

# Air quality at Heathrow Airport

Q4 2014

## Background

Heathrow Airport Ltd (HAL) has monitored air quality since 1993 at its site located near the northern runway (LHR2). It now monitors air quality at three other sites around the airport — Harlington, Longford (Green Gates) and Stanwell (Oaks Road). Fig. 4 shows the locations of these and other air quality monitoring sites within 2km of the Airport. The HAL-operated monitors were all replaced in 2013/14 with new equipment.

Large areas of London exceed the health-based air quality limit values set by the EU, due primarily to emissions from road traffic and from buildings. Every London borough has declared at least one Air Quality Management Area (AQMA).

Located on the western edge of London and close to two busy motorways, the Great Western mainline and local industries, Heathrow Airport is within an area of high air pollution. Of the two pollutants of concern — nitrogen dioxide (NO<sub>2</sub>) and particles (measured as PM<sub>10</sub> and PM<sub>2.5</sub>) — NO<sub>2</sub> has the greatest extent of exceedance and large areas of London (and the rest of the UK) exceed the annual average EU limit value, due mainly to emissions from road traffic and from buildings. This pattern is repeated locally, where the activities that take place at Heathrow Airport are just one source of air emissions in the local area.

Air quality management is a key priority for HAL and we will continue to work in partnership with our key stakeholders — especially local authorities and national government - to reduce emissions from all sources in the area in order to meet the EU limit values. The main pollutants of concern at Heathrow are measured at all these sites — oxides of nitrogen (NO<sub>x</sub> — made up of nitrogen dioxide and nitrous oxide) and particles (measured as PM<sub>10</sub> and PM<sub>2.5</sub>). In addition, ozone (O<sub>3</sub>) is measured at Harlington.

## Headlines

Key information for this quarter is:

- Annual average NO<sub>2</sub> remained below the EU limit values at most monitoring sites for 2014, including Oxford Ave for the second year running (see Fig. 1 & 2).
- Monitoring data for Heathrow's four monitoring sites are still provisional; ratified data will be available in the following report.
- There were 0 breaches of the daily average PM<sub>10</sub> limit value at LHR2 in Q4 and a total of 7 in 2014 (see Fig 3). 35 exceedances are allowed per year before the limit value is breached.
- The number of aircraft movements made by more modern aircraft (CAEP4 and newer) in 2014 was just over 93%; the highest proportion recorded to date (see Fig. 5).
- Figures and graphs in this summary have been updated to incorporate Heathrow Air Quality Working Group requests for clarity and better temporal resolution.

## Measured concentrations

Nitrogen dioxide (NO<sub>2</sub>) monitoring results  
(EU annual average limit value of 40µg/m<sup>3</sup> to be met by 2010)

Fig. 1. NO<sub>2</sub> annual average concentrations measured at sites within 2km of Heathrow Airport since 1995

