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Air Quality Action Plan for the Non Airport sources of Nitrogen Dioxide within the Horley Air Quality Management Area.

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Abbreviations and Definitions

APU	Auxiliary Power Unit - used on planes to provide power (especially for air conditioning at Gatwick) on the ground.
AQMA	Air Quality Management Area.
BAA	British Airports Authority.
BAAG	British Airports Authority - Gatwick.
DEFRA	Department of the Environment, Food and Rural Affairs (formerly DETR).
DfT	Department for Transport.
DMRB	Design Manual for Roads and Bridges.
EA	Environment Agency.
EU	European Union.
g	gram.
Kg	kilogram.
LAQM	Local Air Quality Management.
LTP	Local Transport Plan (produced by Surrey County Council).
m^3	cubic metre.
mppa	million passengers per annum.
NAEI	National Atmospheric Emissions Inventory.
netcen	National Environmental Technology Centre, UK.
NO_2	Nitrogen Dioxide.
NO_x	Oxides of Nitrogen (mainly NO and NO_2 expressed as NO_2 equivalent).
O_3	Ozone.
ppb	part(s) per billion.
SCC	Surrey County Council.
TEMPRO	Trip End Model Program.
µg	microgram (1 millionth of a gram).
µg m^{-3} (µg/m^3)	microgram(s) per cubic metre.

Executive Summary

E.1 Previous studies of air quality in Reigate and Banstead (AQC, 2001, 2004) had identified that the concentration of the airborne pollutant nitrogen dioxide was unlikely to meet the UK Government's 2005 annual average objective of 40 µg m^{-3} (micrograms per cubic metre), on the Horley Gardens Estate in the vicinity of Gatwick Airport. Consequently the council declared an air quality management area (AQMA) in April 2002 that encompassed this area of the Horley Gardens Estate, as required under section 83(1) of the Environment Act 1995.

E.2 Under section 84(2) of the Environment Act 1995 the council is required to draw up an action plan stating what measures it intends to implement in order to meet the Government's air quality objectives where a breach of an objective has occurred or is predicted to occur. The purpose of the action plan is to help the UK Government meet its obligations under the EU air quality daughter directives, which for nitrogen dioxide are identical to the UK air quality objectives but apply from 2010.

E.3 The most recent monitoring data from the Horley Gardens Estate (AQC, 2006; RBBC, 2005a) indicates that the concentration of nitrogen dioxide did not exceed 39 µg m^{-3} in 2005, and thus the UK annual average objective for nitrogen dioxide was not breached. However, recent computer modelling of air pollution in 2010 within the AQMA indicates that an action plan is still required as:

i) around 30 properties within the AQMA are at *risk* of breaching the 2010 EU annual average limit value for nitrogen dioxide of 40 µg m^{-3}, with concentrations of nitrogen dioxide at these properties predicted to be up to 39 µg m^{-3} in 2010 with a modelling uncertainty of around +/- 10 %.

ii) while non airport sources of nitrogen dioxide pollution are predicted to fall between 2005 and 2010 airport sources will increase over the same period, due to increasing aircraft emissions, off setting the falls in the non airport sources of pollution.

iii) the modelling also suggests that the airport will be responsible for 53 % of the pollution at properties at greatest risk of breaching the EU limit value in 2010, compared to 45 % in 2005.

E.4 The airport has a important role to play in ensuring that the UK Government meets the EU limit value for nitrogen dioxide in 2010 and beyond, as it is predicted to be the only growing source of nitrogen dioxide within the AQMA and also responsible for over half the pollution by 2010. Therefore a separate action plan is being drawn up by BAA Gatwick which details the measures that the airport will be taking to ensure that nitrogen dioxide concentrations within the Horley AQMA meet the EU limit value in 2010 and beyond, and this will be published as an addendum to this document.

E.5 This report focuses on the non airport sources of nitrogen dioxide and presents a series of so called 'soft' or 'smart' measures, such a travel planning, promotion of Surrey Car Share, and cycle paths. The measures are aimed at minimising future increases in emissions from non airport sources of nitrogen dioxide rather than achieving significant cuts in emissions now, given the cost of such measures and that in the short to medium term (until 2015) the non airport sources of nitrogen dioxide are predicted to fall anyway primarily due to improvements in vehicle engine technology.

E.6 The report concludes by briefly considering the key facts that the airport will need to address in relation to nitrogen dioxide emissions in the longer term, the importance of an economically sound emissions charging scheme, and that the feasibility of an emissions cap should be examined given the benefits to residents and the airport should the EU limit value be breached and considering the future trends in global ozone concentrations.

1.0 Introduction

1.1 Section 83(1) of the Environment Act 1995 requires local authorities to designate as air quality management areas (AQMAs), those areas where the air quality standards as set out in the Air Quality Strategy (2000), the Air Quality Regulations (England) 2000, the Air Quality (Amendment) Regulations 2002, and the Air Quality Strategy Addendum document (2003), are unlikely to be achieved. When an authority has designated an air quality management area, it is required under section 84(2) of the act to draw up an action plan setting out what it intends to do to meet these objectives.

1.2 On 30th April 2002 Reigate and Banstead Borough Council declared an area of the Horley Gardens Estate (Figure 1.1) in the vicinity of Gatwick Airport an air quality management area (AQMA). This decision was based on the findings of the Stage 3 assessment of air quality within the borough (AQC, 2001), which identified that a number of properties within the Horley Gardens Estate were at risk of breaching the Government's 2005 annual average objective for nitrogen dioxide (NO_2) of 40 µg m^{-3}.

1.3 Further work assessing the air quality within the Horley AQMA has since been completed for 2005 (AQC, 2004), and also 2010 (RBBC, 2005) in conjunction with BAA Gatwick. This work was undertaken in order to:

i) calculate the future concentrations of NO_2 with a greater degree of certainty and,

ii) to quantify the contribution of different pollution sources to the NO_2 problem within the Horley AQMA, both now and into the future, to ensure that any measures introduced to reduce pollution within the AQMA tackle the long term pollution problems and so will have a real impact in practice in the longer term.

1.4 This report therefore covers the principle actions to be taken by the council and others in pursuit of achieving both the 2005 UK annual average objective for NO_2 of 40 µg m^{-3}, and the 2010 EU annual average limit value for NO_2 which is also 40 µg m^{-3}, as the purpose of the UK Government objective value is to help the UK meet its obligations arising from the EU air quality framework and daughter directives (DEFRA, 2003).

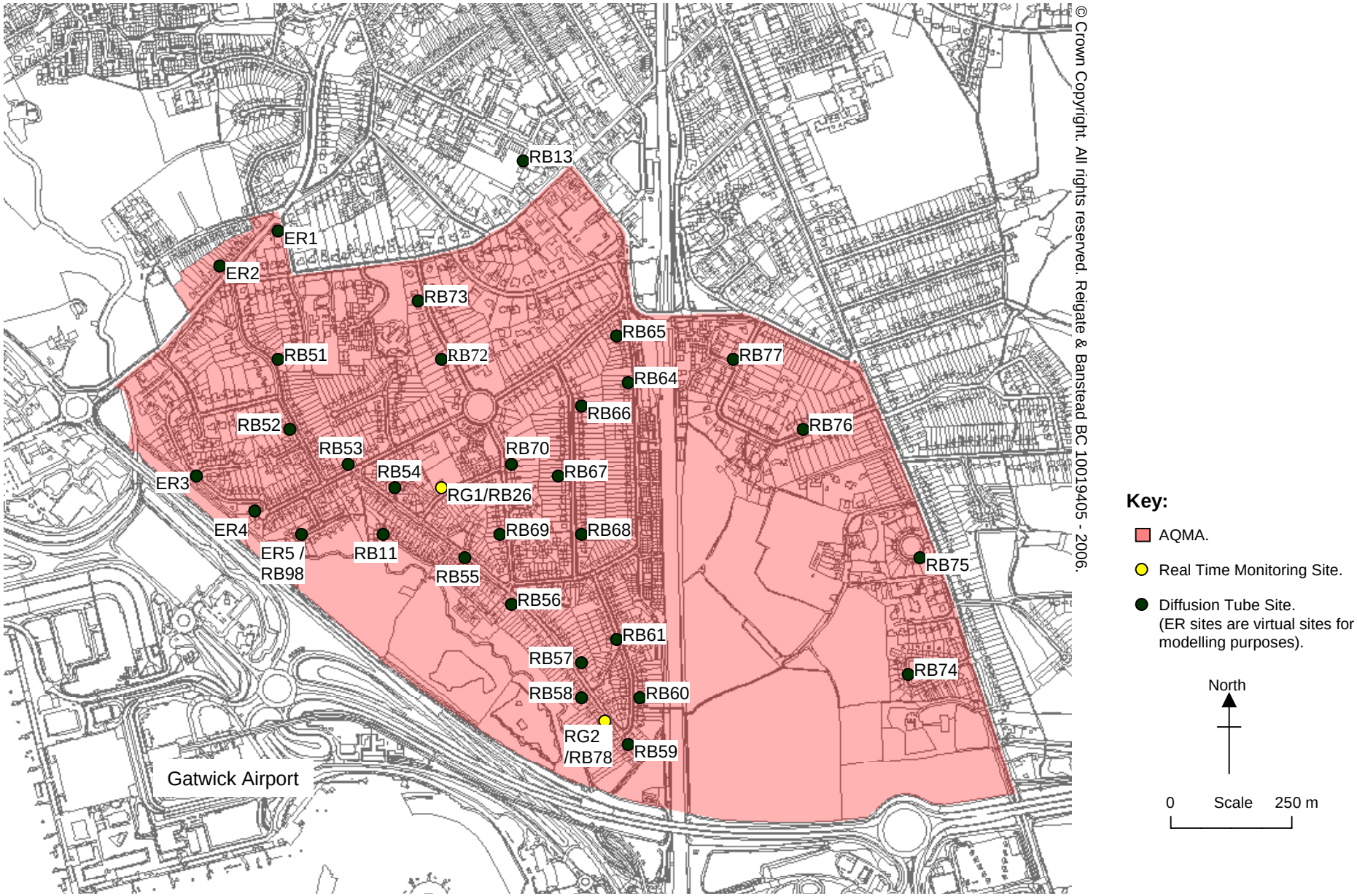


Figure 1.1: The Horley Air Quality Management Area (AQMA) and Locations of Modelling and Monitoring Points within the AQMA.

1.5 The report is divided into two sections

i) non airport sources of nitrogen dioxide,

ii) airport related nitrogen dioxide pollution.

1.6 As the airport action plan has been delayed due to a combination of central government initiatives, most notably the aviation white paper (DfT, 2003), and BAA Gatwick themselves, the current report only covers the actions to be taken in respect of the non airport sources of pollution. A second report will follow that covers all of the actions to be taken by BAA Gatwick to help reduce concentrations of nitrogen dioxide attributable to the airport within the Horley AQMA.

1.1 Changes since the 2010 Addendum document

1.7 The further assessment of air quality in the vicinity of the airport in 2010 was released in February 2005 (RBBC, 2005) and was based on modelling work by BAA Gatwick (NETCEN, 2004). Since the production of the NETCEN and RBBC documents an error has been found (January 2006) in the predicted NO_x concentrations arising from the 'runway 06 ground' source in 2010, which has resulted in these values being revised downwards. A copy of the new data set is given in appendix A to this report, and a revised version of the model output file is given in appendix B.

1.8 As a consequence of these changes the concentration of nitrogen dioxide at the worst case receptor (RB59, Figure 1.1) is now predicted to be 39 μg m^{-3} in 2010, compared to 42 μg m^{-3} in the original Further Assessment (Stage 4) of the Horley Air Quality Management Area - 2010 Addendum. Nevertheless, the change in concentration is within the modelling error of the original assessment work, and the key principles outlined in the 2010 addendum remain unchanged.

1.9 Consequently Reigate and Banstead BC and BAA Gatwick still see a need for an action plan to reduce nitrogen dioxide concentrations within the Horley air quality management area, given that within the error of the model there is still the potential for the 2010 limit value to be broken.

2.0 Background to the Action Plan

2.1 Modelling to 2010

2.1 The original Stage 3 assessment of air quality in the vicinity of the airport was undertaken by Stanger for Air Quality Consultants in July 2001, using a combination of breeze roads and previous dispersion modelling work by NETCEN for BAA Gatwick (Figure 2.1). The work was based on a limited emissions inventory supplied by BAA Gatwick, and while the model showed no predicted exceedences in 2005 (Table 2.1) given an estimated modelling error of 20 %, and the number of houses affected if a precautionary approach was taken, an AQMA was declared. Further work was then instigated by Reigate and Banstead BC in conjunction with BAA Gatwick to refine both the emissions inventory and the dispersion modelling.

	2005 (Stage 3 Model)	**2005 (Current Model) - 34 mppa**	**2010 (Current Model) - 38 mppa**
Over 40 µg m^{-3}	0	c. 10	0
38 to 40 µg m^{-3}	4	80 +	30
36 to 38 µg m^{-3}	64		
34 to 36 µg m^{-3}	180+	290 +	130 +
32 to 34 µg m^{-3}	530+		
30 to 32 µg m^{-3}			

Table 2.1: Number of Properties within the Horley AQMA predicted to breach the UK annual average air quality objective (2005) and the EU annual average limit value (2010) for nitrogen dioxide.

2.2 As part of this 'refinement' work an emissions inventory was produced for 2002/3 (NETCEN 2003a) based on the recorded traffic in 2002/3, and this was then modelled using a bespoke version of ADMS 3.1 (NETCEN 2003b). An examination of the relationship between the modelled results and the measured concentrations of nitrogen dioxide over the same period (AQC, 2004) demonstrated a very good agreement between the two data sets at Gatwick, with the model on average slightly under predicting the measured concentrations in 2002/3, but with no systematic bias to the model.

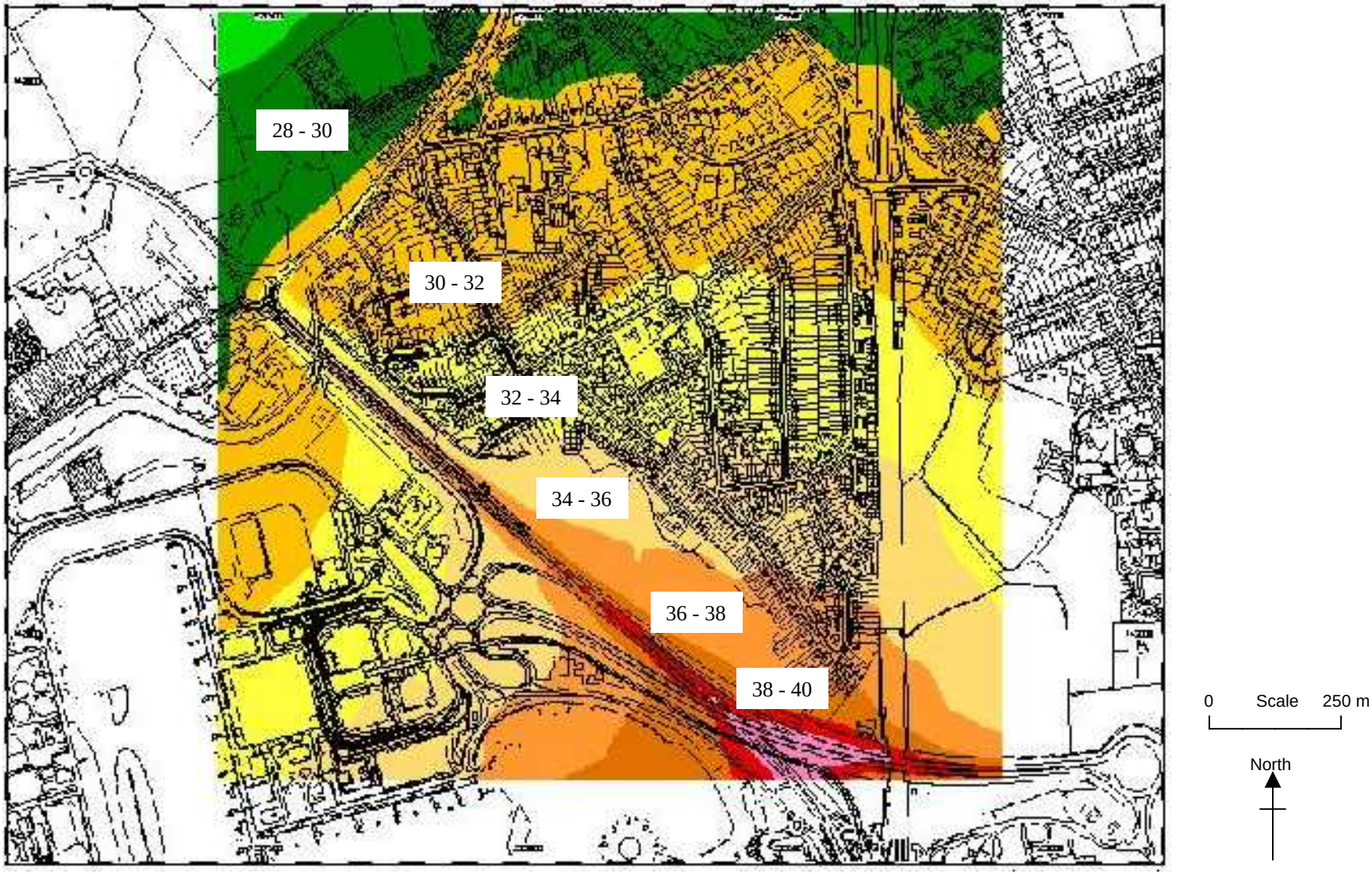


Figure 2.1: Stage 3 Assessment of the 2005 Annual Average NO_2 Concentrations (µg m^{-3}) in Horley near Gatwick Airport.

