

## **Air Quality Monitoring: Joint Report by RBBC and GAL for 2013.**

1. The following report presents the results from the 2013 air pollution monitoring program undertaken on, and in the vicinity of, Gatwick Airport.
2. Committee members are reminded that details of:
  - the legislation,
  - the rationale for the monitoring of certain pollutants,
  - and factors to bear in mind when examining the data e.g. the impact of the weather, and / or changes in the source of a pollutant, were covered in a separate report to the GP sub committee on 11<sup>th</sup> January 2007.

## **Off Airport Monitoring at Relevant Receptors on the Horley Gardens Estate. Annual Compliance Monitoring – Nitrogen Dioxide.**

3. The annual average concentration of nitrogen dioxide across the Horley Gardens Estate in 2013 is shown in Figure 1.
4. Concentrations were below the UK annual average objective of  $40 \mu\text{g m}^{-3}$  (micrograms per cubic metre), and so the UK air quality standards were met within the Horley air quality management area (AQMA) in 2013.
5. The highest concentration measured on the Horley Gardens Estate was  $28 \mu\text{g m}^{-3}$  at two sites, both of which are towards the southern end of The Crescent and include the 'worst case' receptor at RB59. This compares to the highest concentration in 2012 of  $33 \mu\text{g m}^{-3}$  and  $29 \mu\text{g m}^{-3}$  in 2011.
6. Local sources of pollution on the estate remained unchanged throughout 2013, and so the results are comparable to previous years monitoring work.
7. Data capture from the real time monitoring site RG1 was 99.5 %, and from site RG2 99.3 %, and so the data from these sites along with the diffusion tube data is valid for compliance monitoring purposes.
8. The results from 2013 are in line with the predicted distribution of nitrogen dioxide concentrations for the Horley Gardens Estate, with the highest concentrations found towards the southeast corner of the estate. Concentrations in 2013 were typically around  $4$  to  $5 \mu\text{g m}^{-3}$  lower than in 2012 at the 'worst' affected residential premises, although similar to those measured in 2011. Elsewhere on the estate concentrations declined by  $1$  to  $2 \mu\text{g m}^{-3}$ , in line with improvements seen elsewhere in the borough. Thus the improvement in air quality seen in the vicinity of the airport in 2013 reflects the natural year to year variation due to the weather and / or regional changes rather than a specific change related to the airport.
9. While no data was available this year for Charlwood and Hookwood similar air quality improvements are likely to have occurred, with the concentration of nitrogen dioxide falling at most by  $1$  to  $2 \mu\text{g m}^{-3}$ .
10. Passenger numbers and aircraft movements at Gatwick increased by 0.6 % and 1.4 % respectively in 2013 compared to 2012 (Appendix A). However while passenger numbers have recovered to pre-recession levels, aircraft movements still remain 6 % below the 2007 peak which reduces nitrogen dioxide concentrations<sup>1</sup> at the worst affected properties by  $1$  to  $2 \mu\text{g m}^{-3}$ . Traffic flows on the M23 spur grew by 1% during 2013 but remain 9 % below the 2006 peak.

<sup>1</sup> Netcen FAST modelling for GAL (2006). Modelling approach has since changed but the original model is still appropriate for indicative values.



### Annual Compliance Monitoring – PM<sub>10</sub>.

11. The PM<sub>10</sub> air quality standard was met on the Horley Gardens Estate in 2013, with an annual average concentration at RG1 of 20 µg m<sup>-3</sup> (VCM methodology), which was within the expected range of 18 to 23 µg m<sup>-3</sup>. Although concentrations in 2013 were slightly higher than in 2012 this increase reflects year to year changes due to the prevailing weather conditions rather than any increase in local sources of PM<sub>10</sub>.

### Trends in Pollutant Concentrations.

#### Nitrogen dioxide.

12. A three year rolling average concentration is used in the trend analysis work to help remove the year to year fluctuations in concentrations caused by the prevailing weather conditions. The data to date (Figure 2) shows that the long term downward trend in annual average nitrogen dioxide concentrations at the RG1 site has continued in 2013.
13. At the 'worst case' receptors closer to the airport (RG2, RB59) the downward trend has resumed after the slight pause in 2012. The cause of the general convergence of the RB59 and the RG2 concentrations in recent years is unknown, although it is worth noting that computer modelling has consistently suggested a difference of no more than 1 to 2 µg m<sup>-3</sup> between these two sites as has been the case in practice in recent years.
14. The overall downward trend at RG1 and RG2/RB59 is as expected given that computer modelling indicates that non airport sources of nitrogen dioxide and airport related road traffic emissions are predicted to fall until 2015<sup>2</sup>, and to a lesser extent 2025<sup>3</sup>, driven mainly by improvements in road vehicle engine technology. In addition the significant falls in aircraft movements and traffic flows on the M23 spur at Gatwick since the 2007 peak will have led to further improvements in air quality especially at the RG2/RB59 sites.

