Runnymede BOROUGH COUNCIL

Review and Assessment of Air Quality

Updating and Screening Assessment

2006

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Executive Summary

The role of the local authority review and assessment process is to identify areas where it is considered that the government's air quality objectives will be exceeded. The Runnymede Borough Council (the "Council") has previously undertaken the earlier rounds of review and assessment (R&A) of local air quality management and identified areas where the objectives were likely to be exceeded and where there is relevant public exposure. As a consequence, it designated an Air Quality Management Area (AQMA) for the annual mean nitrogen dioxide objective and daily mean PM_{10} objective along the M25, which runs through the Borough.

This report concerns the third round Updating and Screening Assessment. Local authorities are required to review and assess air quality against the objectives in the Air Quality Regulations 2000 and the amendment regulations as part of a rolling three-year cycle ending in 2010. The air quality objectives to be assessed are for the following seven pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particles (PM_{10}). This report provides a new assessment to identify those matters that have changed since the last review and assessment, and which might lead to a risk of the objective being exceeded. It also updates on new local developments affecting the Borough.

The report follows the prescribed guidance given in technical guidance LAQM. TG (03) and the additional advice provided by DEFRA (as Frequently Asked Questions) for the purposes of this round of R&A. This includes guidance on the use of background pollutant concentrations, monitoring results, industrial sources, and road traffic. The guidance also requires both a phased approach and that local authorities only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded.

The conclusions of the third round Updating and Screening Assessment are as follows:
For carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide there is not a significant risk of exceeding the objectives in the Council's area.

For Nitrogen Dioxide (NO_2) the Council has previously designated part of its area an AQMA. Recent monitoring results confirm that concentrations continue to exceed the annual mean objective where there is relevant exposure. Additional monitoring outside the AQMA has confirmed that the annual mean objective has been exceeded in the town centre of Addlestone. The monitoring is undertaken in an area considered representative of relevant exposure.

For PM_{10} (for 2004) the Council has previously designated part of its area an AQMA. Recent monitoring results and an analysis of rolling trends based on monitoring in the Borough indicates that concentrations are not reducing from those monitored in 2001.

For PM_{10} (for 2010 only) despite the expected reductions in emissions there is a risk of the objectives being exceeded across parts of the Borough. The Council however is not required to undertake actions at this time in respect of this finding, other than to note it for longer term planning purposes.

Based on these findings, the Council will undertake a Detailed Assessment of nitrogen dioxide in the Addlestone town centre and also maintain its existing AQMA.

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1.0 Introduction

This report is the 2006 Updating and Screening Assessment of air quality for the Runnymede Borough Council. The purpose of the report is to fulfil the Council's initial obligation under the third round review and assessment of air quality. In so doing it will determine whether or not a there is a risk that an air quality objective will be exceeded in the Borough and therefore whether or not the Council needs to undertake a Detailed Assessment of air quality.

1.1 Background

Part IV of the Environment Act 1995 introduced new responsibilities to both national and local government throughout the UK.

These responsibilities include the requirement upon the national government and devolved administrations to develop an Air Quality Strategy (AQS) for England, Wales, Scotland and Northern Ireland (DEFRA, 2000). The overall purpose of the AQS is to seek improvements in air quality for the benefit of public health. The first AQS was produced in 1997; it was amended in 2000 and is currently undergoing a further revision. Consultation on the latest review has closed.

Local air quality management (LAQM) was also introduced by the Environment Act 1995. It requires local authorities to periodically review and assess air quality across their areas. The AQS confirms that LAQM provides a major component of the government's plan for air quality improvement across the UK.

Air quality objectives have been set for those air pollutants deemed to be of most concern and relevance by the AQS. Seven of these pollutants are included under the LAQM regime and regulations for these were introduced. The air quality objectives for the relevant pollutants are given in Table 1. Additional objectives have been set for ozone and polyaromatic hydrocarbons (PAHs), although these have been deemed the responsibility of national government and therefore not applicable to the LAQM process.

The objectives are all based on health-based standards using current scientific advice taking into account the likely cost and benefits, as well as feasibility and practicality in meeting the objectives. The objectives are mostly in line with limit values prescribed by EU Directive, although additional objectives (including bringing forward the date for compliance) have been included for some pollutants.

1.2 Third round Review and Assessment

This report concerns the third round of LAQM review and assessment (R&A), which is part of a three yearly cycle for review and assessment ending in 2010. It follows the prescribed guidance given in Technical Guidance LAQM. TG (03) (DEFRA, 2003a) and specific amendments released by DEFRA as Frequently Asked Questions in January 2006, supported where necessary by new LAQM Tools. The guidance is designed to help local authorities undertake their duties under the Environment Act 1995 to review and assess air quality in their area from time to time.

It is recognised that whilst most of the original TG03 guidance is still relevant, some parts required revision to reflect the most up-to-date understanding, and to draw upon experience gained during the second round of Review and Assessment.

Updated guidance has been prepared to cover the following issues:

- Background pollution maps and future year calculation tools
- Emissions of sulphur dioxide from steam locomotives
- Emissions of sulphur dioxide from shipping
- Emissions of PM_{10} from poultry farms
- Data ratification procedures
- NO_x:NO2 relationships

In addition, the Updating and Screening Assessment (USA) checklists provided in TG03 have been revised and re-issued to take account of all necessary changes.

The guidance requires a phased approach, as with the previous guidance. This requires local authorities to undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. It is considered that not every authority will need to proceed beyond the first step of the third round of review and assessment.

The findings from the USA determine the need for the Council to undertake the next step i.e. a Detailed Assessment and then potentially progressing to the declaration of an air quality management area (AQMA) with a need for an air quality action plan (AQAP).

1.3 Progress with Local Air Quality Management

Runnymede is situated in the north west of Surrey, and includes the towns of Chertsey, Egham and Addlestone. The Borough had a population of approximately 78,000 in 2004. The M25 and M3 motorways run through the Borough. The main sources of air pollutants are the busy and congested roads.

The Council undertook its First Round review and assessment of air quality during 1999 – 2000. The main issue with respect to local air quality was found to be road traffic emissions (NO_2 and PM_{10}) emanating from vehicles. The Stage 3 report was undertaken for NO_2 and PM_{10} and it assessed air quality across the Council's area in accordance with DEFRA guidance. The predictions in the Stage 3 report were that the statutory objectives for NO_2 and PM_{10} would only be exceeded close to the M25 within the Council's area and consequently the Council designated an AQMA.

The 2003 USA considered each pollutant and concluded that the Council needed to undertake a Detailed Assessment for nitrogen dioxide for parts of its area only, namely for the following roads: Woburn Hill, A320 Chertsey Lane and the junctions of Eastworth Rd/ Guildford Street, High St/ Church Rd, and Woodham Lane/ New Haw Rd. The Detailed Assessment modelling predictions for these roads indicated that annual mean NO_2 concentrations did not exceed the air quality objective where there is relevant exposure, apart from near New Haw Road. This area has previously been declared as an AQMA.

The 2005 Progress Report (Runnymede, 2005) based on up to monitoring showed that the Government's air quality objectives are being exceeded at locations with relevant public exposure, close to the M25. The Council therefore maintained its AQMA.

1.4 Monitoring Data

The Council's monitoring of air quality in its area provides an important source of information for understanding air quality in its area. This benefit can be further enhanced if the monitoring is undertaken as part of a wider e.g. national or regional network. It is however important to ensure that there is confidence in the data being produced and used. Hence QA/QC issues

need to have been considered and the data produced also need to be properly validated and preferably ratified.

1.5 Background Pollutant Concentrations

These are produced nationally for all local authorities in the UK and provide the estimated background annual mean air pollutant concentrations at a 1 km x 1 km grid resolution for 2004 for NOx, NO2, PM10, PM10 secondary concentrations, with projected concentrations also available for NOx (2005, 2010), NO2 (2005, 2010), PM10 (2005, 2010). The data are available from http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

The methods to estimate concentrations in other years use Year Adjustment Factors, which are designed to represent typical trends.

1.6 Industrial Sources

Both the Environment Agency and the Council regulate industrial sources under the Pollution Prevention and Control Act 1999 and Environmental Protection Act 1990. The Environment Agency is responsible for the largest industrial processes (IPPC/ Part A1 installations), whilst the Council is mainly responsible for smaller Part B and A2 processes. Those small industrial processes that fall outside of Part B/A2 Process control can also of interest to LAQM. Details of the processes and installations are available from the Council's Public Register (see tables in the Appendix 2). There are no Part A1 installations in the Borough. There have also been no changes to Part B installations permitted by the Council since the previous USA.

1.7 Road Traffic

Updated details of road traffic movements across the Borough have been checked for significant changes from the previous USA.

