THURROCK COUNCIL

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Fifth Round

Updating and Screening Assessment

For Air Quality

Thurrock Council

April 2012

Acknowledgements

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. Thurrock Council has previously undertaken the earlier rounds of review and assessment (R&A) of local air quality management and identified areas where the objectives are exceeded and where there is relevant public exposure. As a consequence, it has designated Air Quality Management Areas (AQMA's) across its area.

This report concerns the fifth 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.

The report follows the prescribed guidance given in technical guidance LAQM. TG(09) 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 fifth round Updating and Screening Assessment are as follows:

For carbon monoxide, benzene, 1,3-butadiene and lead there is not a significant risk of exceeding the objectives in the Council's area.

For nitrogen dioxide (NO_2) and PM_{10}, the Council has previously designated AQMA's across its area, close to busy roads and junctions. Recent continuous monitoring and bias corrected diffusion tubes results indicate that concentrations continue to exceed the annual mean objective where there is relevant exposure. The Council did undertake a Further Assessment during 2007 of those AQMA's designated in 2005. It found through modelling, that in order to meet with the annual mean objective for nitrogen dioxide by 2010 in AQMA's 10 and 21 that a 30% reduction in Heavy Goods Vehicles (HGV's) or a low emission scenario would be required, Thurrock Council, (2007). In 2011 a Detailed Assessment for NO_2 was carried out for Tilbury and identified that areas along Calcutta Road and Dock Road were exceeding the annual mean air quality objective. A zone of exceedence was identified and the Detailed Assessment made recommendations that an AQMA should be declared for NO_2 along this zoned area Thurrock Council (DA 2011).

For sulphur dioxide the Council has also previously identified that the air quality objectives will be exceeded at locations with relevant public exposure near the Coryton Refinery. But over 2011 the Refinery Operators have been making extensive improvements to the Sulphur Tail Gas Unit (STGU), the Council along with the Environment Agency (EA) liaised with the DEFRA Helpdesk and were granted an extension for declaring an AQMA around the Refinery. From 2012 the STGU will be in operation if the Refinery demonstrates compliance over 2012 then an AQMA will not be necessary.

For PM_{10} some areas still are exceeding the daily mean air quality objective for PM_{10} no new areas have been identified outside of the council's current designated AQMA's.

For pollutants not requiring a Further / Detailed Assessment, the LAQM guidance requires no further action to be taken, other than for the Council to produce of its next annual air quality progress reports by the end of April 2013, prior to undertaking the next Updating and Screening Assessment by the end of April 2015.

The Council is therefore recommended to undertake the following action:

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

1. Continue monitoring for nitrogen dioxide along the Purfleet-Bypass, Purfleet and review what action needs to be undertaken in the next Progress Report due in 2013.

2. The Council will need to ensure that the Coryton Refinery meets the 15-minute air quality objective in 2012, following the installation of a new Sulphur Tail Gas Unit (STGU) in early 2012. If it does not demonstrate compliance then an AQMA will be declared.

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1. Introduction

This report is the 2012 Updating and Screening Assessment of air quality for Thurrock Council. The purpose of the report is to fulfil the Council's initial obligation under the fifth round review and assessment of air quality. In so doing it will determine whether or not there is a risk that an air quality objective will be exceeded in the area 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 U.K.

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, 2007). 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 has undergone further revision, with last one produced in 2007.

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 U.K.

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 2. Additional objectives have been set for ozone and poly-aromatic hydrocarbons (PAHs) in Table 3, 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 Fifth Round Review and Assessment

This report concerns the fifth round of LAQM review and assessment (R&A), which is part of a three yearly cycle for review and assessment ending in 2013. It follows the prescribed guidance given in Technical Guidance LAQM. TG (09) (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.

The TG(09) guidance provides more up to date information and some parts required revision to reflect the most up-to-date understanding and to draw upon experience gained during the third 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 : NO_2 relationships

In addition, the Updating and Screening Assessment (USA) checklists provided in TG(09) have been revised and re-issued to take account of all necessary changes.

The guidance requires a source by source approach, which differs from the previous guidance TG(03) which was a pollutant by pollutant approach, but this is only a recommendation. Considering the amount of monitoring in the borough it has therefore been determined that the phased approach of pollutants from TG(03) is the best approach, together with the newer TG(09) guidance checklists for the fifth round USA. 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 fifth 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, revocation or amendment of an AQMA.

1.3 Progress with Local Air Quality Management – Thurrock Council

Thurrock Council is a unitary local authority along the East Thames Corridor in the southeast of England. Thurrock has borders with Greater London to the west, the River Thames to the south, and the county of Essex to the north and east. It has over 18 miles of riverfront and covers an area of 64 square miles, more than half of which is green belt.

Much of the population and commercial activity is centred along the riverfront. This includes many large and important industrial sites, including a large oil refinery, power station, port and many other manufacturing and distribution sites. Thurrock is also home to the Lakeside Shopping Centre, one of the largest retail attractions in Europe. The major road links in the area are the M25, the A13 and the A1306.

The main settlements in the area include: Aveley, Belhus, Chadwell St Mary, Corringham, Grays, South Ockendon, Stanford and Tilbury, together with a number of villages. Lakeside and the community of Chafford Hundred are located to the west of Grays and to the east of the M25.

Thurrock completed its Stage 3 Review and Assessment of air quality in December 2000. The Stage 3 Report focussed on a detailed assessment of the objectives for annual mean nitrogen dioxide, 24-hour mean PM_{10} and 15-minute mean sulphur dioxide. The assessment was based on both modelling and monitoring of air pollution.

The results from Stage 3 indicated that the sulphur dioxide 15-minute mean objective was unlikely to be exceeded in Thurrock by 2005. However, the 24-hour mean PM_{10} objective and the annual mean NO_2 objective were both likely to be exceeded along the main traffic routes in Thurrock.

Where relevant public exposure was determined as likely within areas exceeding the air quality objectives, air quality management areas (AQMA's) were designated. The Council, following public consultation, initially designated twenty areas where properties were at risk of exceeding the air quality objectives, due to their proximity to busy roads.

Following the designation of AQMA's, a Stage 4 Review and Assessment was carried out using a more sophisticated model, to study the current and future air quality within the AQMA's. This report was published in October 2002 and resulted in the number of AQMA's being reduced.

In parallel with the Stage 4 Report, the Council prepared a Local Air Quality Action Plan, which details the actions the Council intends to take to improve air quality in the AQMA's.

1.4 Updating Screening and Assessment – important considerations

As with the second, third and fourth round USA, relevant considerations and sources of data include the following:

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 ratified.

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 2008 for NO_x, NO_2, PM_{10} and PM_{10} secondary concentrations, with projected concentrations also available for NO_x (up to 2020), NO_2 (up to 2020), PM_{10} (up to 2020). The data are available from http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

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

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 A processes), whilst the Council is mainly responsible for smaller Part B and A2 processes. Details of the processes and installations are available from the Council's Public Register (see tables in the Appendix). The Council permits 82 Part A2 and B processes, with twenty-one of these being petrol stations in its area. Those small industrial processes that fall outside of Part B/A2 Process control can also be of interest to LAQM.

Road Traffic

Updated details of road traffic movements across the area have been made available from the Council to check for changes from the previous USA.

1.5 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). The TG(09) Technical Guidance 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: Summary of existing Thurrock AQMA's

AQMA No.	Pollutant	Description of Air Quality Management Area
1	NO_2	Grays town centre and London Road Grays
2	NO_2	London Road South Stifford and adjoining roads
3	NO_2	East side of Hogg Lane and Elizabeth Road
4	NO_2	West of Chafford Hundred Visitor Centre
5	NO_2 and PM10	Warren Terrace, A13 and A1306
7	NO_2 and PM10	Hotels next to M25
8	NO_2 and PM10	Hotel next to Junction 31 of the M25
9	NO_2	Hotel next to Junction 31 of the M25
10	NO_2 and PM10	London Road Purfleet near to Jarrah Cottages
12	NO_2	Watts Wood estate next to A1306
13	NO_2	London Road Aveley next to A1306
15	NO_2	Near to M25 on edge of Irvine Gardens, South Ockendon
16	NO_2	Next to M25 off Dennis Road
21	NO_2	Hotel on Stonehouse Lane
23	NO_2	London Road, West Thurrock
(24)	(NO_2)	(Calcutta Road, Tilbury) (Declaring in 2012)

Table 2: 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}	Running Annual Mean	31 Dec 2003
	5 μg m^{-3}	Annual Mean	31 Dec 2010
1, 3 Butadiene	2.25 μg m^{-3}	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 2004
	0.25 μg m^{-3}	Annual Mean	31 Dec 2008
Nitrogen Dioxide	200 μg m^{-3} not to be exceeded more than 18 times a year	1 hour mean	31 Dec 2005
	40 μg m^{-3}	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} not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 μg m^{-3} not to be exceeded more than3 times a year	24 hour mean	31 Dec 2004
	266 μg m^{-3} not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2004

Table 3: New air quality objectives, listed in the Technical Guidance 2009 TG(09)

Pollutant	Concentration	Measured as	Date to be achieved by
*Polycyclic Aromatic Hydrocarbons	0.25ng/m^{-3} B[a]P	annual mean	31/12/2010
*Ozone	100 μg/m^{-3} not to be exceeded more than 10 times a year	8 hourly running or hourly mean	31/12/2005
England (apart from London) and Wales			
*Particles ($PM_{2.5}$)	25 μg/m^{-3}	annual mean	2020
	15% cut in urban background exposure	annual mean	2010-2020

- (These new objectives are not currently included in Regulations for the purpose of local air quality management).

2. Carbon Monoxide

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 mg m^{-3}	Daily Maximum Running 8 hour mean	31 Dec 2003

2.2 National Perspective

The most prevalent source of CO in the UK comes from road transport, which accounts for (54% of total UK emissions in 2008). Emissions in 2008 were 2.8 mega tonnes (Mt), compared with emissions in 1990 which were 9 Mt this is a decrease in emissions of 69% from 1990 to 2008. The largest reduction comes from road transport, due to the uptake of catalytic converters and tighter vehicle emission standards, but also from the switching of petrol vehicles to diesel vehicles over the last two decades. The other notable sources are from stationary combustion at 11%, residential combustion at 11% and from iron and steel production with CO emissions at 12%, these sources have also declined, but to a lesser extent in comparison to road transport (DEFRA, 2010).

Monitoring results from the UK national network sites confirm that no site exceeded the objective during the period between 2001 and 2011.

No AQMA's were declared in the first, second, third or fourth rounds of R & A (although the first round was based on the previous objective of 11.6 mg m^{-3}).

Based on TG(09) guidance, it is considered highly unlikely that any authority will be required to proceed beyond the updating and screening assessment.

2.3 Fifth round assessment of CO

A checklist approach is used, based on 1) monitoring data and 2) 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 1 mg 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 2 mg m^{-3} then it is necessary to proceed to the Detailed Assessment stage.

2.4 Monitoring

The Council did undertake CO continuous monitoring at its Thurrock 1 urban background site up until 2008 but based on previous results did not continue monitoring of CO as the levels were well below the air quality objective for CO. The Thurrock 1 site is part of the government's AURN. Details of the monitoring and data capture are given in Table based on scaled and ratified data.

Table 4: CO statistics from Thurrock 1 (mg m^{-3})

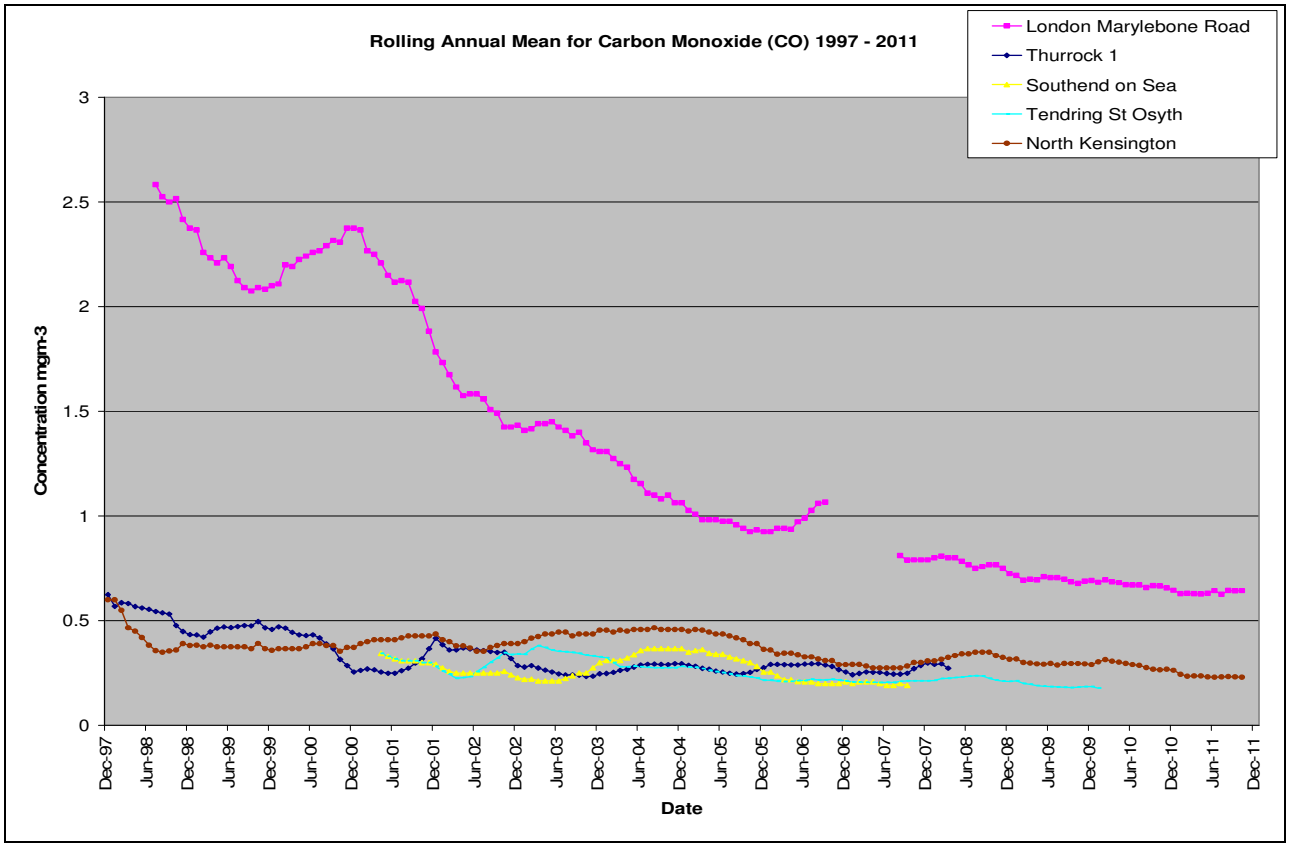
Thurrock 1	2000	2001	2002	2003	2004	2005	2006	2007	2008
Max 8 Hour	5.15	3.71	3.13	2.7	2.23	2.33	1.8	3.9	2.75
Annual mean	0.25	0.42	0.28	0.25	0.29	0.27	0.3	0.3	0.27
Data capture %	96.7	95.8	97.3	98.1	96.1	93.9	98.1	*89.7*	*21.2*
Max 1 Hour	7.2	8.7	5	5.3	3.8	3.8		5.5	4.6

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

There were no periods at these sites where the CO objective was exceeded over the period between 2000 to 2008. The details of the annual mean and maximum one-hour concentrations are also provided for information purposes. The annual mean concentrations are low in comparison to the objective of 10 mg m^{-3}.

An analysis of rolling annual mean concentrations is provided for the Thurrock 1 site and also other AURN sites in Essex (plus a background site in inner London for comparison purposes). The analysis is for the period from 1997 to 2011, although it must be noted that Thurrock 1 and was only in operation up to 2008.

Figure 1: CO Rolling annual mean trends for Thurrock, Essex and inner London sites (1997 to 2011)



The rolling annual mean for all sites for CO, shows a downward trend in concentrations. The most noticeable downward trend would be post 2000 for Thurrock and London sites with the London Marylebone site representing the highest levels for CO in the country, even this is well below the objective value of 10 mg m^{-3}. As would be expected post 2000 levels decreased with the introduction

of tighter emissions standards for road vehicles, and more of the older Pre Euro and Euro I class type vehicles being removed from the road over time and also the ever increasing numbers of diesel vehicles on UK roads which emit much less CO than petrol vehicles.

The results of the monitoring are considered representative of the Councils area. These indicate that the objective is being met and that there is no immediate risk of the air quality objective for CO being breached and therefore a Detailed Assessment of CO based on the monitoring is not required.

2.5 Very busy roads or 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 CO 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 and the estimated background concentrations were below the annual mean threshold of 1mg m^{-3} for CO. An examination of the M25 motorway, which runs through the area, confirmed that there is 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 area as a result of road traffic emissions.

2.6 Conclusion of fifth round assessment of CO

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

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3. 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**	
16.25 μg m^{-3}	Running Annual Mean	31 Dec 2003
5 μg m^{-3}	Annual Mean	31 Dec 2010

3.2 National Perspective

Benzene emissions arise from the evaporation and combustion of petroleum products, as benzene is a constituent of petrol. Emissions in 2008 were 20.1 kilo tonnes (Kt), the most significant source is from fuel combustion in the residential sector, which accounts for 41% of total UK emissions, the second most important source is road transport which accounts for 29% of total UK emissions.
Emissions of benzene have decreased by 48% from 1990 to 2008, which were 38.9 Kt in 1990, this reduction is largely from the road transport sector, due to tighter euro vehicle emission standards and fuel quality directives (DEFRA, 2010).
That said it was predicted back in 2004 that emissions of benzene from vehicles would to reduce by over 90% from 1990 levels by 2010, currently this stands at 75% reduction from 1990 to 2008 (DEFRA, 2004).

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 and from evaporation from petrol stations storage tanks and pumps, now with tighter restrictions on vapour release from petrol stations with the introduction of stage II vapour recovery systems loses to air should fall off dramatically. Benzene is also exhausted in stack emissions and as fugitive emissions from its manufacture and use in the chemical industry.

One AQMA was declared for benzene in the U.K 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 AQMA's were declared during the first round.

3.3 Fifth 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 indicates 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 2 µg 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 10 m 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 5 µg m^{-3} then it is necessary to proceed to the Detailed Assessment stage.