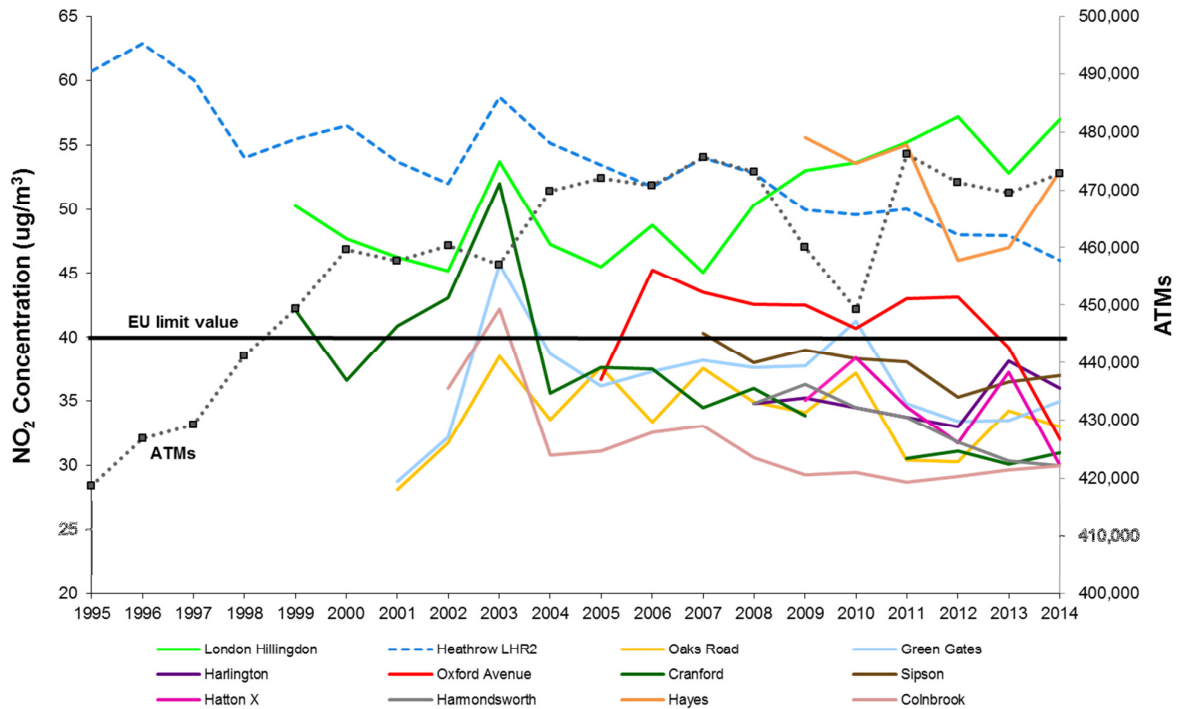


Fig. 1 presents annual average NO<sub>2</sub> measurements at sites either on or close to the airport. Key information is:

- Oxford Avenue (red) is approximately 200m northeast of the airport boundary. Concentrations have generally exceeded the limit value since installation in 2005 but were 39µg/m<sup>3</sup> in 2013 – just below the EU limit value – although data capture at this site was below 90%. The annual concentration has continued to decrease to 32µg/m<sup>3</sup> in 2014; however, the data capture rate remained below 90% and data for the full year have not yet been ratified. Airport emissions (including airport-related road traffic) are approximately 22.5% of measured NO<sub>x</sub> concentrations at this site, 25% is from non-airport related traffic and 52% is from background sources.
- Two sites exceeded the limit value within 2 km of Heathrow:
  - London Hillingdon (light green) is mainly affected by emissions from traffic on the M4. Concentrations have increased in 2014 to approximately 57µg/m<sup>3</sup> (53µg/m<sup>3</sup> in 2013). Airport emissions (including airport-related road traffic) are approximately 16% of measured NO<sub>x</sub> concentrations at this site. A further 42% is from non-airport traffic and 42% is from background sources.
  - Hayes (orange), located 1.9 km to the northeast of the airport, has seen an increase of 12.7% from 2013 to an annual average of 53µg/m<sup>3</sup> in 2014.

Emissions at Hayes are also dominated by road traffic. Emissions from Heathrow represent less than 6% of total NO<sub>x</sub> measured at this site.

- LHR2 (blue dotted line), located near the northern runway, has shown a 32% fall in concentrations since 1993, even though air transport movements (ATMs) have increased by over 11%. Annual average NO<sub>2</sub> was 46µg/m<sup>3</sup> in 2014, the lowest level measured since 1995. Airport emissions (including airport-related road traffic) are approximately 48% of measured NO<sub>x</sub> concentrations at this site. The EU limit values are not applicable at LHR2.

