4.3	2.9	1.7	0.8	0.0	0.0	0.0	0.5	3.0	4.0	4.7	**26.8**
Days of frzng ra/dz	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Days of hail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**

Case Study - Forth Road Bridge Constructors (FCBC)

The FCBC team were aware of the challenges that weather brings to the existing bridge and approached us to support planning at the Queensferry Crossing, a vital link in Scotland's road network.

In the pre-construction phase, we conducted a study to analyse winds of different heights together with a general climate assessment. It identified times of day when winds would potentially be at their highest and lowest speeds; times of year when wind shear would be at its greatest and least; as well as providing a rainfall analysis of the site.

For the build phase, FCBC utilised the Met Office's web-based planning tools, to plan weather-dependent tasks up to 14 days ahead to optimise time periods when it hires large and expensive equipment. FCBC were also able to manage contractors more effectively.

With our expertise in forecasting, the construction team has kept to schedule and reduced costs during the build. The monitoring of potential weather hazards also reduced the possibility of accidents occurring, helping to maintain the well-being of the workforce.

"It is vitally important – not least to the health and safety of our construction personnel – that we have dependable, accurate and site-specific forecasts with which to plan our work schedules"

Ken Clarke
FCBC Marine Liaison Officer

Weather Frequency Analysis

Weather Frequency Analysis Reports allow you to relate two parameters such as temperature and month, or wind speed and wind direction. If you know you can lay concrete or paint over a certain temperature, the Frequency Analysis should allow you to gain insight into the normal size of window you have in the day and by month.

Frequency analyses can be complied for a wide range of weather parameters and are available in annual or monthly tables depending on the length of time of your project.

HOURLY TEMPERATURE FREQUENCY ANALYSIS.

Met Office

EXAMPLE STATION. NGR XXXXE XXXXN. Altitude xxm amsl.

FREQUENCY COUNT Rows = Air temperature (deg C) Columns = Month

Year is 1990 => 1999

MONTH: AIRTEMP:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ALL
-10.0 => -9.1	0	0	0	0	0	0	0	0	0	0	0	0	0
-9.0 => -8.1	0	1	0	0	0	0	0	0	0	0	0	0	1
-8.0 => -7.1	0	1	0	0	0	0	0	0	0	0	0	1	2
-7.0 => -6.1	1	14	0	0	0	0	0	0	0	0	0	6	21
-6.0 => -5.1	3	14	0	0	0	0	0	0	0	0	0	10	27
-5.0 => -4.1	22	33	0	0	0	0	0	0	0	0	1	22	78
-4.0 => -3.1	45	35	1	0	0	0	0	0	0	0	2	56	139
-3.0 => -2.1	75	69	4	0	0	0	0	0	0	3	14	96	261
-2.0 => -1.1	121	156	7	2	0	0	0	0	0	4	30	178	498
-1.0 => -0.1	197	219	38	29	0	0	0	0	0	16	73	234	806
0.0 => 0.9	272	254	119	57	2	0	0	0	0	28	168	297	1197
1.0 => 1.9	438	308	197	105	7	0	0	0	0	48	216	436	1755
2.0 => 2.9	524	465	221	151	16	0	0	0	0	67	234	523	2201
3.0 => 3.9	574	495	426	197	43	2	0	0	0	101	343	672	2853
4.0 => 4.9	789	497	471	290	74	2	0	0	1	144	456	712	3436
5.0 => 5.9	708	567	594	407	138	7	0	0	18	168	537	733	3877
6.0 => 6.9	710	626	661	529	198	15	0	2	38	242	607	663	4291
7.0 => 7.9	729	620	625	652	300	33	6	2	79	388	636	649	4719
8.0 => 8.9	650	741	792	742	480	82	11	10	123	562	641	534	5368
9.0 => 9.9	543	688	863	700	439	138	18	45	224	637	705	496	5496
10.0 => 10.9	442	424	798	808	634	297	48	93	350	799	682	385	5760
11.0 => 11.9	362	287	627	704	729	482	130	164	462	764	606	316	5633
12.0 => 12.9	199	153	415	476	703	728	243	232	652	749	542	239	5331
13.0 => 13.9	27	52	267	388	683	824	376	314	753	692	314	140	4830
14.0 => 14.9	7	28	142	267	601	753	575	501	807	605	236	42	4564
15.0 => 15.9	2	9	70	227	499	714	679	690	863	547	111	0	4411
16.0 => 16.9	0	3	49	165	402	651	792	732	791	395	39	0	4019
17.0 => 17.9	0	7	23	102	335	520	736	773	625	228	6	0	3355
18.0 => 18.9	0	2	15	68	293	454	691	730	467	113	1	0	2834
19.0 => 19.9	0	0	8	64	197	349	598	632	310	59	0	0	2217
20.0 => 20.9	0	0	5	37	173	301	482	562	241	34	0	0	1835
21.0 => 21.9	0	0	2	22	121	242	442	461	149	16	0	0	1455
22.0 => 22.9	0	0	0	10	107	190	393	366	89	9	0	0	1164
23.0 => 23.9	0	0	0	1	84	129	368	296	65	15	0	0	958
24.0 => 24.9	0	0	0	0	66	94	251	206	39	7	0	0	663
25.0 => 25.9	0	0	0	0	76	61	193	162	26	0	0	0	518
26.0 => 26.9	0	0	0	0	36	43	162	141	18	0	0	0	400
27.0 => 27.9	0	0	0	0	4	45	94	94	7	0	0	0	244
28.0 => 28.9	0	0	0	0	0	18	54	74	1	0	0	0	147
29.0 => 29.9	0	0	0	0	0	14	39	65	2	0	0	0	120
30.0 => 30.9	0	0	0	0	0	5	36	41	0	0	0	0	82
31.0 => 31.9	0	0	0	0	0	6	17	19	0	0	0	0	42
32.0 => 32.9	0	0	0	0	0	1	6	16	0	0	0	0	23
33.0 => 33.9	0	0	0	0	0	0	0	10	0	0	0	0	10
34.0 => 34.9	0	0	0	0	0	0	0	4	0	0	0	0	4
ALL	**7440**	**6768**	**7440**	**7200**	**7440**	**7200**	**7440**	**7437**	**7200**	**7440**	**7200**	**7440**	**87645**

Soil Moisture Data

When is it suitable for heavy plant to operate in rural areas projects?

The Met Office's Rainfall and Evapo-transpiration Calculation System (MORECS) calculates soil moisture conditions and can aid assessments of trafficability on site by providing assessments of rainfall, evaporation and soil moisture. This is particularly useful for Autumn and Spring periods to plan when it's the best time to operate on site when in a rural environment.

Output can either be for a single site or as averages over 40 km x 40 km squares which cover the UK.

MORECS allows you to choose desired land use metadata such as bare soil or grass that is placed into the MORECS model for a specific location, and you can see daily outputs to best understand conditions. MORECS utilises a number of observed weather parameters along with crop and local soil information to calculate evaporation, so that most circumstances can be catered for.

Some of the MORECS metadata includes data derived from bare soil, grass, rough grazing, areas of deciduous trees, and coniferous trees.

What are the MORECS outputs?

- **PE: Potential Evaporation (mm)** - The water loss from a crop or surface where the water supply is such that unhindered evaporation occurs. This evaporation rate is governed by the weather and by crop physical factors such as crop height.
- **AE: Actual Evaporation (mm)** - The amount of water which is removed into the air in an un-irrigated crop. It is equal to or less than the Potential Evaporation
- **SMD: Soil Moisture Deficit (mm)** - The amount of rainfall which would have to be added to the soil in order to bring it to field capacity. The larger the SMD the drier the soil.
- **EP/HER: Hydrologically Effective Rainfall / Runoff (mm)** - The period between the return to field capacity and the loss of capacity in spring gives opportunity for rainfall to recharge ground water and flow to rivers. The sum of rainfall less evaporation during this (mainly winter) period is known as excess rainfall (Hydrologically Effective Rainfall)

Degree Day Reports for Heating & Cooling Guidance

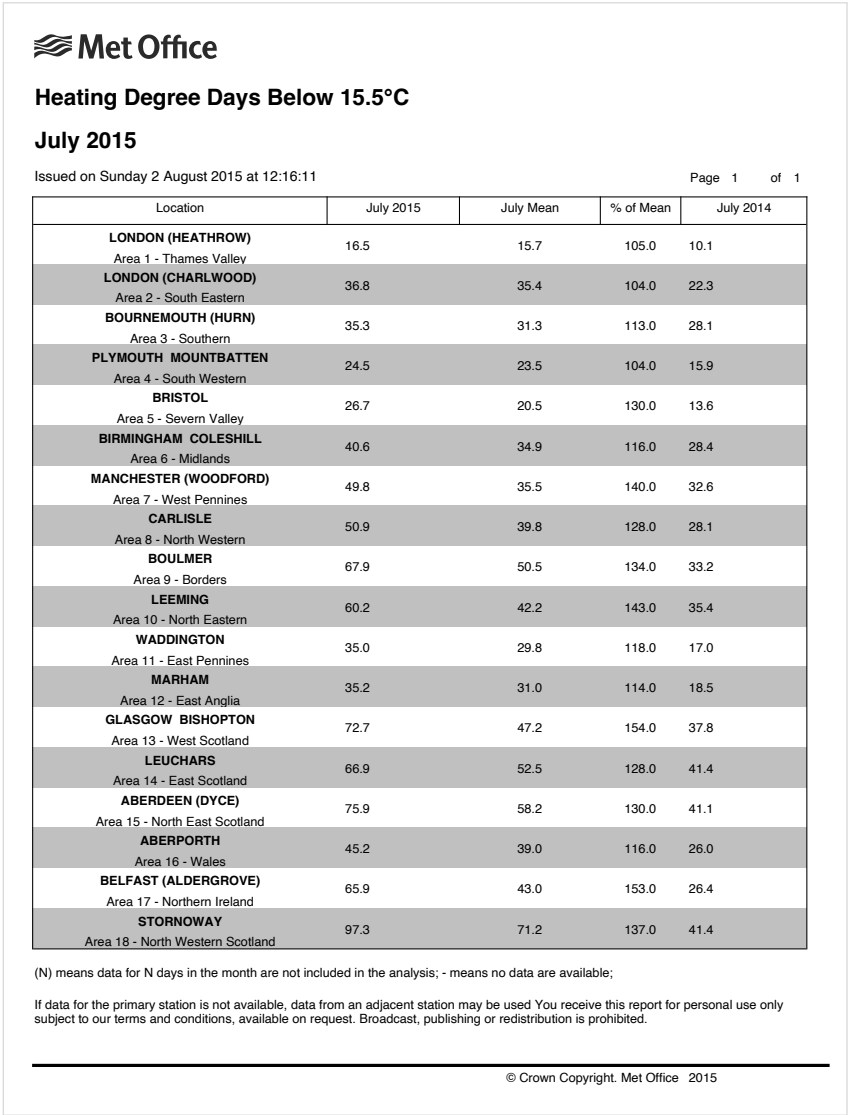
Degree days are defined as the mean number of degrees by which the air temperature has gone above or below a threshold, calculated day by day and summed over a period of days.