#### PM<sub>10</sub>.

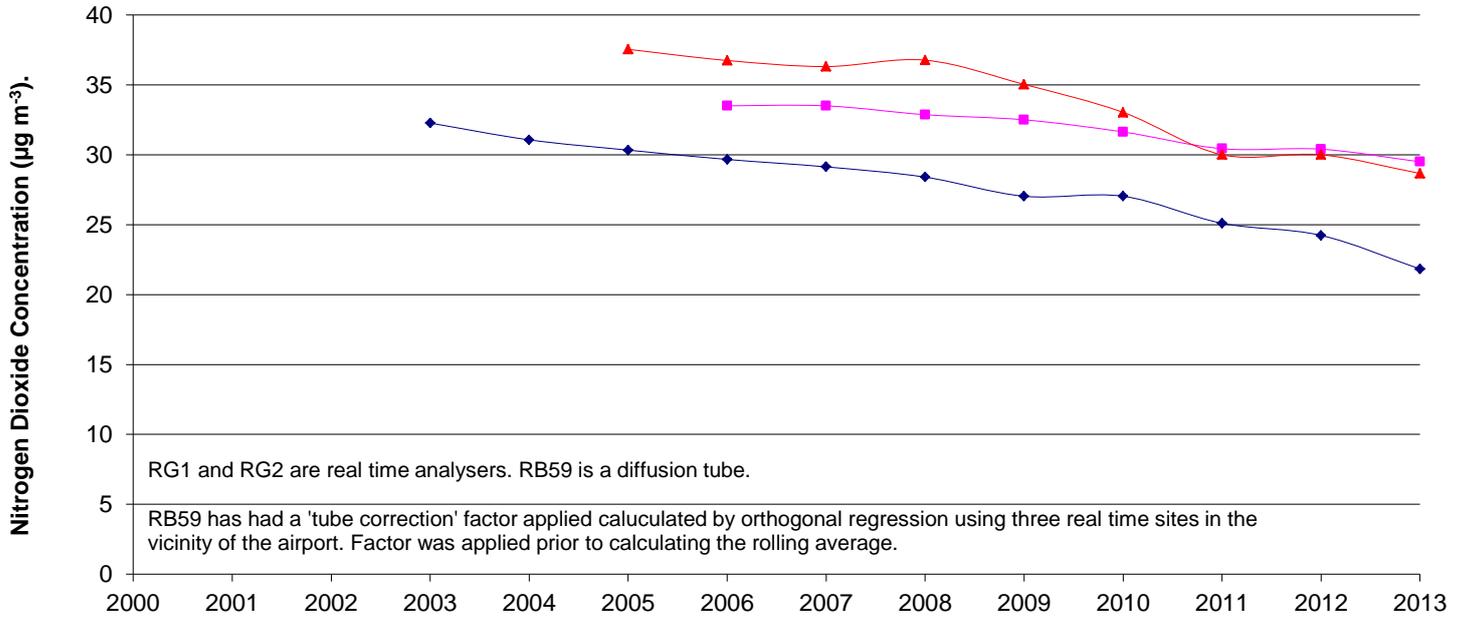
15. It is important to note that the airport is not a significant source of PM<sub>10</sub>, and computer modelling<sup>4</sup> consistently indicates that the airport is responsible for no more than 1 – 2 µg m<sup>-3</sup> of the total PM<sub>10</sub> concentration at the worst affected properties on the Horley Gardens Estate.
16. The main purpose of monitoring PM<sub>10</sub> on the Horley Gardens Estate is to examine trends in the PM<sub>10</sub> concentration, as the UK Government is aiming to reduce people's exposure to particulate matter in the longer term even where the air quality standards are met.
17. Using a three year rolling average to examine the trends in the data there is evidence of an overall downward trend from 2003 to 2010, with concentrations of 23.9 µg m<sup>-3</sup> in 2003 and 19.5 µg m<sup>-3</sup> in 2010 (Figure 3), although much of this improvement in non airport PM<sub>10</sub> to date has occurred between 2007 and 2010. The levelling off in the trend since 2010 (or slight rise using the volatile correction methodology) at present could still be an artefact of the elevated concentration measured in 2011 rather than an overall change in the long term trend.

<sup>2</sup> Gatwick Air Quality Assessment for 2010 (AEAT/ENV/R/2795/Issue 1 – June 2009)