Diagram after AQC, 2001.

2.3 Given the short time difference between 2002/3 and 2005, the 2002/3 data was 'extrapolated' forward to 2005 (see AQC, 2004 for full details). This new work (Figure 2.2) predicted that around 10 properties might breach the 2005 annual average objective, but that as many as 80 properties (Table 2.1) might breach the objective given the modelling error of +/- 5 µg m^{-3} and taking a precautionary approach.

2.4 However, this new work also demonstrated that the concentration of nitrogen dioxide declined much more rapidly with distance from the airport, and so the overall number of properties affected by nitrogen dioxide concentrations over 30 µg m^{-3} was lower than originally predicted in the Stage 3 assessment.

2.5 An emission inventory was subsequently produced for 2010, based on BAA Gatwick's assessment of the most likely scenario for the airport in 2010. However, BAA Gatwick were unwilling to complete a full dispersion model for 2010 in view of the fact that the Department for Transport was going to set up a study to investigate the methodologies for airport air quality assessments, due to the apparent lack of agreement between the modelled and measured values at Heathrow, and the ramifications this had for the aviation white paper.

2.6 Consequently, the 2010 'modelling' data used in this action plan is based on a scaling of the NO_x concentrations in 2002/3 from the airport and surrounding roads, based on the proportional increase in the NO_x emissions from those sources between 2002/3 and 2010 (see RBBC (2005) and NETCEN (2004) for full details).

2.7 The main drawbacks of the 2010 model therefore are that the weather conditions are identical to those in 2002/3 (May 2002 to April 2003), and that the spatial distribution of the pollution sources e.g. runway emissions, taxiing emissions, are the same as in 2002/3.

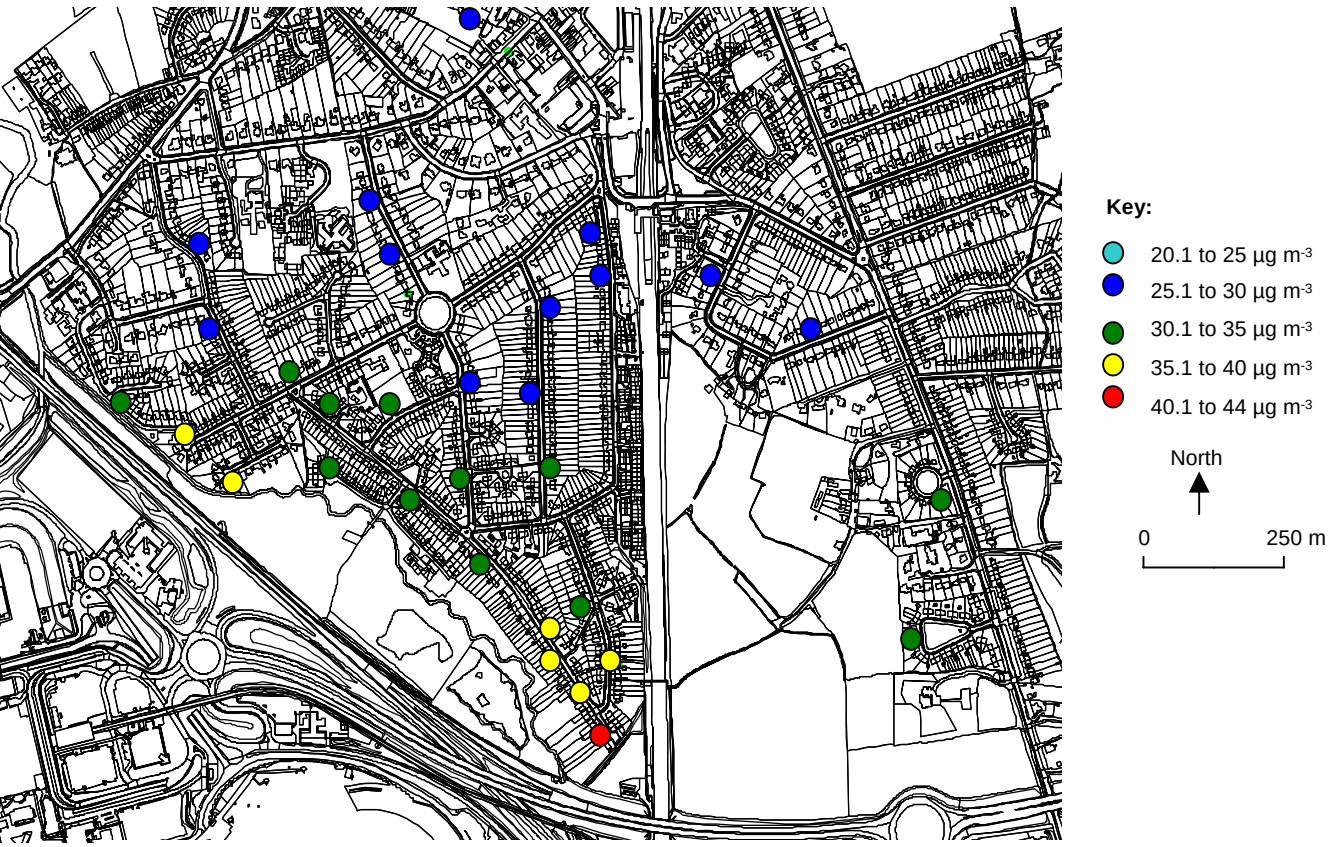


Figure 2.2: 2005 Annual Average NO_2 Concentrations in Horley near to Gatwick Airport.

Values based on dispersion modelling. For full methodology see AQC, 2004.

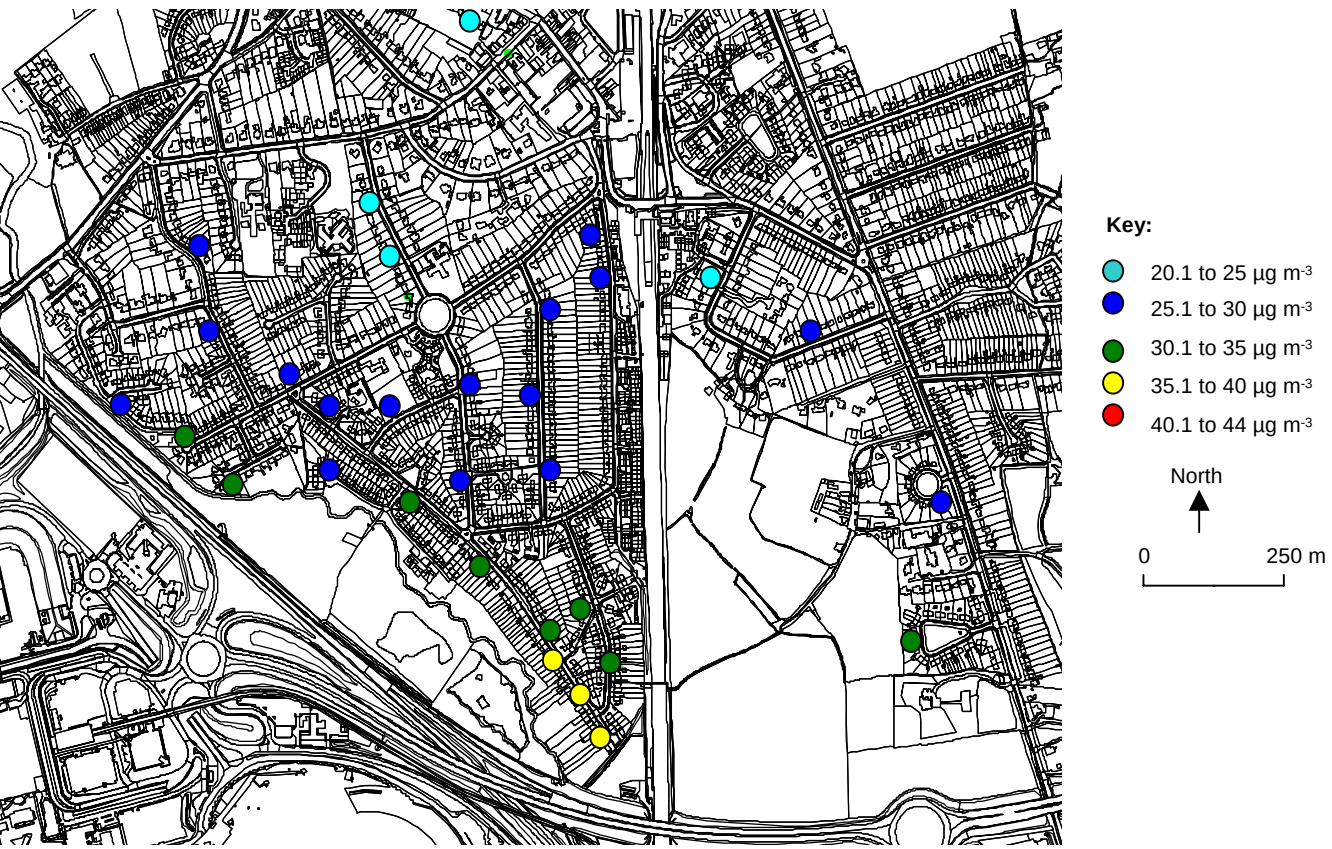


Figure 2.3: 2010 Annual Average NO_2 Concentrations in Horley near to Gatwick Airport.

Values based on scaled 2002/3 dispersion modelling and 2010 Emissions Inventory. For full methodology see NETCEN, 2004).

2.8 The majority of the pollution sources are unlikely to show any spatial changes between 2002/3 and 2010, however as the airport expands from 2005/6 the majority of the new passenger traffic will go through the north terminal at the airport, which is closer to the Horley AQMA, than the south terminal. Consequently there is likely to be a greater utilisation of the aircraft piers associated with the north terminal, and so a greater proportion of the APU emissions for example might occur closer to the residential area than is suggested by the modelling. Whether, within the errors associated with the modelling, this is likely to have a significant impact on the predicted NO_2 concentrations within the Horley Gardens estate is unclear, but such a switch does mean that the current 2010 model might be slightly optimistic.

2.9 The 2010 modelling does though predict an overall fall in NO_2 concentrations on the Horley Gardens estate (Figure 2.3) compared to 2005 (Figure 2.2). However, if the percentage change in concentrations over this period (2005 to 2010) is examined (final column appendix A) the falls in concentrations close to the airport e.g. RB59, RG2 / RB78, RB58, are less than 6 %, compared to comparable properties further away from the airport e.g. RB51, RB52, and RB73 where concentrations are predicted to fall by 11 to 12 %.

2.10 The model indicates that the reason for the predicted lower rate of improvement in NO_2 concentrations at properties close to the airport is because falls in non airport sources of NO_x between 2005 and 2010 (Figure 2.5) are off set to a degree by increasing emissions from the airport itself over the same period (Figure 2.4), hence the smaller improvement of 6 % in NO_2 concentrations at properties close to the airport compared to 11 to 12 % at properties further from the airport.

2.11 As the airport derived NO_x concentrations decrease with distance from the airport (Figure 2.4) the off setting of the falls in non airport derived NO_x concentrations is greatest at properties closest to the airport, hence the lower overall falls in NO_2 concentrations, and much less at properties further from the airport, hence the much greater reductions in NO_2 concentrations between 2005 and 2010 further away from the airport.

Figure 2.4: Airport Related NO_x Concentrations (µg m^{-3}) in 2005 and 2010.

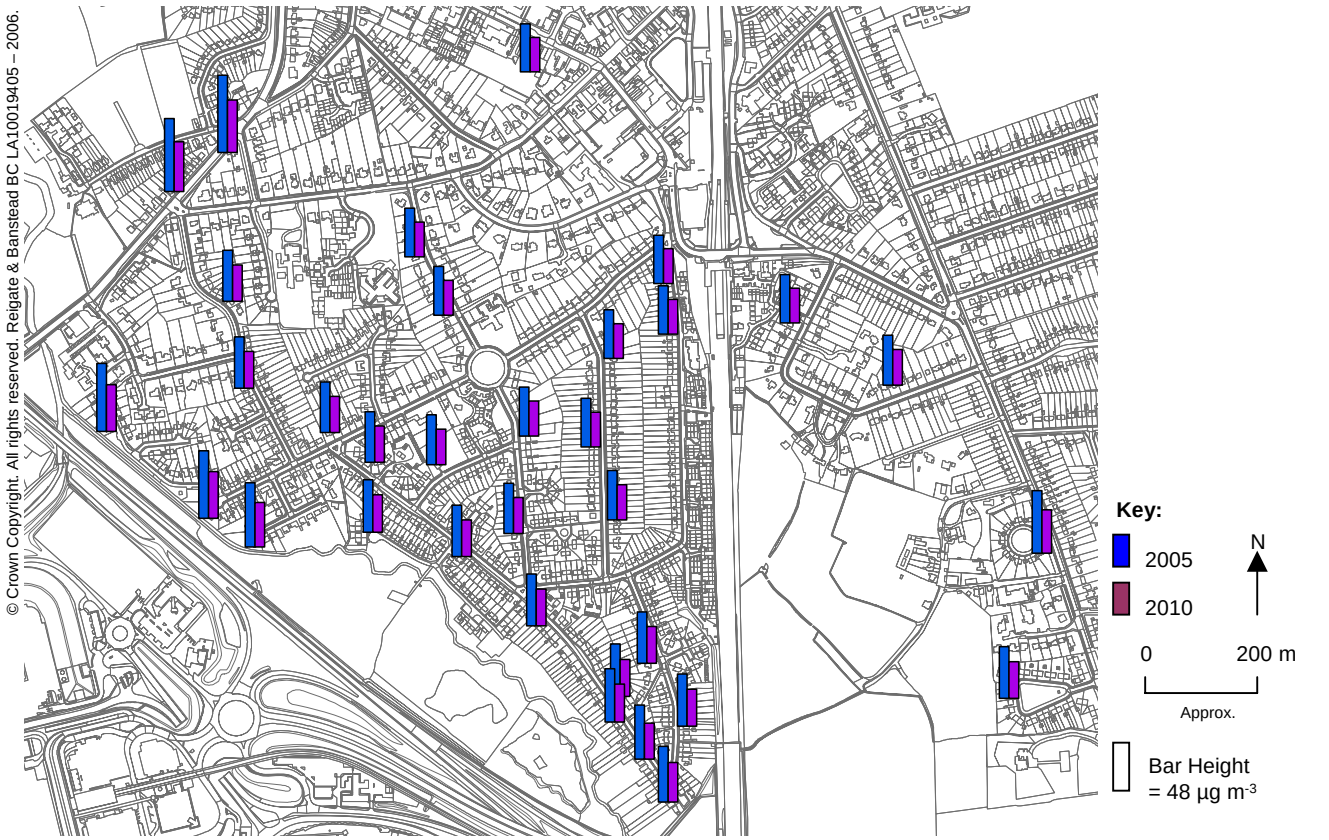


Figure 2.5: Non Airport Related NO_x Concentrations (µg m^{-3}) in 2005 and 2010.

2.12 A more detailed breakdown of the sources of NO_x at the worst case receptor (RB59) demonstrates that the predicted increase in emissions from the airport is primarily due to the aircraft themselves, while emissions from other airport sources are either more or less static or declining (Figures 2.6 and 2.7). A numerical breakdown of the changes at the worst case receptor is given in Table 2.2.

