

**Examination of the
Spelthorne Core Strategy and Policies DPD**

**Background Paper
on
Air Quality**

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**Planning Services
Strategic Directorate (Community)
Borough of Spelthorne
Council Offices
Knowle Green
Staines
Middlesex
TW18 1XB**



Background Paper on Air Quality

[Note: Appendix A contains information on the main pollutants referred to in this statement and how they are measured]

Air Quality in the DPD

1. The Core Strategy vision aims to bring about improvement in air quality through increased use of non car-based travel and a consequent reduction in congestion. Securing an improvement in the Borough's air quality is one of the plan objectives, to which the Core Strategy will make a contribution along with other plans and strategies.
2. Strategic Policy SP6 includes contributing to improvement in air quality as one of the ways in which the quality of the environment will be maintained and improved. Policy EN3 then sets out the specific ways in which air quality will be improved and harm from poor air quality minimised.
3. The approach to air quality has been developed in the light of Government guidance and the Council's separate air quality assessments.

The National Air Quality Strategy

4. The Government's National Air Quality Strategy reviews air quality at a national level, identifies key pollutants and sets targets for maximum concentrations taking account of EU requirements and available scientific evidence. An updated strategy was produced in 2007 replacing the previous document produced in 2000.
5. Local authorities are required to do their own local air quality reviews, which must include assessments of whether national air quality objectives for specified pollutants are being achieved or are likely to be achieved in their area. Where an objective is not met or is not likely to be met within the specified period then the area affected must be declared an Air Quality Management Area and an Air Quality Action Plan must be produced.

Air Quality in Spelthorne

6. Spelthorne is designated as an Air Quality Management Area because of high levels of nitrogen dioxide in some parts of the Borough that exceed UK National Air Quality Objectives. The primary contributor to poor air quality is road traffic and the main road corridors are the worst affected areas.
7. In Spelthorne the first review and assessment of air quality completed in 2000 found that the objective for nitrogen dioxide (NO₂) was likely to be exceeded for significant parts of the Borough and a decision was made to declare the whole Borough an Air Quality Management Area.
8. An Updating and Screening Assessment carried out in 2003 found it to be likely that an NO₂ objective will be exceeded close to motorways, major roads and junctions. It also found it to be possible that the objective for particulate matter, which relates to PM₁₀s, particles with a diameter of up to 10 microns or 10 millionth of a metre, may be exceeded close to Heathrow Airport (see Appendix A for more information on particulate matter). Objectives for other pollutants would

not be exceeded. It recommended detailed assessment of NO₂ and PM₁₀ in areas where there was a risk of exceedence.

9. This led to the Detailed Air Quality Assessment produced by CERC, published in 2006 (CD/SBC/023), which showed the following position:
 - **NO₂**: The objective for annual average concentration is exceeded in 2005 along major roads in the Borough. By 2010 the area of exceedence is forecast to fall by 50%. The hourly average objective is exceeded alongside the M25 only in 2005, with the area of exceedence also forecast to reduce by 2010.
 - **PM₁₀**: The current annual average objective is not exceeded anywhere in the Borough, while the hourly average is exceeded only alongside the M25 in 2005 with no exceedence in 2010. (The study also considered provisional objectives for PM₁₀ by 2010 but these were not included in the 2007 National Air Quality Strategy, see para 12 below).
10. Where an air quality objective is exceeded the significance will be influenced by whether people are likely to be exposed to the exceedence in the location concerned. Government guidance states:

“The Regulations make clear that likely exceedences of the objectives should be assessed in relation to *‘the quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present’*. Reviews and assessments should thus be focussed on those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Authorities should not consider exceedences of the objectives at any location where relevant public exposure would not be realistic”. (Source: Defra: Local Air Quality Management Technical Guidance LAQM TG (03), para 1.19)

So for nitrogen dioxide, where there is a 1 hour mean objective, locations will only be relevant if members of the public are regularly present and it is possible that a member of the public might be present for a one hour period. In Spelthorne some of the worst areas for air quality are locations where relevant public exposure would not occur, for example the central reservation or hard shoulder of a motorway or the centre of a roundabout like Sunbury Cross.

11. Table 1 below shows the relevant targets and the area of exceedence for both pollutants.

Table 1: Extent of Exceedence of National Air Quality Objectives for Selected Pollutants in Spelthorne

(a) *NO₂*

Year	Objective	Exceedence area	Exceedence area (% of Borough)
2005	Annual average < 40ug/cu m	1.8 sq km	3.5%
	Hourly mean > 200ug/cu m no more than 18 times a year (modelled as 99.79 th percentile)	0.2 sq km	0.39%
2010	Annual average < 40ug/cu m	0.9 sq km	1.8%
	Hourly mean > 200ug/cu m no more than 18 times a year (modelled as 99.79 th percentile)	0.06 sq km	0.12%

(b) *PM₁₀*

Year	Objective	Exceedence area	Exceedence area (% of Borough)
2005	Annual average < 40ug/cu m	0 sq km	0%
	24-hour mean > 50ug/cu m no more than 35 times a year (modelled as 90.41 th percentile)	0.1 sq km	0.19%
2010	Annual average < 40ug/cu m	0 sq km	0%
	24-hour mean > 50ug/cu m no more than 35 times a year (modelled as 90.41 th percentile)	0 sq km	0%

Source: Detailed Air Quality Assessment for Spelthorne (2006) tables 11.1 to 11.4 (Data included in the report for the provisional PM₁₀ objective for 2010 has been omitted as no longer relevant, see para 9 above)

12. Figures 11.1 to 11.8 of the report show the modelled geographical extent of the two pollutants, while figures 12.2 to 12.12 show the results of more detailed modelling for areas identified in the 2003 Updating and Screening Assessment as most likely to be subject to exceedences (see para 7 above)
13. A further Updating and Screening Assessment was published in 2006 (CD/SBC/048). This included detailed results from monitoring over the period 2003 to 2005. The data for 2005 showed 11 sites exceeding the NO₂ annual average objective, but, in accordance with the trend for improvement, this was forecast to fall to two sites by 2010, The Parade, Sunbury Cross and London Road, Staines (see Appendix 1 table 3 of the report).
14. The 2007 National Air Quality Strategy introduces a new objective for particulate matter based on PM_{2.5}, which stems from European targets. PM_{2.5} consists of smaller particles within the definition of PM₁₀ (see Appendix A to this statement). There is no accepted threshold effect for PM_{2.5}, i.e. no recognised

safe level for exposure. The new objective is based on an 'exposure reduction' approach for PM2.5 to improve air quality generally rather than just in a small number of localised hotspot areas and includes a target of a 15% reduction in urban background levels between 2010 and 2020. There is also a backstop objective of a minimum level of protection applicable to all areas in the country of 25ug per cu m.