1.8 Relevant Exposure

The objectives relate to public exposure to the pollutants. More specifically any areas that may exceed the objectives should relate to " the quality of air at locations which are situated outside of buildings or other man made structures above or below ground, and where members of the public are regularly present" (from the Air Quality regulations). TG03 advises further that the assessment should focus on those locations where members of the public are likely to be regularly present and are likely to be exposed over the period of the objective

Table 1 Air quality objectives (from Air Quality Regulations 2000 and Amendment Regulations 2002)

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg/m^3 (5 ppb)	Running Annual Mean	31 Dec 2003
	5 μg/m^3	Annual Mean	31 Dec 2010
1, 3 Butadiene	2.25 μg/m^3 (1 ppb)	Running Annual Mean	31 Dec 2003
Carbon Monoxide	10 mg/m^3	Daily Maximum Running 8 hour mean	31 Dec 2003
Lead	0.5 μg/m^3	Annual Mean	31 Dec 2003
	0.25 μg/m^3	Annual Mean	31 Dec 2008
Nitrogen Dioxide (provisional)	200 μg/m^3 (105 ppb) not to be exceeded more than 18 times a year	1 hour mean	31 Dec 2005
	40 μg/m^3 (21 ppb)	Annual Mean	31 Dec 2005
Particles (PM_{10})	50 μg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31 Dec 2004
	40 μg/m^3	Annual Mean	31 Dec 2004
Sulphur Dioxide	350 μg/m^3 (132 ppb) not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 μg/m^3 (47 ppb) not to be exceeded more than3 times a year	24 hour mean	31 Dec 2004
	266 μg/m^3 (100 ppb) not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005

Table 2 Air quality objectives not in regulations (from Air Quality Strategy Addendum (2003))

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	5 μg/m^3	Annual Mean	31 Dec 2010
Carbon Monoxide	10 mg/m^3	Daily Maximum Running 8 hour mean	31 Dec 2003
Particles (PM_{10}) (Except London given in brackets)	50 μg/m^3 not to be exceeded more than 7 (10) times a year	24 hour mean	31 Dec 2010
	20 (23) μg/m^3	Annual Mean	31 Dec 2010

2.0 Carbon Monoxide (CO)

2.1 Introduction

Carbon monoxide (CO) is a colourless and odourless gas produced by the burning of fuels. Exposure to CO leads to a decreased uptake of oxygen by the lungs and can lead to a range of symptoms as the concentration increases. Early symptoms of exposure include tiredness, drowsiness, headache, pains in the chest and sometimes stomach upsets. Some people, for example those with heart disease, are at an increased risk. Exposure to very high concentrations will lead to death. However such conditions, where there are very high concentrations, are most likely to arise in confined spaces, rather than outdoors where the public are exposed and the air quality strategy (AQS) applies.

The AQS objective for CO, based on advice from the Expert Panel of Air Quality Standards (EPAQS), is as follows:

Objective		Date to be achieved by
Concentration	Measured as	
10 mgm^{-3}	Daily Maximum running 8 hour mean	31st December 2003

2.2 National Perspective

The dominant source of CO in the UK remains road transport (49% of UK emissions in 2003) (DEFRA, 2005), although annual emissions are declining mainly as a result of uptake of abatement technologies (catalytic converters) following the introduction of the Euro standards for road vehicles (since 1993). Significant emissions reductions have occurred over the last decade from Euro standards, with reductions of 42% for CO relative to the no abatement scenario (DEFRA, 2004).

Monitoring results from the UK national network sites confirm that no site exceeded the objective during the period between 2001 and 2005.

Current projections are that emissions will reduce by 78% between 2000 and 2010. National modelling has further indicated that at the end of 2003, major roads will not exceed the objective.

No AQMAs were declared in the first and second rounds of R & A (although the first round was based on the previous objective of 11.6mg m^{-3}).

Based on TG03 guidance, it is considered highly unlikely that any authority will be required to proceed beyond the updating and screening assessment.

2.3 Second Round Assessment of CO

A checklist approach is used, based on 1) monitoring data and 2) traffic data relating to very busy roads.

1. For this pollutant, ratified monitoring data are required at locations where there is a potential for public exposure. If the data indicate that the maximum daily running 8-hour concentration exceeds the objective then the Council will be required to proceed to the Detailed Assessment stage.

2. This relates to roads not previously considered and to annual average daily traffic flows exceeding stated flows (which are dependent on the type of road) for areas where the annual mean background is expected to be greater than 1mg m-3. If there is relevant exposure within 10m of the kerb then it will be necessary to obtain additional traffic

information relating to average speeds and the HGV/LGV split. The DMRB screening model can be used to predict concentrations. (Note if junctions occur along any of the roads then the flows from the roads should be added together). If the predicted annual mean concentration is greater than 2mg m-3 then it is necessary to proceed to the Detailed Assessment stage.

2.4 Monitoring

The Council does not undertake CO continuous monitoring in its area, however monitoring is undertaken nearby these include the government's AURN site on the A3 near Hook in Kingston (roadside site) and the Highways Agency site on the M25 (roadside site) nearest the clockwise carriageway to the north of Junction 13 in Spelthorne. The sites do not represent relevant exposure. Details of the monitoring and data capture are given in Table 3 based on scaled and ratified data.

There were no periods exceeding the CO objective at these sites over the period 2000 to 2005.

Table 3 CO statistics from nearby LAQN/ AURN sites (mg m^{-3})

A30	2000	2001	2002	2003	2004	2005
Max 8 Hour	5.4	6.5	2.8	3.1	3.1	4.1
Data capture %	97	98	97	97	96	95
M25	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Max 8 Hour	3.0	3.1	2.6	3.4	1.8	1.6
Data capture %	97	96	93	94	68	98

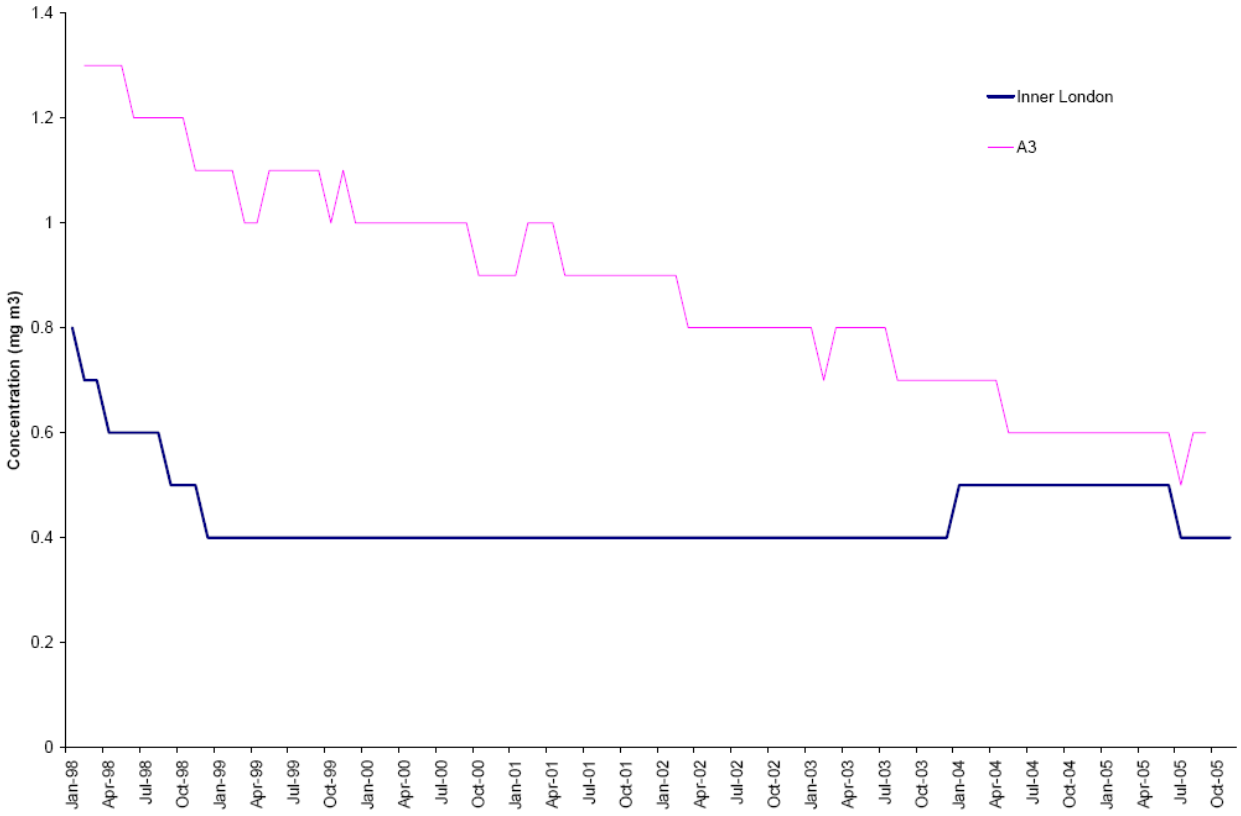
(Note – NO indicates not in operation; italics indicates < 90% data capture)

An analysis of rolling annual mean concentrations is provided for the A3 site (plus a background site in inner London for comparison purposes). The analysis is for the period from 1998. Figure 1 illustrates changing concentrations over time, based on changing annual averaged hourly mean concentrations. The use of rolling annual concentrations in this way largely removes seasonal influences and provides a guide to changing trends over time.

2.5 Very busy roads/ junctions in built up areas

All roads and junctions were considered in the previous USA (including the M25) and none were found to need a Detailed Assessment. This assessment indicated that no road and junction had flows >80,000 vehicles per day for single carriageways, >120,000 vehicles per day for dual carriageways and >140,000 vehicles per day for motorways, apart from the M25. Estimated background concentrations were also below the annual mean threshold of 1mg m-3 for CO. For the M25 there was no relevant exposure within 10m of the kerb. Based on these findings it is considered that the objective is very unlikely to be exceeded in the Borough as a result of road traffic emissions.

Figure 1 Rolling annual mean trends for nearby sites and an inner London site (1998 to 2005)



2.6 Conclusion of Third round Assessment of CO

There have been no significant changes to CO concentrations or emissions in the Borough since the second round USA and as a result a Detailed Assessment for CO will not be required.

3.0 Benzene

3.1 Introduction

Benzene at normal ambient temperatures occurs as a liquid, but it readily evaporates and small amounts are detectable in the air. It is known from workplace studies that benzene is potentially carcinogenic, that is, exposure to it may lead to the development of cancer.
EPAQS (1994) considered that the risks associated with the levels found in the air in the UK to be small and not be measurable with any accuracy. Nevertheless, it considered that efforts continue to be made to reduce the levels even further as a precautionary measure.

The AQS objectives for benzene, based on advice from EPAQS, are as follows:

Objective		Date to be achieved by
Concentration	Measured as	
16 μgm^{-3}	Running Annual Mean	31st December 2003
5 μgm^{-3}5	Annual Mean	31st December 2010

3.2 National Perspective

Benzene emissions arise from the evaporation and combustion of petroleum products, as benzene is a constituent of petrol. It is estimated that 11% of the total emissions from 2003 arose from fuel combustion. Benzene is also exhausted in stack emissions and as fugitive emissions from its manufacture and use in the chemical industry.

