

Moderate – High Particulate Matter (PM₁₀ and PM_{2.5}) Episode 5th and 6th November 2019 – Scotland

On the 5th and 6th November 2019 provisional air quality monitoring data from sites throughout the Glasgow, North Lanarkshire, South Lanarkshire, Paisley and East Dunbartonshire region measured elevated concentrations of particulate matter (PM₁₀ and PM_{2.5}).

Concentrations measured were generally in the air pollution banding Moderate (Index 4 – 6) however high (index 7 - 9) were measured at Glasgow Byres road and North Lanarkshire Kirkshaws. Figure 1 illustrates the elevated concentrations as seen on the Scottish Air Quality Website (www.scottishairquality.scot). Figure 2 illustrates the boundaries between index points for PM₁₀ and PM_{2.5}. Further information on air pollution banding and the health impacts associated can be found on the Scottish Air Quality Website.

The episode is a result of a combination of factors which include: weather conditions, air masses affecting the country, and local Bonfire & Firework displays. The Greater Glasgow region sits within the Clyde valley, the topography of the region may also have contributed to the poor dispersion conditions.

Weather conditions over the 5th and 6th November, and leading up to this time, was dominated by a high-pressure system. Air masses from the north/north-east (illustrated in Figure 3) normally bring in clean air however over this period there was recirculation over the Greater Glasgow area. The high-pressure system created cold, dry and static conditions with pockets of fog experienced in many regions.

There were very low wind speeds recorded in the Greater Glasgow region over this period which created poor dispersion conditions. These poor pollution dispersion conditions caused pollutant emissions including particulate matter to re-circulate and stagnate close to their source. The combination of local firework displays, and poor dispersion conditions caused pollution levels to increase over a relatively short period of time.