15. The Government is seeking to establish a network of PM2.5 monitoring stations within major conurbations and is not currently expecting every local authority to monitor for PM2.5. Spelthorne has recently purchased a mobile monitor capable of measuring PM1, 2.5 and 10. It is based initially at Sunbury Cross. Monitoring has separately taken place in Spelthorne alongside the M25, which showed background levels of between 12.0 and 16.8 ug/cu m for the period 2003 to 2005, well below the 25 ug/cu m backstop level.
16. Spelthorne's next Updating and Screening Assessment will take specific account of the new objective for PM2.5.

Heathrow-Related Studies

17. A further source of information on current and future air quality in Spelthorne is the air quality assessment carried out for the Government in support of the consultation on Adding Capacity at Heathrow (CD/NAT/433). The Future of Air Transport White Paper set compliance with EU air quality limits as a key condition for acceptance of another runway at Heathrow and committed the Government to a programme of work to address the air quality issue.
18. The results of the Government-commissioned studies are summarised in paras 3.51-3.80 of the consultation document. These paragraphs, and the associated figures and tables are reproduced in Appendix B below.
19. The studies show that in the base year (2002) there would be 7,336 residential properties in the vicinity of Heathrow suffering an exceedence in the NO₂ air quality limit (Table 4 in Appendix B) but that all of these are located outside Spelthorne to the north of the airport (Figure 12). Technological improvements, particularly to road vehicles (para 3.55 and figure 13) are forecast to lead to a sharp fall in exceedences, so that by 2020 there would be no exceedence of air quality limits even with the addition of a third runway.
20. The studies suggest that for Spelthorne there is no current exceedence of air quality limits due to Heathrow and that overall air quality will improve as technological improvements lead to reduced emissions from motor vehicles.

Spelthorne Air Quality Action Plan

21. Where an Air Quality Management Area has been declared Councils are required to prepare an Air Quality Action Plan. Spelthorne's plan (CD/SBC/047) was produced in 2005 following public consultation. It is specifically aimed at reducing NO₂ levels as this is the pollutant for which the air quality objective is exceeded. The plan is also likely to impact on pollution from particulates which, like NO₂, is heavily influenced by road traffic. The plan identifies road traffic as the major cause of exceedences and the Action Plan's measures focus on restraining growth in road traffic, specifically:
 - Widening travel choice and encourage more journeys by public transport,

cycle or walking as a result of enhancing the public transport, cycle and pedestrian network and facilities;

- Bringing about the long-term reduction of emissions from vehicles transporting children to school;
- Managing traffic and restraining the demand for travel;
- Providing a more integrated transport system;
- Planning and managing the highway network;
- Helping to make freight distribution more sustainable;

The plan includes a total of 20 actions relating to road emissions. Other actions cover: emissions from the Council's activities, Heathrow emissions, land use planning, the Sunbury Cross area, industrial sources, smoke emissions, raising awareness, air quality monitoring, and energy efficiency in buildings. An update of this list is set out in the Air Quality Progress Report 2008 (CD/SBC/071).

22. There are two key actions related to land use planning. Firstly, to ensure that the new LDF incorporates planning policy that ensures development will not adversely impact on air quality, and secondly, to ensure wherever possible air quality will be enhanced.
23. Section 7.3 of the Action Plan gives specific consideration to Sunbury Cross. It notes that the air quality objective for NO₂ is likely to be exceeded for the roundabout itself beyond 2005 and, after reviewing the options, concludes that the only real sustainable options available for the reduction of emissions from road vehicles within the Sunbury Cross area are those which are being implemented across the Borough, through the action plan. In view of the exceedence it recommends a specific action:

“As part of the planning process, Spelthorne Borough Council will ensure that the impacts on air quality caused by the future development of land within the Sunbury Cross area will be taken into consideration, and where necessary mitigated against in line with the polluter pays principle.”

Planning Policy Guidance

24. Planning policy, along with other initiatives, has a role to play in improving air quality. PPS 23 contains relevant Government guidance. It confirms (para 2) that the air quality impact of development is capable of being a material consideration insofar as it arises from or may affect any land use, and that the planning system has a key role in ensuring that developments and other uses are not, as far as possible, affected by major existing or potential sources of pollution.
25. The role of local development documents in setting a policy framework that prevents harmful development and in mitigating the impact of polluting developments is recognised in para 9. Appendix A of the PPS gives more detail on matters to be considered in the preparation of DPDs. These include the need to separate polluting and other land uses; the existing and likely future air quality in the area, including any Air Quality Management Areas and the findings of air quality reviews and assessments; the need for compliance with air quality objectives; and existing action and management plans with a bearing on environmental quality including Air Quality Management Area Action Plans.

Paragraph 9 also recognises the key role of the planning system in protecting and improving the natural environment, public health and safety and amenity, and the scope of mitigating conditions to allow development that would otherwise not be acceptable to proceed.