3. For new industrial and other sources listed in TG(09) it is likely that an air quality assessment will have been undertaken as part of the 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 2000 m^3, and with nearby roads with more than 30,000 vehicles per day. If there is relevant exposure within 10 m 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 in its area.

Monitoring of benzene is however undertaken at the roadside and Kerbside sites in London, at Marylebone Road and London Eltham and at Glasgow kerbside, these represent (high end concentrations) as part of the government's automated hydrocarbon network. These sites along with other measurements from rural background sites at Harwell and Authencorth Moss representing (low end concentrations) are presented in Figure 2 and Table 5.

Figure 2: Annual mean concentrations for benzene at representative sites from 2003 to 2011 (µg m^{-3})

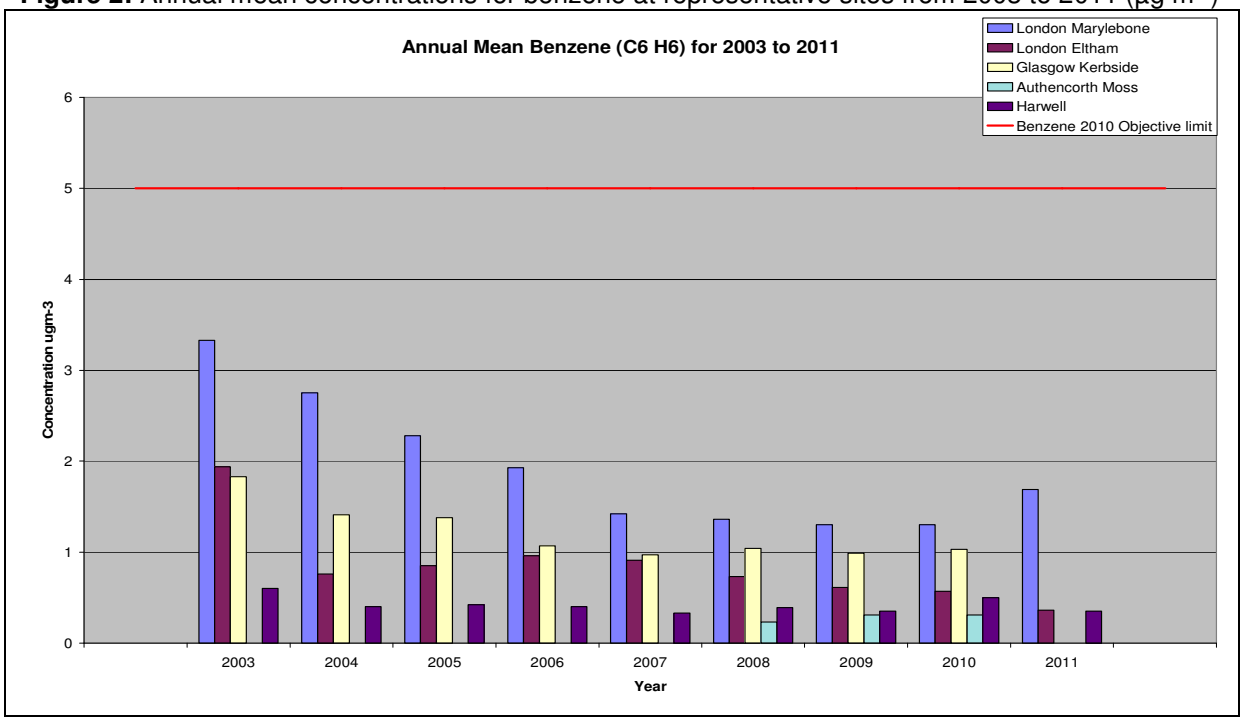

Table 5: Annual mean concentrations of benzene at representative sites for (2003 to 2011) (µg m^{-3})

Site	2003	2004	2005	2006	2007	2008	2009	2010	2011
London Marylebone	3.33	*2.75*	*2.28*	*1.93*	*1.42*	*1.36*	*1.3*	*1.3*	1.69
London Eltham	*1.94*	*0.76*	0.85	*0.96*	*0.91*	*0.73*	*0.61*	*0.57*	0.36
Glasgow Kerbside	*1.83*	*1.41*	1.38	1.07	0.97	1.04	0.99	1.03	
Authencorth Moss						*0.23*	*0.31*	*0.31*	
Harwell	*0.6*	*0.4*	0.42	*0.4*	*0.33*	*0.39*	*0.35*	*0.5*	0.35

(Italics indicate less than 90% data Capture)

All the results are below the 2010 air quality objective, with the concentrations measured at roadside sites being higher than those measured at background locations. Nevertheless even at busy roadside sites in London and Glasgow the 2010 objective is not exceeded. The results also indicate only 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 roadside and urban background locations within the Council's area, the two Kerbside sites at London Marylebone and Glasgow represents the highest levels of pollution in the UK. They indicate that the concentrations will not exceed the benzene objectives for 2010 and therefore based on this a Detailed Assessment based on monitoring is not required.

3.5 Very busy roads or 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. Estimated 2010 background concentrations were also below the annual mean threshold of 2 µg m^{-3} for benzene. Based on these findings it is considered that the objective is very unlikely to be exceeded in the area 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 area, or neighbouring areas.

3.7 Petrol stations

The previous USA did not identify any petrol stations in the area requiring further assessment based on the TG(09) criteria. There has been no change to this position. (See Appendix for list of permitted petrol stations in the area).

3.8 Conclusion of fifth round assessment of benzene

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

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4. 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.

The health effects of 1,3-butadiene at high exposure, acute effects are damage to the nervous system which cause tiredness, headaches, nausea and even fainting. Longer periods of exposure, chronic effects are an increased risk in cardiovascular diseases, it has shown carcinogenic properties which can give rise to cancer.

The AQS objective for 1,3-butadiene, based on advice from EPAQS, is as follows:

Objective		Date to be achieved by
Concentration	Measured as	
2.25 μg m^{-3}	Running Annual Mean	31 Dec 2003

4.2 National Perspective

Emissions in 2008 were estimated to be in the region of 3.1 Kt, the dominant sources are from fuel combustion processes in road transport, which accounts for 67% of total UK emissions in 2008. When compared to emissions in 1990 which were at 14.6 Kt, emissions have decreased by 79% between 1990 and 2008, the bulk of these reductions have come from the road transport sector, since the introduction of three-way catalytic converters, since 1993 (DEFRA, 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 TG(03)) apart from the Marylebone Road site in London in 1999. This site is a very busy kerbside site and concentrations 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. Since this time emissions have decreased markedly, and non of the automatic monitoring sites have been above the objective limit.

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

4.3 Fifth 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.

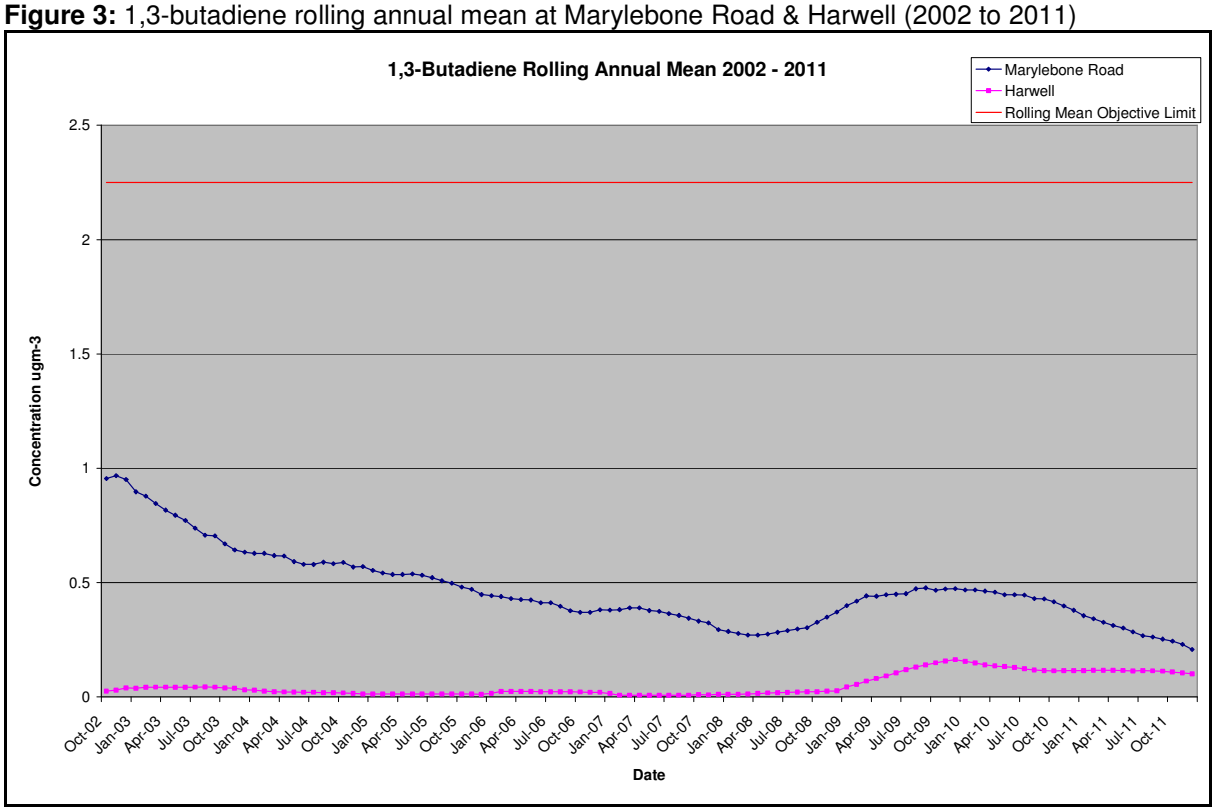
2. For new industrial processes listed in the guidance it is likely that an air quality assessment will have been undertaken as part of planning or authorisation/permit process. The results from this should be cited. Authorities are also asked to check information from previous rounds of R&A and if there are 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 (Figure 3) shows the rolling annual mean for 1,3-butadiene at Marylebone Road). The graph also includes monitoring from the Rural Background monitoring site at Harwell for a direct comparison.

Figure 3: 1,3-butadiene rolling annual mean at Marylebone Road & Harwell (2002 to 2011)



The maximum running annual mean results at these two sites for the period 2002 to 2011 are consistently below the 2003 running annual mean objective of 2.25 µg m^{-3}. The annual mean at Marylebone Road in 2003 was approximately 0.63 µg m^{-3} and for 2011 was 0.21 µg m^{-3} For the rural background site at Harwell the levels are even lower and have shown little change overtime, with a slight increase over 2009. The results recorded at Marylebone can considered representative of the likely maximum concentrations to be found in the Council's area, hence they indicate that the objective will not be exceeded for 1,3-butadiene. 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 area, or neighbouring areas.

4.6 Conclusion of fifth round assessment of 1,3-butadiene

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

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5. 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 are caused from lower exposure to lead. Tower exposure can 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 to reduce the levels even further continue 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 μg m^{-3}	Annual Mean	31 Dec 2003
0.25 μg m^{-3}	Annual Mean	31 Dec 2008

5.2 National Perspective

Emissions of lead in 2008 were estimated to be 67 tonnes, which represents a 98% reduction in emissions since 1990, emission in 1990 were 2890 tonnes. Road transport used to contribute 96% of total UK emissions in 1990, but in 2006 it only accounted for 2%, the main reduction from this was the removal of lead from petrol which was used as an additive to prevent knocking in petrol vehicle engines. The main sources today come from Metal Production iron, steel combustion, and lubricant industries, these emissions have also decreased from improved abatement measures (DEFRA, 2010).

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.

No AQMA's were declared in the first, second, third and fourth rounds of R&A.

Based on the TG(09) guidance, 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 Fifth 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 monitor for lead in its area at Chadwell St Mary, this site was set up in 2008 and forms part of the Automatic Heavy Metals Network, to which all the sites results featured in this section form a part of as well.

Monitoring is undertaken at a number of sites in London as part of the government's national network. The results from these sites (between 2004 and 2010) show that concentrations do not exceed the objectives for 2003 and 2008. The highest annual mean concentration was 0.03382 µg m^{-3} at the Sheffield site 2004, this is well below the 2008 objective. The lead concentrations at Chadwell St Mary are even lower with the highest concentrations at 0.0127 µg m^{-3} in 2009.

Figure 4: Lead monitoring results from 2004 to 2010 (µg m^{-3})

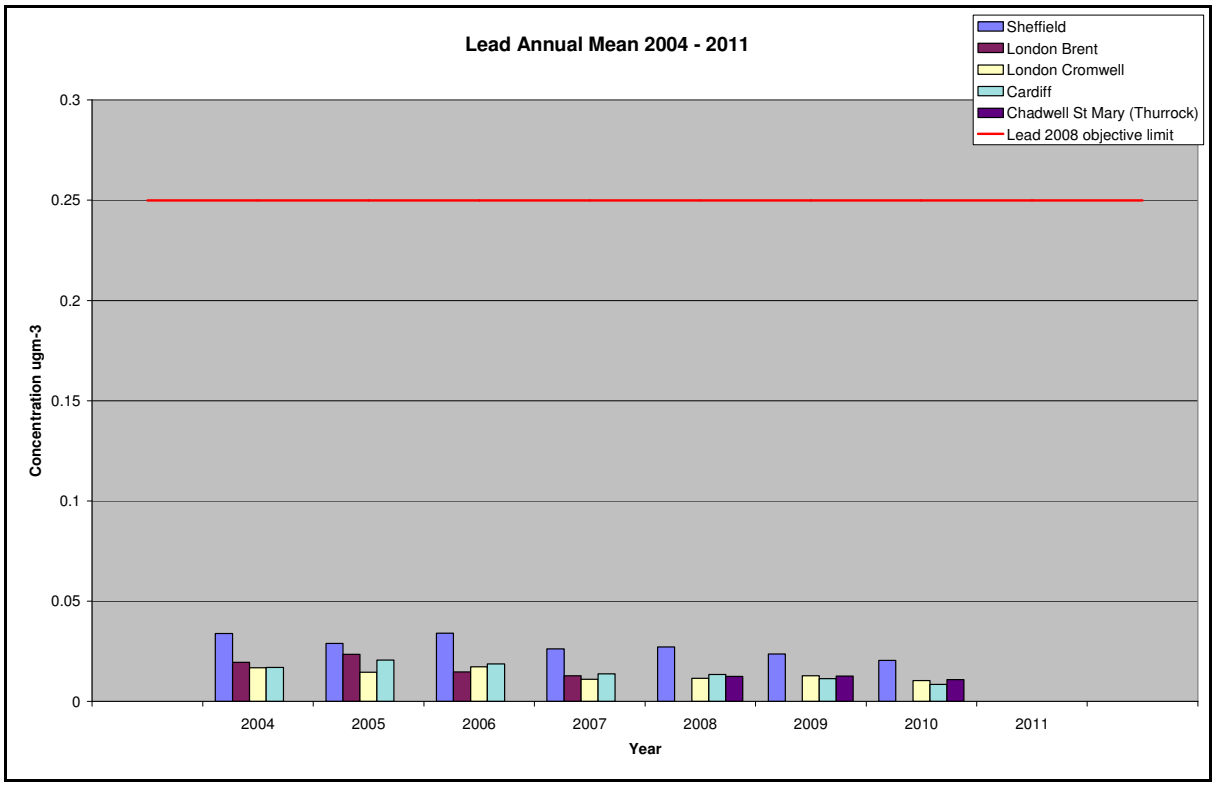


Table 6: Lead monitoring results from 2004 to 2010 (µg m^{-3})

Site	2004	2005	2006	2007	2008	2009	2010
Sheffield	0.03382	0.029	0.0341	0.0263	0.0272	0.0237	0.0204
London Brent	0.01952	0.0235	0.0147	0.0129			
London Cromwell	0.01678	0.0146	0.0173	0.0111	0.0116	0.0128	0.0104
Cardiff	0.01704	0.0207	0.0187	0.0138	0.0134	0.0114	0.085
Chadwell St Mary (Thurrock)					0.0125	0.0127	0.0109

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 2003 or 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 area, or neighbouring areas.

5.6 Conclusion of fifth round assessment of lead

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

6. Nitrogen Dioxide

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 µg m^{-3} not to be exceeded more than 18 times a year	1 hour mean	31 Dec 2005
40 µg m^{-3}	Annual Mean	31 Dec 2005

6.2 National Perspective

The main source of NO_x in the UK is from road transport at approximately 32% in 2008, the other major contributor is from energy production at 20% largest source of this comes from coal-fired power stations. From 1990 to 2008 NO_x emissions have decreased by 49%, with the largest proportion of these reductions from road transport at 58% and from energy production at 64%. These reductions were brought about through increased abatement measures, such as the introduction of three-way catalytic converters to petrol vehicles and Low NO_x burners on power stations (DEFRA, 2010).

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 beyond 2012. These reductions will arise as tougher Euro standards enter into force for new vehicles, and as the older vehicle fleet is retired.

At present there are more than 200 AQMA's declared across the UK, these were declared during the first, second, third and fourth rounds of R & A and are based on the annual mean objective for NO_2.

6.3 Fifth 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 review and

assessment 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 TG(09)) 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 TG(09) 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 undertakes monitoring of NO_2 both within its AQMA's and outside of the AQMA's. Continuous monitoring of NO_2 is undertaken at its:

1) Thurrock 1 - AURN background site, in Grays (outside of AQMA's)
2) Thurrock 2 - LAQN roadside site in Purfleet (within AQMA 10) *closed from March 2008
3) Thurrock 3 – LAQN & (AURN from 2008) roadside site in Stanford Le Hope (outside of AQMA's)
4) Thurrock 8 – LAQN roadside site in Purfleet (within AQMA 10) operating from April 2008)
5) Thurrock 4 – Roadside site in Tilbury, it has been operating since 2010

The sites are operated to AURN / LAQN standards of QA/QC. Regular calibrations are carried out, with subsequent data ratification undertaken by the ERG at King's College London and AEA Technologies.

The results of the monitoring at the sites are given in Table 7. The data capture exceeded 85% for all years other than 2003 for both Thurrock 2 and 3, 2005 and 2010 for Thurrock 1, and 2008 for Thurrock 2 and 8, when the sites were set up or decommissioned.