Figure 1: Scottish Air Pollution website 6th November 2019

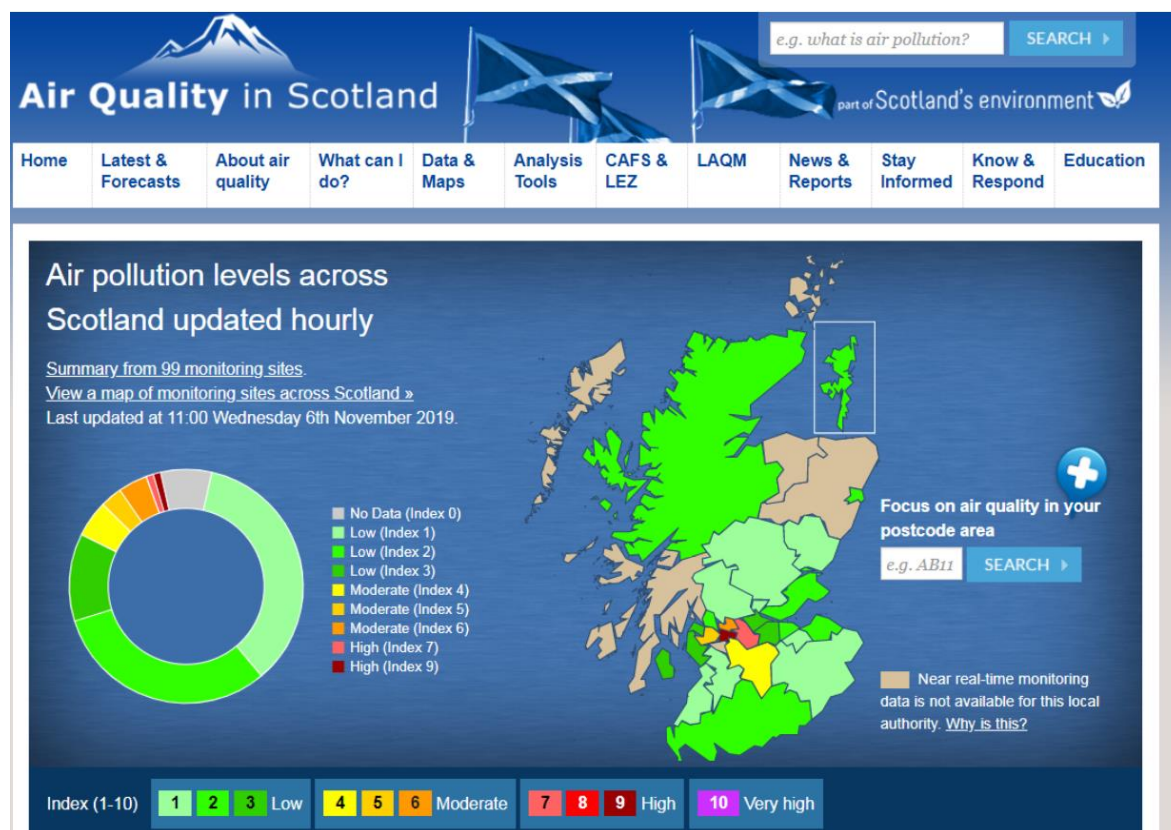


Figure 2: Daily Air Quality Index (DAQI) for PM₁₀ and PM_{2.5}

PM_{2.5} Particles

Based on the daily mean concentration for historical data, latest 24 hour running mean for the current day.

Index	1	2	3	4	5	6	7	8	9	10
Band	Low	Low	Low	Moderate	Moderate	Moderate	High	High	High	Very High
μgm^{-3}	0-11	12-23	24-35	36-41	42-47	48-53	54-58	59-64	65-70	71 or more

PM₁₀ Particles

Based on the daily mean concentration for historical data, latest 24 hour running mean for the current day.

Index	1	2	3	4	5	6	7	8	9	10
Band	Low	Low	Low	Moderate	Moderate	Moderate	High	High	High	Very High
μgm^{-3}	0-16	17-33	34-50	51-58	59-66	67-75	76-83	84-91	91-100	101 or more

These prevailing weather conditions affected the majority of Scotland, however, it was only in the Glasgow and North Lanarkshire region that concentrations of PM₁₀ and PM_{2.5} reached High and Very High pollution levels. This was most likely due to the combination of local firework displays, poor dispersion and local topography.

Figure 4 below plots PM₁₀ and PM_{2.5} concentrations across Scotland, it shows how levels become elevated over the 5th and 6th November period. The concentrations returned to normal during the evening of the 6th November. For more analysis or detailed information on individual sites please visit the Air Quality in Scotland website <http://www.scottishairquality.scot/>. The site has pollution plots, data selector and data analysis tools which will provide more information on areas of interest.

Figure 3: Air Mass back trajectories for 5th – 6th November 2019

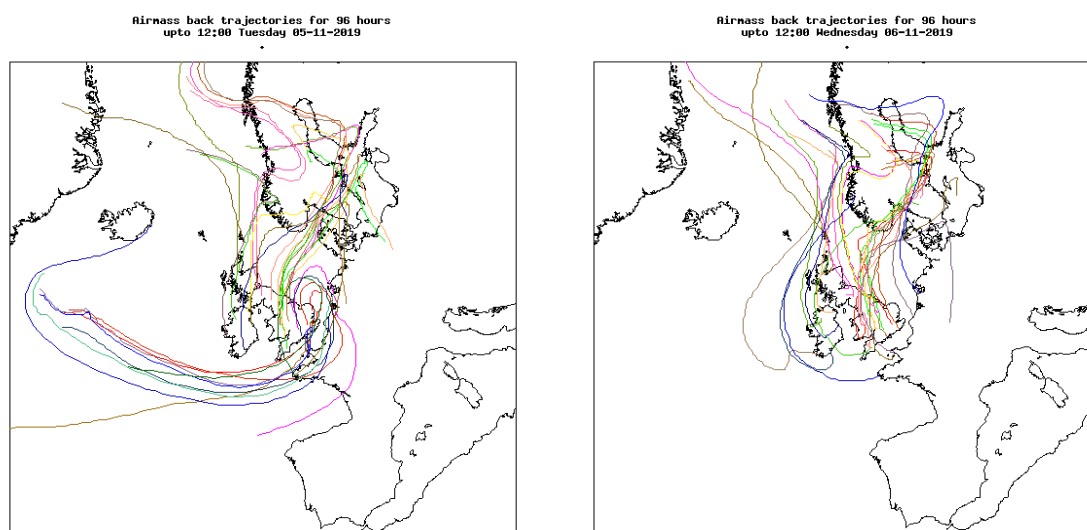


Figure 4: Plot of Elevated PM₁₀ and PM₂₅ concentrations across Scotland.

