

Creating an atmosphere for change

Stansted Air Quality Strategy 2010-2015



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“Air quality at Stansted Airport is well within UK air quality standards”

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1 Foreword

Stansted Airport is one of the UK's principal international gateways for trade, tourism and travel and is a key driver for economic development in the East of England. In 2009, the Airport served 19.9 million passengers making Stansted the third busiest airport in the UK and placed it in the top 50 of the world's leading airports.

In December 2009, the Airport offered over 140 destinations served by 19 airlines. As we move forward we expect this mix of destinations and airlines to continually evolve. The Airport also handled approximately 200,000 tonnes of cargo. In the future we look forward to supporting the 2012 Olympics as one of the key international gateways for London.

However, we are only too aware that with growth comes responsibility. Living near to an airport like Stansted has its advantages – for example employment opportunities and great transport links – but the Airport can also disadvantage some people living in the local community, particularly when it comes to local environmental impacts such as local air quality.

Stansted Airport was the first major UK airport to hold the ISO14001 environmental accreditation. We have monitored, reported on and managed air quality for over ten years and have well established processes and procedures in place.



The air quality monitoring around Stansted shows that it is well within the regulatory air quality limits. The trend for air quality has been one of continual improvement.

In developing this next stage of our Air Quality Strategy, we have reviewed our current Strategy, assessed relevant air quality data and reviewed best practise.

We will continue to manage air quality in a proactive way, take further actions to reduce and mitigate the impact of the Airport operation on air quality, as well as work in partnership with key stakeholders.

David Johnston

Managing Director, London Stansted Airport.



“Air quality management is a key priority for Stansted Airport”

2 Introduction

Air quality management is a key priority for Stansted Airport Limited (STAL) and local air quality is one of the issues identified as a concern to both local residents and national stakeholders. Aircraft, airside operations and surface access travel to and from the Airport are amongst the contributors to air quality.

Managing and where possible improving air quality is a long standing commitment within STAL's corporate responsibility agenda. We recognise the need to manage the emissions that we have direct responsibility for and to work in partnership with Airport users and tenants to manage air quality impacts.

STAL has a long history of monitoring and mitigating the impacts of the Airport on air quality. During this time, we have always remained well within the EU air quality limits.

In October 2008, Stansted Airport Limited (STAL) received approval from the Secretary of State to grow the Airport from 25 million passengers per annum (mppa) to 35 mppa.

Whilst we expect there to be only limited impacts on air quality during this phase of growth, STAL is committed to a number of planning obligations, mitigating the impacts of this growth on the environment. Central to this approach is our Air Quality Strategy; which sets out how we plan to manage air quality ensuring that we continue to sustain the air quality levels at Stansted, within European Union (EU) limits.

This Strategy sets out how we will manage the next phase of our growth from 2010-2015; to ensure that the Airport's contribution to local air quality is minimised and our overarching goal is to be fully compliant with EU air quality limits. The activities which we will undertake are defined by our Action Plan which are grouped into four themes:

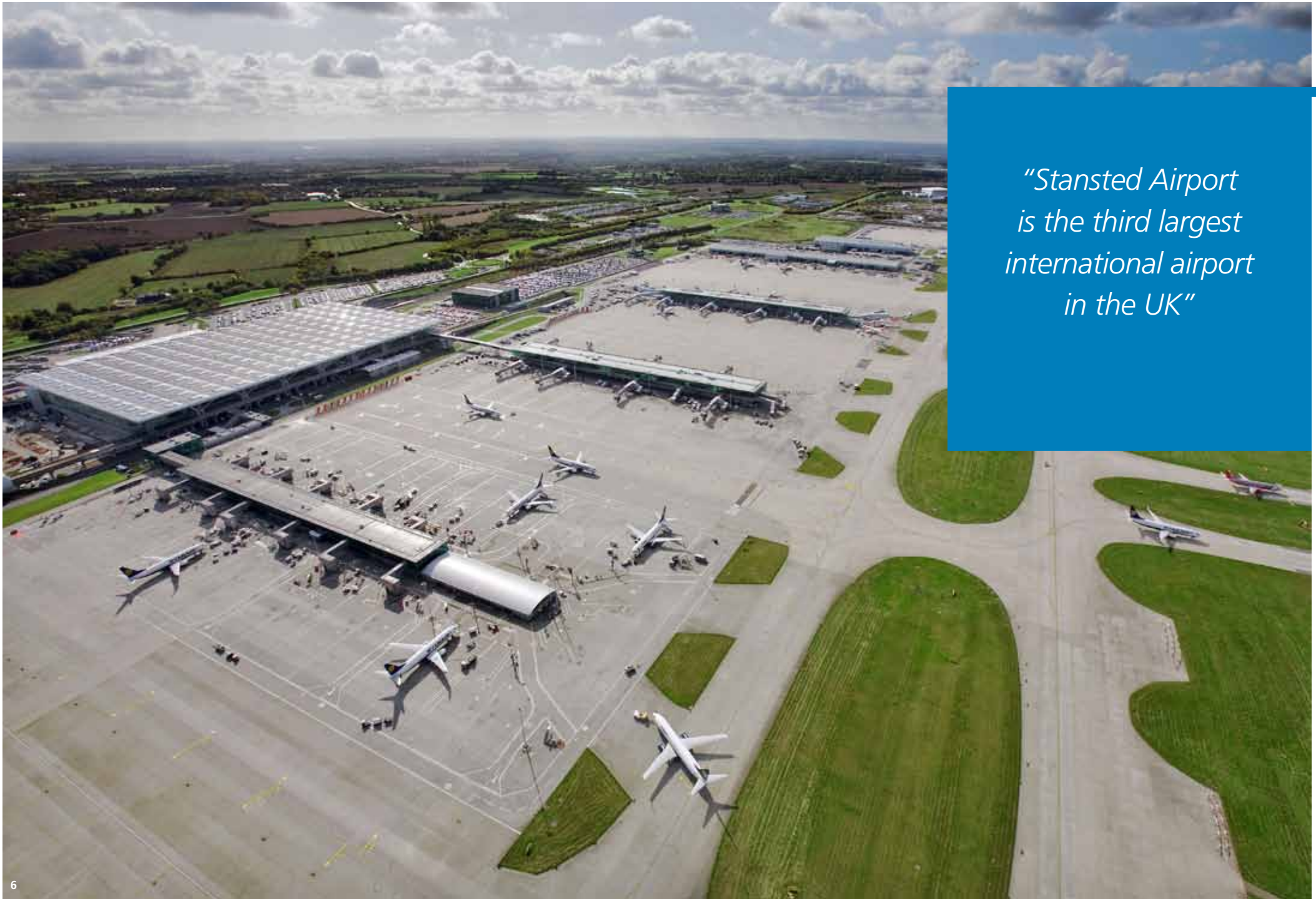
- Managing emissions from aircraft operations
- Managing emissions from airside vehicles
- Managing emissions from landside vehicles
- General air quality management.

Within these themes we have focused upon activities to manage nitrogen oxides and particles, as these are one of the primary causes of poor air quality.

Managing emissions from landside vehicles is managed through the Airport Surface Access Strategy.

To monitor our performance, we have also identified a number of air quality key performance indicators (KPI's). Each year we will review our Action Plan performance against these KPI's and report our progress in our Corporate Responsibility Report.





*“Stansted Airport
is the third largest
international airport
in the UK”*

3 Stansted Airport

Stansted Airport is the third largest international airport in the UK primarily serving London, the East of England and the South East. In 2009, it handled 19.9 mppa.

It covers an area of 957 hectares and is located approximately 65 kilometres north-east of London, and 50 kilometres south-east of Cambridge. Land surrounding the Airport is predominantly arable agricultural land, interspersed with dwellings and farmhouses.

Towns in the vicinity of the Airport include Bishop's Stortford, located 3.5 kilometres to the west and Great Dunmow approximately 8 kilometres to the east. Nearby villages include Stansted Mountfitchet, Molehill Green, Bamber's Green, Takeley, Takeley Street, Birchanger, Burton End, Tye Green and Gaunt's End.

The Airport has one operational runway and a single main terminal building located to the south of the runway. To the north of the runway, a number of general aviation companies operate from their own facilities.

The main runway is known as '04/22' (based upon compass bearings). It is 3,048m in length and is equipped with a Category 3b instrument landing system. In 2009, 88 different aircraft types served the Airport with the overwhelming types being twin engine, medium sized, narrow bodied aircraft such as the Boeing 737-800 and the Airbus A319.

Stansted Airport is accessed from the south via direct free flow slip roads from the M11 via Junction 8a and the A120. Traffic from the west and M11 north enter the Airport via a signalled controlled junction at Junction 8. Rail access is provided by a purpose built spur that leaves the London Liverpool Street to Cambridge Line north of Stansted Mountfitchet.

The Public Transport Interchange facility at the Airport allows for easy and convenient access between the Terminal building and all forms of public transport. The Rail Station is located beneath the Terminal building and Forecourt. The Bus and Coach Station is adjacent to the Rail Station and both stations are connected to the Terminal by escalators, ramps, walkways and lifts.

Stansted's development

Stansted Airport's origins date back to the Second World War when the Airport was built to provide an airfield base for the United States Army.

The modern Airport includes the iconic terminal building opened in 1991, having been granted planning permission in 1985. The permission granted was an initial phase of 8 million passengers per annum (mppa), a second permission of 15 mppa and a third permission of 25 mppa.

In October 2008, the Secretary of State approved the Generation 1 planning application for growth upto 35 mppa along with a series of conditions and obligations. These conditions restrict passenger numbers upto 35 mppa, air transport movements to 264,000 and the area within the 57dB LAeq noise contour to 33.9 square kilometres.



Airport use

On average the Airport handles approximately 500 flights per day in the winter period and 600 flights per day in the summer period – these being evenly split between departures and arrivals.

In December 2009, there were 19 scheduled and charter passenger airlines flying to over 140 destinations. The total Air Traffic Movements (ATM's) for 2009 were 156,233.

The Airport serves a catchment area of over 12 million people in the East of England, London and the wider South East. Over 3 million business passengers use Stansted Airport each year. In 2009, over 190 companies and agencies were located on-airport; employing 10,859 people, 80% of whom live in Essex and Hertfordshire.



“There are three main tiers of regulation for air quality in the UK; European, National and Local”

4 The regulation of air quality in the UK

There are three main tiers of regulation which govern air quality in the UK: European, National and local.

Air quality limits

European Regulatory Framework

The European Union (EU) requires Member States to achieve health-based air quality limits for a range of pollutants. These limit values are prescribed principally through the 2008 European Directive on Ambient Air Quality and Cleaner Air for Europe. The limits are legally binding and must be met by the UK Government and they include limits for Nitrogen Dioxide (NO₂), particulate matter less than 10 microns (PM₁₀) and particulate matter less than 2.5 microns (PM_{2.5}) (Table 1).