Table 7: Continuous monitoring results for NO_2 in Thurrock (2005 to 2011) (µg m^{-3})

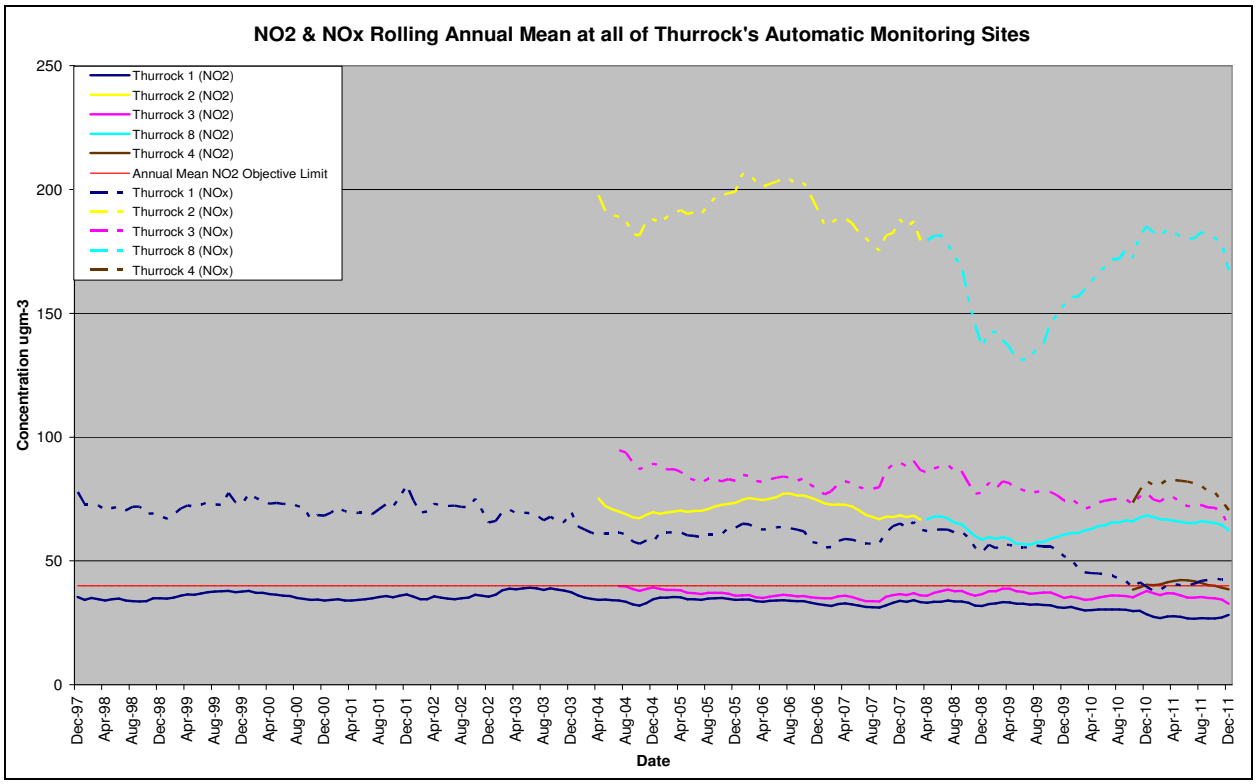
Site		2005	2006	2007	2008	2009	2010	2011
THURROCK 1	Annual mean	*34.65*	32.57	*33.83*	31.78	30.98	*29.2*	28.01
	Data capture %	*84.70%*	93.68%	*87.30%*	96.79%	97.48%	*84.68%*	90.06%
	Max 1 hour	*139.4*	141.3	*263.1*	163.3	113	*138*	134
	Exceeds 200 µg m^{-3}	*0*	0	*3*	0	0	*0*	0
THURROCK 2	Annual mean	**73.39**	**74.31**	**68.44**	***64.87***			
	Data capture %	94.41%	94.74%	96.64%	*20.46%*			
	Max 1 hour	305.3	267.9	416.2	*229.9*			
	Exceeds 200 µg m^{-3}	14	**26**	**48**	*7*			
THURROCK 3	Annual mean	35.88	34.96	36.59	35.1	34.34	37.33	32.72
	Data capture %	99.10%	97.88%	98.92%	97.21%	96.74%	97.42%	98.16%
	Max 1 hour	160.7	161.5	180	160.4	148	163	156
	Exceeds 200 µg m^{-3}	0	0	0	0	0	0	0
THURROCK 8	Annual mean				***56.5***	**60.67**	**68.62**	**62.59**
	Data capture %				*72.21%*	97.97%	96.45%	98.38%
	Max 1 hour				*185.1*	200	274	237
	Exceeds 200 µg m^{-3}				*0*	1	12	5
THURROCK 2 & 8	Annual mean				**58.34**			
	Data capture %				92.67%			
	Max 1 hour				229.9			
	Exceeds 200 µg m^{-3}				7			
THURROCK 4	Annual mean						**40.2**	38.56
	Data capture %						93.40%	94.8%
	Max 1 hour						157	138
	Exceeds 200 µg m^{-3}						0	0

(Note: **Bold;** indicates exceedence of objective, *italics;* <90% data capture, underline; provisional data), (The shaded light yellow area shows combined results from two monitoring stations which follow on chronologically and are used as a comparison only)

The results indicate that the annual mean objective for NO_2 was not exceeded post 2003 at Thurrock 1 and 3 sites, with a general downward trend over this time period. The 1-hour objective with a maximum of 18 permitted exceedences at 200 µg m^{-3} was not breeched at either site, but there were some 1-hour exceedences at Thurrock 1 during 2003 and 2007, 2003 was notable for high pollution episodes occurring across the country, 2007 was not as bad as 2003 nationally, but locally has had an impact. Both the annual means were also higher during this year at Thurrock 1 and Thurrock 3.
Thurrock 2 and Thurrock 8 did not fit this trend, the annual mean has shown fluctuations the highest concentrations were in 2003, they then dropped over 2007 to 2008 but have increased over 2010 to 2011 back up to the high 60's. The 1-hour exceedences were the highest recorded in 2007 at 48 which is in breech of the 1-hour objective, some major changes occurred along the roadside during 2007/08 with the traffic flows gaining greater efficiency due to a roundabout emplacement close to the site. The subsequent improvement of the road has lead to the number of exceedences at Thurrock 2 and Thurrock 8 during 2008 tailing off considerably with only 7 exceedences and only 1 exceedence in 2009, these have since increased with 2010 having 12 exceedences.

An analysis of rolling annual mean NO_x and NO_2 concentrations is provided for the Thurrock monitoring sites to indicate trends over time. The analysis is for the period from 1997 through to 2011. Figure 5 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.

Figure 5: Rolling annual mean NO_x / NO_2 trends for Thurrock monitoring sites (1997 to 2011)



The rolling annual mean concentrations for the Thurrock 1 site, which has been operating the longest, indicate a downward trend over time in line with reductions in emissions over time. Although the downward trend for NO_x from 1997 to 2011 (approximately 35 µg m^{-3}) as the primary emission is more pronounced than that for NO_2 (approximately 7 µg m^{-3}).

Thurrock 2 & (8) from 2004 to 2011 has shown a much greater variation in NO_2 than the other sites, the decline for NO_x from 2004 to 2011 is (approximately 30 µg m^{-3}), and for NO_2 is (approximately 13 µg m^{-3}), this is most likely attributable to the junction improvement at the Stonehouse Roundabout which allowed traffic to move more freely along the London Road reducing the queuing vehicles which are predominantly comprised of Heavy Goods Vehicles (HGV's). Over 2008 levels of NO_2 and NO_x had declined rapidly, but since 2009 levels have increased again and then remaining fairly stable over 2011. It is not entirely clear what has caused this increase in recent years, but it is likely to be heavily influenced by varying meteorological conditions, which over recent years have produced some very strange whether patterns particularly over the winter to spring and autumn to winter periods of the year.

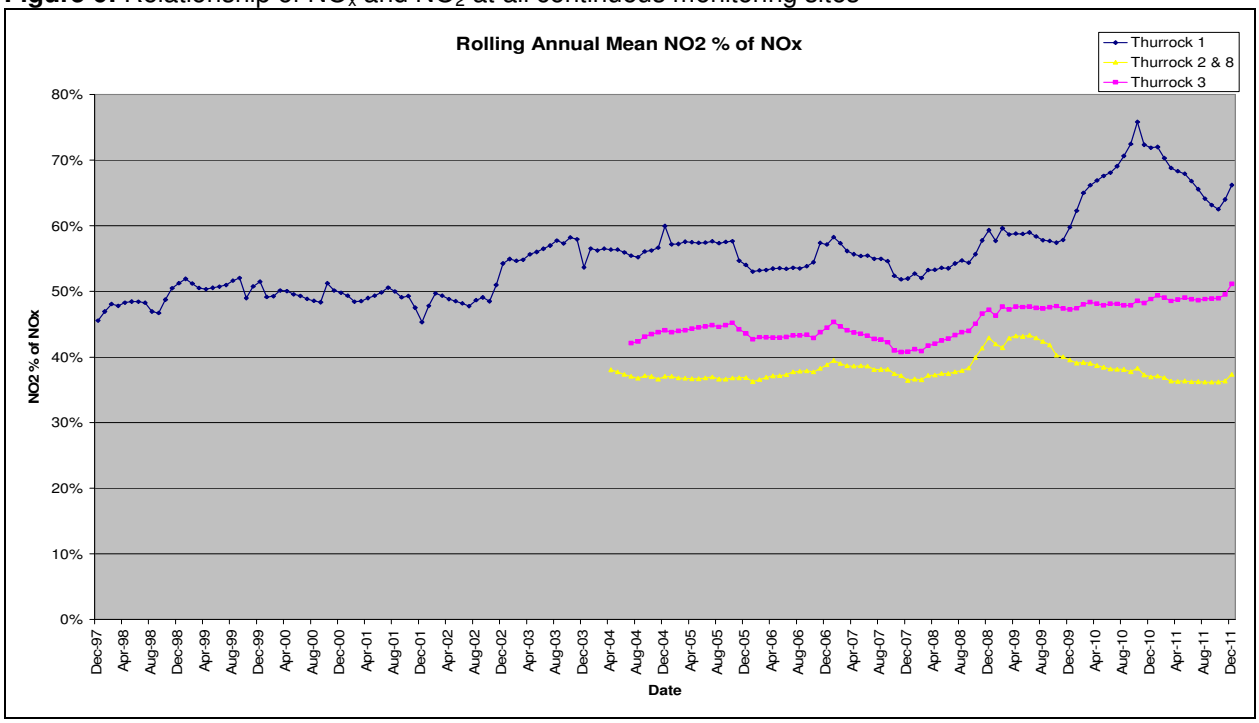
Thurrock 3 has shown for NO_x from 2004 to 2011 a decrease of (approximately 31 µg m^{-3}) and for NO_2 a decrease of (approximately 7 µg m^{-3}).

The decrease in NO_x and NO_2 for Thurrock 1 over the same period as for Thurrock 3 and Thurrock 2 & 8 sites, the (2004 to 2011) period was (approximately 18 µg m^{-3} for NO_x and 6 µg m^{-3} for NO_2). As Thurrock 1 is an urban background site the decreases of NO_x and NO_2 at Thurrock 3 and Thurrock 2 & 8 were larger than those of Thurrock 1, this would indicate that air quality has improved more than just from the urban background contribution at these two sites over this period.

It is important to note that the relationship between NO_x and NO_2 does not show a linear pattern, and as progressive years go by the proportion of NO_2 to NO_x on the whole is increasing (Figure 6) demonstrates the proportion of NO_2 to NO_x at all continuous monitoring locations by looking at the annual means of both NO_2 and NO_x a percentage is determined). Both Thurrock 1 and to a lesser extent Thurrock 3 show increasing trends in the proportion of NO_2 to NO_x. Thurrock 2 & 8 roadside site on the other hand shows no clear increase and it is proportionally much lower than Thurrock 1 which is the urban background monitoring site. The reason for this is most likely due to the types of emission source the site is exposed to, most of which comes directly as a result of road traffic and is heavily influenced by HGV traffic, most of the emissions from traffic are in the form of nitric oxide (NO)

as apposed to direct NO_2. The important thing to note from this location is that the trend is stationary for NO_2 which would indicate that the improvements in the Euro standards for vehicles are not having an impact at roadside locations but are at the background locations.

Figure 6: Relationship of NO_x and NO_2 at all continuous monitoring sites



The Council also uses diffusion tubes to measure NO_2 at 42 locations;

The diffusion tubes used are supplied and analysed by Gradko using a preparation method of 20% TEA in water. Details of the sites monitored are given in Appendix 2.

Locally derived correction factors shown in (Table 8) below have been derived from the diffusion tubes exposed adjacent automatic monitoring stations at Thurrock 1 background and Thurrock 3 roadside sites and for Thurrock 2 & 8 roadside and more recently Thurrock 4 roadside monitoring sites. The Thurrock 1 correction factors are from 2002 to 2011 and the Thurrock 3 site for 2004 to 2011, Thurrock 8 for 2003 to 2011 and Thurrock 4 for 2011 only. The factors are calculated as follows:-

Table 8: Locally derived bias correction factors using continuous and unadjusted diffusion tube data

Year	Thurrock 1 (UB)			Thurrock 3 (R)			Thurrock 2 & 8 (R)			Thurrock 4 (R)		
	Cm	Dm	Bias factor	Cm	Dm	Bias factor	Cm	Dm	Bias factor	Cm	Dm	Bias factor
2002	36.1	31.4	**1.15**									
2003	35.6	34.2	**1.04**				74.99	54.76	**1.33**			
2004	38.3	34.9	**1.1**	39	43.6	**0.89**	69.42	62.89	**1.1**			
2005	35.5	29.7	**1.2**	36	38.5	**0.94**	73.55	57.54	**1.28**			
2006	33	32	**1.03**	35	37.9	**0.92**	74.38	61.04	**1.22**			
2007	34	33.2	**1.02**	37	41.6	**0.89**	68.42	56.73	**1.21**			
2008	30.86	34.26	**0.9**	35.42	39.57	**0.895**	59.31	54.41	**1.09**			
2009	31.01	33.06	**0.938**	34.34	40.75	**0.859**	60.56	51.34	**1.18**			
2010	28.43	31.73	**0.9**	37.72	39.68	**0.95**	68.29	53.38	**1.28**			
2011	28.56	28.94	**0.99**	32.74	36.28	**0.9**	62.65	52.25	**1.2**	38.76	35.04	**1.11**

The factors indicate for 2011 that for Thurrock 1 & Thurrock 3 sites the diffusion tubes are over-reading the automatic analyser by 1% and 10%. For Thurrock 2 & 8 site the diffusion tubes are under-

reading the automatic analyser by 20% and the diffusion tubes and for Thurrock 4 they are under reading by 11%.

The results in (Table 9), have all been bias adjusted based on all four automatic monitoring sites using the adjustment factors from (Table 8). Each diffusion tube site indicates which factor has been applied. The diffusion tube locations are assigned bias factors from one of the four automatic monitoring sites which best represent their location.

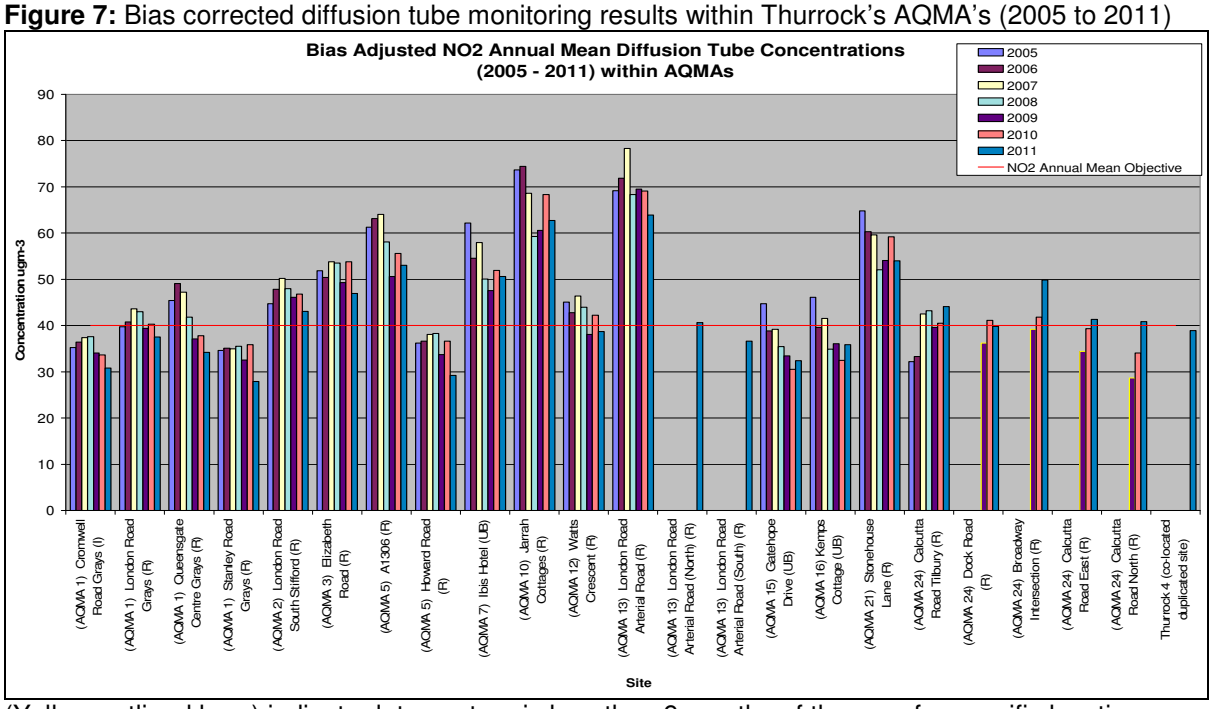
Table 9: Bias corrected diffusion tube monitoring in Thurrock (2005 to 2011) (µg m^{-3})