**Fig. 2. NO<sub>2</sub> running annual average concentrations at selected sites since 2010**

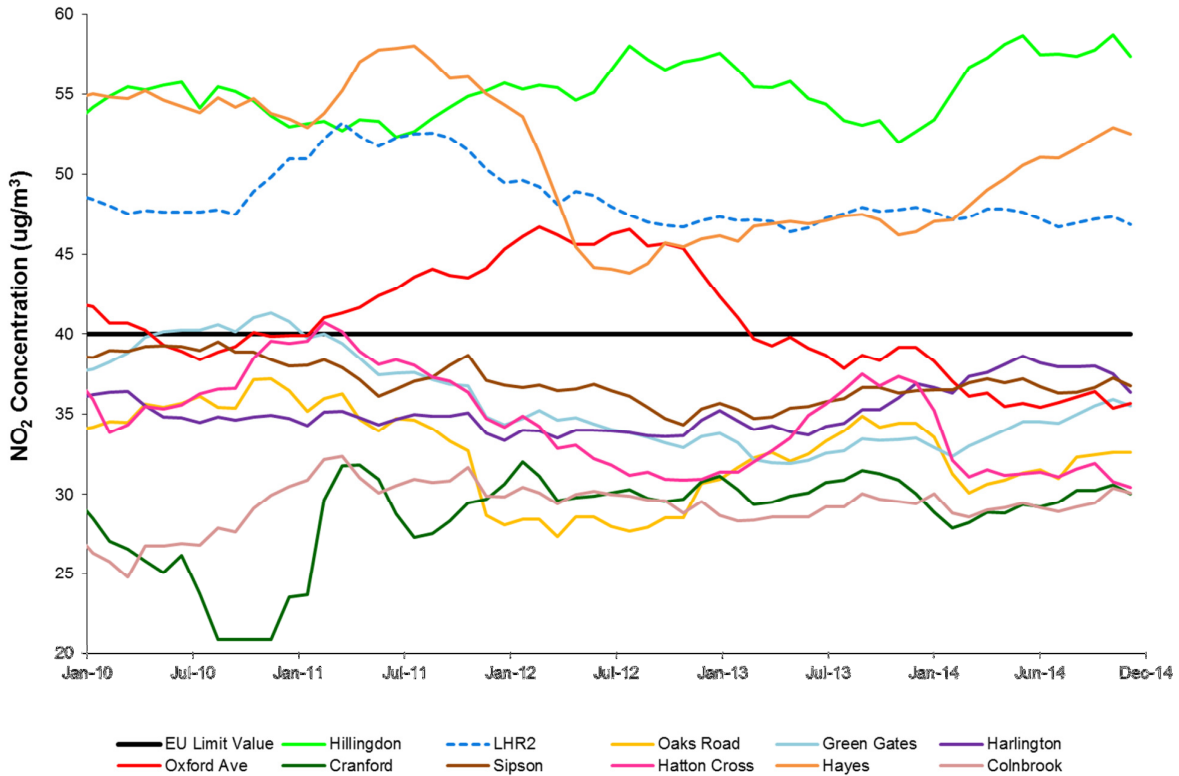


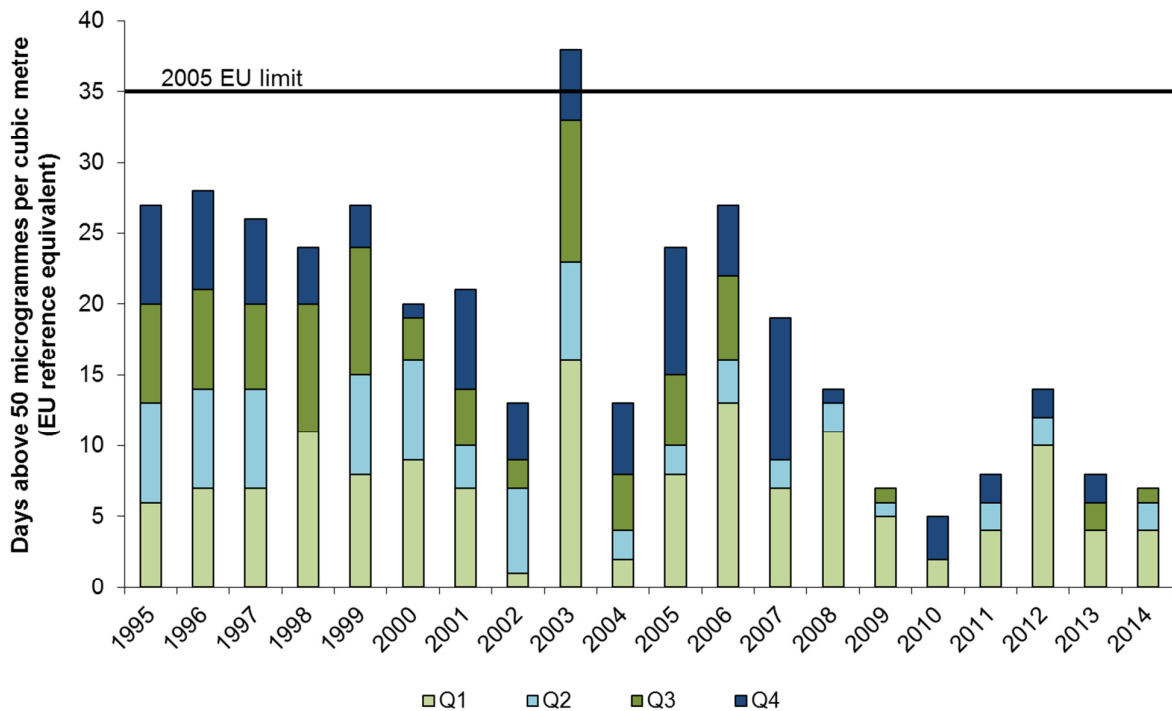
Fig. 2 shows the NO<sub>2</sub> monitoring data expressed as running annual means, which allows us to track changes throughout the year for informational purposes only. It should be noted that the running annual mean cannot be compared against the 2010 EU limit for regulatory compliance. This graphic has been updated from previous versions to show data from 2010 onwards, in order to provide better detail of trends in recent years.

**Particles (2005 PM<sub>10</sub> EU limit value of 50µg/m<sup>3</sup> [35 exceedances allowed]) (2020 PM<sub>2.5</sub> EU target of 25µg/m<sup>3</sup>)**

PM<sub>10</sub> is measured at all four of HAL’s monitoring sites and concentrations measured at LHR2 are generally the highest. The EU limit value for PM<sub>10</sub> is 50µg/m<sup>3</sup> averaged over 24 hours, not to be exceeded more than 35 times a calendar year. Results are presented in Fig. 3.

Eight exceedances of the 50 µg/m<sup>3</sup> 24-hour mean for PM<sub>10</sub> were recorded at LHR2 in 2013, and seven have occurred so far to Q3 2014. The EU limit value for PM<sub>10</sub> has been met at the LHR2 site since 2003, when unfavourable weather conditions produced 38 breaches at LHR2 and affected sites throughout the UK. All monitored sites remain well below the annual average EU limit value of 40µg/m<sup>3</sup> for PM<sub>10</sub>.

**Fig. 3. PM<sub>10</sub> at LHR2 since 1995 – Comparison with the 2005 EU limit value (number of days above 50µg/m<sup>3</sup>)**



### Locations of the air quality monitoring sites at Heathrow and their individual NO<sub>2</sub> monitoring history.

The locations of air quality monitoring sites local to the airport are shown in Fig. 4, which also shows the annual average NO<sub>2</sub> concentrations measured at each site since in 2014. Table 1 provides a summary of each station within 2km of Heathrow’s boundary as well as the type of source environment its measurements represent.