What is Degree Day Data used for?

- As a guide for seasonal heating/cooling requirements.
- Preparing annual budgets.
- Detecting faults in heating/cooling systems.
- Evaluating the success of savings measures.
- Constructing control charts that compare benchmarked and actual energy usage.
- To help assess where potential energy waste may occur in heating and cooling systems.

Degree Day Reports

The Degree Day Report provides you with monthly heating degree-day data, at a standard base temperature of above 15.5°C for cooling or below 15.5°C for heating. Just like Planning Average Reports, this report contains a monthly long-term average for comparison.



Met Office

Heating Degree Days Below 15.5°C

July 2015

Issued on Sunday 2 August 2015 at 12:16:11 Page 1 of 1

Location	July 2015	July Mean	% of Mean	July 2014
LONDON (HEATHROW) Area 1 - Thames Valley	16.5	15.7	105.0	10.1
LONDON (CHARLWOOD) Area 2 - South Eastern	36.8	35.4	104.0	22.3
BOURNEMOUTH (HURN) Area 3 - Southern	35.3	31.3	113.0	28.1
PLYMOUTH MOUNTBATTEN Area 4 - South Western	24.5	23.5	104.0	15.9
BRISTOL Area 5 - Severn Valley	26.7	20.5	130.0	13.6
BIRMINGHAM COLESHILL Area 6 - Midlands	40.6	34.9	116.0	28.4
MANCHESTER (WOODFORD) Area 7 - West Pennines	49.8	35.5	140.0	32.6
CARLISLE Area 8 - North Western	50.9	39.8	128.0	28.1
BOULMER Area 9 - Borders	67.9	50.5	134.0	33.2
LEEMING Area 10 - North Eastern	60.2	42.2	143.0	35.4
WADDINGTON Area 11 - East Pennines	35.0	29.8	118.0	17.0
MARHAM Area 12 - East Anglia	35.2	31.0	114.0	18.5
GLASGOW BISHOPTON Area 13 - West Scotland	72.7	47.2	154.0	37.8
LEUCHARS Area 14 - East Scotland	66.9	52.5	128.0	41.4
ABERDEEN (DYCE) Area 15 - North East Scotland	75.9	58.2	130.0	41.1
ABERPORTH Area 16 - Wales	45.2	39.0	116.0	26.0
BELFAST (ALDERGROVE) Area 17 - Northern Ireland	65.9	43.0	153.0	26.4
STORNOWAY Area 18 - North Western Scotland	97.3	71.2	137.0	41.4

(N) means data for N days in the month are not included in the analysis; - means no data are available;

If data for the primary station is not available, data from an adjacent station may be used You receive this report for personal use only subject to our terms and conditions, available on request. Broadcast, publishing or redistribution is prohibited.

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Mean Annual Frost Index

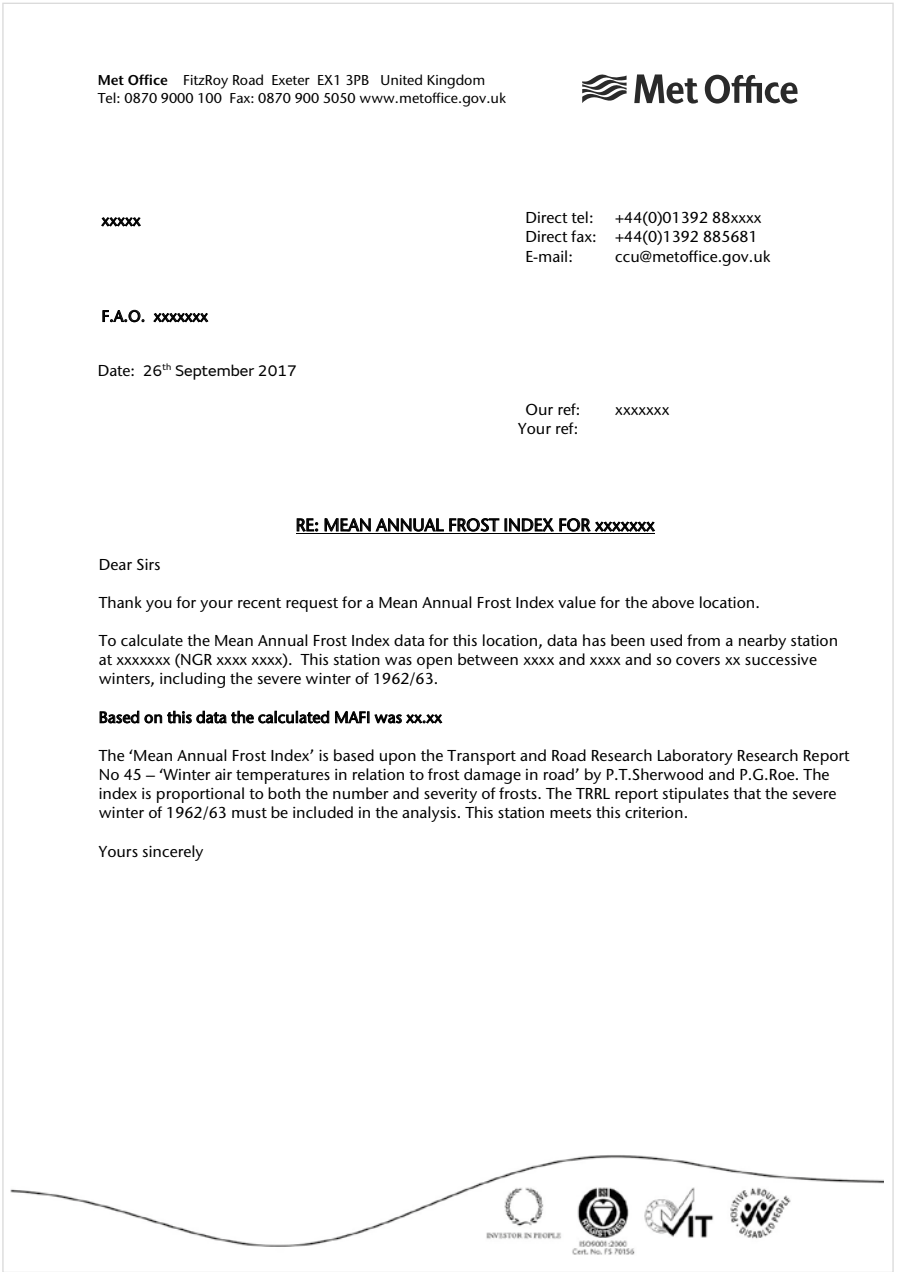
Who is the Mean Annual Frost Index suitable for?

The Frost Index gives a measure of the severity and duration of a cold spell in an area. It is used to decide which material can be used for road dressing. The basis of the design procedure (Department of Transport Guidelines) has been to require that non-frost susceptible materials must be used in the top 450mm of the road surface if the area is susceptible to frost. If the mean annual frost index is below 50, materials which are more frost susceptible can be used closer to the surface.

How is the Mean Annual Frost Index calculated?

The mean annual frost index can be calculated for any Met Office station which has a suitable long record (generally from 1959, but it must include the severe winter of 1962/63). The index is an accumulation of the daily mean temperature below 0 deg Celsius; - e.g. a daily mean temperature of -2.5 deg C adds 2.5 to the total. These values are totalled over each winter to give a winter index. The mean annual frost index is the average of all these values.

What does a Mean Annual Frost Index look like?



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xxxxx

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Direct fax: +44(0)1392 885681
E-mail: ccu@metoffice.gov.uk

F.A.O. xxxxxxx

Date: 26th September 2017

Our ref: xxxxxxx
Your ref:

RE: MEAN ANNUAL FROST INDEX FOR xxxxxxx

Dear Sirs

Thank you for your recent request for a Mean Annual Frost Index value for the above location.

To calculate the Mean Annual Frost Index data for this location, data has been used from a nearby station at xxxxxxx (NGR xxxx xxxx). This station was open between xxxx and xxxx and so covers xx successive winters, including the severe winter of 1962/63.

Based on this data the calculated MAFI was xx.xx

The 'Mean Annual Frost Index' is based upon the Transport and Road Research Laboratory Research Report No 45 – 'Winter air temperatures in relation to frost damage in road' by P.T.Sherwood and P.G.Roe. The index is proportional to both the number and severity of frosts. The TRRL report stipulates that the severe winter of 1962/63 must be included in the analysis. This station meets this criterion.

Yours sincerely

Project Delivery, Construction, & Operations

VisualEyes™ – Location-specific Monitoring & Alerting

VisualEyes™ is the Met Office's 24/7, web-based, location specific weather monitoring and alerting system. It contains a broad range of weather types and a long range forecast out to fourteen days with probabilistic forecasting.