In total benzene emissions are estimated to have decreased by 71% between 1990 and 2003, to 18.3 kt in 2003 (DEFRA, 2005).

Monitoring results from national sites using pumped tubes indicated that the stricter 2010 objective was not exceeded. This network started in 2002 and the results include the period from 2002 to 2005.

Emissions from vehicles are predicted to reduce by over 90% from 1990 levels by 2010 (DEFRA, 2004).

One AQMA was declared for benzene during the second round of R & A. This was at a school, which is sited close to a busy petrol station. It was based on the 2010 objective. No AQMAs were declared during the first round

3.3 Third round assessment of Benzene

A checklist approach is used, based on 1) monitoring data 2) data relating to very busy roads 3) industrial sources/ petrol stations/ major fuel storage depots.

1. For monitoring the data should be prioritised, based on locations near busy roads the results at building facades. Where monitoring relating to industrial and other sources is undertaken then monitoring down wind from the site is recommended. If monitoring is undertaken by diffusion tube, suitable QA/QC procedures should be used and the tubes validated and bias corrected. The results will need to be corrected to 2010. If the data indicate that the objective is exceeded then the Council will be required to proceed to the Detailed Assessment stage.

2. This relates to roads not previously considered and to 2010 only, where the 2010 annual mean background exceeds 2µg m-3 and the annual average daily traffic flows exceed the stated flows (which are dependent on the type of road). If there is relevant exposure within 10m of the kerb then it will be necessary to obtain additional traffic information relating to average speeds and the HGV/LGV split. The DMRB screening model can be used to predict 2010 concentrations. (Note if junctions occur along any of the roads then the flows from the roads should be added together). If the predicted concentration is greater than 5µg m-3 then it is necessary to proceed to the Detailed Assessment stage.

3. For new industrial and other sources listed in TG03 it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. Authorities are also asked to check information from previous rounds of R&A and if there are substantially increased emissions (>30% per annum). Where it is necessary to check industrial sources then the annual emission of benzene is needed along with the height of discharge to calculate whether the relevant threshold in the guidance has been exceeded.

   For petrol stations it is necessary to identify those stations not covered by previous reports and with a throughput of more than 2000m3, and with nearby roads with more than 30,000 vehicles per day. If there is relevant exposure within 10m of the pumps it is necessary to proceed to a Detailed Assessment.

   For major petrol storage depots not covered by previous reports it is necessary to identify relevant exposure and annual emissions to calculate whether the relevant threshold in the guidance has been exceeded.

3.4 Monitoring

The Council does not undertake benzene monitoring.

Monitoring is however undertaken in neighbouring Woking and the results are shown in Table 4. The measurements indicate that annual mean levels are well below the 2003 objective. Concentrations have varied in recent years but remain less than 3 µg m^{-3} at the site. Continuous monitoring of benzene is not undertaken nearby; hence it is not been possible to undertake a co-location study to derive a bias correction factor.

Table 4 Results of benzene monitoring (µg m^{-3}) in neighbouring Woking (2000-2005)

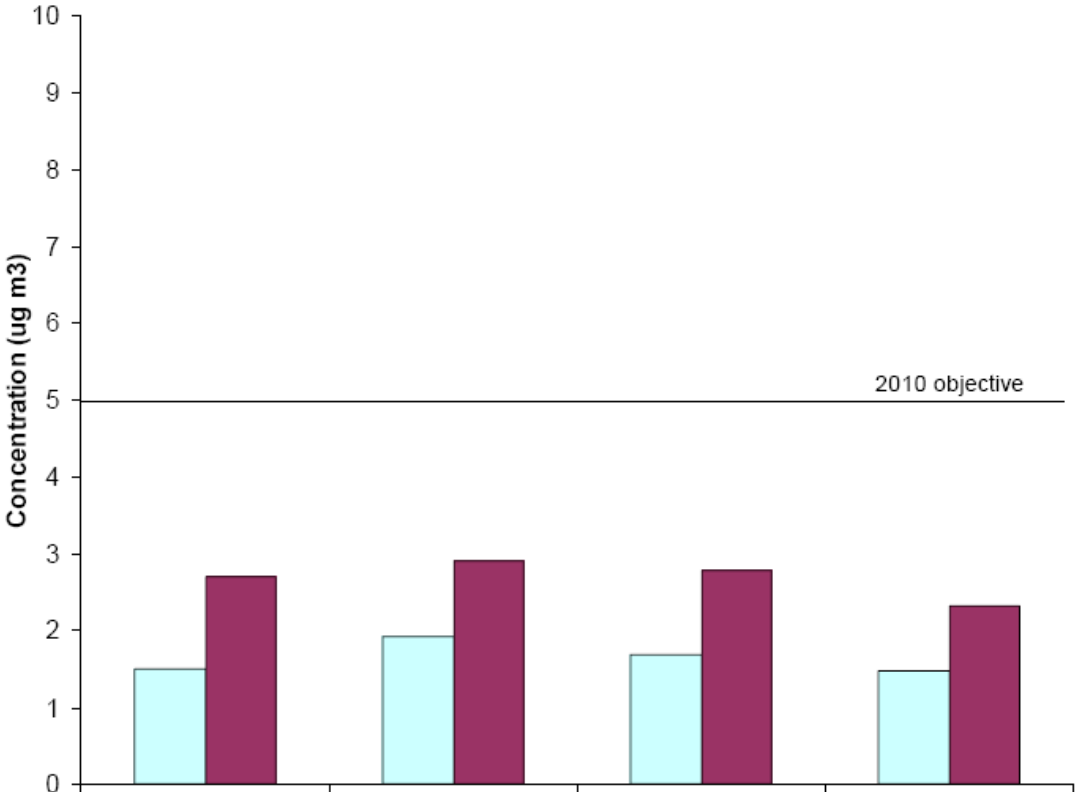
Location	2000	2001	2002	2003	2004	2005
Sandy Lane, Woking	1.6	2.3	1.3	2.0	1.3	1.2

Monitoring of benzene is also undertaken at the urban background site in nearby Reading as part of the government's non-automated hydrocarbon network. This network uses pumped tubes that are replaced fortnightly. This site along with other measurements from central London and a London roadside are presented in Figure 2.

All the results are below the 2003 and 2010 objectives, with the concentrations measured at roadside higher than those measured at background. Nevertheless even at busy roadsides in London the 2010 objective is not exceeded. The results also indicate only very slight changes over the limited period of monitoring. Due to the measurement uncertainty and inter annual variability it is not possible to confirm that concentrations are decreasing, although as outlined above further emission reductions are expected.

These monitoring results are considered representative of the Council's area. They indicate that the concentrations will not exceed the benzene objectives for 2003 and 2010 and therefore a Detailed Assessment based on monitoring is not required.

Figure 2 Annual mean concentrations of benzene at representative sites (μg m^{-3})



	2002	2003	2004	2005
Central London	1.49	1.91	1.69	1.47
London roadside	2.7	2.91	2.78	2.32

3.5 Very busy roads/ junctions in built up areas

All roads and junctions were considered in the previous USA and none were found to exceed the criteria for the benzene objective. This assessment indicated that no road and junction had flows >80,000 vehicles per day for single carriageways, >120,000 vehicles per day for dual carriageways and >140,000 vehicles per day for motorways, apart from the M25 (where there was no relevant exposure). Estimated 2010 background concentrations were also below the annual mean threshold of 2μg m-3 for benzene. Based on these findings it is considered that the objective is very unlikely to be exceeded in the Borough as a result of road traffic emissions.

3.6 Industrial sources

There are no new industrial processes or significant increased emissions of benzene from existing industrial processes of relevance in the Borough, or neighbouring areas.

3.7 Petrol stations

The previous USA did not identify any petrol stations where the TG03 criteria applied in the Borough and there has been no change to this position.

3.8 Major fuel storage depots

There are no major fuel storage depots within the Council's area (as listed in TG03).

3.9 Conclusion of Second Round Assessment of Benzene

There have been no significant changes to benzene concentrations or emissions in the Borough since the second round USA and as a result a Detailed Assessment for benzene will not be required.

4.0 1,3-Butadiene

4.1 Introduction

1,3 Butadiene arises from the combustion of petroleum products and its manufacture and use in the chemical industry. It is not present in petrol but is formed as a by-product of combustion.

Objective		Date to be achieved by
Concentration	Measured as	
2.25 μgm^{-3}	Running Annual mean	31st December 2003

4.2 National Perspective

Road transport and other machinery are the dominant sources of UK emissions (83% of the total in 2003) (DEFRA, 2005). As with other predominantly vehicle related pollutants, annual emissions are declining mainly as a result of uptake of abatement technologies (i.e. catalytic converters) following the introduction of the Euro standards for road vehicles (since 1993). This has led to a reduction in emissions of 55% relative to a "no abatement" scenario (DEFRA, 2004). Current projections are that emissions will continue to reduce by 81% in 2010.

Current monitoring indicates that all of the UK national network sites were significantly below the 2003 objective during the period between 1999 and 2004 (from TG03) apart from the Marylebone Road site in London in 1999. This site is a very busy kerbside site and concentrations at this site have greatly reduced since. Reductions in emissions from road vehicles are continuing and hence only locations close to industrial sites were expected to proceed beyond the second round updating and screening assessment for this objective.

National mapping also indicated that for all areas the 2003 objective would not be exceeded. No AQMAs were declared in the first round of R&A.

4.3 Third round assessment of 1,3-Butadiene

A checklist approach is used, based on 1) monitoring data 2) new industrial sources and existing industrial sources with significantly increased emissions.