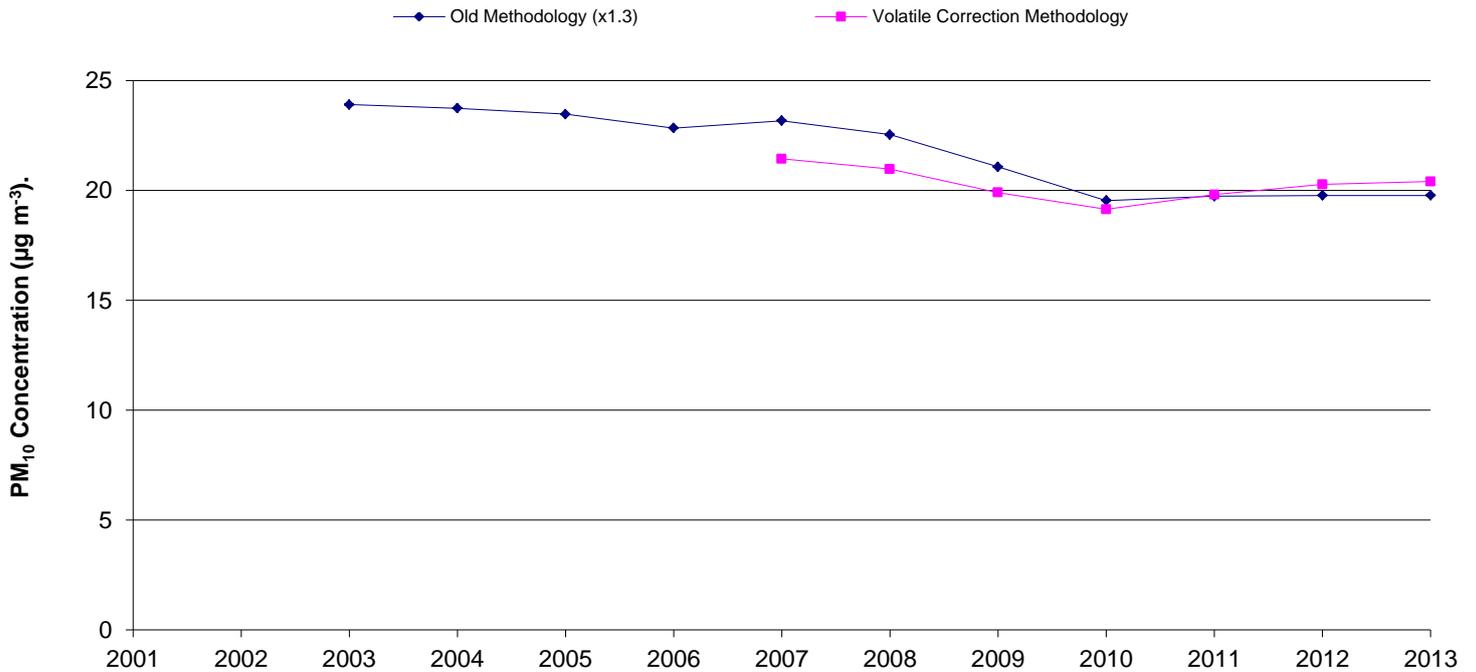
<sup>3</sup> Gatwick Airport Master Plan: Air Quality Assessment 2024/25 (AEAT/ENV/R/3139/Issue 1 – 18<sup>th</sup> May 2011)

<sup>4</sup> Gatwick Air Quality Assessment for 2010 (AEAT/ENV/R/2795/Issue 1 – June 2009)

**Figure 2: Three year Rolling Annual Average Nitrogen Dioxide Concentration at RG1, Michael Crescent Horley (Blue diamond), RG2, The Crescent Horley (Purple square), and RB59 (Red triangle).**



**Figure 3: Three Year Rolling Annual Average PM<sub>10</sub> Concentration at RG1, Michael Crescent, Horley.**



### On Airport Monitoring.

18. In the absence of relevant receptors<sup>5</sup> at the airport monitoring site, it is largely academic whether or not the air quality standards are breached. However the monitoring results from 2013 (Table 1) indicate that the standards were met at the LGW3 monitoring station for PM<sub>10</sub> and nitrogen dioxide.

	On Airport (LGW3)	Standard	Standard Met?
Annual Average nitrogen dioxide Concentration	32.0	40	Yes
Nitrogen Dioxide: No. of hours over 200 $\mu\text{g m}^{-3}$	0	18	Yes
Annual Average PM <sub>10</sub> Concentration (Volatile Correction Method)	23.8 (22.9)	40	Yes
PM <sub>10</sub> : No. of days over 50 $\mu\text{g m}^{-3}$ (Volatile Correction Method)	7 (11)	35	Yes
All concentrations are in $\mu\text{g m}^{-3}$ . Data Capture: Nitrogen Dioxide 94.7 %, PM <sub>10</sub> 98.9 %.			