26. Para 7 refers to the role of the national Air Quality Strategy and Air Quality Management Areas in controlling pollution. Annex 1 to the PPS states at para 1.12 that in Air Quality Management Areas the planning, transport and air quality control functions of local authorities should work closely together in considering the results of air quality reviews and assessments both in the preparation of development plans and the making of development control decisions. It adds in para 1.27 that core strategies should include strategic land use policies on the location of potentially polluting developments and on the location of sensitive developments (such as housing, schools, hospitals etc.) in proximity to existing sources of pollution (including, for example, roads and certain industrial processes)
27. Annex 1 to PPS 23 provides important guidance at Appendix 1G on the approach to new development and the opportunity to secure betterment through new development.

“It is not the case that all planning applications for developments inside or adjacent to AQMAs should be refused if the developments would result in a deterioration of local air quality. Such an approach could sterilise development, particularly where authorities have designated their entire areas as AQMAs. LPAs, transport authorities and pollution control authorities should work together to ensure development has a beneficial impact on the environment, for example by exploring the possibility of securing mitigation measures that would allow the proposal to proceed. Road transport is recognised as a significant contributor to poor local air quality, particularly in urban areas. LPAs can play a key role by ensuring that developments reduce the need to travel and encouraging more sustainable travel choices”.

The Approach of the DPD

28. The need to improve air quality in Spelthorne, reflected in the Borough’s status as an Air Quality Management Area, is recognised in the Core Strategy objectives. Improving air quality forms one of four specific components to strategic policy SP6 on maintaining and improving the quality of the environment. The policy deliberately uses the phrase “*contribute* to improving air quality” in recognition of the fact that planning policies can only be part of the strategy for improving air quality in the Borough, as the Air Quality Action Plan makes clear (see paras 15-17 above).
29. Policy EN3 sets out, under four headings, how air quality will be improved and how the harm from poor air quality will be minimised. The first two measures are specifically aimed at road traffic, the major contributor to poor air quality in the Borough (see para 15 above). Paras 10.16 – 10.18 expand on measures in the LDF and related documents covering, the location of development, travel plans, encouraging alternatives to the car, improved facilities and information for public transport users and cyclist (including the specific proposal in the Allocation DPD for improvements to Staines bus station), reducing parking provision, lorry routing and use of low emission technology. The third and fourth measures are specifically concerned with new development. The third requires an assessment of the impact of development that could worsen air quality or be sensitive to poor

air quality, while the fourth allows for development to be refused where there are adverse air quality effects.

30. The policy approach is consistent with PPS23 guidance in seeking to improve air quality along with other initiatives and ensure development is located to minimise the harm from poor air quality. It is also consistent with the provisions of the Air Quality Action Plan in its support for measures to reduce road traffic impacts and in its approach to development (see para 16 above). The approach to assessing air quality impact provides an appropriate framework for considering development proposals in the Sunbury Cross area consistent with section 7.3 of the Action Plan (see para 17 above)

An Alternative Approach

31. The Green Street Action Group suggest an alternative policy in which residential development would not be permitted within 500m of all primary roads. In support reference is made to American studies identifying adverse health impacts for the young and elderly within this range.
32. The Council cannot support such a policy for the following reasons:
 1. The fundamental problem with the alternative approach is that it would prevent residential development in extensive areas of the Borough in which national air quality objectives would not be exceeded. The Council's air quality monitoring and forecasting shows only two locations (The Parade, Sunbury Cross and London Road, Staines) where the NO₂ objective levels are forecast to be exceeded in 2010 and no locations where objectives for other pollutants are forecast to be exceeded. There is no basis in Government policy for refusing development on air quality grounds where levels of pollution are below air quality objectives.
 2. The Air Quality Action Plan sets the air quality policy direction for the Borough. Adopting the alternative approach would put the LDF in conflict with the Action Plan. Any proposal for an alternative approach to air quality should be considered first through a future review of the Action Plan and not imposed via the LDF.
 3. Care needs to be taken in applying the findings of American studies, or those from any other part of the world, direct to Britain. The Mayor of London's Air Quality Strategy reviewed available information on health impacts including a major Californian study of children's health. It commented that the nature of pollution in California differs from that in London and that the relevance of the study to London should be treated with caution. It also considered other studies relating living in polluted areas with respiratory problems and found that the conclusions varied (see Appendix D to this statement)
 4. The alternative approach would significantly reduce the area of the Borough in which new residential development would be acceptable reducing the extent to which housing need could be met. While housing need could not justify permitting new development where air quality is unacceptably poor, it does add weight to the case for ensuring policy does not lead to housing being refused where air quality objectives are not forecast to be exceeded.

33. The Council considers that its approach, which is based on assessing air quality in relation to individual developments, is more appropriate to the situation in Spelthorne where it is not realistic to monitor actual air quality in every location and modelling suggests a general trend towards improvement. An assessment-based approach will enable informed decisions to be made in each case.

Technical Terms used in this Statement

NO₂ Nitrogen Dioxide. Road transport is the main source, followed by the electricity supply industry and other industrial and commercial sectors.

NO₂ is associated with adverse effects on human health. At high levels NO₂ causes inflammation of the airways. Long term exposure may affect lung function and respiratory symptoms. NO₂ also enhances the response to allergens in sensitive individuals.

PM Particulate matter. PM is made up of a wide range of materials and arise from a variety of sources. Concentrations of PM comprise primary particles emitted directly into the atmosphere from combustion sources and secondary particles formed by chemical reactions in the air. Both short-term and long-term exposure to ambient levels of PM 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.

Recent reviews by the World Health Organization and the Committee on the Medical Effects of Air Pollutants (COMEAP) 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.

PM_{2.5} Particulate matter with a diameter of up to 2.5um

PM₁₀ Particulate matter with a diameter of up to 10um

ug Microgram

um Micron (1 micron = 1 millionth of a metre)

Source: National Air Quality Strategy (2007) Table 1 and Glossary.

Extract from 'Adding Capacity at Heathrow Airport' – Department for Trade Consultation document, November 2007. Chapter 3: Heathrow in future – meeting the environmental tests.

CHAPTER 3: Heathrow in Future – PART I

- 3.50** Should policy approval be given for further development of Heathrow, BAA would need to engage closely with the MOD to develop a safe operational solution acceptable to all parties as part of any planning application.