1. For monitoring the data should be prioritised and for locations near industrial sites monitoring down wind from the site is recommended. If the data indicates that the objective is exceeded then the Council will be required to proceed to the Detailed Assessment stage.

2. For new industrial processes listed in the guidance it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. Authorities are also asked to check information from previous rounds of R&A and if there substantial increases in emissions (>30% per annum). Where it is necessary to check an industrial sources then the annual emission of 1,3 butadiene is needed, along with the height of discharge, to calculate whether the relevant threshold emissions rate in the guidance has been exceeded.

4.4 Monitoring

The Council does not undertake monitoring of 1,3-butadiene.

Continuous monitoring however is undertaken at the busy central roadside London site at Marylebone Road, which is part of the government's automated network.

The maximum running annual mean results at this site for the period 2002 to 2005 are approximately 1.14 µg m^{-3} (in 2002) and 0.57 µg m^{-3} (in 2005). These results indicate that concentrations are dropping over time. The results are also less than the 2003 objective and can considered representative of the likely maximum in the Council's area, hence they indicate that the concentrations will not exceed the 1,3-butadiene objective. In view of this a Detailed Assessment is not required.

4.5 Industrial sources

There are no new industrial processes or changes relating to existing industrial processes of relevance for 1,3 butadiene in the Borough, or neighbouring areas.

4.6 Conclusion of Third round assessment of 1,3 Butadiene

There have been no significant changes to 1,3 butadiene concentrations or emissions in the Borough since the second round USA and as a result a Detailed Assessment for 1,3 butadiene will not be required.

5.0 Lead

5.1 Introduction

Lead in particulate form in air can be inhaled directly by people, and ingested indirectly following its deposition on soil and crops. Exposure to lead has been known to be harmful to people for many years, with severe adverse effects on the blood, the nervous system and the kidneys (although these effects only occur with high exposures). More subtle effects caused by lower exposure to lead can also arise, such as may occur from the presence of lead in drinking water, paint and dust, and in the ambient air. These effects include the impaired intellectual development of children. EPAQS concluded that the available evidence suggests that the risks associated with the levels found in the air in the UK are very small and cannot be measured with any accuracy (EPAQS, 1998). However, efforts should continue to reduce the levels even further as a precautionary measure.

The AQS objective for lead, based on advice from EPAQS, is as follows:

Objective		Date to be achieved by
Concentration	Measured as	
0.5 μgm^{-3}	Annual Mean	31st December 2003
0.25 μgm^{-3}5	Annual Mean	31st December 2008

5.2 National perspective

Lead emissions have declined greatly in recent decades, principally as a result of the lead content in fuel (where it was used as an anti-knock additive) being reduced and subsequently phased out at the end of 1999.

Other sources include industrial processes, such as iron and steel production and waste incineration. Emissions from these sources have also decreased as a result of improved abatement measures.

Emissions in 2003 are estimated to be 0.13 kt, a decrease of 95% on the 1990 estimates, with road transport contributing only 1% to UK emissions total (DEFRA, 2005).

Current monitoring indicates that none of the UK national network sites exceeded the 2004 objective during the period between 2000 and 2004, with industrial sites having higher concentrations than urban background sites. Similarly no network site exceeded the stricter 2008 objective during the period since 2002 (one industrial site in the Midlands exceeded this objective in 2001).

No AQMAs were declared in the first and second rounds of R&A.

Based on TG03, it is considered that only relevant locations in the vicinity of major industrial processes emitting lead will be required to proceed beyond to a Detailed Assessment.

5.3 Third round Assessment of Lead

A checklist approach is used, based on 1) monitoring data 2) new industrial sources and existing industrial sources with significantly increased emissions.

1. For monitoring the data should be prioritised and for locations near industrial sites monitoring down wind from the site at the nearest residential property is recommended. If the data indicates that the objective is exceeded then the Council will be required to proceed to the Detailed Assessment stage.

2. For new industrial processes listed in the guidance it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. Authorities are also asked to check information from previous rounds of R&A if there are substantial increases in emissions (>30% per annum). Where it is necessary to check industrial sources then the annual emission of lead is needed along with the height of discharge to calculate whether the relevant threshold in the guidance has been exceeded.

5.4 Monitoring

The Council does not monitor lead in its area.

Monitoring however is undertaken at a number of sites in London as part of the government's national network. The results from these sites (between 1999 and 2005) show that concentrations do not exceed the objectives for 2003 and 2008. The highest annual mean concentration was 0.038 µg m^{-3} at the kerbside site at Marylebone Road site in central London in 2000, although concentrations at the London sites have since reduced. The results are all less than the 2008 objective.

Table 5 Lead monitoring results from London (µg m^{-3})

	2000	2001	2002	2003	2004
Cromwell Rd, London	0.032	0.031	0.027	0.022	0.017
Central London			0.022	0.021	0.015
London Brent	0.024	0.030	0.022	0.025	0.020
Marylebone Road, London	0.038	0.036	0.028	0.028	0.0183

These monitoring results are considered representative of the likely highest concentrations in the Council's area. The results indicate that the concentrations will not exceed the 2004 and 2008 lead objectives and therefore a Detailed Assessment is not required.

5.5 Industrial sources

There are no new industrial processes or changes relating to existing industrial processes of relevance for lead in the Borough, or neighbouring areas.

5.6 Conclusion of Third round assessment of Lead

There have been no significant changes to lead concentrations or emissions in the Borough since the second round USA and as a result a Detailed Assessment for lead will not be required.

6.0 Nitrogen Dioxide (NO_2)

6.1 Introduction

Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health. At high concentrations NO_2 causes inflammation of the lung. Long-term exposure is also considered to affect lung function and exposure to NO_2 is particularly important for people with asthma and related diseases. NO_x is also important in the formation of ozone and secondary particle formation.

The AQS objectives for NO_2 are as follows:

Objective		Date to be achieved by
Concentration	Measured as	
200 μgm^{-3} not to be exceeded more than 18 times a year	1 Hour Mean	31st December 2005
0.25 μgm^{-3}5	Annual Mean	31st December 2005

6.2 National Perspective

The dominant source of NOX in the UK remains road transport (around 40% of UK emissions in 2003) (DEFRA, 2005). Although in urban areas this proportion is higher, up to 70%. Combustion sources also emit significant amounts of NOX, however such sources only make a small contribution to NO2 levels. Significant emissions reductions have occurred over time primarily as a consequence of: abatement measures in road transport and power stations and the increased use of other fuels for power generation. Since 1989, total NOX emissions are estimated to have declined by 45%

Despite the above reductions, monitoring results from across the UK continue to indicate that sites, particularly at roadside, exceed the annual mean objective. Although it is only the busiest urban roadside sites that have recorded periods where the hourly standard has been exceeded.

Further improvements are projected to 2010 (with emissions reductions of 69% for NOX, relative to the no abatement scenario). These reductions arise as tougher Euro standards enter into force for new vehicles, and as the older vehicle fleet is retired. Further emissions reductions are also projected to occur post 2010.

As a result of high concentrations arising post 2005 more than 150 AQMAs were declared across the UK during the first and second rounds of R & A for the annual mean objective.

6.3 Third round assessment of NO_2

A checklist approach is used for the updating and screening assessment, based on 1) monitoring data 2) roads including narrow congested streets and junctions 3) bus stations 4) new industrial sources and existing ones with significantly increased emissions 5) aircraft.

1. Ratified monitoring data should be considered and if the data indicate that the concentration exceeds either objective then the Council will be required to proceed to the Detailed Assessment stage.

2. This section focuses on specific road traffic locations, not fully considered during previous rounds of R&A. For these situations, annual average daily traffic flows exceeding stated flows (which are dependent on the type of road) for different locations are required. If the indications arising from these assessments are greater than 40 µg m^{-3} then a Detailed Assessment is necessary. For any new roads a specific assessment is required based on the DMRB screening model. Similarly roads close to the objective at the last R&A or roads with significantly changed flows (> 25% increase) should be re-assessed.

3. Bus stations not previously considered should be assessed, based on the numbers of bus movements and the proximity of relevant exposure (in this instance it should be judged against the 1 hour criteria). If the bus station meets these requirements then DMRB is to be used to obtain a predicted annual mean. If the predicted concentration is greater than 40 µg m^{-3} then it is necessary to proceed to the Detailed Assessment stage.

4. For new industrial sources (as listed in TG03) it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. If no assessment were undertaken then TG03 provides nomograms for an assessment. The same approach is required where there has been a substantial increase in emissions (i.e. one greater than 30%).

5. Aircraft emissions not previously considered are important if there is relevant exposure within 1000m of the airport boundary and the equivalent passenger numbers is predicted to exceed 5 million passengers per annum.

6.4 Monitoring

The Council uses diffusion tubes to measure NO2 in its area. The diffusion tubes used are supplied and analysed by Lambeth Scientific Services using a preparation method of 50% TEA in acetone. The monitoring sites are located at roadside and background locations in the Borough, including sites within the Council's AQMA (Sports Centre, Egham and M25 sites 10 and 11).

Locally derived correction factors are not available, instead default factors obtained from DEFRA helpdesks have been used. The correction factors used (from revised factors dated 6 September 2006) are as follows and the results presented in Table 6 are the bias adjusted results for 2000 to 2005:

Year	Bias adjustment factor
2000	0.97
2001	1.09
2002	1.15
2003	1.05
2004	1.21
2005	1.24

The background sites in Ottershaw and Addlestone both met the annual mean objective. The background site at the Sports Centre in Egham in the AQMA however exceeded the standard during four of the years reported. The two M25 sites, set up at the start of 2003 in the AQMA, also exceeded the standard during 2003. (Note - there were only three months of measurements obtained during 2004, hence it is not possible to fully confirm concentrations at the two M25 sites for 2004).