There are also limits for the protection of vegetation and ecosystems. The limits to protect vegetation are limited in their application rather than being intended to protect human health. In addition to this Nitrogen Oxides (NOx) limits have been in force for some years.

UK Regulatory Framework

The Air Quality Standards Regulations 2007, implement the air quality limit values in the UK and set out the Government's obligations.

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland sets health-based air quality targets for a range of pollutants. The Air Quality (England) Regulations 2000 (as amended) define health-based national air quality objectives for seven main pollutants, as set out in the Air Quality Strategy (Table 2 outlines the objectives for NO₂, PM₁₀ and PM_{2.5}). Local authorities are required to work towards these objectives.

Performance against these objectives is monitored where people are regularly present and might be exposed to air pollution. When an assessment indicates that one or more of the objectives might potentially be exceeded, the local authority has a duty to declare an Air Quality Management Area (AQMA). The local authority has to undertake a further stage assessment and to implement an Air Quality Action Plan (AQAP) to reduce air pollution concentrations so that the objectives are met.

Table 1: EU air quality limits for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Standard	Criteria	Date to be achieved by & maintained thereafter
Nitrogen dioxide (NO ₂)	Hourly limit value for the protection of human health	1 hour mean of 200 µg/m ³ not to be exceeded more than 18 times a calendar year	1st Jan 2010
	Annual limit value for the protection of human health	Calendar year mean of 40 µg/m ³	1st Jan 2010
Particulate matter less than 10 microns (PM ₁₀)	24-hour limit value for the protection of human health	24 hour mean of 50 µg/m ³ not to be exceeded more than 35 times a calendar year	1st Jan 2005
	Annual limit value for the protection of human health	Calendar year mean of 40 µg/m ³	1st Jan 2005
Particulate matter less than 2.5 microns (PM _{2.5})	Annual target value for the protection of human health	Calendar year mean of 25 µg/m ³	1st Jan 2010
	Annual limit value for the protection of human health	Calendar year mean of 25 µg/m ³	1st Jan 2015
	Annual limit value for the protection of human health ^a	Calendar year mean of 20 µg/m ³	1st Jan 2020
Nitrogen oxides (NOx)	Annual limit for the protection of vegetation	Calendar year mean of 30 µg/m ³	19th July 2001

^a Indicative limit value to be reviewed by the European Commission in 2013

Table 2: UK air quality objectives from the Air Quality Strategy 2007 for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Air quality objective		Date to be achieved by & maintained thereafter
	Concentration	Measured as	
Nitrogen dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1 hour mean	31st Dec 2005
	40 µg/m ³	annual mean	31st Dec 2005
Particles (PM ₁₀) (gravimetric) ^a	50 µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31st Dec 2004
	40 µg/m ³	annual mean	31st Dec 2004
Particles (PM _{2.5})	25 µg/m ³	annual mean	2020
	Target of 15% reduction in concentrations at urban background	annual mean	Between 2010 and 2020

^a Measured using the European gravimetric transfer sampler or equivalent

4 The regulation of air quality in the UK continued

National Planning Policy

Planning Policy Statement (PPS) 23: Planning and pollution control

This Statement includes guidance in relation to the effects of development upon ambient air quality. It states that local authorities should have regard to this guidance in preparing policies relevant to potentially polluting developments, or development near to polluted or potentially polluting sites. The advice should also be taken into account by Regional Planning Bodies (RPBs) and Local Planning Authorities (LPAs) in preparing Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs). The advice is also material to decisions on individual planning applications.

DEFRA Low Emissions Strategies 2010

These strategies have been designed to help Local Authorities reduce emissions from transport, by encouraging 'a joined up approach' to tackling air pollutants and greenhouse gases together. It encourages the uptake of low emission fuels and technologies for new developments and promotes a modal shift away from car travel.

Local Planning Policy

The Uttlesford Local Plan

The Uttlesford Local Plan, adopted in January 2005, refers to the Council's review and assessment of air quality, commenting that areas of poor air quality had been identified along the M11 and A120. These areas pass through open countryside and, consequently, any new buildings would be strictly controlled. The Local Plan uses distance bands from the road centre-line, within which any developments that may expose the public over long periods of time to poor air quality would not be permitted.

Policy ENV13 relates to exposure to poor air quality and sets out that: 'Development that would involve users being exposed on an extended long term basis to poor air quality outdoors near ground level will not be permitted. A zone 100 metres on either side of the central reservation of the M11 and a zone 35 metres either side of the centre of the new A120 have been identified as particular areas to which this policy applies.'

Local authority air quality management

More than 200 local authorities across the UK, have identified locations within their boundaries where national objectives have been or are likely to be breached. Where a local authority identifies an area at risk of not meeting one or more national objectives, it must designate it as an Air Quality Management Area (AQMA). Where an AQMA is declared, the local authority is required to produce an action plan towards achieving compliance with the objectives.

Uttlesford District Council has assessed air quality across its area and designated three AQMA's in Saffron Walden. This is principally due to road traffic congestion. No AQMA's are in the vicinity of Stansted Airport. East Hertfordshire District Council designated an AQMA in Bishops Stortford in 2007 and is currently gathering further data to determine any actions required. Further information can be found at the local authority websites.

STAL is fully committed to working in partnership with local authorities to assist in reducing the Airport's emission sources that are shown to be contributing significantly to poor air quality beyond the Airport boundary.

Beyond this, STAL is working collaboratively with local authorities to share information and knowledge to better manage air quality within the region of the Airport.



Regulating air emissions at source

There is also a range of legislation which seeks to manage and reduce the emission of air pollutants at source. For example, activities that are significant producers of air pollutants (such as industry and transport) are specifically regulated to reduce their contribution to air pollution.

Emissions from aircraft

Emissions from aircraft are regulated in the UK by the European Aviation Safety Agency and the UK Civil Aviation Authority (CAA). In addition, the International Civil Aviation Organisation (ICAO) has published a number of internationally agreed standards and recommended practices on aircraft engine emissions. ICAO's environmental activities are largely undertaken through the Committee on Aviation Environment Protection (CAEP). Air quality and noise standards for new aircraft were agreed at the CAEP/4 meeting in 1998. These standards were further modified at the CAEP/6 meeting in 2004 for new engine types certified after 31st December 2007. The ICAO standards are 'technology following' and therefore many aircraft engines manufactured before the CAEP/4 meeting already meet the CAEP/4 standards.

Emissions from transport

A range of regulatory controls are aimed at improving emissions from transport and fuels. These include European Commission (EC) regulations to restrict emissions from road vehicles ('Euro standards') and a Directive restricting the sulphur content of certain fuels. The onus is on vehicle and fuel suppliers to achieve compliance.

Emissions from on-site activities

At Stansted, the boilers that produce heating and hot water for the Terminal and associated buildings are not large enough to require regulation by the Environment Agency. Their impacts on local air quality are quite insignificant. There are a number of processes at the Airport classified as 'Part B' processes under the Environmental Permitting (England and Wales) Regulations 2007. These are regulated by the local authority and are all compliant with their permit conditions.

Planning conditions and obligations

STAL has a number of planning conditions and obligations which either cap, reduce or mitigate the impact of the Airport on air quality. These planning conditions and obligations relevant to air quality are being managed through the Air Quality Strategy.

Until the implementation date of the 35 mppa Planning Permission STAL will until 2010 monitor air quality in the vicinity of the Airport in the following ways:

- Continuous monitoring of oxides of nitrogen and fine particulate matter (PM₁₀) at a fixed site to be agreed with UDC such monitoring to be conducted for a period of three months agreed with UDC in each year until 2005, and throughout each year thereafter
- Diffusion tube monitoring of nitrogen dioxide levels
- Provide to UDC annually a summary of the results

- Submit to UDC schemes of appropriate and proportionate measures to mitigate the significant effects arising from the Development should any exceedances be identified
- Undertake any works identified as a result of paragraph 1.4
- STAL shall make the results of its obligations available to UDC within 28 days.

Within 6 months of the implementation date of the 35 mppa planning permission and until 31st December 2020 STAL shall monitor air quality in the vicinity of the Airport in the following terms:

- Continuous monitoring of oxides of nitrogen and fine particulate matter (PM₁₀) at three fixed sites (including subject to the agreement of The National Trust a site in Hatfield Forest)
- Diffusion tube monitoring of nitrogen dioxide levels at not less than 4 sites and the possible location of such sites shall be discussed with UDC and subject to the agreement of The National Trust, nine diffusion tubes at sites within Hatfield Forest and such tubes shall be arranged as two transects of four diffusion tubes each with the ninth diffusion tube co-located at the site of the monitor located in Hatfield Forest
- To provide to UDC annually a summary of the results of the monitoring
- To consider schemes of appropriate measures to compensate for any material adverse effects on vegetation within Hatfield Forest that are identified as arising from levels of oxides of nitrogen exceeding 30 microgram's per cubic metre annual mean within Hatfield Forest and such compensation shall be proportionate to the extent that the development contributes to measured levels
- to use all reasonable endeavours to undertake any measures identified
- STAL shall make the results of its monitoring to Uttlesford District Council within 28 days of final results becoming available.



Regulating air quality for the health and safety of workers at Stansted Airport

All employers have a legal duty under the Control of Substances Hazardous to Health (COSHH) Regulations 2002 to control the exposure of hazardous substances to their staff in the workplace. The Health and Safety Commission (HSC) sets Workplace Exposure Limits (WELs) to help employers to control exposure of their staff. Currently, no limit has been set for NO₂, so STAL adopts a risk based approach to ensure any exposure is as low as reasonably practicable and that adequate controls are in place.

5 Air quality at Stansted Airport

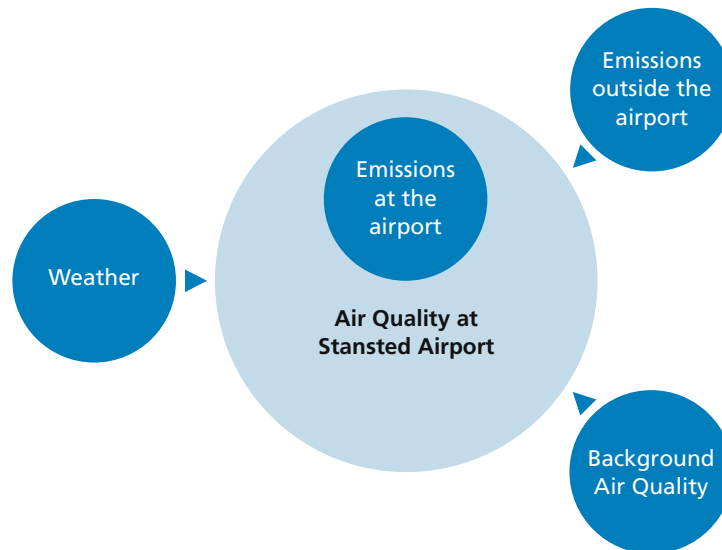
“Air quality at Stansted Airport is influenced by the weather, Airport operations, activity outside of the Airport and background air quality”

Influences on air quality

Air quality at Stansted is influenced by a number of factors which include the weather, emissions from Airport operations, emissions from outside of the Airport and background air quality (Figure 1).