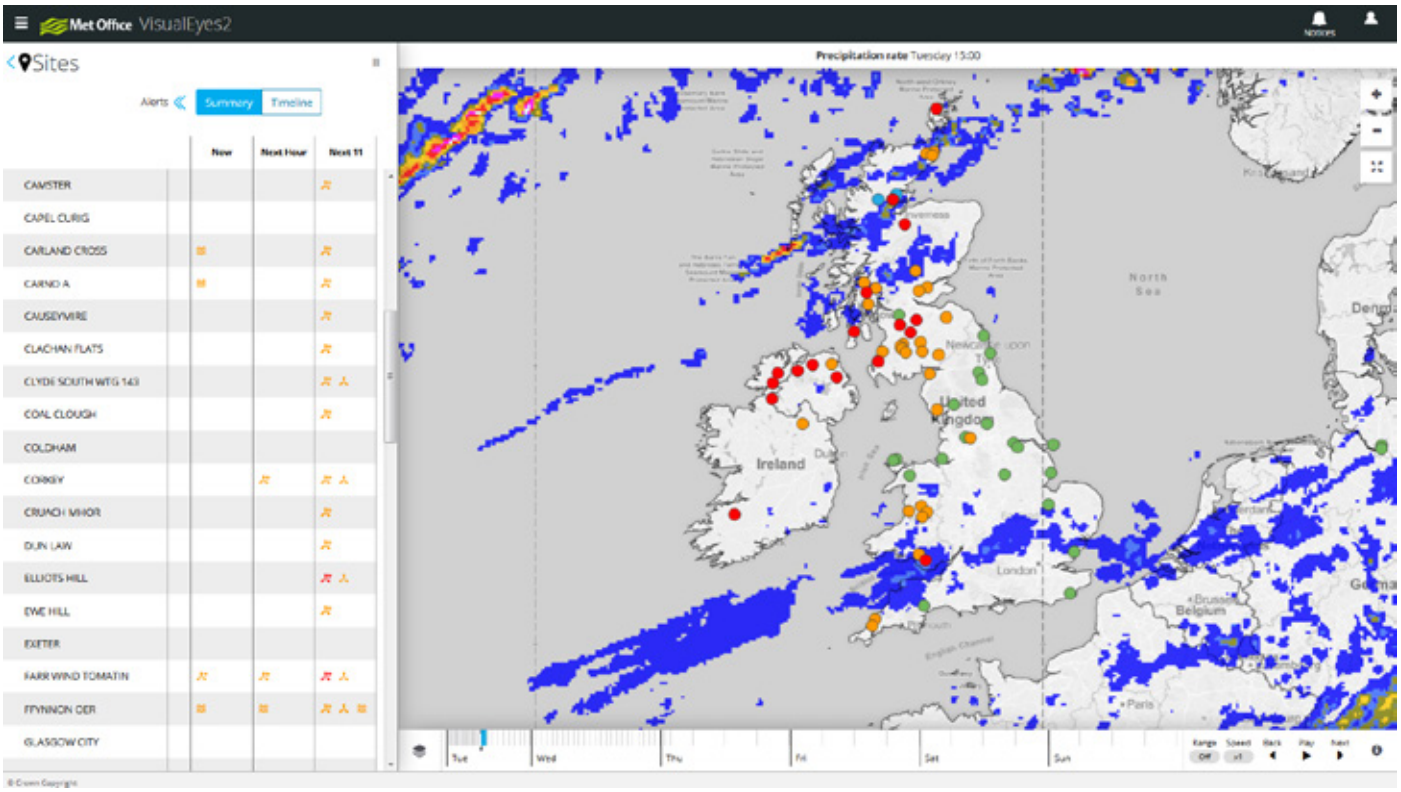
The main benefits to using VisualEyes™ are:

- Managing decision making around health and safety risks - protect personnel and customers during operations and maintenance to avoid litigation and other risks.
- Increase efficiency and preparedness–minimise asset downtime through effective planning of workforce, equipment hire and site access. VisualEyes™ planning charts quickly identify the optimum times for specific operations.
- Stay fully informed - wherever your team are on site, with device responsive mobile access to access critical site-specific weather conditions wherever you are with email and SMS alerts, so it is perfect to use while in the control room or while working on site.

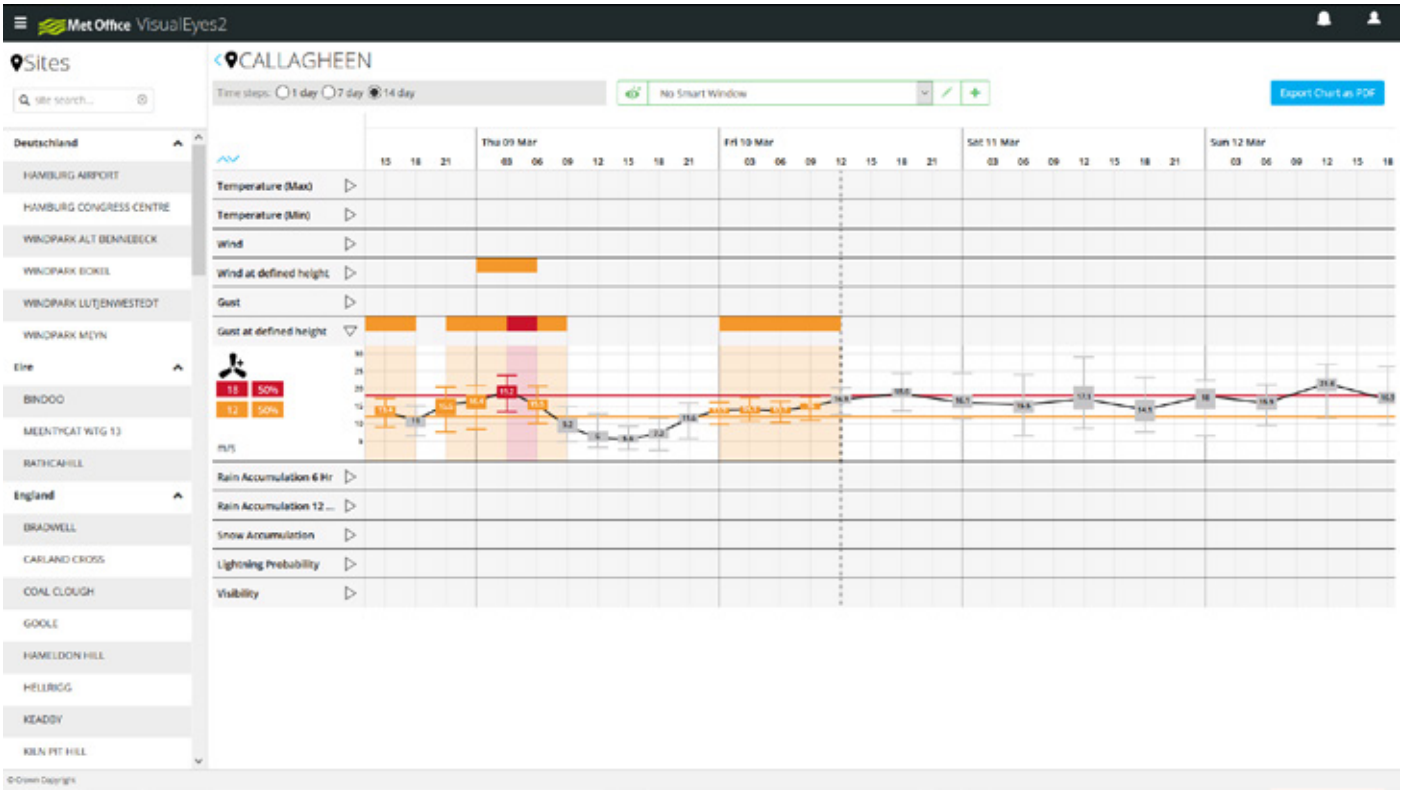
Key features

VisualEyes™ enables you to access two distinct views to suit your needs. Control Room view, and Weather Chart view, which includes 'Smart Windows':

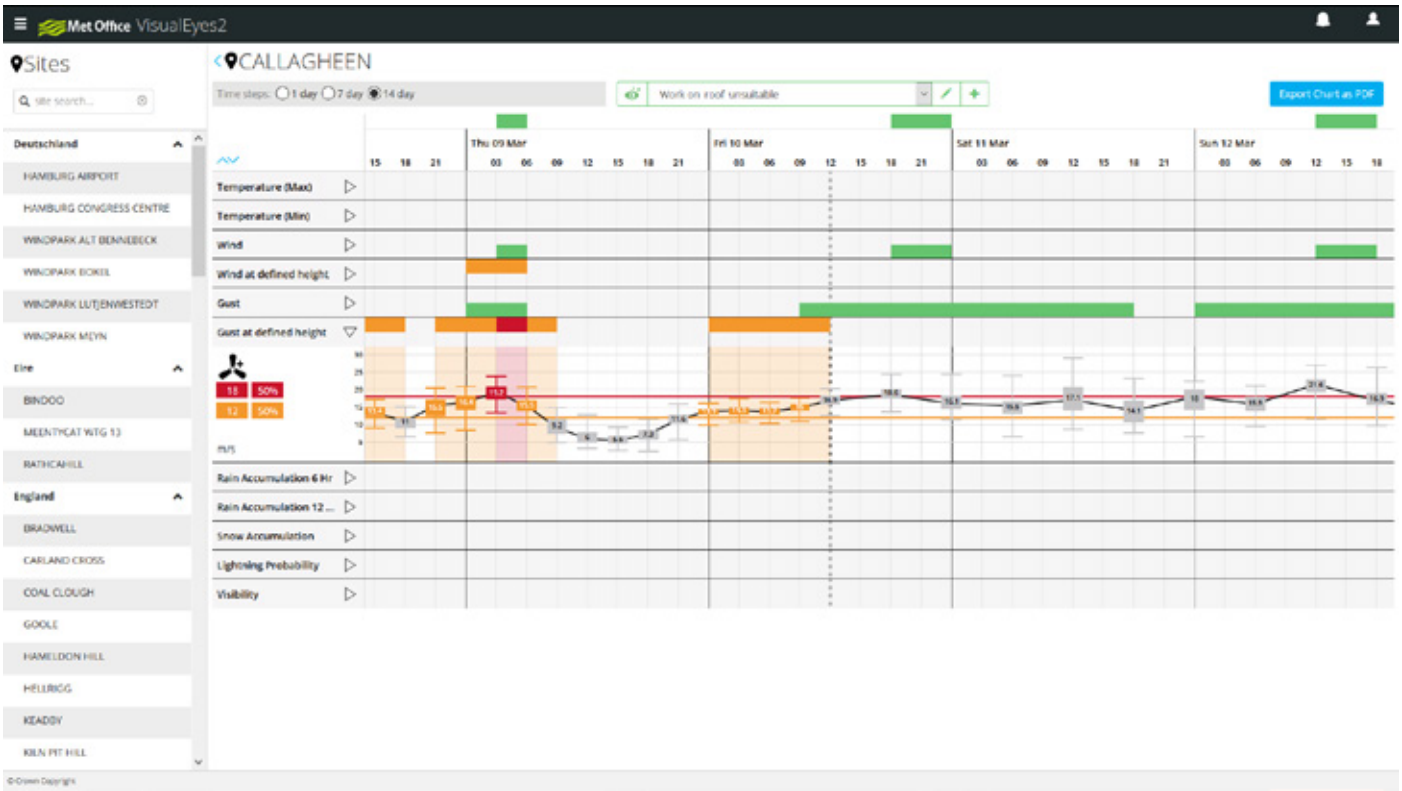
Control Room view monitors weather conditions across multiple sites. It includes a map viewer and collapsible alert panel.