Site	BIAs Factor	2005	2006	2007	2008	2009	2010	2011
A1306 (R)	TK3	**61.25**	**63.17**	**64.04**	**58.12**	**50.62**	**55.58**	**53.04**
Bulphan (RB)	TK1	27.15	22.37	22.98	20.57	20.88	20.13	20.19
Calcutta Road Tilbury (R)	TK3 & TK4 (from 2011)	32.24	33.32	**42.53**	**43.24**	39.61	**40.5**	**44.08**
Chestnut Avenue Grays (UB)	TK1	36.15	34.64	33.38	26.07	25.91	24.47	24.73
Cromwell Road Grays (I)	TK3	35.21	36.43	37.39	37.62	34.07	33.63	30.84
Elizabeth Road (R)	TK3	**51.86**	**50.43**	**53.82**	**53.51**	**49.28**	**53.77**	**46.95**
Gatehope Drive (UB)	TK1	**44.72**	38.85	39.17	35.41	33.43	30.53	32.42
Hogg Lane (R)	TK3	38.59	37.85	38.09	37.35	32.72	36.43	29.93
Howard Road (R)	TK3	36.17	36.64	38.11	38.28	33.72	36.61	29.2
Ibis Hotel (UB)	TK1	**62.2**	**54.53**	**57.94**	**50.07**	**47.56**	**51.96**	**50.62**
Jarrah Cottages (R)	TK8	**73.65**	**74.46**	**68.64**	**59.3**	**60.58**	**68.33**	**62.7**
Kemps Cottage (UB)	TK1	**46.12**	39.61	**41.51**	34.88	36.11	32.48	35.89
Lakeside Tesco Roundabout (R)	TK8	**61.33**	**65.29**	**70.37**	**54.76**	**63.83**	**72.54**	**69.75**
London Road Arterial Road (R)	TK8	**69.13**	**71.85**	**78.31**	**68.36**	**69.48**	**69.11**	**63.93**
London Road Grays (R)	TK3	39.75	**40.8**	**43.61**	**42.99**	39.36	**40.33**	37.51
London Road South Stifford (R)	TK3	**44.76**	**47.86**	**50.19**	**48**	**46.08**	**46.78**	**43.08**
London Road W Thurrock (R)	TK3	**45.91**	**44.17**	**46.12**	**45.82**	39.04	39.43	38.8
Manorway mon/site mean	TK3	35.97	34.88	37.03	35.79	34.33	37.7	32.65
Park Road (R)	TK3	32.82	33.12	35.85	34.39	31.26	32.32	30.69
Poison Store AURN Site (UB)	TK1	35.13	32.93	33.91	30.83	31.01	28.55	28.65
Purfleet Rail Station (R)	TK3	35.65	37.49	39.31	36.73	35.68	37.67	31.88
Queensgate Centre Grays (R)	TK3	**45.45**	**49.07**	**47.23**	**41.81**	37.12	37.78	34.19
Stanford Library (UB)	TK1	36.18	32.67	33.09	29.93	30.27	28.19	28.97
Stanley Road Grays (R)	TK3	34.67	35.11	34.97	35.53	32.55	35.85	27.95
Stonehouse Lane (R)	TK8	**64.8**	**60.3**	**59.57**	**52.1**	**54.08**	**59.2**	**54**
Watts Crescent (R)	TK3	**45.05**	**42.79**	**46.37**	**43.97**	38.06	**42.22**	38.7
William Edwards School (R)	TK3	37.19	37.15	38.99	39.05	32.67	32.56	28.37
Wingfield Grays (UB)	TK1	30.86	29.43	29.71	23.94	23.68	20.51	23.66
Tilbury Sites (2009)								
Dock Road (R)	TK3 & TK4 (from 2011)					36.21	**41.16**	39.83
Broadway Intersection (R)	TK3 & TK4 (from 2011)					39.17	**41.8**	**49.87**
St Andrews Road (R)	TK3 & TK4 (from 2011)					35.95	**42.71**	**47.66**
Calcutta Road East (R)	TK3 & TK4 (from 2011)					34.42	39.31	**41.34**
Calcutta Road North (R)	TK3 & TK4 (from 2011)					28.65	34.04	**40.84**
New Sites (2010 - 2011)								
Francisco Close (I)	TK3						35.71	29.5
Stanford le Hope Railway Station (R)	TK3						30.77	30.21
East Tilbury Rail Station (R)	TK3						28.37	27.75
London Road Arterial Road (North) (R)	TK8							**40.62**
London Road Arterial Road (South) (R)	TK8							36.59
Purfleet-Bypass (R)	TK8							**55.95**
Thurrock 4 (duplicated site mean)	TK4							38.89

Bold indicates concentrations are above the air quality objective.
Red indicates that the data capture is less than 9 months of the year.

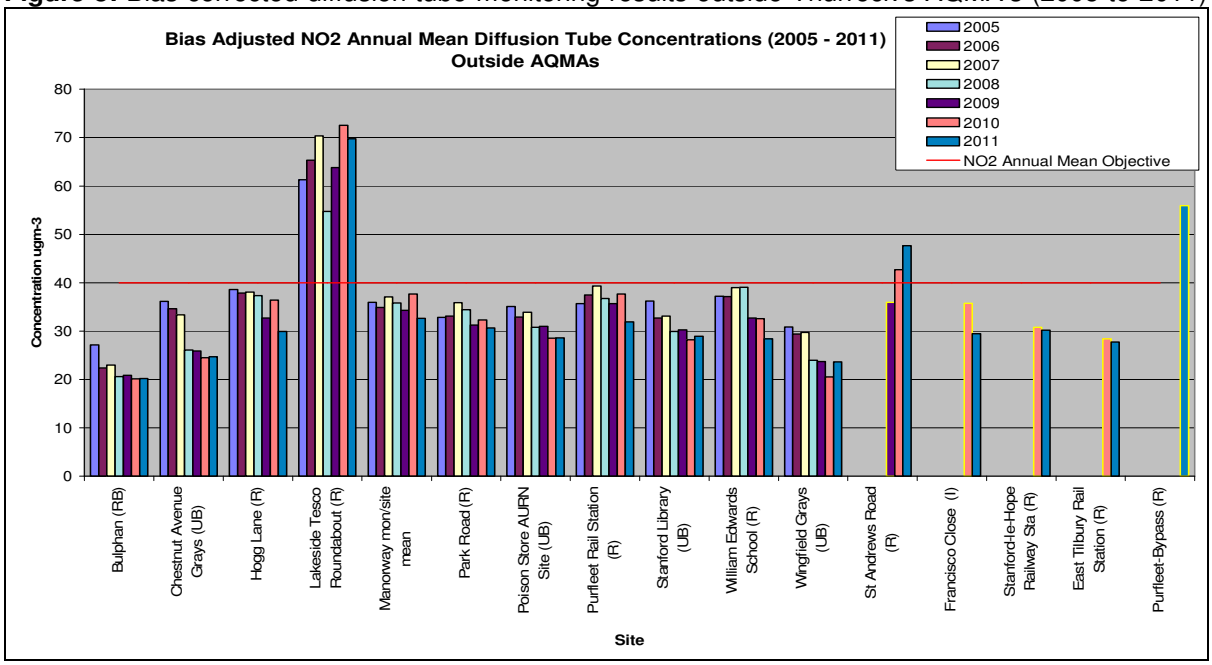
All of the sites identified above as exceeding the annual mean objective are located within the Council's AQMA's. These are shown on the map in Appendix 2. The exceptions are the sites adjacent to Lakeside Tesco roundabout, which was noted in the 2003 USA report, it is located close to the kerbside near commercial sites and as such they do not represent relevant exposure. The other notable exceptions are firstly for St Andrews Road Tilbury, however this site does not represent relevant public exposure either as it straddles the Port of Tilbury and the Railway Station. The other location is Purfleet-Bypass a new site set up mid 2011, this site location does represent relevant public exposure as there are some new residential flats which sit close to the Purfleet-Bypass road. As there has only been 6 months worth of data capture for 2011, continued monitoring is planned over 2012 if by this time the diffusion tube is still above the annual mean objective, then more detailed modelling or monitoring may need to be carried out and a Detailed Assessment will need to be undertaken.

Figure 7: Bias corrected diffusion tube monitoring results within Thurrock's AQMA's (2005 to 2011)



(Yellow outlined bars) indicate data capture is less than 9 months of the year for specific locations

Figure 8: Bias corrected diffusion tube monitoring results outside Thurrock's AQMA's (2005 to 2011)



(Yellow outlined bars) indicate data capture is less than 9 months of the year for specific locations

6.5 Roads

The earlier Stage 3 and 4 and Detailed Assessment reports for the previous rounds of R&A provided modelling of the relevant roads in Thurrock and all busy junctions were dealt with in detail and have not been re-examined here. In 2007 the Council carried out a further assessment for those AQMA's declared in 2005, which identified that a 30% reduction of HGV movements would be needed in order to bring these back down to below the annual mean objective.

The Council plans to carry out more detailed modelling of it road network for NO_2 as well as for PM_{10} in 2012 across the entire borough in order to re-assess the state of the Council's current AQMA's and to identify if there may be any new areas above the air quality objectives.

The previous USA also did not identify any narrow congested streets or busy streets where people may spend an hour or more close to traffic. There has been no change to these findings since then and no new roads have been constructed.

The roads with a high proportion of HGV's were examined in the previous reports and there has been no change in these. The Council however, as referred to earlier, started monitoring at Stanford le Hope to assess the potential impact of increased road traffic in the area arising from the proposed port development at Thameshaven and has a monitoring station in Purfleet to assess what impact HGV's are having along the London road Purfleet and more recently set up a monitoring station to assess the road traffic pollution generated along Calcutta Road in Tilbury.

6.6 Bus stations

Bus stations in the area were assessed in the previous assessment and found not to need further investigation. This position has not changed.

6.7 Industrial sources

There are no new industrial processes or changes relating to existing industrial processes of relevance for NO_2 in the area, or neighbouring areas.

6.8 Aircraft

There is not an airport in the area or immediate neighbouring areas.

6.9 Conclusion of fifth round assessment of NO_2

There have been no significant changes to NO_2 concentrations or emissions in the area since the fourth round USA and Detailed Assessments for NO_2. Therefore the Council will not need to carry out a Detailed Assessment for NO_2. But with one exception the new Purfleet-Bypass Road monitoring site has so far been shown to be above the annual mean objective level but with only limited data capture for 2011. Continued monitoring is planned a decision will be made in the next Progress Report in 2013 as to whether a Detailed Assessment will need to be undertaken.

The Council will however need to produce a Further Assessment in 2012/2013 for Tilbury which follows on from the Detailed Assessment carried out in 2011 it will also revise its Air Quality Action Plan as part of its requirements for LAQM.

The Council will also carry out detailed modelling for all its roads in the borough in order to re-assess the levels of NO_2 in its current AQMA's, as well as any new areas which might be exceeding the air quality objectives.

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7. Sulphur Dioxide

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 µg m^{-3} not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
125 µg m^{-3} not to be exceeded more than3 times a year	24 hour mean	31 Dec 2004
266 µg m^{-3} not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005

7.2 National Perspective

From 1990 to 2008 SO_2 emissions in the UK have decreased by 86% from 3.7 Mt in 1990 to 0.5 Mt in 2006, this reduction is due to reduced emissions from industrial and public power sectors, arising from decreased use of high sulphur coal and from increasing abatement equipment, such as Flue Gas Desulphurisation (FGD) on coal-fired power stations. Although combustion of fuels in power stations, refining and manufacturing of solid fuels still accounts for 55% of total UK SO_2 emissions in 2008. Emissions from petroleum use have declined by 93% from 1970 the main reasons for this is due to decline in fuel oil use, reduction in the sulphur content of gas and oil and reduced sulphur content in diesel emitting road vehicles (DEFRA, 2010).

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 AQMA's during the previous rounds of R & A. More recently this has increased to 12 local authorities with AQMA's for SO_2 (AEAT, 2008)

7.3 Fifth round assessment of 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 TG(09) 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 TG(09) 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 TG(09) 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 is between 5,000 – 15,000 movements per year or over 15,000 movements per year (and exposure within 1km) then a Detailed Assessment is required, (note this is an amendment in TG(09) from TG(03)).

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 3 occasions a day when locomotives are stationary with engines running (note this is another amendment in TG(09) to compared TG(03)) then it is necessary to go to a Detailed Assessment.

7.4 Monitoring

The Council monitors SO_2 in its area at two sites: Thurrock 1 in Grays and Thurrock 3 roadside site in Stanford-le-Hope. The Thurrock 1 site is part of the government's AURN (started in 1995) and the Thurrock 3 is part of the LAQN (started in 2003) and has recently been affiliated to the government's AURN as of 2008.

Monitoring is also undertaken in the neighbouring local authority of Castle Point (an urban background LAQN site that started in 1996).

The monitoring results indicating the number of periods exceeding the objective standards since 2000 are given in (Table 10), along with details of data capture. In all cases the data are fully ratified, apart from the 2011, which are still provisional.

Table 10: SO_2 monitoring statistics in Thurrock and Castle Point (2005 to 2011)

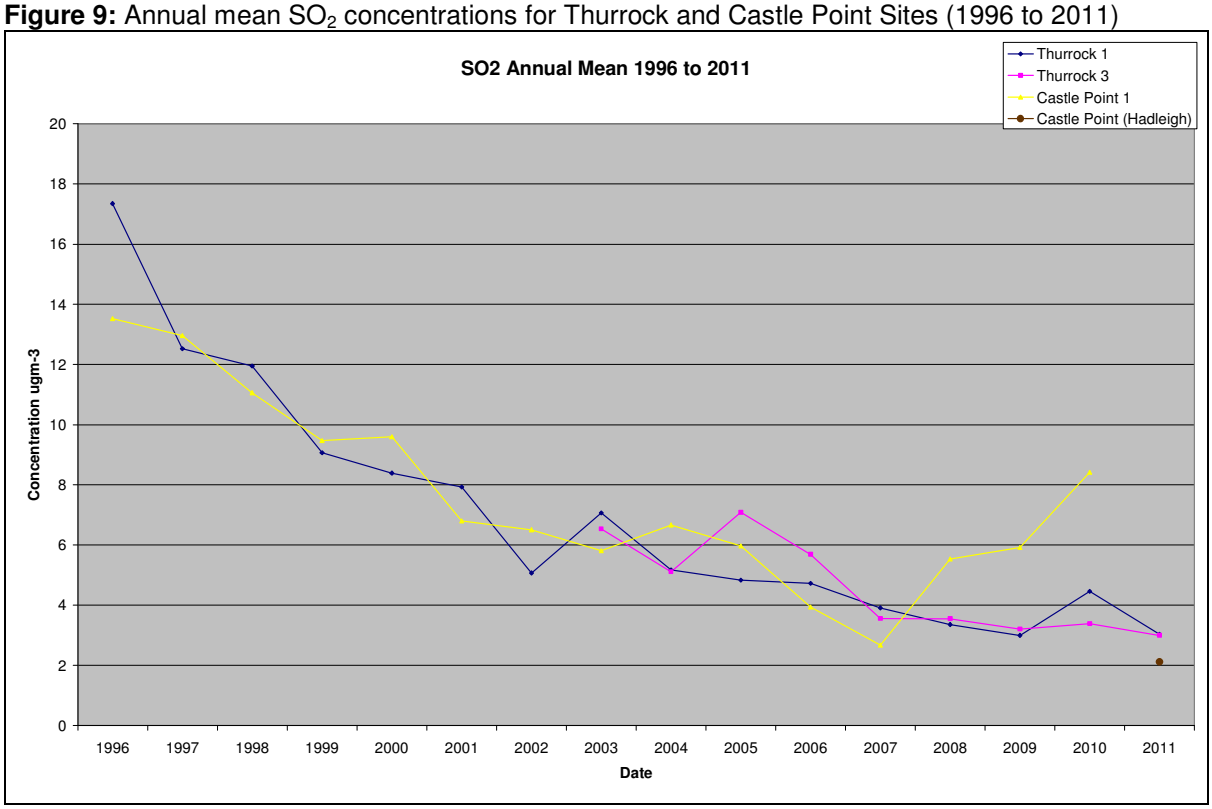
Site		2005	2006	2007	2008	2009	2010	2011
Thurrock 1	15-minutes > 266 μg m^{-3}	0	0	0	0	0	0	0
	1-hour > 350 μg m^{-3}	0	0	0	0	0	0	0
	24-hour > 125 μg m^{-3}	0	0	0	0	0	0	0
	Data Capture %	94.00%	98.18%	97.66%	95.43%	96.40%	97.50%	93.48%
	Maximum 15-minute	192	237	101	144	237	149	100
	Maximum 1-hour	154	207	72	106	186	123	59
	Maximum 24-hour	37	53	19	14	31	18	17
Thurrock 3	15-minutes > 266 μg m^{-3}	0	0	0	0	0	*0*	1
	1-hour > 350 μg m^{-3}	0	0	0	0	0	*0*	0
	24-hour > 125 μg m^{-3}	0	0	0	0	0	*0*	0
	Data Capture %	99.00%	94.92%	99.32%	99.29%	*84.71%*	*85.34%*	98.89%
	Maximum 15-minute	148	215	136	192	*101*	*125*	271
	Maximum 1-hour	115	93	90	138	*57*	*59*	220
	Maximum 24-hour	28	25	16	24	*11*	*12*	23
Castle Point	15-minutes > 266 μg m^{-3}	0	0	0	*0*	0	0	

	1-hour > 350 µg m^{-3}	0	0	0	*0*	*0*	0	
	24-hour > 125 µg m^{-3}	0	0	0	*0*	*0*	0	
	Data Capture %	95.50%	97.13%	95.90%	*88.70%*	*86.97%*	*41.48%*	
	Maximum 15-minute	164	113	90	*71*	*94*	*101*	
	Maximum 1-hour	137	93	82	*66*	*57*	*75*	
	Maximum 24-hour	24	34	37	*22*	17	32	
Castle Point (Hadleigh)	15-minutes > 266 µg m^{-3}							*0*
	1-hour > 350 µg m^{-3}							*0*
	24-hour > 125 µg m^{-3}							*0*
	Data Capture %							*39.40%*
	Maximum 15-minute							*47*
	Maximum 1-hour							*28*
	Maximum 24-hour							*15*

(note: underlined date indicate that the data is only provisional)
(italics indicates data capture is less than 90%)

These results indicate that the objectives have not been exceeded at the monitoring sites although there have been periods where the 15 minute standard has been exceeded but only in years previous to 2005 and one exceedence at Thurrock 3 in 2011.

Figure 9: Annual mean SO_2 concentrations for Thurrock and Castle Point Sites (1996 to 2011)



(Note that 2008 data is provisional, those years with less than 90% data capture are in years 1996 & 1998 for Castle Point, 1997 & 1998 for Thurrock 1 and 2003 for Thurrock 3)

(Figure 12) clearly shows a downward trend over the last decade, with levels becoming less of an issue and much less exceedences of the 1-hour and 15-minute objective have been seen over the later part of this decade, which compliments the annual mean trend.