Local air quality

- 3.51** The critical local pollutant at Heathrow is nitrogen dioxide (NO₂) where the current European Directive imposes the following limits from 2010¹⁵:

- Hourly limit value for the protection of human health – 200µg/m³ NO₂, not to be exceeded more than 18 times a calendar year.
- Annual limit value for the protection of human health – 40µg/m³ NO₂ annual average.

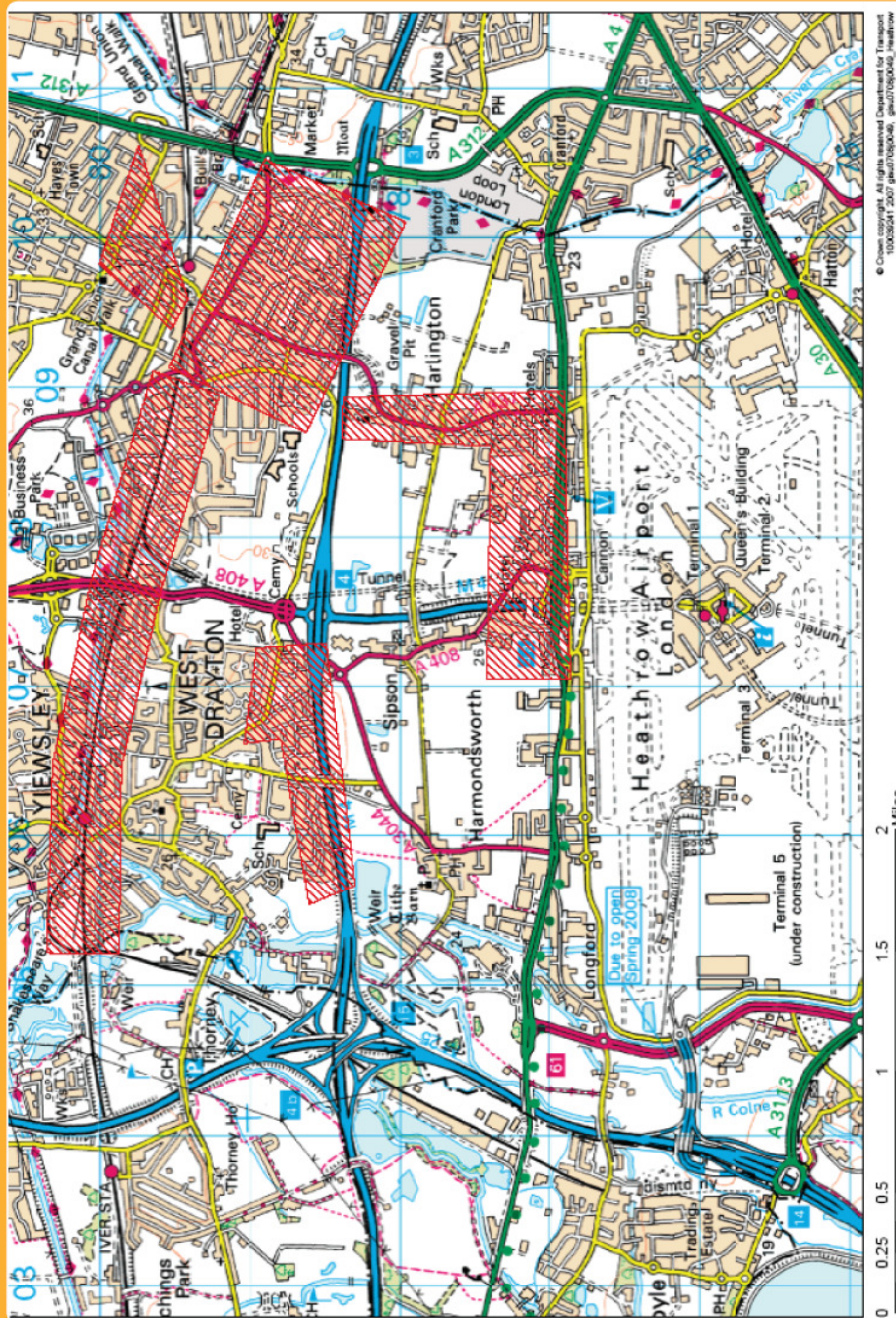
These limit values are currently being exceeded in many parts of central London. Around Heathrow the *hourly* limit value for NO₂ is not currently exceeded, but the *annual* limit value was being exceeded in 2002 in a number of areas – see **Figure 12**.

- 3.52** The most significant contributors to NO₂ in the Heathrow area are road vehicles and aircraft. Their relative importance varies around the airport, but typically aircraft emissions predominate in areas close to the runways – particularly to the north east, given that the prevailing winds tend to be south westerly. Road vehicle emissions tend to predominate

close to the motorways (M4 and M25) and other heavily trafficked A-roads. In the 2002 base year, emissions from the railway line to the north and from commercial gas sources (east, between the M4 and the railway) are also noticeable, but both of these sources have been shown to become much less important over time.