Background air quality refers to the underlying air quality of the region, in this case the south east of England. The weather can play a large part in determining the quality of air at the Airport. In particular, wind strength and direction will clearly affect the direction and distance of any emissions from inside and outside of the Airport (Information Point 1).

Figure 1: Influences on local air quality at Stansted Airport



Information Point 1

The importance of weather

Examples of the influence of weather conditions on typical air quality include:

- There is a diluting effect of **wind speed**: at London Hillingdon, an approximate halving of NOx concentrations with a doubling of wind speed from 5 to 10 metres per second (m/s) has been shown
- PM_{2.5} decreases when **wind speed** increases due to dilution but PM_{coarse} increases with wind speed due to re-suspension. These effects show the different sources of PM components
- Daily maximum ozone concentration is highly sensitive to **temperature**, particularly where this rises above around 24-25°C. At Lullington Heath in Sussex, between 1993 and 1998, a rise from 25-30°C typically produced a rise in ozone peak of around 60g/m³, compared to 13g/m³ for a 10-15°C rise
- **Precipitation** can reduce PM concentrations dramatically, although other weather factors are also associated with rainfall, such as wind speed. Around a 6g/m³ difference in PM₁₀ has been observed in Edinburgh between days with no rainfall and those with >20mm rainfall
- The incidence of certain **wind directions** can also lead to high pollution concentrations. An unusually high number of easterly and south-easterly winds in February/ March 1996 resulted in a increase in the exceedences of the PM₁₀ 24hr average objective across the UK monitoring network.

From The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007, DEFRA

Pollutants of interest in the Stansted Area

The main pollutants of concern around Stansted are nitrogen dioxide (NO₂), nitrogen oxides (NO_x) and particles (PM₁₀ and PM_{2.5}). Other air quality pollutants (Appendix B) have shown to be negligible at the Airport or not within the ability of STAL to influence.

Nitrogen dioxide and nitrogen oxides

Combustion processes, such as road vehicle engines, aircraft and boilers, produce nitrogen dioxide (NO₂) and nitric oxide (NO), collectively known as nitrogen oxides, or NO_x. NO also reacts in the air to form more NO₂. NO₂ can exacerbate respiratory illness such as asthma, and NO_x can also impact on vegetation (Information Point 2).



Information Point 2

Potential effects on health and the environment from NO_x and NO₂

- Long term exposure to nitrogen dioxide may affect lung function and respiratory symptoms such as asthma. NO₂ also enhances the response to allergens in sensitive individuals
- High levels of NO_x can have an adverse effect on vegetation. Deposition of pollutants derived from NO_x emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity, often at locations far removed from the original emissions
- NO_x also contributes to the formation of secondary particles and ground level ozone, both of which are associated with ill-health effects.

From The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007, DEFRA

Particles (PM₁₀ and PM_{2.5})

Particles are generally categorised on the basis of their size. PM₁₀ refers to particles with a diameter of 10 micrometres (µm) or less and PM_{2.5} is particles with a diameter of 2.5µm or less. Particles consist of a wide range of materials and are produced from many sources, including road vehicles, aircraft, construction and natural sources. They can affect respiratory and cardiovascular systems (Information Point 3).

In preparing the 2007 Air Quality Strategy for England, Wales and Northern Ireland the Department of Environment, Food and Rural Affairs (DEFRA) plotted how they expected emissions of PM₁₀, PM_{2.5}, and nitrogen oxides (by source) to change between 2002 and 2020. Aircraft emissions formed only a very small part of these emissions when compared to road transport, waste treatment and disposal or combustion in domestic premises.

Information Point 3

Potential effects on health and the environment from particles

- Both short-term and long-term exposure to ambient levels of particulate matter are consistently associated with respiratory and cardiovascular illness and mortality as well as other ill-health effects. The associations are believed to be causal. It is not currently possible to discern a threshold concentration below which there are no effects on the whole population's health
- PM₁₀'s are likely to be inhaled into the thoracic region of the respiratory tract. Recent reviews have suggested exposure to a finer fraction of particles (PM_{2.5}, which typically make up around two thirds of PM₁₀ emissions and concentrations) give a stronger association with the observed ill health effects, but also warn that there is evidence that the coarse fraction between (PM₁₀ – PM_{2.5}) also has some effects on health.

From The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007, DEFRA

5 Air quality at Stansted Airport continued

The Stansted picture

As well as the Airport, other significant pollution sources in the area include the M11, A120 and the town of Bishop's Stortford. The relatively rural setting of the Airport means that the background pollution levels are lower than more densely populated areas. The prevailing wind direction is from the south-west which means that air pollution tends to be carried towards the north-east (Figure 2).

Figure 2: Map of the Stansted area



Monitoring results

STAL undertakes automatic air quality monitoring at a number of sites which includes Nitrogen Oxide and particulate levels.

Nitrogen Oxide levels

The annual mean NO₂ concentrations at STAL's two continuous monitoring stations are shown in Figure 3. Concentrations are well below the 2010 EU limit value of 40µg/m³.

In the future we feel it will be important to understand the relationship between NO_x and NO₂ in determining future NO₂ levels (the Government's Air Quality Expert Group reported in 2007 that NO₂/NO_x levels are increasing). We will seek to understand the trends in the NO_x/NO₂ relationship at Stansted once more data are available.

Stakeholders have asked STAL to investigate the pollutant sources in the vicinity of the Airport, as they are concerned that these may cause elevated levels of NO_x at Hatfield Forest and Eastend Wood. These are both designated sites of special scientific interest (SSSI).

NO_x concentrations at these locations are currently below the EU limit for the protection of vegetation. The Government's Air Quality Strategy for England, Wales, Scotland and Northern Ireland makes it clear that the NO_x objective does not apply at these locations. However, STAL recognises the need to manage any potential airport-related impacts as they may arise. As part of its current planning obligations, STAL is producing a scoping report of how this will be investigated.

Particulate matter levels

STAL commenced continuous monitoring for PM₁₀ in 2006. Current measured concentrations (Figure 4) are well below national objectives and EU limits. Due to the potential health impacts of particles, STAL will continue to monitor PM₁₀ and review the need for PM_{2.5} monitoring. Additionally a review of the current level and location of monitoring will be undertaken following expert advice to ensure that monitoring is effective.

Figure 3: Annual mean NO₂ trends at Stansted

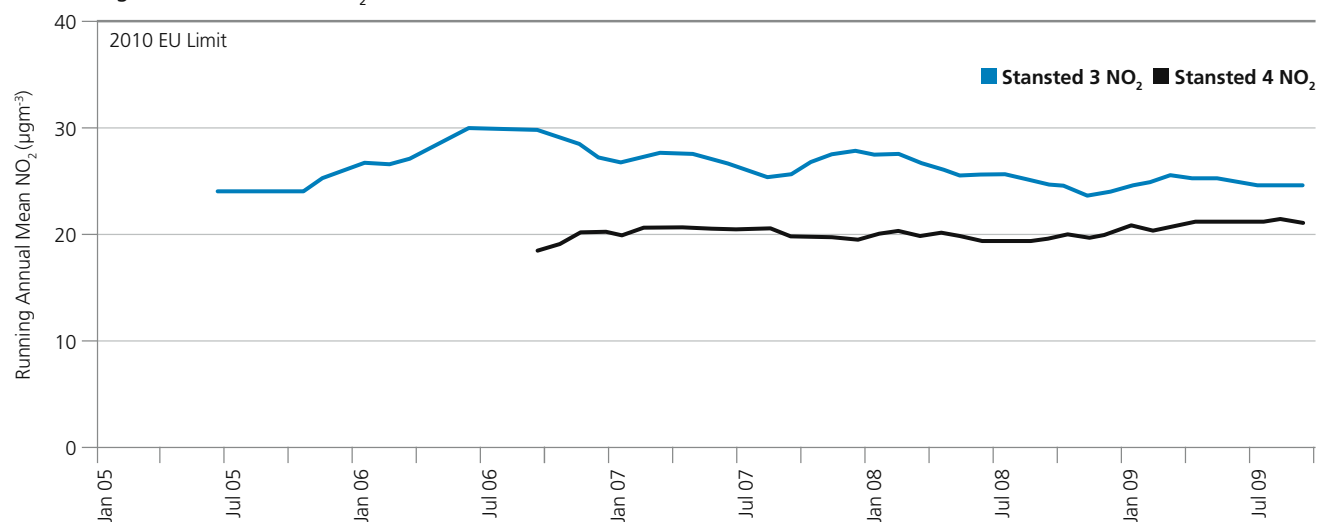
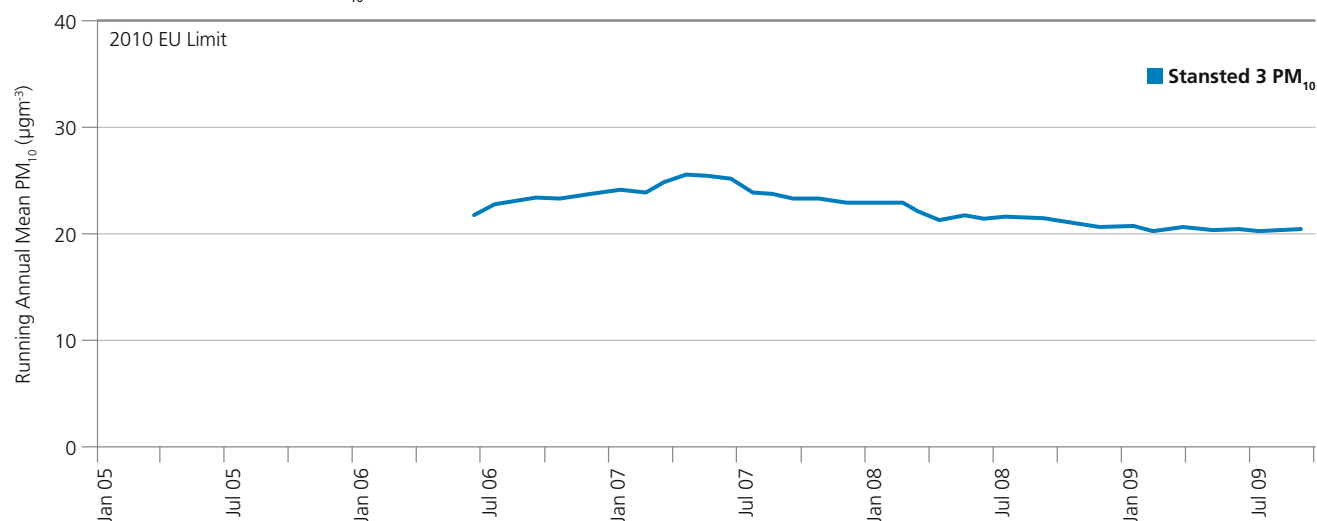


Figure 4: Annual mean PM₁₀ trends at Stansted



5 Air quality at Stansted Airport continued

Emissions inventory

STAL has compiled emissions inventories to identify which Airport activities are the most significant contributors of emissions. By doing this we can focus our efforts on those activities which contribute the most.