**Table 1: Nitrogen Dioxide and PM<sub>10</sub> Concentrations on Airport in 2013.**

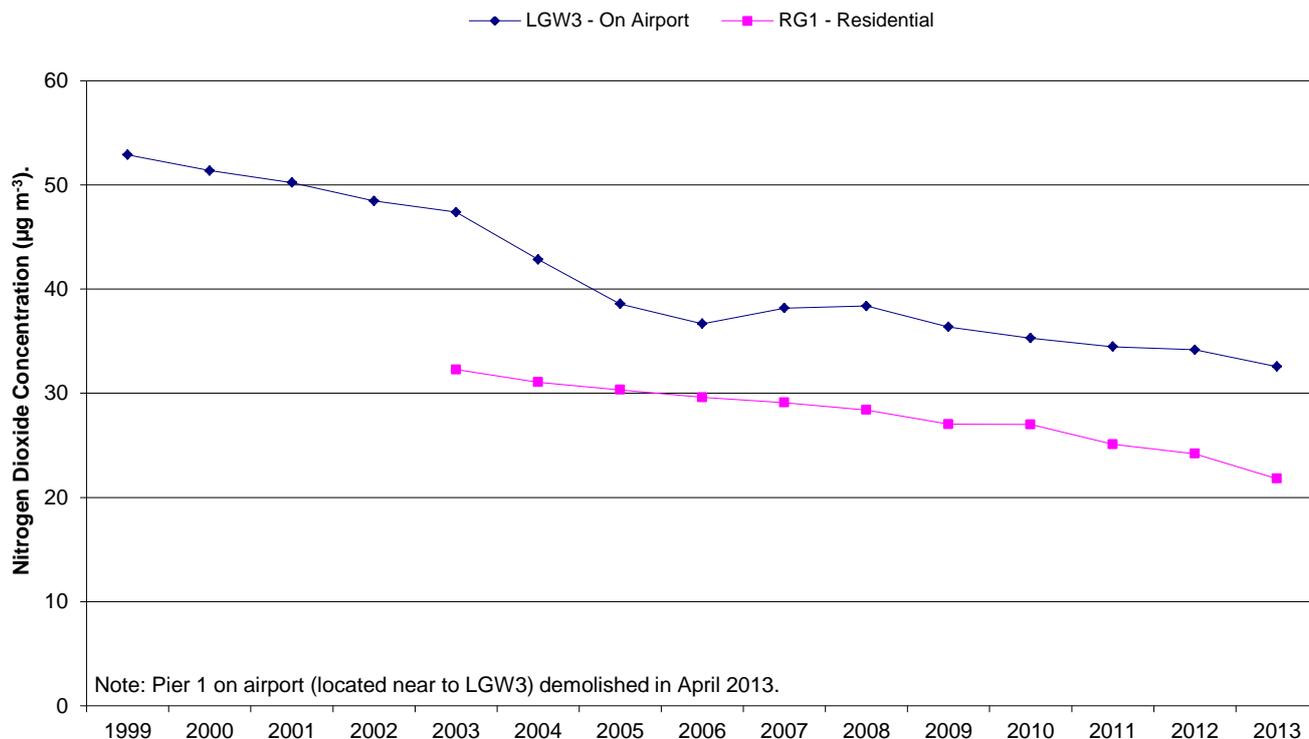
19. It should be pointed out that while the LGW3 monitor is of limited use for compliance monitoring, it is of particular use for verifying the computer modelling work used to make forward predictions about air quality at the airport.
20. During 2013 Pier 1 on the airport was closed for redevelopment, which represents a major change in the airport sources of air pollution affecting this monitor. Thus the results for 2013 and subsequent years are not directly comparable to data pre 2013 when examining trends in on airport pollution.

### On Airport Pollutant Trends.

21. Bearing in mind the changes in the on airport sources of pollution Figure 4 shows the 3 year rolling average nitrogen dioxide concentration at the on airport monitor LGW3, and the data from the residential monitor RG1 for comparison. The graph shows a steady improvement in nitrogen dioxide concentrations at the LGW3 monitor, with a significant improvement from 2003 onwards, followed by a subsequent increase in 2007 and 2008, while concentrations from 2009 to date continue to follow the long term downward trend.
22. The sudden fall in the annual average nitrogen dioxide concentrations in 2004 and 2005 (Table 2), which is reflected in the 3 year rolling average data (Figure 4), was noted but unexplained in the 2005 monitoring report (GP sub committee January 2007). Subsequent work indicated that the falls in 2004 and 2005 were more likely to have been due to the change in contractor servicing the equipment in 2003, than 'real' improvements in air quality on airport (GP sub committee June 2007), and this appeared to be confirmed by a rise in concentrations in 2006 when the original servicing agent was reappointed.
23. Annual mean nitrogen dioxide concentrations at LGW3 decreased by 1.4  $\mu\text{g m}^{-3}$  in 2013 although the on airport decrease was comparable to that seen elsewhere in Reigate and Banstead, as with the increase of 1.1  $\mu\text{g m}^{-3}$  in 2012, and so reflects a regional decrease in pollution driven by the weather and / or regional sources rather than a decrease due to activities on the airport. Thus while the redevelopment of Pier 1 has the potential to affect the monitoring data, the size of the impact at present on nitrogen dioxide concentrations is less than the year to year variation due to weather / regional effects.

<sup>5</sup> 'Relevant receptors' were discussed in the outline air quality paper presented to the GP sub committee in January 2007. However, for the purposes of this of this report relevant exposure can be taken as residential housing, or in the case of the 1 hour nitrogen dioxide objective where a member of the public might be present for 1 hour or more.