	NO_x Concentration ($\mu g\ m^{-3}$)		**Predicted Change in NO_x Conc. ($\mu g\ m^{-3}$).**	**Predicted Change in NO_x Conc. (%). (2010-2005 /2005)**
	2005	**2010**		
Background	38.54	28.20	-10.34	-26.8 %
Non airport related Road Traffic	11.36	7.00	-4.36	-38.4 %
Aircraft	9.17	14.47	+5.30	+57.8 %
Aux. Power Units (APUs)	6.36	8.61	+2.25	+35.4 %
Airside Vehicles	6.54	7.38	+0.84	+12.8 %
Airport Misc.	2.18	1.72	-0.46	-21.1 %
Airport related Road Traffic	10.91	7.97	-2.94	-26.9 %
Total Non Airport	49.90	35.20	-14.70	-29.5 %
Total Airport	35.16	40.15	+4.99	+14.2 %
Total	85.06	75.35	-9.71	-11.4 %*

*Note: The NO_x / NO_2 relationship is not a simple one. Thus while an 11 % fall in NO_x is shown here, this results in only a 5.7 % fall in the NO_2 concentration (Appendix A).

Table 2.2: Changes in NO_x Concentration by Source at the worst case receptor (RB59) between 2005 and 2010.

2.13 Table 2.2 clearly demonstrates that while non airport sources of NO_x are predicted to fall by around 30 %, airport related sources of NO_x are predicted to increase by 14 %, and that all of this increase is being driven by the aircraft themselves which are the largest and fastest growing source of airport NO_x pollution.

2.14 It is also important to note from Table 2.2 that a fairly large drop in the NO_x concentrations, in this case around 11 %, does not translate into an equivalent percentage fall in the NO_2 concentration, which at this site is predicted to fall by around 5.7 % (Appendix A).

Figure 2.6: Total Airport & Total Non Airport NO_x Contributions by Source at RB59 (2005 & 2010).

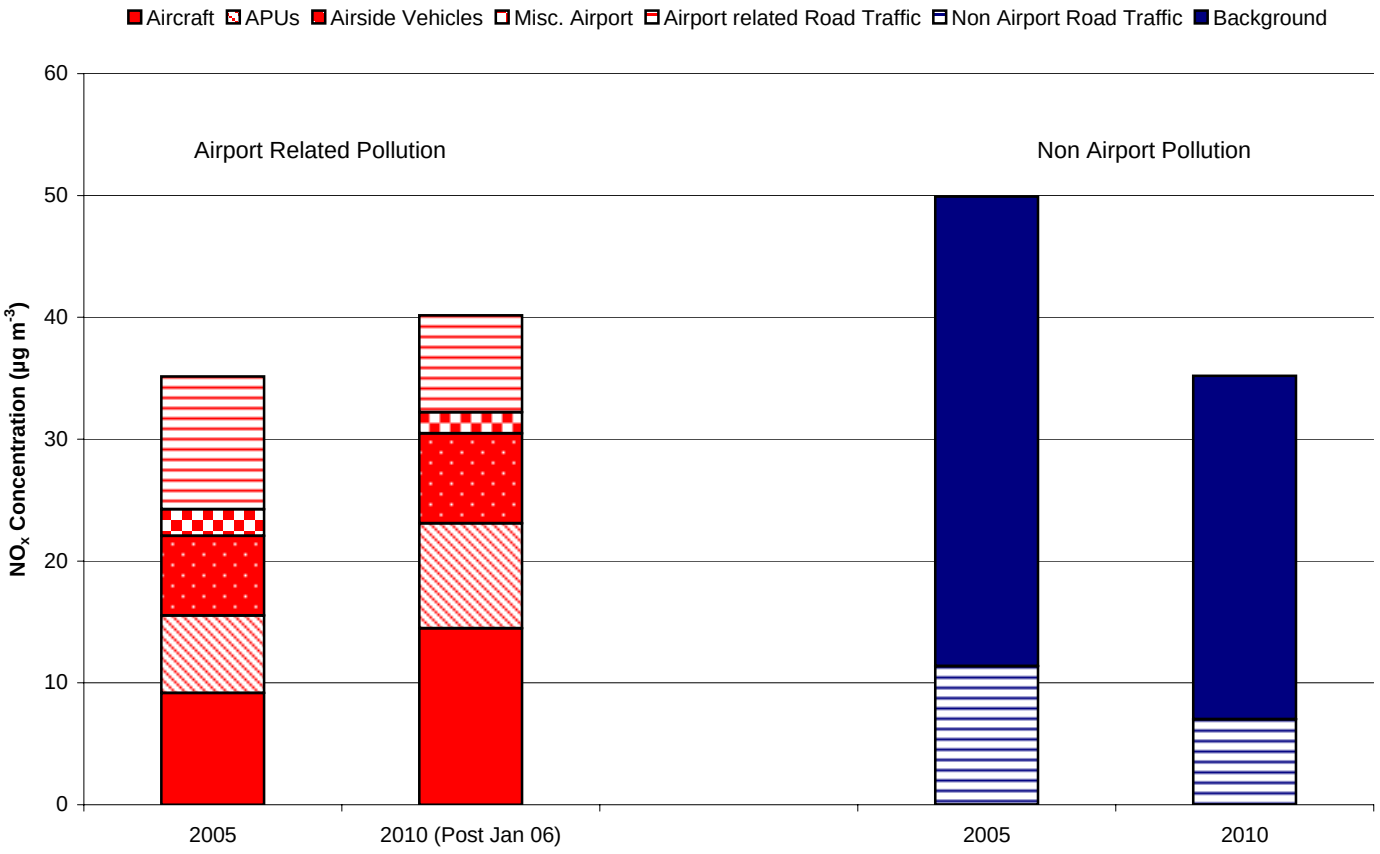
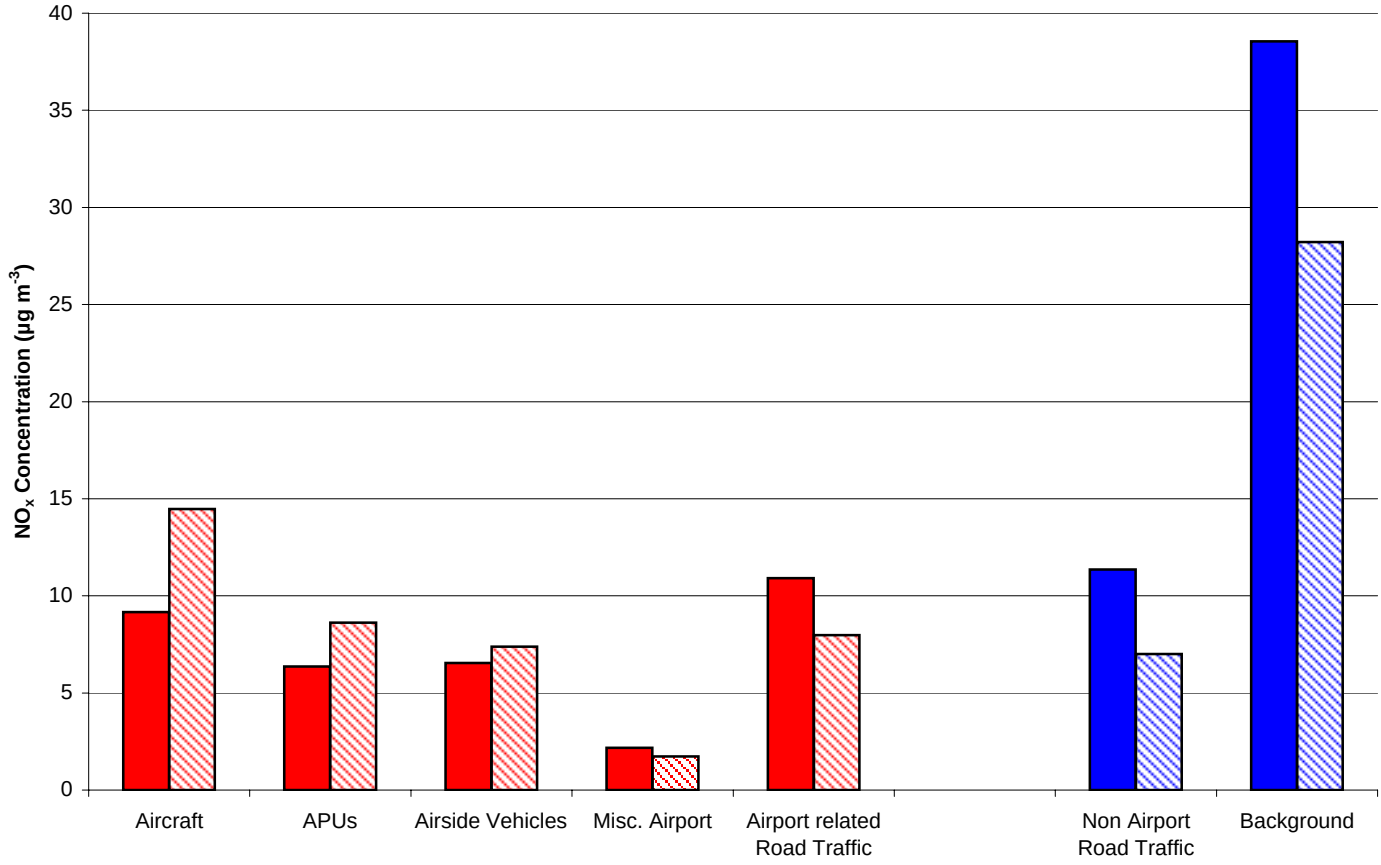


Figure 2.7: NO_x Concentration by Source at RB59 in 2005 (solid bar) and 2010 (striped bar).



2.15 The modelling results from 2010 also predict that the airport will be responsible for more than half the NO_x pollution by 2010 at the worst case receptor, compared to 45 % in 2005 (Figures 2.8 and 2.9).

2.16 The falling non airport concentrations of NO_x and increasing airport NO_x concentrations also means that at RB78 / RG2 the airport is predicted to be responsible for over half of the pollution problem by 2010, and that the airport will also be responsible for an increasing proportion of the residents NO_x exposure on the Horley Gardens estate by 2010 (Figures 2.10 and 2.11).

2.17 For the purposes of action planning it is worth bearing in mind that were the airport not present, then the predicted NO_2 concentration at the worst case receptor would fall from 39 µg m^{-3} in 2010 to 23 to 25 µg m^{-3} i.e. well below the EU limit value even allowing for modelling error.

2.2 Beyond 2010

2.18 The modelling work to 2010 demonstrates that the increasing emissions from the airport are likely to be more than offset by the falling non airport emissions, leading to an overall reduction in NO_2 concentrations by 2010 compared to 2005. However, the aim of any action plan is not just to ensure that the 2010 EU limit value is met by 2010, but also to ensure that it continues to be met beyond 2010.

2.19 The modelling work to 2010 demonstrates that emissions from the airport are likely to increase, and while it is impossible to predict what is likely to happen to aircraft emissions in the longer term, in the short to medium term i.e. to 2020 it is not unreasonable to assume that emissions from the airport are likely to continue to increase given the life span of aircraft, and as the 2010 scenario considered 38 million passengers per annum (mppa) using the airport, while the practical capacity of the airport is currently estimated at 44 million passengers per annum.

2.20 Therefore the question then becomes can the year on year falls in non airport emissions be maintained in order to off set the rising airport (primarily aircraft) emissions, so that the NO_2 concentrations remain static or continue to fall within the AQMA?

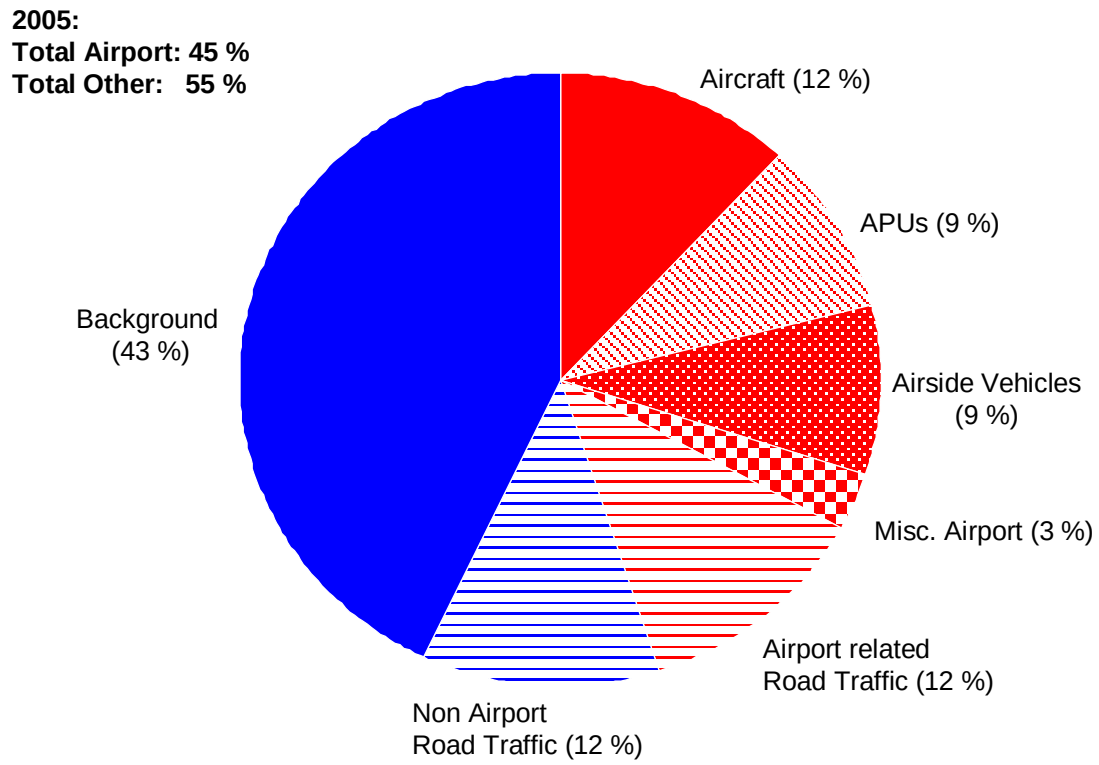


Figure 2.8: NO_x Contribution by Source to RB59 in 2005 (NO_2 Concentration: 41 µg m^{-3}).

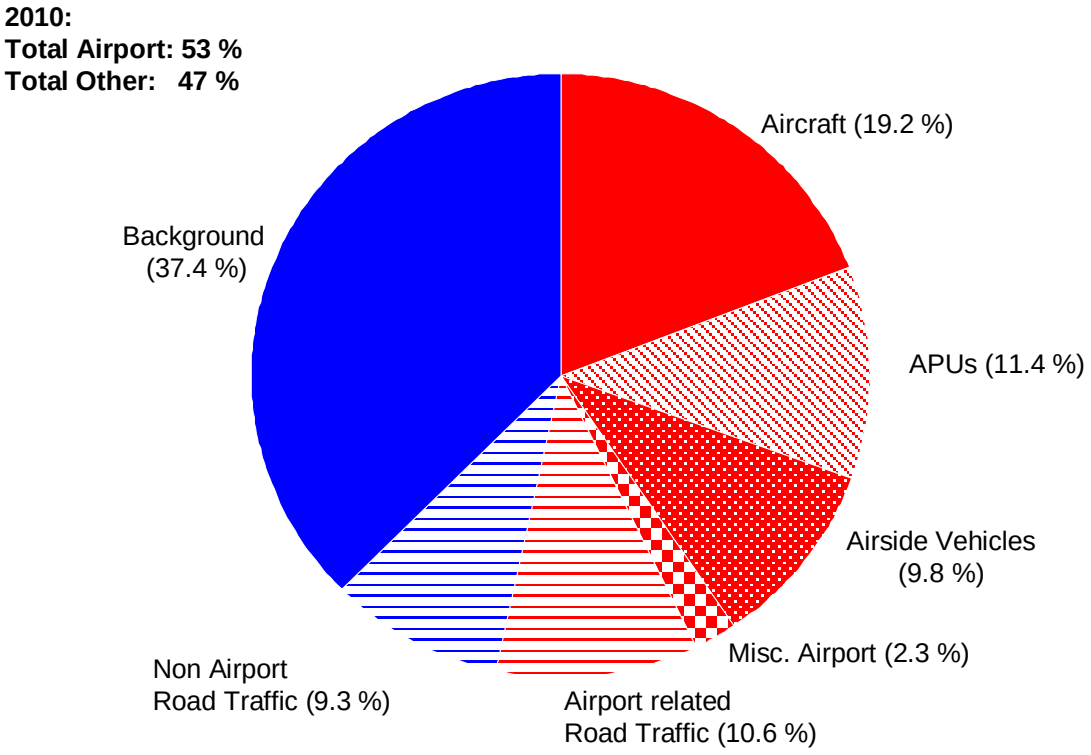


Figure 2.9: NO_x Contribution by Source to RB59 in 2010 (NO_2 Concentration: 39 µg m^{-3}).