The 2006 emissions inventory identified that:

- Landside vehicles, incorporating all private cars, bus and coaches, delivery vans and HGV's, contributed over 60% of Airport-related NOx emissions in the area
- Airside vehicles and stationary sources combined, produce only 2% (Figure 5)
- Aircraft produced 36% of the ground-level Airport-related NOx. Of this take-off roll accounted for almost half (Figure 6)
- Landside vehicles are the dominant source of Airport-related PM₁₀ emissions, accounting for 84 percent (Figure 7)
- Non-Airport sources contribute significantly to emissions and air pollution in the area, notably the M11 and A120.

Air quality modelling

Modelling is used to predict future air quality. The modelling results for Stansted are shown in Appendix A.

Local air quality and climate change

There can be both synergies and trade-offs in tackling local air pollution and climate change.

Carbon dioxide (CO₂) is an important contributor to climate change. CO₂ is created in combustion processes, so reducing fuel use also reduces CO₂ emissions. However, improvements in aircraft engine technology to improve fuel efficiency tend to increase NOx emissions for the same amount of fuel used (although engine manufacturers have delivered improvements in CO₂ and NOx emissions in recent years). It is important to understand the full impact of mitigation measures before adopting them.

Scientific understanding in this field is relatively immature and more needs to be done to ensure a balanced approach to managing environmental issues. The Government's Air Quality Expert Group (AQEG) has examined the linkages between mitigation policies for climate change and air quality. Its report, 'Air Quality and Climate Change: A UK Perspective' was published in April 2007, and further research is planned. The report is available from www.defra.gov.uk/environment/airquality/publications/airqual-climatechange/index.htm

STAL's Energy Strategy outlines how the Airport will manage its energy requirements for its fixed assets, in turn managing CO₂ impacts. The Strategy focuses on:

- How energy demand is expected to change between now and 2015 as Stansted grows
- Options for delivering the energy demand between now and 2015
- Setting targets for CO₂ from Energy at Stansted between now and 2015
- How STAL will contribute to BAA Corporate CO₂ from Energy targets by 2020
- How the Strategy will be monitored by STAL.

Where there are trade-offs between climate change and local air quality at Stansted, we will take careful account of these trade-offs, informed by the current understanding of impacts around the Airport. For instance, options in the Energy Strategy include the increased use of biomass, which will benefit CO₂, but is likely to have a small air quality penalty in terms of increased PM₁₀. Given our current pressures on local air quality and climate change, this is considered an appropriate approach for Stansted.

For more information about our climate change initiatives, please view our website at www.stanstedairport.com

Figure 5: Estimated ground-level airport-related NOx emissions for 2006: Percentage by category

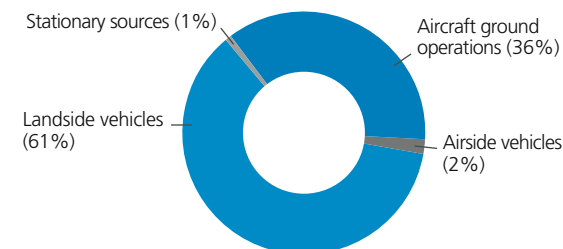


Figure 6: Estimated ground-level aircraft NOx emissions for 2006: Percentage by aircraft movement phase

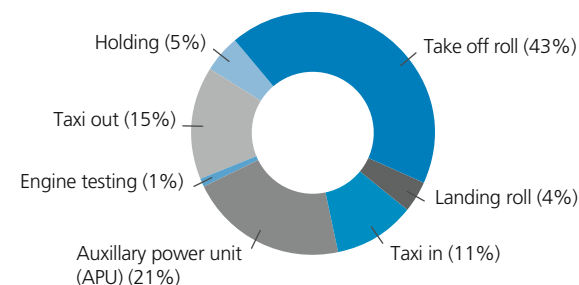
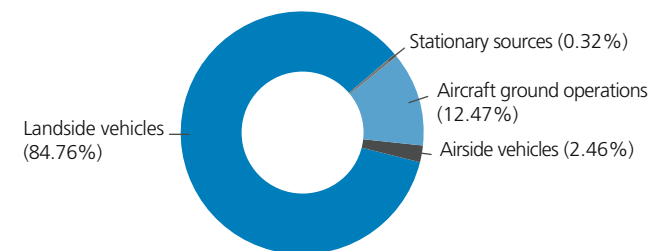


Figure 7: Estimated ground-level airport-related PM₁₀ emissions for 2006: Percentage by category



Data source: AEA Energy and Environment. Stansted 106 Air Quality Assessment, September 2008

6 Stansted Airport Air Quality Strategy

“STAL’s long term goal is to continue to be fully compliant with EU air quality limits”

Background

Monitoring and managing local air quality affected by the Airports operations is a long standing commitment within STAL’s Corporate Responsibility Agenda.

Our commitment is further endorsed by the achievement, in 2005 of the ISO 14001 environmental accreditation, which includes the management of air quality. We have consistently maintained this accreditation in subsequent years.

STAL’s long-term goal for managing air quality is to continue to be fully compliant with EU air quality limit values where the Airport makes a significant contribution. To achieve this goal we have developed the Air Quality Strategy and Action Plan. This sets out how STAL will manage the Airport’s contribution to local air pollution over the period 2010-2015 and our continued commitment to local air quality management.

Although the area around Stansted Airport is currently well within EU air quality limits, we recognise the need to continue to manage emissions and air quality impacts associated with the Airport. We will manage our growth responsibly by making full use of appropriate regulatory mechanisms.

The Strategy mainly focuses on managing the impacts of nitrogen oxides and particles, the pollutants of greatest potential concern around the Airport.

We have consulted widely internally in the development of this document and sought feedback from the Essex Air Quality Consortium. The Strategy has been generally well-received and following feedback, we have sought greater focus on the Action Plan points for key performance indicators.

We will continue to work with the Stansted Airport Consultative Committee, the Essex Air Quality Consortium and other bodies, as appropriate, in the implementation of this Strategy. The actions within this Strategy will also support our work to ensure the Airport plays its part in meeting the challenges posed by climate change. Reductions in carbon dioxide and other greenhouse gas emissions are managed through our specific Climate Change and energy targets.

The Stansted Air Quality Strategy

The Strategy to deliver our air quality goal has four main themes:

- Managing emissions from aircraft operations
- Managing emissions from airside vehicles
- Managing emissions from landside vehicles
- General air quality management.

In order to deliver these themes we will:

- Ensure we meet all our air quality planning obligations
- Improve the accuracy of Airport air quality assessments
- Influence aircraft emissions through dialogue with the industry
- Continue to manage and influence ground-based emissions
- Understand the contribution of non-Airport activities to emissions
- Continue to understand external developments relating to air quality management and develop appropriate best practice
- Promote a partnership approach to managing air quality with our business partners and local authorities.

The Strategy and Action Plan will evolve during its implementation period. Where appropriate, the Strategy will be revised and updated to reflect developments in government policy and regulation, scientific knowledge, stakeholder feedback, company policy, infrastructure changes and Airport air quality management.

The Action plan has clear timescales for delivery, where it is appropriate and key performance indicators against which performance will be measured on an annual basis.

6 Stansted Airport Air Quality Strategy continued

6.1 Managing emission from aircraft operations

At Stansted Airport we have a range of measures to manage the emission from aircraft operations:

Auxiliary Power Units Engine Testing

Stansted Airport control aircraft operations in a number of ways. An example of this is through documents called Directors notices (DN's). These include:

- Control of Ground Noise for Fixed Wing Aircraft Engines
- Control of Ground Noise for Rotary Wing Aircraft
- APU/GPU Restrictions of Use.

These DN's seek to restrict emissions by stipulating what areas of the Airport, and during what times these activities can take place. These include the ground running of rotary and fixed wing aircraft engines, the testing of aircraft engines on stands, the use of Auxiliary Power Units (APU) and the use of Ground Power Units (GPU). These details are recorded, monitored and used to continually improve our performance and minimise emissions. A Directors Notice enables STAL to take an enforceable course of action if the requirements set out are breached. This is controlled by the Airport Bylaws.

Fixed Electrical Ground Power (FEGP)

Fixed Electrical Ground Power (FEGP), is provided at all pier served stands at Stansted Airport. The benefit of FEGP is that it allows the pilot of an aircraft to turn off the Auxiliary Power Unit (APU), which is a small engine at the back of the aircraft, therefore reducing ground noise and emissions.

A survey of FEGP usage at Stansted was undertaken in 2005 which showed that not all aircraft were turning off their APU's, whilst attached to the FEGP system. We sought feedback from pilots and ground crews as to why APU's are continually run rather than FEGP. The results were very useful highlighting issues of serviceability and sensitivity of the power supply to aircraft. However, it also highlighted a number of misconceptions and communication issues which were hindering a resolution to the problem.



Since then, STAL has run training sessions with both airlines and ground handling agents to build confidence in our FEGP system. We have investigated how other airports, such as Munich and Copenhagen have achieved 100% FEGP reliability.

In 2007, STAL was invited to Boeing in Seattle to discuss plans to modify the FEGP socket on new generation 737 aircraft. This is the first time an airport has been invited to take part in a Boeing retro fit re-design workshop. The workshop has resulted in a modification to ensure the connection does not fail after attachment.

Reduced Engine Taxi

A coalition of aviation representatives, including Stansted Airport and easyJet launched a new initiative, known as Reduced Engine Taxi, in October 2009 to cut aircraft noise, emissions and improve local air quality at airports. This new Departures Code of Practice promotes how aircraft can taxi to and from the runway with not all of the engines operating, leading to significant reductions in ground noise, CO₂ and NOx emissions, depending on aircraft type and operator techniques.

Stansted Airport and easyJet have instigated the trialling of this new technique and are now working together to determine how other airlines might best use the recommendations made in this Code of Practice.

Promoting reduced thrust on take off

The adoption of a reduced thrust setting for an aircraft during take-off can reduce the take-off NOx emissions by up to 30% or more in some cases compared to a full thrust setting. However, whilst there may be lower CO₂ and NOx emissions on take-off, there can be a small increase in the noise experienced by those under the departure flight path as the aircraft takes a more gentle angle of ascent.

STAL is very aware of these trade-offs between noise and air quality and has undertaken a number of studies to help quantify the exact balance that needs to be struck for specific situations.

Airport Noise Monitoring Advisory Committee (ANMAC)

STAL is an active member of this group which is chaired by the DfT. It is an advisory and research group who's activities include improving noise monitoring and management. By reducing noise from aircraft, emissions have also been reduced.