Weather Chart view allows for forward planning of specific operational activities and highlights times when weather conditions exceed a given threshold – that you define -which may affect planning, or the running of a build.

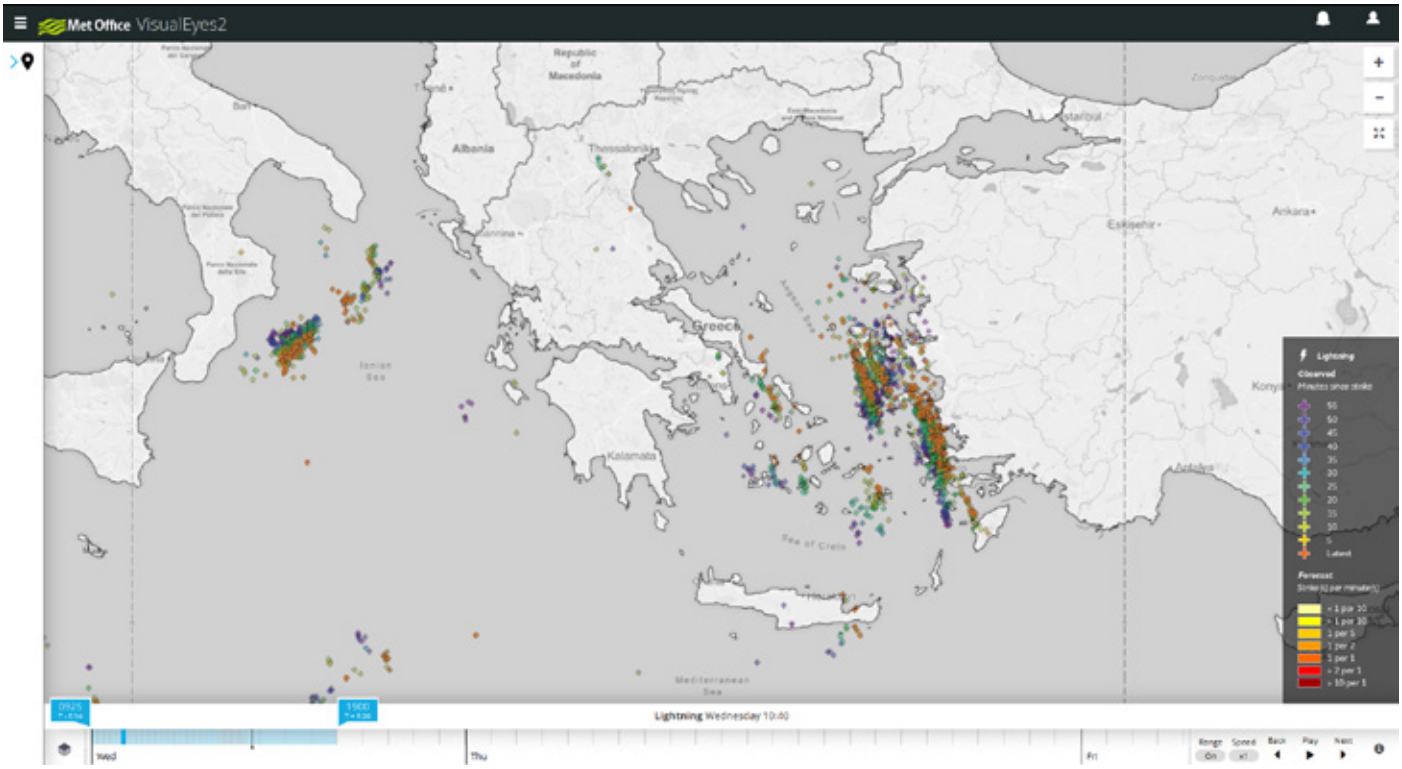


Smart Windows is a flexible tool for identifying both favourable and unfavourable weather combinations. Up to ten different weather types can be combined to identify operational windows in the weather – all in which adds operational context to the forthcoming weather conditions. The green line in the case below would indicate when it is safe to work on a particular task such as concrete laying or crane operations.



Potential uses and benefits of VisualEyes™

- Help assist organisers in making suitable arrangements for severe weather such as planning facilities for a reduction of accidents.
- Help Managers determine when it is and is not safe for staff to work at height due to wind, rain, or lightning risk.



An example of lightning strike monitoring

Case Study - London Legacy Development Corporation (LLDC)

LLDC was involved in a £25million scheme to regenerate Hackney Wick Overground Station. VisualEyes™ was used from planning through to operational delivery of the project.

VisualEyes™ was critical due to the volatile nature of the weather during that time of year, compounded by the pressure of the works needing to be complete within a 99-hour rail blockade. There was no option to 'wait for the storm to pass'. The graphical format of VisualEyes™ was also used in getting the messages across at board-level presentations.

VisualEyes™ was key to the project's success and was used for key decisions by the project team. Making the wrong call at this point had the potential for LLDC to incur months of delay and many hundreds of thousands of pounds in postponement costs.

"Installing the new subway at Hackney Wick Overground Station was an incredible feat of engineering, which was dependant on the right weather conditions being in place. By being given solid, up to the minute data, my team was able to make an informed decision on whether to go ahead with the work and, as a result of a successful period of construction, we are making excellent progress on delivering improved transport facilities for residents and workers in the Hackney Wick area."

Janet Townsend
Director of Development, LLDC

‘Talk to a Forecaster’ Forecaster Consultancy Service

At times when projects need additional details to the conditions on certain days, the Met Office can provide 24/7/365 meteorology consultancy.

The ‘Talk to a Forecaster’ service provides a direct line for you to ask any weather information or forecast for any location. Perhaps there is a time of uncertainty, or if you really need to get some expert advice.

Forecasters on the line are located within the Met Office’s Operations Centre at Met Office HQ, Exeter.

- Direct access to a weather forecaster, 24/7/365.
- Each call is approximately three-to-four minutes in duration.
- Access is issued via a PIN, which is given on the instigation of the service.

Project Analysis

Downtime Summary Reporting

Monthly Downtime Summary reports support your claims for downtime. They provide detailed weather conditions experienced over a month. This can be used to compare the Long-Term Averages and 1-in-10 year values identifying conditions that could not have been planned for. Our weather reports are trusted to help resolve contractual disputes within contracts such as NEC and JCT, and are available as Location-based or Station-based reports.

The difference between Station-based, and Location-based Downtime Summaries

The Met Office produces Downtime Summary Reports with data from two different sources.

Location-based Planning Average Reports use modelled data from one of more than 3,600 locations across the UK. Data is compliant with a wide range of construction contracts.

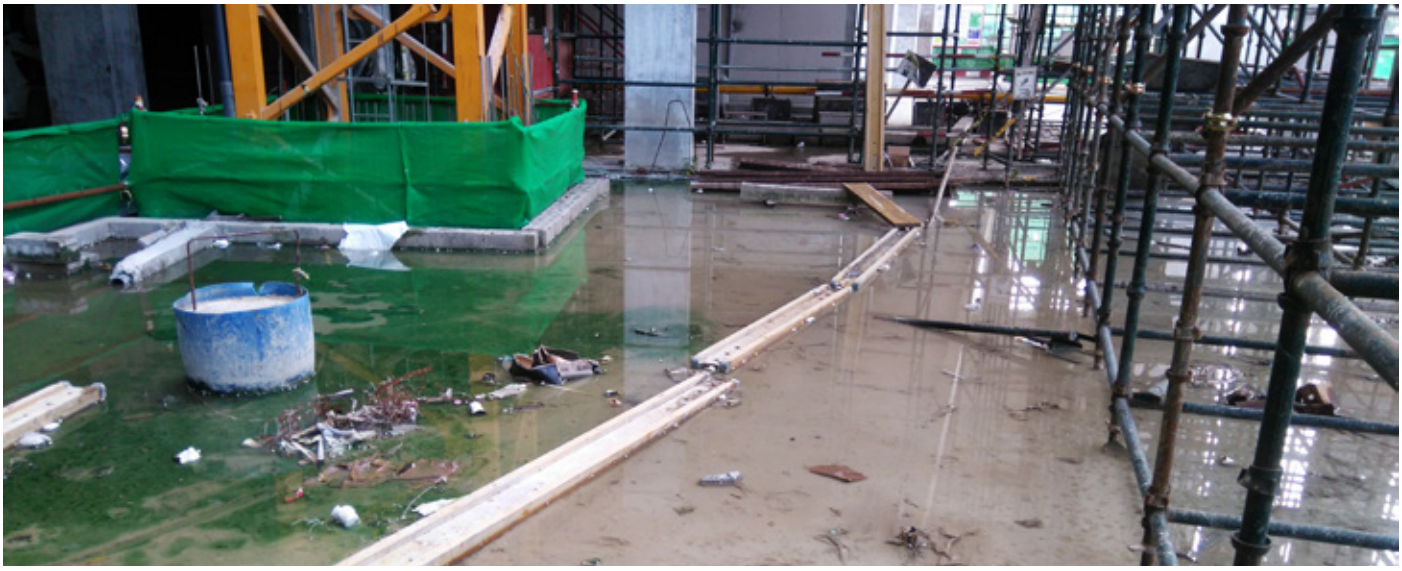
Station-based Planning Average Reports use observational data from one of 100 physical weather stations across the UK. Both are suitable for a variety of building contracts including JCT contracts and guidance of NEC3 and 4 contracts 60.1 (13).