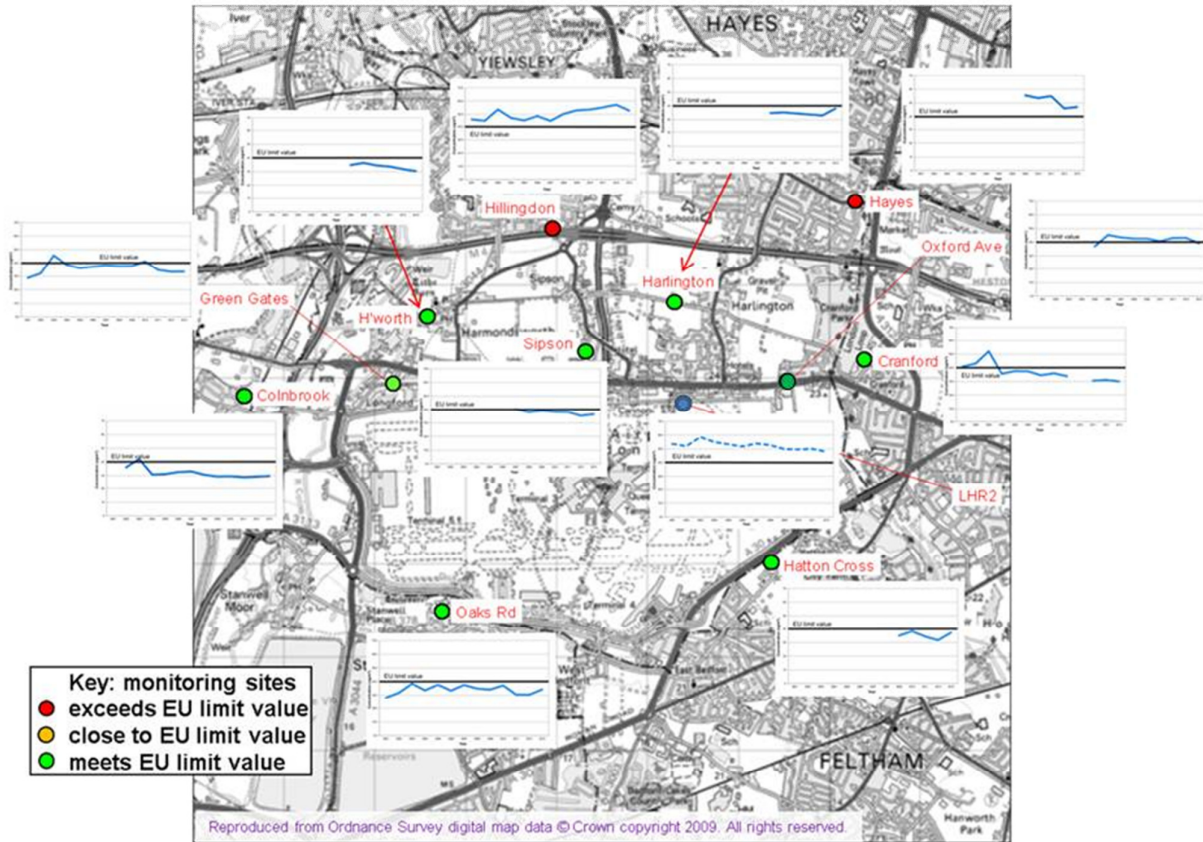
### CAEP value of air transport movements

Through its Committee on Aviation Environmental Protection (CAEP), the International Civil Aviation Organization (ICAO) sets new emissions standards for aircraft engines – including for NO<sub>x</sub>. Engine models which were certified on or after 1 January 2008 must meet the CAEP6 standard for NO<sub>x</sub>. CAEP8 is the latest standard and is required for engine models which were certified on or after 1 January 2014.

Fig. 5 shows the proportion air transport movements (ATMs) at Heathrow based on their relationship to the CAEP NO<sub>x</sub> emissions standards. The number of ATMs each year is presented below each bar as well as on the chart itself. The relative proportion of flights made by newer, cleaner aircraft (those defined as CAEP4 or better) through Q4 2014 rose

to its highest point ever; just over 93%. The trend is expected to continue as airlines proceed in replacing their older, higher emission aircraft and Heathrow's NO<sub>x</sub> emission landing charges encourage their use at our Airport.