Action plan summary

- We will work with airlines to achieve 90% of all aircraft turnarounds using FEGP rather than APU's by 2015
- Together with our partners in sustainable aviation we will develop a best practise guide for reduced engine taxiing by the end of 2010
- We will annually review and update our APU usage strategy annually and implement any changes necessary
- We will work with airlines and NATS to achieve 50% of arriving aircraft using reduced engine taxiing procedures by 2015
- Through ANMAC continue to seek reductions in aircraft noise and emissions.

6.2 Managing emissions from airside vehicles

STAL has a programme to help Airport organisations reduce their fleet's emissions and introduce best practise.

STAL has issued a Directors Notice (DN) to all Airport Companies that operate airside, which requires all airside vehicles to have a valid pass. The pass allocation requires vehicles to meet certain standards to limit vehicle exhaust emissions. Routine spot checks are also carried out on all airside vehicles by STAL to ensure that they meet MOT emissions standards

In the airside environment a large number of electric vehicles are already used, this is primarily by the various handling agents who use these vehicles to transport luggage to and from the planes.

Vehicles under STAL's control are regularly tested and serviced to ensure that they meet the best standards in relation to modern engines. The replacement vehicle program for vehicles supports these principles and the use of alternatively fuelled and hybrid vehicles. In the near future we will be reviewing the options to enhance this strategy.

Action plan summary

- We will develop a strategy to manage emissions from airside vehicles at Stansted by 2011
- We will increase the number of Euro IV/V and low-emission vehicles in the STAL vehicle fleet by 2015
- Continue to operate the airside vehicle pass system and carry out spot checks on airside vehicle emissions.



6.3 Managing emissions from landside vehicles

STAL published a revised Airport Surface Access Strategy (ASAS) in 2008. This set out a number of targets to increase public transport mode share, decrease single occupancy car use, reduce the number of people who get friends and family to drop them off and pick them up at the Airport and measures to improve the environmental performance of buses and coaches. The surface access targets and outcomes will benefit air quality. In 2008, 47% of air passengers used public transport for their journeys, this is the highest public transport mode share of any major UK airport.

Measures currently in place include:

Bus and coach services: working with operators and Local Authorities to develop new and improved services to make public transport more attractive.

Bus and coach licensing: This was introduced in 2004 and included the introduction of criteria on environmental and vehicle standards. Since then many public transport operators have replaced their fleets with EURO IV standard vehicles. It is currently estimated that 90% of the scheduled bus and coach vehicles operating from Stansted Airport are of EURO 1V standard. STAL will investigate with operators how EURO V or alternatively fuelled vehicles can be introduced.

Car park buses: In 2008, the buses used for the Airports car parking operation were replaced with EURO V standard vehicles.

Action plan summary

- To deliver the 2008 ASAS.

6 Stansted Airport Air Quality Strategy continued



Figure 8: Monitoring sites around Stansted Airport

6.4 General air quality management

Monitoring

STAL has undertaken a range of air quality assessment activities in recent years which include monitoring, emissions inventories and air quality modelling in line with our planning obligations. The results have consistently shown air pollution levels to be below EU limits and national objectives. Figure 8 shows the location of the monitoring sites around the Airport.

We collect nitrogen dioxide levels using passive diffusion tube samplers which use a process called molecular diffusion along an inert tube to a chemical absorbent. After exposure for a month the absorbent material is chemically analysed and the concentration calculated.

The automatic air quality monitoring at Stansted provides real-time measurements of oxides of nitrogen and particulate matter concentrations. This provides high quality data within a very short time period.

We collate the results on a quarterly basis and report on them annually through the Airport's Corporate Responsibility Report.

When the 35mppa planning permission is implemented STAL will comply with the obligations detailed in Section 4.

Action plan summary

- Continue to monitor air quality around Stansted at 2 continuous monitoring sites for NO_x, NO₂ and PM₁₀
- Continue to monitor NO₂ around Stansted at 4 diffusion tube sites
- Subject to the agreement of the National Trust, monitor NO_x, NO₂ and PM₁₀ at a continuous monitor in Hatfield Forest and NO₂ at 9 diffusion tube sites
- Undertake a review of STAL's air quality monitoring programme, to include location of monitors, pollutants measured and use of local authority air quality monitors
- Implement changes to air quality monitoring at the Airport following completion of the review plus any changes required from legislation
- Commission a diffusion tube transect study to understand how NO₂ levels vary across the Airport
- Adopt best-practice for monitoring the construction impacts for any significant development at the Airport.

Emissions inventory

After monitoring the air quality at the Airport, the emissions inventory is the next key stage of analysis required before any air quality modelling can take place. An emissions inventory quantifies the annual emissions from the following sources:

1. Aircraft engines in the landing and take-off (LTO) flight phases on the ground and up to a specific height (usually 1,000ft)
2. Aircraft brake and tyre wear
3. Use of Auxiliary Power Units (APU's)
4. Aircraft engine testing
5. Airside support vehicles and plant
6. Road vehicles on airport landside roads and on a selected road network around the Airport
7. Vehicles in car parks and car rental areas
8. Airport heating boilers and equipment
9. The fire-training ground.

STAL conducted the latest emissions inventory in 2006. As part of this Strategy STAL is committed to updating the Airport emissions inventory as required and plans to do this in 2013.

Action plan summary

- Produce Airport emission inventory in 2013.

Modelling

Air quality modelling is used primarily to enable forecasts of air quality pollutant concentrations in the future. It is usually used to assess air quality assessment criteria which is included in environment statements for planning applications. In this respect it has been extensively used by STAL as part of our G1 and G2 planning applications.

In preparation for the G2 planning application, baseline air quality forecasts for 2014 were developed assuming no further expansion of the Airport once the G1 planning application is fully implemented. The results for the NO₂, NO_x and PM₁₀ are shown in Appendix A. These were generated using the dispersion model ADMS 4. The process for producing these forecasts is complex and is summarised in Figure 9.

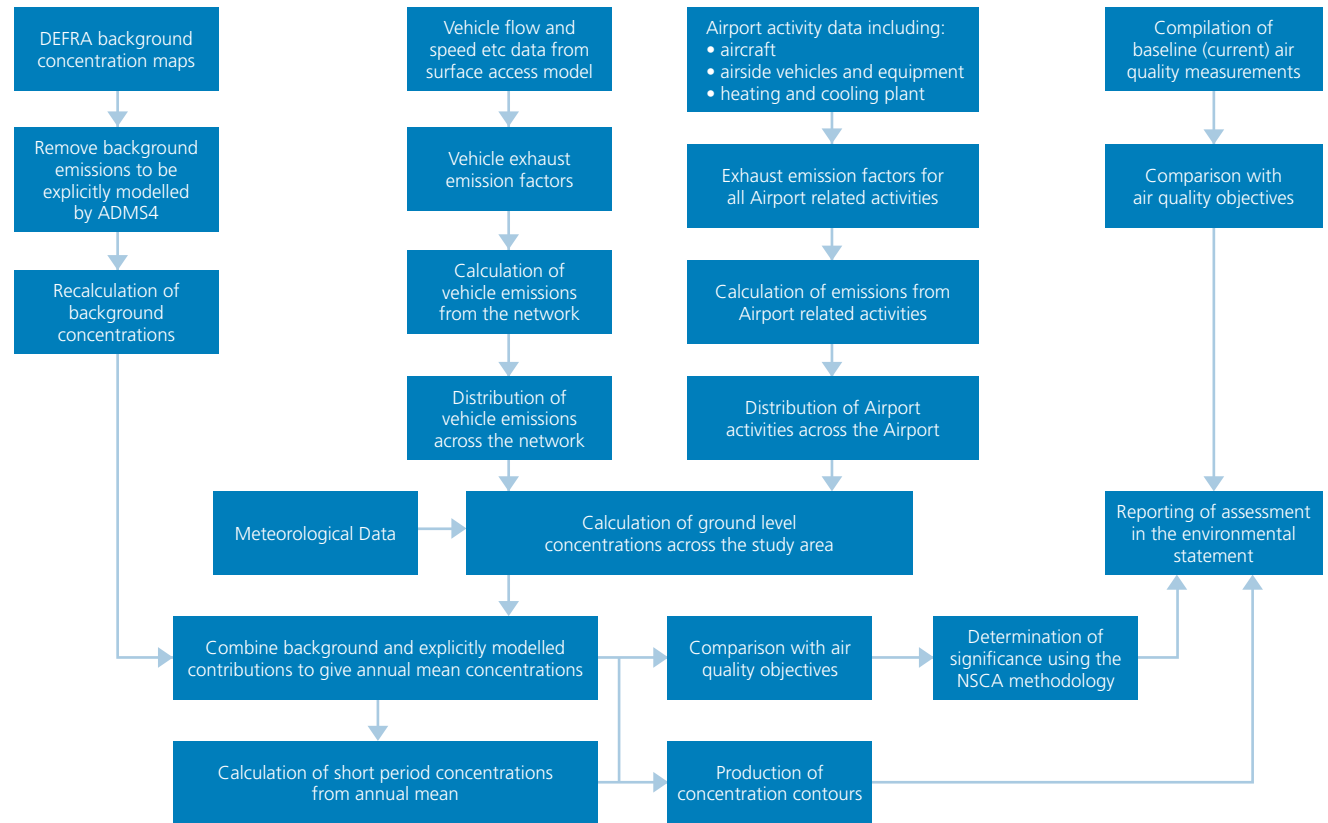
The concentration contours shown in Appendix 1 primarily follow the Airport boundary and trunk road network. At lower concentration levels however, the NO_x and NO₂ contours, fan out between the Airport, A120 and M11 which includes Hatfield Forest.

At present the UK Government considers that the obligations relating to the vegetation Limit Value for NO_x in Directive 1999/30/EC do not apply in certain areas identified in the Directive, including areas within 5km of a motorway. This issue was considered in response to representations made as part of the SERAS consultation and the Government concluded in the Air Transport White Paper (ATWP)21 that:

'The NO_x concentration limit for the protection of vegetation is not considered to be applicable around a developed Stansted'

However, STAL is committed to working with the National Trust to better understand any air quality impacts to Hatfield Forest as a result of Airport emissions.

Figure 9: Air quality modelling process (used to produce contour maps in Appendix A)



Action plan summary

- Produce Airport dispersion modelling in 2014
- Undertake further studies to understand possible impacts of NO_x on vegetation around Stansted.

6 Stansted Airport Air Quality Strategy continued

Odour

Odour created as a result of volatile organic compounds are very difficult to quantify and to determine their true origin. How people perceive odour and whether or not it is regarded as a nuisance is subjective. It is strongly dependant on the nature of the odour and the sensitivity or tolerance of those exposed.