What is the difference between 'observational' and 'modelled' data?

Observed data has been physically acquired from a weather station. Modelled data uses a combination of our scientific systems, essentially all data collected from our weather stations over the years, interpolated over the UK onto a 1km grid. The benefits of location-based reporting are that you can work with data more representative to your site, if by chance there is not a weather station nearby.

What is the difference between 'observational' and 'modelled' data?

Our modelled data has undergone extensive scientific investigation, analysis, and verification to ensure accuracy. This **technical report** explains the benefits of using location-specific data.



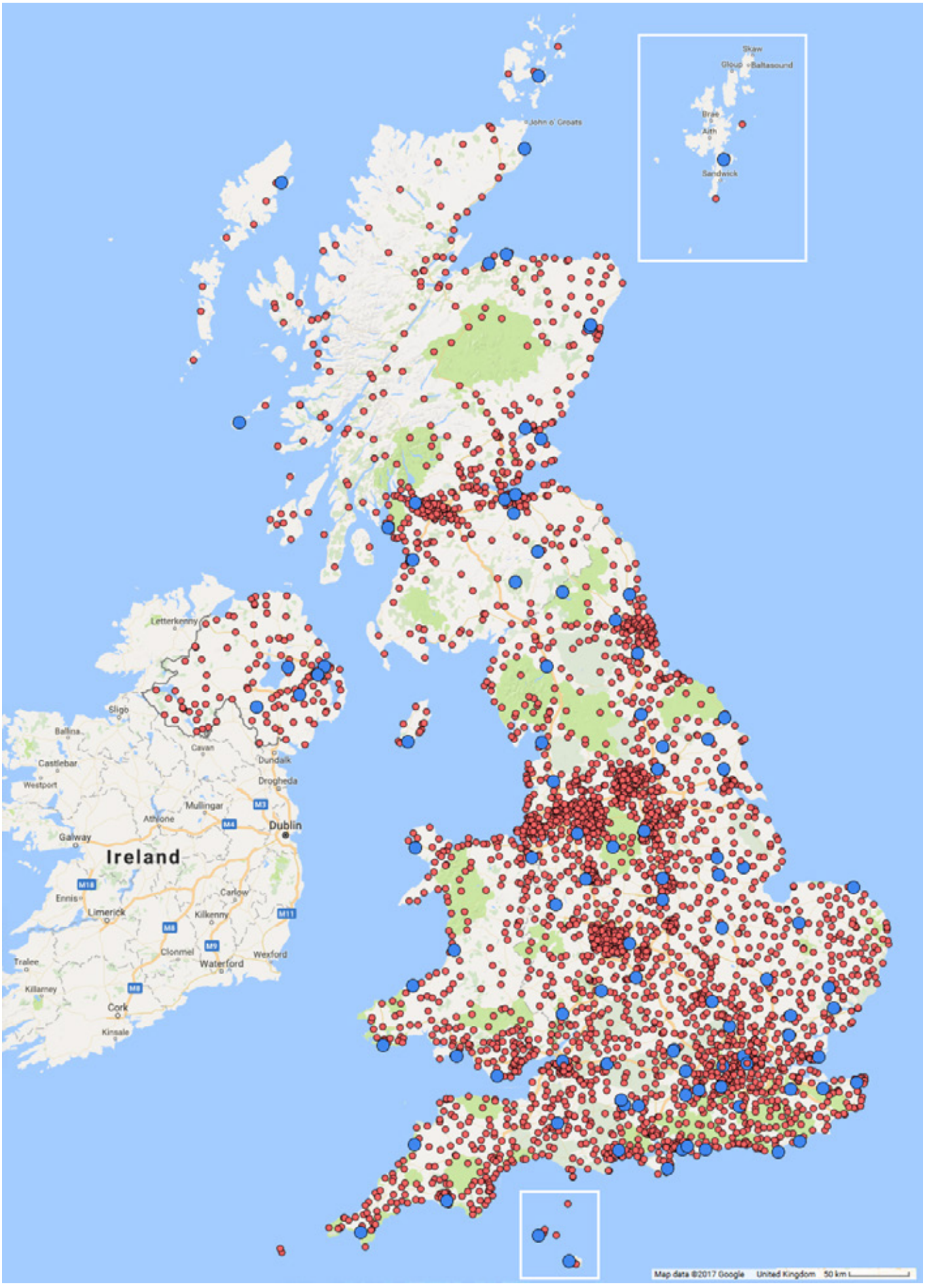
Downtime Summary Comparison Table

Downtime Summary Report data is available from both Station-based sources (such as weather stations) and Location-based sources (such as model data). So, what are the differences?

	Station Based Monthly Planning Averages	Station Based Monthly Planning Averages (with Wind)	Station Based Monthly Planning Averages (Daytime)	Location Based Monthly Planning Averages (includes wind as standard)
Example report	Page 25	Page 25	Page 25	Page 24
Features				
Greater representation of actual onsite weather conditions				✔
Over 3,600 locations available				✔
100 weather observation stations	✔	✔		
55 weather observation stations			✔	
Includes wind		✔		✔
Reports over 24 hours	✔	✔		✔
16 different weather elements, 11 with Long Term Averages (LTAs) and 1-in-10 year values				✔
Makes it immediately clear if compensation event reached				✔
Volume discounts available	✔			✔
Advantages				
Can be used across a variety of construction contracts including JCT & NEC contracts	✔	✔	✔	✔
Suitable for NEC clause 60.1 (13)	✔	✔		✔

Where is my nearest location to derive data?

This **link** will take you to the map to assist you in finding the nearest location to your site where data for Planning Average reports can be derived from. Both Location and Station-based Planning Average are available. A summary version is on **page 23**.


Skaw
Gloup
Baltasound
Brae
Aith
Sandwick
John o' Groats
Letterkenny
Sligo
Ballina
Castlebar
Westport
Cavan
Dundalk
Drogheda
Mullingar
M3
Athlone
M4
Dublin
Galway
Ireland
M18
Ennis
Limerick
Carlow
Kilkenny
M11
M8
M9
Clonmel
Wexford
Waterford
Tralee
Killarney
M8
Cork
Kinsale
Map data ©2017 Google
United Kingdom
50 km

Location-based Downtime Summary Reports

Location based downtime summaries

Prepared for: A Company
Site: Somewhere, Latitude 51.555, Longitude -1.555
Weather Data from: Latitude 51.5075, Longitude -1.5301
Month: May 2017

Issued on Wednesday 7 June at 08:40:21

Summary Page

	Monthly Summary for May 2017	1-in-10 Year Value (1971-2010)	Long-term Average (1981-2010)
Monthly Rainfall Total (mm) 0900-0900	78.7	105.0	63.0
Total Days of Rain > 5mm	7	8	4
Monthly Snowfall Total (cm)	0.0	not available	not available
Total Days of Snow	0	1	0
Total Days with Snow Lying at 0900	0	0	0
Maximum Snow Depth (cm) at 0900	0.0	not available	not available
Total Days of Freezing	0	0	0
Minimum monthly Ground Temp (Deg C)	3.8	not available	not available
Total Days of Ground Frost	0	not available	not available
Minimum monthly Air Temp (Deg C)	-0.9	-1.7	0.2
Total Days of Air Frost	1	3	1
Mean monthly Wind Speed (mph) 0900-0900	8.9	11.4	9.4
Monthly Sunshine Total (hours)	172.5	239.0	190.0
Maximum monthly Gust Speed (mph) 0900-0900	34.5	not available	not available
Total Days of Lightning	3	not available	not available
Monthly Solar Radiation Total (kWh/m^2)	139.5	158.0	146.0

Monthly value is less than or equal to the 1-in-10 year value, except for Minimum Ground Temp and Minimum Air Temp where the monthly value is greater than or equal to the 1-in-10 year value.

Monthly value is greater than the 1-in-10 year value, except for Minimum Ground Temp and Minimum Air Temp where the monthly value is less than the 1-in-10 year value.