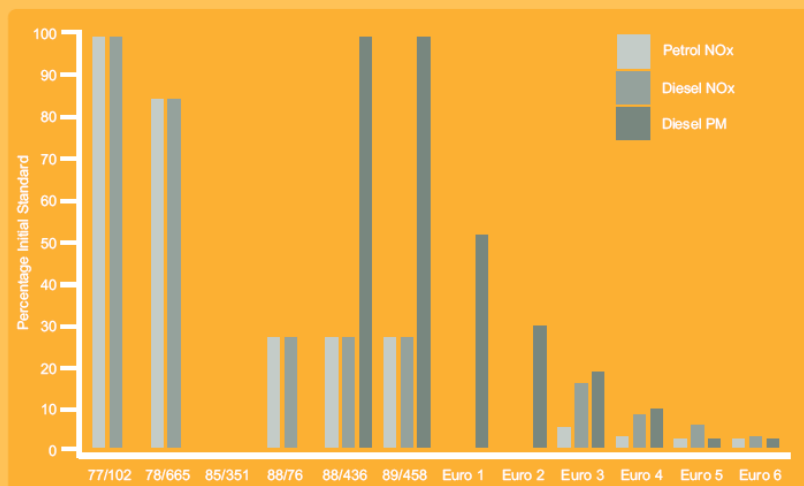
- 3.53** Air quality has been progressively improving, due mainly to emission controls on road vehicles and industrial sources. Emissions of particulate matter (PM) and oxides of nitrogen (NO_x) from road vehicles have been reduced as progressively tighter emission standards have been applied, and will improve further in 2010 when further controls are introduced for specific vehicle types. The position is also set to improve beyond that as progressively tighter standards come into force for both cars and heavy goods vehicles. **Figures 13** and **14** illustrate this for the key pollutants – particulates (PM) and oxides of nitrogen (NO_x) showing percentage reductions in emissions under successive Euro standards since the late 1970s.
- 3.54** In the light of these trends, the White Paper concluded that there was a better prospect of meeting air quality limits in the 2015-2020 period, allowing time to reap the benefits of cleaner road vehicles and other technology improvements.

Figure 12: Illustrative map of areas where annual average NO₂ concentrations exceed limit values in 2002 base year



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Figure 13: Relative improvement in Car Engine Emissions under successive Euro standards

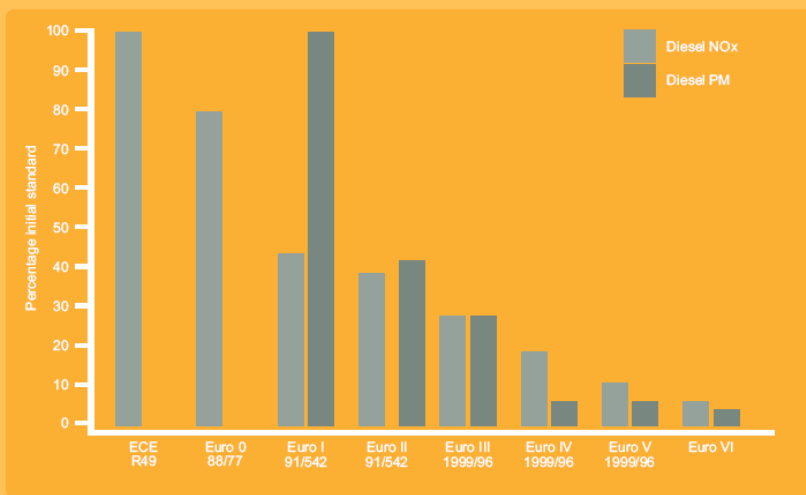


3.55 Our modelling, building on the recommendations of the air quality technical panels, has confirmed this. It predicts substantial reductions in road vehicle emissions over the next decade, as a result of tighter European standards. It identifies improved environmental performance of aircraft, as today's fleet is either replaced or re-equipped with cleaner engines, and there is a marked trend towards a higher proportion of twin-engined aircraft, producing lower emissions than their four-engined

predecessors. In addition, it shows significant reductions in emissions from diesel locomotives on the Great Western line following plans to modernise the existing fleet of high speed trains within the next decade.

3.56 As a result, future predictions of local air quality around Heathrow are therefore much more positive than was the case at the time of the White Paper. In addition, the latest modelling has been shown to represent future emissions much more accurately

Figure 14: Relative improvement in Heavy Duty Engine Emissions under successive Euro standards



than at the time of the White Paper, reducing a significant element of over-prediction in that work.

3.57 Our analysis has confirmed the conclusions in the July 2006 report that PM_{10} levels do not exceed EU limit values around Heathrow, and are unlikely to do so in the future. Annual mean levels of PM_{10} in all future cases are consistently below $25\mu\text{g}/\text{m}^3$, against the limit of $40\mu\text{g}/\text{m}^3$. As $PM_{2.5}$ comprises the fine particle component of PM_{10} , concentrations of $PM_{2.5}$ will

be less than those of PM_{10} . Thus the PM_{10} modelling also indicates that the new objective for $PM_{2.5}$ (annual average of $25\mu\text{g}/\text{m}^3$, mandatory from 2015) will not be exceeded in any future case.

3.58 Importantly, our modelling shows that, even with a third runway, the combined effects of these technology improvements will see NO_x emissions in the Heathrow area fall by some 49 per cent between 2002 and 2030, and NO_2 by 36 per cent over the same

period, without any further measures. This means that, even with Heathrow handling around 702,000 annual movements, the modelling for the central case produced no results for NO₂ above the critical 40µg/m³ limit. The results are set out in detail in the technical supporting documents listed in Annex D and summarised in Table 4. In keeping with the work done for the White Paper, results are given in terms of exposure at residential properties to illustrate the extent of likely exceedences. A comprehensive assessment based on the legal requirements for ambient air quality contained in the current air

quality directives or the proposed new EU directive referred to in paragraph 1.18 would need to be made in the event of any subsequent planning application.

Surface access – meeting air quality limits

3.59 Heathrow is directly served by road – including the M4 and M25 – and by rail (Heathrow Express, Heathrow Connect and Piccadilly Line). Around 112,000 vehicles enter Heathrow every day, bringing air passengers, airport workers and goods. In addition,

Table 4: Summary of Air Quality Impacts of a Third Runway (with figures for two runways in segregated mode shown for comparison)

	2002 ¹⁶	2015	2020		2030	
	2 runways 461,000 ATMs	2 runways 480,000 ATMs	2 runways 480,000 ATMs	3 runways 702,000 ATMs	2 runways 480,000 ATMs	3 runways 702,000 ATMs
Number of properties in area of NO₂ exceedence (annual average 40µg/m³)	7,336	22	Nil	Nil	Nil	Nil

16. Results for the base case use a slightly different method for determining populations exposed, as explained in the supporting technical document. This gives slightly higher values, but the base results would be several orders of magnitude higher than the future cases, whatever method was chosen.

around 30,000 air passengers a day arrive at the airport by rail.