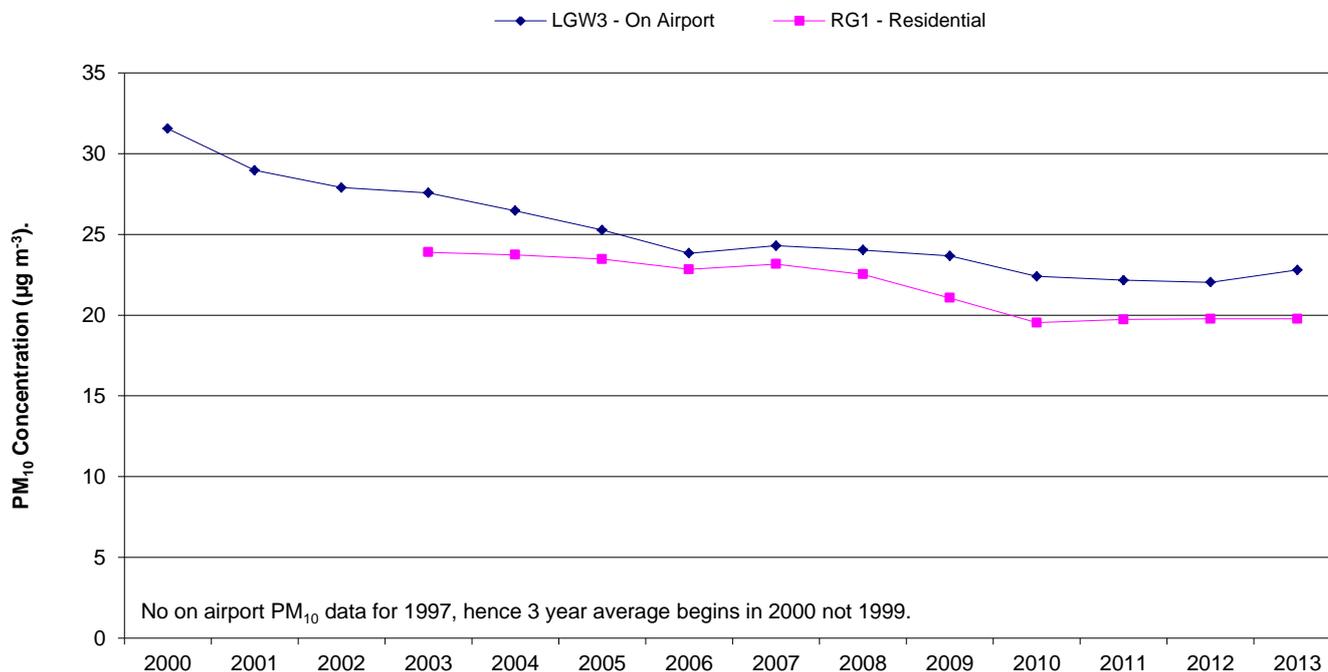
**Figure 4: Three Year Rolling Annual Average Nitrogen Dioxide Concentration at LGW3, Gatwick Airport.**



**Table 2: Annual and Three Year Annual Average Nitrogen Dioxide Concentrations (µg m<sup>-3</sup>).**

LGW3	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Annual Average	53.8	52.6	52.3	49.2	49.1	47.0	46.0	35.5	34.2	40.3	40.0	34.8	34.3	36.8	32.3	33.4	32.0
Data Capture	94.9	89.2	93.3	93.4	93.5	96.1	94.0	95.4	96.7	96.3	94.2	96.8	93.7	99.2	96.4	94.7	99.2
Hours Over 200 µg m <sup>-3</sup>	2	0	1	1	0	0	2	0	0	0	1	0	0	0	0	0	0
3 Year Rolling Average	LGW3		52.9	51.4	50.2	48.5	47.4	42.9	38.6	36.7	38.2	38.4	36.4	35.3	34.5	34.2	32.6
3 Year Rolling Average	RG1					32.3	31.1	30.3	29.6	29.1	28.4	27.0	27.0	25.1	24.2	21.8	

**Figure 5: Three Year Rolling Annual Average PM<sub>10</sub> Concentration at LGW3, Gatwick Airport.**



24. Figure 5 shows the three year rolling annual average PM<sub>10</sub> concentrations at the airport monitor, and PM<sub>10</sub> data from the residential monitor for comparison. The graph shows a steady improvement in PM<sub>10</sub> concentrations on airport until 2006, at which point concentrations remained largely static for a few years before resuming a downward trend. In 2013 PM<sub>10</sub> concentrations have increased slightly on airport, but given the redevelopment of Pier 1 this increase may well be a 'one off' event.

### Benzene Monitoring Data.

25. The concentration of benzene is measured at one residential site (RB11) on the Horley Gardens Estate and on airport at LGW3.
26. As expected measurements met the air quality standard in 2013 (Table 3), and were either unchanged (residential site) or slightly higher (on airport) than those measured in 2012. Due to the nature of the measurement technique it is difficult to compare values over the long term, but it is worth noting that residential benzene concentrations fell year on year from 2007 to 2012 before levelling off in 2013.

	Concentration ( $\mu\text{g m}^{-3}$ )	Standard	Standard Met?
Annual Average Benzene Concentration: Residential	1.0	5	Yes
Annual Average Benzene Concentration: On Airport	0.7	5	Yes

**Table 3: Annual Average Benzene Concentrations on the Horley Gardens Estate at RB11 and Gatwick Airport (LGW3) in 2013 (Non pumped BTEX Tubes).**

### Additional Monitoring Data.

#### Ozone.

27. Ozone monitoring began to the SW of the airport in 2005 at the RG3 site in Poles Lane Crawley. The aim of this site is to monitor long term trends in ozone concentrations in the vicinity of the airport.
28. Although the airport is not responsible for local ozone pollution, ozone plays an important role in the formation of nitrogen dioxide, which is the main pollutant of concern in the vicinity of the airport. Therefore examining the long term ozone trend is important for understanding nitrogen dioxide concentrations in both the short and longer term.
29. At present there are seven years of data from the ozone monitor and based on a three year rolling average the overall trend to date is flat (data not shown).
30. Compared to the air quality standards ozone concentrations failed to meet the UK ozone objective for the 8<sup>th</sup> consecutive year, although the EU standard (which is less strict) was met in 2013 (Table 4).