Other sites that exceeded the objective included the roadside site in New Haw Road in New Haw during 2004, which is just inside the AQMA and the roadside site at the Civic Centre in

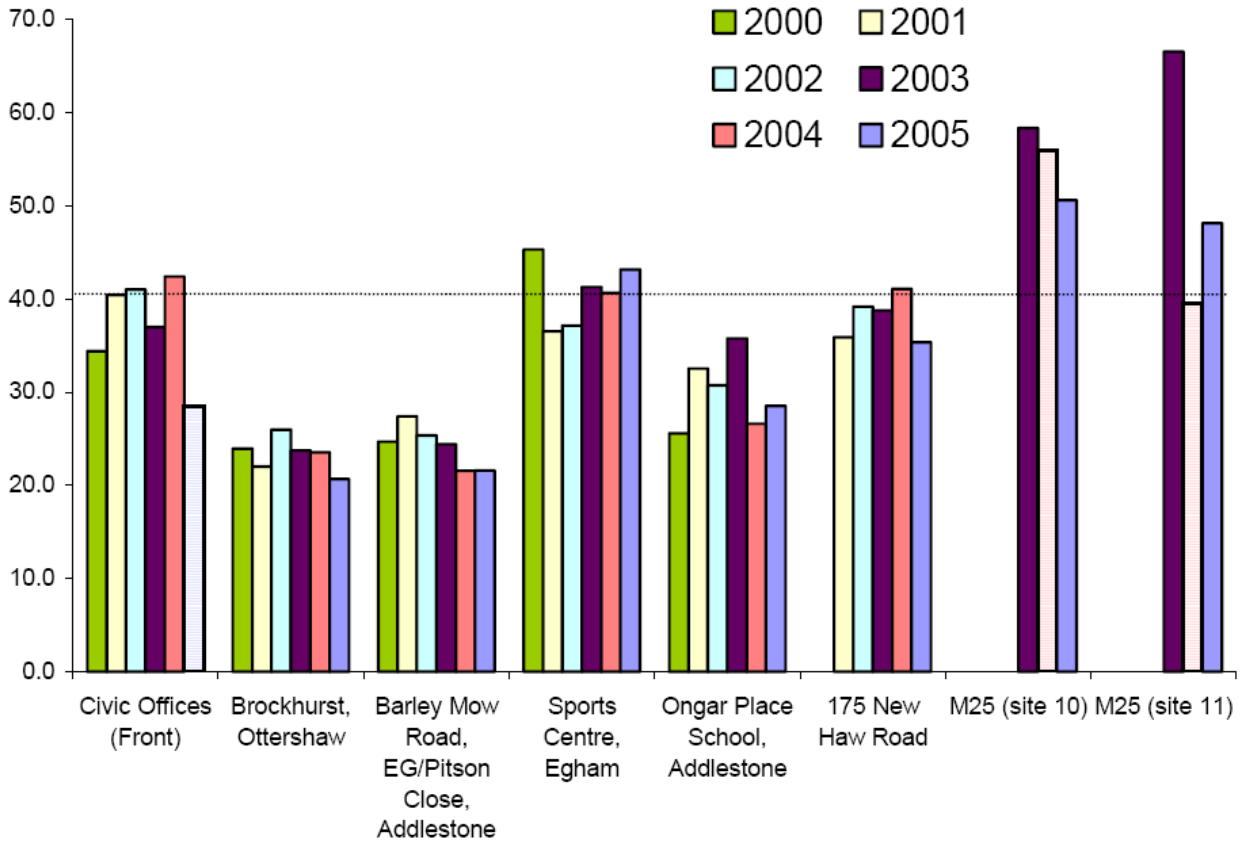
Station Road, Addlestone (most recently in 2004), which is outside the AQMA. Both sites are considered representative of relevant exposure.

Table 6 NO2 bias adjusted results in Runnymede (2000 – 2005) (µg m^{-3})

Site no	Location	Type	2000	2001	2002	2003	2004	2005
1	Civic Offices (Front)	R	34.4	**40.4**	**41.0**	37.0	**42.4**	28.5
3	Brockhurst, Ottershaw	B	23.9	22.0	26.0	23.7	23.6	20.7
4	Barley Mow Road, EG/Pitson Close, Addlestone	B	24.7	27.4	25.4	24.4	21.6	21.6
6	Sports Centre, Egham (AQMA)	B	**45.3**	36.5	37.2	**41.3**	**40.7**	**43.2**
8	Ongar Place School, Addlestone	B	25.6	32.6	30.8	35.8	26.6	28.5
9	175 New Haw Road	R	N/O	35.9	39.2	38.8	**41.1**	35.3
10	M25 (AQMA)	B	N/O	N/O	N/O	**58.3**	55.9	**50.6**
11	M25 (AQMA)	B	N/O	N/O	N/O	**66.5**	39.5	**48.1**

(Note: bold indicates > than objective; italics indicates less than 9 months data)

Figure 3 NO_2 bias adjusted results in Runnymede (2000 – 2005) (µg m^{-3})



(Note – the diagonal pattern in columns indicates sites with less than 6 months results)

Although continuous monitoring is not undertaken in the Borough, it is undertaken elsewhere in nearby areas. The results for these sites are presented below. These include sites that belong to the government's network (AURN) and the London Air Quality Network (LAQN).

The results indicate that the annual mean objective was not exceeded at the background sites for the years monitored, similarly the hourly standard of 200 µg m^{-3} was not approached at the sites during this time. The A3 roadside site however easily exceeded the annual mean objective for all years monitored. The stricter hourly objective was also exceeded at this site in 2005. Recent research (Carslaw D.C and Beevers, S. D, 2005) indicates that direct NO_2 emissions may be increasing and this may be a reason for the hourly objective being exceeded in 2005.

Table 7 Continuous NO_2 monitoring results from nearby sites (2000 to 2005)

		2000	2001	2002	2003	2004	2005
A3	Annual Mean	55	53	58	73	66	61
(AURN Roadside)	Data capture	97	97	88	80	96	96
	Maximum 1 Hour	140.2	172.8	368.6	495.8	437.8	563
	Periods exceeding	0	0	6	16	8	21
Mole Valley 2	Annual Mean	27	28	25	27	26	26
(LAQN suburban)	Data capture	98	98	99	97	98	99
	Maximum 1 Hour	107.5	104	97.7	113.5	102.2	108.1
	Periods exceeding	0	0	0	0	0	0
Teddington	Annual Mean	29	29	25	28	25	25
(AURN Urban Backgound)	Data capture	99	94	98	96	94	94
	Maximum 1 Hour	136.5	143	99.8	131.5	113.1	126.1
	Periods exceeding	0	0	0	0	0	0
Hillingdon*	Annual Mean	47	46	45	54	47	45
(AURN surburban)	Data capture	98	96	97	83	97	92
	Maximum 1 Hour	188.2	159.4	140.2	199.7	192.5	185.8
	Periods exceeding	0	0	0	0	0	0
M25	Annual Mean	41	40	39	55	56	43
(Highways Agency site)	Data capture	100	98	96	94	70	93
	Maximum 1 Hour	154	152	151	196	279	162
	Periods exceeding	0	0	0	0	1	0

(Note: * this site is located 30m from the M4 motorway)

The above results suggest that annual mean objective in Runnymede may be exceeded at the busiest roadsides in the Borough, but not at background locations

6.5 Roads

The second round USA did not identify any narrow congested streets or busy streets where people may spend an hour or more close to traffic. In addition no roads were identified as having more than 10000vpd and a proportion of buses and HGVs greater than 25% with exposure within 10m of the roads. There has been no change to these findings since then and no new roads have been constructed or proposed since the last review.

No roads of more than 10,000vpd have been identified with a greater than 25% increase in traffic flows since the last USA.

6.6 Bus stations

No potentially significant bus stations were identified in the previous assessment and there has been no change to this position.

6.7 Industrial sources

There are no new industrial processes or changes relating to existing industrial processes of relevance for NO2 in the Borough, or neighbouring areas.

6.8 Aircraft

The nearest large airport to Runnymede is Heathrow Airport in neighbouring Spelthorne and Hillingdon. It is however more than 1km from the Borough's boundary and as such further investigation is not required (based on the TG03 guidance).

6.9 Conclusion of Third round assessment of NO_2

The monitoring results in the Council's AQMA continue to exceed the annual mean objective for nitrogen dioxide and as such there is no need to undertake a Detailed Assessment with a view to revoking the AQMA.

Monitoring outside the AQMA at the roadside near the Council's Civic Offices has also exceeded the annual mean objective. This site is considered representative of relevant exposure in the area. Furthermore anecdotal evidence suggests that congestion has increased in the area. As a result of these findings a Detailed Assessment for nitrogen dioxide will be undertaken in this part of Addlestone.

7.0 Sulphur Dioxide (SO_2)

7.1 Introduction

Sulphur dioxide (SO_2) is a colourless gas, produced from burning fossil fuels like coal and oil. Power stations and oil refineries are the main sources in the UK, with small releases from other industries. SO_2 is also found naturally in the air at low concentrations from natural releases such as volcanoes and forest fires. SO_2 also has role in the formation of secondary particles.

SO_2 can cause breathing difficulties at high concentrations over short periods of time, particularly to those with asthma and chronic lung disease. As a result the AQS objectives are all incident based as follows:

Objective		Date to be achieved by
Concentration	Measured as	
350 μgm^{-3} not to be exceeded more than 24 times a year	1 Hour Mean	31st December 2004
125 μgm^{-3} not to be exceeded more than 3 times a year	24 Hour Mean	31st December 2004
266 μgm^{-3} not to be exceeded more than 35 times a year	15 minute Mean	31st December 2005

7.2 National Perspective

UK emissions have decreased to approximately 1Mt in 2003, representing a decrease of 74% from 1990 (DEFRA, 2005). This is mostly as a result of reduced emissions from the industrial, particularly the electricity supply sector, arising from the decreasing use of coal and increasing use of abatement equipment. However, coal combustion still accounts for 76% of the 2003 UK SO2 emissions.