3.60 The White Paper recommended that some form of road traffic demand management should be considered in the context of an expanded Heathrow, in the absence of any plans for further motorway widening. It was assumed at the time that such measures might be essential to enable an expanded Heathrow to meet the air quality limits. The subsequent air quality assessments have shown, however, that even if a third runway is added, no NO₂ exceedences are expected;

and if full mixed mode were introduced with effect from 2015, exceedences would only occur in a limited number of places along the M4 – see next section. We do not therefore expect to have to resort to any of these measures in order to satisfy the air quality constraint for a third runway. We discuss below the approach we took to examining these issues.

3.61 For each of options 1, 2 and 3, forecasts were made of the numbers of non-transfer air passengers, the share of surface access trips carried by public transport, and the growth in

Table 5: Air Passenger Forecasts

Airport Development Scenario	Year	Non-Transfer Air Passengers (m)	Public Transport Annual Mode Share (%)
	2004	43.6	36.2
Within current permissions	2010	56.9	37.5
	2015	63.6	39.2
	2020	67.1	41.0
	2030	74.1	43.6
Mixed mode	2015	67.2	39.6
	2030	78.7	43.0
Third runway/ new terminal	2020	82.2	39.5
	2030	91.5	41.7

road traffic and reduction in road traffic speeds in the vicinity of the airport in the key years from 2010 to 2030. A summary of the passenger forecasts and mode shares is in Table 5. Growth in traffic is predicted at around ten per cent in all 2015 cases and 15-20 per cent in 2020 cases. Road traffic speeds are predicted to fall by at most six per cent.

- 3.62** The key assumptions underlying these forecasts are set out in the supporting technical document on surface access (see Annex D). The forecasts show that the share of surface access trips carried by public transport is expected to increase over time under all three airport development scenarios. The forecasts also show that traffic volumes on the roads in the vicinity of Heathrow are expected to grow and traffic speeds to fall. Changes to the assumed airport access arrangements for a third runway account for the fact that traffic speed reductions are lower than with mixed mode.
- 3.63** Assumptions on changes to the transport system and travel costs are set out in the supporting technical document on surface access. They take no account of interventions that may be proposed by the airport operator as part of a transport assessment designed to mitigate the impacts of developing the airport. While identifying such interventions

has not been the focus of our work, we have given it some consideration.

Potential measures to mitigate air quality exceedences

- 3.64** We have looked, for example, at the composition of traffic using roads where air quality is particularly sensitive (the air quality 'hotspots'). Early analysis showed that, at some locations nearer to the airport, reductions in airport-related traffic could play an important role, whereas, at other locations such as the M4, it might be more important to seek to reduce non-airport traffic.
- 3.65** A wide range of possible measures for reducing airport-related traffic was considered, including:
- additional rail services, such as Crossrail and AirTrack;
 - more, higher frequency and lower fare coach services;
 - various forms of charging air passengers for access to the airport;
 - increased parking charges and park-and-ride for air passengers; and
 - reduced parking space or access charging for employees, coupled with park-and-ride and a network of free bus services between all employment centres on or near the airport.

3.66 A series of measures for reducing non-airport traffic was also considered, including traffic management measures, such as closure or restricted use of eastbound slip roads on the M4 and a widespread motorway ramp metering strategy, and – for illustration purposes – charging users on the public road network to cross a cordon around Heathrow, including use of the M4 to the north of the airport.

3.67 Tests carried out using a specially developed and assembled suite of transport models, in advance of the air quality modelling, showed the following:

- the only package of measures which would significantly reduce airport employee traffic at the air quality hotspots involved the removal of three-quarters of parking space for employees, coupled with a park-and-ride system. This was considered to be draconian and likely to inhibit staff retention and recruitment unacceptably;
- charging for access to terminal forecourts, coupled with an increase in parking charges or charging for access to the airport terminal areas, could substantially reduce the amount of car and taxi use by air passengers. But this would have only modest impacts on roads such as the M4, given that traffic to and from the airport represents only a

modest proportion of total traffic using these roads;

- a modest charge applied to heavy goods vehicles only to cross a cordon on the public roads around the airport, including the M4, could reduce traffic significantly. This would be likely to be sufficient to mitigate air quality exceedences adjacent to the M4.

3.68 In the last scenario, heavy goods vehicles would either have to pay the charge or divert to take a longer route. Other traffic would benefit from the reductions in congestion around the airport. Those vehicles required to divert would incur additional travelling time and extra vehicle operating costs. Alternatively, an airport access charge could bring about substantial relief to all road users in the vicinity of the airport. Depending on the level of the airport access charge (or forecourt charge and parking charge increase), this could be a more attractive option.

3.69 We discuss at the end of this chapter how the additional demand for trips to and from the airport might be managed – see the section on Surface Access (*Other Issues*) from paragraph 3.159 and the steps that the airport operator would need to take to develop a surface access strategy in advance of any planning application.

London Low Emission Zone

- 3.70** The Mayor's London Low Emission Zone (LEZ)¹⁷ is an emissions-focused air quality improvement scheme targeted at heavier, more polluting vehicles and focused on particulates. Its aim is to improve air quality in the capital, in effect by bringing forward the point at which vehicles are expected to comply with the latest emissions standards. The scheme will cover almost all of Greater London from 2008, including the M1 south of London Gateway Services, the Heathrow M4 Spur and the M4 east of Junction 3. The M25 is excluded.
- 3.71** The LEZ will include HGVs, buses and coaches from 2008 and heavier diesel-engined Light Goods Vehicles from 2010. Vehicles not meeting designated emissions standards for particulates will be expected to pay a significant charge (£200 for HGVs) for entry to the zone, with penalties for not paying the charge set between £500 and £1,000. This will provide an incentive for hauliers to upgrade their vehicles or retrofit them with pollution abatement equipment.
- 3.72** Although the scheme focuses on reducing particulate emissions (PM₁₀), it should help London move closer to achieving the 2010 EU air quality targets for NO₂ more rapidly than would occur through the natural vehicle replacement cycle. However, the benefits of this acceleration

process will have largely worked themselves through over the next five to seven years. Our modelling for a third runway from 2020 (and for mixed mode) has not therefore taken this specifically into account.