	Number of exceedences.	Standard Met?	
		UK <sup>a</sup>	EU <sup>b</sup>
RG3: Poles Lane Crawley.	30/ 7 <sup>b</sup>	No	Yes
<b>Standards:</b>			
UK: Daily Max. of running 8 hour mean of 100 $\mu\text{g m}^{-3}$ .	10 max.	-	-
EU: Daily Max. of running 8 hour mean of 120 $\mu\text{g m}^{-3}$ (averaged over 3 years).	25 max.	-	-
<sup>a</sup> in 2013			
<sup>b</sup> The EU standard is averaged over 3 years i.e. 2011, 2012, and 2013.			

**Table 4: Number of exceedences of the Ozone standard in 2013.**

**Summary.**

## 31. In summary:

- i) The annual average air quality standard for nitrogen dioxide was met at relevant receptors in the vicinity of the airport during 2013 (Table 5), as were the air quality standards for other pollutants under the local authority air quality management regime (Table 5).
- ii) Ozone concentrations in the vicinity of the airport did not meet the UK air quality standard for the 8<sup>th</sup> consecutive year, although the airport is not responsible for local ozone pollution.
- iii) Trend analysis of the nitrogen dioxide concentrations at properties most at risk of breaching the air quality objective (RB59) shows that the previous downward trend has resumed after levelling off in 2012, while the long term downward trend at the 'background' site (RG1) continued. The long term decrease in pollution at the background site is most likely due to improvements in road vehicle emissions, while the more recent falls at the worst case receptor(s) reflect the significant falls in aircraft movements and road traffic between 2008 and 2010 together with the background improvements seen at RG1. The long term downward trend at the RG1 site is in line with predictions for non airport nitrogen dioxide pollution at Gatwick and across the southeast.
- iv) The concentration of nitrogen dioxide measured on airport in 2013 at LGW3 meets the UK air quality objective of 40  $\mu\text{g m}^{-3}$ . The concentrations of the other pollutants measured at LGW3 also met the relevant air quality standards.
- v) The three year rolling annual average trend analysis of the on airport nitrogen dioxide concentrations shows a decrease in concentrations between 2008 and 2013, with the concentrations in 2013 the lowest to date.
- vi) The average PM<sub>10</sub> concentration (VCM measurement) measured on airport in 2013 showed a slight increase compared to 2012, although this increase is unlikely to be related to an increase in airport activity as a similar increase was seen off airport.

	Measured value	Standard	Standard Met?
<b>Nitrogen Dioxide:</b>			
Highest measured annual average residential concentration.	28.5	40	Yes
Annual Average nitrogen dioxide concentration Airport monitor.	32.0	40	Yes
<b>PM<sub>10</sub>:</b>			
Annual Average PM <sub>10</sub> Concentration: Residential Monitor. (VCM value)	18.7 (20.1)	40	Yes
PM <sub>10</sub> : No. of days over 50 $\mu\text{g m}^{-3}$ : Residential Monitor. (VCM value)	1 (2)	35	Yes
Annual Average PM <sub>10</sub> Concentration: Airport Monitor. (VCM value)	23.8 (22.9)	40	Yes
PM <sub>10</sub> : No. of days over 50 $\mu\text{g m}^{-3}$ : Airport Monitor. (VCM value)	7 (11)	35	Yes
<b>Benzene:</b>			
Residential Benzene Monitor (Site RB 11).	1.0	5	Yes
<b>Ozone:</b>			
RG3 Monitor to SW of Airport (Number of exceedences).	30	10	No
All concentrations are in $\mu\text{g m}^{-3}$ .			

**Table 5: Summary of Air Quality in the Vicinity of Gatwick Airport in 2013.**

Figure A.1: Passenger and Aircraft Movement Trends at Gatwick Airport.

