2013 Air Quality Progress Report for Thurrock Council

In fulfillment of Part IV of the
Environment Act 1995
Local Air Quality Management

December 2013

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Executive Summary

This is the Air Quality and Action Plan Progress Report 2013 for Thurrock Council. This report is the latest report produced by the Council to fulfil this part of the continuing commitment to the Local Air Quality Management (LAQM) process. This Report provides the most recent annual update of recent air quality issues in Thurrock, based on its air quality monitoring results in the Borough, as well as a focus on the Council's progress on reducing air pollution through its Air Quality Action Plan.

The Council's previous Review and Assessments of air quality confirmed that there were locations across the Borough with relevant public exposure where the Government's air quality objectives might be exceeded.

The Council's monitoring results for sulphur dioxide indicate that the objectives for this pollutant are not being exceeded. However the more up to date monitoring of nitrogen dioxide and PM_{10} in this report confirms that the Government's air quality objectives are still being exceeded widely at locations with relevant public exposure. The Council will therefore maintain its Air Quality Management Areas (AQMAs) for these two pollutants.

The report also includes a section on the Council's ozone monitoring. The monitored results for this pollutant confirm that the ozone objective was not exceeded in 2012, 2010 or 2009, but for all other previous years it was exceeded in the Borough. The rolling annual mean over the period of 15 years of monitoring has shown a slight increasing trend, however this has levelled off in recent years.

The purpose of the Council's Air Quality Action Plan is to ensure that air quality is considered corporately and to seek to reduce air pollution within the Borough, in pursuit of the Government's air quality objectives. The Council is however limited in its abilities to influence local air quality, firstly as a result of pollution arising elsewhere in London (and beyond) and secondly because it has limited responsibility for the main sources of emissions within the Borough. The major roads in the Borough are the responsibility of the Highways Agency. The action plan however includes measures to seek to reduce traffic flow and emissions that are consistent with other Council policies. These measures are now more focused on individual Air Quality Management Areas (AQMA's) rather than generalised measures as shown in previous reports. Further details are found in (Appendix 3) of this report for measures currently proposed or are currently enforced to tackle poor air quality in Thurrock's AQMA's.

The Council based on the findings of this report will submit a Further Assessment based on the annual mean objective for NO_2 for Tilbury, to determine the extent and size of an AQMA which will be needed based on detailed dispersion modelling of the area.

Council will undertake a Detailed Assessment for NO_2 based on exceedence of the annual mean limit for NO_2 at two new Locations, the first of which is located along the Purfleet By-Pass in Purfleet, and the second being the main High Street along Aveley and Aveley Ship Lane, as there is relevant public exposure in these two locations. Based on the findings the Council will determine if an AQMA is required. It is hoped these Detailed Assessments will be completed by the end of 2014

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1 Introduction

1.1 Description of Local Authority Area

Thurrock is located along the mouth of the River Thames just outside of the Greater London Authority. Along the River Front within Purfleet & West Thurrock & Tilbury are predominantly industrial combined with Docks at Purfleet & Tilbury. Further up the Thames at Coryton is the new DP World Logistic Port Development. The north of the Authority is predominantly rural while the south is mainly urban with centres such as Grays, Tilbury, Purfleet, Corringham, Stanford-le-Hope, Aveley & South Ockendon.

The main sources of air pollution come from the main roads running through Thurrock, such as the M25, A13, A1013, A1089. Thurrock Council currently has 15 Air Quality Management Areas (AQMA's) all of which are transport related.

Potential Trans-boundary pollution effects Thurrock due to its close proximity to London, and power stations located nearby i.e. Kingsnorth, Littlebrook & Grain & the Thames estuary with shipping. Other pollution sources, including commercial, industrial and domestic sources, also make a contribution to background pollution concentrations.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1. This table shows the objectives in units of microgram's per cubic metre μg/m^3 (milligram's per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg/m^3	Running annual mean	31.12.2003
	5.00 μg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 μg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 μg/m^3	Annual mean	31.12.2004
	0.25 μg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 μg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 μg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 μg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 μg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 μg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 μg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Since December 1997 local authorities in the UK have been carrying out a review and assessment of air quality in their area, as they are required to do under Part IV of the Environment Act 1995. The review and assessment involves measuring air pollution and trying to predict how it will change in the next few years.

The aim is to ensure that the concentrations of seven key pollutants are below a particular level by a specific date. Where these objectives are unlikely to be met, the Local Authority is obliged to declare an Air Quality Management Area (AQMA), and prepare an Action Plan detailing how it intends to improve air quality for the health of residents in these areas.

In 1997 to 2000 the council undertook its first round of Review & Assessment for Air Quality. The reports identified that there were large areas along busy roads within Thurrock that were in breach of the air quality standards for NO_2 & PM_{10}.

In April 2001 Thurrock Council declared twenty AQMAs, for nitrogen dioxide and particulates (PM_{10}).

This was subsequently revised in the following the Stage 4 Review and Assessment resulting in seven being revoked and two new AQMAs totalling 15 AQMAs. All pollution problems are related to emissions from traffic, with Heavy Goods Vehicles being the major contributors in most areas. Subsequently, a Draft Air Quality Action Plan was published in summer 2002 and a final full action plan was published in 2004.

In 2004 a Detailed Assessment was carried on the council's twenty AQMAs following newly modelled exceedence lines for NO_2 and PM10 during the Stage 4 R&A, because of this the Council decided to revoke seven of its AQMAs (numbers 6, 11,14,17,18,19 and 20) and decided to designate two new AQMAs (numbers 21 and 23) based on new modelling carried out in the 2004 Detailed Assessment, leaving the Council with fifteen AQMAs. Subsequently following this a new Air Quality Action Plan was published in late 2004.

In 2005 the council published it annual Progress Report. The monitoring results still showed exceedences of the Air Quality Standards within its AQMA's but no new areas were indentified.

A Detailed Assessment of SO_2 was published in July 2005, in order to assess the extent of exceedence of the 15-minute mean objective for SO2 away from Coryton based on modelling and monitoring data. The report found that the objectives were not exceeded at Thurrock 3, but it concluded by continuing to investigate potential for public exposure in areas where the SO_2 15-minute objective was predicted to exceed.

In 2006 the council published its Third round Updating Screening Assessment (USA), published in June 2006, no additional areas were identified as having problems, with the exception of sulphur dioxide (SO_2) with regards to relevant public exposure around Coryton. The report concluded that the a Further Assessment was to be undertaken with regards to the newly declared AQMAs in 2005 for nitrogen dioxide (NO_2) and for SO_2 for the Coryton Refinery.

In 2007 a Progress Report was published, the report did not identify any new significant issues with the air quality standards still being breached within its AQMA's.

Following the 2006 USA report, a further assessment for NO_2 was published in April 2007. Further more detailed modelling was carried out for newly declared AQMAs 21 and 23 and various scenarios were tested in order to ascertain what would be required in order to meet the annual mean air quality objective for NO_2. The Report concluded that both AQMA 21 and 23 should be retained and monitoring should continue.

As part of the continuing assessment process for air quality a further Progress Report was published in 2008. The report identified a new exceedence of the annual mean objective for NO_2 in Calcutta Road, Tilbury, based on diffusion tube measurements.

In April 2009 the Council produced its fourth round Updating Screening assessment report. The report included the latest monitoring data for the Thurrock monitoring stations. It also included an update on the Calcutta Road NO_2 exceedence, by means of a Design Manual for Roads and Bridges (DMRB) Screening Tool, it indicated that there was not an exceedence of the NO_2 annual mean objective, based on the use of updated traffic survey data conducted in February 2009. However further analysis was needed and proposed to publish a Detailed Assessment. The report also notes the council's intention to carry out a Further Assessment for SO_2 around the Coryton Refinery, to carry out new detailed modelling in order to determine the extent of exceedence of the 15-minute SO_2 objective.

In April 2010 Thurrock Council produced its Air Quality Progress Report (2010). It reviewed all the Council's air quality monitoring data up to the end of 2010. The report indicated that nitrogen dioxide (NO_2) and particulate matter (PM10) are still widely being exceeded across the borough. The report also outlined the latest Air Quality Actions for tackling poor air quality and shows the prioritisation of these measures for the Council's Air Quality Management Areas (AQMA's).

The Council produced in April 2011 another Air Quality Progress Report (2011). The report included up to date monitoring data from the Council's air quality monitoring locations. They showed that nitrogen dioxide (NO_2) and particulate matter (PM10) are still widely being exceeded across the borough. The report also showed that NO_2 concentrations at the Tilbury (Thurrock 4), Calcutta Road automatic monitoring station were above the air quality objective for 2010.

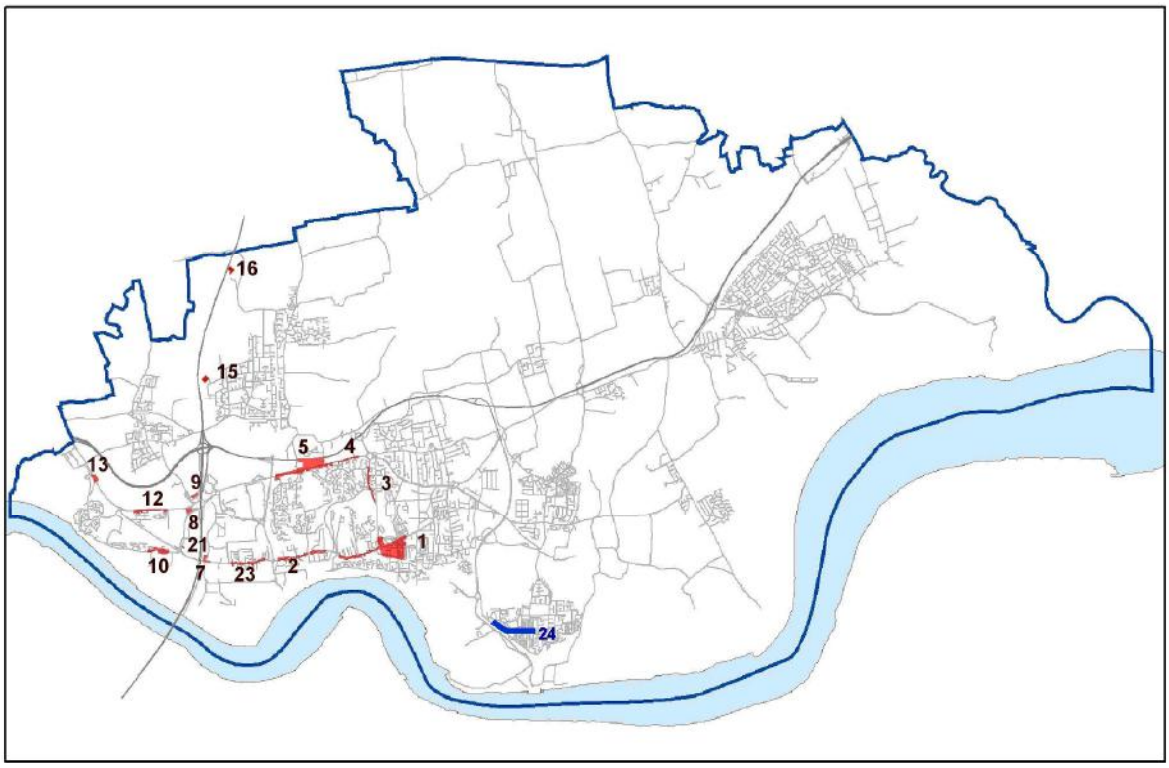
In 2011 the Council investigated in more detail the annual mean exceedence for NO_2 along Calcutta Road and Dock Road Tilbury. Continuous monitoring data and diffusion tube monitoring for 2010 confirmed that there was an exceedence. The report concluded that an AQMA should be declared for the annual mean NO_2 along Calcutta Road and Dock Road.

In 2012 the fifth round of review & Assessment was carried out with the publication of the 2012 USA report. The report concluded that monitoring should continue along the Purfleet Bypass to see for certain is the annual mean air quality standard (AQS) for NO_2 is in breach. It also concluded that a Further Assessment for NO_2 for Tilbury was to be undertaken with detailed modelling to see the full extent of exceedence and then declare an AQMA based on the verified modelled results. The Council was to give a time extension to the Coryton Oil Refinery from declaring a new AQMA for SO_2 based on the new Sulphur Tail Gas Unit at the Coryton Refinery being installed at the Refinery which would make the SO_2 issue go away. If it did not demonstrate compliance then it would declare an AQMA.

Table 2 Summary of existing Thurrock AQMAs

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	Tilbury Calcutta Road & Dock Road (to be declared this year)

Figure 1 Map of AQMAs in Thurrock



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

In 2012 the Council undertook air quality monitoring for a wide range of pollutants including, nitrogen dioxide (NO_2), particulate matter (PM_{10} & $PM_{2.5}$), ozone (O_3) and sulphur dioxide (SO_2), at four automatic monitoring stations, all of which are listed in (Table 3). The council also undertakes passive diffusion tube monitoring for nitrogen dioxide (NO_2) at a wide variety of locations at either the kerbside, roadside or background localities, all of which are listed in (Table 3).

2.1.1 Automatic Monitoring Sites

Table 3 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
TK1	Thurrock Grays AURN	Urban Background	561066	177894	3.5	PM_{10} NO_2 SO_2 O_3	No	FDMS Chemiluminescent Fluorescent Photometry	No	38	No
TK8 & Formerly (TK2)	Purfleet,London Road	Roadside	556701 (556737)	177937 (177928)	1.5	PM_{10} NO_2	Yes	BAM Chemiluminescent	No	2.6	Yes
TK3	Stanford-le-Hope, Manorway	Roadside	569358	182736	2.75	PM_{10} $PM_{2.5}$ NO_2 SO_2	No	FDMS FDMS Chemiluminescent Fluorescent	No	3	No
TK4	Tilbury, Calcutta Road	Roadside	563900	176282	1.5	NO_2	To be Declared	Chemiluminescent	Yes (2m)	5.5	No

2.1.2 Non-Automatic Monitoring Sites

Map(s) of Non-Automatic Monitoring Sites (if applicable)