STAL undertook an odour survey in 2005, feedback was sought from approximately 14,000 local residents. STAL received 99 responses to this survey, however the level of information and relevant data was very low. Also STAL noted that reporting of odour fell dramatically once any prompting for data was stopped. The principle conclusion of the survey report was:

'Without further accurate data and information it is not possible to draw many conclusions about correlations between odour and other factors such as meteorological data, because any such correlations would not stand up to statistical challenge and would be supposition. So, although general trends have been found that show that when prompted, a small number of people living locally will indicate that they have experienced an odour occurrence, it has not been possible to deduce any of the causes or factors related to odour occurrences from this study.'

STAL is committed to maintaining a log of odour complaints going forward.

Action plan summary

- Maintain a log of complaints in relation to odour and undertake analysis of complaints once sufficient data are available.



6.5 Communication and reporting

Following the publication of this Air Quality Strategy, STAL is committed to sharing our air quality work to keep stakeholders informed of our progress.

Each year we report our monitoring information to the Planning Authority as part of our planning obligations and include it within our annual Corporate Responsibility Report. We will also report on our progress against our Action Plan within the Corporate Responsibility Report.

Sharing of information across the local areas helps inform both STAL and the local authorities when they are making decisions about managing air quality.

Collaborative working

As the majority of emissions at the Airport are not generated directly by STAL, we are committed to continuing to work collaboratively with both our internal business partners and external stakeholders.

Action plan summary

- Work with key business partners, eg. Airlines, ground handling agents, public transport companies and NATS, to develop an 'Airport community' approach to improving local air quality at Stansted Airport
- Work with Essex Air Quality Consortium to understand air quality issues in the vicinity of Stansted Airport
- Work with East Hertfordshire District Council to understand any Airport contribution to pollution within the Bishops Stortford AQMA
- Work with Uttlesford District Council to understand any Airport contribution to pollution within the Saffron Walden AQMA
- Ensure construction activities identify any impacts on local air quality and that correct controls are put in place
- Ensure fire training activities are strictly controlled to minimise smoke and emissions.



Innovation

STAL has a track record of continually reviewing, improving and introducing new activities to mitigate the impact of emissions on air quality. We are also committed to working with others to share information and best practise.

However, at present there is limited knowledge around how emissions disperse and spread across local and regional areas. In addition, as technology develops it is expected that aircraft engines will become more efficient and consequently reduce emissions.

Integral to this Strategy is the ability to adapt, support and enable new technologies and techniques to be introduced to the airport which reduce the impact of emissions.

Action plan summary

- Work with Essex Air Quality Consortium, Uttlesford District Council, East Hertfordshire District Council and other external stakeholders to optimise air quality monitoring techniques to improve source apportionment and dispersal knowledge
- In conjunction with Sustainable Aviation we will seek continual improvement in aircraft engine technology towards the ACARE target of an 80% reduction in NOx emissions by 2020
- In conjunction with Sustainable Aviation we will deliver continued improvements in airport ground vehicles, supply of ground power services, operational practice and the availability of cleaner fuels to reduce NOx emissions
- In conjunction with Sustainable Aviation we will quantify trade-offs between NOx, noise and CO₂ emissions, so that these are taken into consideration by relevant regulators when setting future requirements.

Benchmarking

It is important that this Strategy and the work we do to manage and monitor air quality at the Airport remains relevant and effective. The best way for STAL to achieve this is to benchmark our work against others locally and on a wider scale.

Action plan summary

- Conduct an annual review of advances in local air quality management and monitoring techniques
- Review annually the Airport's Air Quality Strategy against district, county, regional and national air quality strategies to ensure that it remains relevant and effective
- Review annually the Air Quality Strategy against other environment strategies at the Airport to ensure they continue to support each other.



“The Action Plan is the next stage in the development of our Air Quality Strategy”

7 Stansted Air Quality Action Plan

The Air Quality Action Plan is the next stage in the development of our Air Quality Strategy. It covers a five year period from 2010 to 2015 and contains a range of measures some of which are already in place, as well a number of new measures.

Table 3: Stansted Air Quality Action Plan 2010-2015

Source/Area	Action	Action Type	Emissions Benefit (potential NOx emissions reduction) ¹	Timescales
1. Managing emissions from aircraft operations				
Reducing emissions from aircraft operating at Stansted Airport.	Together with our partners in Sustainable Aviation we will develop a best practise guide for reduced engine taxiing by the end of 2010.	Policy	Medium	2010
	We will work with airlines and NATS to achieve 50% of arriving aircraft using reduced engine taxiing procedures by 2015.	Emission reduction	Medium	2015
Reducing emissions from auxiliary power units.	We will work with airlines to achieve 90% of all aircraft turnarounds using FEGP rather than APU's by 2015.	Emission reduction	Medium	2015
	Through ANMAC continue to seek reductions in aircraft noise and emissions.	Emission reduction	Medium	Quarterly
	We will annually review and update our APU usage strategy and impliment any changes necessary.	Emission reduction	medium	Annually
2. Managing emissions from airside vehicles				
Airside vehicle strategy.	We will develop a strategy to manage emissions from airside vehicles at Stansted.	Emissions reduction	Medium	2011
Reducing emissions from STAL fleet.	We will increase the number of Euro IV/V and low-emission vehicles in the STAL vehicle fleet.	Emissions reduction	Medium	2015
	We will continue to operate the airside vehicle pass system and carry out spot checks on airside vehicle emissions.	Emissions reduction	Medium	6 monthly
3. Managing emissions from landside vehicles				
Implement measures to reduce emissions from landside vehicles through the Stansted Airport Surface Access Strategy.	We will deliver the Stansted Airport Surface Access Strategy 2008-2015 targets.	Emissions reduction	Medium	2015

¹ Low NOx emissions reduction: potential for less than 1 tonne per annum reduction in NOx emissions.
Medium NOx emissions reduction: potential for greater than 1 tonne per annum reduction in NOx emissions

7 Stansted Air Quality Action Plan continued

Table 3: Stansted Air Quality Action Plan 2010-2015 continued

Source/Area	Action	Action Type	Emissions Benefit (potential NO _x emissions reduction) ¹	Timescales
4. STAL air quality management				
Air quality monitoring programme	Continue to monitor air quality around Stansted at 2 continuous monitoring sites for NO _x , NO ₂ and PM ₁₀ .	Management	Not applicable	Ongoing
	Continue to monitor NO ₂ around Stansted at 4 diffusion tube sites.	Management	Not applicable	Ongoing
	Subject to the agreement of the National Trust, monitor NO _x , NO ₂ and PM ₁₀ at a continuous monitor in Hatfield Forest and NO ₂ at 9 diffusion tube sites.	Management	Not applicable	Within 6 months of implementation of G1 Planning Permission.
	Undertake a review of STAL's air quality monitoring programme, to include location of monitors, pollutants measured and use of local authority air quality monitors.	Management	Not applicable	As above
	Implement changes to air quality monitoring at the Airport following completion of the review and implement any changes plus any changes required from legislation.	Management	Not applicable	As above
	Commission a diffusion tube transect study to understand how NO ₂ levels vary across the Airport.	Management	Not applicable	2011
	Adopt best-practice for monitoring of construction impacts for any significant development at the Airport.	Management	Not applicable	Ongoing as required for each project.
Emission inventories	Produce Airport Emission Inventory.	Data research	Not applicable	2013
Modelling	Produce Airport Dispersion Modelling.	Data research	Not applicable	2014
NO _x vegetation studies	Undertake further studies to understand possible impacts of NO _x on vegetation around Stansted.	Data research	Not applicable	2010 and as required
Odour	Maintain a log of complaints in relation to odour and undertake analysis of complaints once sufficient data is available.	Management	Not expected	Ongoing
Collaborative working	Work with Essex Air Quality Consortium to understand air quality issues in the vicinity of Stansted Airport.	Management	Not expected	Ongoing
	Work with East Hertfordshire District Council to understand any Airport contribution to pollution within the Bishops Stortford AQMA.	Management	Not expected	Ongoing
	Work with Uttlesford District Council to understand any Airport contribution to pollution within the Saffron Walden AQMA.	Management	Not expected	Ongoing
	Work with key business partners to develop an Airport community approach to improving local air quality at Stansted.	Management	Not expected	Ongoing
	Ensure construction activities identify any impacts on local air quality and that correct controls are put in place.	Management	Not expected	Ongoing
	Ensure fire training activities are strictly controlled to minimise smoke and emissions.	Management	Not expected	Ongoing

Table 3: Stansted Air Quality Action Plan 2010-2015 continued

Source/Area	Action	Action Type	Emissions Benefit (potential NOx emissions reduction) ¹	Timescales
4. STAL air quality management continued				
Innovation	Work with Essex Air Quality Consortium, Uttlesford District Council, East Hertfordshire District Council and other external stakeholders to optimise air quality monitoring techniques to improve source apportionment and dispersal knowledge.	Management	Dependent on initiative	Ongoing
	In conjunction with Sustainable Aviation we will seek continual improvement in aircraft engine technology towards the ACARE target of an 80% reduction in NOx emissions by 2020.	Management	Dependent on initiative	2020
	In conjunction with Sustainable Aviation we will deliver continued improvements in airport ground vehicles, supply of ground power services, operational practice and the availability of cleaner fuels to reduce NOx emissions.	Management	Dependent on initiative	Ongoing
	In conjunction with Sustainable Aviation we will quantify trade-offs between NOx, noise and CO ₂ emissions, so that these are taken into consideration by relevant regulators when setting future requirements.	Management	Dependent on initiative	Ongoing
Benchmarking	Conduct an annual review of advance in local air quality management and monitoring techniques.	Research	Dependent on initiative	Ongoing
	Review the Air Quality Strategy against other environment strategies at the Airport.	Management	Dependent on interactions and trade-offs.	At least annually
	Review Air Quality Strategy against district, county, regional and national air quality strategies.	Management	Dependent on interactions and trade-offs.	Annually

8 Key performance indicators

“We will use performance indicators to monitor the progress of our Air Quality Action Plan to ensure maximum benefits are achieved”

We will use a set of performance indicators (Table 4) to monitor our progress against each action point, to ensure that the work we are undertaking is resulting in the maximum benefit in terms of air quality.

Our performance against these indicators will be regularly reviewed internally through our environmental governance structure. During the five year period of this Strategy, we may add to or amend the range of performance indicators to respond to improvements which will enable us to better manage the Airport’s impact on local air quality.

We will publish our performance against the key performance indicators in our annual Corporate Responsibility Report.