7.5 Industrial sources

The report has not identified any new industrial sources, but results from previous reports namely the Detailed Assessment for SO_2 carried out in 2005, based on the 15-minute mean, 1-hour mean and 24 hour mean for SO_2, indicated that some exceedences of the 15-minute mean and 1-hour mean objectives, and that there was a risk of public exposure close to the Coryton Refinery along a public

footpath. This has been confirmed by monitoring at Oozedam Farm where there is nominal public exposure along a public footpath. There have been wide exceedences of the 15-minute SO_2 objective, with some exceedences of the hourly objective over 2009 to 2011.

In June 2011 the Council along with the Environment Agency and the Refinery Operators met to discuss the ongoing SO_2 issue, it was agreed that the refinery would install a Sulphur Tail Gas Unit (STGU), which will drastically reduce the amount of SO_2 emissions from the plant by early 2012. The refinery would then have to demonstrate compliance of the objective over 2012. If it does not comply then an AQMA will have to be declared. This was all given approval with the Defra Help desk, to grant the refinery a time extension to meet the air quality objectives.

7.6 Domestic sources

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

7.7 Boilers

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

7.8 Shipping

The previous USA investigated relevant ships movements along the river Thames in Thurrock's area. Details of all ship movements indicated that the two busiest ports are Purfleet Thames Terminal in the west of the Council's area and the Port of Tilbury Freeport towards the east. Neither port had more than 5,000 ship movements and therefore no further assessment was made based on TG(03), this guidance has since been updated and relaxed in the TG(09) Guidance, to more than 15,000 ship movements. This position has not changed, no new sources have been detected.

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 fifth round assessment of SO_2

There have been no significant changes to sulphur dioxide concentrations or emissions in the area since the fourth round USA and as a result a Detailed Assessment for sulphur dioxide will not be required.

The Council will assess in 2013 whether the Coryton Refinery has managed to comply with the 15-minute SO_2 objective over the 2012 period.

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8. Particles (PM_{10})

8.1 Introduction

The PM_{10} (particles measuring 10 µm 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 three main categories (APEG, 1999): (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.

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

Objective		Date to be achieved by
Concentration	**Measured as**	
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

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 U.K emissions are 133 Kt for 2008, this is a 53% reduction from 1990, which had total PM emissions of 281 Kt. The reason for the decline in emissions is the trend away from coal use especially from domestic users. Road transport is the largest source of UK PM_{10} emissions accounting for 29% of them in 2008, but this can vary dramatically from region to region, (in urban areas it can be as high as 50%) (DEFRA, 2010). The main source of PM_{10} from road traffic emissions comes from diesel vehicles and HGV's, and also from brake and tyre wear.

Monitoring results from across the UK continue to indicate that sites, including busy roadside sites, exceed the current 2004 (extended 2010) daily mean objective during some years. Concentrations of annual mean PM_{10} are generally well below the 2004 objective.

In recent years the rate of decrease in PM_{10} has slowed, this is mainly due to the changes in vehicle type with a higher percentage of diesel vehicles being introduced on to UK roads. This combined with the fact that the latest Euro standards IV & V particularly for diesel vehicles have not given the reductions that they were supposed too and some may even be worse in terms of PM_{10} than older Euro classes.

As a result of high concentrations arising post 2004 more than 50 AQMA's were declared across the U.K during the first and second rounds of R & A for the daily mean objective, since that time the current total stands at 74 AQMA's.

8.3 Fifth 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 $\mu g\ m^{-3}$. If the number of exceedences is greater than 35, then a Detailed Assessment is necessary. Similar assessments are required for roads with high numbers of HGV's 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 TG(09) 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 TG(09) 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 undertakes continuous monitoring of PM_{10} using TEOM instruments at its Thurrock 1 (AURN background) site in Grays and Thurrock 3 (LAQN roadside) site in Stanford Le Hope, this site was recently affiliated to (AURN) in 2008. Thurrock 2 started operating a continuous PM_{10} Beta Attenuated Mass or (BAM) instrument in 2007, this site was then moved in 2008 approximately 30 metres to the west of the Thurrock 2 site and re-designated Thurrock 8. Thurrock 1 opened in 1995 and Thurrock 3 in 2003. These two sites are both located outside of the Council's AQMA's, but Thurrock 2 and 8 are located inside AQMA 10.

The following (Table 11) provides results from Thurrock's monitoring sites. The results for both sites were factored by 1.3 to equate to gravimetric equivalent (in accordance with the TG(03) guidance), the TG(09) guidance now recommends that all future results will be factored by use of the Volatile Correction Model (VCM) as the 1.3 bias correction factor is no longer relevant due to failure of the TEOM instrument in meeting the UK government equivalence testing trials.
The VCM compares data from sites which have TEOM Filtered Dynamic Measurement System or (FDMS), as the TEOM FDMS did meet the equivalence test, it adjusts standard TEOM data by adding the volatile element which is normally lost with the standard TEOM instrument, as it operates at a much higher temperature 50℃ which can evaporate the volatile mass from the particle. The 2006 to 2008 values have been calculated using the VCM. All data post 2008 is from TEOM FDMS instruments, as Thurrock 1 and Thurrock 3 had upgrades in early 2009, so no factors need to be applied to these results.

Table 11: PM_{10} monitoring in Thurrock (2005 to 2011) (µg m^{-3})

Site		2005	2006	2007	2008	2009	2010	2011
Thurrock 1	Annual mean	23.4	19.9	18.92	18.88	21.26	24.3	24.61
	Data capture %	94.56	97.38	98.16	97.79	96.63	95.42	96.4
	Maximum 1 hr	191	244.8	152.5	115	117	331	492
	Maximum 24 hr	72.3	77.6	83.1	71	83	76	105
	Days > 50 µg m^{-3}	5	5	10	3	6	9	26
Thurrock 3	Annual mean	26.53	22.28	20.84	21	*21.3*	*20.69*	23.19
	Data capture %	99.04	98.72	97.82	99.68	*79.89*	*89.5*	96
	Maximum 1 hr	236	252.1	406.2	129.2	*153*	*217*	142
	Maximum 24 hr	63.6	85.8	80.8	85	*77*	*57*	100
	Days > 50 µg m^{-3}	10	9	11	6	*6*	*4*	18
Thurrock 2	Annual mean			*36.52*	*34.81**			
	Data capture %			*70.1*	*20.34**			
	Maximum 1 hr			*356.3*	*354.4**			
	Maximum 24 hr			*96.2*	*92.3**			
	Days > 50 µg m^{-3}			***51***	*14**			
Thurrock 8	Annual mean				*24.43**	*25.85*	29.43	27.71
	Data capture %				*70.41**	*80.61*	92.12	97.45
	Maximum 1 hr				*356.3**	*201*	408	248
	Maximum 24 hr				*73**	*79*	113	95
	Days > 50 µg m^{-3}				*8**	*5*	21	26
Thurrock 2 & 8	Annual mean				29.62*			
	Data capture %				90.75*			
	Maximum 1 hr				356.3*			
	Maximum 24 hr				92.3*			
	Days > 50 µg m^{-3}				22*			

(Note- italics indicates < 90% data capture; bold indicates > daily mean objective)
(Pink indicates TEOM FDMs Data)
(Blue indicates that ERG's VCM was used in order to meet equivalence for TEOM data)
(* & Yellow indicates that for 2008 both results for Thurrock 2 and Thurrock 8 were combined as there was a relocation of Thurrock 2 to Thurrock 8 by 35 metres along the same road)

The results for the sites indicate that the 2004 annual mean objective was not exceeded during any of the years reported with the exception of 2003 at Thurrock 1 and 2007 at Thurrock 2.

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.

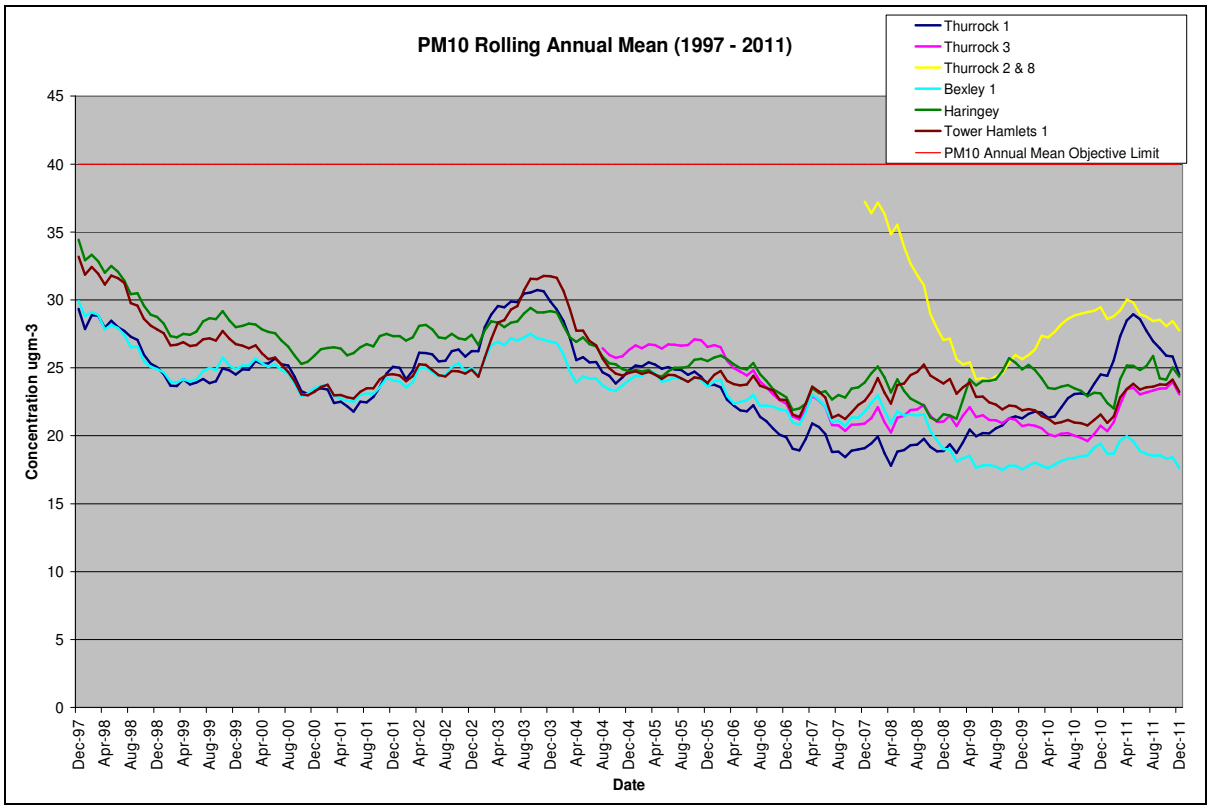
It should also be noted however, that the Thurrock 1 site, has previously been influenced by an industrial source nearby. A Detailed Assessment was carried out by Thurrock Council and it was

noted that PM_{10} concentrations were elevated by approximately 10% (as an annual mean) and by 15 additional daily means above 50 µg m^{-3} during the 12 months ending November 2003. Further analyses using wind rose data confirmed the source as a local factory. Subsequent action has reduced emissions with a consequent reduction in concentrations below the objectives.

An analysis of rolling annual mean PM_{10} concentrations and daily mean PM_{10} exceedences are provided for the Thurrock monitoring sites to indicate any trend over time. In addition other sites, including the Bexley 1, Tower Hamlets 1 background sites and Haringey roadside are included for comparison. The analysis is for the period from 1997 through to 2011, (note that 2011 is provisional data only).

(Figure 10) below illustrates changing concentrations over time; based on changing rolling annual mean PM_{10} concentrations and Figure 11 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.

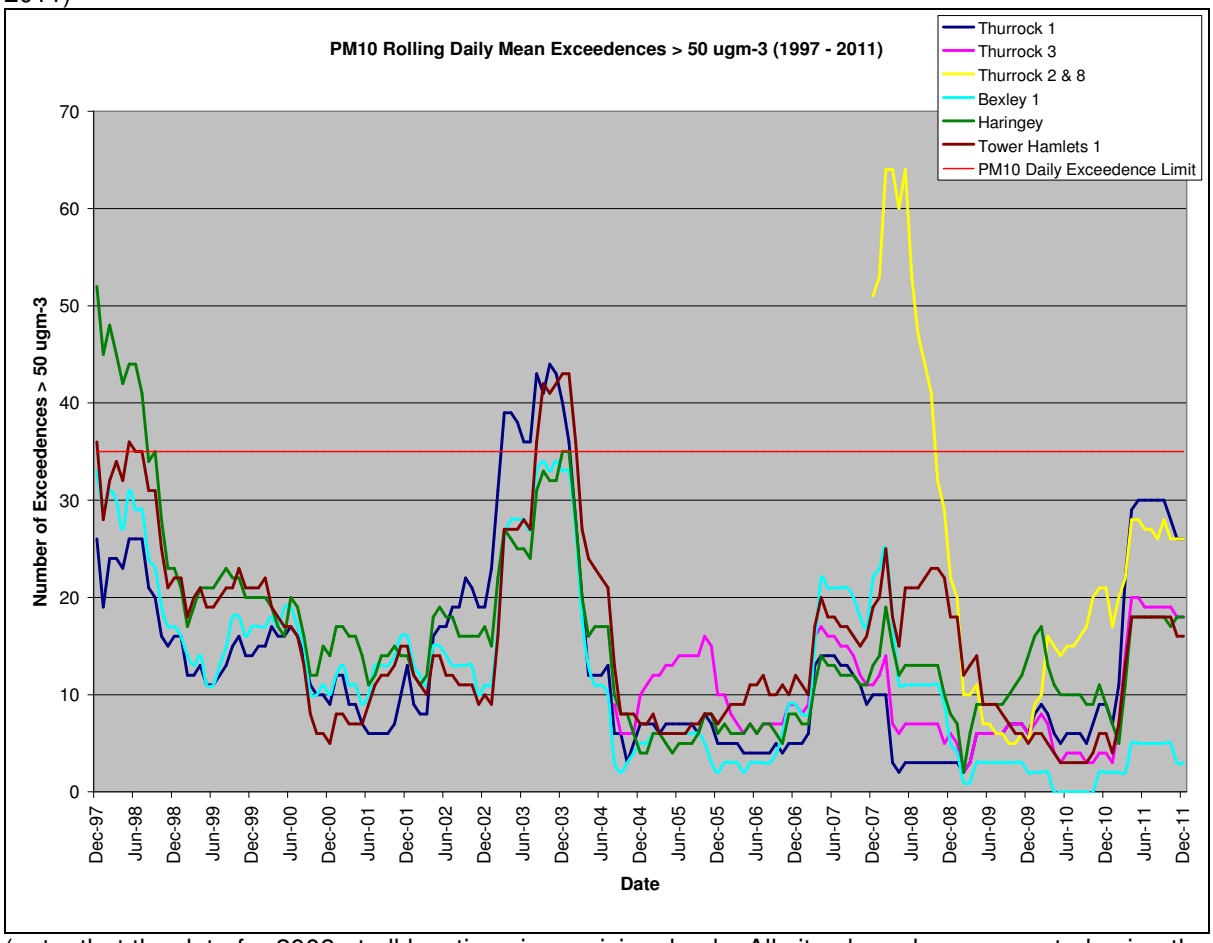
Figure 10: Rolling annual mean PM_{10} trends for Thurrock and London monitoring sites (1997 to 2011)



(note: that the data for 2008 at all locations is provisional only. All sites have been corrected using the VCM from the years 2006 to 2008, the variation is little opposed to the 1.3 correction for these years with the exception of the Tower Hamlets 1 site. Information on FDMS site corrections is located in Appendix 3)

The rolling annual mean trends for the Thurrock sites are consistent with the other sites shown in (Figure 10). The data for the Thurrock 3 site are also short term and reflect the later start of operations at the site, Thurrock 2 (formerly known) now Thurrock 8 over its short history has shown a dramatic decrease over the 2007 period, this is due to improvement of the London Road by adding a roundabout where it intersects with Stonehouse Road and the Purfleet Bypass, this has stopped the queuing of HGV's along the road, and thus PM_{10} levels have fallen. However in recent years the site has been steadily increasing and is averaging between 25-30 µg m^{-3}. The use of trends in this way highlights that although concentrations dropped in 2004, this was mainly as a result of the pollution incidents in 2003 not being repeated in 2004. Levels also dropped to pre 2003 levels and do not appear to be reducing further; indeed for some sites there may be a slight increase, possibly as a result of increasing primary PM_{10} emissions (ERG, 2006) rather than the predicted decrease in emissions. Thurrock 1 has from 2009 to 2011 steadily been increasing after reaching an all time low in early 2008, it is not entirely clear why this might be, although 2011 has seen elevated levels at all locations, this has also been the case nationally.