Emissions from petroleum use also have reduced due to a decline in fuel oil use and the reduction in the sulphur content in the fuel. These have led (by 2001) to a 96% reduction in SO2 from the transport sector.

Monitoring results from sites across most of the UK indicate that the AQS objectives are met and that concentrations have reduced in over time. Unlike other LAQM pollutants further large reductions in emissions are not expected in the coming years.

Despite most locations meeting the objectives, there are some areas and locations where high concentrations do arise from specific local sources. As a result 11 local authorities across the UK declared AQMAs during the previous rounds of R & A.

7.3 Third round Assessment of Sulphur Dioxide (SO_2)

A checklist approach is used, based on 1) monitoring data 2) new industrial sources and existing ones with significantly increased emissions 3) areas of domestic coal burning 4) boilers burning coal or oil 5) shipping and 6) railway locomotives.

1. Ratified monitoring data are to be considered and if the data indicate that the concentration exceeds any of the objectives then the Council will be required to proceed to the Detailed Assessment stage.

2. For new industrial sources listed in TG03 it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. If no assessment were undertaken then TG03 provides nomograms for an assessment. The same approach is required where there has been a substantial increase in emissions (i.e. one greater than 30%).

3. For domestic sources not previously considered there is the need to identify small areas (500 x 500m) where significant coal burning still takes place. If the density of coal burning premises exceeds 100 per 500 x 500m then a Detailed Assessment is required.

4. For boiler plant it is necessary to identify all plant >5MW(thermal) that burns coal or fuel oil and establish whether there is relevant exposure within 500m. If such boilers are found then TG03 provides nomograms for an assessment to be made.

5. For shipping not previously considered or where there is new relevant exposure, it is necessary to identify whether there is relevant exposure close to the berths and main area of manoeuvring. If this is established then the number of ship movements (relating to large ships only) should be collated and if the number exceeds more than 5000 movements per year then a Detailed Assessment is required.

6. Both diesel and coal fired locomotives emit sulphur dioxide and this is most relevant where the locomotives are stationary for periods of 15 minutes or more. It is also necessary to establish whether or not there is relevant exposure within 15m of the source. If there are more than 2 occasions when locomotives are stationary with engines running then it is necessary to go to a Detailed Assessment.

7.4 Monitoring

The Council does not monitor SO2 in its area.

Monitoring is however undertaken in the neighbouring local authorities of Richmond upon Thames (an urban background AURN site in Teddington) and Hillingdon (a suburban site in West Drayton).

The monitoring results indicating the number of periods exceeding the objective standards since 2000 are given in Table 8, along with details of data capture. In all cases the data are fully ratified, apart from the 2005, which are still provisional.

Table 8 SO2 monitoring in neighbouring local authorities (2000 to 2005)

		2000	2001	2002	2003	2004	2005
Teddington	15 minutes > 266 µg m^{-3}	0	0	0	0	0	0
(AURN)	1 hour > 350 µg m^{-3}	0	0	0	0	0	0
	24 hour > 125 µg m^{-3}	0	0	0	0	0	0
Hillingdon	15 minutes > 266 µg m^{-3}	0	0	0	0	0	0
(AURN)	1 hour > 350 µg m^{-3}	0	0	0	0	0	0
	24 hour > 125 µg m^{-3}	0	0	0	0	0	0

These results indicate that the standards and hence the objectives have not been exceeded at the monitoring sites during any year. These results are considered representative of the Runnymede Borough.

7.5 Industrial sources

Part B sources in the Borough and Part A1/2 and B sources close to the borders were assessed previously and found not to be relevant. There were no Part A sources in the Borough. The position for Part A and B processes has not changed and there are no significantly increased emissions in neighbouring areas.

7.6 Domestic sources

This was considered in the previous USA and no areas of domestic coal burning were identified and there has been no change to this position.

7.7 Boilers

There have been no new small boilers installed within the Borough since the last USA.

7.8 Shipping

There are no local sources of shipping emissions.

7.9 Railway locomotives

Diesel trains were considered in the previous USA and found not to idle at locations close to relevant receptors. This position has not changed.

7.10 Conclusion of Third round Assessment of SO_2

There have been no significant changes to SO_2 concentrations or emissions in the Borough since the second round USA and as a result a Detailed Assessment for SO_2 will not be required.

8.0 Particles (PM_{10})

8.1 Introduction

The PM_{10} (particles measuring 10µm or less aerodynamic diameter) standard was agreed to represent those particles likely to be inhaled by humans, accepting that the chemical and physical composition varies widely. In view of this there is a wide range of emission sources that contribute to PM_{10} concentrations in the UK. Research studies have confirmed that these sources can be divided into 3 main categories (APEG): (i) Primary particle emissions derived directly from combustion sources, including road traffic, power generation, industrial processes etc. (ii) Secondary particles formed by chemical reactions in the atmosphere, comprising principally of sulphates and nitrates. (iii) Coarse particles comprising emissions from a wide range of sources, including re-suspended dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles.

Particles are associated with a range of health effects, including effects on respiratory and cardiovascular systems, asthma and mortality. As a result, EPAQS recommended a daily standard based on the evidence reviewed with an annual mean standard to assist with policy formation.

A subgroup of the Committee on the Medical Effects of Air Pollutants (COMEAP) is currently preparing a report which will, as far as possible, quantify the benefits to health of reducing air pollution in the UK. This group have previously advised that there is strengthening evidence base that links long-term exposure to particles and mortality and are of the view that the associations reported are likely to represent causal relationships with air pollution. They are also investigating the effects on morbidity and aim to publish a detailed report later in 2006.

The AQS objectives for PM_{10} are as follows:

Objective		Date to be achieved by
Concentration	Measured as	
50 μgm^{-3} not to be exceeded more than 35 times a year	24 Hour Mean	31st December 2004
40 μgm^{-3}	Annual Mean	31st December 2004

Proposed new particle objectives were introduced by the 2003 Air Quality Strategy Addendum (DEFRA, 2003b) based on the Stage 2 limit values set in the first EU Air Quality Daughter Directive. These objectives were included as provisional pending further EU reviews. TG03 guidance confirmed that local authorities are not statutorily required to assess air quality against these, but advised that they may find it helpful to do so, to assist with longer term development planning.

Objective		Date to be achieved by
Concentration	Measured as	
50 μgm^{-3} not to be exceeded more than 7 times a year	24 Hour Mean	31st December 2010
20 μgm^{-3}	Annual Mean	31st December 2010

8.2 National Perspective

The main sources of primary PM_{10} are road transport (with diesel vehicles emitting a greater mass per vehicle kilometre driven than other vehicles), stationary combustion (with domestic coal combustion traditionally being a major source of emissions) and industrial processes (including bulk handling, construction, mining and quarrying).

Current UK emissions are estimated to be 0.14 Mt in 2003 (DEFRA, 2005) and emissions have declined by 51% between 1990 and 2003, partly reflecting a trend away from coal use particularly by domestic users. PM_{10} emissions from road transport have also shown a steady decline across recent years. Coal combustion and road transport together contributed 57% of UK emissions of PM_{10} in 2003.

Monitoring results from across the UK continue to indicate that sites, including busy roadside sites, exceed the current 2004 daily mean objective during some years. Concentrations of annual mean PM10 are generally well below the 2004 objective.

Further emissions reductions of 69% for PM_{10} improvements are projected over the period to 2010, arising as tougher Euro standards enter into force for new vehicles, and as the older vehicle fleet is replaced. Additional post 2010 emissions reductions are also projected to occur (DEFRA, 2004).

As a result of high concentrations arising post 2004 more than 50 AQMAs were declared across the UK during the first and second rounds of R & A for the daily mean objective.

8.3 Third round Assessment of PM_{10}

A checklist approach is used, based on 1) monitoring data 2) roads including junctions and new roads 3) new industrial sources and existing ones with significantly increased emissions 4) areas of domestic coal burning 5) quarries, landfill sites, opencast coal, handling of dusty cargoes at ports, etc and 6) aircraft.

1. Ratified monitoring data are to be considered and if the data indicates that the concentration exceeds the 2004 objectives then the Council will be required to proceed to the Detailed Assessment stage.

2. These sections focus on specific road traffic examples not considered in the previous rounds of R&A. For busy roads with annual average daily traffic flows exceeding 10,000vpd any relevant exposure within 10m of the kerb needs to be determined. Then using DMRB screening model to predict the number of 24-hour periods exceeding 50 µg m^{-3}. If the number is greater than 35 then a Detailed Assessment is necessary. Similar assessments are required for roads with high numbers of HGVs and/or buses, i.e. where the proportion of this type of vehicle exceeds 20% and the HGV/ bus flow exceeds 2000vpd. For any new roads a specific assessment is required based on the DMRB screening model. Similarly roads close to the objective at the last review and assessment or roads with significantly changed flows (>25% increase) should be re-assessed.

3. For new industrial sources listed in the guidance it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. If no assessment were undertaken then TG03 provides nomograms for an assessment. The same approach is required where there has been a substantial increase in emissions (i.e. one greater than 30%).

4. For domestic sources, not previously considered, there is the need to identify small areas (500m x 500m) where significant solid fuel burning still takes place. If the density of such premises exceeds 50 houses then the nomogram in TG03 is used to determine whether or not a Detailed Assessment is required.

5. For quarries, landfill and other waste sites, and ports where dusty cargoes are handled not previously considered then it is necessary to identify whether there is relevant exposure near to any unpaved haul road, processing plant and materials handling facility. Poultry farms with known dust problems are also introduced by the new DEFRA advice. The proximity to each relates to distance, which is dependant on the annual mean background. For sites identified there is a need to use professional judgement based on complaints received and concerns with the facility.

6. Aircraft emissions are important if there is relevant exposure within 500m of the airport boundary. If the source has not been previously considered and the equivalent passenger numbers is predicted to exceed 10 million passengers per annum (mppa) then a Detailed Assessment is required.