Figure 2 NO_2 Diffusion Tube locations with site designations in Thurrock

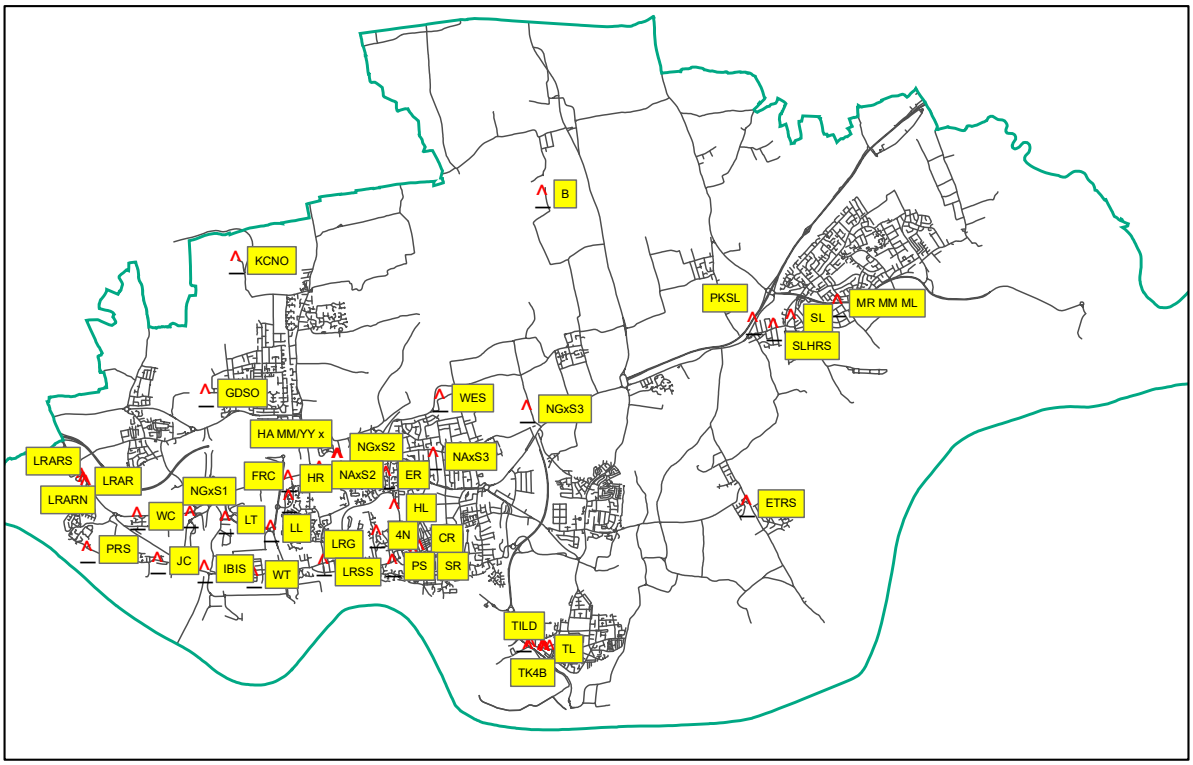


Figure 3 NO_2 Diffusion Tube locations and site designations in Tilbury

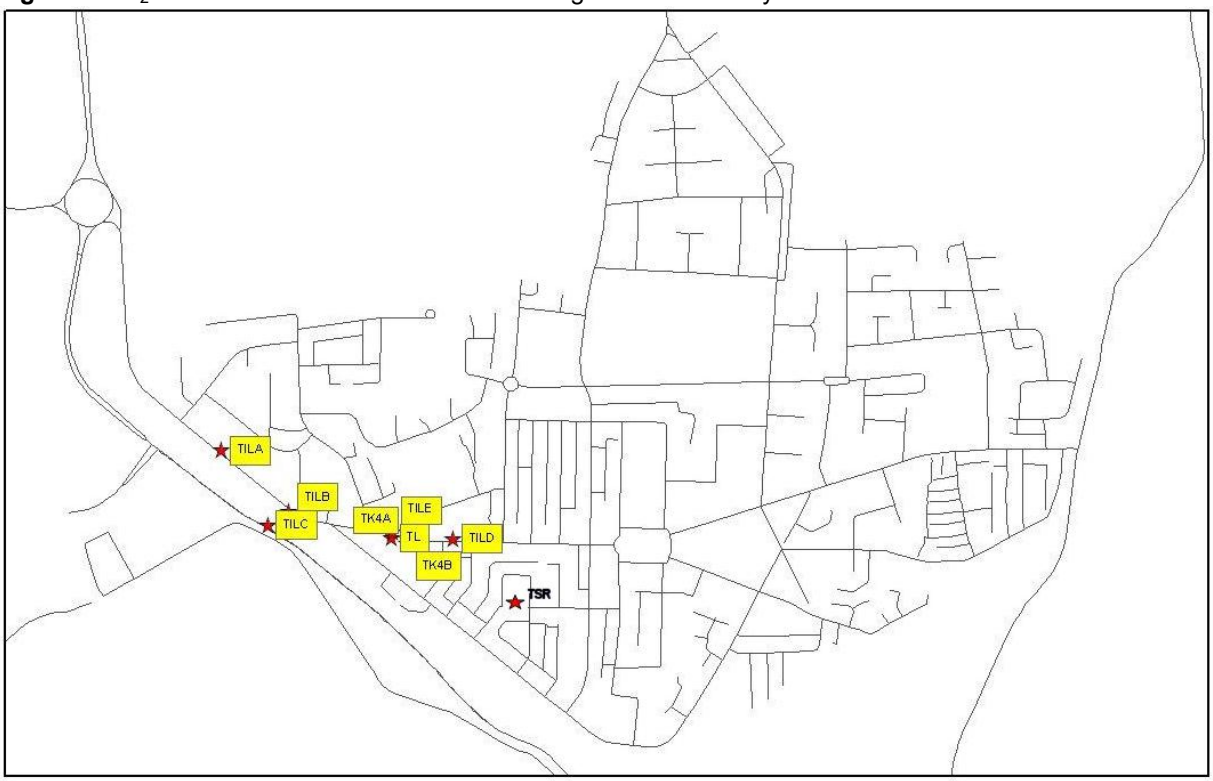


Figure 4 NO_2 Diffusion Tube locations and site designations in Purfleet, West Thurrock, Aveley, South Ockendon and Grays

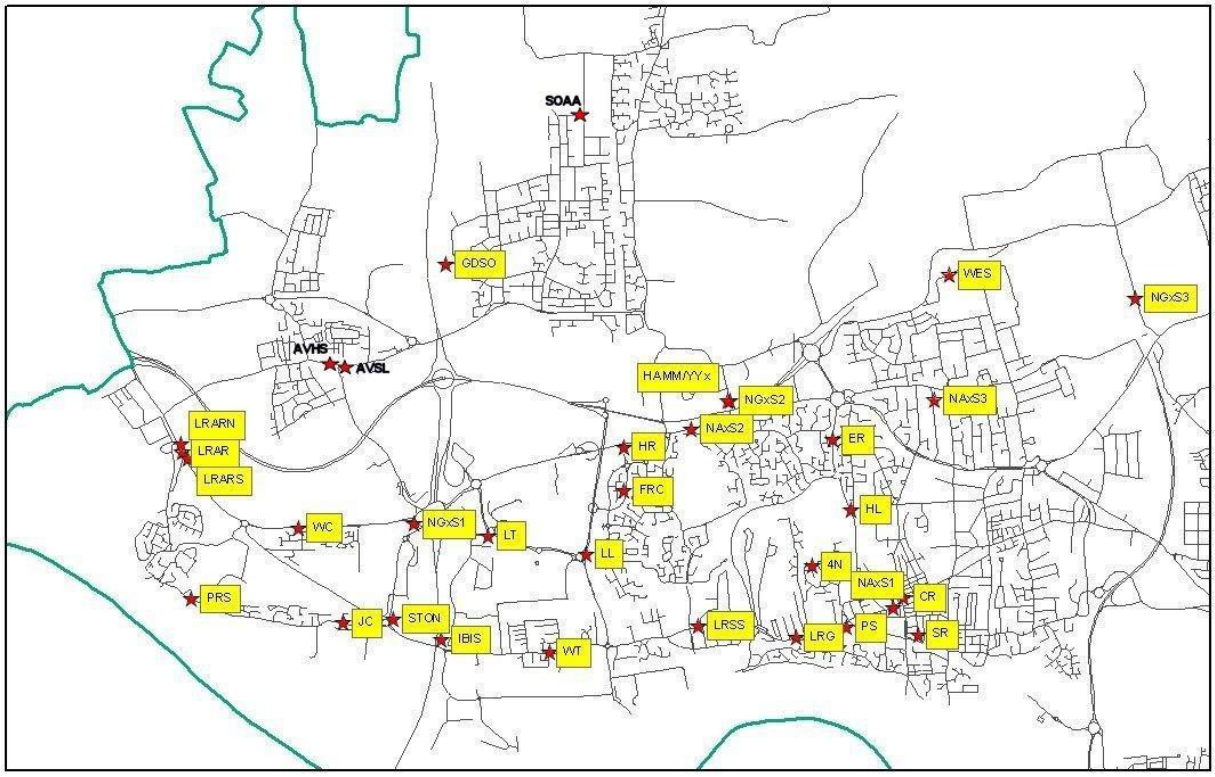


Table 4 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
LRAR	London Road Arterial Road (R)	R	555301	179438	1.5	NO_2	13	N	N	0.5	N
PRS	Purfleet Rail Station (R)	R	555389	178145	2	NO_2	No	N	N	1.5	N
WC	Watts Crescent (R)	R	556314	178765	2	NO_2	12	N	N	2	N
JC	Jarrah Cottages (R)	R	556701	177937	1.5	NO_2	10	Y (TK8)	N	2.6	N
STON	Stonehouse Lane (R)	R	557132	177970	1.5	NO_2	21	N	N	30	N
IBIS	Ibis Hotel (UB)	UB	557570	177789	2	NO_2	7	N	N	52	N
GDSO	Gatehope Drive (UB)	UB	557595	181060	1.25	NO_2	15	N	Y (23m)	105	Y
LT	Lakeside Tesco Roundabout (R)	R	557981	178700	2	NO_2	No	N	N	1	N
KCNO	Kemps Cottage (UB)	UB	558148	183532	2	NO_2	16	N	Y (10m)	57	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
WT	London Road W Thurrock (R)	R	558483	177678	1.5	NO_2	23	N	N	4	N
HR	Howard Road (R)	R	559118	179462	1.5	NO_2	5	N	Y (0m)	29	Y
NAS2	A1306 (R)	R	559720	179630	2	NO_2	5	N	N	4.5	N
LRSS	London Road South Stifford (R)	R	559785	177910	2	NO_2	2	N	N	3.5	N
LRG	London Road Grays (R)	R	560624	177811	2	NO_2	1	N	N	2.5	N
NAS4	Wingfield Grays (UB)	UB	560772	178434	1.5	NO_2	No	N	Y	N/A	N
ER	Elizabeth Road (R)	R	560954	179535	2	NO_2	3	N	N	0.5	N
PS	Poison Store AURN Site (UB)	UB	561066	177894	3.5	NO_2	1	Y (TK1)	N	38	N
HL	Hogg Lane (R)	R	561108	178922	2	NO_2	3	N	N	1.2	N
NAS1	Queensgate Centre Grays (R)	R	561469	178063	2	NO_2	1	N	Y (0m)	5	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CR	Cromwell Road Grays (I)	I	561572	178154	2	NO_2	1	N	N	0.5	N
SRG	Stanley Road Grays (R)	R	561685	177833	2	NO_2	1	N	Y (2.5m)	5	N
NAS3	Chestnut Avenue Grays (UB)	UB	561830	179878	1.5	NO_2	No	N	Y	N/A	N
WES	William Edwards School (R)	R	561958	180967	2	NO_2	No	N	N	N/A	N
B	Bulphan (RB)	RB	563855	184772	2	NO_2	No	N	N	N/A	N
TL	Calcutta Road Tilbury (R)	R	563867	176293	2	NO_2	No	N	N	0.5	N
PKSL	Park Road (R)	R	567781	182400	2	NO_2	No	N	Y (24m)	9	N
SL	Stanford Library (UB)	UB	568501	182459	2	NO_2	No	N	N	N/A	N
M	Manorway Monitoring Station	R	569357	182737	2.75	NO_2	No	Y (TK3)	N	3	N
FRC	Francisco Close (Chafford Hundred) (I)	I	559136	179084	2	NO_2	No	N	Y (10m)	17	N

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
SLHRS	Stanford-le-Hope Railway Station (R)	R	568162	182296	2	NO_2	No	N	N	4.5	N
ETRS	East Tilbury Rail Station (R)	R	567655	179003	1.5	NO_2	No	N	Y	2.5	N
TILA	Dock Road (Tilbury) (R)	R	563498	176483	2	NO_2	{ 24 }	N	N	2.5	N
TILB	Broadway Intersection (Tilbury) (R)	R	563645	176348	2	NO_2	{ 24 }	N	N	2.5	N
TILC	St Andrews Road (Tilbury) (R)	R	563600	176321	1.5	NO_2	No	N	N	2.5	N
TILD	Calcutta Road East (Tilbury) (R)	R	563995	176291	2	NO_2	{ 24 }	N	N	0.5	N
TILE	Calcutta Road North (Tilbury) (R)	R	563870	176305	2	NO_2	{ 24 }	N	N	2	N
TK4 (A&B)	Thurrock 4 (co-located duplicated site)	R	563900	176282	1.5	NO_2	{ 24 }	Y (TK4)	Y	5.5	Y
PBP	Purfleet By-pass (R)	R	556257	178438	1.5	NO_2	No	N	Y (5.5m)	9.5	Y
LYD	Lydden (UB)	UB	560057	179873	2	NO_2	4	N	Y (26m)	18	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
AVSL	Aveley Ship Lane (R)	R	556713	180167	2	NO_2	No	N	Y (1m)	2	Y
AVHS	Aveley High Street (R)	R	556661	180180	2	NO_2	No	N	N	0.75	N
SOAA	South Ockendon Arisdale Avenue (R)	R	558785	182323	2	NO_2	No	N	Y (6 m)	7	Y
TSR	Tilbury Sydney Road (UB)	UB	564122	176152	2	NO_2	No	N	N	N/A	N
DR	Devonshire Road (R)	R	560279	178944	1.5	NO_2	No	N	Y (10.5m)	6	Y
LRARN	London Road Art Road (North) (R)	R	555286	179501	2	NO_2	13	N	Y (0.5m)	19.5	Y
LRARS	London Road Art Road (South) (R)	R	555357	179362	1	NO_2	13	N	Y (40m)	15	Y
LRARMN	London Road Art Road (Mid-North) (R)	R	555299	179453	2	NO_2	13	N	N	8	N
LRARMS	London Road Art Road (Mid-South) (R)	R	555329	179397	2	NO_2	13	N	N	7	N

2.2 Comparison of Monitoring Results with Air Quality Objectives

Nitrogen Dioxide (NO_2)

Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Table 5 Annual mean NO_2 concentrations in Thurrock (2006 – 2012 inclusive)(µg m^{-3})

LAQN site	Type	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	U	32.57	*33.83*	31.78	30.98	*29.2*	*28.17*	28.69
Thurrock 2	R	**74.31**	**68.44**	***64.87***				
Thurrock 3	R	34.96	36.59	35.1	34.34	37.93	33.92	31.15
Thurrock 4	R					**40.2**	38.56	38.92
Thurrock 8	R			***56.5***	**60.67**	**68.29**	**62.27**	***60.86***
Thurrock 2 & 8	R			**58.34**				

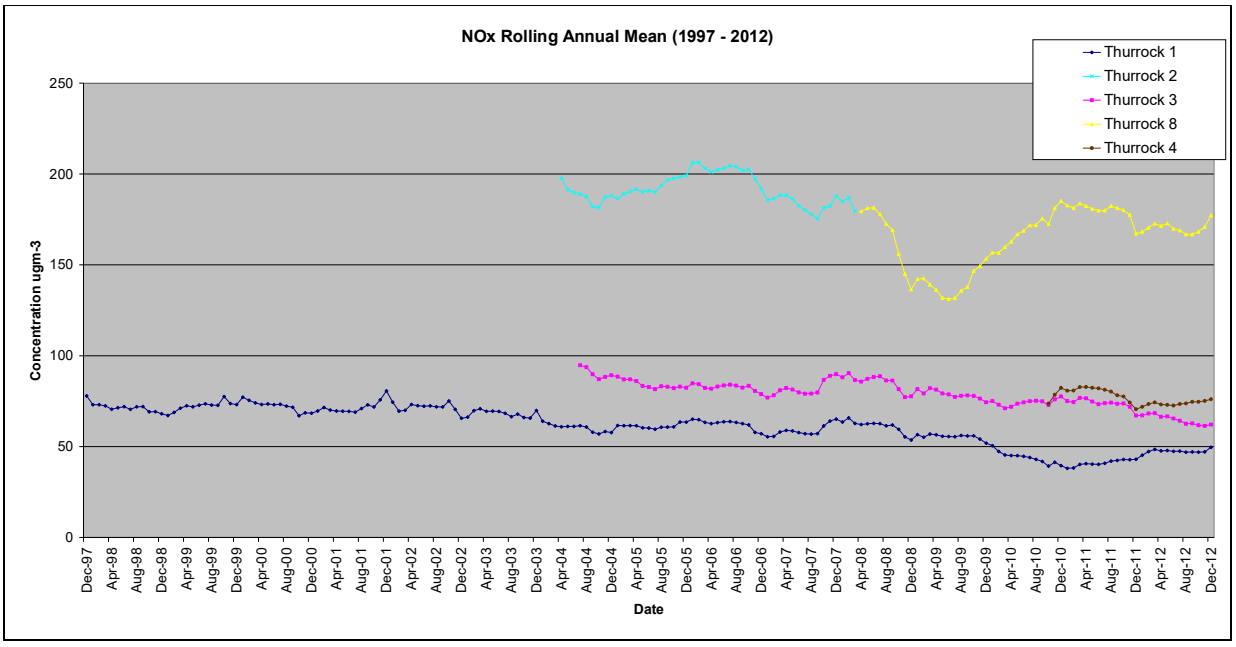
(Note - italics indicates < 90% data capture; bold indicates > annual mean objective)
* (Green indicates that for 2008 both results for Thurrock 2 and Thurrock 8 were combined as there was a relocation of Thurrock 2 to Thurrock 8 by 35 metres along the same road

Table 6 NO_2 data capture for year (%)

LAQN Site	Type	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	UB	93.68%	87.30%	96.79%	97.48%	84.43%	89.69%	98.33%
Thurrock 2	R	94.74%	96.64%	20.46%*				
Thurrock 3	R	97.88%	98.92%	97.21%	96.74%	98.65%	98.92%	93.34%
Thurrock 4	R					93.40%	94.80%	98.92%
Thurrock 8	R			72.21%*	97.97%	96.45%	98.36%	89.86%
Thurrock 2 & 8	R			92.67%*				

Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites

Figure 5 Rolling annual mean NOx concentrations for continuous monitoring sites in Thurrock