Figure 11: Rolling daily mean PM_{10} exceedences for Thurrock and London monitoring sites (1997 to 2011)

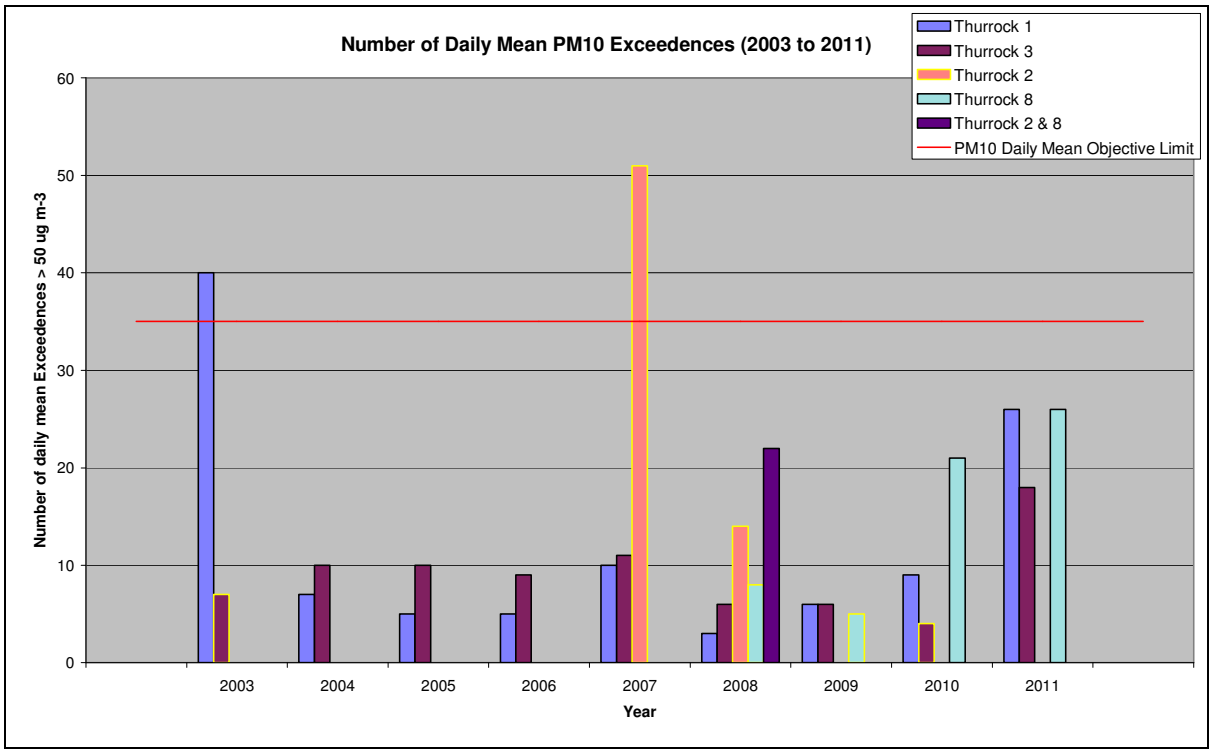


(note: that the data for 2008 at all locations is provisional only. All sites have been corrected using the VCM from the years 2006 to 2008 the variation is little opposed to the 1.3 correction for these years with the exception of the Tower Hamlets 1 site. Information on FDMS site corrections is located in Appendix 3)

The rolling trend of daily PM_{10} exceedences (Figure 11) 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 shown for these sites. From 1998 Thurrock 1 site was recording approximately 27 daily exceedences and showed a general decline up to 2002 and then peaked mid 2003 to 43 exceedences during the unusual weather events in 2003, but since this time has remained relatively low until 2011 where it peaked to 26 exceedences. The London sites have showed a similar trend although slightly elevated overall for Tower Hamlets 1, and during 2011, this has shown an increase in the number of exceedences but not as much as Thurrock 1. The VCM was applied from 2006 to 2008 for all sites, the years previous to this were based on the 1.3 correction factor, as there were not enough sites from 1997 to 2005 that used FDMS TEOM data for the VCM to be applied properly. All data post 2008 used FDMS data or BAM data in relation to Thurrock 2 & 8.

(Figure 12) below, shows the actual number of daily mean exceedences, at all the automatic monitoring stations, with Thurrock 2 site in 2007 being above the permitted exceedences of 35 per year above 50 µg m^{-3}, these have fallen markedly during 2008 the combined Thurrock 2 and 8 sites show 22 exceedences reaching the lowest in 2009 at 5 exceedences and then increasing in 2011 to 26 exceedences. The Thurrock 1 site in 2003, this was due to the unusually hot summer that year, also a point source was also partly responsible for the increase in this year but has since been resolved and has fallen well below the objective limit, but in 2011 levels have increased and has seen the most exceedences, 26 in total.

Figure 12: Number of days > 50 µg m^{-3} for PM_{10} at Thurrock monitoring sites (1997 to 2011)



(Yellow outlined bars) indicate data capture is less than 9 months of the year for specific locations

2011 has seen more exceedences than in recent years this has mainly been due to the whether giving rise to smog events particularly over the March and April period, this has affected all the monitoring sites across the UK not just here in Thurrock.

8.5 Roads

The second and third round USA considered major roads in the area and noted that the Stage 3 and 4 reports for the previous round of R&A provided modelling of the main roads in the Council's area and addressed the following issues: junctions and high flows of HGV's and buses. The TG(03) guidance also required an assessment of roads close to the objective during the first round of R&A and this was undertaken in the Stage 4 further assessment. Hence no further examination of these issues was undertaken. There is no change in this position.

Additionally no roads with unusually high proportions of heavy goods vehicles (>25%) were identified from the revised traffic data available and there have been no significant increases in traffic flows. There is no change in this position since then and no new roads have been constructed or proposed since the last review.

There are also no new roads with traffic flows greater than 10,000vpd have been built in the Council's area since the first round of R&A where there is relevant exposure arising.

8.6 Industrial sources

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

8.7 Solid fuel burning

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

As noted in the previous USA, potential sources within the Council's area include the licensed landfill sites. Many of these are no longer operating and only two sites were previously identified as having dust sources within 200m of residential exposure and investigated further. One of these, East Tilbury Gravel Ltd has since closed. The other site Southfields Gravel Co. Ltd was assessed and found not to need further assessment, which was identified in the last USA report. Similarly there are other small inert quarries in the Council's area but none of these are the cause of recent complaints. This position has not changed and it is not therefore necessary to go to a Detailed Assessment for these sites.

The revisions to the TG(03) guidance and now the new TG(09) guidance include a reference to potential problems from poultry farms. There are two poultry farms within the area, however the Council has received no dust complaints concerning these sites and as a result further investigation is not considered necessary.

8.9 Aircraft

There is not an airport in the area or immediate neighbouring areas.

8.10 Conclusion of fifth round assessment of PM_{10}

There have been no significant changes to PM_{10} concentrations or emissions in the area since the fourth round USA and as a result a Detailed Assessment for PM_{10} will not be required.

The Council will be carrying out detailed modelling for all its roads in the borough in order to re-assess the levels of PM_{10} in its current AQMA's, as well as any new areas which might be exceeding the air quality objectives.

However in line with previous government guidance and for the purposes of future planning the Council will note that close to localised sources such as busy roads and junctions, the 2010 annual mean objective is likely to be exceeded in 2013.

9. Fine Particles ($PM_{2.5}$)

Proposed new particle objectives were introduced by the new technical guidance 2009 TG(09)

Pollutant	Concentration	Measured as	Date to be achieved by
England (apart from London) and Wales			
*Particles ($PM_{2.5}$)	25 $\mu g/m^{-3}$	annual mean	2020
	15% cut in urban background exposure	annual mean	2010-2020

(These new objectives are not currently included in Regulations for the purpose of local air quality management).

Finer Particles or $PM_{2.5}$ are also worth mentioning, as they have shown a similar pattern to PM_{10}, with reductions of 48% between 1990 and 2008 from 21 Kt in 1990 to 11 Kt in 2008. The reduction of emissions is mainly due to a reduction in coal use from domestic, commercial and institutional sectors. It must be noted that road transport has become an increasingly important source in recent years and accounts for 39% of total $PM_{2.5}$ emissions. (DEFRA, 2010).

There are 3 years of results gathered thus far. Results for 2011 to 2009 have been outlined below in (Table 12), these results however are associated with very low data capture of 78.69% for 2011, 58.66% for 2010 and 44.43% for 2009. The low data capture is due mainly to the late installation of the analyser in 2009, but also from problems with the analyser after it was installed which have still not been fully resolved,

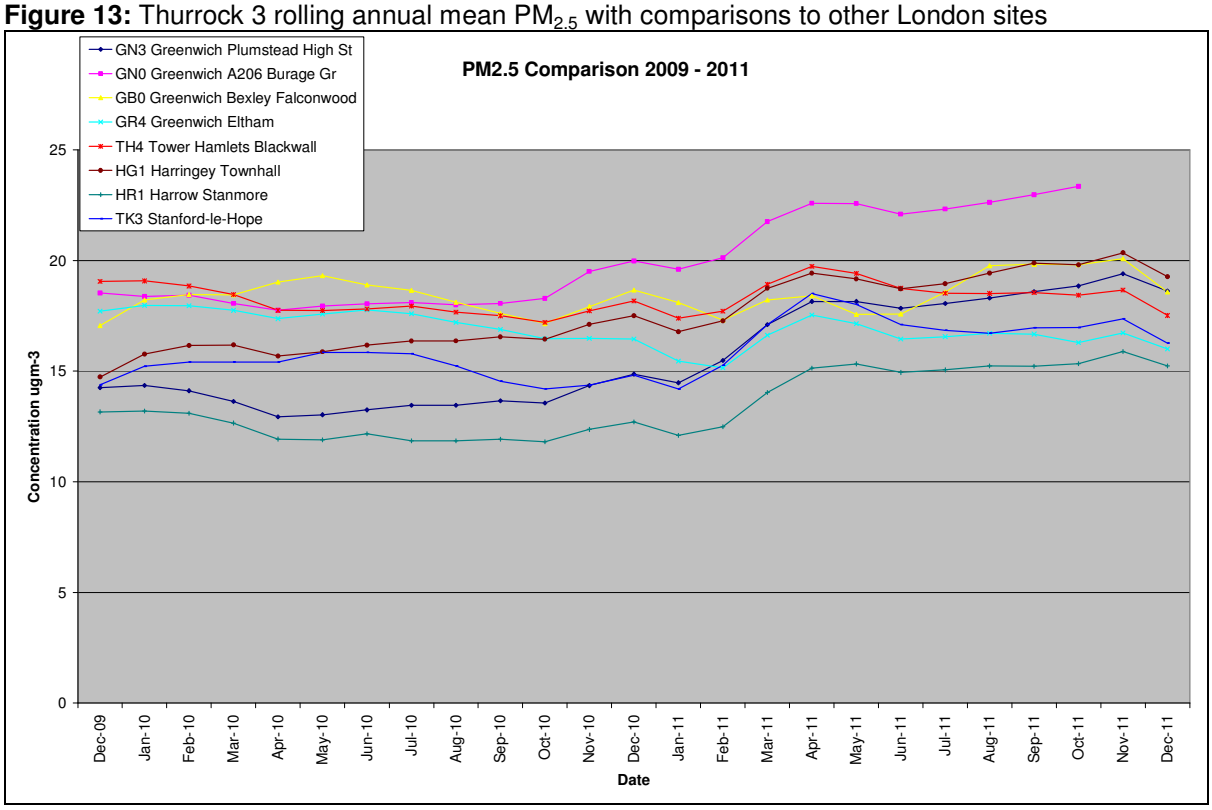
*****NOTE** the data should be analysed with caution as it has higher concentrations than expected in relation to the PM_{10} monitor at the same location, the issues are ongoing with this monitor, and hence the data may not give a true representation of the actual levels, (direct comparisons have been drawn below with other London sites below)***

Table 12: Thurrock 3 $PM_{2.5}$ statistics from (2009 to 2011)

$PM_{2.5}$	2009	2010	2011
Annual Mean	14.54	15.77	17.38
1 Hour Maximum	145	229	120
24 Hour Maximum	47	50	86
Data Capture	44.43%	58.66%	78.69%

The $PM_{2.5}$ concentrations measured at Thurrock 3 site, tend to fall in line with those measured across other monitoring locations within the LAQN as shown in (Figure 13) below, and has so far followed the same trends, levels remain fairly consistent over this time period, (albeit it relatively short time-fame). Note that all the sites have recorded increasing concentrations over 2011, this increase in concentrations is associated with the more stable whether conditions over the entire UK than in previous years.

Figure 13: Thurrock 3 rolling annual mean $PM_{2.5}$ with comparisons to other London sites



The Council is not required at present to take any further action for $PM_{2.5}$ at this time as it does not fall under the current Technical Guidance TG(09), the above information has just been added for information purposes only.

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10. Ozone (O_3)

Reporting or responsibility of Ozone is not a requirement of the local authority as it is a national problem and requires a higher authority such as central government to deal with this pollutant. However as this authority monitors for Ozone, a small section has been added for information purposes only.

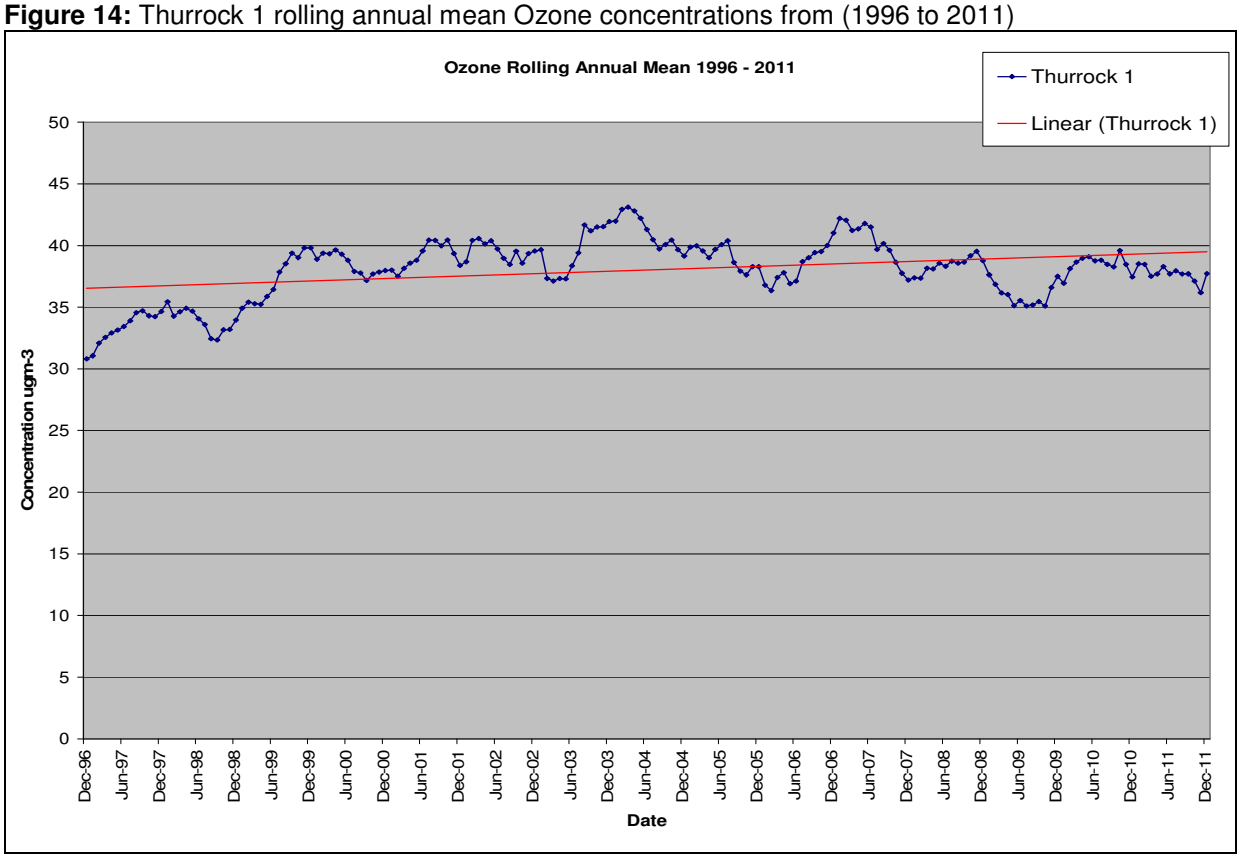
The continuous measurement of ozone during 2011 in the Borough was undertaken at the Thurrock 1 urban background monitoring site in Grays.

The results for the period 2003 – 2011 are given in (Table 13) the data capture for all years exceeded 90% at the Thurrock 1 site; full details for the site are given in the Appendix.

Table 13: Thurrock 1 Ozone statistics from (2003 to 2011)

	2003	2004	2005	2006	2007	2008	2009	2010	2011
No Exceedences of the daily maximum 100 ug/m-3	**40**	**15**	**13**	**25**	**11**	**12**	**6**	**7**	**11**
Annual mean	**37**	**38**	**39**	**37**	**41**	**39**	**39**	**38**	**38**
Annual mean daily max 8-hr	**55**	**55**	**56**	**55**	**61**	**57**	**58**	**55**	**56**

Figure 14: Thurrock 1 rolling annual mean Ozone concentrations from (1996 to 2011)



The Government's air quality objective, not to exceed 10 periods in a calendar year, was exceeded in 2011 at the Thurrock 1 site with a total of 11 exceedences. The objective was exceeded in all previous years with the exception of 2010and 2009 at the site. 2003 in particular was notable for a very hot dry summer conducive to the formation of ozone; hence the much higher of periods during this particular year. In other years, 2004 and 2005, the weather was less conducive to the formation of ozone. In 2008, 2009 and 2010 the summer was notable for being very wet and again these conditions were not conducive to the formation of ozone. However the annual mean for ozone, has shown an increasing tendency in recent years which is reflected the rolling annual mean shown in (Figure 14).

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11. Conclusion / Recommendations

This report follows the technical guidance (TG(09) and Frequently Asked Questions) produced for this part of the fifth 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 identified an additional risk of the air quality objectives being exceeded.

The Council however has previously identified that the air quality objectives for NO_2 will be exceeded at locations with relevant public exposure in its area and designated AQMA's. Further monitoring in these areas confirms that the annual mean objective has been exceeded and that there is no need to consider amending or revoking these. However recent monitoring has identified one new area, which is currently in breach of the annual mean objective for NO_2, which is located on the Purfleet-Bypass, Purfleet, the council will need to continue monitoring with the current diffusion tube first in order to obtain a full years data capture as the results for 2011 are only based on 6 months of the year.

For SO_2, The Council was given a time extension for declaring an AQMA around the Coryton Refinery. Based on the condition that the Council, the Environment Agency and the Refinery Operators, agreed that the refinery would install a Sulphur Tail Gas Unit (STGU). The STGU will cut the amount of SO_2 emissions from the plant by early 2012. The refinery will have to demonstrate compliance of the objective over 2012. If it does not comply then an AQMA will have to be declared.

The LAQM guidance requires that the Council produce its next air quality progress reports by the end of April 2013, prior to undertaking the next updating and screening assessment by the end of April 2015.

The Council is therefore recommended to undertake the following action:

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

2 Continue monitoring for nitrogen dioxide along the Purfleet-Bypass, Purfleet and review what action needs to be undertaken in the next Progress Report due in 2013.

3 The Council will need to produce a Further Assessment for NO_2 in 2012/2013 for Tilbury which follows on from the Detailed Assessment carried out in 2011 it will also revise its Air Quality Action Plan as part of its requirements for LAQM.

4 The Council will also carry out detailed modelling for all its roads in the borough in order to re-assess the levels of NO_2 and PM_{10} in its current AQMA's, as well as any new areas which might be exceeding the air quality objectives.