Location based downtime summaries

Prepared for: A Company
Site: Somewhere, Latitude 51.555, Longitude -1.555
Weather Data from: Latitude 51.5075, Longitude -1.5301
Month: May 2017

Issued on Wednesday 7 June at 08:40:21

Day of Month	Daily Rainfall Total (mm)	Days of Rain > 5mm	Daily Snowfall Total	Days of Snow	Days with Snow Lying at 0900 UTC	Snow Depth (cm) at 0900 UTC
1	0.3		0.0			0.0
2	0.0		0.0			0.0
3	0.0		0.0			0.0
4	0.0		0.0			0.0
5	0.0		0.0			0.0
6	0.0		0.0			0.0
7	0.0		0.0			0.0
8	0.0		0.0			0.0
9	0.0		0.0			0.0
10	0.0		0.0			0.0
11	7.6	1	0.0			0.0
12	1.6		0.0			0.0
13	7.3	1	0.0			0.0
14	2.4		0.0			0.0
15	0.9		0.0			0.0
16	5.4	1	0.0			0.0
17	24.6	1	0.0			0.0
18	2.4		0.0			0.0
19	5.4	1	0.0			0.0
20	1.8		0.0			0.0
21	0.0		0.0			0.0
22	0.0		0.0			0.0
23	0.0		0.0			0.0
24	0.0		0.0			0.0
25	0.0		0.0			0.0
26	5.4	1	0.0			0.0
27	0.0		0.0			0.0
28	9.4	1	0.0			0.0
29	4.3		0.0			0.0
30	0.0		0.0			0.0
31	0.0		0.0			0.0
Summary	78.7	7	0.0	0	0	0.0
1-in-10 Year Value (1971-2010)	105.0	8	not available	1	0	not available
Long-term Average (1981-2010)	63.0	4	not available	0	0	not available

Location based downtime summaries

Prepared for: A Company
Site: Somewhere, Latitude 51.555, Longitude -1.555
Weather Data from: Latitude 51.5075, Longitude -1.5301
Month: May 2017

Issued on Wednesday 7 June at 08:40:21

Day of Month	Days of Freezing	Minimum Ground Temperature (Deg C)	Days of Ground Frost	Minimum Air Temperature (Deg C)	Days of Air Frost
1		7.2		7.7	
2		6.2		4.0	
3		6.7		6.2	
4		7.9		8.1	
5		6.8		6.2	
6		7.9		8.2	
7		7.7		7.9	
8		5.2		5.0	
9		5.6		5.8	
10		3.8		-0.9	1
11		5.5		5.3	
12		11.3		11.6	
13		10.3		10.7	
14		10.1		9.7	
15		8.4		7.5	
16		12.7		13.2	
17		13.5		14.0	
18		8.0		6.4	
19		8.8		8.5	
20		5.6		5.4	
21		7.2		6.8	
22		9.2		9.5	
23		10.5		10.2	
24		10.8		11.6	
25		11.5		9.9	
26		11.7		11.6	
27		14.0		14.5	
28		11.6		10.0	
29		14.3		13.1	
30		12.7		12.1	
31		12.5		11.2	
Summary	0	3.8	0	-0.9	1
1-in-10 Year Value (1971-2010)	0	not available	not available	-1.7	3
Long-term Average (1981-2010)	0	not available	not available	0.2	1

Location based downtime summaries

Prepared for: A Company
Site: Somewhere, Latitude 51.555, Longitude -1.555
Weather Data from: Latitude 51.5075, Longitude -1.5301
Month: May 2017

Issued on Wednesday 7 June at 08:40:21

Day of Month	Mean Wind Speed (mph)	Sunshine Total (hours)	Maximum Gust Speed (mph)	Days of Lightning	Solar Radiation Total (kWh/m^2)
1	8.7	6.2	23.0		4.3
2	11.2	8.3	26.5		5.3
3	14.3	1.4	27.6		2.7
4	15.0	2.2	28.8		3.5
5	17.0	5.3	28.8		4.8
6	10.3	0.7	23.0		3.4
7	9.2	5.7	23.0		4.9
8	11.4	6.7	20.7		5.6
9	6.3	4.6	16.1		4.7
10	7.4	11.4	23.0		7.3
11	7.6	5.1	23.0	1	4.0
12	9.8	2.0	24.2		2.9
13	11.4	7.2	28.8		4.8
14	8.7	8.3	29.9		5.7
15	14.3	0.0	34.5		1.4
16	9.4	2.1	29.9		3.1
17	5.8	0.0	16.1		0.6
18	4.2	6.6	17.3		4.8
19	6.5	2.9	20.7	1	3.2
20	7.8	4.9	28.8		3.8
21	8.7	11.1	23.0		6.8
22	10.3	11.3	28.8		7.1
23	7.2	1.1	27.6		3.5
24	2.9	10.6	10.4		6.6
25	8.7	11.6	24.2		6.8
26	11.2	12.6	27.6	1	7.9
27	9.4	6.5	31.1		5.1
28	6.5	6.2	25.3		5.0
29	6.3	0.1	19.6		1.8
30	7.6	6.0	27.6		4.9
31	4.2	3.9	15.0		3.6
Summary	8.9	172.5	34.5	3	139.5
1-in-10 Year Value (1971-2010)	11.4	239.0	not available	not available	158.0
Long-term Average (1981-2010)	9.4	190.0	not available	not available	146.0

Station-based Downtime Summary Reports

Station Based Downtime Summary for ALDERGROVE

Weather Data from: (Lat=54:66N Long=06:22W)

Month: January 2014

Issued on Monday 1 December 2014 at 11:42:40

Date	Daily Rainfall total (mm) 0900-0900	Days of Rain >5mm	Minimum Air Temp (Deg C)	Days with Air Frost	Snow Depth (cm) at 0900 UTC	Days with Snow Lying at 0900 UTC
01	3.8		3.3		0	-
02	3.2		3.3		0	-
03	0.6		3.5		0	-
04	1.8		2.6		0	-
05	7.8	1	0.4		0	-
06	0.2		4.7		0	-
07	0.6		6.6		0	-
08	0.2		4.3		0	-
09	0.2		-0.1	1	0	-
10	4.4		2.7		0	-
11	0.0		0.3		0	-
12	3.8		0.4		0	-
13	0.6		1.5		0	-
14	9.6	1	-1.4	1	0	-
15	2.8		-0.2	1	0	-
16	17.6	1	4.1		0	-
17	tr		4.3		0	-
18	9.4	1	3.3		0	-
19	0.2		2.4		0	-
20	2.4		1.7		0	-
21	4.4		1.8		0	-
22	2.0		4.8		0	-
23	5.0		2.9		0	-
24	6.4	1	2.5		0	-
25	16.2	1	4.9		0	-
26	2.6		2.1		0	-
27	7.8	1	2.5		0	-
28	0.8		4.6		0	-
29	2.6		3.8		0	-
30	2.0		2.9		0	-
31	17.4	1	3.3		0	-
Total	136.4	8	-	3	-	-
1-in-10 Year Value	126.7	10	-	16	-	7
Long-term average (1981-2010)	81.3	6	-	9	-	2

Explanatory Notes
"#" means some data are missing, the no. of hours missing follows the symbol; "-" means no data are available; "n/a" means the total, long-term average or 1-in-10 year value is not available or not applicable; "tr" means 'trace' of rainfall i.e. less than 0.05mm.

Station-based Downtime Summary Reports are also available with additional wind information on request.

Station-Based Downtime Summary Report (Daytime)

Building Downtime Summary (MetBUILD)

Met Office

Tel: 0870 900 0100 www.metoffice.gov.uk

ABERPORTH - January 2014

Issued on Monday 14 July 2014 at 10:49:17

	Number of hours in the priod 07 to 17 GMT										
	with temperature less than (deg C)								#	with Relative Humidity > 90%	#
Day	0	1	2	3	4	5	8	15			
01	0	0	0	0	0	0	3	10		10	
02	0	0	0	0	0	0	5	10		1	
03	0	0	0	0	0	1	10	10		0	
04	0	0	0	0	1	7	10	10		6	
05	0	0	0	0	0	1	7	10		8	
06	0	0	0	0	0	0	0	10		1	
07	0	0	0	0	0	0	1	10		0	
08	0	0	0	0	0	0	7	10		9	
09	0	0	0	0	0	0	10	10		0	
10	0	0	0	0	0	0	4	10		4	
11	0	0	0	0	0	1	10	10		0	
12	0	0	0	0	0	0	10	10		2	
13	0	0	0	1	2	6	10	10		7	
14	0	0	2	3	3	5	10	10		2	
15	0	0	0	0	0	0	1	10		8	
16	0	0	0	0	0	0	10	10		6	
17	0	0	0	0	0	0	10	10		1	
18	0	0	0	0	0	0	8	10		6	
19	0	0	0	2	3	5	10	10		3	
20	0	0	0	0	0	2	10	10		5	
21	0	0	0	0	0	0	10	10		8	
22	0	0	0	0	0	0	10	10		2	
23	0	0	0	0	0	0	10	10		0	
24	0	0	0	0	0	0	7	10		10	
25	0	0	0	0	0	0	4	10		2	
26	0	0	0	0	0	1	6	10		4	
27	0	0	0	0	0	0	10	10		0	
28	0	0	0	0	0	0	10	10		5	
29	0	0	0	0	0	2	10	10		4	
30	0	0	0	2	10	10	10	10		0	
31	0	0	0	1	2	3	9	10		10	
Mon-Fri Total	0	0	2	7	17	29	177	230		93	
Long-term avg	13	20	29	44	64	87	163	210		68	
Mon-Sat Total	0	0	2	7	18	37	209	270		107	
Long-term avg	17	25	36	54	80	108	202	260		85	

Building Downtime Summary (MetBUILD)

Met Office

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ABERPORTH - January 2014

Issued on Monday 14 July 2014 at 10:49:17

	Rainfall Total (mm)				Number of hours in the period 07 to 17 GMT			Snow lying during the day (06-18 (GMT)
	00-24 (GMT)	#	07-17 (GMT)	#	with rainfall over 0.2mm	when snow fell	#	
Day								
01	13.0		12.2		8	0		-
02	5.0		0.2		0	0		-
03	10.0		4.8		3	0		-
04	7.8		5.4		2	0		-
05	6.4		2.6		2	0		-
06	12.8		12.6		5	0		0
07	0.6		0.6		0	0		0
08	17.4		4.4		3	0		0
09	2.0		0.0		0	0		0
10	2.2		0.2		0	0		0
11	tr		tr		0	0		-
12	2.2		0.2		0	0		-
13	12.4		9.4		5	0		0
14	10.8		2.2		3	0		0
15	4.6		3.4		4	0		0
16	7.0		2.2		3	0		0
17	1.2		0.4		1	0		0
18	16.0		9.2		4	0		-
19	0.2		0.2		0	0		-
20	4.8		1.6		1	0		0
21	3.6		2.2		4	0		0
22	1.8		1.0		1	0		0
23	1.8		tr		0	0		0
24	15.6		6.6		4	0		0
25	0.8		0.8		1	0		-
26	5.4		4.4		4	0		-
27	2.6		0.4		1	0		0
28	17.4		8.2		6	0		0
29	0.6		0.2		0	0		0
30	tr		0.0		0	0		0
31	13.4		10.0		8	0		0
Mon-Fri Total	160.6		82.8		60	0		0
Long-term avg	62.3		23.7		22	5		2
Mon-Sat Total	185.2		98.2		67	0		0
Long-term avg	77.2		29.4		27	7		2