Figure 2.10: Source Apportionment of NO_x Concentrations in 2005.

Figure 2.11: Source Apportionment of NO_x Concentrations in 2010.

2.21 The 2010 addendum study (RBBC, 2005) modelled trends in both background (Figure 2.12) and road traffic (Figure 2.13) NO_x and NO_2 concentrations beyond 2010, and it was clear from this work that the falls seen in the non airport sources of NO_x pollution were likely to cease by 2015. The work also demonstrated that the falls in NO_x pollution from non airport sources would be smaller between 2010 and 2015, than the predicted falls between 2005 and 2010, and so any off setting of increasing airport emissions would be smaller beyond 2010 and cease by 2015.

2.22 The 2010 addendum also pointed out that increasing direct NO_2 emissions, for example from the increasing proportion of diesels in the national car fleet, meant that the falls in non airport NO_2 concentrations beyond 2010 may be even smaller than predicted and so the off setting of airport emissions may cease even before 2015.

2.23 The 2010 addendum also considered the impact of rising global ozone concentrations on the nitrogen dioxide concentrations within the Horley Gardens estate, and concluded that the rising ozone concentrations certainly would not help in the reduction of NO_2 concentrations, with a real risk that year on year cuts in NO_x emissions would be needed simply for the NO_2 concentrations to remain unchanged.

2.3 Summary and Factors for Consideration within the Action Plan

2.24 Computer modelling of the Horley AQMA near Gatwick Airport, assuming a business as usual scenario in 2010, indicates that at the worst case receptor (RB59) the annual average concentration of nitrogen dioxide is likely to be around 39 µg m^{-3}. The 2010 EU annual average limit value for nitrogen dioxide is 40 µg m^{-3}, but within the error associated with the modelling a breach of the 2010 limit value is possible.

2.25 The airport has a significant impact on nitrogen dioxide concentrations within the AQMA. The magnitude of this impact is reflected in the fact that if, hypothetically, NO_x emissions from the airport were reduced to zero by 2010, the nitrogen dioxide concentrations at the worst affected properties on the Horley Gardens Estate would fall from 39 µg m^{-3} to 23 to 25 µg m^{-3} i.e. considerably below the EU limit value.

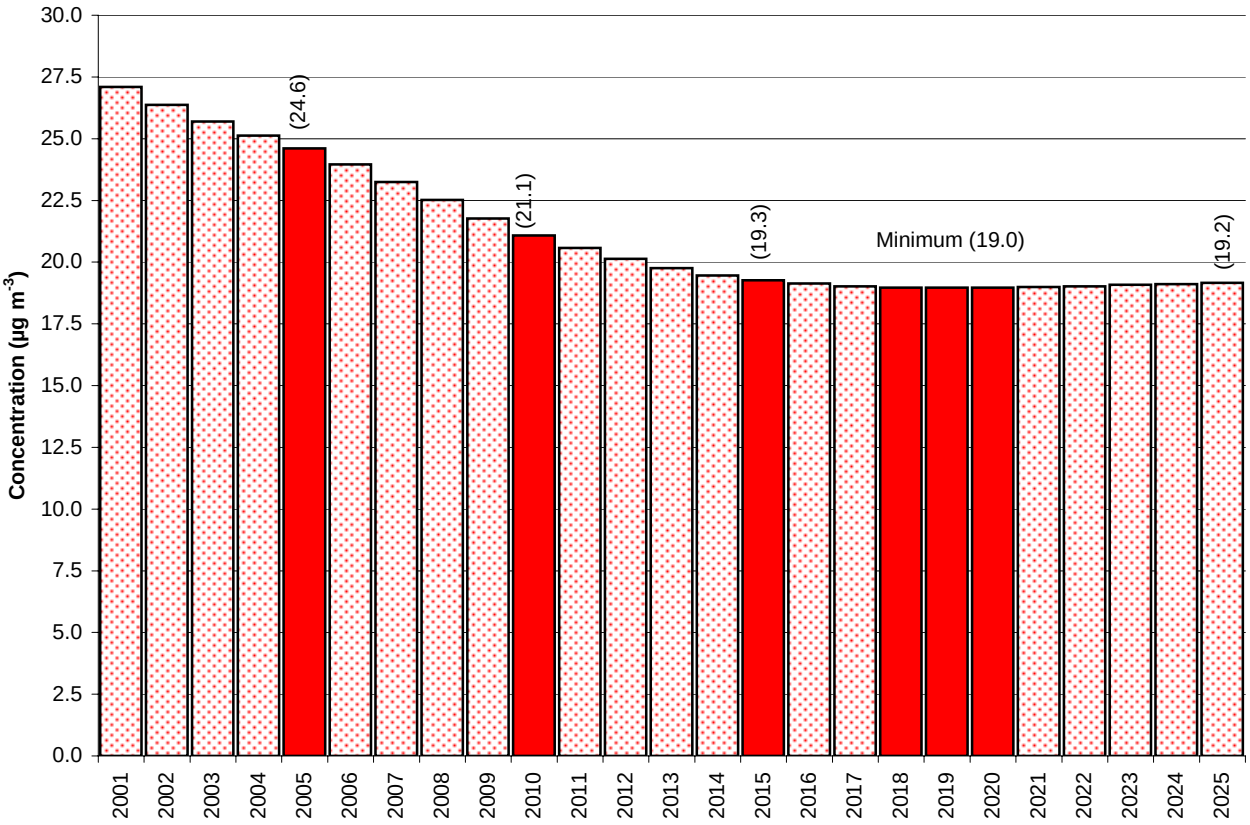


Figure 2.12: Background NO_2 Concentrations 2001 - 2025 (Grid Ref: 528500, 157500: NAEI, 2005).

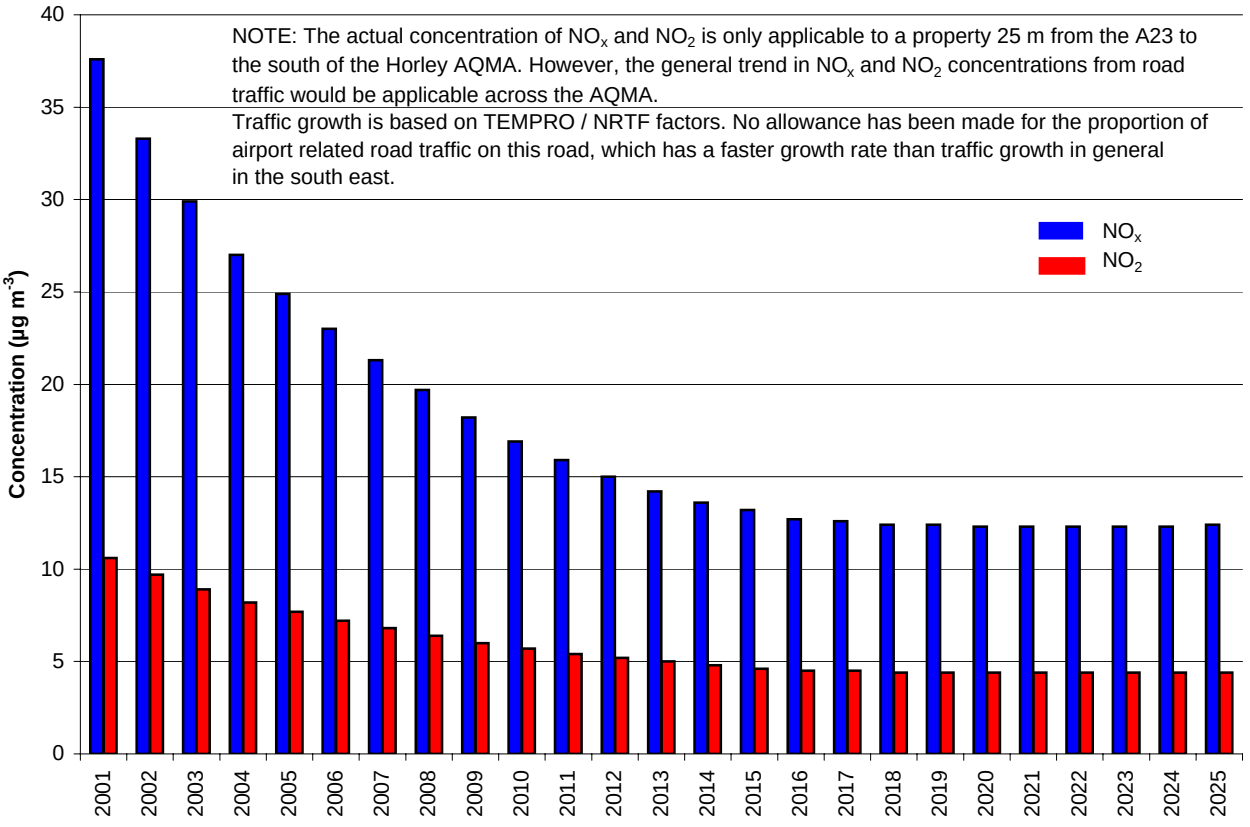


Figure 2.13: Annual Average NO_x and NO_2 Concentrations 25 m from A23 (within grid 528 000, 141 910) due to Traffic EXCLUDES Background Concentrations.

2.26 Source apportionment work also indicates that by 2010 the airport is predicted to be responsible for over half of the NO_x pollution where concentrations of nitrogen dioxide exceed 36 µg m^{-3} within the AQMA.

2.27 The concentrations of non airport sources of NO_x pollution are predicted to *decrease* year on year across the AQMA between 2005 and 2010, and are likely to continue to fall until 2015. However, the magnitude of the fall between 2010 and 2015 is likely to be smaller than that between 2005 and 2010.

2.28 The concentrations of airport derived NO_x are predicted to *increase* year on year until 2010, and are likely to continue to increase beyond 2010 given that 38 million passengers per annum (mppa) are predicted to use the airport in 2010 compared to a predicted capacity at the airport of 44 mppa[1].

2.29 The predicted increase in airport emissions between 2005 and 2010 is due almost entirely to the aircraft themselves, which are the largest and fastest growing source of airport NO_x pollution.

2.30 The falls in non airport NO_x concentrations (i.e. background and non airport road traffic) more than off set the increasing airport NO_x concentrations between 2005 and 2010 within the AQMA. As a consequence this leads to a predicted fall in the annual average nitrogen dioxide concentration at the worst case receptor from 41 µg m^{-3} in 2005 to 39 µg m^{-3} in 2010.

2.31 However, the falls in the non airport sources of NO_x are likely to cease by 2015 and so any increase in NO_x emissions from the airport beyond 2015, and possibly before this date i.e. 2010 to 2015, that leads to an increase in airport derived NO_x concentrations within the Horley AQMA will lead to a direct increase in NO_2 concentrations within the Horley Gardens Estate.

[1] NO_x emissions do not necessarily increase proportionally with passenger numbers. However, more passengers do result in more and / or bigger planes, and additional airside equipment, which results in more NO_x emitted in absolute terms.

2.32 The final point the needs to be borne in mind within the action plan is that the rising global concentrations of ozone mean that:

i) where possible there is a need to achieve year on year reductions in NO_x emissions in order to reduce the overall concentration of nitrogen dioxide within the AQMA.

ii) there is a risk that despite real reductions in the NO_x emissions, and thus the NO_x concentrations within the Horley Gardens AQMA, the actual concentration of nitrogen dioxide will remain unchanged or even increase if the reductions in NO_x emissions are insufficient to offset the rising ozone concentrations.

3.0 Action Planning

3.1 The source apportionment and modelling work, as summarised in section 2.3, clearly shows that over half of the NO_x pollution at the worst affected properties within the AQMA arises from the airport itself, and that a breach of the EU annual average nitrogen dioxide limit value is possible in 2010. Therefore, the airport has a very significant role to play in reducing it's emissions to help ensure compliance with the annual average EU limit value for nitrogen dioxide.

3.2 As the airport has such a major role to play in any action plan aimed at meeting the 2010 EU limit value, regular meetings have been held with BAA Gatwick, via an air quality working group, in order to draw up an action plan for the airport.

3.3 However, it should be pointed out that regulatory responsibility for the airport rests with various central government departments and organisations, while planning matters relating to the airport are the responsibility of Crawley Borough Council and West Sussex County Council.

3.4 A section 106 planning agreement exists between Gatwick Airport, Crawley BC, and West Sussex county council, which requires the airport to complete a range of tasks as part of the airport's permitted development. The s106 signatories have also signed a memorandum of understanding with other local authorities around the airport, including Reigate and Banstead BC, and Surrey County Council.

3.5 Nevertheless, the ability of the council (RBBC) to ensure that airport related measures within the action plan are implemented is limited, though we will be aiming to ensure that matters relating to air quality are adequately dealt with in the new section 106 agreement which is due for completion in early 2007.

3.6 It should also be pointed out that any other major commercial operation in the UK producing a significant amount of pollution from one point would be likely to be classed as a Part A process and regulated by the Environment Agency (EA). The EA interpretation of the EU air quality framework directive (96/62/EC) and the subsequent daughter directives, including that relating to nitrogen dioxide (1999/30/EC), is that the limit values should not be breached *anywhere* outside of the perimeter of the business premises (EA, 2005).

3.7 However, as the airport is not classed as a Part A process it does not fall within the remit of the Environment Agency for air quality purposes, and so the local air quality management (LAQM) regime applies. Under LAQM the air quality limit values only have to be met where there is relevant exposure, which in this context is residential property. Consequently, the measures that the airport needs to take in order to reduce pollution as part of the action planning process are less onerous than they would need to be if the airport were in a different commercial sector.

3.1 Quantification of Impacts

3.8 Throughout the action planning process the focus of the work centres on the impact of measures on the worst case receptor at RB59, the assumption being that if concentrations of nitrogen dioxide are reduced at this point then the concentrations across the AQMA will also decrease albeit to a lesser extent. This assumption holds true providing that the emissions from a given source are reduced rather than simply moved elsewhere on the airport or along the road network.

3.9 Although the focus throughout the quantification process and action planning is on the worst case receptor, all of the other sites shown in Figure 1.1 and a selection of further points surrounding the airport have also been analysed and screened in a similar way to the worst case receptor at RB59. This was to ensure that a given measure did not have an unforeseen detrimental effect somewhere else with the AQMA, or elsewhere around the airport.

3.10 The first stage of the action planning process was to screen all of the sources that contribute NO_x to the worst case receptor (RB59), to see what the impact would be on the NO_x and NO_2 concentrations of certain percentage reductions in the NO_x emissions from the contributing sources. The purpose of this work was to ensure that only emission sources where cuts lead to a quantifiable reduction in NO_2 concentrations at RB59 were considered, and also to identify any emission sources where a relatively small reduction in emissions could have a large impact on NO_2 concentrations at RB59 particularly in relation to airport emissions.

3.11 The quantification of the impact of reductions in emissions from a given source was undertaken using the FAST model developed by NETCEN. The FAST model is essentially the output from a dispersion model (in this case the 2002/3 dispersion model) mounted up within a computer program that allows the user to adjust the NO_x emissions from a given source and assess the impact of this change on the concentration of NO_x or NO_2 at a given point or across an area.

3.12 The main drawback of the FAST model used in the action plan is that the underlying dispersion model is from 2002/3, as no dispersion modelling was undertaken for 2010. Therefore the model assumes that any increase in emissions has a similar spatial distribution to emissions in 2002/3. For most sources this assumption is valid but for APU emissions, for example, the model is unable to take into account the increasing usage of the north terminal at the airport by 2010, and instead 'assumes' a similar North terminal / South terminal split as in 2002/3. Despite this limitation the model is still a useful method of screening the sources of pollution in a quantitative way, to identify those sources which give the biggest reductions in NO_2 at RB59.

3.13 For the FAST screening work an increase in the NO_x emissions from a given source of 1, 2, 5, and 10 % were considered, together with a 0, 1, 2, 5, 10, 15, 20, 25, and 50 % reduction in NO_x from a given source. It should be noted that these increases and decreases in emissions are from, or in addition to, the predicted emissions in 2010 in a business as usual scenario. An example of the FAST model output for RB59 is shown in Table 3.1.