5 The Council will need to ensure that the Coryton Refinery meets the 15-minute air quality objective in 2012, following the installation of a new Sulphur Tail Gas Unit (STGU) in early 2012. If it does not demonstrate compliance then an AQMA will be declared.

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Appendix I

Table 14: Part A processes in Thurrock

Operator Name	Permit No.	Site address	Process type
Allied Mills Ltd	BM9688IS	Sunblest Mill Port of Tilbury Essex	ANIMAL, VEGETABLE AND FOOD
Petroplus Refining and Marketing Ltd	AF8050	CORYTON REFINERY, THE MANORWAY, STANFORD-LE-HOPE, ESSEX	GASIFICATION, REFINING ETC
Chemviron Carbon Limited	AP3338SP	434 LONDON ROAD, GRAYS, ESSEX	RECOVERY OF WASTE
Chemviron Carbon Limited	FP3033BD	434 London Road West Thurrock Essex	CARBON DISULPHIDE, AMMONIA
Industrial Chemicals Limited	BJ7298IF	STONE NESS ROAD, WEST THURROCK, GRAYS, ESSEX	ORGANIC CHEMICALS
Industrial Chemicals Limited	DP3637SG	TITAN WORKS, TITAN INDUSTRIAL ESTATE, HOGG LANE, GRAYS, ESSEX	INORGANIC CHEMICALS
Kerneos Limited	BL0863IG	Dolphin Way PURFLEET Essex	CEMENT AND LIME
Pura Foods Limited	BU7677IZ	Pura Foods London Road PURFLEET Essex	ANIMAL, VEGETABLE AND FOOD

Table 15: List of permitted petrol stations in the Council's area

Reference number	Operator	Address
SSP1	Mr S Ramachandran	36/38 Southend Road, Grays RM17 5NJ
SSP2	TOTAL UK Limited	Aveley Service Station, Purfleet Road, Aveley RM15 4DJ
SSP3	ASDA Stores Limited	Thurrock Park Way, Tilbury, RM18 7HJ
SSP4	Tesco Stores Limited	Cygnet View, Lakeside, Thurrock RM20 1TX
SSP5	Mr M Gopalakrishnan	26-28 Southend Road, Stanford-le-Hope SS17 0PE
SSP6	BP Oil UK Limited	A13 Eastbound, Grays RM16 3BG
SSP7	BP Oil UK Limited	A13 Westbound, Grays RM16 3BG
SSP9	Murco Petroleum Limited	London Road, Stanford-le-Hope SS17 0WL
SSP10	Esso Petroleum Limited	Granada Thurrock Services, M25 Thurrock RM16 3BG
SSP11	ROC (UK) Limited	Meads Service Station, London Road, Purfleet RM16 1TD
SSP12	Esso Petroleum Limited	Chafford Service Station, Hogg Lane, Grays RM17 5QT
SSP13	Sainsbury's Supermarkets Limited	Burghley Road, Chafford Hundred, RM16 6QQ
SSP14	Pace Petroleum Limited	Daneholes Service Station, Stanford Road, Grays RM16 4XS
SSP15	Murco Petroleum Limited	The Broadway, Dock Road, Grays RM17 6EW
SSP16	Mr S V Chandrakumar	712 London Road, West Thurrock RM20 3PZ
SSP17	Tesco Stores Limited	11-13 Brentwood Road, Chadwell St Mary RM16 4JD
SSP18	George Payne	Church Road, Corringham SS17 9AP
SSP19	Tesco Stores Limited	North Road, South Ockendon, Essex RM15 6QJ
SSP20	Central Garage	31 Lampits Hill, Corringham SS17 9AA
SSP21	Wm Morrison Supermarkets PLC	1 London Road, Grays RM17 5XZ
SSP23	Bell Corner Service Station	London Road, Fobbing Essex SS17 0LE

Table 16: Part A2 & B installations in Thurrock (excluding dry cleaners)

Reference number	Operator	Address	Process / activity undertaken
A2 001 V3	***Civil & Marine Slag Cement Limited***	***London Road, Grays, Essex RM20 3NL***	***Blend / pack / load / use of bulk cement***
B101	Bulphan Service Station	Brentwood Road, Essex RM14 3SS	Small waste oil burner
B102	Benchsound Limited	47 Kings Street, Stanford-le-Hope SS17 0HJ	Small waste oil burner
B103	Hanson Thermalite Limited	Motherwell Way, WT, Essex RM20 3LB	Blend / pack / load / use of bulk cement
B106	C.Y Repair Services	Manorway Ind. Est. Grays RM17 6PG	Small waste oil burner
B110 V1	Lafarge Cement	Oliver Close, WT, Essex RM20 3EE	Blend / pack / load / use of bulk cement
B111	Foster Yeoman Limited	Jurgens Road, Purfleet, Essex RM16 1SH	Roadstone coating processes
B115	CEMEX Materials UK	London Road, Grays RM20 3NL	Blend / pack / load / use of bulk cement
B116	Tarmac Topblock Limited	Buckingham Road, Linford SS17 0PY	Blend / pack / load / use of bulk cement
B119	Brett Concrete Limited	Magnet Industrial Estate, WT RM16 1DB	Blend / pack / load / use of bulk cement
B122	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B135	Calor Gas Limited	Manorway, Coryton, SLH SS17 9LW	Coating of metal and plastic
B141	Palmer and Klein Limited	Brentwood Road, Orsett, RM16 3HU	Veg. oil extraction/ refining process
B151 V1	West Thurrock Coachworks Limited	Unit39, Purfleet Indust. Aveley RM15 4YG	Respraying of road vehicles
B152 V1	West Thurrock Coachworks Limited	Unit 2, Curzon Drive, Grays RM17 6BG	Respraying of road vehicles
B153 V1	Enterprise Coachworks Limited	Oliver Close, West Thurrock, RM20 3EE	Respraying of road vehicles
B159	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B160 V1	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B161 V2	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B164	Commodore Kitchens	Gumley Road, Grays RM20 4XP	Timber and wood-based products
B165	CdMP Purfleet Limited	London Road, Purfleet RM19 1PD	Respraying of road vehicles
B167	Clearserve Limited	Holford Road, Linford SS17 0PJ	Mobile crushing and screening
B168	Esso Petroleum Limited	London Road, Purflleet RM19 1RS	Storage, loading, unloading of petrol
B169	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B170	Vopak Tank Terminal London BV Ltd	Oliver Road, West Thurrock RM20 3EY	Storage, loading, unloading of petrol
B171	BP Oil UK Limited	Manorway, Coryton, SLH SS17 9LQ	Storage, loading, unloading of petrol
B174	Kaneb Terminals Limited	London Road, West Thurrock RM17 5YZ	Storage, loading, unloading of petrol
B180	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B183	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM191SR	Mobile crushing and screening
B184	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM191SR	Mobile crushing and screening
B185 V1	Balgores Motors 1982 Limited	Unit3 Manor Road, WT RM20 4BA	Respraying of road vehicles
B186	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening
B187 V1	DWS Bodyworks	Unit 1&2 Magnet Way, Grays RM20 4DP	Respraying of road vehicles
B188	Clearserve Limited	Holford Road, Linford SS17 0PJ	Mobile crushing and screening
B189 V1	Tony le Voi	Unit C8 Motherwell Way, WT RM20 3WE	Respraying of road vehicles
B191	Flavin Consulting Limited	1 One Tree Hill, SLH SS17 9NH	Small waste oil burner
B192	Sejoc Auto Repairs	Dock Road, Tilbury RM18 7PT	Small waste oil burner
B193	Derek Mean Vehicle Services	69/71 Victoria Road, SLH SS17 0HZ	Small waste oil burner
B194	Euromix Limited	Oliver Close, West Thurrock RM20 3AD	Blend / pack / load / use of bulk cement
B198	Thurrock 4x4 Centre	Oliver Road West Thurrock Essex	Small waste oil burner
B199	S Walsh and Sons Limited	Sleepers Farm, Chadwell St Mary	Mobile crushing and screening
B200	Pullman Fleet Services	Sartoria Business Park, WT, RM20 3NL	Small waste oil burner
B203	Spectrum Vehicle Resprayers	Sandy Lane, WT RM20 4BH	Respraying of Road Vehicles
B204	Steintec Paving Systems	728 London Road, WT RM20 3LU	Blend / pack / load / use of bulk cement
B205 *(new)	Walker Crane Services	Hainault Trading Est, Motherwell Way, WT	Small waste oil burner

(***bold italics*** indicates it is an A2 process)

Table 17: Part B installations in Thurrock – Dry Cleaners

Reference number	Operator	Address	Solvent
DC1	Royal Express Dry Cleaners	10 Kings Parade, Stanford le Hope, Essex	perchloroethylene
DC2	Braiden Dry Cleaners	11 Calcutta Road, Tilbury Essex	perchloroethylene
DC3	Tip Top Dry Cleaners	55 Lampits Hill, Corringham, Essex	perchloroethylene
DC6	Jems Dry Cleaners	59 Lodge Lane, Grays, Essex	perchloroethylene
DC7	Jems Dry Cleaners	Sainsburys, Burghley Road, Chafford Hundred, Essex	perchloroethylene
DC8	Sangana International	25 High Street, Grays, Essex	Hydrocarbon
DC11	Classic Dry Cleaners	15-17 The Broadway, Grays, Essex	perchloroethylene
DC12	Corringham Dry Cleaners	18 Grover Walk, Corringham, Essex	perchloroethylene

Table 18: Part B installations no longer in operation (as of 2011)

Ref number	Operator	Address	Process/ activity undertaken
DC4	Paul's Dry Cleaners	8 Canterbury Parade, South Ockendon, Essex	Perchloroethylene
B195	Fairlight Vehicles Limited	Patricia Drive, Fobbing SS17 9HR	Small waste oil burner

Table 19: Inactive Part B installations

Ref number	Operator	Address	Process/ activity undertaken
B201	Industrial Chemicals Group Limited	Stoneness Road, WT RM20 3AG	Blend / pack / load / use of bulk cement

Appendix II

Figure 15: Map of Thurrock AQMA locations

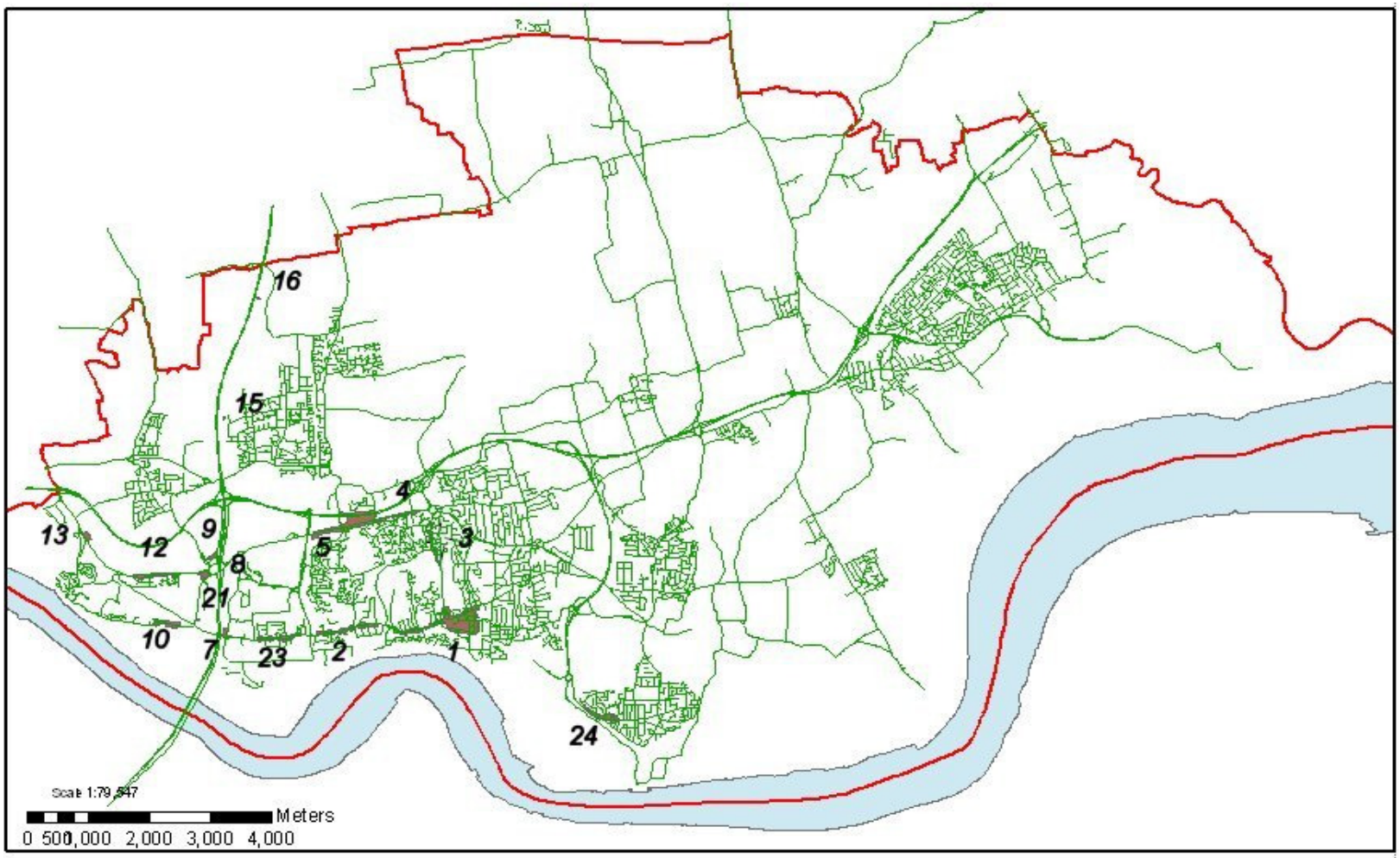

Table 20: Thurrock AQMA's

AQMA No.	Pollutant	Description of Air Quality Management Area
1	NO_2	Grays town centre and London Road Grays
2	NO_2	London Road South Stifford and adjoining roads
3	NO_2	East side of Hogg Lane and Elizabeth Road
4	NO_2	West of Chafford Hundred Visitor Centre
5	NO_2 and PM10	Warren Terrace, A13 and A1306
7	NO_2 and PM10	Hotels next to M25
8	NO_2 and PM10	Hotel next to Junction 31 of the M25
9	NO_2	Hotel next to Junction 31 of the M25
10	NO_2 and PM10	London Road Purfleet near to Jarrah Cottages
12	NO_2	Watts Wood estate next to A1306
13	NO_2	London Road Aveley next to A1306
15	NO_2	Near to M25 on edge of Irvine Gardens, South Ockendon
16	NO_2	Next to M25 off Dennis Road
21	NO_2	Hotel on Stonehouse Lane
23	NO_2	London Road, West Thurrock
(24)	(NO_2)	(Calcutta Road, Tilbury) (Declaring in 2012)

Appendix III

Volatile Correction Model: FDMS site locations used in the correction of data for Thurrock 1 and Thurrock 3 sites.

2008

FDMS 1: Bexley 7 (BX6) Thames Road North: *"Includes un-ratified data"*

FDMS 2: Tower Hamlets 4 (TH4) Blackwall *"Includes un-ratified data"*

FDMS 3: Chichester Roadside FDMS (CI3) *"Includes un-ratified data, Distant site >100 km"*

2007

FDMS 1: Tower Hamlets 4 (TH4) Blackwall *"Includes un-ratified data"*

FDMS 2: Ealing 2 (EA0) Acton Town Hall *"Includes un-ratified data"*

FDMS 3: Bexley 7 (BX6) Thames Road North *"Includes un-ratified data"*

2006

FDMS 1: Bexley 7 (BX6) Thames Road North

FDMS 2: Ealing 2 (EA0) Acton Town Hall

FDMS 3: Greenwich 13 (GN3) Plumstead High Street *"Data capture 77*

Appendix IV

12 Action Plan Progress Report

12.1 Introduction

The Council adopted the Thurrock Air Quality Action Plan in 2004 following full consultation with relevant stakeholders. The plan focused on measures to reduce traffic flow and vehicle emissions that are consistent with other Council wide policies, principally in relation to both transport and planning. The main aim was to reduce NO_X and PM_{10} emissions. Other actions include reducing emissions from buildings and industry, measures to raise public awareness of air pollution and greener travel. The Council through its Action Plan, and other policies, also supports other initiatives proposed and undertaken by other authorities to reduce emissions in Thurrock.

12.2 Achievement of objectives

The Council's Action Plan applies to the whole of the Borough, although the Air Quality Management Areas cover only parts of Thurrock. This recognises that, although not everyone in the Borough will be exposed to concentrations that exceed the air quality objectives, it is the intention of the Action Plan is to reduce pollution levels, wherever possible, in pursuit of the achievement of the objectives.

12.3 Summary of key measures

This section provides a brief summary of some of the key measures to be included in the Action Plan and also the Council's progress on these actions.

12.3.1 Monitoring air quality

The Council has maintained its commitment to monitoring air quality in the Borough and reporting to other bodies, including Defra since release of its plan. As reported earlier the Council monitors air quality using real-time monitoring static stations, as well as with nitrogen dioxide passive diffusion tubes which are located around the Borough. The Council is part of the London Air Quality and the AURN monitoring Networks. Current monitoring data and historic data for the sites can be viewed on the www.londonair.org.uk site, or from the newly created Essex Air website: www.essexair.org.uk/Default.aspx or the newly re-vamped Defra website: www.uk-air.defra.gov.uk/. The council has added additional continuous monitoring for NOx at the beginning of 2010 in Tilbury to assess air quality there.

12.3.2 Planning Policy and Control

The Council is using the planning system to bring air quality benefits, through imposing planning conditions and through using section 106 agreements for new developments.

12.3.3 Travel Plans in Thurrock

The Council's supports the provision for School Travel plans and Work travel plans. And has 100% uptake for schools.

12.3.4 Low Emission Zone

The Council in its Action Plan recognised that the London-wide Low Emission Zone (LEZ) could play an important part in determining air quality in the Borough. The Mayor of London has now introduced the LEZ, to cut harmful emissions from the most polluting Lorries, coaches and buses. It was launched in February 2008, with the aim of improving air quality across the capital. From February 2008 the LEZ applied to Lorries over 12 tonnes. Since the beginning of July 2008 the LEZ also applied to lighter Lorries, buses and coaches, and recently from 2011 further restrictions will apply to LGV's.

12.3.5 Thurrock actions

These are shown in Table 15.