Building Downtime Summary (MetBUILD)

Met Office

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ABERPORTH - January 2014

Issued on Monday 14 July 2014 at 10:49:17

	Number of hours in the period 07 to 17 GMT								
	with mean winds (mph) greater than						with gusts (mph) greater than		
Day	15	18	23	26	32	39	39	46	#
01	10	10	9	6	2	1	7	4	
02	6	2	0	0	0	0	0	0	
03	10	10	10	4	1	0	10	6	
04	3	2	0	0	0	0	0	0	
05	10	10	7	6	2	0	6	5	
06	10	10	10	10	3	0	10	9	
07	10	10	6	3	0	0	5	1	
08	0	0	0	0	0	0	0	0	
09	10	9	1	0	0	0	0	0	
10	5	1	0	0	0	0	0	0	
11	3	2	0	0	0	0	0	0	
12	10	10	10	7	2	0	7	3	
13	5	2	0	0	0	0	0	0	
14	2	2	0	0	0	0	0	0	
15	9	6	3	0	0	0	0	0	
16	9	4	0	0	0	0	0	0	
17	0	0	0	0	0	0	0	0	
18	6	4	3	0	0	0	2	0	
19	1	0	0	0	0	0	0	0	
20	0	0	0	0	0	0	0	0	
21	10	10	6	4	0	0	5	0	
22	9	8	0	0	0	0	0	0	
23	10	10	8	3	1	0	3	1	
24	8	1	0	0	0	0	0	0	
25	8	7	6	6	5	3	6	6	
26	10	10	10	10	5	0	10	9	
27	10	10	10	10	1	0	7	3	
28	10	10	6	3	0	0	2	0	
29	0	0	0	0	0	0	0	0	
30	0	0	0	0	0	0	0	0	
31	10	10	8	8	0	0	8	5	
Mon-Fri Total	153	125	77	51	8	1	57	29	
Long-term avg	133	100	64	50	16	4	25	12	
Mon-Sat Total	173	140	86	57	13	4	65	35	
Long-term avg	165	124	80	61	20	6	31	15	

Building Downtime Summary (MetBUILD)

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ABERPORTH - January 2014

Issued on Monday 14 July 2014 at 10:49:17

Day	Air min temp (deg C)	Grass min temp (deg C)	Rainfall amount 09-09 (mm)	Snow depth (cm) at 09GMT	Mean wind speed for day (mph)	Maximum gust for day (mph)
01	4.8	2.9	8.4	-	23.0	56.4
02	5.4	3.1	7.2	-	19.6	46.0
03	4.0	2.1	14.0	-	26.5	62.1
04	3.7	1.5	1.4	-	13.8	33.4
05	2.0	-0.1	6.8	-	21.9	56.4
06	5.5	6.2	12.4	0	27.6	61.0
07	7.0	5.6	0.6	0	21.9	51.8
08	7.3	4.9	19.4	0	15.0	40.3
09	5.8	4.4	0.2	0	18.4	33.4
10	3.2	1.2	2.2	0	15.0	31.1
11	5.3	3.1	tr	-	12.7	28.8
12	1.6	0.0	3.6	-	24.2	49.5
13	2.5	0.7	11.0	0	15.0	36.8
14	1.1	-1.1	11.6	0	16.1	41.4
15	1.8	5.3	5.8	0	18.4	38.0
16	5.3	3.3	5.8	0	16.1	34.5
17	5.0	3.6	11.2	0	12.7	23.0
18	4.8	3.2	5.2	-	13.8	39.1
19	1.2	-0.8	3.4	-	12.7	26.5
20	2.0	0.0	1.8	0	6.9	17.3
21	1.6	-0.4	4.4	0	18.4	43.7
22	4.6	2.5	2.8	0	16.1	26.5
23	5.1	3.5	6.8	0	20.7	47.2
24	5.1	3.9	8.8	0	17.3	33.4
25	6.3	5.1	4.4	-	24.2	74.8
26	5.0	3.2	3.2	-	29.9	61.0
27	3.3	2.0	6.0	0	31.1	54.1
28	5.9	4.4	13.2	0	26.5	55.2
29	4.5	2.9	tr	0	11.5	33.4
30	2.7	0.5	0.4	0	9.2	20.7
31	0.1	-1.6	13.4	0	23.0	49.5
	No. of air frosts	No. of ground frosts	No. of days rain >=1mm	No. of days rain >= 10mm	No. of days snow lying	Mean wind speed (mph)
Mon-Fri Total	0	3	19	8	0	18.5
Long-term avg	4	7	10	1	1	15.9
Mon-Sat Total	0	3	22	8	0	18.2
Long-term avg	5	9	13	2	1	15.9

Historical Weather Data

Weather Observations

The Met Office holds an extensive archive of weather observations from thousands of different locations around the UK and globally. We hold original manuscripts dating back to 1860 and have digitised climate records from around 1960 for a wide variety of weather variables to meet your individual business needs.

These include the following:

- Precipitation
- Air temperature
- Grass temperature
- Concrete temperature
- Soil temperature (at a depth of 10cm, 30cm and 100cm)
- Humidity
- Sunshine hours
- Global radiation
- Snow depth
- Cloud cover
- Visibility
- Pressure
- Mean wind speed
- Mean wind direction
- Max gust wind speed
- Max gust corresponding wind direction

Data is available in hourly, daily, weekly, monthly or annual time-steps from our observing station network. We also have some data available in 1-minute frequencies.

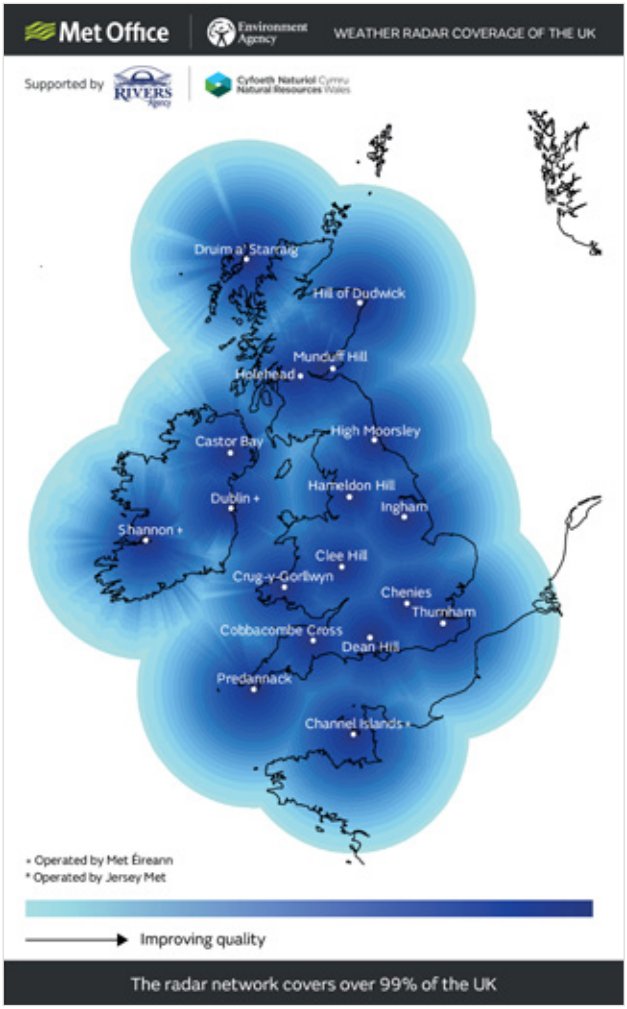
In addition, we are also able to offer monthly long-term average data (based on 30 years of historical data, currently 1981-2010). However, if you are looking to claim for downtime, we would recommend Downtime Summary Reports.

Historical Rainfall Radar Data

The UK and Ireland weather radar network composite operates 24/7/365 and is currently composed of a total of 18 weather radars, of which 15 are operated and maintained by the Met Office.

Each radar provides location-specific rainfall data out to 255 km, completing a series of scans about the vertical axis at different elevation angles every five minutes. Rainfall Radar Data can be extracted in five minute or hourly timesteps, and delivered in an Excel Spreadsheet.

For more information on Historical Observations and Radar Data availability please provide your locations, weather parameters, and time ranges of interest, to **construction@metoffice.gov.uk**



ClaimCheck Reports

The ClaimCheck report is a report which contains five consecutive hours of hourly data of five consecutive days of daily data to assist in claims for specific weather affected events, in which you may need to make an insurance claim.

Met Office

Daily Report for

Bude postcode sector EX23 0

Covering the period 07/12/2017 to 11/12/2017

	07	08	09	10	11
Temperature (Max)	13.5 Celsius	7.8 Celsius	7.8 Celsius	10.7 Celsius	7.8 Celsius
Temperature (Min)	5.9 Celsius	3.7 Celsius	3.1 Celsius	4.4 Celsius	1.6 Celsius
Wind Speed (Mean)	38 mph	39 mph	29 mph	51 mph	35 mph
Wind Gust (Max)	51 mph	46 mph	35 mph	69 mph	39 mph
Rainfall Rate (Max)	13.2 mm per hour	14.2 mm per hour	4.0 mm per hour	13.3 mm per hour	22.1 mm per hour
Total Rainfall (00-12)	12.1 mm	6.3 mm	0.8 mm	20.8 mm	3.1 mm
Total Rainfall (12-24)	2.7 mm	3.9 mm	3.9 mm	5.7 mm	5.3 mm
Lightning Risk	0.00	0.00	0.00	0.00	0.00

The ClaimCheck database is derived from a number of operational data sources including radar data, lightning detection systems and analysis fields generated as part of our operational forecast process. We then map these gridded data to UK postcode sectors to generate the ClaimCheck service. Please be advised that the data provides the most significant value in the postcode sector, which may vary from your precise location of interest, most notably in the cases of larger postcode sectors and those in hilly or mountainous terrain.