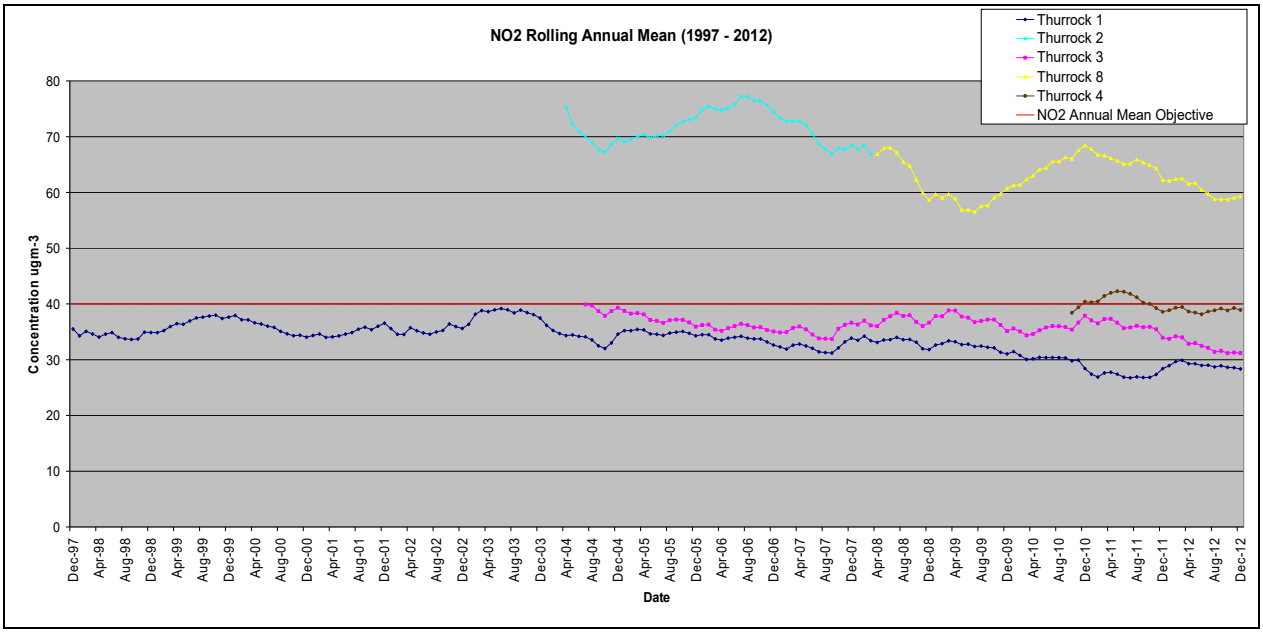


The rolling annual mean concentrations of NOx (Figure 5) indicated a very slight downward trend at the Thurrock 1 urban background site over time in line with reductions in emissions. The downward trend for NOx as the primary pollutant at the site decreased, by approximately 28.31 μg m^{-3}, from the end of 1997 to the end of 2012. From the start of 2010 to the end of 2010 the levels decreased by 12.37μg m^{-3}, this level of decrease is not reflected in the other sites. However the last two years have seen a slight increase in NO_x at Thurrock 1.

The reduction of NOx at Thurrock 2 now known as (Thurrock 8), showed little variation from 2004 to early 2008 with less than 10μg m^{-3} decrease. From mid 2008 to the end of 2009 however there was much greater variation with an overall decrease over this period of 26.1 μg m^{-3}, this margin was much greater over the latter part of 2008, but has shown to be increasing in concentrations over the latter part of 2009. In 2010 however these levels have again shown increases, to 185 μg m^{-3} at the end of 2010, and since that period there has been little or no change with concentrations in December 2012 remaining at 177μg m^{-3}. This increase could be due to meteorological conditions, seasonal variations, with more prolonged stable conditions leading to a build up of NO_x. There has been no noticeable change in traffic operation along this road over this time which could explain the increase.

For Thurrock 3 site, it has a similar pattern of change to the Thurrock 1 site it has seen a steady decrease in NOx of approximately 32.6 μg m^{-3} over the 2004 to 2012 period, with the most pronounced decrease over 2012, however the data is only provisional for this period and should be viewed with some caution.

Figure 6 Rolling annual mean NO_2 concentrations for continuous monitoring sites in Thurrock



The reductions for NO_2 (Figure 6) were smaller than for NOx for all the sites. For Thurrock 1 concentrations reduced by approximately 7.17 μg m^{-3} from December 1997 at 35.5 μg m^{-3} to December 2012 at 28.33 μg m^{-3}, which is an average decrease of 0.48 μg m^{-3} per year. The decrease is not in-line with current UK Government predictions which show a more pronounced decline.

The Thurrock 2 & (Thurrock 8 roadside sites as it is now known) has showed a different trend to the urban background site at Thurrock 1. The concentrations show much more variation with two major dips in concentrations in 2004, 2008 and 2011 to 2012. However this has been accompanied by two large increases in 2005 and 2010. Overall the trend over the 9 years of monitoring has shown a slight improvement. In 2004 concentrations were measured at 70 μg m^{-3} and in 2012 they were measured at 59.33μg m^{-3}. This is a total decrease of 10.7 μg m^{-3} over 9 years and 1.19 μg m^{-3} decrease per year.

For the Thurrock 3 roadside site the decrease, has been less pronounced that for Thurrock 8. For 2004 concentrations measured 39.9 μg m^{-3} and for 2012 they measured 31.19 μg m^{-3}, which is a total

decrease of 8.71 μg m^{-3} over approximately 9 years and a 0.97 μg m^{-3} per year. These levels however have changed little over the whole period, with most of the reductions occurring over the last two years (2011-2012) *it is important to note that the data for 2012 is only provisional so some caution should used in its interpretation*.

Thurrock 4 roadside site has shown little change in concentrations; however it has been running for a much shorter period than the other sites with only two years of data. Concentrations in 2010 measured 38.41 μg m^{-3} and in 2012 measured 38.91μg m^{-3} an overall increase of 0.5 μg m^{-3} over two years and a 0.25 μg m^{-3} per year.

2.3 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

2012 saw very little change in the number of recorded exceedences to recent years, with Thurrock 8 being the only site to record any (6 in total) but well below the permitted 18 exceedences per year. The highest hourly concentrations at the Thurrock sites in 2007 also arose during episodes in November/ December and also February and April/ May. The monitoring results for the hourly objective are given in (Table 7).

Table 7 Hourly mean NO_2 periods > 200 μg m^{-3} in Thurrock (2006 – 2012 inclusive)

LAQN site	Type	2006	2007	2008	2009	2010	2011	2012
Thurrock 1 (Percentile<90% DC %)	U	0	*3* *(138.4)*	0	0	*0* *(97)*	*0* *(98)*	0
Thurrock 2	R	**26**	**48**	*7*				
Thurrock 3	R	0	0	0	0	0	0	0
Thurrock 4	R					0	0	0
Thurrock 8 (Percentile<90% DC %)	R			*0*	1	12	4	*6* *(181.2)*
Thurrock 2 & 8	R			7				

(Note- italics indicates < 90% data capture; bold indicates > hourly mean objective)
Figures in brackets ( ) give 99.8th percentile values where data capture was below 90%
* (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

In previous years this standard has been breached, most notably during 2006 and 2007. There was also an increase in the number of sites exceeding this objective in London during 2005 - 2006, compared to 2002, when there was only one London site that exceeded. (ERG, 2006). Eleven sites exceeded in 2005 and 14 exceeded in 2006, these included sites at both kerbside and roadside locations. No background locations exceeded in either year, although a number of sites exceeded the 200 μg m^{-3} standard. The rises in direct emissions of NO_2 are thought to be implicated in this, as indicated by recent research (Carslaw D.C and Beevers, S. D, 2005 and AQEG, 2007).

A widespread primary pollution episode arose in early December 2007. At this time weather conditions were cold and calm, with very light winds. Initial analysis suggests that this was the most significant nitrogen dioxide incident for 10 years, when NO_2 was elevated across the region, the hourly mean AQS objective of not more than 18 hours per year above 200 μg m^{-3} was breached at 9 sites, and equalled at 2 sites, on the basis of measurements during this episode alone. Parts of west and central London saw the most elevated levels of pollution. 2008 and 2009 were not exceptionally special years for extreme meteorological conditions, and have reflected this in the numbers of hourly exceedences, which are much less than on previous years. 2010, has seen some more unusual meteorological conditions, with more prolonged easterly winds, which have led to more stable conditions and thus higher pollution events but not on the scale of 2007. The last two years have not shown any deterioration of air quality in relation to the short-term NO_2 objective in Thurrock.

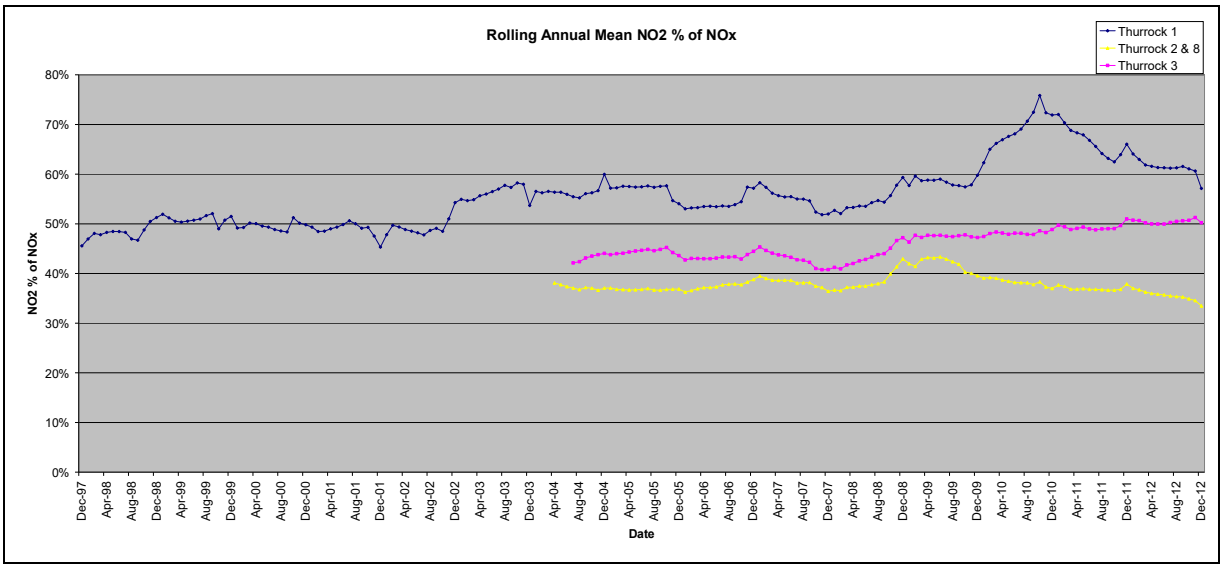
2.4 NO_2 and NOx trends in Thurrock

Rolling annual mean plots can be used to indicate changing concentrations over time. The use of rolling annual mean concentrations, based on hourly averaged data, largely removes seasonal influences and provides a guide to changing trends. Plots have been produced for both NOx and NO_2.

NO_2 is a mainly secondary pollutant formed by chemical reactions in the atmosphere from NOx emissions produced by combustion sources. These reactions also involve ozone, which is scavenged by NO. The relationship between NOx and NO_2 is non-linear and it is also further complicated by changes in direct emissions of NO_2 from some road vehicles.

The rolling annual mean plots for both NOx and NO_2 concentrations at all three Thurrock sites are shown in (Figure 7). This analysis is for an extended length of time from 1997 to the end of 2012.

Figure 7 Rolling annual mean proportion % of NO_2 of NOx concentrations for continuous monitoring sites in Thurrock



The trend for of total percentage of NO_2 of NO_x has remained largely the same for the Thurrock 1 background site. Only in recent years from 2010 onwards has the proportion of NO_2 of NO_x increased. It is unclear why this sudden jump occurred in 2010.

The Thurrock 3 site which is a roadside site has shown a steady increase in proportion of NO_2 of NO_x. This would confirm that road traffic emissions which are proportionally dominated by Cars along this section of road rather than HGV's are emitting more direct NO_2 from the tail pipe than they were in the past.

The Thurrock 8 site which is also a roadside site, but differs from the Thurrock 3 site as it has a much higher percentage of HGV road traffic. This has shown in recent years a decline in total percentage of NO_2 of NO_x. This would suggest that the HGV's are emitting much more direct NO than NO_2, this would confirm that in more recent years there are more HGV's using either selective or non-selective catalysts to filter out the NO_2 in the exhaust. However it must be said that overall they emit much higher quantities of NO_2 than Cars, and hence this is the main reason why levels of NO_2 are much higher at this site. There is also the secondary reaction of NO to NO_2 in the atmosphere to consider which will ultimately lead to more NO_2 in the air as well.

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2.5 Diffusion Tube Monitoring Data

The Council continued its programme of monitoring using diffusion tubes located at sites across the Borough. It also continued co-location studies at four of the Council's continuous sites (Thurrock 1, Thurrock 3, Thurrock 8 and Thurrock 4). The diffusion tubes were sited at 38 roadside sites and 11 background locations across the Borough, both inside and outside of the Council's AQMAs. The sites mostly represented locations relevant for public exposure. Additional diffusion tube sites were set up in 2011-2012.

All the sites had greater than 75% data capture, with the exception of Aveley High Street and Devonshire Road. The locations of the sites of the diffusion tubes and reference number are given in (Table 10) and in the Appendix. Gradko supplied and analysed the diffusion tubes using a preparation method of 50% TEA in water, but as of February 2009 the diffusion tubes were prepared with 20% TEA in water method.

Co-location studies to determine suitable local bias factors were undertaken at the Council's automatic sites. One tube was co-located at the Thurrock 1 background site and three tubes were co-located at the Thurrock 3 roadside site, and two tubes were co-located with Thurrock 4 roadside site, and 1 tube co-located with Thurrock 8 roadside site. The local bias factors were derived from these (see table 8).

The Council determined that to use the national bias adjustment factors would unfairly bias the results from individual diffusion tube sites. As every site within Thurrock has very different local conditions, i.e. differences in types of road traffic which influence the overall result from the diffusion tube. Hence the Council determined these four local bias adjustment factors for each co-located monitoring automatic & no-automatic monitoring sites within the borough all of which represent very different conditions. And to use local factors instead of national factors is also more representative to the local environment as Thurrock is not the same as the rest of the UK and England.

Thurrock 1 for example is an urban background location hence all local background diffusion tube monitoring sites have this factor applied to them.

Thurrock 3 is a roadside site and has road traffic primarily consisting of 93% Cars & LGV's and 7% HGV's. This factor is applied to all roadside diffusion tube sites with a similar composition of vehicles.

Thurrock 8 is a roadside site and has a much greater fraction of HGV's in relation to Cars. With 31% HGV's and 69% Cars & LGV's. This factor is then applied to all roadside diffusion tube sites with a similar vehicle composition.

Thurrock 4 is a roadside site which is almost exclusively composed of Cars & LGV's located within the heart of Tilbury. This factor is applied to all diffusion tube monitoring sites within Tilbury.

Table 8 Thurrock bias correction factors used for years (2002 – 2012)

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**	68.57	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**
2012	31.42	28.24	**1.11**	34.12	35.78	**0.95**	62.54	54.7	**1.14**	41.5	37.56	**1.11**

*(**Note Bias results for 2012 are based on 10 months diffusion tube data only as June and July are not included)*

The derived mean local bias factor for background and roadside sites indicates that the diffusion tube result under reads slightly in comparison with continuous monitoring in 2012 at Thurrock 1, Thurrock 4 and Thurrock 8 sites. For Thurrock 3 the diffusion tube data over reads the continuous data.