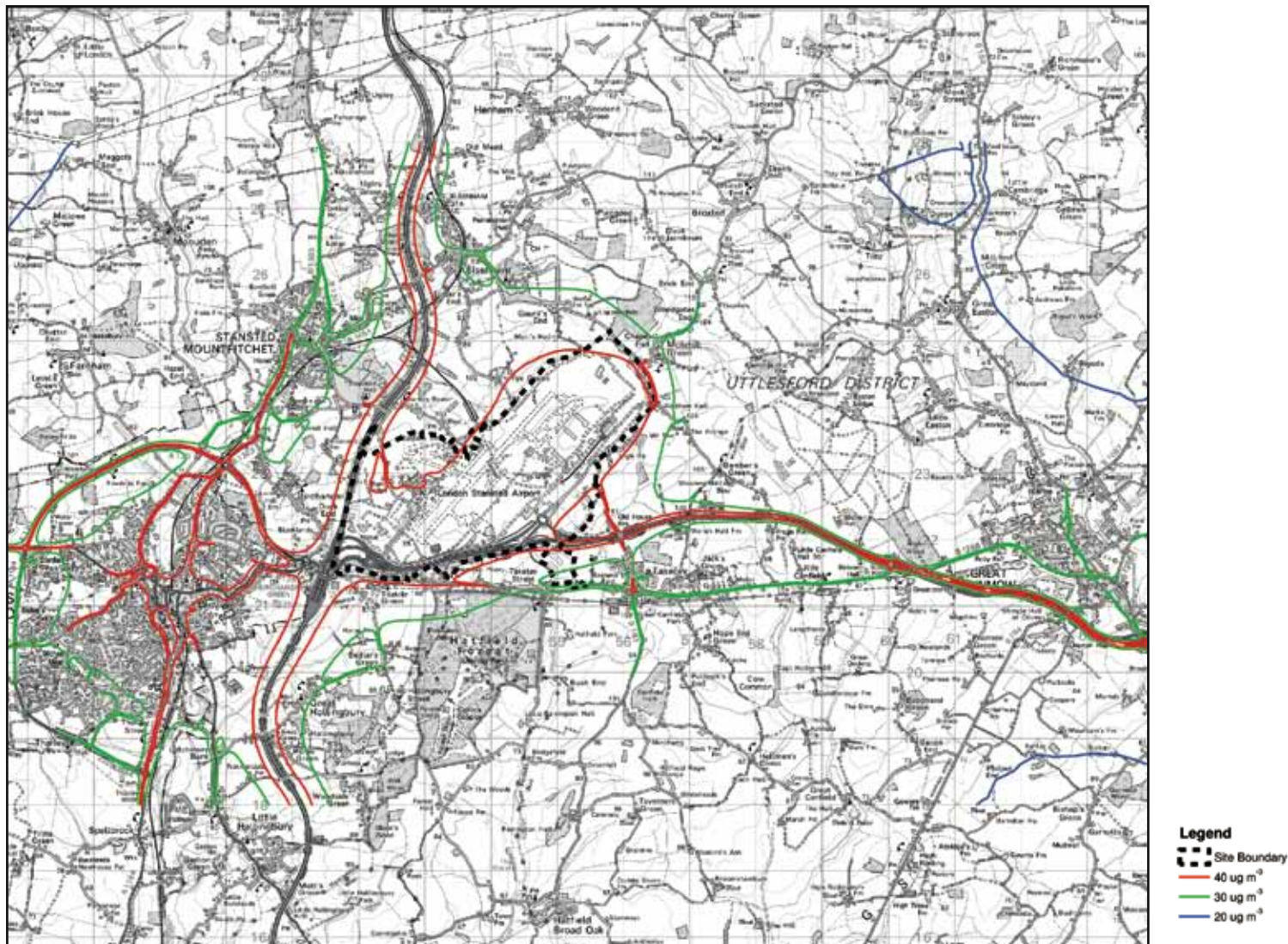
Table 4: STAL Air Quality Key Performance Indicators

KPI	2008 baseline performance	2015 Target
Annual mean NO ₂	Stansted 3: 24 µg/m ³ Stansted 4: 21 µg/m ³	Stansted 3: <40 µg/m ³ Stansted 4: <40 µg/m ³
Number of hours auxiliary power unit usage per year	58,207	Equivalent to 10% or less of annual aircraft movements running APU’s
% of turnarounds using fixed electrical ground power	26%	90%
Average taxi delay time	12 minutes	Not >12 minutes
% of arrivals using reduced-engine taxiing	0%	50%
% low-emission vehicles in STAL fleet	0%	50% of non-specialist vehicles
% low-emission vehicles in all airside vehicles	9%	20%

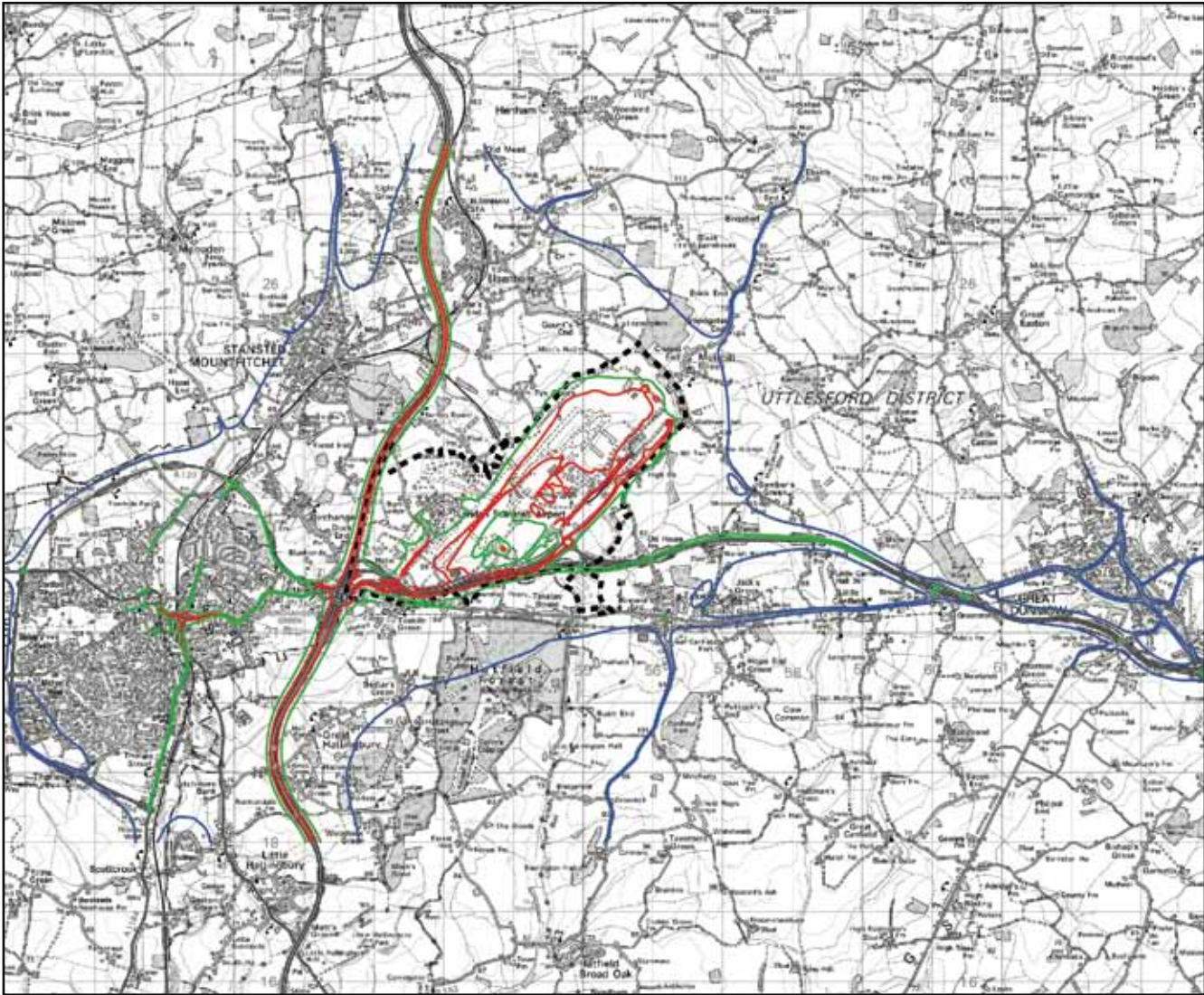
Appendices

Appendix A 2014 air quality forecasts

Annual mean NO_x concentrations base case – no construction (33 mppa) in 2014 modelled using the 2003 meteorological case

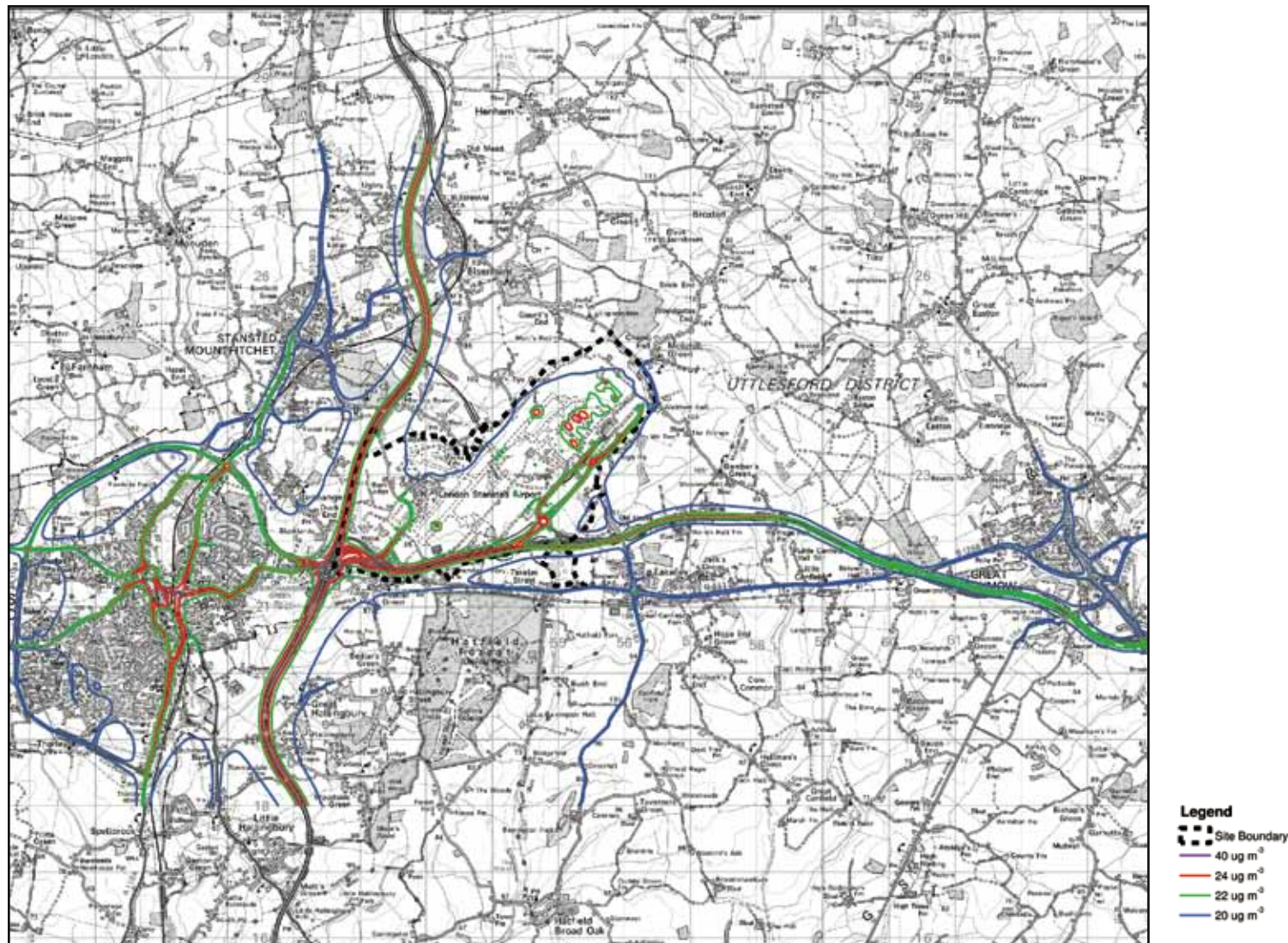


Annual mean NO₂ concentrations base case – no construction (33 mppa) in 2014 modelled using the 2003 meteorological case