How robust is the air quality modelling?

- 3.73** All modelling – especially when it is concerned with predicting impacts in decades to come – is necessarily uncertain. We have carried out additional evaluation of the air quality modelling approach to test confidence in the robustness of the results to inform a policy decision on adding a third runway. The focus was on confidence in those areas closest to the limit value, and on aircraft sources (as recommended by the technical panels). Further details are set out in the technical report 'Demonstrating Confidence in the Air Quality Modelling' (see Annex D) which also reports how the recommendations from the July 2006 technical report of the air quality panels have been carried through.
- 3.74** Scientific assessment clearly shows that the dispersion model used is the most appropriate one (as was concluded in the technical report), that it has a good overall agreement with measured data (better than other models), and that it generally reflects the different sources of emissions well.

- 3.75** The modelling has taken account of all aircraft-related technical panel recommendations (and gone beyond them in some cases). If anything, we believe it is likely to be conservative. In line with the precautionary approach, we have adopted some elements of conservatism (where there are known uncertainties) such as assuming a five per cent higher take-off thrust for some aircraft, and taking a conservative assessment of the improvement in future road vehicle fleet emissions, with no allowance for incentives to accelerate take-up of new standards. Sensitivity tests have also been carried out, for example in relation to future primary NO₂ emissions (see the relevant supporting documents in Annex D).
- 3.76** In comparing the air quality model to local monitoring data, there is a good match, with no significant under- or over-estimate of NO₂ or NO_x. The overall performance of the model is slightly better than in the technical panel model work, and is well within EU guidelines for model performance. To help show confidence in the approach, the dispersion approach used (ADMS-Airport) was also compared with a completely different approach from Europe (LASPORT) for the same test, and showed similar patterns of dispersion.
- 3.77** Meteorology is an important factor in the variation of air quality from year to year, as well as being strongly related to runway use. The choice of year on which to base the meteorological conditions to be used in the model is fundamental to the results it produces. The air quality modelling has used meteorological conditions from 2002 (the base year of the model) as recommended in the 2006 air quality technical report. The technical panels found that, unlike in general dispersion, the contribution of aircraft to concentrations does not increase with lower wind speed; this is because of the associated plume rise from aircraft exhausts. Use of meteorology from other years will produce different patterns of results, as background contributions change with wind direction.
- 3.78** The model's ability to replicate the strength of the airport pollution signal has also been tested, using statistical techniques. Comparing model outputs and measured data for those times when aircraft take-offs were from the northern runway, and those times when take-offs were from the southern runway, the model was found to reflect the impact of runway alternation very well, and thus to show the impact of changing from segregated mode operations. Analysis also shows that airport emissions (NO_x) can be detected over 1km from the airport boundary to the north-east, supporting early indications from the

technical report (using data collected for this purpose).

- 3.79** Overall, we believe that this provides an appropriate way forward for consultation. Insofar as there are remaining uncertainties inherent in modelling, the intensity of NO_x emissions may be greater or lesser than predicted, but the pattern of NO₂ concentrations is not likely to be significantly different. The position is illustrated in some detail in the supporting technical document on Population Exposure (see Annex D) which gives an indication of the trends. Consultees can therefore consider the extent to which uncertainties might affect them.
- 3.80** The Government believes that, on the basis of improved modelling following the air quality technical panel work reported in July 2006, and with the benefit of substantial reductions in emissions expected over the next decade or so, a short third runway as described could be added at Heathrow by around 2020 and enable EU air quality limits for PM₁₀ and NO₂ to be met without the need for further mitigation measures. The ability to meet air quality limits in future years largely results from substantial improvements in road vehicle emissions due to further developments in European emission standards. It also reflects

trends in cleaner aircraft engines and moves towards a higher proportion of twin-engined, as opposed to four-engined, aircraft with lower emissions.

Question 3

Do you agree or disagree with the Government's view that a third runway could be added whilst meeting air quality limits, without the need for further measures? What are your reasons? Are there any significant considerations you believe need to be taken into account? If so, what are they?

Noise

- 3.81** Levels of aircraft noise at Heathrow have been steadily reducing over time as the environmental performance of aircraft has improved and older, noisier aircraft have been retired and replaced. Modern aircraft are typically 20 decibels quieter than their predecessors in the 1960s and 1970s. This represents a reduction in perceived noise of around 75 per cent, achieved through a combination of improved engine design (the application of high by-pass ratio engines), better performance (allowing aircraft to climb more rapidly on departure) and quieter airframe designs.
- 3.82** Figure 15 shows the trends since 1974, based on the Noise and Number Index (NNI) used up to