Issued 15/12/2017 09:50

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Met Office

Hourly version ClaimCheck weather summary for:

Location: Sandwell postcode sector B70 6
Date/Time: 01:00 06/05/2015 to 05:00 06/05/2015

Time	01:00	02:00	03:00	04:00	05:00
Temperature (Max)	8.4 Celsius	8.2 Celsius	7.9 Celsius	7.7 Celsius	7.0 Celsius
Temperature (Min)	8.1 Celsius	7.8 Celsius	7.6 Celsius	7.5 Celsius	6.8 Celsius
Wind Speed (Mean)	13 mph	10 mph	10 mph	11 mph	14 mph
Wind Gust (Max)	28 mph	24 mph	26 mph	28 mph	30 mph
Rainfall Rate (Max)	0.0 mm per hour	0.0 mm per hour	0.0 mm per hour	0.0 mm per hour	0.0 mm per hour
Total Rainfall	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm
Lightning Risk	0.00	0.00	0.00	0.00	0.00

The ClaimCheck database is derived from a number of operational data sources including radar data, lightning detection systems and analysis fields generated as part of our operational forecast process. We then map these gridded data to UK postcode sectors to generate the ClaimCheck service. Please be advised that the data provides the most significant value in the postcode sector, which may vary from your precise location of interest, most notably in the cases of larger postcode sectors and those in hilly or mountainous terrain.

Issued 13/04/2017 15:28

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When would you use a ClaimCheck?

ClaimChecks are not designed for claims of downtime; they are used for looking back at specific times of interest where an event may have occurred. It has been designed to assess weather-related insurance claims with greater efficiency and confidence.

ClaimCheck only needs the postcode and date (and time if you have it) to provide all the relevant weather information needed to assess weather conditions.

Storm Analysis

If a specific storm has interrupted site operations considerably and you require more details on the events around it, a Storm Analysis Report can help provide a comprehensive analysis.

It provides an extensive breakdown of the storm as well as the most significant rainfall amounts. You also receive a return period which is the recurrence interval of time between events of a similar size. For example, if the storm has a return period of 31, you may expect such an event to occur once in every 31 years. This may also be expressed as a 1-in-31 year event, or an event which has a ~3% chance of occurring each year.

Storm Analysis

Met Office

Met Office FitzRoy Road Exeter EX1 3PB United Kingdom
Tel: 0870 900 0100 Fax: 0870 900 5050 www.metoffice.gov.uk

WRC LTD
F.A.O
Tel:
Email:

Ref: xxxxxxxxx

Full Report

Location	Grid Reference	Date	Event Start	Event End
xxxxxx	**xxxxx**	**12/06/2016**	**1600 GMT**	**1700 GMT**

Return Period of Most Significant Event (yrs)
125, ONE HUNDRED AND TWENTY FIVE YEARS *

Rainfall Type
Convective (Showers)~~/Dynamic (Frontal)~~

Rainfall Amount	
Data Source	mm
UK COMPOSITE RADAR	48.0

Most Significant Amount	
mm	Duration
38.9	1600 TO 1700 GMT 12/06/2016

Return Periods for Standard Durations	**(UK Composite Radar)**	
Amount (mm)	Duration	Years
18.7	15 mins	48 *
29.2	30 mins	97 *
39.7	60 mins	125 *

Confidence:	**HIGH**

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Event at: **xxxxxx**

Date of event: 12th June 2016

Rainfall Stations used in assessment.

Station	Distance (miles) & Direction		09/06/2016	10/06/2016	11/06/2016	12/06/2016	
MISERDEN PARK	6.8	S	0	0.8	2.8	25.8	
DOWDESWELL RSERVOIR NO 2	2.6	E	0	4.0	5.6	27.8	
EBWORTH	5.9	SSW	0	1.2	6.6	25.4	
UK COMPOSITE RADAR			0	3.7	1.9	48.0	

Rainfall measurements in mm
Table represents daily 24hr totals from 0900GMT on the date shown

Opinions and conclusions on likely significance of the event

A band of more organised showery rain pushed into Northern Ireland, Wales and the south-west of England.

In central and southern parts of England it remained mostly dry, with some cloud breaks. It was another muggy night, with minimum temperatures mostly in double figures Celsius.

Through the morning, the band of rain across the west continued to move eastwards, affecting Northern Ireland, the Midlands, and south-east England by midday.

Through the afternoon, the rain continued to break up, but as some sunny spells developed, this led to some heavy, thundery and slow-moving showers. By the evening, the focus of the heavy showers were to the north of London.

In the sunnier parts of England and Wales, it was warm and muggy.

Through the evening, thunderstorms continued at first, but towards midnight, the heaviest of the showers tended to ease into light rain. Elsewhere, much of the country stayed cloudy with rain, low cloud, hill and sea fog.

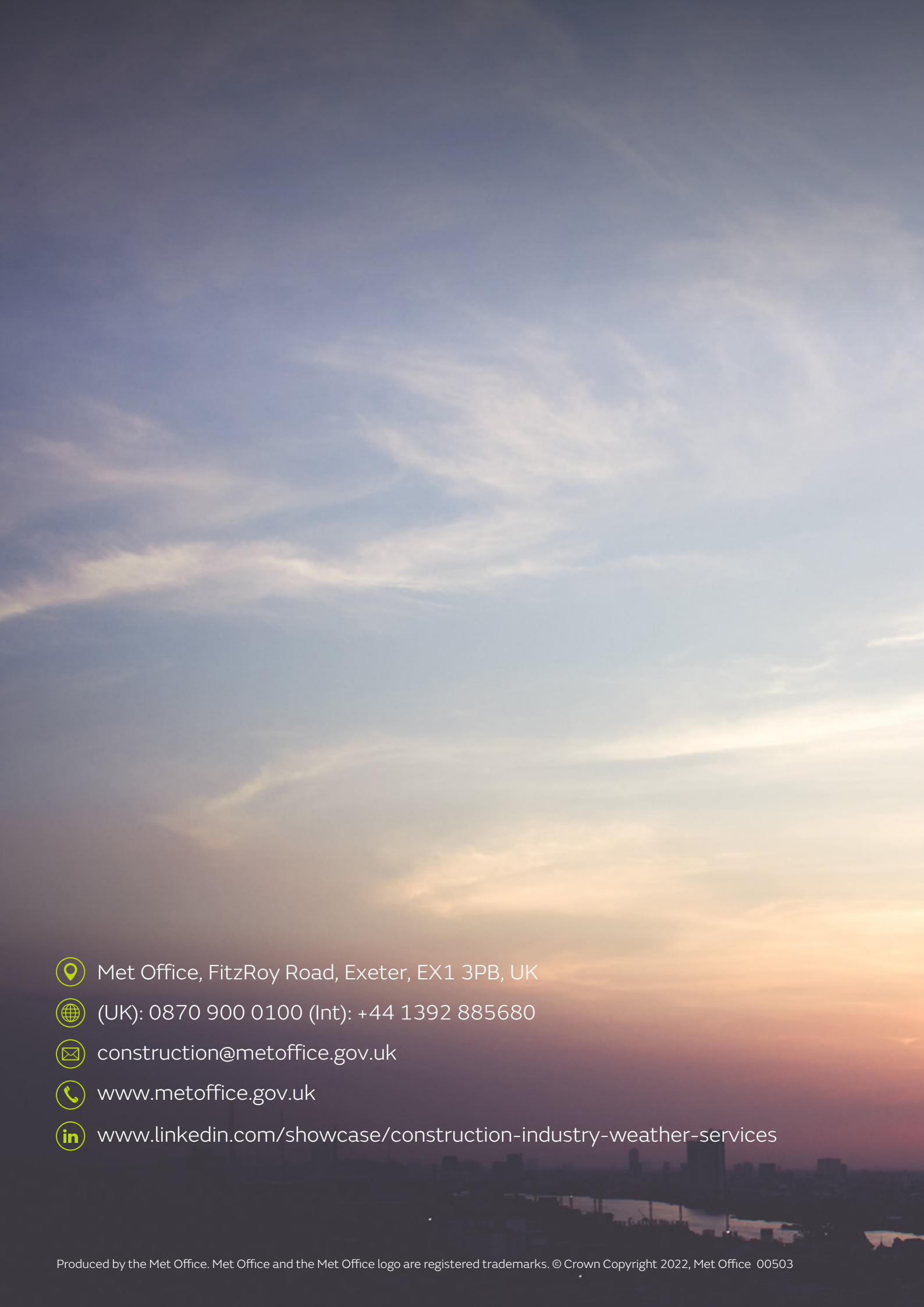
The nearest rainfall stations to the site were Miserden Park with 25.8mm, Dowdeswell Reservoir No2 with 27.8mm and Ebworth with 25.4mm.

Data from the radar showed an intense burst of rainfall between 1600 to 1700 on 12/06/2016

To provide guidance on the rainfall rate at the location – Leckhampton, on 12th June 2016, return periods were calculated from the UK Composite Radar data. The highest return period for this data was **125 years*.**

Prepared by	Date
xxxxx	12/07/2017

It is not always the case that the nearest available data site is the most representative of the incident site.
*The return period assigned to this radar rainfall value is calculated in accordance with the method described in the Flood Estimation Handbook (FEH). The FEH method used to determine return periods is based on analysis of rain gauge data only. Hence, this return period estimate is for guidance only.



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