A particular challenge for the construction industry is ensuring that the weather information contractors incorporate into planning and post-project phases reflects as closely as possible the actual conditions expected or experienced onsite. Virtual observations provide location-specific weather and climate reports.

Weather information is usually provided by observation stations located throughout the UK (of which there are 100 Met Office and NEC report producing ones). We have developed a system of virtual observations which means this weather information can now come from over 3,600 UK locations.

Weather observation stations gather weather data in a variety of ways. Most of the land surface weather observation stations in our UK network are long-established. They provide automatic, frequent and accurate readings for weather elements, such as rainfall, and temperature. Virtual observations can be created in a number of ways. It is possible to use the data from land surface observation stations and interpolate it into a gridded dataset of UK weather.

The use of sophisticated statistical and modelling techniques to take into account topography, exposure, altitude and any coastal effects can be used to ensure accurate representation at fine resolution. Alternatively virtual observations can be created using a wider combination of data sources, including weather radar, satellite images, radiosonde and observations from planes and ships. These are assimilated and interpolated to provide a detailed view of the current state of the atmosphere which can be used to generate observations for any location.

This methodology was chosen as the required underlying data can be produced routinely and is available immediately at the end of the month, rather than some time later.

**USING VIRTUAL OBSERVATIONS**

Virtual observations can be used in the same way as station based observations, and can also be used to address issues that we sometimes associate with station based observations. For example, they are typically closer to the contractor’s build site, and datasets are always complete with no missing values. To ensure these datasets are compatible, robust and rigorous testing has been applied. A systematic verification process has ensured that these new reports offer data comparable to actual station recorded data. While it is not possible to say that they are always 100 per cent correct, it is clear that they can provide a more representative view for sites that are not close to physical observation sites.

It is possible to use these methods to produce key information for both the planning stages of a project, and the consideration of any compensation events.

**LOCATION BASED REPORTS**

Our Location Based Reports provide more flexibility to contractors, as the previous system sometimes left them finding reports were not representative of actual onsite weather conditions. In addition where the station based reports have just temperature, rain and snow information, the new reports summarise up to 16 different weather elements, 10 of these including LTAs and 1-in-10 year values. The system has been rigorously tested over a year to verify its robustness.

**CALCULATING LTA’S**

We use the first method to produce 1-in-10 year values and Long Term Averages (LTAs), based on a 1 km grid. These statistics are less sensitive to changes in the data collection frequency or methodology — something that often occurs in longer-term historic data sets.

Both are available in planning average reports. For monthly downtime summary reports, we have used the latter method, incorporating a wider range of data sources.
This article is part of a series of Met Office/NEC articles designed to highlight weather impacts on the construction industry and how contractors can take the impacts into account during projects.

Systems based on physical weather observations and virtual observations are both relevant to the construction industry. Virtual observations provide a greater density of coverage of the UK as well as weather information that can more accurately reflect onsite conditions for locations that may be a long distance from an observation station or in an area with a different weather profile due to topography and orography.

Weather station observations remain relevant also as they provide accurate weather information for those sites whose location is either nearby or subject to the same general weather conditions.

The two types of report available are:

**Location based monthly planning averages**
Planning averages tell you the average weather conditions expected on site for each month. This report is an enhancement of the station based product. It offers LTAs and 1-in-10 year values for 11 weather elements for each month of the year. Available for over 3,600 locations.

**Location based monthly downtime summaries**
Monthly downtime summaries tell you the weather experienced and recorded in a particular month compared against the LTAs and 1-in-10 year values.

This product is an enhancement of the station based product, now reporting on 16 weather parameters. It offers LTAs and 1-in-10 year values for 10 of these weather elements. Available for over 3,600 locations. There is a colour coded summary page in the report to make it easy to see if you have cause for a compensation event (for example, if the monthly values exceed the 1-in-10 values).