8.4 Monitoring

The Council does not monitor PM_{10} in the Borough.

The following table however provides results from AURN and LAQN monitoring sites in nearby areas within Surrey and outer London. The A3 site near Hook in Kingston (AURN) is at the roadside, the Mole Valley 2 and Heathrow (both LAQN) sites are located at background sites and the Hillingdon AURN site is located at a suburban location. The Highway Agency's M25 site located at the roadside of the M25 nearest the clockwise carriageway to the north of junction 13 in Spelthorne. The site closed was re-sited in 2004 to a location 100m to the north of its previous position. The monitoring at these sites is undertaken using TEOM instruments and therefore the results were multiplied by 1.3 to obtain a gravimetric equivalent (in line with TG03 guidance).

Table 9 PM_{10} monitoring in neighbouring areas (2000 to 2005)

		2000	2001	2002	2003	2004	2005
A3	Annual Mean	26	27	24	33	27	31
(AURN Roadside)	Days > 50 μgm^{-3}	16	15	3	**43**	18	20
	Data capture %	98	98	96	96	98	98
Mole Valley 2	Annual Mean	21	22	22	24	20	20
(LAQN suburban)	Days > 50 μgm^{-3}	3	5	4	15	1	1
	Data capture %	90	99	96	99	99	99
Teddington	Annual Mean	28	29	28	31	26	30
(AURN Urban Backgound)	Days > 50 μgm^{-3}	14	21	15	**39**	13	19
	Data capture %	97	93	97	96	99	89
Hillingdon*	Annual Mean	25	26	25	30	27	27
(AURN surburban)	Days > 50 μgm^{-3}	12	12	7	32	13	10
	Data capture %	98	92	98	89	98	96
M25	Annual Mean	28	27	25	28	28	24
(Highways Agency site)	Days > 50 μgm^{-3}	17	26	27	26	19	8
	Data capture %	94	91	83	89	56	92

(Note – bold indicates objective exceeded; italics < 90% data capture)

The results for the sites indicate that the 2004 annual mean objective was not exceeded during any of the years reported. The 24-hour standard however was exceeded for most years at all sites, with the 2004 daily mean objective being exceeded during 2003 at the A3 and Heathrow sites. It was also approached at the Hillingdon AURN site.

It should be noted that 2003 was a year with high pollutant concentrations in many areas of the UK, due to the long periods of high pressure that arose during the hot summer months. Such periods are conducive to secondary particle formation over wide areas. The monitoring at these sites is considered representative of background and roadside locations in the Runnymede area.

Based on the above results, an estimate of 2010 concentrations and number of days greater than 50 µg m^{-3} can be made using the TG03 updated guidance. These estimates are given in Table 10.

Table 10 Estimated PM_{10} results at nearby sites for 2010 (using updated TG03 guidance)

	Annual Mean (μgm^{-3})	No of days > 50 μgm^{-3}
Mole Valley2	18.1	1.5
A3	24.5	11.3

Despite the predicted reduction, resulting from future emission changes, the estimates for the A3 roadside site indicate that the provisional 2010 objectives may be exceeded. This suggests that busy roadside sites within Runnymede may also exceed these provisional future objectives.

An analysis of rolling annual mean PM_{10} concentrations and daily mean PM_{10} exceedences is provided for the above monitoring sites to indicate any trend over time. The analysis is for the period from 1997 through to 2005. Figure 4 illustrates changing concentrations over time, based on changing rolling annual mean PM_{10} concentrations and Figure 5 the rolling daily mean PM_{10} exceedences. The use of rolling data in this way largely removes seasonal influences and thus provides a guide to changing trends over time.

The rolling annual mean trend for the Hillingdon AURN site provides the longer dataset. The site shows a similar trend to that of the A3 and Mole Valley 2 sites, albeit the concentrations at the background at Mole Valley 2 site are lower than those for the other sites shown. The data for the Heathrow site represents a shorter time period, reflecting the later start of operations at the site.

The use of trends in this way highlights that although concentrations have dropped in 2004 this was mainly as a result of the pollution incidents in 2003 not being repeated in 2004. Levels have dropped to pre 2003 levels and do not appear to be further reducing; indeed for some sites there may be a slight increase, possibly as a result of increasing primary PM10 emissions (ERG, 2006) rather than the predicted decrease in emissions.

Figure 4 Rolling annual mean PM10 trends for selected nearby monitoring sites (1997 to 2005)

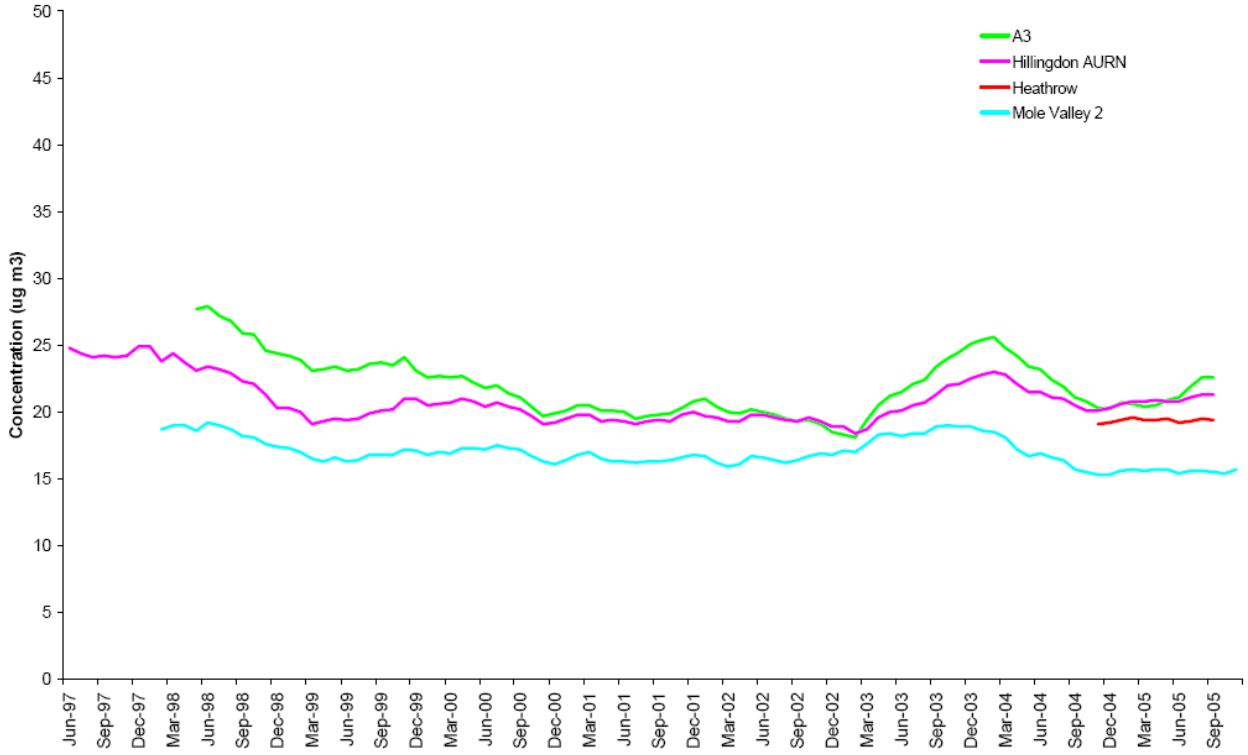
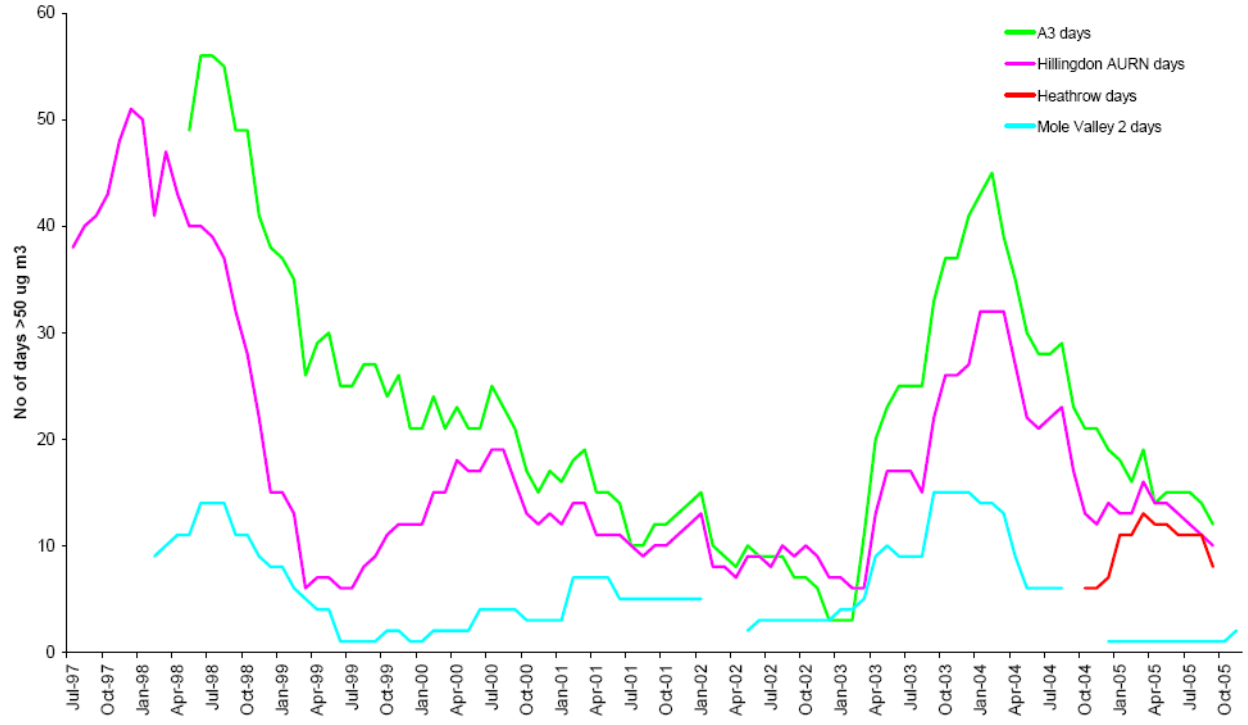


Figure 5 Rolling number of days PM_{10} > 50 µg m^{-3} for selected monitoring sites (1997 to 2005)



The rolling trend of PM10 exceedences similarly shows the effect of the pollution episodes in 2003. Otherwise levels, although fluctuating, appear not to have decreased markedly over the period of time since 2001 for these sites. Averages based on London sites for the period from 1995 to 2000 show a downward trend from around 50 days above 50 µg m^{-3} to 10 days in 2002. By the end of 2004 the number of days exceeding the standard at background sites was comparable to that measured at the start of 2001, whereas inner London roadside sites had a higher number of days exceeding in 2004 than 2001 (ERG, 2006).