Spelthorne Air Quality Action Plan: Action List

This appendix reproduces the list of actions from the Air Quality Action Plan

Action Code	Description of Action
Road Emissions 1	Identify and implement long-term solutions for the reduction of emissions from road vehicles using Highway Agency controlled trunk roads within Spelthorne.
Road Emissions 2	Identify, prioritise and implement actions to reduce vehicle emissions emanating from county maintained roads within NAQS exceedance locations throughout the borough of Spelthorne.
Road Emissions 3	Surrey County Council will continue to work with Spelthorne's schools for the development, implementation of the "Safe Routes to School" program.
Road Emissions 4	Continue to work with Spelthorne's schools for the development, implementation and the annual review of School Travel Plans.
Road Emissions 5	Continue to work with schools in Spelthorne help organise "Walking Buses".
Road Emissions 6	Continue to work to help schools teach pupils cycling proficiency training and cycle skills.
Road Emissions 7	Install vehicle activated signs to control road traffic speeds at appropriate locations within Spelthorne.
Road Emissions 8	Investigate the feasibility of installing variable message signs to provide travel advice information at appropriate locations in and around the borough of Spelthorne.
Road Emissions 9	Implement decriminalised parking enforcement within the borough of Spelthorne
Road Emissions 10	Publicise the establishment of decriminalised parking enforcement within the borough of Spelthorne
Road Emissions 11	Investigate the feasibility of establishing controlled parking zones at various locations within the borough of Spelthorne
Road Emissions 12	Carry out a feasibility study into the development of a lorry routing strategy.
Road Emissions 13	To promote integrated public transport as a good alternative form of transport to the car and improve facilities at bus stops within Spelthorne
Road Emissions 14	Promote bus travel as a good alternative form of transport to the car and improve facilities at bus stops within Spelthorne.
Road Emissions 15	Buses operating along critical corridors within the borough of Spelthorne will be encouraged to have Euro III compliant engines.
Road Emissions 16	Bus prioritised infrastructure will be installed at strategic locations throughout Spelthorne.
Road Emissions 17	Increase the number of journeys made by cycle from 2% to 4% above 2001 base level.
Road Emissions 18	Introduce a linked, segregated cycle land between Chertsey Bridge and Walton Bridge Road.
Road Emissions 18	The production of a series of Cycle Guides that will detail all the cycle routes throughout Surrey.
Road Emissions 19	Promote the use of "cleaner technology and fuels" within Spelthorne.
Road Emissions 20	Promote the development and implementation of "business travel plans" by companies located within the borough of Spelthorne.

Action Code	Description of Action
Reducing emissions from the Council's Activities 1	Reduce car dependency and facilitate transport choice by encouraging alternatives to car use along with changes in working arrangements.
Reducing emissions from the Council's Activities 2	Spelthorne Borough Council will review its Business Travel Plan.
Reducing emissions from the Council's Activities 3	All new fleet vehicles purchased by Spelthorne Borough Council will be meet Euro III emissions as a minimum, additionally, where appropriate, the use of alternatively fuelled vehicles will be considered.
Heathrow Emissions 1	Spelthorne Borough Council will continue to work to in partnership to minimise the impacts on air quality caused by the activities of Heathrow Airport air.
Land Use Planning 1	Ensure that the new Development Framework incorporates planning policy that will not adversely impact air quality, but furthermore, enhance air quality where possible.
Land Use Planning 2	Ensure that the future development of land will not adversely impact on air quality.
Sunbury Cross Area	As part of the planning process, Spelthorne Borough Council will ensure that the impacts on air quality caused by the future development of land within the Sunbury Cross area will be taken into consideration, and where necessary mitigated again in line with the polluter pays principal.
Industrial Sources 1	Continue to ensure that emissions from all 'prescribed processes' remain controlled and regulated in line with national policy.
Smoke Emissions 1	Continue to enforce the Smoke Control Areas within the borough.
Smoke Emissions 2	The Borough of Spelthorne will encourage the recycling of the green waste generated in the borough and discourage the burning of domestic waste as a means of waste disposal.
Smoke Emissions 3	Enforce against bonfires that are causing a statutory nuisance.
Smoke Emissions 4	Where appropriate, use enforcement powers to control dark smoke from bonfires
Smoke Emissions 5	Bonfires at commercial premises will be passed to the Environment Agency for enforcement purposes.
Raising Awareness and the Provision of Information 1	Raise the public's awareness of initiatives that will improve the quality of air within the borough of Spelthorne.
Working in Partnership 1	Spelthorne Borough Council will continue to work, in partnership with its neighbouring boroughs and others for the control of air pollution and continued improvement of air quality.
Working in Partnership 2	Spelthorne Borough Council will seek opportunities for effective partnerships for the continued improvement of air quality
Air Quality Monitoring 1	Spelthorne Borough Council will enhance the NO ₂ monitoring network within Spelthorne in order to develop a better understanding of the air quality within Spelthorne.
Air Quality Monitoring 2	Spelthorne Borough Council will make available regularly updated detailed information about the quality of air within Spelthorne on the Council's website (http://www.spelthorne.gov.uk).
Air Quality Monitoring 3	Spelthorne Borough Council will use the data obtained, in partnership with Surrey County Council to find further cost-effective measures to reduce emissions emanating from County maintained roads within Spelthorne.

Action Code	Description of Action
Energy Efficiency in Buildings 1	Establish the innovations programme; "Future Green", which seeks to fund and promote energy efficient services and measures.
Energy Efficiency in Buildings 2	Utilize the results of the Borough thermal imaging survey to promote the benefits and potential for energy efficiency in all sectors.
Energy Efficiency in Buildings 3	Link the Fuel Poverty Strategy to the weekly heating costs of properties occupied by vulnerable residents to a percentage of the state pension.
Energy Efficiency in Buildings 4	Achieve the Home Energy Conservation Act (HECA) target of eradicating fuel poverty within the borough of Spelthorne.

Source: Based on table 6.14 of the Spelthorne Air Quality Action Plan

Extract from the Mayor of London's Air Quality Strategy

Para 2.27: There has been much debate about whether air pollution triggers or causes asthma. The southern California Children's Health Study put forward evidence that ozone-related smog may cause asthma. This large, ten-year study of the health effects of children's chronic exposures to southern California air pollution, examined about 5,500 children in 12 communities (three with below average air pollution, nine with above average). It should be noted that ozone-related air pollution experienced in California is different from and found at much higher levels than pollution normally found in London, therefore the relevance of this study to London should be treated with caution. The study reported that children:

- taking part in a greater number of sporting activities in high ozone areas were more likely to develop asthma
- who are exposed to higher concentrations of particles are much more likely to develop bronchitis
- suffered worsened lung development in areas with higher concentrations of particles, acid vapour compounds and nitrogen dioxide
- had increased lung development if they moved from study communities to areas with lower particulate pollution, and had decreased lung development if the new areas had higher particulate pollution.

2.28 Studies in Nottingham and in the Netherlands have also shown associations between living in polluted areas (in proximity to main roads) and respiratory problems, in children and adults (though other studies do not support such associations). Like the southern California study, some of these European studies have reported increased effects in girls relative to boys, though the reasons for this are not known.”