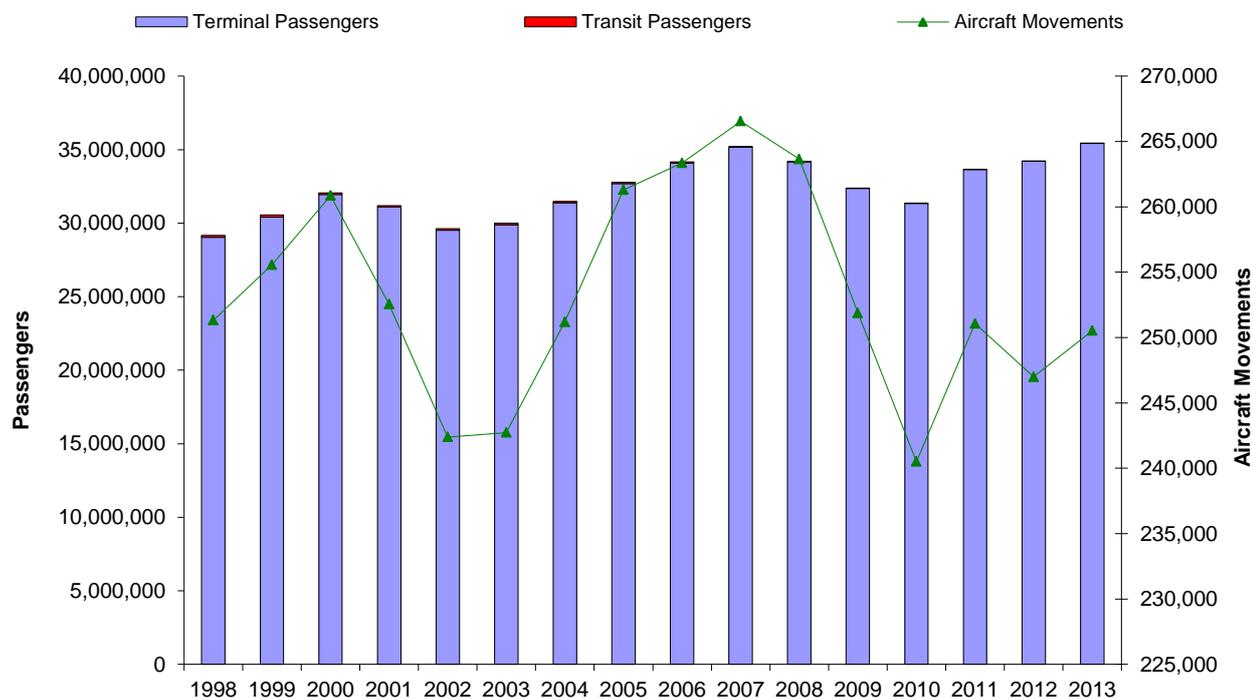


Table A.1: Annual Passenger Numbers and Aircraft Movements at Gatwick Airport.

	Number of Passengers			No. of Aircraft Movements
	Terminal	Transit	Total	
1998	29,032,838	140,292	29,173,130	251,321
1999	30,409,860	153,761	30,563,621	255,570
2000	31,947,524	119,601	32,067,125	260,859
2001	31,096,563	85,207	31,181,770	252,543
2002	29,517,894	109,515	29,627,409	242,379
2003	29,893,288	111,974	30,005,262	242,731
2004	31,391,352	75,418	31,466,770	251,195
2005	32,693,005	82,690	32,775,695	261,292
2006	34,080,345	83,234	34,163,579	263,363
2007	35,165,404	50,709	35,216,113	266,550
2008	34,162,014	43,873	34,205,887	263,653
2009	32,360,773	31,747	32,392,520	251,879
2010	31,342,263	33,027	31,375,290	240,500
2011	33,643,989	30,275	33,674,264	251,067
2012	34,218,668	17,314	34,235,982	246,987
2013	35,428,548	15,658	35,444,206	250,520

Data from Civil Aviation Authority. [www.caa.co.uk/default.aspx?catid=80&pagetype=90](http://www.caa.co.uk/default.aspx?catid=80&pagetype=90)

## Appendix B: Summary of Annual Monitoring Results 1999 to 2013.

Nitrogen Dioxide																
Site	Parameter	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
RG1	Ann. Average ( $\mu\text{g m}^{-3}$ )	-	-	34.1	31.3	31.4	30.5	29.1	29.4	28.9	26.9	25.3	28.9	21.1	22.7	21.7
RG2	Ann. Average ( $\mu\text{g m}^{-3}$ )	-	-	-	-	-	33.8	34.3	32.4	33.8	32.4	31.3	31.2	28.8	31.2	28.5
RG3	Ann. Average ( $\mu\text{g m}^{-3}$ )	-	-	-	-	-	-	-	19.4	20.9	18.9	18.2	20.5	17.8	23.2	19.3
LGW3	Ann. Average ( $\mu\text{g m}^{-3}$ )	52.3	49.2	49.1	47.0	46.0	35.5	34.2	40.3	40	34.8	34.3	36.8	32.3	33.4	32.0 <sup>c</sup>
RB59	Ann. Average ( $\mu\text{g m}^{-3}$ )	-	-	-	-	40	39	34	37	38	35	32	32	26	32	28
RG1	Data Capture (%)	-	-	99.0	100.0	99.7	99.6	98.0	98.5	99.1	99.4	100.0	91.4	99	99.5	99.5
RG2	Data Capture (%)	-	-	-	-	-	89.0	97.0	96.0	96.3	92.8	95.0	92.4	88.5	85.1	99.3
RG3	Data Capture (%)	-	-	-	-	-	-	-	97.8	98.8	99.2	99.0	97.5	92.3	99.4	96.9
LGW3	Data Capture (%)	93.3	93.4	93.5	96.1	94.0	95.4	96.7	96.3	94.3	96.8	93.7	99.2	96.4	94.7	99.2
RB59	Data Capture (%)	-	-	-	-	91.6	100	91.6	100	100	100	100	100	91.6	100	100
RG1	Hours Over 200 $\mu\text{g m}^{-3}$	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0
RG2	Hours Over 200 $\mu\text{g m}^{-3}$	-	-	-	-	-	0	0	0	0	0	0	0	0 <sup>b</sup>	0 <sup>b</sup>	0
RG3	Hours Over 200 $\mu\text{g m}^{-3}$	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0
LGW3	Hours Over 200 $\mu\text{g m}^{-3}$	1	1	0	0	2	0	0	0	1	0	0	0	0	0	0
RB59	Hours Over 200 $\mu\text{g m}^{-3}$	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Particulate Matter (PM <sub>10</sub> )																
RG1	Ann. Average ( $\mu\text{g m}^{-3}$ )	-	-	22.8	23.2	25.7	22.3	22.4	23.8	23.3	20.5	19.4	18.7 <sup>a</sup>	21.1	19.5	18.7
	Ann. Average VCM* ( $\mu\text{g m}^{-3}$ )	-	-	-	-	-	-	-	21.2	22.0	19.7	18.0	19.7	21.7	19.4	20.1
LGW3	Ann. Average ( $\mu\text{g m}^{-3}$ )	31.0	28.7	27.2	27.8	27.8 <sup>***</sup>	23.8 <sup>***</sup>	24.2 <sup>***</sup>	23.3	25.3	23.4	22.3	21.6	22.7	21.9	23.8 <sup>c</sup>
	Ann. Average VCM* ( $\mu\text{g m}^{-3}$ )	-	-	-	-	-	-	-	21.1	23.7	21.8	20.9	22.0	23.0	22.0	22.9 <sup>c</sup>
RG1	Data Capture (%)	-	-	99.7	100	99.5	100	100	99.4	99.3	99.0	100	73.1	97.8	98.1	98.9
	Data Capture VCM** (%)	-	-	-	-	-	-	-	96.4	98.1	99.0	99.1	73.1	98.6	98.1	98.1
LGW3	Data Capture (%)	91.5	92.9	97.3	99.2	97.3	97.3	97.3	96.2	95.1	93.4	85.7	97.2	100	98.9	99.0
	Data Capture VCM** (%)	-	-	-	-	-	-	-	93.6	93.6	93.4	85.7	97.2	99.5	98.9	99.0
RG1	No. days over 50 $\mu\text{g m}^{-3}$	-	-	6	6	16	0	3	5	9	4	0	0 <sup>b</sup>	1	2	1
	No. days over 50 $\mu\text{g m}^{-3}$ (VCM)	-	-	-	-	-	-	-	6	18	5	2	0 <sup>b</sup>	9	7	2
LGW3	No. days over 50 $\mu\text{g m}^{-3}$	35	28	20	17	31 <sup>***</sup>	10 <sup>***</sup>	9 <sup>***</sup>	7	18	13	0 <sup>b</sup>	3	1	6	7
	No. days over 50 $\mu\text{g m}^{-3}$ (VCM)	-	-	-	-	-	-	-	10	23	16	2 <sup>b</sup>	4	19	15	11