8.5 Roads

The second round USA considered major roads in the area and concluded that the 2004 PM_{10} objectives are unlikely to be exceeded within the Runnymede Borough as a result of road traffic emissions from busy roads and junctions. As a result a Detailed Assessment was not required.

Since the previous assessment no further roads with unusually high proportions of heavy goods vehicles (>20%) have been identified and there have been no significant increases (i.e. greater than 25%) in traffic flows on roads with more than 10,000 vehicles per day. In addition no new roads have been constructed or proposed since the last review.

The revised TG03 guidance also requires those roads close to the objective in the previous assessment to be re-assessed. This is because there have been revisions to the predicted background PM_{10} concentrations; these revisions take account of improved methodologies, and comparisons with 2004 monitoring data. The effect in the Borough is to increase annual mean background concentrations very slightly (by up to 4 µg m^{-3}). In the previous assessment however no roads approached the daily mean objective of more than 35 days (the maximum was 26 days) and in view of this no roads need be re-assessed further in this assessment.

8.6 Industrial sources

There are no new industrial processes or changes relating to existing industrial processes of relevance for PM_{10} in the Borough, or neighbouring areas.

8.7 Domestic sources

This was examined in the previous USA and no areas of domestic coal burning were identified and there has been no change to this position

8.8 Quarries/ landfill sites/ etc

There are no quarries within the Runnymede Borough and there are no landfill sites currently operating (the sites formerly in operation within the Borough have closed).

The revisions to the TG03 guidance also include a reference to potential problems from poultry farms. This revision does not apply, as there is not a poultry farm in the Borough.

8.9 Aircraft

As described in the nitrogen dioxide chapter, there is not an airport in the Borough and therefore further investigation is not needed based on TG03 guidance.

8.10 Conclusion of Second Round Assessment of PM_{10}

There have been no significant changes to PM10 concentrations or emissions in the Borough since the second round USA and as a result a Detailed Assessment for PM10 will not be required.

However in line with previous government guidance and for the purposes of future planning the Council will note that the close to localised sources such as busy roads and junctions, the 2010 annual mean objective is likely to be exceeded in 2010.

9.0 Conclusion and Recommendations

This report follows the technical guidance (TG03 and Frequently Asked Questions) produced for this part of the third round of review and assessment. It therefore fulfils this part of the continuing LAQM process.

The results, from following this methodology, are that the Council has not identified an additional risk of the air quality objectives for carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide being exceeded by the relevant years anywhere in the Council's area. Thus the Council need not proceed beyond the updating and screening assessment for these pollutants.

The Council however previously identified that the air quality objectives for NO_2 and particles (PM_{10}) will be exceeded at locations with relevant public exposure. As a result it designated an AQMA along the M25. Further monitoring in the area confirms that the annual mean NO_2 and daily mean PM_{10} concentrations are not reducing. As a result the Council should maintain its AQMA.

Results from additional kerbside monitoring sites in Addlestone town centre also exceeded the annual mean nitrogen dioxide objective. As a result the Council will need to undertake a Detailed Assessment of this area.

The Council has also identified a risk that the air quality objectives for PM_{10} (for 2010 only) will be exceeded at locations with relevant public exposure. The Council are not required to undertake a Detailed Assessment for PM_{10} at this stage. The findings for PM_{10} however will be noted for longer term planning.

The Council is therefore recommended to undertake the following action:

1. Consult on the findings arising from this report with the statutory and other consultees as required.

2. Compete a Detailed Assessment of Addlestone town centre, including Station Road and the High Street.

3. Consider extending nitrogen dioxide monitoring in areas with relevant exposure in Addlestone.

10.0 References

Carslaw D.C and Beevers S.D, 2005. *Evidence of an increasing NO2/NOx emissions ratio from road traffic emissions*. Atmospheric Environment 39, 2049-2059.

DEFRA, 2000. *Air Quality Strategy for England, Scotland, Wales and Northern Ireland.* DEFRA, London. Cm 4548.

DEFRA, 2003a. *Local Air Quality Management, Technical guidance LAQM.TG03*. DEFRA, London.

DEFRA, 2003b. *Air Quality Strategy Addendum for England, Scotland, Wales and Northern Ireland*. DEFRA, London.

Runnymede Borough Council (2003). *Local Air Quality Management – Updating and Screening Assessment 2003*

Runnymede Borough Council (2004). *Local Air Quality Management – Detailed Assessment 2004*

Runnymede Borough Council (2005) *Local Air Quality Management – Progress Report. April 2005*

Expert Panel on Air Quality Standards (1994 to 2002). *Series of reports on benzene, 1,3 butadiene, carbon monoxide, lead, particles, nitrogen dioxide and sulphur dioxide*. DEFRA, London.

DEFRA, 2005. *UK Emissions of Air Pollutants 1970 to 2003*. NETCEN 2005.

DEFRA, 2004. *Evaluation of the Air Quality Strategy*. AEA Technology December 2004.

Airborne Particles Expert Group (APEG), 1999. *Source apportionment of particulate matter in the United Kingdom*. HMSO.

COMEAP, 2006. Committee on the Medical Effects of Air Pollutants *Interim Statement on Quantification of the Effects of Air Pollutants on Health in the UK*.. 18th January 2006.

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Appendix 1: Glossary

AADT	Annual Average Daily Traffic (vehicles per day)
APEG	Airborne Particles Expert Group
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CO	Carbon monoxide
COMEAP	Committee on the Medical Effects of Air Pollutants
DA	Detailed Assessment
DEFRA	Department for Environment Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges Screening Model
HGV	Heavy Goods Vehicles
LAQM	Local Air Quality Management
mg/m^3	Milligrams of the pollutant per cubic metre of air
$\mu g/m^3$	Micrograms of the pollutant per cubic metre of air
ppb	Parts per billion
ppm	Parts per million
NAEI	National Atmospheric Emissions Inventory
AQS	Air Quality Strategy
NO	Nitric oxide
NO_2	Nitrogen dioxide
PM_{10}	Particles with diameter less than 10µm
QA/QC	Quality Assurance / Quality Control
R&A	Review and Assessment
SO_2	Sulphur dioxide
TEOM	Tapered Element Oscillating Microbalance

Appendix 2: Authorised Processes in Runnymede BC

Table 11 List of permitted petrol stations in the Council's area

Location
Wheatsheaf Service Station London Road GU25 4QE
Ayebridges Service Station 171 Thorpe Lea Road TW20 8HP
Shell Ottershaw Guildford Road KT15 2DS
Trident Garage Guildford Road KT16 0NZ
Totalfina Chertsey Road KT15 1ED
Shell Egham 186/7 High Street TW20 9ED
Chertsey Service Station 102 Bridge Road KT16 8LA
Runnymede Service Station, 41 The Avenue TW20 9AD
BP Express Shopping, 1 Egham Hill TW20 0ET
Fillup Motor Co Ltd New Haw Road KT15 2DS
Sainsbury's Petrol Station The Causeway TW18 3AG
J Sainsbury Petrol Station 1 Sainsbury's Centre KT16 9AG
Tesco Petrol Filling Station 117 Station Road KT15 2AS

Table 12 Part B processes in the Council's area

Process	Name	Installation Address
MOBILE CRUSHER	Capital Demolition Ltd	Capital House, Woodham Park Road, Woodham, Weybridge, Surrey, KT15 3EG
COATING	Eclipse Auto Repairs	Unit 2A, Bridge Wharf, Chertsey, Surrey, KT16 8LJ
COATING	Ferrari UK	Maranello Concessionaires Ltd, Thorpe Industrial Estate, Egham, Surrey, TW20 8RJ
COATING	LA Coachworks	Byron Road, Addlestone, Surrey, KT15 2SY.
BULK CEMENT	Lafarge Redland Aggregates	Longside, Thorpe Lea Road, Egham, Surrey, TW20 8RH
INCINERATOR	M.A.F.F	Central Veterinary Laboratory, Woodham Lane, New Haw, Addlestone, Surrey
COATING	Medcalf & Co (Coachbuilders)	Fordwater Trading Estate, Fordwater Road, Chertsey, Surrey
COATING	Neweld Coachworks	Crystal Haven Ltd, Hanworth Lane, Chertsey, Surrey
COATING	Panel Wise	Hamm Moor Lane, Weybridge Industrial Estate, Weybridge, Surrey, KT15 2SD.
BULK CEMENT	Ready Mix Concrete	(Thames Valley) Ltd, Staines Lane, Chertsey, Surrey
BULK CEMENT	Remix Dry Mortar Ltd	Addlestone Quarry, Byfleet Road, Addlestone, Surrey, KT15 3LA
COATING	Denmark Coachworks	AS Denmark Coachworks, Unit B9, Crabtree Road, Capons Yard, Thorpe Industrial Estate, EGHAM, Surrey, TW20 8RN