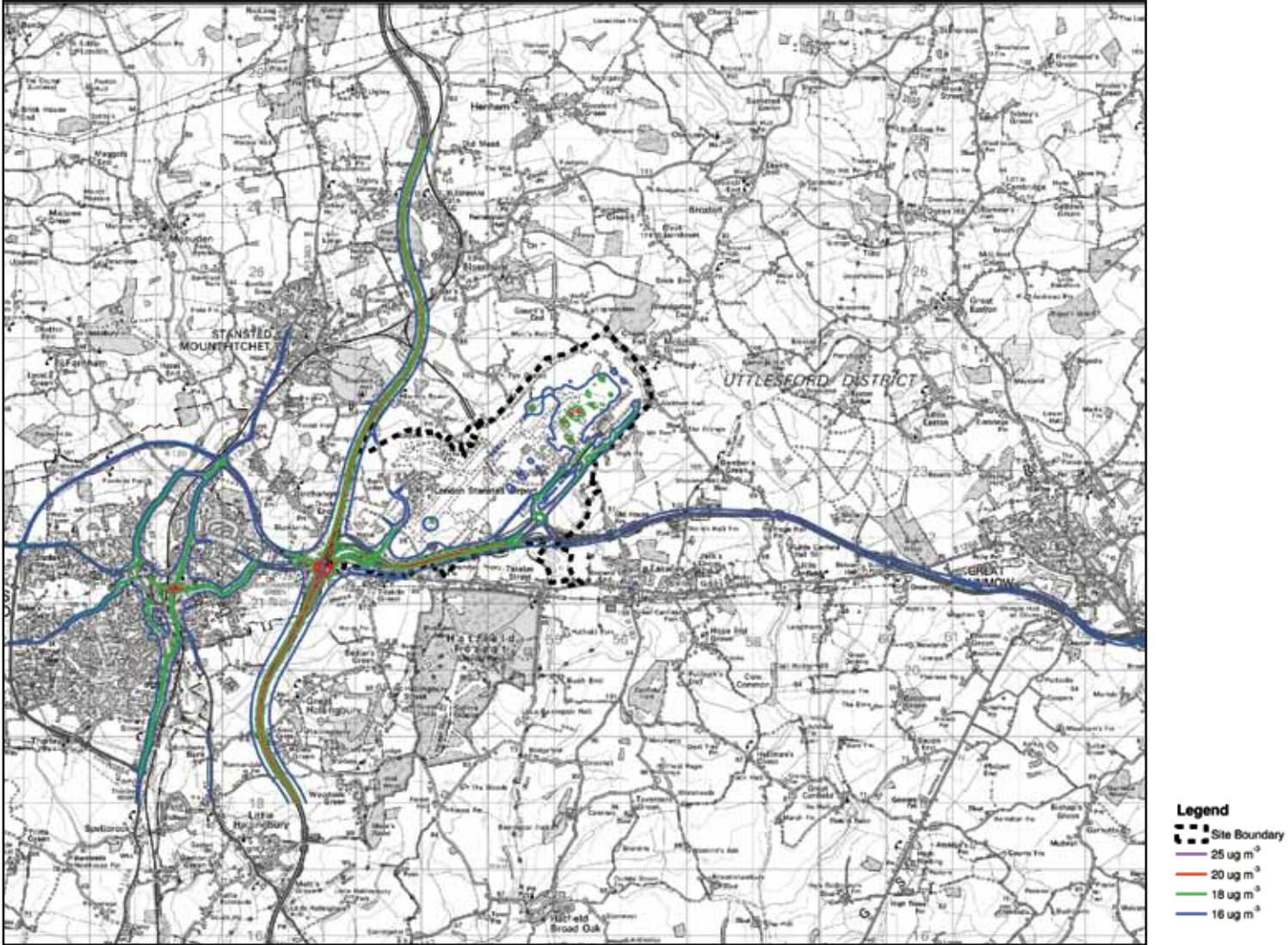


Appendix A
2014 air quality forecasts continued

Annual mean PM₁₀ concentrations base case – no construction (33 mppa) in 2014 modelled using the 2003 meteorological case



Annual mean PM_{2.5} concentrations base case – no construction (33 mppa) in 2014 modelled using the 2003 meteorological case



Air quality pollutants

Air quality pollutants

(Source: UK Air Quality Archive – www.airquality.co.uk – January 2010)

Air Pollution

In both developed and rapidly industrialising countries, the major historic air pollution problem has typically been high levels of smoke and sulphur dioxide arising from the combustion of sulphur-containing fossil fuels such as coal for domestic and industrial purpose. The major threat to clean air is now posed by traffic emissions. Petrol and diesel-engined motor vehicles emit a wide variety of pollutants, principally carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOCs) and particulates (PM₁₀), which have an increasing impact on urban air quality. In addition, photochemical reactions resulting from the action of sunlight on nitrogen dioxide (NO₂) and VOCs from vehicles leads to the formation of ozone, a secondary long-range pollutant, which impacts in rural areas often far from the original emission site. Acid rain is another long-range pollutant influenced by vehicle NO_x emissions. In all except worst-case situations, industrial and domestic pollutant sources, together with their impact on air quality, tend to be steady-state or improving over time. However, traffic pollution problems are worsening world-wide. Opposite is an introduction to the principal pollutants produced by industrial, domestic and traffic sources.

Introduction to the principal pollutants produced by industrial, domestic and traffic sources.

Pollutant	Description	Health Impact
Sulphur Dioxide	Sulphur dioxide (SO ₂) is produced when a material, or fuel, containing sulphur is burned. Globally, much of the sulphur dioxide in the atmosphere comes from natural sources, but in the UK the predominant source is power stations burning fossil fuels, principally coal and heavy oils. Widespread domestic use of coal can also lead to high local concentrations of SO ₂ .	Even moderate concentrations may result in a fall in lung function in asthmatics. Tightness in the chest and coughing occur at high levels, and lung function of asthmatics may be impaired to the extent that medical help is required. Sulphur dioxide pollution is considered more harmful when particulate and other pollution concentrations are high.
Nitrogen Oxides	Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO ₂), which is harmful to health. NO ₂ and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO _x).	Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.
Fine Particulates	Fine Particles are composed of a wide range of materials arising from a variety of sources including: <ul style="list-style-type: none"> • combustion sources (mainly road traffic); • secondary particles, mainly sulphate and nitrate formed by chemical reactions in the atmosphere, and often transported from far across Europe; • coarse particles, suspended soils and dusts (eg. from the Sahara), seasalt, biological particles and particles from construction work. Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focussed on PM ₁₀ , but the finer fractions such as PM _{2.5} and PM ₁ are becoming of increasing interest in terms of health effects.	Fine particles can be carried deep into the lungs where they can cause inflammation and a worsening of the condition of people with heart and lung diseases. In addition, they may carry surface-absorbed carcinogenic compounds into the lungs
Ozone and Volatile Organic Compounds	Ozone (O ₃) is not emitted directly from any man-made source in any significant quantities. In the lower atmosphere, O ₃ is primarily formed by a complicated series of chemical reactions initiated by sunlight. These reactions can be summarised as the sunlight-initiated oxidation of volatile organic compounds (VOCs) in the presence of nitrogen oxides (NO _x). The sources of VOCs are similar to those described for NO _x above, but also include other activities such as solvent use, and petrol distribution and handling. The chemical reactions do not take place instantaneously, but can take hours or days, therefore ozone measured at a particular location may have arisen from VOC and NO _x emissions many hundreds or even thousands of miles away. Maximum concentrations, therefore, generally occur downwind of the source areas of the precursor pollutant emissions.	Ozone irritates the airways of the lungs, increasing the symptoms of those suffering from asthma and lung diseases.

Pollutant	Description	Health Impact
Toxic Organic Micro-Pollutants (TOMPS)	<p>TOMPs are produced by the incomplete combustion of fuels. They comprise a complex range of chemicals some of which, although they are emitted in very small quantities, are highly toxic or carcinogenic. Compounds in this category include:</p> <ul style="list-style-type: none"> • PAHs (PolyAromatic Hydrocarbons) • PCBs (PolyChlorinated Biphenyls) • Dioxins • Furans 	<p>TOMPS can cause a wide range of effects, from cancer to reduced immunity to nervous system disorders and interfere with child development. There is no “threshold” dose - the tiniest amount can cause damage.</p>
Benzene	<p>Benzene is a VOC which is a minor constituent of petrol. The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source (70% of total emissions).</p>	<p>Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.</p>
1,3-Butadiene	<p>1,3-butadiene, like benzene, is a VOC emitted into the atmosphere principally from fuel combustion of petrol and diesel vehicles. 1,3-butadiene is also an important chemical in certain industrial processes, particularly the manufacture of synthetic rubber.</p>	<p>Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.</p>
Carbon monoxide	<p>Carbon Monoxide (CO) is a colourless, odourless poisonous gas produced by incomplete, or inefficient, combustion of fuel. It is predominantly produced by road transport, in particular petrol-engine vehicles.</p>	<p>This gas prevents the normal transport of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.</p>
Lead and Heavy Metals	<p>Since the introduction of unleaded petrol in the UK there has been a significant reduction in urban lead levels. In recent years industry, in particular secondary non-ferrous metal smelters, have become the most significant contributors to emissions of lead. The highest concentrations of lead and heavy metals are now therefore found around these installations in industrial areas.</p>	<p>Even small amounts of lead can be harmful, especially to infants and young children. In addition, lead taken in by the mother can interfere with the health of the unborn child. Exposure has also been linked to impaired mental function, visual-motor performance and neurological damage in children, and memory and attention span.</p>

Further Information:

For more information on pollution sources and current UK national and regional air quality please visit the following websites:

UK Air Quality Archive

www.airquality.co.uk

National Atmospheric Emissions Inventory

www.naei.org.uk



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