Table 21 Air Quality Actions

No.	Action	Timescale	Progress with measure	Outcome to date	Progress in last 12 months	Comments
Traffic Engineering and Management Schemes						
	Three major road schemes: A) West Thurrock Marshes Relief road, B) Grays Town Centre regeneration, C) Hedley Avenue extension	(2004) Completed Or no further progress	Schemes A and B completed Scheme C has been cancelled			
1	The pollution team will ensure that it is consulted about future traffic management schemes so that the effect on air quality is considered. This will be through attendance of Local Transport Plan and Traffic Liaison meetings	On-going	Improved relations with transport	This is an ongoing action.		
2	The Council will liaise with the Highways Agency to ensure that air quality in the Borough is a consideration in the Environmental Impact Assessment for all relevant strategic road projects.	On-going	Improved relations with HA	Traffic data provided by both HA and DfT		
3	The pollution team will continue to liaise with the strategic transport team to ensure that air quality is an integral part of the local transport plan (LTP).	On-going	The 2006-2011 LTP was published in March 2006 with air quality included in section 4.	Improved liaison between departments		
4	The Council will work towards reducing traffic levels, using the strategies laid out in the Road Traffic Reduction Plan.	On-going	The Road Traffic Reduction Plan has been superseded as a result of Thames Gateway proposals.	Similar measures are incorporated into LTP		
5	The Council will continue to work towards a rail freight terminal in Thurrock.	On-going	A draft Sustainable Distribution Strategy for Freight was produced for Essex.	Thurrock participates in the Essex Freight Forum		
6	The Council will aim to reduce congestion by effectively enforcing parking measures as soon as it has the powers to do so.	Completed	The Council has designated controlled parking areas in Aveley, Chadwell, Corringham, Grays, Purfleet, South Ockendon, Stanford, Tilbury			These have made it safer for drivers and pedestrians, supported town centre needs, and increased Blue Badge benefits.
7	The Passenger Transport Unit will continue to promote sustainable modes of transport by implementing the Council's Local Transport Plan. Details of performance are contained in the Annual Progress Report.	On-going	An integrated system allowing elderly and disabled residents to easily get their free bus passes and library cards was introduced to improve and encourage usage			
8	The Council will continue to implement the cycle network across Thurrock.	On-going	The Thurrock Cycle Strategy was produced in 2007			Increased cycling provides health benefits to cycle users
9	The Council will continue to make walking an attractive option by providing street furniture and a public rights of way map. It will explore the possibility of working with local companies to improve local footpaths.	On-going	LTP introduced a Walking Strategy seeking to increase walking in the Borough			

No.	Action	Timescale	Progress with measure	Outcome to date	Progress in last 12 months	Comments
10	The Council will continue to implement Safer Routes to School as outlined in the Road Safety Plan. It will support schools that are preparing School Travel Plans.	On-going Completed	Every school in Thurrock now has a School Travel Plan.	Thurrock is the first local Authority nationwide to have achieved this.		
11	The pollution control team will continue to work with planning colleagues to ensure that air quality policy in the UDP is updated and relevant. It will continue to develop supplementary planning guidance for air quality assessments.	On-going	Air quality is incorporated into the Council's LTP and LDF		AQ Information relating to AQMA Trends and Projections for 2011-2016 for next LTP were Submitted in early 2011	
12	The Council will continue to take into account a development's impact on air quality when considering planning applications, and use conditions to mitigate these impacts where appropriate. It will also investigate the possibilities of using Section 106 agreements for air quality.	On-going	The Council is using the planning system to bring air quality benefits, through imposing planning conditions and through using section 106 agreements for new developments		*No section 106 agreements were required in 2011 for AQ*	
13	We will work with the new Urban Development Corporation to ensure that air quality is considered as a priority in the regeneration of Thurrock	On-going	The Council is working with the TTGDC to bring air quality benefits, through recommending planning conditions and through using section 106 agreements for new developments			*The TTGDC is to be subsumed back Into Thurrock Council for 2011 Onwards. But will function Independently, the Council will Continue to liaise on AQ issues.*
14	The Council will continue to promote the Green Grids initiative, to provide non-car access to the countryside	On-going	A new Thurrock Green Infrastructure Framework Plan was prepared in 2007			
15	The Council will assist local businesses in drawing up Green Travel Plans. It will ensure that they are implemented.	On-going	S.106 agreements have been agreed for new developments			
Actions to reduce road vehicle emissions						
16	The Council will publicise the availability of grants for cleaner vehicles to individuals and businesses.	Grants ended March 2005	No grants are available	No plans to reinstate promotion at present		
17	The Council will look at the results of the London-wide LEZ feasibility study. It will make sure the implications For air quality in Thurrock are considered and will make representations as appropriate	2008	The London LEZ was introduced in February 2008.	The LEZ applied to lorries over 12 tonnes initially and from July 2008 it also applies to lighter lorries, buses and coaches.		
18	The Council will continue to lead by example and reduce the emissions from its own fleet of vehicles.	On-going	The fleet contract is currently being tendered and the council is to trial electric vehicles.	Further information on the outcome of the tender process end 2007.		No further progress made
19	The Council will encourage the take-up of alternatively fuelled lease car vehicles by providing information to employees.	Grants ended March 2005	Lease car scheme ended April 2006	This scheme intended use grants		

No.	Action	Timescale	Progress with measure	Outcome to date	Progress in last 12 months	Comments
20	The Council will continue to work towards a Green Travel Plan for its employees.	On-going	A draft was approved but not taken forward			*No further progress made*
21	The Council will continue to use procurement strategies to buy goods and services from providers who show a commitment to the environment.	On-going	Included in conditions of contract where appropriate			
22	The Council will continue to work with businesses. It will provide information on best practise, including using cleaner fuel technologies.	On-going	This is provided on request through information packs			
23	The Council will continue to test emissions on a voluntary basis. It will explore the possibility of using the Vehicle Inspectorate for issuing Fixed Penalty Notices.	On-going	Testing undertaken on 150 cars as part of initiatives such Green Transport Week.			No further progress made
24	The Licensing team will continue to work with the Vehicle Inspectorate to test the emissions of taxis in Thurrock.	On-going				
Actions to reduce emissions from non-road sources						
25	The Council will continue to inspect all of its permitted processes to ensure compliance. Permits will be updated as and when appropriate so that operation conditions are up to date.	On-going	Visits to all relevant industrial installations are undertaken based on risk assessments on a regular basis	Annual returns are sent to Defra		All Processes were inspected on time In 2011
26	The Council will continue to use planning conditions to control dust emissions. The Council will continue to take action to abate nuisance from fugitive dust emissions	On-going	New London-wide guidance has been used with all relevant construction projects in Thurrock.			
27	The Council will continue to work to improve energy efficiency in the Borough. Details of this improvement can be found within the Council's annual HECA (Home Energy Conservation Act) report.	On-going	The Council supports the Thurrock Energy Partnership			
28	The Council will continue to enforce the Clean Air Act 1993 and encourage local businesses to dispose of waste in a responsible manner, so as to prevent dark smoke bonfires.	On - going	This is undertaken as part of the Council's regulatory actions			
29	The Council will continue to educate residents and businesses to use smokeless fuel or an approved appliance for smokeless combustion.	On-going	Thurrock has several Smoke Control Areas		The Council has had many Enquiries on this in 2011, advice is issued.	Advice is issued to residents & Businesses, info is found on www.http://smokecontrol.defra..gov.uk
30	The Council will continue to promote alternatives to domestic bonfires. We will encourage residents to recycle or compost as much waste as possible or dispose of it responsibly at a civic amenity site.	On-going	The Council offers advice and publicises its enforcement policy to try to avoid nuisance	The Council implements fortnightly green waste collection and promotes disposal at civic amenity site to discourage domestic bonfires		
31	The Council will investigate the feasibility of pursuing Environmental Management Systems in other departments. It will also work to disseminate EMS to local businesses and other parts of the public sector.	On-going	The Council retained its ISO 14001 certification in 3 departments in 2005			
32	Air quality will remain an integral part of the Community Strategy.	On-going	The Sustainable Community Strategy for Thurrock was launched in 2007			

No.	Action	Timescale	Progress with measure	Outcome to date	Progress in last 12 months	Comments
33	Achievement of Air Quality Objectives will continue to be included in the Local Health Plan	On-going	Details are forwarded annually			
Public awareness raising and education						
34	The Council will continue to explore and implement the best ways of working together with schools to improve awareness of air quality issues in Thurrock.	On-going	Information provided on Council website and on request			
35	The Council will continue to promote air quality issues at public awareness events.	On-going	Ensuring Air Quality issues are highlighted at public events.		The Council updated information on its air quality website in 2011 The Council along with other Essex LA's launched a new web-Site in Jan 2011 called EssexAir	New EssexAir website provides the Latest AQ info, as well as learning Tools and games to educate people Of AQ issues

12.4 AQMA prioritisation for action under the LTP

In September 2009 Thurrock's AQMA's were prioritised in order of importance to assign air quality measures to best counteract poor air quality from transport related sources of air pollution. By prioritising each AQMA in terms of importance for air quality actions, this would increase the focus and spending of money in certain AQMA's which have more air quality issues.

A few of the AQMA's were excluded from prioritisation, due to them either having sources attributable from Highways Agency controlled roads, i.e. AQMA's 15 & 16 those along the (M25) motorway, and secondly that some AQMA's may not represent relevant exposure as they are Hotels, this was confirmed with the UWE Review and Assessment Helpdesk, those excluded from the prioritisation in the LTP were AQMA's 7, 8, 9 & 21. However, these Hotels may be in exceedence with regards to the 1-hour NO_2 objective, the council intends early in 2012 to carry out further detailed modelling for NO_2 and PM_{10} over the entire borough to reassess all its AQMA's and these four AQMA's in particular to see if they do represent public exposure in relation to the 1-hour NO_2 objective, if they do not then the Council will revoke these AQMA's.

The prioritisation was determined using a points based system with 1 scoring the lowest and 5 scoring the highest using four criteria, which each score would be multiplied by in order to get an overall score the higher the number the higher the priority, overall scores ranged from 1 to 625.

The four criteria for scoring are listed below:-

Table 22 The four criteria for AQMA prioritisation and assignment of scoring

Score	(1) In Health Deprived Area	(2) Receptor Placement: Metres from NO_2 measurement	(3) 2010 Estimated NO_2 concentration ($\mu g\ m^{-3}$)	(4) Source Apportionment: % Road Transport Contribution
1	No	Roadside: <30m	>40.0	>24.3%
2	Not Applicable	Roadside: 20m-30m	40.1-43.5	24.4%-39.2%
3	Not Applicable	Roadside: 10m-20m	43.6-47.0	39.3%-54.0%
4	Not Applicable	Roadside: >10m	47.1-50.5	54.1%-68.9%
5	Yes	At receptor facade	50.6-54.0	69.0%-83.7%

Table 23 Each AQMA individual and overall scoring under the four criteria

AQMA	In Health Deprived Area	NO2 Measurement Location: Metres from receptor	Highest 2010 Estimated NO2 Concentration ($\mu g\ m^{-3}$)	Source Contributions: % Road Transport	Score Total	Priority #
1	5	4	1	1	**20**	**8**
2	1	4	3	2	**24**	**7**
3	1	3	4	4	**48**	**5**
4	1	2	5	5	**50**	**3**
5	1	2	5	5	**50**	**3**
10	1	4	3	5	**60**	**2**
12	1	1	2	3	**6**	**9**
13	1	4	5	5	**100**	**1**
23	1	4	2	4	**32**	**6**

Table 24 AQMA prioritisation ranking

Prioritisation Rank	AQMA
1	13
2	10
3	4
3	5
5	3
6	23
7	2

8	1
9	12

AQMA 13 was identified as being the most important for air quality improvement measures, the measures suggested for improving air quality with timescales were (*note this timescale has fallen slightly behind schedule)*:-

2010/2011:

- Pollution barrier (AQMA 13) **(This option is now being seriously considered by Strategic Transport. Funding is available for implementing this scheme)**
- D-NOx paint trials (AQMA 10 & 13) **(This option is now being seriously considered by Strategic Transport. Funding is available for implementing this scheme)**
- Urban Traffic Management and Control (AQMA 3, 4, 5 & 13)
- Low Emissions Zone – Feasibility work
- Eco Driver Training for HGV's (focus is on AQMA 10) **(This option is now being seriously considered by Strategic Transport)**

2011/2012

- Road System Design Review (AQMA's 2 & 23)
- Retrofit Pollution Reduction Equipment for HGV's
- Low Emissions Zone – Further Feasibility work
- Lakeside Travelling Planning (AQMA 4 & 5)

2012/2013

- Workplace Travel Planning (AQMA 2, 3 & 23)
- Road System Re-Design (AQMA 2 & 23)
- Low Emissions Zone – Design
- Retrofit Pollution Reduction Equipment for HGV's

2013/2014

- Road System Re-design implementation (AQMA 2 & 23)
- Low Emission Zone – Design and/or implementation

It is hoped that these measures will bring about some improvement to air quality locally within the AQMA's, but real overall improvement will result from a national level by improving background concentrations for NO_2 based on better vehicle abatement technology and engine design efficiency for new motor vehicles which will gradually phase out older more polluting vehicles as time goes on.

12.5 Air Quality Action Plan Update for 2012

Highway Improvements

Are progressing a road improvement scheme as a result of the South Stifford Study which proposes to lift the weight restriction on Devonshire Rd. This will allow approx 900 daily HGV movements to utilise Devonshire Rd thereby significantly reducing the HGV movements on London Rd. This is expected to have a significant benefit in terms of air quality upon AQMA 1, 2 and 23. Democratic approval to progress this scheme is to be provided in November. This measure is not currently implemented but should come into effect over 2012, monitoring using a NO_2 diffusion tube will be carried out along Devonshire Rd as there are residential properties along this road the increase HGV's along this road may increase the levels of NO_2.

Highway Capacity Improvements

The Thameside junction scheme will deliver highway capacity improvements that will impact upon AQMA 1. Proposals will see traffic flows improve at this location, reducing congestion and queuing traffic. These improvements are programmed for delivery within this financial year (RP to chase JD for an update). Not yet implemented.

Workplace Travel Plans

Workplace Travel Plans continue to be implemented across the borough. These plans have been progressed to deliver a modal shift in transport patterns in order to encourage increased walking cycling, car share and use of public transport. Working in partnership with Lakeside will continue to develop in order to encourage and enable alternative modes of travel.

Air Quality & Climate Change
AQMA 13 - The 2011/12 LTP works programme identifies the provision of a pollution barrier and improved signal phasing to improve AQ at this location. Assessment data is awaited and will inform how this scheme is to be progressed within this financial year. Investigative work is being conducted with regards to trialling the use of De-NOx titanium oxide (TiO_2) paint. The council will be considering whether such a scheme is feasible and whether it will be cost effective. The Council has contacted a company who can provide the special paint coatings. This company has also been used in the past by Camden Council who did a study on the effectiveness TiO_2 coatings in one of their AQMA's.

AQMA 10 - The 2011/12 LTP works programme identifies the delivery / progression of eco-driver training and vehicle retro-fitting for companies and hauliers who have a direct impact upon HGV use in this location. These interventions are to be progressed this year with support from the Council's LSTF bid. Information has been obtained for the implementation of this scheme from a company called ECOSTAR's, the council will try to encourage adoption of this scheme by the local freight companies.

Jarrah Cottages
The Council's Highways Development Control Department are in talks with Cobelfret Freight Company regarding a potential scheme that will remove queuing traffic from London Rd, Purfleet, which could provide a major benefit for air quality to AQMA 10. However, there is no timescale for this work and as yet no application (which would trigger the possibility of this new scheme) has been submitted.

Bus Patronage
Thurrock-based bus journeys have increased to 4.2m following infrastructure and service improvements. Promotional campaigns have also raised awareness of the benefits of bus travel.
Rail Patronage
Thurrock-based rail journeys have increased to 4.2m following infrastructure and service improvements. Promotional campaigns have also raised awareness of the benefits of rail travel.
Cycling data
Cycle trips have increased by 65% since 2006 as a result of network improvements, improved promotion and cycling education at local schools.

Local Sustainable Transport Fund (LSTF)
Thurrock has been successful in its bid for LSTF funding which will enable increased resources to be used to deliver a package of measures. Our LSTF package is focused on enabling a modal shift away from single occupancy car use towards sustainable transport such as walking, cycling and public transport. The dominant element of the package is the delivery of Smarter Choices measures, including workplace travel planning, school travel planning, station travel planning, personalised journey planning, liftsharing, as well as marketing and promotional activities. These measures will be complemented by targeted improvements in sustainable transport infrastructure for walking, cycling and public transport. Furthermore, the council will develop a Freight Quality Partnership and associated measures to improve the economic and environmental performance of local industry in this authority area. The FQP is likely to be the starting point for working with freight partners to deliver eco-driver training and vehicle retro fitting.
The LSTF provides the council with an opportunity to deliver revenue based interventions in a more focused and productive way. Measures such as travel planning, eco-driver training and vehicle retro fitting will receive a focused, expert resource as a result of the LSTF funds. LSTF measures are to be implemented from Aug 2011 over the 4-year LSTF period.

Freight Quality Partnership
The Freight Quality partnership in Thurrock will be focused on those freight corridors with the highest volumes of freight movements, including Purfleet, Tilbury Port and the new London Gateway Port, as well as where freight transport emissions have led to the declaration of an Air Quality Management Area. We will also encourage freight operators to purchase and retrofit pollution abatement equipment to individual freight vehicles through the Freight Quality Partnership. This will help to ensure compliance with the London Low Emission Zone and also work to have immediate effect on reducing both air pollution and greenhouse gas emissions from these vehicles throughout Thurrock.

Also for Action (No 35) the council has continued to promote air quality and awareness for the public.

Firstly information was updated on the Council's air quality website in relation to Air Quality which provides information on Health, Pollution and also information on Air Quality monitoring within the borough. Updated annually.

Secondly the Council along with other local Authorities launched a new Air Quality website called "EssexAir" which provides information on Air Quality, Health, Pollutants and local monitoring networks diffusion tube data as well as learning tools and games for the public to engage and learn about air quality in general. Updated annually.

Thirdly in July 2010. The Council organised an awareness Event at Davy Down on Sustainable Modes of Transport, to which Air Quality information was provided to the Public through advice and from leaflets. No new awareness events since 2010.