3.14 For example Table 3.1 demonstrates that a 50 % reduction in the airside vehicle emissions currently predicted for 2010 would cause the NO_2 concentration at RB 59 to fall by 1.2 µg m^{-3}. A similar 50 % reduction in non airport related road traffic emissions would lead to a 1.1 µg m^{-3} reduction in NO_2 concentrations at RB59. The table also shows that around a 4.4 % fall in the non airport road traffic emissions is needed in 2010 to achieve a 0.1 µg m^{-3} fall in the predicted NO_2 concentration at RB59.

3.15 The table shows the impact of each individual measure in isolation, and so a range of measures would lead to a cumulative fall in concentrations e.g. a 50 % reduction in airside vehicle emissions, and a similar reduction in the non airport related road traffic emissions would lead to a 2.3 µg m^{-3} fall in NO_2 concentrations at RB59.

3.16 Table 3.1 demonstrates the usefulness of FAST as a screening tool, in that a 50 % reduction in emissions from the much smaller airside vehicle fleet would lead to a comparable reduction in NO_2 concentrations at RB59, as a 50 % reduction in emissions from all of the non airport related road traffic in the area. A decision can then be made as to whether to spend money targeting, for example, the much smaller and controllable airside vehicle fleet, or the national road traffic, or the split in spending on reduction measures between the two options.

	% Increase NO_x ($\mu g\ m^{-3}$)												
Source	10.00%	5.00%	2.00%	1.00%	0.00%	-1.00%	-2.00%	-5.00%	-10.00%	-15.00%	-20.00%	-25.00%	-50.00%
Runway 08 ground	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375
Runway 08 elevated	75.378	75.376	75.376	75.375	75.375	75.375	75.375	75.374	75.373	75.371	75.370	75.369	75.363
Runway 26 ground	76.714	76.045	75.643	75.509	75.375	75.241	75.107	74.706	74.036	73.367	72.697	72.028	68.681
Runway 26 elevated	75.482	75.428	75.396	75.386	75.375	75.365	75.354	75.322	75.269	75.216	75.162	75.109	74.843
APUs	76.237	75.806	75.547	75.461	75.375	75.289	75.203	74.945	74.514	74.083	73.653	73.222	71.069
Airside vehicles	76.113	75.744	75.523	75.449	75.375	75.301	75.228	75.006	74.637	74.268	73.899	73.530	71.685
Engine testing	75.384	75.380	75.377	75.376	75.375	75.374	75.373	75.371	75.366	75.361	75.357	75.352	75.329
Car parks etc	75.477	75.426	75.396	75.385	75.375	75.365	75.355	75.324	75.274	75.223	75.172	75.121	74.867
Fire training ground	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375	75.375
Boilerhouses	75.437	75.406	75.388	75.381	75.375	75.369	75.363	75.344	75.314	75.283	75.252	75.222	75.068
Airport-related roads	76.172	75.774	75.535	75.455	75.375	75.296	75.216	74.977	74.578	74.180	73.781	73.383	71.390
Non Airport-related roads	76.075	75.725	75.515	75.445	75.375	75.305	75.235	75.025	74.675	74.325	73.975	73.625	71.874

	% Increase NO_2 ($\mu g\ m^{-3}$)												
Source	10.00%	5.00%	2.00%	1.00%	0.00%	-1.00%	-2.00%	-5.00%	-10.00%	-15.00%	-20.00%	-25.00%	-50.00%
Runway 08 ground	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647
Runway 08 elevated	37.648	37.647	37.647	37.647	37.647	37.647	37.647	37.646	37.646	37.645	37.645	37.645	37.642
Runway 26 ground	38.110	37.879	37.740	37.693	37.647	37.600	37.554	37.414	37.180	36.946	36.711	36.476	35.288
Runway 26 elevated	37.684	37.665	37.654	37.650	37.647	37.643	37.639	37.628	37.610	37.591	37.573	37.554	37.462
APUs	37.945	37.796	37.707	37.677	37.647	37.617	37.587	37.497	37.347	37.197	37.046	36.895	36.137
Airside vehicles	37.903	37.775	37.698	37.672	37.647	37.621	37.595	37.518	37.390	37.261	37.132	37.003	36.355
Engine testing	37.650	37.648	37.647	37.647	37.647	37.646	37.646	37.645	37.644	37.642	37.640	37.639	37.631
Car parks etc	37.682	37.664	37.654	37.650	37.647	37.643	37.640	37.629	37.611	37.594	37.576	37.558	37.470
Fire training ground	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647	37.647
Boilerhouses	37.668	37.657	37.651	37.649	37.647	37.645	37.642	37.636	37.625	37.615	37.604	37.593	37.540
Airport-related roads	37.923	37.785	37.702	37.674	37.647	37.619	37.591	37.508	37.369	37.230	37.091	36.952	36.251
Non Airport-related roads	37.874	37.760	37.692	37.669	37.647	37.624	37.601	37.533	37.419	37.304	37.190	37.075	36.500

Note: 0 % is the baseline 2010 scenario. NO_2 concentrations are unadjusted hence the difference between the 37.6 $\mu g\ m^{-3}$ in the above table and 39 $\mu g\ m^{-3}$ discussed in the text. For further information see Appendix A.
Data is shown to 3 dp for comparison purposes only, and should not be taken as indicative of model accuracy.

Table 3.1: Fast Model Output for the Worst Case Receptor (RB59).

4.0 Action Planning for the Non Airport Sources

4.1 The non airport sources of NO_x pollution include road traffic that is not related to the airport and which is on specific roads that have been modelled as part of the dispersion modelling, and the 'background' which is essentially a 'fog' of NO_x pollution which hangs over the south east from a combination of sources such as residential central heating, industry, road traffic elsewhere in the south east, and also road traffic which has not been specifically modelled on local minor roads.

4.2 The emissions from both the background and non airport road traffic sources, and thus the concentration of nitrogen dioxide that results from these sources, is predicted to fall over the next 5 to 10 years even if the council were to do nothing (Figure 2.12 and 2.13) primarily due to improved engine technology in road vehicles.

4.3 These business as usual improvements in non airport sources on their own are predicted to lead to an improvement in air quality at the worst affected receptor (RB59), but the full benefit of these improvements does not feed through to this receptor as increasing emissions from the airport 'use up' these ‘non airport’ improvements to leave the overall concentration at RB59 only slightly lower.

4.4 Table 4.1 which is derived from Table 3.1 demonstrates some of the problems involved in improving the air quality at RB59, in that an increase of just 1 % is needed in either the aircraft emissions (Runway 26 Ground), APU emissions, or the airside vehicle fleet to cause an increase in the NO_2 concentration at RB59 of between 0.02 to 0.04 $\mu g\ m^{-3}$. However, the only way for the council to off set this increase is to drive down emissions from road vehicles still further i.e. over and above that already predicted due to emissions improvements, and in the longer term this approach is simply unsustainable.

	Impact of 1 % change (increase or decrease) on NO_2 Concentrations at RB59 from 2010 baseline scenario ($\mu g\ m^{-3}$).	% Change in 2010 emissions required to increase / decrease the NO_2 concentration at RB59 by 0.1 $\mu g\ m^{-3}$ in 2010.
Aircraft Emissions (Runway 26 Ground)	0.046	2.1
APUs	0.030	3.3
Airside Vehicles	0.025	3.9
Airport Related Road Traffic	0.028	3.6
Non Airport Related Road Traffic	0.022	4.4

Table 4.1: Impact of a 1 % Change in Emissions on NO_2 Concentrations at RB59, and % Change in Emissions needed to cause a 0.1 $\mu g\ m^{-3}$ change in NO_2 Concentrations at RB59, from the 2010 Baseline Scenario.

4.1 Non Airport Related Road Traffic

4.5 Given the predicted fall, in absolute terms, in the nitrogen dioxide concentrations resulting from the non airport road traffic within the Horley AQMA for the business as usual scenario in 2010, and as any additional improvements made in local road transport emissions could be relatively easily negated by small increases in emissions from the airport, all of the measures proposed for lowering emissions from the non airport road traffic are so called 'soft' or 'smart' measures.

4.6 The aim of these measures is not to bring about a dramatic change in road traffic emissions in the short term, but effectively to prolong the fall / minimise the increase in nitrogen dioxide concentrations that is predicted for road traffic in the area beyond 2010 (Figure 2.13). The proposals are therefore aimed at giving some of the existing and potential future road users a viable alternative to the car.

4.7 The air quality impacts of each of the proposed measures on their own is likely to be small especially within the AQMA, but the aim of the measures is not to generate dramatic cuts in air pollution but to limit future growth, as said. In addition, all of the measures have other potential benefits for the borough, which in many cases are the reasons for the schemes being initiated e.g. reduced congestion, improved transport links etc. Also while the air quality improvements may be small within the Horley AQMA, any air quality benefits that do arise from road traffic measures will also benefit other residents who live along major roads in the area.

4.1.1 Local Transport Plan (LTP)

4.8 One of the overriding aims of the second Surrey Local Transport Plan (LTP2) (SCC, 2005) is to limit traffic growth to 5.5 % between 2005 and 2011. As the 2010 emissions and modelling work for the Horley AQMA assumed a 9 % growth in traffic over this period (mid line traffic growth in 2010 using TEMPRO), then if the transport plan is successful and traffic growth on the major roads around the Horley AQMA is limited to 5.5 %, then the nitrogen dioxide concentration within the AQMA due to road traffic will be lower than that predicted for 2010 albeit by around 0.1 $\mu g\ m^{-3}$.

4.1.2 Public Transport

4.9 A Fastway service (Quality bus partnership) between Crawley and Gatwick Airport was extended to Horley in August 2005. It is too soon to predict the impact of this service on traffic volumes and thus air quality within the AQMA, but in Crawley where such a service has been in operation for a couple of years passenger numbers are 43 % over predictions and there is evidence of a shift from cars to the bus (Evans, 2005). More recent work (FQMG, 2006) indicates that 7.5 % of passengers using the service used to use a car for the same trip, and 23 % of new passenger traffic generated by the new service have a car available but choose to use the bus.

4.10 The aim of the Fastway scheme in the longer term is also to serve the two new proposed housing developments in Horley (note: these are not within the AQMA) to help minimise traffic growth on the surrounding roads, as the new developments will increase the number of residential properties in Horley by a quarter from 8700 in 2005 to 11000 by 2015.

4.11 There are also aspirations in Surrey County Council's LTP2 to extend the Fastway service to Redhill and Reigate. While this is unlikely to lead to a noticeable improvement in air quality within the Horley AQMA, if such a service were to operate in the early morning and late evenings it would give airport employees an alternative to the car.

4.12 The Council's licensing regime for taxis and private hire vehicles is in line with 'average' licensing policy in the UK in terms of its strictness, and means that at present the entire taxi fleet is replaced every nine years. Within the action plan it is not proposed that this policy be changed, simply that it is maintained given that a number of trips to and from the airport are by taxi and that a proportion, but by no means all, of the trips will involve local firms. This policy also helps

air quality elsewhere across the borough by insuring these high mileage vehicles are well maintained.

4.1.3 Travel Plans

4.13 The majority of major employers within Horley have drawn up travel plans and implemented them, along with five schools within the Horley area (Hurdle, 2006). BAA Gatwick launched an airport wide travel plan in April 2006 to encourage all employers at the airport to produce their own plans. BAA Gatwick has also joined the Mole Valley / RBBC Decongestion Forum, whose membership includes most of the borough's major employers and the council. The Forum is concentrating on developing a network of shuttle buses, building on major employers own fleets, and encouraging car sharing through Surrey Car Share (a county wide internet based car share scheme). As the Forum covers 45,000 employees this gives it a large scope for reducing car use.

4.14 The implementation of travel plans elsewhere within the borough, the promotion of Surrey Car Share, and the maintenance of existing travel plans within the Horley area, will help minimise the growth of future road traffic emissions both within the air quality management area and in the borough as a whole and especially at properties close to the major roads.

4.15 Nevertheless, the magnitude of the air quality impacts within the Horley AQMA are likely to be small, with the FAST model indicating that a 5 % reduction in emissions on those predicted for 2010 would lead to a 0.1 µg m^{-3} reduction in NO_2 concentrations at RB59.

4.16 As part of the Horley air quality action plan it is also proposed to implement the council's own travel plan for employees and councillors. The impact of the council's travel plan on air quality in the Horley AQMA is likely to be negligible, and is more likely to have an impact on air quality within the AQMA on Reigate High Street. However, until the council's travel plan has been implemented it makes it difficult to suggest to other employers to draw up and implement their own travel plans.

4.1.4 Cycling

4.17 The impact of more people cycling on air quality within the Horley AQMA is likely to be small, unless there is a very significant shift from road transport to the bicycle. However, the aim of increasing the number of cycle paths within the Horley area is to give people another alternative to the car for certain journeys, in order to help limit long term growth in local traffic in the Horley area.

4.18 There is of course no guarantee that people will give up (or not take up) car use for certain trips, but at the present time cycling on some of the main roads is seen as 'not safe' compared to the car, and so dedicated cycle routes will help in this context.

4.19 The aim of the new paths and routes is to link the proposed new housing developments within Horley to the railway station, the local shops, and the airport, primarily to:

i) provide an alternative for existing commuters to the station, or to the airport which is a major employer.

ii) to help prevent a car 'habit' forming among residents of the new developments for short trips.

4.1.5 Congestion Reduction Measures

4.20 Traffic on the A23 bordering the southern edge of the Horley AQMA is fairly free flowing, and no significant increases in congestion are predicted or have therefore been factored into the model for 2010. Therefore congestion on the roads surrounding the Horley AQMA is not a significant cause of the road traffic pollution that contributes to the overall pollution problem with nitrogen dioxide within the Horley AQMA.

4.21 Nevertheless, there is a risk that traffic congestion may become responsible for a proportion of the non airport related, and airport related, road traffic NO_x emissions in the longer term. Therefore projects that are aimed at reducing traffic congestion on the A217 near Reigate, and the A23 near Redhill, have been included in the action plan as schemes to monitor to identify measures which may help reduce congestion and which might be applicable to the Horley AQMA if needed in the longer term. The schemes will also be monitored to identify any measures which do not work in practice, and the reasons why they do not work, as this information will also be of use if measures to tackle congestion in Horley are required in the future.

4.2 Background Sources

4.22 The background nitrogen dioxide is essentially a combination of nitrogen dioxide pollution from road traffic emissions from outside of the borough, industrial emissions from across the south east, and also local and regional household emissions from domestic central heating for example, together with a contribution from local residential roads.

4.23 The background concentration of nitrogen dioxide within the Horley AQMA is predicted to fall until around 2015 (Figure 2.12) assuming a business as usual scenario, and these falls in the background to date, and predicted for the future, have helped and will help off set the increasing emissions from the airport.

4.24 Given the potential year on year improvements in the background nitrogen dioxide concentrations and as by its very nature a large proportion of the background nitrogen dioxide is from regional sources outside of the borough, and thus outside the control of the council, there is little that the council can do at a local level that is both cost effective and which will lead to a significant reduction in the background concentration of nitrogen dioxide in the short to medium term.

4.25 At a national level a further tightening of vehicle emissions standards for both cars and more importantly HGVs over and above those already predicted, would have a significant impact on the background concentrations of nitrogen dioxide not just in Reigate and Banstead but across the UK and Europe.

4.26 However, as with the non airport related road traffic emissions there are some measures which the council can take to help limit future increases in the 'local component' of the background concentration of nitrogen dioxide i.e. beyond 2015, which has benefits for both the Horley AQMA and the borough as a whole.

4.2.1 Heating and Insulation

4.27 On a local level the local contribution to the background concentration of nitrogen dioxide can be reduced by:

i) the specification and installation of central heating systems that have a low NO_x output.

ii) burning less fuel, by ensuring that new houses are built to high insulation standards and ensuring that existing homes, for example those in the housing trust, are brought up to modern insulation standards where practicable.

4.28 Within the action plan it is not proposed to include schemes to update home insulation and heating systems, as the housing trust for example has such plans in place already (Cogbill, 2006), and various grants are available for home insulation that are promoted by the council.

4.29 However, planning is currently underway for a new residential housing development in Horley that will increase the number of residential properties in the area by 29 %. Thus the installation of low NO_x boilers in this new development would have a significant impact on the growth of local NO_x emissions. Consequently proposals have already been submitted to the planning department that low NO_x gas boilers should be used in the housing development, and that this specification should be included within the design guide for the new development.

4.2.2 Energy from Renewable Sources

4.30 As part of the planning requirements for the new development in Horley, a condition has been included that 10 % (as a minimum) of the energy used by the residences has to come from renewable sources. At this stage it is unclear what form this renewable source will take, although there is a risk from some sources e.g. biomass burning that a localised source of NO_x pollution will be created.