2.6 Results of NO_2 Diffusion Tubes 2012

Table 9 Bias adjusted results for all Thurrock sites (2006 – 2012) (µg m^{-3})

Site	BIAs Factor	2006	2007	2008	2009	2010	2011	2012
A1306 (R)	TK3	**63.17**	**64.04**	**58.12**	**50.62**	**55.58**	**53.04**	**53.37**
Bulphan (RB)	TK1	22.37	22.98	20.57	20.88	20.13	20.19	23.83
Calcutta Road Tilbury (R)	TK3 & TK4 (from 2011)	33.32	**42.53**	**43.24**	39.61	**40.50**	**44.08**	**46.88**
Chestnut Avenue Grays (UB)	TK1	34.64	33.38	26.07	25.91	23.92	24.73	27.39
Cromwell Road Grays (I)	TK3	36.43	37.39	37.62	34.07	33.63	30.84	35.68
Elizabeth Road (R)	TK3	**50.43**	**53.82**	**53.51**	**49.28**	**53.77**	**46.95**	**52.92**
Gatehope Drive (UB)	TK1	38.85	39.17	35.41	33.43	30.53	32.42	35.01
Hogg Lane (R)	TK3	37.85	38.09	37.35	32.72	36.43	29.93	33.52
Howard Road (R)	TK3	36.64	38.11	38.28	33.72	36.61	29.2	30.53
Ibis Hotel (UB)	TK1	**54.53**	**57.94**	**50.07**	**47.56**	**51.96**	**50.62**	**52.93**
Jarrah Cottages (R)	TK8	**74.46**	**68.64**	**59.30**	**60.58**	**68.33**	**62.7**	**62.36**
Kemps Cottage (UB)	TK1	39.61	**41.51**	34.88	36.11	32.48	35.89	39.57
Lakeside Tesco Roundabout (R)	TK8	**65.29**	**70.37**	**54.76**	**63.83**	**72.54**	**69.75**	**63.81**
London Road Arterial Road (R)	TK8	**71.85**	**78.31**	**68.36**	**69.48**	**69.11**	**63.93**	**67.96**
London Road Grays (R)	TK3	**40.8**	**43.61**	**42.99**	39.36	**40.33**	37.51	38.29
London Road South Stifford (R)	TK3	**47.86**	**50.19**	**48**	**46.08**	**46.78**	**43.08**	**48.81**
London Road W Thurrock (R)	TK3	**44.17**	**46.12**	**45.82**	39.04	39.43	38.8	**43.45**
Manorway mon/site mean	TK3	34.88	37.03	35.79	34.33	37.70	32.65	33.99
Park Road (R)	TK3	33.12	35.85	34.39	31.26	32.32	30.69	32.99
Poison Store AURN Site (UB)	TK1	32.93	33.91	30.83	31.01	28.55	28.65	31.35
Purfleet Rail Station (R)	TK3	37.49	39.31	36.73	35.68	37.67	31.88	35.34
Queensgate Centre Grays (R)	TK3	**49.07**	**47.23**	**41.81**	37.12	37.78	34.19	32.78
Stanford Library (UB)	TK1	32.67	33.09	29.93	30.27	28.19	28.97	29.98
Stanley Road Grays (R)	TK3	35.11	34.97	35.53	32.55	35.85	27.95	30.82
Stonehouse Lane (R)	TK8	**60.30**	**59.57**	**52.10**	**54.08**	**59.20**	**54**	**50.46**
Watts Crescent (R)	TK3	**42.79**	**46.37**	**43.97**	38.06	**42.22**	38.7	**40.12**
William Edwards School (R)	TK3	37.15	38.99	39.05	32.67	32.56	28.37	31.44
Wingfield Grays (UB)	TK1	29.43	29.71	23.94	23.68	20.51	23.66	25.15
Francisco Close (Chafford Hundred) (I)	TK3					35.71	29.5	32.26
Stanford-le-Hope Railway Station (R)	TK3					30.77	30.21	27.83
East Tilbury Rail Station (R)	TK3					28.37	27.75	31.13
Tilbury Sites								
Dock Road (Tilbury) (R)	TK3 & TK4 (from 2011)				36.21	**41.16**	39.83	**49.89**
Broadway Intersection (Tilbury) (R)	TK3 & TK4 (from 2011)				39.17	**41.80**	**49.87**	**49.31**
St Andrews Road (Tilbury) (R)	TK3 & TK4 (from 2011)				35.95	**42.71**	**47.66**	**50.68**
Calcutta Road East (Tilbury) (R)	TK3 & TK4 (from 2011)				34.42	39.31	**41.34**	**45.2**
Calcutta Road North (Tilbury) (R)	TK3 & TK4 (from 2011)				28.65	34.04	**40.84**	**42.66**
Thurrock 4 (co-located duplicated site)	TK4						38.89	**41.69**
New Sites from (2011)								
Purfleet By-pass (R)	TK8						**55.95**	**48.82**
Lydden (UB)	TK3							35.59
Aveley Ship Lane (R)	TK3							**46.5**

Aveley High Street (R)	TK3			[a]39.62
South Ockendon Arisdale Avenue (R)	TK3			31.68
Tilbury Sydney Road (UB)	TK4			38.46
Devonshire Road (R)	TK3			[a]30.15
London Road Art Road (North) (R)	TK8		**40.62**	**40.68**
London Road Art Road (South) (R)	TK8		38.17	37.47
London Road Art Road (Mid-North) (R)	TK8			**[a]50.97**
London Road Art Road (Mid-South) (R)	TK8			**[a]45.04**

(The Purple indicates results are for less than 9 months data capture for site location)

[a] Means should be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if full calendar year data capture is less than 75%

(Table 9) shows that many diffusion tube locations have not declined over 2012, some sites have shown increases in the last year most notably the Tilbury sites, London Arterial Road, London Road W Thurrock, Elizabeth Road, London Road South Stifford. All of these sites are above the annual mean objective for NO_2. Most sites have either stayed the same or shown slight increases or decreases over the last few years.

It should be noted that some caution should be used in the interpretation of the 2012 results as the bias adjustment factors applied only had 10 months data capture available as two of the summer months June and July were missing, this will naturally skew the results towards an elevated level as the summer months are usually lower than the winter results so the annual mean for the years will be higher than normal. Which can be evidenced in all of the bias adjusted diffusion tube results for 2012.

Table 10 2012 Raw NO_2 Diffusion Tube results for Thurrock ($\mu g\ m^{-3}$)

Site	Designation	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Data Capture for 2012
Bulphan (RB)	B	22.23	16.43	26.06	17.79	13.58			17.51	21.49	22.37	26.42	30.76	83%
Cromwell Road Grays (I)	CR	39.94	30.66	42.10	35.27	28.41			33.72	32.05	38.93	42.67	51.83	83%
Elizabeth Road (R)	ER	60.93	38.56	69.60	50.08	52.83			45.76	51.39	61.82	66.59	59.52	83%
Gatehope Drive (UB)	GDSO	27.70	27.45	38.35	33.90	23.79			30.39	32.83	31.57	BAD DATA	37.85	75%
Hogg Lane (R)	HL	26.11	32.45	MISSING	37.19	33.33			28.66	31.90	38.09	42.76	47.03	75%
Howard Road (R)	HR	27.45	23.72	42.68	35.41	26.85			28.13	34.78	30.37	35.72	36.30	83%
Ibis Hotel (UB)	IBIS	33.81	42.59	56.28	52.16	47.49			27.01	51.58	51.63	56.97	57.34	83%
Jarrah Cottages (R)	JC	37.17	46.51	63.57	54.64	58.22			54.23	56.68	58.33	57.49	60.19	83%
Kemps Cottage (UB)	KCNO	24.01	25.27	37.29	35.96	31.50			36.75	41.87	32.53	47.66	43.66	83%
London Road Arterial Road (R)	LRAR	49.41	51.42	69.95	66.56	55.43			55.67	54.16	61.03	71.14	61.39	83%
London Road Grays (R)	LRG	31.73	31.88	51.52	46.30	37.80			31.67	38.23	41.43	44.29	48.21	83%
London Road South Stifford (R)	LRSS	39.33	37.86	56.26	51.73	BAD DATA			38.95	47.43	58.23	77.12	55.54	75%
Lakeside Tesco Roundabout (R)	LT	42.54	46.64	67.43	59.64	58.68			38.00	48.56	69.62	66.02	62.61	83%
Manorway Monitoring Station	ML	27.58	28.36	52.69	36.58	36.55			24.59	24.78	36.54	37.81	48.17	83%
Manorway Monitoring Station	MM	28.00	27.58	43.66	37.52	32.50			26.31	35.04	38.59	38.38	42.65	83%
Manorway Monitoring Station	MR	43.61	31.34	47.65	41.12	32.57			26.47	37.06	38.37	35.05	36.34	83%
Park Road (R)	PKSL	34.46	25.75	39.47	40.59	31.52			24.00	33.00	33.25	43.05	42.20	83%
Purfleet Rail Station (R)	PRS	28.31	37.21	46.97	40.62	33.08			29.24	34.07	37.23	43.05	42.20	83%
Poison Store AURN Site (UB)	PS	24.72	21.72	38.82	32.98	21.05			22.18	27.07	26.37	33.14	34.39	83%
Stanford Library (UB)	SL	26.28	20.07	30.93	28.52	21.46			20.33	26.45	31.37	30.52	34.17	83%
Stanley Road Grays (R)	SRG	26.72	28.63	35.52	34.17	31.85			25.11	32.92	36.44	40.61	MISSING	75%
Stonehouse Lane	STON	30.33	41.28	47.84	44.51	43.21			42.59	49.10	51.19	48.47	44.12	83%
Calcutta Road Tilbury (R)	TL	31.29	28.97	50.04	34.97	32.95			41.35	44.93	42.79	58.64	56.39	83%
Watts Crescent (R)	WC	28.65	36.23	51.66	47.30	43.29			42.19	36.63	41.27	47.95	47.17	83%
William Edwards School (R)	WES	33.44	27.18	40.87	34.73	35.52			21.92	28.88	34.84	32.73	40.87	83%
London Road W Thurrock (R)	WT	37.34	36.18	50.95	42.03	BAD DATA			36.78	51.11	50.60	47.09	59.52	75%

Queensgate Centre Grays (R)	NAS1	22.73	28.21	46.35	39.38	35.29		31.23	31.35	33.00	37.88	39.59	83%
A1306 (R) From Jan 2001	NAS2	43.80	53.04	67.03	64.29	45.20		50.79	49.47	58.87	68.39	60.86	83%
Chestnut Avenue Grays (UB)	NAS3	23.17	20.48	33.11	26.57	18.76		17.40	23.59	25.77	26.92	31.00	83%
Wingfield Grays (UB)	NAS4	19.98	21.89	29.27	19.94	16.44		17.37	22.27	23.72	28.41	27.26	83%
Dock Road (Tilbury) (R)	TILA	39.19	35.70	49.52	42.10	31.42		41.17	46.66	46.51	53.54	63.65	83%
Broadway Intersection (Tilbury) (R)	TILB	36.39	37.82	47.26	40.67	38.50		41.81	50.47	48.17	44.37	58.75	83%
St Andrews Road (Tilbury) (R)	TILC	39.06	35.77	58.55	43.38	41.11		39.45	48.55	35.96	55.72	58.99	83%
Calcutta Road East (Tilbury) (R)	TILD	34.25	31.80	45.68	38.23	34.28		38.89	43.23	48.19	40.86	51.77	83%
Calcutta Road North (Tilbury) (R)	TILE	34.00	33.21	40.08	38.31	29.61		35.75	38.20	38.65	43.54	52.99	83%
Thurrock 4 (co-located duplicated site)	TK4A	29.64	28.02	40.39	35.58	32.05		35.43	43.24	36.28	51.51	42.78	83%
Thurrock 4 (co-located duplicated site)	TK4B	38.66	26.26	48.21	36.45	30.34		32.84	37.74	39.88	42.92	42.95	83%
Francisco Close (Chafford Hundred) (I)	FRC	25.77	31.15	42.11	35.43	29.70		24.21	34.38	35.31	41.60	39.93	83%
East Tilbury Rail Station (R)	ETRS	60.93	38.56	37.99	28.85	24.84		19.15	22.82	29.74	34.24	30.58	83%
Stanford-le-Hope Railway Station (R)	SLHRS	24.52	24.51	22.15	32.73	26.18		25.17	31.62	34.51	33.21	38.35	83%
London Road Art Road (North) (R)	LRAR N	21.53	40.40	41.32	40.76	29.60		36.21	39.51	21.85	45.35	40.35	83%
London Road Art Road (South) (R)	LRAR S	25.10	25.40	40.93	34.58	BAD DATA		30.43	31.16	33.28	38.56	36.36	75%
Purfleet By-pass (R)	PBP	40.47	47.41	45.42	41.12	36.90		34.44	43.40	46.29	51.53	41.24	83%
Lydden (UB)	LYD	27.87	34.19	44.87	38.29	30.38		39.86	39.15	35.87	41.55	42.63	83%
Aveley Ship Lane (R)	AVSL	37.46	57.22	55.28	46.64	42.76		41.98	MISSING	51.29	55.36	52.54	75%
Aveley High Street (R)	AVHS	43.19	39.25	MISSING	MISSING	BAD DATA		41.04	36.08	42.85	44.98	36.70	58.3%
South Ockendon Arisdale Avenue (R)	SOAA	30.10	29.32	37.78	34.58	26.04		26.40	34.43	39.29	42.15	MISSING	75%
Tilbury Sydney Road (UB)	TSR	32.39	31.82	41.05	31.02	22.47		33.73	38.37	35.87	41.01	38.79	83%
Devonshire Road (R)	DR			37.29	31.25	24.63		25.93	27.44	32.07	40.26	38.91	66.6%
London Road Art Road (Mid-North) (R)	LRARMN							37.23	50.89	42.02	49.47	52.27	41.6%
London Road Art Road (Mid-South) (R)	LRARMS							33.69	34.36	43.37	47.29	46.22	41.6%

(R) Roadside site, (I) Intermediate site, (UB) Urban Background site, (RB) Rural Background site

Table 11: Results of fall off with distance from the roadside for the nearest receptor at Jarrah Cottages

Step 1	**How far from the KERB was your measurement made (in metres)?**	(Note 1)	**2.5**	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	(Note 1)	**8.5**	metres
Step 3	**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)	**28.7**	µg/m^3
Step 4	**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)	**62.36**	µg/m^3
Result	**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)	**52.2**	µg/m^3

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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The annual mean concentration with fall off calculated from the roadside indicates that the concentration at the receptor would be 52.2 µg m^{-3}, so the hourly objective would be unlikely to be breached as the annual mean concentration is less than 60 µg m^{-3} .

Table 12: Results of fall off with distance from the roadside for the nearest receptor at London Road Arterial Road

Step 1	**How far from the KERB was your measurement made (in metres)?**	(Note 1)	**0.5**	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	(Note 1)	**10**	metres
Step 3	**What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**28.7**	$\mu g/m^3$
Step 4	**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**67.96**	$\mu g/m^3$
Result	**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)	**47.2**	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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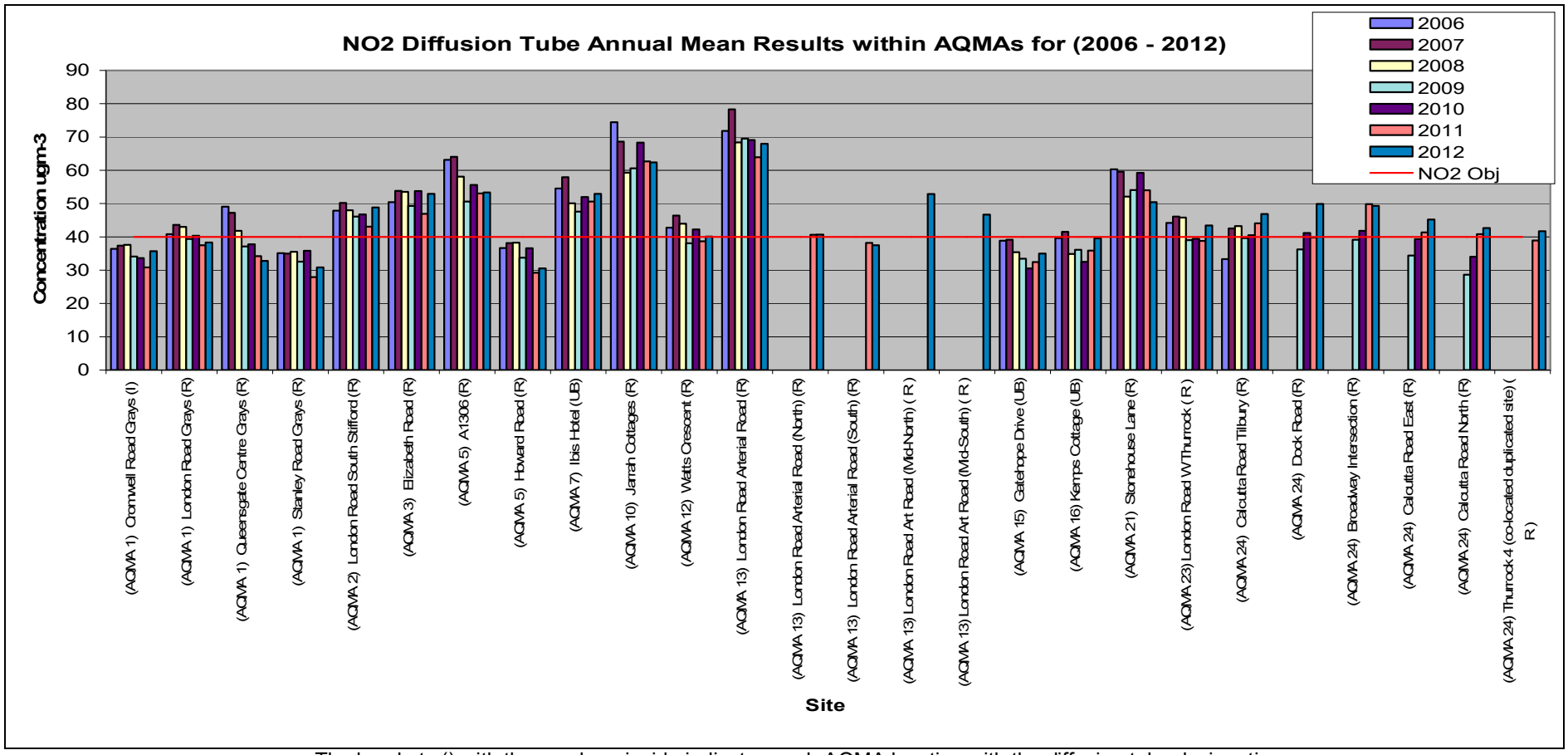
The annual mean concentration with fall off calculated from the roadside indicates that the concentration at the receptor would be 47.2 µg m^{-3}, so the hourly objective would be unlikely to be breached as the annual mean concentration is less than 60 µg m^{-3} .