### Locations:

RG1 is located on the Horley Gardens Estate in Michael Crescent (NE of the Airport).

RG2 is located on the Horley Gardens Estate in The Crescent (NE of the Airport).

RG3 is located to the SW of the airport in Poles Lane, Crawley.

RB59 is a diffusion tube (not a real time site) located at the southern most end of the Horley Gardens Estate to the NE of the Airport.

\*for details on volatile correction methodology see [www.volatile-correction-model.info](http://www.volatile-correction-model.info). Spreadsheets downloaded 05/05/09 for values to 2009. From 2009 data direct from London Air Website [www.londonair.org.uk](http://www.londonair.org.uk).

\*\* as the VCM requires data from three other sites VCM data capture can be lower than from the site of interest.

\*\*\* figures have been revised down as data originally supplied for these 3 years was incorrect. Correction made in July 2010 report.

<sup>a</sup> data capture under 75 %. Therefore these values cannot be compared to the relevant air quality standard.

<sup>b</sup> data capture under 90 %. Therefore these values cannot be compared to the relevant air quality standard. Data shown will be minimum number of hours or days depending on standard.

<sup>c</sup> pier 1 on the south terminal closed 8th April 2013 for redevelopment. Thus values from 2013 onwards not necessarily comparable to previous years.

**Abbreviations and Definitions.**

AQMA	Air Quality Management Area.
GAL	Gatwick Airport Limited.
m <sup>3</sup>	cubic metre.
mg	milligram (1 thousandth of a gram).
NETCEN	National Environmental Technology Centre, UK.
ng	nanogram (1 billionth of a gram).
nm	nanometre (1 billionth of a metre or 1 millionth of a millimetre)
NO <sub>2</sub>	Nitrogen Dioxide.
NO <sub>x</sub>	Oxides of Nitrogen (mainly NO and NO <sub>2</sub> expressed as NO <sub>2</sub> equivalent).
O <sub>3</sub>	Ozone.
PM	Particulate Matter.
PM <sub>10</sub>	Essentially particles under 10 µm in diameter. Officially defined as the size fraction below 10µm in aerodynamic diameter, which has a cut off point at 50% of the particles which are 10µm in aerodynamic diameter.
ppb	part(s) per billion.
ppm	part(s) per million.
TEOM	Tapered Element Oscillating Microbalance. (Device for measuring PM <sub>10</sub> concentrations in real time).
µg	microgram (1 millionth of a gram).
µg/m <sup>3</sup>	microgram(s) per cubic metre
µg m <sup>-3</sup>	microgram(s) per cubic metre, This scientifically is the correct form to use rather than µg/m <sup>3</sup> , though either can be used.
µm	micrometre (1 millionth of a metre or 1 thousandth of a millimetre)
VCM	Volatile Correction Method.  (used to correct PM <sub>10</sub> measurements made using a TEOM. This results in data equivalent to measurements made using the European Union's 'preferred' PM <sub>10</sub> monitoring technique.