4.31 Nevertheless, there is the potential for a further reduction in the overall amount of NO_x produced by the development, and thus the renewable energy section of the Horley design guide has been included in the action plan. This is for the potential benefits of minimising future increases in local NO_x emissions, although the main benefits will be in terms of carbon emissions, and also to

keep a 'watching brief' to ensure that a very localised NO_x problem is not created e.g. plume grounding either within the Horley AQMA or elsewhere from biomass burning.

4.2.3 Home Zones

4.32 The proposed new housing developments in Horley will also be Home Zones, as set down in the Horley design guide. From an air quality perspective the low vehicle speeds associated with home zones i.e. under 20 mph, have the potential to increase the local residential road networks contribution to the background nitrogen dioxide concentration i.e. NO_x emissions are likely to be higher than might be the case if higher vehicle speeds were possible.

4.33 However, if such a scheme encourages people to walk or cycle for local trips to the shops, or the station (which ties in with the improved cycle path provision), then there may well be a net, albeit small, air quality benefit. Once again this has little impact on the Horley AQMA directly, but it does help minimise the future growth in the background concentration of nitrogen dioxide.

4.3 Other Measures

4.3.1 Purchase of Affected Residential Properties

4.34 An alternative to reducing NO_x emissions in order to meet the air quality objectives at the relevant receptors, is simply to purchase properties that are over or predicted to be over the EU limit value, so that there are no relevant receptors affected by the high concentrations of nitrogen dioxide. This has been done by councils elsewhere in the UK (NSCA, 2001), but while this may produce a short term solution to the problem, this measure is inappropriate for the Horley AQMA and is one that will *not* be taken by the Council for the following reasons:

i) Cost. With house prices in the area over £200,000, and around 30 properties that are at risk of breaching the 2010 EU limit value, the cost to the council would be in the region of £6 million for a voluntary purchase scheme. Given that the airport is predicted to be responsible for over 50 % of the pollution problem at these properties by 2010, such an action is against the concept of the polluter pays and would effectively amount to a state subsidy of a private business.

ii) Sustainability. The UK sustainable development strategy (DETR, 2000) places an emphasis on the effective protection of the environment within the context of social and economic progress, and thus infers the need for well targeted action in

managing the worst environmental risks first, and for investing in prevention rather than cure. Purchasing the affected properties does not solve the problem of increasing emissions from the airport, and thus beyond 2015 potentially an ever increasing number of houses would need to be purchased.

iii) Legal. The UK objectives for nitrogen dioxide only have to be met at relevant receptors i.e. residential properties, schools, and hospitals in the case of the annual average nitrogen dioxide concentration, and the UK Government applies a similar interpretation to the 2010 EU limit values for nitrogen dioxide. However, the original EU legislation applies the 40 μg m^{-3} annual average value for nitrogen dioxide to an area regardless of the presence or absence of human exposure. Thus if such a scheme were pursued there is a risk that this would not help the Government meet its obligation under European law.

4.35 While the purchase of residential houses by the council is inappropriate as a means of addressing air quality problems, this does not mean that such an approach is inappropriate for the airport operator, providing:

i) it is only used as a short term measure to gain time while longer term measures are put in place to reduce emissions from the airport;

ii) residents who wish to sell are paid a fair market price for the property;

iii) properties that are purchased are maintained so as not to drive down the prices of other residences in the area, or otherwise affect the amenity of the area.

4.3.2 National Measures

4.36 At a national level the Government needs to push for tighter constraints on engine emissions from both HGVs and cars, as discussed in section 4.2, which has the effect of reducing both background nitrogen dioxide concentrations and the emissions from the specifically modelled roads. However, this tightening of emissions legislation primarily at an EU level must not be done in isolation from other road vehicle legislation e.g. safety legislation.

4.37 It is not within the remit of the action plan to discuss in depth the various trade offs between air pollution and vehicle safety measures, but policy and law makers do need to examine the trade

offs in a quantifiable and scientific manner between vehicle safety features for example which might add weight to a vehicle, and the impact on air quality and health, and also carbon emissions.

4.38 The Government also needs to be pushing for more stringent emissions limits on aircraft engine emissions at an international level, as at Gatwick these are the biggest and fastest growing source of pollution from the airport. Such improvements are not only important for local air quality in the UK and elsewhere in the world but also in terms of global climate change, where high level NO_x emissions have a far greater net global warming potential than those emitted at ground level (AQEG, 2005). It is also important to bear in mind that given the likely future UK and global growth in air transport, and the longer life span of a commercial airliner compared to a car / lorry, any delays in agreeing and implementing improved emissions standards for aircraft engines have much longer lasting impacts than for road vehicles.

4.3.3 Local Forums

4.39 As discussed in section 3.0 the council has limited influence over the airport directly. Nevertheless, the council will continue to ensure that joint local authority meetings and other forums are aware of the current air quality issues in relation to the airport, so that local authorities with planning responsibilities for the airport are able to make informed decisions that take account of air quality.

4.40 The council will also continue to push for the inclusion of a series of measures in the airport's sustainable development strategy in relation to air quality, which are also likely to form part of the airport's action plan to reduce air pollution.

4.41 As part of this work the council will be putting forward proposals for air quality modelling examining scenarios five and ten years in advance of the present day, with the exercise repeated every five years to:

i) identify potential future problems in air quality in relation to the airport;

ii) allow the implementation of measures to mitigate / prevent air quality problems on a pro active basis;

iii) move away from the reactive situation that currently exists at the airport.

4.3.4 Monitoring

4.42 Monitoring of the air quality within and around the Horley air quality management area will continue as part of the action plan, to help ensure that air quality within the Horley AQMA meets, and continues to meet, the relevant European limit values and thus help protect residents health within the AQMA.

4.43 The monitoring program will be regularly reviewed to ensure that it is providing the information that is needed for both compliance monitoring and also to help verify and inform the dispersion modelling at the airport, so as to ensure that the predictive modelling of future air quality in the vicinity of the airport is as accurate and precise as is reasonably practicable.

4.4 Summary of Proposals for minimising the increase in Non Airport Sources of Pollution

4.44 Table 4.2 summarises the proposed actions and measures that Reigate and Banstead BC will undertake in relation to the non airport NO_x emissions within the Horley air quality management area, in order to help the UK Government achieve the EU annual mean limit value for nitrogen dioxide of 40 µg m^{-3} by 2010, and to help the Government to continue to meet the objective beyond 2010.

4.45 The table also includes approximate time scales, costs, and an indication of the potential advantages and disadvantages of each action, and the likely impact on nitrogen dioxide concentrations. These actions are considered a proportionate response to the problems of poor air quality within the Horley AQMA, given that:

i) the contribution of non airport sources of NO_x to the properties where a breach of the 2010 objective is likely is less than 50 % and is predicted to fall further beyond 2010.

ii) NO_x emissions from the airport are predicted to contribute over half of the pollution problem at the affected properties in 2010, and emissions from the airport show no sign of decreasing in the near future due to increasing aircraft emissions.

Measure	Cost[a]	Air Quality Improvement[b]	Person / organisation responsible	Indicator	Start Date	Completion Date	Additional Benefits	Potential Problems	Comments	Simple Cost : Benefit for Air Quality Purposes. (Cost x AQ Improvement, 1 = most cost effective)
Limit Road Transport Growth to 5.5 % by 2011 from 2004/5 levels. (Annex 9 LTP).	High (3)	c.0.1 µg m^{-3} (2) at RB59[(c)]	SCC (via LTP 6).	For current traffic flows see note 'd' at end of table.	April 2006	April 2011	Primary aim is to limit growth in congestion across Surrey. If scheme is successful air quality benefits will be county wide, not just within the AQMA.	Failure of LTP. For air quality this would have minimal impact on Horley AQMA, as already working to higher traffic flows. (see note c).	Cost borne by Surrey County Council	6
Fastway Route (Horley to Crawley via Gatwick).	High (3)	<0.1 µg m^{-3} (3)	SCC / RBBC/ HTC/ BAAG.	Reduction in peak hour traffic flow.	Jan 2006	April 2011	Main aim is to reduce peak hour traffic flows, and thus congestion.	Fails to achieve modal shift in peak hours.	General measure to reduce car usage. If significant shift does occur, as seen else where, impact on air quality within AQMA could be as high as 0.1 µg m^{-3}.	9 (possible 6 if significant modal shift (> 5%)).
Fastway Interchange at Horley Station.	High (3)	<0.1 µg m^{-3} (3) at RB59	SCC / RBBC for information contact Emily Mottram Policy & Regeneration (RBBC).	Project Completion	April 2006	April 2011	If helps modal shift, then benefits for AQ and congestion on all major roads in area. Improved transport links for non motorists.	Project is subject to funding.	Cost is £2 million, with cost split between SCC, local authorities, and others. Impacts on AQ within AQMA will be small, but will not have an adverse impact.	9
Bus Priority Lanes on A23 (p105 5.43 in LTP).	Medium (2)	<0.1 µg m^{-3} (3) at RB59	SCC / RBBC for information contact Emily Mottram Policy & Regeneration (RBBC).	Project Completion	Unknown	April 2015	Faster public transport.	Depends on nature of the scheme. If existing lane space is used up, possible increased congestion for other road users at junctions. If this does occur then risk of decline in air quality in these areas.	Minimal benefit to air quality within Horley AQMA.	6

Measure	Cost[a]	Air Quality Improvement[b]	Person / organisation responsible	Indicator	Start Date	Completion Date	Additional Benefits	Potential Problems	Comments	Simple Cost : Benefit for Air Quality Purposes. (1 = most cost
Extension of Fastway to Redhill and Reigate. (LTP2 aspiration).	High (3)	<0.1 µg m^{-3} (3) at RB59	SCC / RBBC for information contact Emily Mottram Policy & Regeneration (RBBC).	Project Completion	Unknown	April 2015 (if implemented)	Main benefits of scheme are improved public transport links within the borough. Also possible improvements in AQ within Reigate High Street AQMA.	Project may not go ahead, no measurable benefit for Horley AQMA.	As impacts on air quality within the AQMA are small to negligible, failure of the scheme has no impact on air quality within the Horley AQMA.	9
Maintain current taxi licensing regime.	Low (1)	<0.1 µg m^{-3} (3) at RB59	RBBC Licensing.	Standards relating to Taxis maintained	On going	On going	New vehicles for passengers, thus potentially safer. Lower emissions across borough.	Cost of measures to taxi operators.	Current scheme means that entire taxi fleet is replaced every 9 years. Minimal impact on Horley AQMA.	3
Public Service Agreement to reduce Congestion on the A217 and A23 (Horley Road).	Low (1) (to RBBC)	<0.1 µg m^{-3} (3) at RB59	SCC / RBBC/ ODPM. Contact Linden Mendes SCC.	5 % reduction in average vehicle delay by March 2008.	March 2005	March 2008	Main aim is reduction in congestion on these routes. This may have a minor impact on air quality if congestion is reduced.	No impact on pollution within Horley AQMA. Risk that congestion problem is simply moved elsewhere.	Success or failure of project has no bearing on Horley AQMA. However, reason for success / failure worth bearing in mind – if appropriate – for future reference if congestion becomes a problem within the Horley AQMA.	3
Travel Plans (Work).	Low to medium (1 to 2)	<0.1 µg m^{-3} (3) at RB59	RBBC / Local employers Contact Julia Dawe Policy & Regeneration (RBBC).	4 to 5 plans to be completed per annum.	On going	On going	Wider air quality benefits for borough, reduced congestion on roads, or reduced rate of congestion growth.	Potentially high implementation and running costs for employer. Unlikely to have impact on air quality in Horley AQMA, as major businesses in area already have plans.	Plan is nothing unless implemented, maintained and updated. Most major employers in Horley have a travel plan in place.	3 to 6

Measure	Cost[a]	Air Quality Improvement[b]	Person / organisation responsible	Indicator	Start Date	Completion Date	Additional Benefits	Potential Problems	Comments	Simple Cost : Benefit for Air Quality Purposes. (1 = most cost effective)
Travel Plans (Schools) (LTP indicator TP3).	Low to medium (1 to 2)	<0.1 µg m^{-3} (3) at RB59	SCC (Richard Hoyland).	All Horley Primary and Secondary schools have, and have implemented, a travel plan.	On going	2010 / 12	Depending on type and nature of plan, reduced congestion in vicinity of schools, reduced AM peak flows. If pupils cycling then health benefits.	Minimal impact on air quality within Horley AQMA. Possible safety risks to cyclists and pedestrians if poor road sense.	Risk that when Head / person responsible for plan leaves, active implementation of plan ceases.	3 to 6
Continued Promotion of Surrey Car Share.	Low (1) (to RBBC)	<0.1 µg m^{-3} (3) at RB59	Contact at RBBC – Raymond Dill Policy & Regeneration.	Steady Growth in number of participants. (1300 users at start of 2006).	On going	On going	Lower rate of traffic growth on roads.	Risk of bad experiences when using scheme will put people off.	Measurable improvements in air quality unlikely in the short term, minimal if any impact on air quality within the AQMA.	3
Implementation of Council Travel Plan.	Low to medium (1 to 2)	<0.1 µg m^{-3} (3) at RB59	RBBC Raymond Dill Policy & Regeneration.	Implementation of plan.	Jan 2006	Implemented end 2008.	Enables council to demonstrate commitment to travel plans. Possible improvements in air quality on Reigate High Street.	Negligible impact on Horley air quality management area.	Implementation allows council to encourage other employers to implement their own plans, with possible benefits for Horley.	3 to 6
Additional Cycle Paths in Horley.	Medium (2)	<0.1 µg m^{-3} (3) at RB59	SCC. For information contact Raymond Dill Policy & Regeneration (RBBC).	Additional 5 km of cycle paths linking Horley Station, new developments, airport, and shops.	Jan 2005	Dec 2010	Extension of existing cycle path network. Potential health improvements from increased exercise.	No one uses new routes, hence 'waste' of money.	AQ impact minimal unless major shift to cycling. Although risk that paths are not used, at present the lack of paths and heavy traffic on the road is a disincentive to cycle.	6

Measure	Cost[a]	Air Quality Improvement[b]	Person / organisation responsible	Indicator	Start Date	Completion Date	Additional Benefits	Potential Problems	Comments	Simple Cost : Benefit for Air Quality Purposes. (1 = most cost effective)
Incorporation of Sustainable energy policy into local development framework document.	Low (1) to RBBC, possibly Medium (2) to High (3) to developers.	Variable, depending on scheme.	RBBC Policy & Regeneration Raymond Dill.	Incorporation of policy	Current	Jan 2007	Reduction in CO_2 emissions.	Depending on energy source there is a risk of local AQ hotspots e.g. biomass burning. Also additional cost to development.	Benefit to Horley AQMA marginal in short term. However, may help reduce growth in background NO_2 concentrations from new developments in area, which would be of benefit.	?
Horley Design Guide: - Low NO_x boilers.	Low (1)	<0.1 µg m^{-3} (3) at RB59	RBBC Leon Hibbs	Measure adopted by developers.	June 2005	Jan 2007	None – aim is to reduce local NO_x emissions.	Higher emissions boilers chosen – rate of increase in background higher than need be.	Aim is to minimise growth in background.	3
- Minimum of 10 % of energy from renewable sources.	Medium (2)	<0.1 µg m^{-3} (3) at RB59, but potential increase for local 'hot spots' depending on source.	RBBC Policy & Regeneration Raymond Dill.	Scheme up and running.	On going	Jan 2007 for local development framework policy	Minimises CO_2 emissions. Sustainable energy supply.	Amenity / visual impact of scheme – though dependent on source. Risk of localised NO_x 'hot spots' if for example biomass burner.	Background NO_x benefit dependent on source used, and if burning fuel if heat generated used in a local heating scheme.	6
- Home Zone.	Medium (2)	<0.1 µg m^{-3} (3) at RB59	RBBC Planning	New developments completed as home zones.	On going	Jan 2007	Makes for a more pleasant residential area. Encourages walking.	If cars running at much lower speeds risk of more pollution generated.	Impact on air quality potentially low. However, may encourage walking over short distances and avoid car use.	6
Monitoring.	Low (1) to Medium (2) depending on time scale	N/A	RBBC Leon Hibbs	Data capture > 90 %.	On going	On going	Equipment also available for some emergency planning scenarios.	N/A	Real time background site used for diffusion tube work elsewhere in the borough.	N/A

Measure	Cost[a]	Air Quality Improvement[b]	Person / organisation responsible	Indicator	Start Date	Completion Date	Additional Benefits	Potential Problems	Comments	Simple Cost : Benefit for Air Quality Purposes. (1 = most cost effective)
Local Forums / Policy: - AQ Working Group with BAAG.	Low (1) to RBBC	1 µg m^{-3} (1) at RB59	RBBC Pollution Team	No specific measure, but will include Gatwick AQ plan implemented, on going predictive modelling work.	On going	On going	Good working relationship with BAAG. Also access to data to enable future modelling of the airport.	None, other than airport action plan may not be implemented.	Good opportunity to share council and airport technical expertise in relation to measures affecting air quality. Also to include surrounding local authorities where relevant.	1
- New section 106 agreement and sustainable development strategy.	Low (1) to RBBC	1 µg m^{-3} (1) at RB59	RBBC Planning and Environ. Health. Others: GAJA, GOG, GATCOM.	Agreement and Implementation of new agreement and strategy.	On going	Mid 2007	Work also relates to noise, surface access, water quality. Aim is to maintain profile of AQ as potential longer term problem if not addressed.	AQ measures 'watered down' so that do not deliver real improvement in air quality.	AQ improvement is connected to the above measure, not in addition to it.	1
National / EU measures: - Tighter vehicle emissions standards.	Low (1) to RBBC, but very high (3+) to industry.	Up to 1 µg m^{-3} (1) at RB59	UK Government via EU.	Higher standards in place.	?	?	UK and EU wide benefits, not just local.	Improvements on an urban test cycle do not translate into improvements in emissions in the real world.	Policies and standards for different areas e.g. safety must be co-ordinated, so that benefits are maximised.	3+
- Tighter aircraft engine emissions standards.	Low (1) to RBBC, but very high (3+) to industry.	Aim is to reduce the rate of growth of aircraft emissions.	UK Government via EU.	Higher standards in place.	?	?	Global benefits not just for AQ around airports, but also from a climate change perspective.	-	Aircraft emissions are the only growing source of NO_x at Gatwick between 2005 and 2010.	?