2.7 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

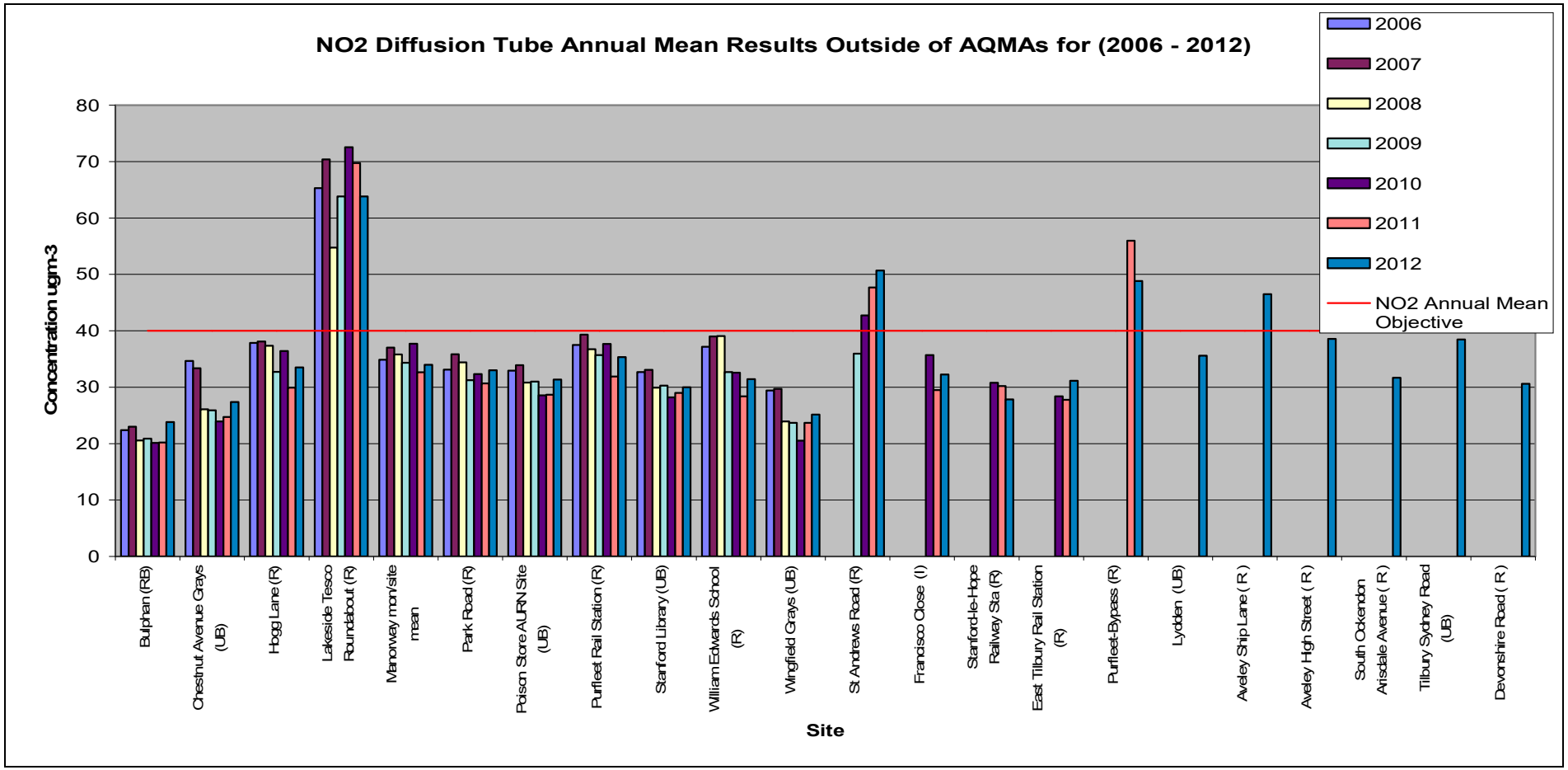
Figure 8 Bias adjusted results for all Thurrock sites 2006 to 2012 (µg m^{-3}) within AQMAs



The brackets () with the numbers inside indicates each AQMA location with the diffusion tube designation

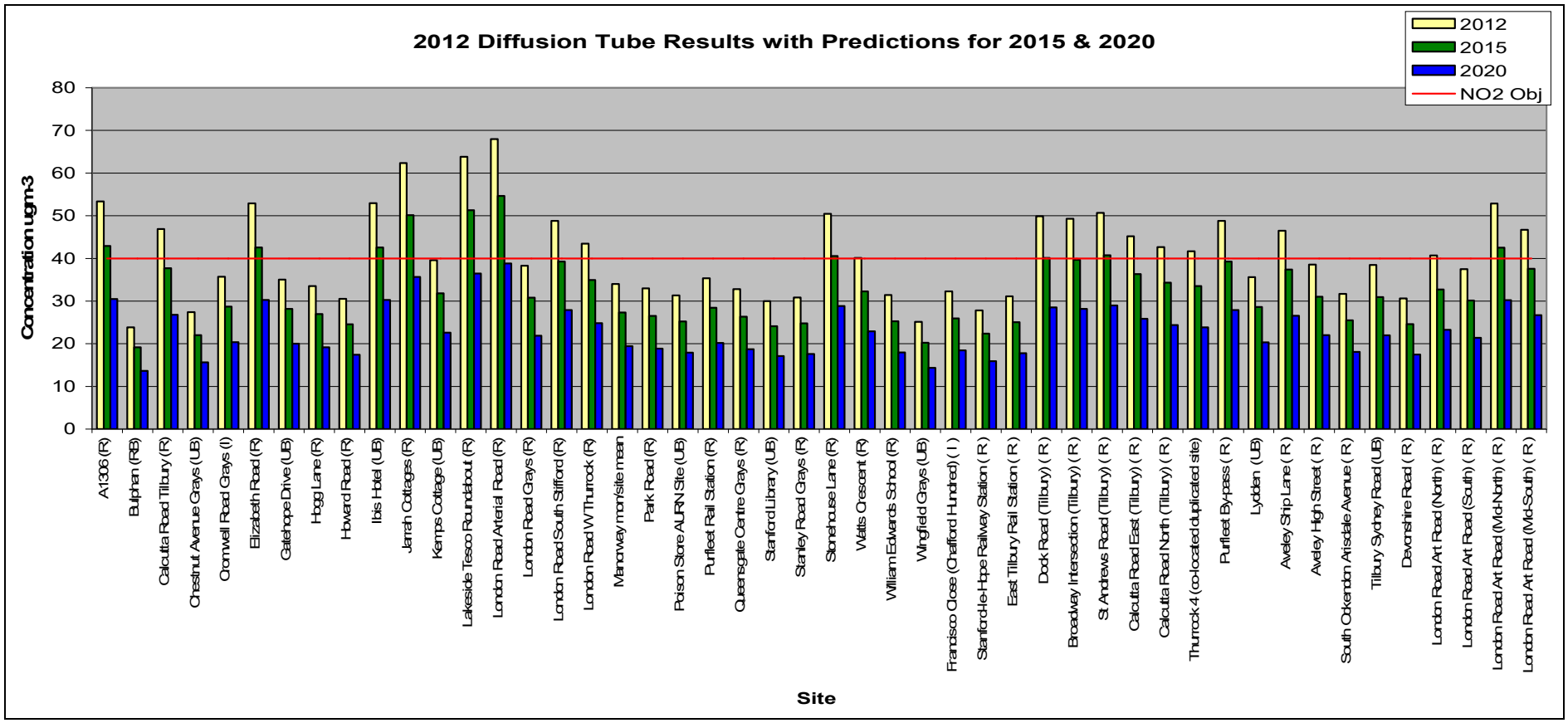
The results in (Figure 8) indicate that the concentrations regularly exceed the Government's objectives in all the Council's AQMAs, although not always at every site monitored within the AQMA.

Figure 9 Bias adjusted results for all Thurrock sites 2006 to 2012 (µg m^{-3}) outside of AQMAs



For those sites outside of AQMAs, (Figure 9), the annual mean objective of 40 µg m^{-3} was exceeded consistently at the Lakeside Tesco Roundabout, although as reported in previous Council Progress Reports this site does not represent relevant exposure, the same applies to St Andrews Road. However in 2012 some new sites such as the Purfleet By-Pass and Aveley Ship Lane were also above the annual mean objective of 40 µg m^{-3}. Both of these sites represent public exposure. These two sites will require further investigation and a Detailed Assessment will be required, in order to assess the full extent of this exceedence and determine if an AQMA should be declared.

Figure 10 NO_2 Diffusion Tube results for sites in Thurrock for 2012 & estimated 2015 & 2020 concentrations



Predictions of post 2012 concentrations were made using the Defra year adjustment factors, based on 2012 measurements. These are shown in (Figure 10), with the 2015 predictions (in green) & 2020 predictions (in blue). For 2012 there are 22 sites still exceeding the annual mean objective. The estimates indicate that despite the predicted reduction in concentrations, of the same 22 locations 10 are predicted to be exceeding the annual mean objective in 2015 and no sites will exceed in 2020. This prediction must be taken with some scepticism as the diffusion tube results have not shown this level of decrease in previous years and are unlikely to follow this trend, so hence more sites are likely to still exceed the annual mean objective in 2015 and for 2020.

2.8 Particulate Matter (PM_{10})

During 2009 the particulate monitors at Thurrock 1 & 3 were upgraded from standard Tapered Element Oscillating Microbalances (TEOM's) to TEOM Filter Dynamic Measurement System (FDMS) which are equivalent to the EU reference method. During the years 2006 to 2008 the Volatile Correction Model (VCM) created by Kings College London, Environmental Research Group (ERG) was used which converts normal TEOM measurements by combining measurements from 3 local FDMS, which makes the TEOM measurements equivalent to the EU reference method, the previous years pre-dating 2006 were not converted using this method as there were not enough FDM's measurements to do the correction and hence these results are based on the old 1.3 correction factor.

The monitoring results for these sites are given in (Table 13 & 14). Not all the sites meet the 90% data capture for 2012, Thurrock 3 the data capture was only 83.8%, this was due mainly to issues with the new FDMs upgrades. Thurrock 1 maintained a high level of data capture over 2012 at 94.48% with the FDMs upgraded analyser performing reliably at this site. Thurrock 8 with operates a different type of instrument called a Beta Attenuated Mass Analyser (BAM) also had good data capture in 2012 at 96.76%.

Table 13 PM_{10} data capture for year (%)

LAQN Site	Type	2005	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	UB	94.56%	97.38%	98.16%	97.76%	96.63%	95.42%	96.40%	94.48%
Thurrock 2	R			70.12%	20.34%*				
Thurrock 3	R	99.04%	98.72%	97.82%	99.69%	79.89%	89.50%	96.00%	83.80%
Thurrock 8	R				70.41%*	80.61%	92.12%	97.45%	96.76%
Thurrock 2 & 8	R				90.75%*				

Table 14 PM_{10} monitoring in Thurrock (2006 – 2012)

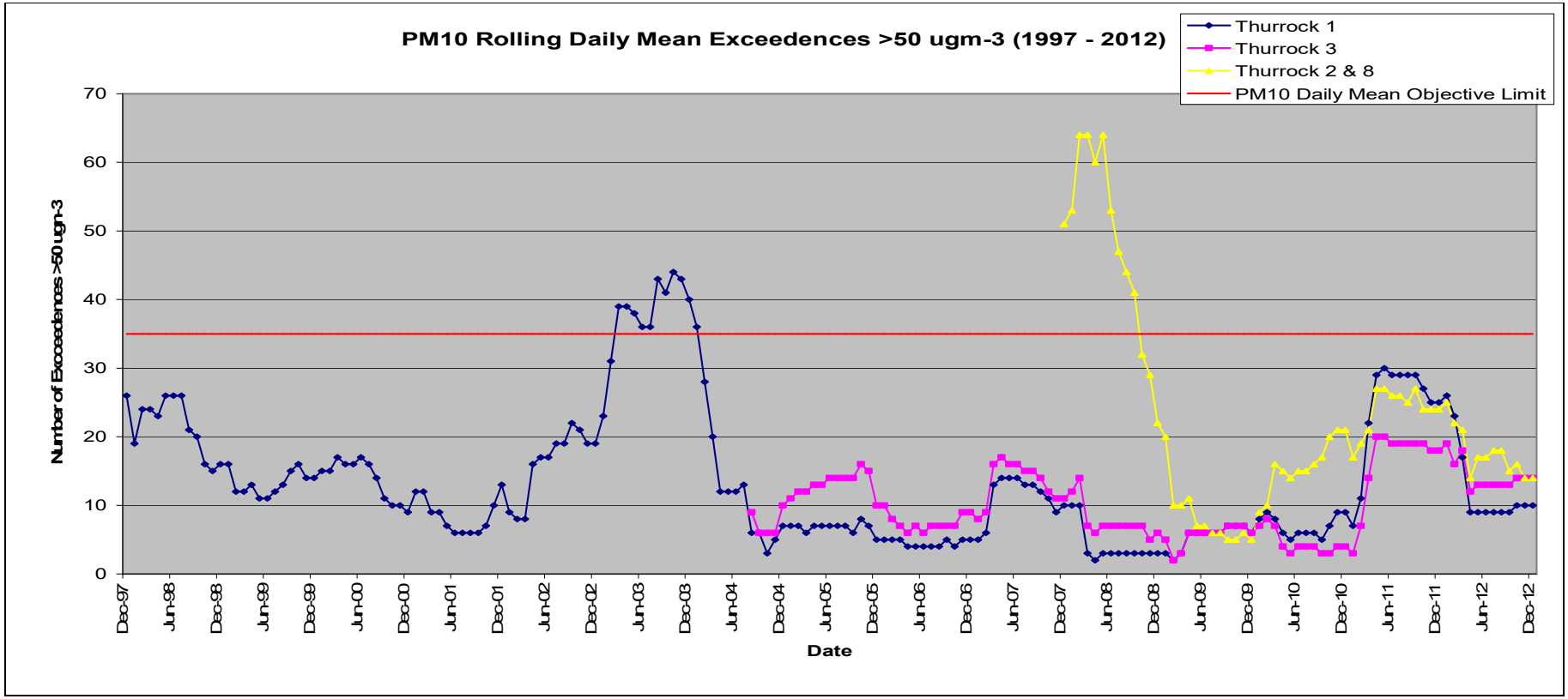
Site		2006	2007	2008	2009	2010	2011	2012
Thurrock 1	Annual mean	19.9	18.92	18.88	21.26	24.3	24.85	17.84
	Data capture %	97.38	98.16	97.79	96.63	95.42	96.4	94.48
	Maximum 1 hr	244.8	152.5	115	117	331	492	112
	Maximum 24 hr	77.6	83.1	71	83	76	105	67
	Days > 50 μg m^{-3}	5	10	3	6	9	25	10
Thurrock 3	Annual mean	22.28	20.84	21	*(21.3)*	*(20.69)*	23.37	*(21.98)*
	Data capture %	98.72	97.82	99.68	*79.89*	*89.5*	96	*83.8*
	Maximum 1 hr	252.1	406.2	129.2	*(153)*	*(217)*	123	*(158)*
	Maximum 24 hr	85.8	80.8	85	*(77)*	*(57)*	100	*(75)*
	Days > 50 μg m^{-3}	9	11	6	*(6)*	*(4)*	18	*(14)*
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	23.92
	Data capture %			*70.41**	*80.61*	92.12	97.45	96.76
	Maximum 1 hr			*(356.3)**	*(201)*	408	248	138
	Maximum 24 hr			*(73)**	*(79)*	113	95	76
	Days > 50 μg m^{-3}			*(8)**	*(5)*	21	24	14
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
() brackets indicate the values represented may not be entirely representative as the data capture was below 90%

The results for 2012, (shown in Table 14) show that there were days where the daily mean air quality threshold for PM_{10} of 50 µg m^{-3} was exceeded. Although the daily mean objective was not breached at any of the monitoring sites. There does not appear to be any substantial change in the number of exceedences recorded over the past 6 years at any location, in fact the last few years have shown a slight increasing trend at all locations with the exception of 2012.