**Fig. 4. Air quality monitoring sites and mean annual NO<sub>2</sub> in 2014**

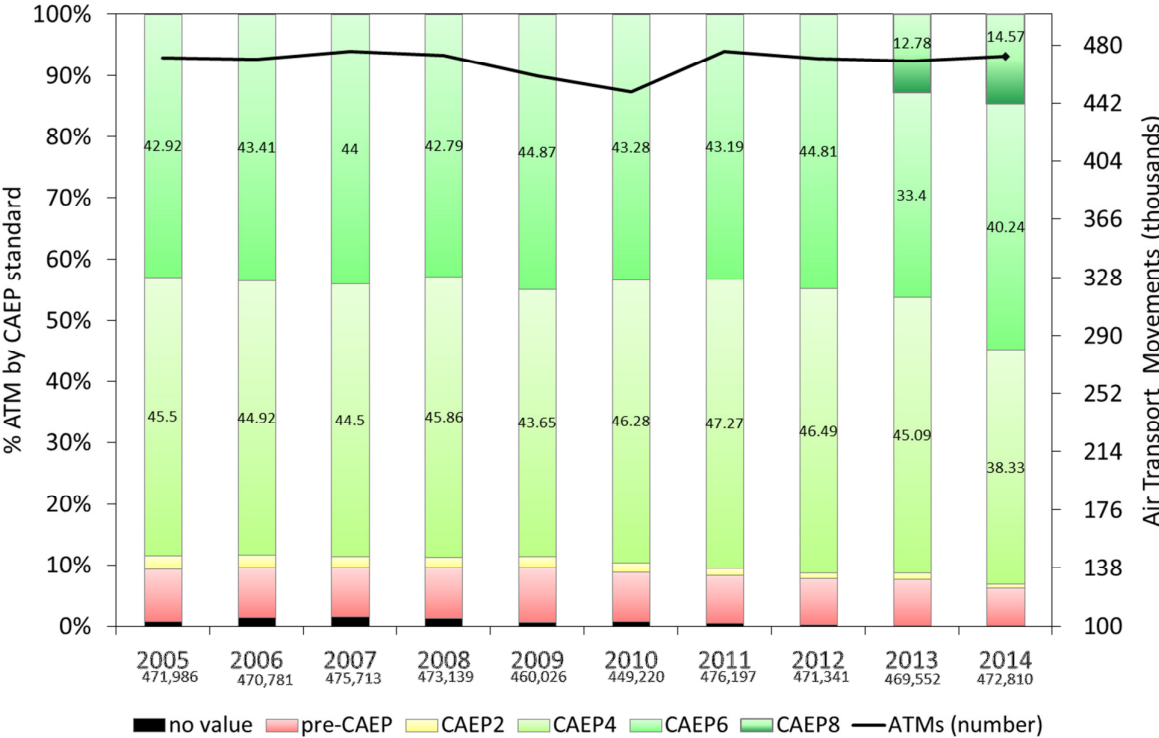


**Table 1. Summary of NO<sub>2</sub> monitoring sites**

Monitoring station	Owner	Source Type	2014 average NO <sub>2</sub> (µg/m <sup>3</sup> )
Heathrow LHR2	Heathrow Airport	Airport	46
Harlington	Heathrow Airport	Urban industrial	36
Green Gates	Heathrow Airport	Airport	35
Oaks Road	Heathrow Airport	Airport	33
Hillingdon	Defra	Urban background	57
Hayes	Hillingdon	Roadside	53
Harmondsworth	Hillingdon	Urban background	30
Oxford Ave	Hillingdon	Urban centre	32
Sipson	Hillingdon	Urban background	37
Hatton Cross	Hounslow	Roadside	30
Cranford	Hounslow	Suburban	31

Colnbrook	Slough	Urban background	30
-----------	--------	------------------	----

**Fig. 5. CAEP compliance of ATMs since 2005**



\* Note: 2014 ATM data are provisional