Notes:
[a] (1) Low £<100K, (2) Medium £100K to £1 million, (3) High £1 million to £10 million.
[b] (1) improvement of 1 µg m^{-3}, (2) 0.1 to 1 µg m^{-3}, (3) <0.1 µg m^{-3}.
[c] as used mid line forecast in original TEMPRO model equivalent to a 10 % increase in traffic 2005 to 2010.

[d] The current traffic flows as measured on roads in the area are as follows:

	Site ID	AADT 2004	AM weekday peak flow 2004	PM Weekday peak flow 2004
A217 (Mill Lane / Nursery Lane)	A0217 (04063A)	18,061	2036 (8 to 9am)	1703 (17 to 18:00)
A23 (just before Massetts Rd / Woodroyd Av.)	A0023 (04082C)	29,392	2217 (8 to 9am)	2493 (17 to 18:00)
M23 Gatwick Spur (contact Margaret King at: area4@interroutejv.co.uk)	6009 & 6010 (TRADS 2 Ref) (529427, 141683) and 529498, 141694)	63,500 (2% HGV)	4719 (8 to 9am) 4874 (9 to 10am)	3862 (17 to 18:00) 4236 (18 to 19:00)

RB59 is the worst case receptor within the Horley Air Quality Management Area (AQMA).

BAAG: British Airports Authority – Gatwick.
GAJA: Gatwick Airport Joint Local Authorities.
GATCOM: Gatwick Consultative Committee.
GOG: Gatwick Officers Group.
HTC: Horley Town Council.
ODPM: Office of the Deputy Prime Minister.
RBBC: Reigate and Banstead Borough Council.
SCC: Surrey County Council.

Table 4.2 Summary of Proposed Actions for the Non Airport Sources of Pollution within the Horley AQMA.

5.0 Action Planning for Airport Related Emissions

5.1 The original intention of the action planning work was that the action plan produced by BAA Gatwick would form part of an integrated document for reducing air pollution within the Horley Gardens AQMA. However to date (April 2006) the airport has still to complete this project, and so the actions to be taken to reduce the overall emissions from the airport will form an addendum to this document.

5.2 While the council has been involved in the action plan to reduce emissions from the airport it is not for the council to say what measures the airport should adopt to reduce emissions, as this ultimately is a business decision to be made by the airport in terms of the measures it wishes to use based on long and short term investment and development priorities.

5.3 Nevertheless, it is the council's role to assess air quality and to point out if, when, and where, a breach of the air quality objectives is likely to help the UK Government meet the various EU limit values. This assessment work also allows the council to provide similar information to the airport so that it is in a position to take informed and appropriate remedial and preventative actions to ensure that the air quality objectives are met in the vicinity of the airport.

5.4 To this end there are a small number of key factors that any airport action plan will need to address in the longer term based on the results to date.

i) airport emissions are predicted to contribute over 50 % of the NO_x pollution where properties are predicted to be at risk of breaching the 2010 EU limit value, and so the airport has a significant role to play in reducing emissions.

ii) emissions from the airport are increasing year on year in real terms, not just as a proportion of total emissions, as the airport develops. The potential for considerable further growth at the airport from 38 million passengers per annum in 2010 to 44 to 45 million passengers per annum with the current airport configuration means that emissions are unlikely to fall without direct intervention.

iii) the predicted increase in emissions from the airport between 2002/3 and 2010 is due entirely to the emissions from the aircraft themselves (Figure 2.7).

iv) the increase in aircraft emissions in the longer term is unsustainable, as in 2010 58 % of the airport emissions come from the planes themselves (including the auxiliary power units). Thus while improvements can be made in the short term by tackling non aircraft sources at the airport, if no attempt is made to tackle aircraft emissions in the longer term then air quality will remain a risk to further development of the business.

5.1 Emissions Charging

5.5 One method of encouraging a shift to and development of lower emission aircraft is to use emission charging at the airport, for example in terms of a fixed cost per unit weight of pollutant emitted. However, any emissions charging scheme needs to be based on a robust and fully quantified economic study that is open to scrutiny and takes into account other major airports in the south east. This ensures that the charging scheme will deliver a real improvement in local air quality, and ensures that a pollution problem is not simply moved elsewhere.

5.6 If such a study is not undertaken then any emissions charge risks simply becoming a tax on landing, and a cost to the airline industry which does nothing to improve air quality.

5.2 Emissions Cap

5.7 The aim of the council's action plan for the Horley AQMA, and the airport's action plan, is to ensure that the annual mean EU limit value for nitrogen dioxide is met by 2010, and continues to be met beyond this date. In a situation where the air quality limit value is not being met beyond 2010, then consideration will need to be given to the feasibility of a cap on emissions from the airport.

5.8 At this stage it is not proposed that an emissions cap be introduced, merely that the feasibility of introducing an emissions cap in the event of a breach of the EU limit value for nitrogen dioxide be examined.

5.9 The introduction of an emissions cap not only has potential air quality benefits in the event of a breach of the limit value, but it would also be in the interest of the airport if rising global ozone levels mean that it becomes increasingly difficult to achieve the nitrogen dioxide limit value.

5.10 In this situation an emissions cap, with possible year on year reductions, would enable the airport to show that it was working towards improving air quality even if the nitrogen dioxide limit value was being breached.

5.11 The feasibility study on such an emissions cap would need to look at if the emissions inventories were robust enough to make an emissions cap work in practice, given the assumptions made in the inventories, and also at what level a cap should be set.

6.0 Consultation

6.1 A consultation exercise on the draft (April 2006) action plan began in June 2006, and as part of this work a letter was sent to all residents (1561) within the Horley air quality management area updating them on the wok to date, and asking them for feedback on the measures proposed within the action plan. A feedback form was enclosed (Appendix C) along with a prepaid envelope.

6.2 In addition a presentation was given to Horley Town Council on the action plan, and the statutory / interested parties listed in Appendix D were sent a copy of the action plan and asked for their comments and views both in general and on the individual measures within the plan.

6.1 Residents' Feedback

6.3 A total of 161 feedback forms were returned by 31st December 2006, representing 10.3 % of the residents contacted. This represents quite a low rate of return for this area, as a previous study examining the type of air quality information that residents would like to receive in 2004 had a return rate of 20 %. Thus when examining the results of the feedback on the action plan this low return rate (for this area) needs to be borne in mind.

6.4 Nevertheless, of the residents who responded a minimum of 66 % either agreed or strongly agreed with the measures proposed (Table 6.1), with the exception of the proposal for bus priority lanes on the A23.

6.5 The installation of a bus priority lane on the A23 was the only measure where there was significant disagreement, 43 % compared to 37 % in agreement, with 20 % neutral. The reasons cited for disagreeing with the measure included a lack of space for the lanes, likely increased congestion for the other road users, and cost.

6.6 Although overall residents agreed with measures aimed at extending the Fastway bus service, 18 to 20 % of those who responded disagreed with these proposals compared to less than 7 % disagreement with any of the remaining proposals in the action plan. The reasons cited against the extension of the Fastway bus service centred on the disruption that had been caused by junction changes undertaken as part of the first phase of the Fastway service, coupled with concerns over the size of the Fastway buses and their suitability for use in Horley.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total Responses	Summary (%) Agree	Disagree	Neutral
To limit road transport growth to 1% per year between 2005 and 2011.	43.9	36.3	12.7	2.5	4.5	157	80.3	7.0	12.7
To extend the Fastway bus route (Horley to Crawley via Gatwick) to serve the new housing developments planned for Horley.	30.2	38.4	11.9	7.5	11.9	159	68.6	19.5	11.9
Establish a new Fastway bus interchange at Horley Station.	26.8	39.5	16.6	5.7	11.5	157	66.2	17.2	16.6
Install bus priority lanes on the A23.	18.4	19.1	19.7	27.6	15.1	152	37.5	42.8	19.7
To extend the Fastway bus service to Redhill and Reigate.	28.7	42.0	11.5	9.6	8.3	157	70.7	17.8	11.5
Encourage local businesses to draw up plans to help their employees use the car less.	34.2	41.8	18.4	4.4	1.3	158	75.9	5.7	18.4
Help schools reduce car use.	52.2	37.3	9.3	1.2	0.0	161	89.4	1.2	9.3
Continued promotion of Surrey Car Share (an internet site that allows people making similar road trips to be matched and so share a car journey).	30.3	42.6	19.4	6.5	1.3	155	72.9	7.7	19.4
Implementation of the Reigate and Banstead Council travel plan for employees and councillors. (Although this will have no noticeable impact on Horley, it is to lead by example).	22.9	43.1	30.7	2.6	0.7	153	66.0	3.3	30.7
Ensure that new housing developments proposed for Horley are linked to the existing cycle path network.	38.5	42.3	14.1	1.9	3.2	156	80.8	5.1	14.1
The following two items are designed to help reduce nitrogen dioxide pollution mainly from domestic heating, both in Horley and across Reigate and Banstead, by the use of less fuel e.g. gas. Both measures are designed to limit nitrogen dioxide pollution in the longer term from new developments, and are:									
To incorporate a sustainable energy policy into the council's local development framework document.	34.4	49.0	13.4	1.9	1.3	157	83.4	3.2	13.4
In the Horley Design Guide ensure that there is a requirement for low NOx boilers, and a minimum of 10% of energy from renewable sources.	37.7	44.7	13.8	3.8	0.0	159	82.4	3.8	13.8
Although this action plan is aimed at non airport sources, it is proposed to ensure that any legal agreement over the future development at the airport includes measures to reduce air pollution.	71.5	22.2	5.1	0.6	0.6	158	93.7	1.3	5.1
The following proposal is not currently in the action plan for Horley, but your view would be appreciated. In future developments policies, ensure that there is a requirement for heating systems which produce no pollution e.g. Solar Panels	40.5	43.7	12.7	3.2	0.0	158	84.2	3.2	12.7
Notes: Feedback forms were sent to 1561 homes with an explanatory letter on the 23rd and 24th August 2006, with a closing date of 25/9/06. 161 responses were received back (10.3 %) by 31st December 2006. Some replies did not express an opinion on all items on the feedback form. All figures are % rounded to 1 d.p. except total responses.									

Table 6.1: Summary of Residents' Feedback on the Proposed measures within the action plan for the Non Airport Sources of Nitrogen Dioxide.

6.2 Statutory Consultation

6.7 Horley Town Council noted the measures in the action plan, though were 'concerned by the direction of growth in airport emissions'. The Highways Agency had no specific comments in relation to the action plan.

6.8 Crawley Borough Council, who are the planning authority responsible for Gatwick, stated that, 'Crawley Borough Council agrees with and supports the proposals for improvements in public transport, alternative modes of transport and travel plans. Crawley Council and West Sussex County Council are closely involved with, and financially supportive of, the extension of the Fastway route between Crawley and Horley via Gatwick.

6.9 'Crawley Borough Council welcomes and supports Reigate and Banstead's involvement in bringing about air quality improvements at Gatwick Airport through the new s.106 agreement and Sustainable Development Strategy. Crawley Council hopes to work closely with, Reigate and Banstead Council, BAA and other neighbouring local authorities, to agree and implement the new s.106 and Strategy in the near future.'

6.10 DEFRA responded that the plan was 'thorough and well thought out', and 'well written and covers the majority of the main processes required from an action plan'. Nevertheless, three main comments were made by DEFRA, and the responses to these are listed below.

6.11 More explicit consideration (should be given) to financing of the measures and whether additional funding will be required.

All of the proposed measures within the action plan are fully financed either via Surrey County Council and the local transport plan, or by Reigate and Banstead Borough Council. The only exceptions to this are:

i) the extension of the Fastway route to Reigate and Redhill, although the Borough Council is in discussions with Surrey County Council over funding of this work.

ii) the tighter emissions standards relating to aircraft and vehicle engines.

6.12 More explicit consideration (should be given) to the mechanism for monitoring and evaluation of progress within (the) action plan measures.

Table 4.2 of the action plan summarises the measures and the start and completion dates where these have been set. For the major infrastructure projects e.g. the Fastway interchange

at Horley station no intermediate indicators have been included in the plan, as the intention was, and remains, to simply contact the people responsible for the project on an annual basis prior to the production of the progress report to ask if the project is on track against their more detailed work schedule, and if not how far behind the project is, and if the original completion date for the whole project is still likely to be achieved.

6.13 For the smaller projects the indicator column gives an appropriate indicator for annual reporting of progress, especially with the soft / smart options e.g. a certain number of travel plans completed per annum, additional members of Surrey Car Share etc. Progress on each of the actions will be reported as part of the annual progress report to DEFRA, as has been the case with the measures contained within the action plan for the M25.

6.14 *Include details of the consultation mechanism, and how the results of the consultation have influenced the plan.*

The measures in the action plan were the result of discussions with the principal transport planner at Surrey County Council, and also meetings with the Policy and Regeneration Team (Planning) at Reigate and Banstead Borough Council prior to the production of the action plan.

6.15 The aim of these meetings and discussions was to draw together a series of practical and realistic measures for which funding was, or was likely to be, available, and which had benefits for the area other than just in terms of improvements in air quality, bearing in mind the fairly limited improvements in air quality that were possible when tackling non airport sources of pollution alone.

6.16 Due to the limited impact that improvements in local non airport sources of pollution would have on the overall exposure of residents within the Horley AQMA, residents were consulted mainly on the measures proposed in the draft action plan (section 6.1). However, elsewhere in the borough where a large proportion of the pollution is due to local sources e.g. Reigate High Street, residents and businesses are consulted prior to the production of the draft action plan for suggestions for measures to be included within the plan.

6.17 Aside from the comments from Horley Town Council, Crawley BC, the Highways Agency, and DEFRA, no other responses were received from the statutory consultees or other interested parties listed in Appendix D.

Appendix A.

2002/3, 2005, 2010, and uncorrected 2010 NO_2 Concentrations.