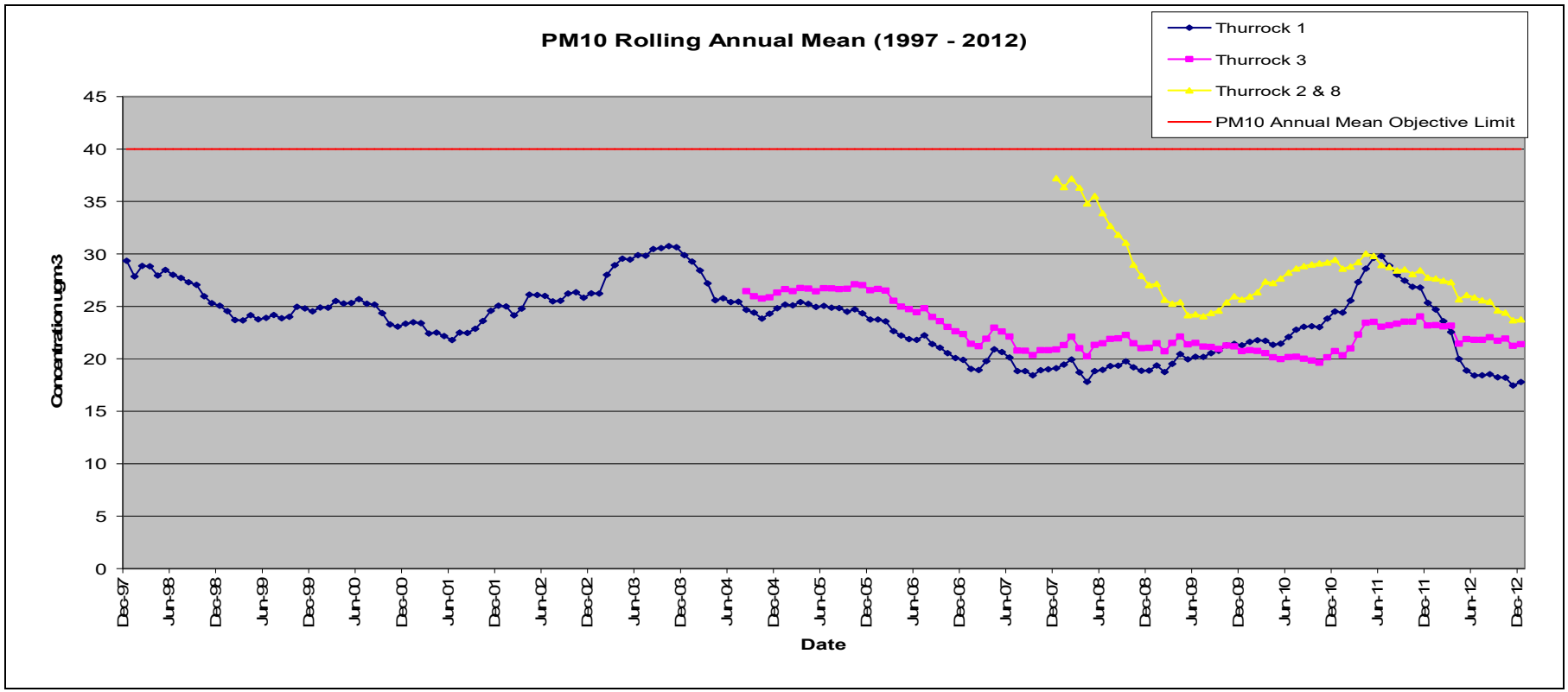
Trends in Annual Mean PM_{10} Concentrations

Figure 11 Rolling number of days PM_{10} > 50 µg m^{-3} in Thurrock (1997 to 2012)



The number of rolling annual daily mean exceedences greater than 50 µg m^{-3} in (Figure 11), for Thurrock 1 & 3 sites have stayed largely the same for 2012. Thurrock 2 & 8 has shown a dramatic improvement over 2009, with a slight increasing trend ever since then, but considering the high proportion and volume of Heavy Goods Vehicles (HGV's) movements along this road, this site in recent years has not been notably worse than the urban background site at Thurrock 1.

Figure 12 Rolling annual mean PM_{10} trends in Thurrock (1997 to 2012)



The rolling annual mean PM_{10} trends in (Figure 12) have, shown greater variation in recent years for Thurrock 1 with the lowest recorded concentrations in 2012, this follows however a marked increase during 2011. PM_{10} levels have remained fairly steady for Thurrock 3 site with no noticeable improvement. For Thurrock 2 & 8 the decrease over 2008 and early 2009 has been dramatic, by over 10 µg m^{-3}, this trend has tailed off by the end of 2009, and over 2010 had been steadily increasing again, but this has levelled off and concentrations have started to fall once more over 2012. The latest published (London Air Quality Network (LAQN) report 2006-07) carried out by Kings College London, Environmental Research Group shows a similar trend in the rolling annual mean PM_{10} concentrations across all sites within the LAQN.

2.9 Sulphur Dioxide (SO_2)

SO_2 monitoring

The Council has continued to monitor SO_2 at two of its automatic monitoring sites (Thurrock 1 urban background and Thurrock 3 roadside). Details of data capture for the period 2003 to 2012 are given in Appendix 1.
The results indicated that the 15-minute mean objective of 266 µg m^{-3} was not exceeded at the site during 2012 for Thurrock 1, although this standard was exceeded occasionally in previous years at Thurrock 1 site. The 15-minute mean objective was exceeded twice for the Thurrock 3 site in 2012 with a maximum recorded concentration of 414 µg m^{-3}. The Maximum values for the 15-minute mean for each year of monitoring are shown in (Table 15) and the number of 15-minute exceedences in a given year shown in (Table 16).

Table 15 Maximum 15-minute mean concentrations for SO_2 monitoring (µg m^{-3}) (2003-2012)

LAQN Site	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	1041.3	280.3	192.2	237.6	101.5	144	237	296	88	192
Thurrock 3	*133.3*	187	148.6	248.7	136	192	*101*	*117*	255	414

(Note - italics indicates < 90% data capture)

Table 16 Number of 15 minute periods > 266 µg m^{-3} at the Thurrock monitoring sites (2003 - 2012)

LAQN Site	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	9	2	0	0	0	0	0	1	0	0
Thurrock 3	*0*	0	0	0	0	0	*0*	0	0	2

The 15-minute mean objective is the most stringent of the three SO_2 objectives; and there were no recorded periods where the hourly or daily mean standards were exceeded at either site. The results confirm that all the SO_2 objectives have been met during 2012, as in all previous years for both Thurrock's monitoring sites.

Table 17 SO_2 data capture for year (%)

LAQN Site	Type	2005	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	UB	94%	98.18%	97.66%	95.43%	96.40%	97.50%	97.84%	96.26%
Thurrock 3	R	99%	94.92%	99.32%	99.29%	84.71%	85.34%	96.51%	97.41%

Trends in SO_2 Concentrations

The SO_2 objectives and standards relate to short periods with high concentrations based on the impact of episodes of high pollution on human health. An examination of annual mean concentrations over time however can provide an insight to changes that are taking place, although it should be noted that the relationship between annual mean concentrations and the standards is not straightforward. (Figure 13) shows the annual mean concentrations for both monitoring sites have mainly reduced over the past 14 years as a result of reductions in SO_2 emissions. This has arisen from the burning of gas rather than oil in industrial/ commercial and domestic settings, as well as reductions in S levels in the petrol and diesel fuels used by road vehicles.

Figure 13 Annual mean SO_2 concentrations monitored at Thurrock sites and neighbouring Castlepoint sites (1996 – 2012)

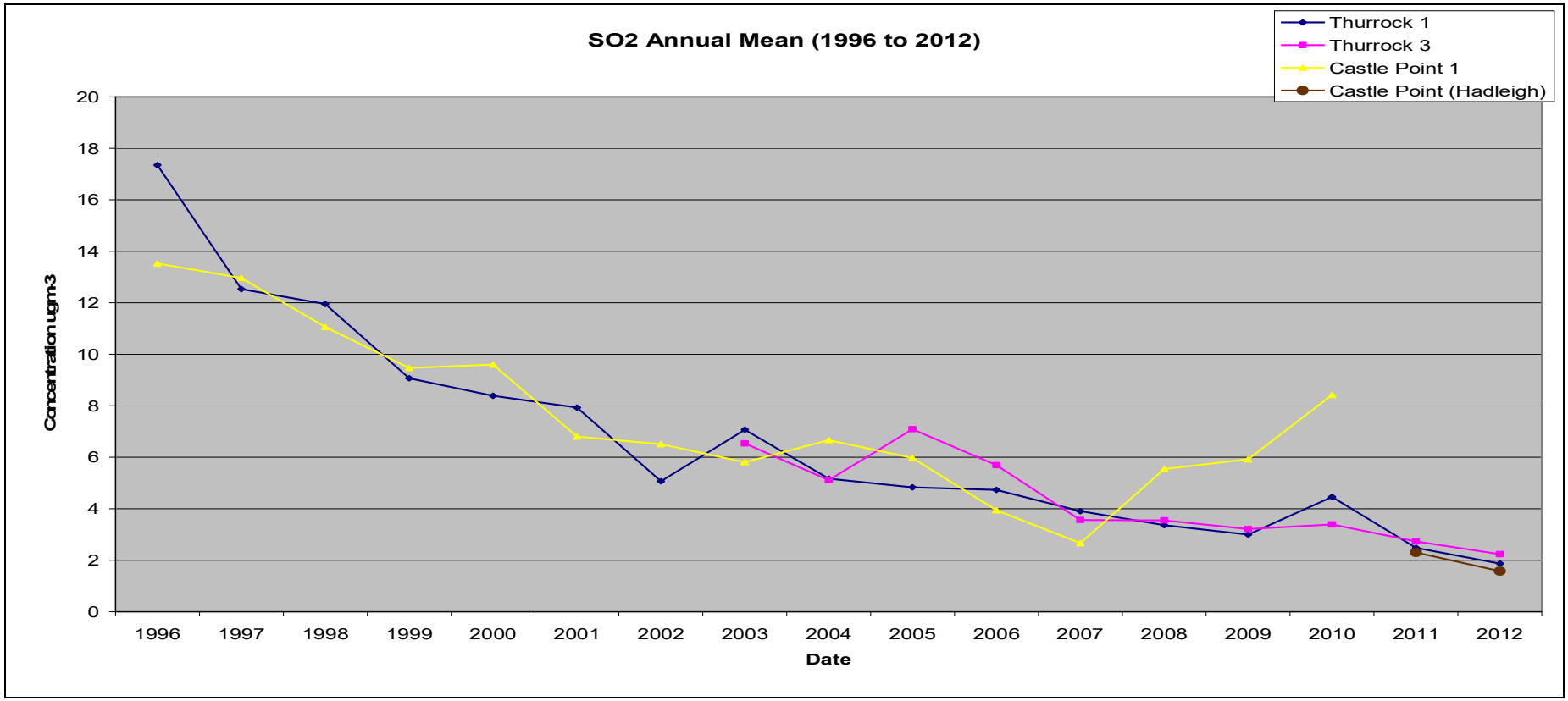
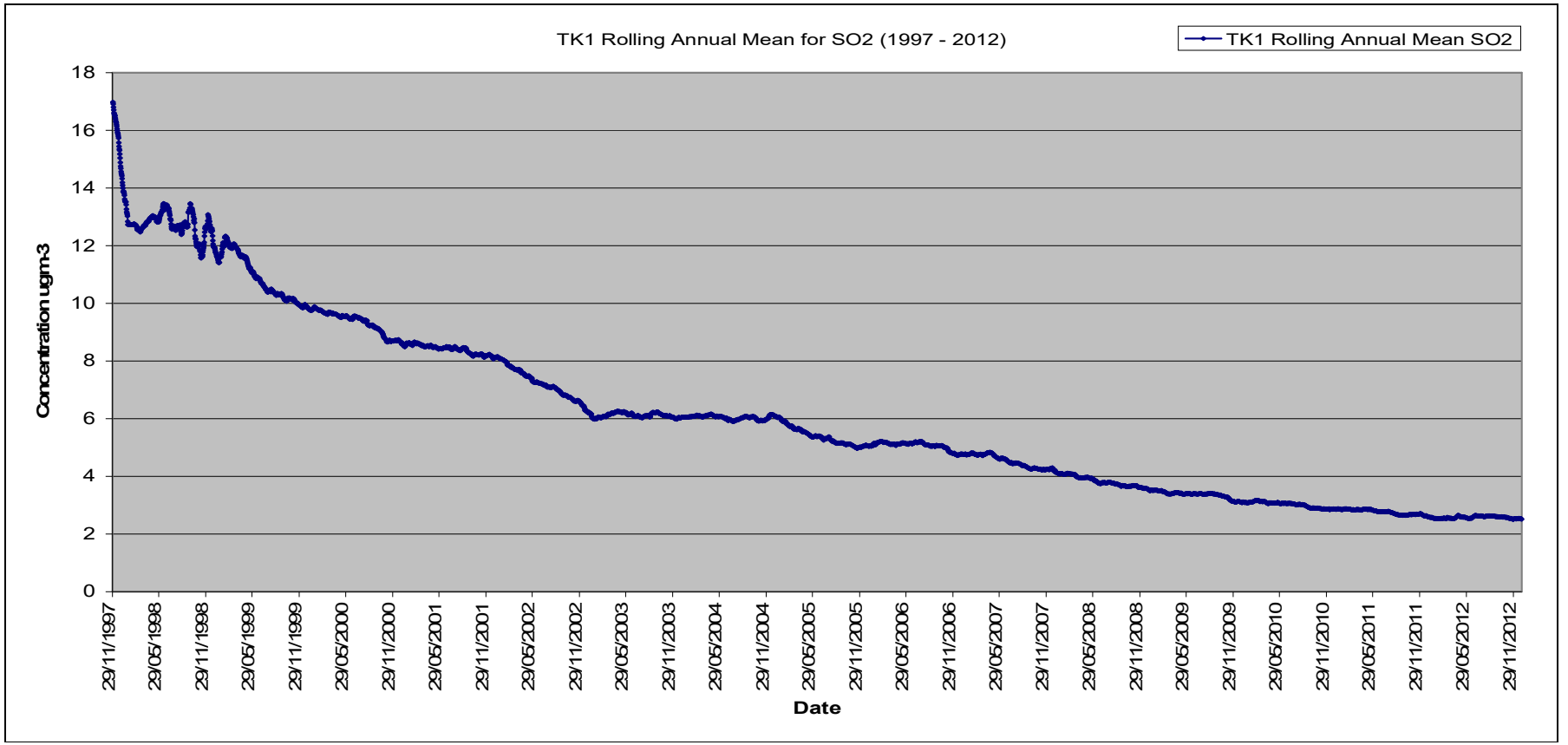


Figure 14 Rolling Annual Mean Trend for Thurrock 1 (1997 – 2012)



The rolling annual mean trend for Thurrock 1 (Figure 14) demonstrates how much things have improved over the years with concentrations approaching the limit of detection in recent years.

2.10 Benzene

Thurrock Council does not currently monitor Benzene levels.

This was scoped out in previous reports and there have been no new developments since then which would potentially give rise to any new sources.

2.11 Other Pollutants Monitored

$PM_{2.5}$ Monitoring

During the Spring of 2009 Thurrock 3 was upgraded with a $PM_{2.5}$ TEOM FDMs analyser, which was funded by Defra as under its obligations to the EU it needed to increase the number of $PM_{2.5}$ monitoring locations across the UK, Thurrock 3 was selected as one of those new sites.

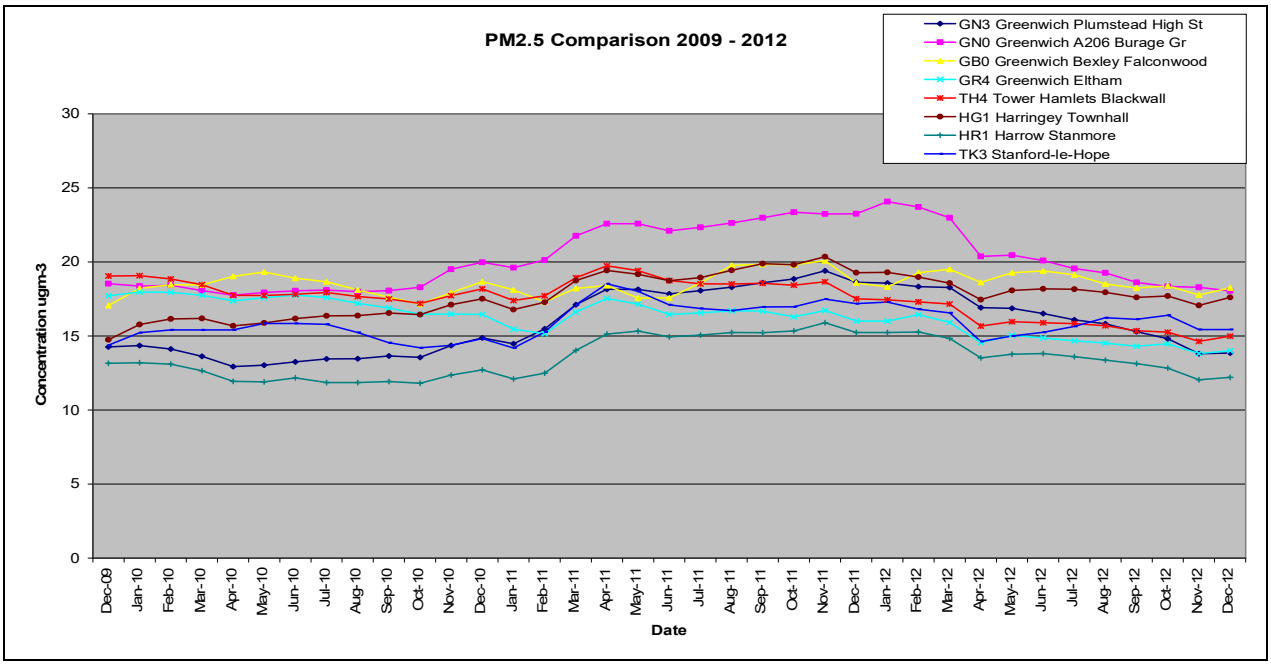
There are now 4 years of results gathered thus far. Results have been outlined below in (Table 18), these results however are associated with very low data none of which are close to the desired 90% data capture. The data capture for 2011 & 2012 has shown a significant improvement over previous years. The poor data capture is to do with an internal problem with the drier unit within the FDMS analyser which persists unfortunately and of more minor issues. 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 with the monitor may not be completely resolved, and hence the data may not give a true representation of the actual levels.

Table 18 $PM_{2.5}$ monitoring in Thurrock at Thurrock 3 Stanford-le-Hope Roadside monitoring station

$PM_{2.5}$	2009	2010	2011	2012
Annual Mean	14.54	15.77	17.93	14.72
1 Hour Maximum	145	229	120	90
24 Hour Maximum	47	50	86	57
Data Capture	44.43%	58.66%	77.65%	78.87%

The low data capture results for 2012 at 78.87% show an annual mean value of 14.72 µg m^{-3} for $PM_{2.5}$, as opposed to the PM_{10} results at Thurrock 3 with an annual mean of 21.98 µg m^{-3} with a slightly higher data capture of 83.8%. The very fine particle element ($PM_{2.5}$) as a fraction of PM_{10} is approximately 67% for 2012 and was 68.3% for 2009. This shows that the results have been consistent over this time period for both analysers indicating some confidence in the measurements considering the low data capture.

Figure 15 Thurrock 3 $PM_{2.5}$ comparisons with other London monitoring sites.



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 15), and has so far followed the same trends, levels remain fairly consistent over this time period, (albeit it relatively short time-fame).

Ozone monitoring

The continuous measurement of ozone during 2012 in the Borough was undertaken at the Thurrock 1 urban background monitoring site in Grays.

The results for the period 2003 – 2012 are given in (Table 19) the data capture for all years exceeded 90% at the Thurrock 1 site (Table 20); full details are also for the site are given in the Appendix.

Table 19 Thurrock 1 Ozone results and statistics for (2003-2012)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
No Exceedences of the Daily Maximum 100 ug/m-3	**40**	**15**	**13**	**25**	**11**	**12**	**6**	**7**	**11**	**8**
Annual Mean	**37**	**38**	**39**	**37**	**41**	**39**	**39**	**38**	**38**	**36**
Annual mean Daily Max 8-hr	**55**	**55**	**56**	**55**	**61**	**57**	**58**	**55**	**56**	**52**

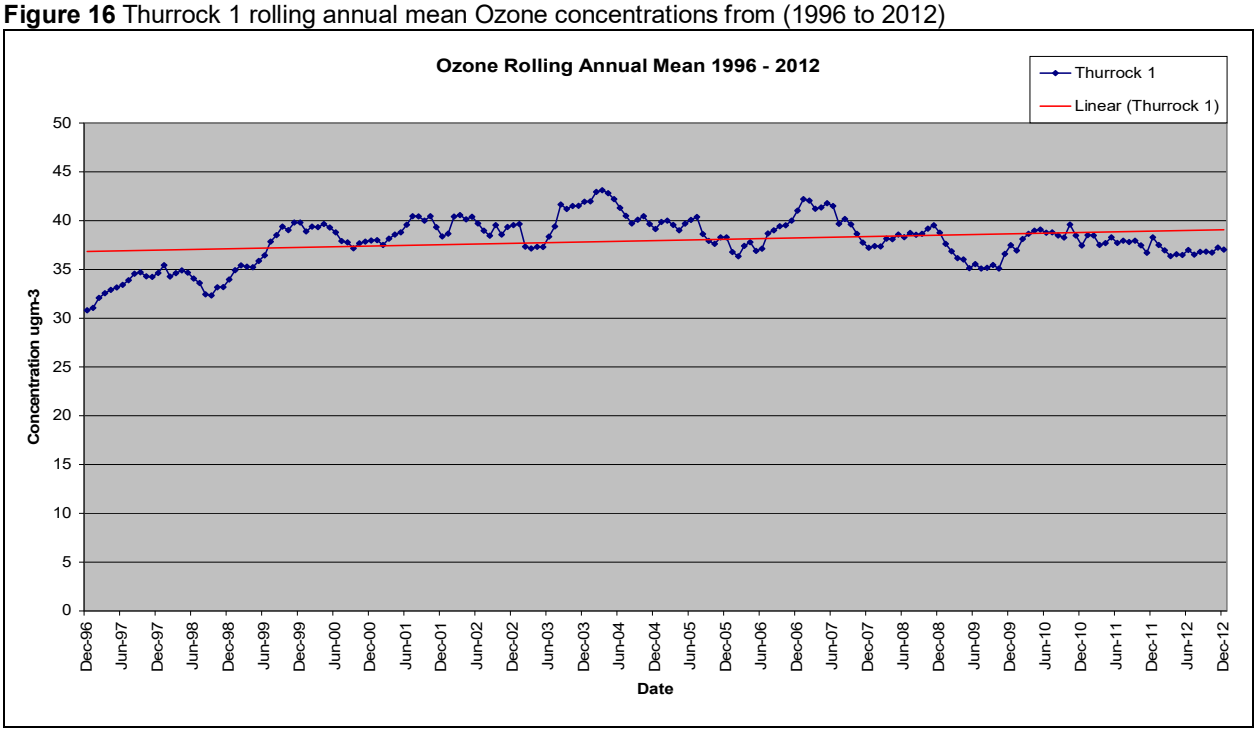
Table 20 Ozone data capture rate for year (%)

LAQN Site	Type	2005	2006	2007	2008	2009	2010	2011	2012
Thurrock 1	UB	94.16%	98.17%	96.58%	96.31%	98.64%	94.19%	97.73%	93.94%

The Government's air quality objective, not to exceed 10 periods in a calendar year, was not exceeded in 2012 at the Thurrock 1 site. The objective was exceeded in all previous years with the exception of 2009 and 2010 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 a slightly increasing trend over

the last 15 years however the last few years have stayed relatively the same. The rolling annual mean is shown in (Figure 16) below, although recently no significant change has been observed.

Figure 16 Thurrock 1 rolling annual mean Ozone concentrations from (1996 to 2012)



2.12 Summary of Compliance with AQS Objectives

Thurrock Council has measured concentrations of nitrogen dioxide above the annual mean objective at relevant locations within Aveley at the site Aveley Ship Lane and also for Purfleet, at the site of the Purfleet-Bypass, and **will need to proceed to a Detailed Assessment**, for The main High Street and Ship Lane for Aveley, and also along the Purfleet-Bypass in Purfleet.

3 New Local Developments

This section outlines those local developments that may take place and may affect air quality in the Borough. These are not for consideration now but are listed for a more thorough assessment during the next round of Review and Assessment. The guidance identifies the following developments that should be considered:

- New industrial processes included in the list of Annex 2 of LAQM. (TG 09).
- New developments with an impact on air quality, especially those that will significantly change traffic flows. Only those developments with planning permission granted are included.
- New landfill sites, quarries, etc with planning permission granted and nearby relevant exposure.

Table 21 New Local Developments since 2012

Development	Location
New Part A or B industrial processes	See below
New retail or mixed residential/ commercial development	None
New road scheme	None
New mineral or landfill development	None

Landfills
No new sites have been identified since the last review & assessment

Quarries
No new sites have been identified since the last review & assessment

Unmade haulage roads on industrial sites.
No new sites have been identified since the last review & assessment

Waste transfer stations, etc.
No new sites have been identified since the last review & assessment

Other potential sources of fugitive particulate emissions.
No new sites have been identified since the last review & assessment

3.1 Road Traffic Sources

No new locations have been identified since the last review & assessment

3.2 Other Transport Sources

No new locations have been identified since the last review & assessment

3.3 Industrial Sources / Biomass

Biomass: There have been now new or significant biomass plants that have impacted significantly on air quality in relation to PM_{10} within the borough for 2012-13.

The Borough regulates Part A2 and Part B installations in its area (see details of the installations permitted by the Council in the Appendix). Recent permits issued include those for a temporary filling station and mineral related industry, these additions however are not considered sufficiently important to require the Council to undertake further LAQM actions, other than to note the change.

Part A1 installations are permitted by the Environment Agency, there have been some changes to some of the A1 Processes in the Borough during 2011-2012. Firstly the switch of Tilbury Power Station to burning of Biomass rather than burning Coal, this was required in order for the Power Station to continue operating as it had opted out of Best Available Techniques (BAT) process, but was permitted to operate until a certain time limit without implementing BAT. The Power Station now uses biomass which will prolong the life of the plant as this generates much less SO_2 emissions as well as NO_2 but to a lesser extent. PM_{10} emissions from the biomass plant are not going to have any worse impact than when it was burning Coal.

As noted in the Previous USA Report in 2012, it stated that the Coryton Refinery is no longer in operation, due to the liquidation of Petroplus, the site is currently mothballed.

For Part A2 Processes (Details of the Part A2 installations permitted by the Council are also given in Appendix) The Council's only A2 process Civil & Marine Slag Cement Limited has been relegated now to a Part B instillation. Also The Kerneos Limited Cement & Lime process in Purfleet, which was regulated by the Environment Agency as an A1 installation has now become an A2 installation and is now regulated by the Council.

For Part B installations, there are 7 processes which are no longer in operation as of 2011-2012. These include Hanson Thermalite Limited (B103), Brett Concrete Limited (B119), Steintec Paving Systems (B204) which are both Blend / pack / load / use of bulk cement processes. Two mobile crushing & screening processes G Killoughery Limited (B184) & (B186). Two small waste oil burners processes, Flavin Consulting Limited (B191) and Thurrock 4x4 Centre (B194).

Also one other Part B process a storage, loading, unloading of petrol, BP Oil UK Limited (B171) has been mothballed.

Over 2012 there has only been one new Part B process, which is a mobile crushing and screening process, Seales Road Haulage Ltd, Purfleet (B206).

All Part B processes are listed in Appendix 2. The new processes are highlighted in (green). Processes which have ceased operating are total highlighted in (grey), and inactive processes are highlighted in (yellow) these are all listed at the end of appendix 2.

3.4 Commercial and Domestic Sources

No new locations have been identified since the last review & assessment

3.5 New Developments with Fugitive or Uncontrolled Sources

No new locations have been identified since the last review & Assessment

Thurrock Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Thurrock Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

Thurrock Local development framework (LDF)

The Planning & Compulsory Purchase Act 2004 introduced a new development plan system to streamline the local planning process and enable a Local Development Framework (LDF) to replace previous Unitary Development Plans (UDP). The Council is working on its LDF that will set out the spatial strategy, policies and proposals to guide the future development and use of land in Thurrock up to the year 2021. It will replace the existing adopted Thurrock Borough Local Plan (1997), which is the current statutory plan.

The first stage is the Local Development Scheme (LDS). This is a programme for the preparation of the new Local Development Documents (LDD). Three of these will become statutory plans and they are called Development Plan Documents (DPD); these are:

Core Strategy and Policies for Control of Development (DPD) – these set out a spatial vision, objectives and strategy for the development of the Thurrock area and a framework for development control, minerals and waste.

Site Specific Allocations and Policies (DPD) – which contain detailed policies and site proposals that deliver the core strategy.

Minerals and Waste (DPD) – which contain detailed policies and proposals for the extraction and processing of minerals and the handling of commercial and residential waste.

In addition non-statutory Supplementary Planning Documents (SPD) will be prepared to accompany the above plans. These will be for Affordable Housing, Development Control Standards, Developer Contributions and the Green Grid.

The DPD, together with the Regional Spatial Strategy for the East of England will form the Statutory Development Plan for Thurrock.

The Council produced its first Local Development Scheme (LDS) in 2005. A revised local development scheme was subsequently approved and published in August 2007. The main effects of the changes in the revision to the local development scheme are summarised below:

- The programme for the preparation of the Core Strategy and Policies for Control of Development has been altered with the adoption date now October 2009.
- The stages of the Site Specific Allocations and Policies Development Plan Document have been slipped back and the Examination and Adoption stages have moved to September 2009 and April 2010 to follow on after publication of the Inspector's Report into the Examination of the Core Strategy Development Plan Document.
- The preparation of the Minerals and Waste Development Plan Document has been slipped with Adoption in June 2010.
- The Introduction of Interim Supplementary Planning Documents for Affordable Housing, Green Grid, Developer Contributions and Urban Character linked to "Saved Policies" and to be adopted in 2008.
- A new Urban Character and Design Supplementary Planning Document is added to the programme. The programme of Supplementary Planning Documents linked to Development Plan Documents is altered with adoption in March 2010.

Thurrock Thames Gateway Development Corporation

The Thurrock Thames Gateway Development Corporation TTGDC was established in October 2003 by Statutory Instrument as a special purpose delivery vehicle introduced to facilitate the realisation of the growth of homes and jobs within the Borough. TTGDC has significant powers to effect change. Specifically it is able to:

- Acquire, hold, manage, reclaim and dispose of land and other property

- Carry out building and other operations
- Seek to ensure the provision of water, electricity, gas, sewerage and other services
- Carry on any business or undertaking for the purposes of regenerating its area

TTGDC recognises that the development of appropriate transport and infrastructure are critical in meeting the growth targets. The Draft East of England Plan targets of 18,500 new homes and 26,000 new jobs to be delivered within Thurrock by 2021, this will clearly impact on a transport network that is already congested on a number of strategic routes (A13, M25 Junction 30 and 31) as well as locally around Lakeside and Grays Town Centre.

The Development Corporation has been developing the policy that will underpin the sustainable development of Thurrock and the realisation of these targets. A number of documents have recently emerged which will shape the way forward.

As from 12th October 2005 TTGDC became responsible for determining certain strategic and other planning applications in Thurrock. TTGDC prepared a 'Regeneration Framework' and a 'Spatial Plan'. In addition TTGDC is preparing local area master plans for (a) Purfleet, (b) Lakeside/West Thurrock, (c) Grays Town Centre, (d) Aveley & South Ockendon and (e) Tilbury.

As of 2012 the TTGDC was subsumed back within the Council, and thus the Council is now in control of planning policy in all areas of Thurrock excluding the Tilbury Docks.

London Gateway (Shellhaven)

A 1,500 acre major port and employment development (known as ‘London Gateway’) is proposed by P&O at the former Shellhaven refinery site, located at the eastern edge of the Borough. The developers of the scheme aim to create 16,500 new jobs, with the first business unit occupied in 2010 and the first container berths operational by 2011. It is envisaged that both the Port and the Business Park will be built in phases to meet market demand and that they will take between 10 and 15 years to complete fully.

The proposed London Gateway port will be capable of handling the largest deep-sea container ships. P&O’s proposals include a 2,300 metre long container quay with a fully developed capacity of 3.5 million TEU (standard containers) a year and a roll-on roll-off (ro-ro) freight facility. The Logistics and Business Park will cover a development area of 300 hectares (700 acres) and provide for the distribution, manufacturing and high-tech sectors. The Park will be able to accommodate buildings in excess of 100,000 sq m and will offer linkage to the rail network

Infrastructure Planning Commission

From 1 March 2010 a new planning body was introduced and will be involved in planning decisions for nationally important infrastructure projects:

The Infrastructure Planning Commission is the independent body that decides applications for nationally significant infrastructure projects. These are the large projects that support the economy and vital public services, including railways, large wind farms, power stations, reservoirs, harbours, airports and sewage treatment works.

IPC Commissioners make these decisions within the framework of National Policy Statements, also weighing the national benefit of proposals against the local impact.

On 1 October 2009, we opened for business providing advice to all parties who are involved in the process. From 1 March 2010, we were switched on to start receiving applications by government Minister John Healey MP.

The IPC was set up under the Government's 2008 Planning Act, alongside other reforms, to make the application process for nationally significant infrastructure projects faster, fairer and easier for people to get involved in.