Site code	Site Description	2002/2003	2005	2010* unadjusted	2010	Change 2005-2010
RB11	Outside 38, Riverside, Horley	34.6	33.0	30.2	29.9	-9.3%
RB13	Public Car Park, off Massetts Road, Horley	27.6	26.0	23.9	22.6	-13.2%
RB51	Outside 17 Wolverton Gardens, Horley	30.4	28.7	26.1	25.1	-12.6%
RB52	Outside 20 Wolverton Gardens, Horley	31.7	30.0	27.3	26.5	-11.6%
RB53	Outside 66/68 Cheyne Walk, Horley	32.2	30.7	28.1	27.5	-10.5%
RB54	Outside 7/9 Crescent Way, Horley	32.7	31.1	28.6	28.0	-9.9%
RB55	Outside 40a Crescent Way, Horley	34.5	33.0	30.4	30.2	-8.5%
RB56	Outside 8/10 The Crescent, Horley	36.1	34.7	32.1	32.2	-7.2%
RB57	Outside 29/31 The Crescent, Horley	37.7	36.3	33.7	34.1	-6.2%
RB58	Outside 39/41 The Crescent, Horley	38.9	37.5	34.8	35.4	-5.7%
RB59	Outside 92/94 The Crescent, Horley	42.4	**41.0**	37.6	38.7	-5.7%
RB60	Outside 120/122 The Crescent, Horley	37.8	36.4	33.8	34.1	-6.2%
RB61	Outside 79/81 The Crescent, Horley	36.0	34.6	32.2	32.2	-6.8%
RB64	Outside 16/22 The Drive, Horley	29.5	28.0	26.0	24.9	-11.0%
RB65	Outside 4/6 The Drive, Horley	29.0	27.5	25.4	24.3	-11.6%
RB66	Outside 3a/3b Fairfield Avenue, Horley	29.9	28.4	26.3	25.3	-10.8%
RB67	Outside 30/32 Fairfield Avenue, Horley	31.2	29.7	27.6	26.8	-9.7%
RB68	Outside 57 Fairfield Avenue, Horley	32.4	31.0	28.8	28.3	-8.8%
RB69	Outside 61 Upfield, Horley	33.4	31.9	29.5	29.1	-8.7%
RB70	Outside 58/60 Upfield, Horley	31.2	29.7	27.6	26.8	-9.7%
RB72	Outside 25/27 Upfield, Horley	29.7	28.1	26.0	25.0	-11.1%
RB73	Outside 9/11 Upfield, Horley	29.1	27.5	25.4	24.2	-11.8%
RB74	On Green, 30a/30b Meadowcroft Close, Horley	34.8	33.2	30.7	30.5	-8.1%
RB75	On Roundabout, The Coronet, Horley	35.3	33.3	29.9	29.5	-11.4%
RB76	33 Limes Avenue, Horley	30.4	28.8	26.5	25.6	-11.1%
RB77	Layby at Entrance to Staffords Place, Horley	29.4	27.9	25.8	24.7	-11.5%
RG1	Horley Air Monitoring Station	32.2	30.7	28.4	27.8	-9.5%
RG2	Outside 74 The Crescent Horley (BAA Site)	40.2	38.8	36.1	36.8	-5.2%
ER1	Brighton Road, Near The Ave	37.5	34.8	27.7	27.0	-22.4%
ER2	Brighton Road, opp. jcn. with Massetts Road	36.4	33.9	27.5	26.7	-21.1%
ER3	Longbridge Road	36.9	34.7	29.3	28.8	-16.9%
ER4	SW end of Cheyne Walk	39.4	37.3	31.8	31.8	-14.7%
ER5	SW end of Woodroyd Gardens	38.9	37.0	32.1	32.2	-13.0%

*Unadjusted figures are model output. For comparison purposes to the 2002/3 and 2005 data use the 2010 column which has had a correction of 1.176 x modelled NO_2 – 5.606 applied.
% changes calculated from un-rounded values.

Note: The adjustment factor applied to the 2010 values is to ensure a consistency of approach, and does not mean that the adjusted data is any more accurate in terms of the 'actual' concentration that will be measured in 2010 than the unadjusted data, especially given the small correction to the data and the uncertainty associated with the predictions for the future fleet mix, passenger numbers etc.

Appendix B.

NETCEN 2010 Modelling Results (Version 4).

NO_x concentrations in µg m^{-3}			Airport											Non-airport						NO_2 (µg m^{-3})
Site	X	Y	Runway 08 Ground	Runway 08 elevated	Runway 26 Ground	Runway 26 elevated	APUs	Airside Vehicles	Engine testing	Car parks etc	Fire training ground	Boiler houses	Airport-related roads	Non-airport roads	Back-ground	Total airport-related	Total non-airport	Total	Total
ER1	527865	142850	0.03	0.04	3.11	0.49	1.58	1.17	0.03	0.09	0.00	0.26	6.81	19.35	27.82	**13.60**	**47.17**	**60.77**	**27.72**
ER2	527777	142786	0.06	0.05	3.05	0.49	1.67	1.24	0.03	0.10	0.00	0.29	6.01	17.06	27.81	**12.98**	**44.86**	**57.84**	**27.51**
ER3	527666	142392	0.20	0.06	3.82	0.61	3.34	2.47	0.04	0.34	0.00	0.81	5.89	14.05	27.84	**17.58**	**41.89**	**59.47**	**29.30**
ER4	527834	142249	0.16	0.05	5.45	0.70	4.60	3.48	0.05	0.78	0.00	2.14	6.97	13.88	27.94	**24.37**	**41.82**	**66.20**	**31.82**
ER5	527910	142202	0.12	0.05	6.22	0.75	4.96	3.79	0.06	0.56	0.00	2.34	6.59	11.94	27.97	**25.44**	**39.92**	**65.36**	**32.13**
RB11	528104	142226	0.03	0.04	6.86	0.78	4.61	3.57	0.06	0.33	0.00	1.27	3.97	5.50	28.02	**21.51**	**33.52**	**55.03**	**30.21**
RB12	528424	142934	0.00	0.03	3.39	0.53	1.55	1.17	0.03	0.09	0.00	0.30	1.22	2.88	27.92	**8.30**	**30.80**	**39.10**	**24.10**
RB13	528362	142983	0.00	0.03	3.24	0.51	1.46	1.10	0.03	0.08	0.00	0.27	1.19	2.93	27.89	**7.91**	**30.82**	**38.73**	**23.95**
RB26	528208	142337	0.01	0.04	6.17	0.74	3.71	2.86	0.05	0.24	0.00	0.91	2.79	4.06	28.01	**17.51**	**32.07**	**49.57**	**28.39**
RB51	527873	142606	0.05	0.05	3.87	0.56	2.33	1.73	0.03	0.15	0.00	0.46	2.15	4.70	27.85	**11.39**	**32.55**	**43.93**	**26.10**
RB52	527892	142463	0.07	0.05	4.54	0.62	3.04	2.27	0.04	0.25	0.00	0.77	2.67	5.01	27.88	**14.31**	**32.89**	**47.21**	**27.32**
RB53	528033	142390	0.03	0.04	5.43	0.68	3.48	2.64	0.05	0.28	0.00	1.05	2.78	4.53	27.94	**16.47**	**32.48**	**48.94**	**28.14**
RB54	528107	142341	0.02	0.04	5.95	0.71	3.75	2.88	0.05	0.27	0.00	1.08	2.94	4.45	27.98	**17.70**	**32.43**	**50.14**	**28.61**
RB55	528250	142186	0.01	0.04	7.54	0.83	4.86	3.80	0.06	0.28	0.00	0.88	3.82	4.80	28.07	**22.10**	**32.86**	**54.97**	**30.45**
RB56	528372	142072	0.00	0.03	8.92	0.91	6.10	4.83	0.07	0.27	0.00	0.65	4.39	5.06	28.13	**26.17**	**33.19**	**59.36**	**32.13**
RB57	528510	141956	0.00	0.03	10.50	0.97	7.06	5.77	0.08	0.27	0.00	0.56	4.93	5.29	28.19	**30.18**	**33.48**	**63.66**	**33.72**
RB58	528501	141914	0.00	0.03	11.23	1.00	7.72	6.39	0.08	0.29	0.00	0.57	5.57	5.82	28.21	**32.89**	**34.03**	**66.92**	**34.83**
RB59	528589	141783	0.00	0.02	13.39	1.06	8.61	7.38	0.09	1.02	0.00	0.61	7.97	7.00	28.21	**40.16**	**35.21**	**75.38**	**37.65**
RB60	528620	141907	0.00	0.02	10.97	0.99	6.84	5.69	0.08	0.33	0.00	0.55	5.09	5.13	28.16	**30.56**	**33.28**	**63.84**	**33.79**
RB61	528554	142011	0.00	0.03	9.58	0.94	6.12	4.96	0.07	0.25	0.00	0.54	4.17	4.65	28.16	**26.65**	**32.81**	**59.46**	**32.17**
RB64	528589	142552	0.00	0.03	4.89	0.68	2.50	1.92	0.04	0.15	0.00	0.46	1.75	3.13	27.98	**12.42**	**31.11**	**43.52**	**25.95**
RB65	528581	142635	0.00	0.03	4.49	0.65	2.23	1.71	0.04	0.13	0.00	0.42	1.59	3.04	27.96	**11.30**	**31.00**	**42.30**	**25.45**
RB66	528499	142512	0.00	0.03	5.12	0.69	2.68	2.06	0.05	0.16	0.00	0.51	1.88	3.18	28.03	**13.17**	**31.21**	**44.39**	**26.31**
RB67	528462	142366	0.00	0.03	6.05	0.75	3.37	2.61	0.05	0.19	0.00	0.59	2.35	3.47	28.06	**16.00**	**31.53**	**47.53**	**27.57**
RB68	528505	142246	0.00	0.03	6.99	0.81	4.10	3.20	0.06	0.21	0.00	0.57	2.80	3.74	28.11	**18.77**	**31.85**	**50.61**	**28.79**
RB69	528335	142224	0.00	0.03	7.22	0.81	4.44	3.46	0.06	0.25	0.00	0.74	3.25	4.19	28.08	**20.27**	**32.27**	**52.54**	**29.55**
RB70	528360	142384	0.00	0.03	5.92	0.73	3.34	2.58	0.05	0.20	0.00	0.68	2.38	3.55	28.03	**15.92**	**31.58**	**47.50**	**27.56**
RB71	528246	142527	0.01	0.03	4.99	0.65	2.73	2.08	0.04	0.17	0.00	0.64	1.97	3.39	27.96	**13.31**	**31.35**	**44.66**	**26.42**
RB72	528220	142583	0.01	0.03	4.67	0.63	2.52	1.91	0.04	0.16	0.00	0.58	1.82	3.33	27.94	**12.37**	**31.28**	**43.65**	**26.00**
RB73	528172	142679	0.01	0.04	4.18	0.58	2.19	1.65	0.04	0.13	0.00	0.47	1.64	3.31	27.91	**10.92**	**31.22**	**42.14**	**25.38**
RB74	529149	141953	0.00	0.01	9.69	0.88	3.79	3.07	0.07	0.25	0.00	0.47	4.32	5.14	27.90	**22.56**	**33.04**	**55.60**	**30.72**
RB75	529203	142192	0.00	0.01	7.33	0.79	3.07	2.46	0.06	0.17	0.00	0.35	2.52	10.95	27.78	**16.76**	**38.74**	**55.49**	**29.87**
RB76	528958	142468	0.00	0.02	5.32	0.71	2.62	2.05	0.05	0.14	0.00	0.34	1.79	4.11	27.81	**13.05**	**31.92**	**44.97**	**26.54**
RB77	528789	142570	0.00	0.02	4.75	0.68	2.38	1.84	0.04	0.13	0.00	0.38	1.65	3.33	27.87	**11.87**	**31.20**	**43.07**	**25.77**
RB78	528550	141853	0.00	0.03	12.22	1.03	8.17	6.91	0.09	0.47	0.00	0.58	6.53	6.26	28.21	**36.03**	**34.47**	**70.49**	**36.06**
CR1	529500	141460	0.00	0.00	10.88	1.02	2.39	2.00	0.07	0.50	0.00	0.70	5.13	9.79	27.95	**22.69**	**37.74**	**60.43**	**31.88**
CR2	526300	139860	4.95	1.69	1.38	0.19	0.99	0.80	0.12	1.56	0.00	0.12	1.00	1.72	27.78	**12.81**	**29.50**	**42.31**	**25.45**
CR3	527800	139980	1.21	0.05	5.59	1.25	1.76	1.41	0.10	0.09	0.00	0.21	6.65	9.66	29.51	**18.33**	**39.17**	**57.50**	**29.27**
LGW3	528601	140799	0.01	0.01	63.26	1.61	6.16	5.83	0.22	0.43	0.00	1.67	7.26	13.48	28.93	**86.46**	**42.42**	**128.88**	**52.94**

Data from NETCEN (2004). Datasheet version 4 - January 2006.

Appendix C.

Resident Feedback Form on the Action Plan.

Feedback on the Measures proposed in the Action Plan

Note: the current action plan to reduce nitrogen dioxide pollution in Horley covers the **non airport sources** of nitrogen dioxide i.e. road traffic, which makes up around 10% of the pollution (compared to the predicted 50% from the airport, and 40% from sources across the south east of England.)

As new road vehicles are becoming cleaner all the time, the aim of this plan is not to reduce existing traffic but to minimise the amount of new traffic coming on to the roads from new housing developments and so on.

The council would welcome your view on whether you agree or disagree with each of the proposed measures, and at the end of this sheet there is space for any additional measures that you think the council should be considering to reduce air pollution from road traffic.

NOTE: if you disagree or strongly disagree with a measure it would be useful if you could give your reasons in the comments box at the end.

Q1 **Please tick how strongly you agree with the following statements?**

	Strongly Agree	*Agree*	*Neutral*	*Disagree*	*Strongly Disagree*
To limit road transport growth to 1% per year between 2005 and 2011.	☐	☐	☐	☐	☐
To extend the Fastway bus route (Horley to Crawley via Gatwick) to serve the new housing developments planned for Horley.	☐	☐	☐	☐	☐
Establish a new Fastway Interchange (the Fastway Bus Service) at Horley Station.	☐	☐	☐	☐	☐
Install bus priority lanes on the A23.	☐	☐	☐	☐	☐
To extend the Fastway bus service to Redhill and Reigate.	☐	☐	☐	☐	☐
Encourage local businesses to draw up plans to help their employees use the car less.	☐	☐	☐	☐	☐
Help local schools reduce car use.	☐	☐	☐	☐	☐
Continued promotion of the Surrey Car Share (an internet site that allows people making similar road trips to be matched and so share a car journey).	☐	☐	☐	☐	☐
Implementation of Reigate and Bansteads Council's travel plan for employees and councillors. (Although this will have no noticeable impact on Horley, it is to lead by example).	☐	☐	☐	☐	☐
Ensure that new housing developments proposed for Horley are linked to the existing cycle path network.	☐	☐	☐	☐	☐

Q2 **The following two items are designed to help reduce the nitrogen dioxide pollution mainly from domestic heating, both in Horley and across Reigate and Banstead, by the use of less fuel e.g. gas. Both measures are designed to limit nitrogen dioxide pollution in the longer term from new developments, and are:**

	Strongly Agree	*Agree*	*Neutral*	*Disagree*	*Strongly Disagree*
To incorporate a sustainable energy policy into the councils local development framework document.	☐	☐	☐	☐	☐
In the Horley Design Guide ensure that there is a requirement for low NOx boilers, and a minimum of 10% of energy from renewable sources.	☐	☐	☐	☐	☐

Q3 **Although this action plan is aimed at non airport sources, it is proposed to ensure that any legal agreement over future development at the airport includes measures to reduce air pollution.**

Strongly agree ☐ *Neutral* ☐ *Strongly Disagree* ☐

Agree ☐ *Disagree* ☐

Q4 **The following proposal is not currently in the action plan for Horley, but your view would be appreciated. In future development policies, ensure that there is a requirement for heating systems which produce no pollution e.g. Solar Panels.**

Strongly agree ☐ *Neutral* ☐ *Strongly Disagree* ☐

Agree ☐ *Disagree* ☐

Q5 **If you have any other suggestions for measures that you think the council should consider for reducing non airport air pollution please use the space provided below (or an additional sheet of paper if needed).**

Q6 **Finally, if you would like to make any additional comments, please use the box below (continue on a separate sheet if necessary).**

Q7 **Personal Information (please note this will remain confidential)**
Name:

Q8 **Address:**

Q9 **Postcode**

Q10 **e-mail:**

PLEASE RETURN THIS FEEDBACK FROM IN THE ENCLOSED PRE PAID ENVELOPE (NO STAMP IS NEEDED), BY 25th SEPTEMBER 2006.

THANK YOU FOR YOUR COMMENTS

Appendix D.

Statutory Consultees and other Interested Parties.

Statutory:
Tandridge District Council
Crawley Borough Council
DEFRA
Environment Agency - Thames Region (SE Area)
Epsom & Ewell Borough Council
Greater London Authority
London Borough of Croydon
London Borough of Sutton
Mole Valley District Council
Surrey County Council – Environment
Surrey County Council – Transport Planning

Other routine consultees:
East Elmbridge and Surrey PCT
Health Protection Agency
Highways Agency
Surrey & Sussex Strategic Health Authority
Sussex Air Quality Steering Group
BAA Gatwick

Gatwick Airport Joint Authorities

Internal

Policy and Regeneration Services – Policy and Environment Dept RBBC.

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