Proposals for nationally significant infrastructure projects will be submitted to the IPC by applicants (such as energy companies, ports developers, rail and water companies).

5 Planning Applications

There have been no new planning applications in the borough that would have any significant impact on Air Quality.

6 Local Transport Plans and Strategies

Thurrock Transport Strategy

The Council's draft Thurrock Transport Strategy describes the transport strategy in Thurrock for the period 2008 to 2021 and will provide the main strategic focus for the third and fourth Local Transport Plans, as well as influence the on-going delivery of the second Local Transport Plan. It was produced in July 2008.

Key aims to meet the Council's vision relate to:

- Delivering Accessibility by improving accessibility by walking, cycling and public transport to services, as well as education, employment and healthcare
- Tackling Congestion by delivering a targeted programme of measures to reduce the need to travel, encourage a modal shift to more sustainable modes of transport such as walking and cycling, particularly in the urban areas, and improve the efficiency of the transport network, especially increasing the capacity of routes providing access to strategic employment hubs
- Improving Air Quality and Addressing Climate Change by seeking to reduce the need to travel and encouraging a modal shift (as per the congestion strategy above).
- Safer Roads – by supporting other strategy areas. The strategy, whilst aiming to reduce casualties where people are killed or seriously injured, will take a broader and proactive approach, aiming to reduce road danger and thereby promote modal shift and community regeneration, even where large numbers of collisions are not apparent. The strategy will also aim to create a safer transport system through implementing measures that will reduce collision severity.

7 Implementation of Action Plans

This section is explained in more detail in **Appendix C: Thurrock Air Quality Action Plan for Transport.**

As Thurrock Council operates a separate approach when dealing with air quality action planning for its AQMA's. Thurrock Council's Strategic Transport Team are responsible for bringing up new measures to mitigate air quality within its AQMA's. Based on liaison with Thurrock Council's Environmental Protection Team / Pollution Control. They produce their own Report for Air Quality Action Plan Measures & progress with these measures, which is explained in great detail in Appendix C.

Additional supporting information on the above measures and progress towards their completion to be added here …

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

This Air Quality and Action Plan Progress Report for 2013 fulfils the requirements of the Defra LAQM (PG 09) guidance and has updated monitoring results in the Borough and noted new relevant local developments and other initiatives. It also advises on the Council's progress in implementing its Action Plan.

The up to date monitoring results continue to indicate that the Government's current air quality objectives for NO_2 and PM_{10} are exceeded widely at locations across the Borough where there is relevant public exposure. Based on the findings in this report still need to complete further detailed modelling of the Tilbury Calcutta Road and Dock Road exceedences in order to confirm the full extent of the exceedence of the annual mean objective for NO_2, in order to then Declare an AQMA and to come up with a new Air Quality Action Plan for this AQMA.

Further to this the Council will undertake a Detailed assessment for NO_2 based on exceedence of the annual mean limit for NO_2 at two new Locations, the first of which is located along the Purfleet By-Pass in Purfleet, and the second being the main High Street along Aveley and Aveley Ship Lane, as there is relevant public exposure in these two locations. Based on the findings the Council will determine if an AQMA is required.

There are no new breaches of the air quality standards for SO_2, O_3, or PM_{10}, and as confirmed in the last Updating Screening Assessment the exceedence of SO_2 around the Coryton Refinery is no longer applicable with the mothballing of the site due to the liquidation of Petroplus.

The purpose of the Council's Air Quality Action Plan is to ensure that air quality is considered corporately and to seek to reduce air pollution within the Borough, in pursuit of the Government's air quality objectives. The Council is however limited in its abilities to influence local air quality directly as outlined in its Stage 4 Further Assessment report, partly as a result of pollution arising elsewhere in London (and beyond) and also because it has limited responsibility for the main sources of emissions within the Borough. The major roads in the Borough are the responsibility of the Highways Agency, rather than the Council. The Action Plan does however include measures to seek to reduce traffic flow and vehicle emissions that are consistent with other Council policies.

The Council's progress on its current Air Quality Action Plan, has not brought about the improvements in Air Quality it would have anticipated, it has been decided that the old method of having a table of measures is now out of date and to generalised and not a good method of showing progress in improving air quality. It is recognised that all of Thurrock's AQMA's are affected by Road Traffic based emissions, and any real improvement in Air Quality within Thurrock's AQMAs has to come from within Thurrock Council's own Strategic Transport Department. So a more focused approach is required rather than the old system of soft generalised measures which have been outlined in previous Air Quality Reports which don't actually give any real benefit to local Air Quality. By looking at individual AQMA's and prioritising them and coming up with traffic related schemes which have a more direct impact on that specific AQMA is the way forward. All of the proposed schemes for individual AQMA's are listed in (Appendix 3) which includes an additional report solely focused on Air Quality Action Plan Measures written by our consultants Small Fish working on behalf of Thurrock Council's Strategic Transport Department.

It was intended that the Council would carry out detailed modelling during 2012, this however did not happen due to issues with our consultants being able to deliver on-time. This modelling work is now to be conducted by the Council itself in-house, which will unfortunately push the time-scale for delivery passed the original date stated. The Council will therefore carry out further detailed dispersion modelling in 2013 / 2014 for NO_2 and PM_{10} across the entire borough of Thurrock, in order to reassess its current AQMAs and see if some of them still represent relevant public exposure to

these pollutants, or if there maybe new areas which may represent public exposure to these two pollutants.

The Council will continue its air quality monitoring programme and prepare for the next round of review and assessment, including the next Progress Report 2014.

8.2 Conclusions relating to New Local Developments

There are no new developments which will have any significant impact on air quality which might require the need for a Detailed Assessment.

8.3 Other Conclusions

N/A

8.4 Proposed Actions

- Council will undertake a Detailed Assessment for NO_2 based on exceedence of the annual mean limit for NO_2 at two new Locations, the first of which is located along the Purfleet By-Pass in Purfleet, and the second being the main High Street along Aveley and Aveley Ship Lane, as there is relevant public exposure in these two locations. Based on the findings the Council will determine if an AQMA is required. It is hoped these Detailed Assessments will be completed by the end of 2014
- The Council will submit an Air Quality Progress Report in 2014
- The Council will submit a Further Assessment based on the annual mean objective for NO_2 for Tilbury, to determine the extent and size of an AQMA which will be needed based on detailed dispersion modelling of the area.

9 References

Air Quality Expert Group, 2007. Trends in Primary Nitrogen Dioxide in the UK. Defra, London.

Carslaw D.C and Beevers S.D, 2005. Evidence of an increasing NO_2/NOx emissions ratio from road traffic emissions. Atmospheric Environment 39, 2049-2059.

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

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

Defra, 2009. Local Air Quality Management, Technical guidance LAQM.TG09. Defra, London.

Defra, 2009. Local Air Quality Management, Policy Guidance LAQM. PG09. Defra, London.

Thurrock (2012). Local Air Quality Management – Updating and Screening Assessment 2012

Thurrock (2011) Local Air Quality Management – Air Quality Progress Report. 2011

ERG, 2007. Air Quality in London 2006-7. London Air Quality Network Report 14. ERG, King's College London 2008.

Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Appendix B: List Industrial Processes in the Borough

Appendix C: Thurrock Air Quality Action Plan for Transport

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion Tube Bias Adjustment Factors

Thurrock Council undertook monitoring at 54 NO2 diffusion tubes sites in 2012.

- The diffusion tubes are supplied and analysed by Gradko Environmental.
- Preparation method : 20% TEA in water
- United Kingdom Accreditation Services (Testing Laboratory number 2187).

Discussion of Choice of Factor to Use

Thurrock Council undertook its own local bias adjustment factors. As it has a very diverse air quality environment and thus the national bias adjustment factors may unfairly bias the diffusion tube results. Hence this is the reason why Thurrock has four individual locally derived factors, each factor provides a different local bias, which in turn is then applied to whichever diffusion tube site most represents that local bias factor. (Local Bias Factors for all years listed in the table below). I.e. the (TK8) factor is influenced by a high proportion of HGV's relative to Cars, whereas the (TK4) factor is almost exclusively influenced by Cars.

There are also other local factors which may not be accounted for, i.e. fugitive emissions from industrial plants power generation etc, which may unfairly bias certain sites, but as most of the diffusion tubes are roadside sites and most of the bias factors are roadside sites, and the predominant source of air pollution locally is influenced by the roads, it was deemed more appropriate to use local bias factors rather than a regional or national bias factor. For background sites it was appropriate to use our own local urban background factor from (TK1).

Factor from Local Co-location Studies

Thurrock Local Bias Adjustment Factors (2002 to 2012)

Year	Thurrock 1 (UB) (TK1)			Thurrock 3 (R) (TK3)			Thurrock 2 & 8 (R) (TK8)			Thurrock 4 (R) (TK4)		
	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**	68.57	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**
2012	31.42	28.24	**1.11**	34.12	35.78	**0.95**	62.54	54.7	**1.14**	41.5	37.56	**1.11**

*(**Note Bias results for 2012 are based on 10 months diffusion tube data only as June and July are not included)*

Also historically the local bias factors (listed in the table above) from year to year typically vary by less than 10%, which also indicates good precision between the co-located diffusion tube and automatic monitoring site.

PM Monitoring Adjustment

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*

QA/QC of Automatic Monitoring

There are a number of different organisations responsible for carrying out QA/QC at various stations and equipment at Thurrock's automatic monitoring sites.

For Thurrock 1, Grays AURN site, the QA/QC is managed by Bureau Veritas (BV) and by Ricardo AEA, the site Audits are conducted by Ricardo AEA. Service contracts do vary, all the gas analysers are maintained by Enviro Technology, and the PM_{10} FDMs is maintained by Air Quality Monitors.

For Thurrock 3, Stanford-le-Hope site, this is an affiliated site on the AURN network and is also part of the London Air Quality Network (LAQN). The QA/QC is managed by Environmental Research Group (ERG) at King College London (KCL), the site Audits are conducted by Ricardo AEA. The Service contracts are managed by Enviro Technology.

For Thurrock 4, Tilbury site, this is also part of the London Air Quality Network (LAQN). The QA/QC is managed by Environmental Research Group (ERG) at King College London (KCL). The site Audits are conducted by Ricardo AEA. The Service contracts are managed by Enviro Technology.

For Thurrock 8, Purfleet site, this is also part of the London Air Quality Network (LAQN). The QA/QC is managed by Environmental Research Group (ERG) at King College London (KCL). The site Audits are conducted by the National Physical Laboratory (NPL). The Service contracts are managed by Enviro Technology.

Calibrations for all sites are done every fortnight by Thurrock Council Environmental Health Officers & the Air Quality Officer.

QA/QC of Diffusion Tube Monitoring

Diffusion Tube studies for Gradko analysis using 20% TEA in water over 2012 demonstrated overall Good Precision http://laqm.defra.gov.uk/documents/Tube_Precision_2013_version_09_13-Final.pdf

Appendix B: List Industrial Processes in the Borough

Table 22 Part A1 installations 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	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
Inustrial Chemicals Limited	DP3637SG	TITAN WORKS,TITAN INDUSTRIAL ESTATE, GRAYS, ESSEX	INORGANIC CHEMICALS
Pura Foods Limited	BU7677IZ	Pura Foods London Road PURFLEET Essex	ANIMAL, VEGETABLE AND FOOD

Table 23 Part B installations in Thurrock (excluding dry cleaners)

Reference numb	Operator	Address	Process / activity undertaken
A2 001 V2	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
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
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
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
B185 V1	Balgores Motors 1982 Limited	Unit3 Manor Road, WT RM20 4BA	Respraying of road vehicles
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
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
B195	Fairlight Vehicles Limited	Patricia Drive, Fobbing SS17 9HR	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
A2	Kerneos Limited	Dolphin Way PURFLEET Essex	CEMENT AND LIME
B206	Seales Road Haulage Ltd	7A Juliette Way, Purfleet Ind Est, Purfleet	Mobile crushing and screening

**Pink indicates that process has changed from an A2 to a Part B installation*

Table 24 Part B installations in Thurrock – Service Stations

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 25 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 26 Part B installations no longer in operation

Reference n	Operator	Address	Process/ activity undertaken
B198	Thurrock 4x4 Centre	Oliver Road West Thurrock Essex	Small waste oil burner
B191	Flavin Consulting Limited	1 One Tree Hill, SLH SS17 9NH	Small waste oil burner
B204	Steintec Paving Systems	728 London Road, WT RM20 3LU	Blend / pack / load / use of bulk
B103	Hanson Thermalite Limited	Motherwell Way, WT, Essex RM20 3LB	Blend / pack / load / use of bulk
B119	Brett Concrete Limited	Magnet Industrial Estate, WT RM16 1DB	Blend / pack / load / use of bulk
B184	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM191SR	Mobile crushing and screening
B186	G Killoughery Limited	Beacon Hill Ind. Est. Purfleet RM19 1SR	Mobile crushing and screening

Table 27 Inactive Part B installations

Reference n	Operator	Address	Process/ activity undertaken
B171	BP Oil UK Limited	Manorway, Coryton, SLH SS17 9LQ	Storage, loading, unloading of petrol

Appendix C: Thurrock Air Quality Action Plan for Transport

Thurrock Interim Air Quality Action Plan for Transport

2012/13 – 2014/15

Living Draft – March 2013

Prepared on behalf of Thurrock Council:
Small Fish
www.smallfish.org.uk

Table of Contents

▪ Introduction

○ Background

In Thurrock, Air Quality issues have been highlighted in relation to two regulated air pollutants – Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}).

Particulate Matter is generally categorised on the basis of the size of the particles and is made up of a wide range of materials and arises from a variety of sources. Concentrations of PM comprise primary particles emitted directly into the atmosphere from combustion sources and secondary particles formed by chemical reactions in the air.

PM derives from both human-made and natural sources, but in the UK the biggest human-made sources are stationary fuel combustion and transport. Road transport gives rise to primary particles from engine emissions, tyre and brake wear and other non-exhaust emissions. Other primary sources include quarrying, construction and non-road mobile sources.

Both short-term and long-term exposure to ambient levels of PM are consistently associated with respiratory and cardiovascular illness and mortality, as well as other ill-health effects, and these associations are believed to be causal. It is not currently possible to discern a threshold concentration for PM below which there are no effects on the whole population's health.

All combustion processes in air produce oxides of nitrogen (NO_x). Nitrogen Dioxide (NO_2) and Nitric Oxide (NO) are both oxides of nitrogen and together are referred to as NO_x. Road transport is typically the main source, followed by the electricity supply industry and other industrial and commercial sectors.

NO_2 is associated with adverse effects on human health. At high levels NO_2 causes inflammation of the airways. Long-term exposure may affect lung function and respiratory symptoms. NO_2 also enhances the response to allergens in sensitive individuals.

High levels of NO_x can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from NO_x emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity, often at locations far removed from the original emissions. NO_x also contributes to the formation of secondary particles and ground level ozone, both of which are associated with ill-health effects and also damages vegetation.

○ Policy Context

Action to manage and improve air quality is largely driven by EU legislation. The most recent EU Ambient Air Quality Directive (2008/50/EC) is a revision of previously existing European air quality legislation, and sets out long-term air quality objectives and introduces new air quality standards. The 2008 directive replaced nearly all the previous EU air quality legislation and was made law in England through the Air Quality Standards Regulations 2010, which establishes mandatory standards for air quality and sets limits and guides values for sulphur and nitrogen dioxide, suspended particulates and lead in air. Those limit values relevant to Thurrock at set forth in **Figure 1** below.

Figure 1: Pollutant Objectives Relevant to Thurrock

Pollutant	Objective	Concentration Measured as	Date (European obligations)
Nitrogen Dioxide (NO_2)	40 µg/m^3	Annual Mean	1 January 2010
Particles (PM_{10})	50 µg/m^3 not to be exceeded more than 35 times a year	24 hour mean	1 January 2005

The UK *Air Quality Strategy* (2007) sets out a way forward for work and planning on air quality issues. It also reiterates the air quality standards and objectives to be achieved and introduces a new policy framework for tackling fine particles. Furthermore, the strategy identifies potential new national policy measures which modeling indicates could give further health benefits and move closer towards meeting the strategy's objectives.

Part IV of the Environment Act 1995 introduced air quality responsibilities to both national and local government throughout the UK. These responsibilities include the requirement upon local authorities to periodically review and assess air quality across their areas. Air quality objectives have been set for those air pollutants deemed to be of most concern. Seven of these pollutants are included under the Local Air Quality Management regime and regulations for these were introduced.

The Local Air Quality Management regime requires all local authorities to review and assess the quality of their local air quality in a staged process. Should this confirm that any of the objectives will not be met within the required timescale, the local authority must designate Air Quality Management Areas (AQMAs) and produce a Local Air Quality Action Plan setting out how it intends to improve air quality in these areas.

In April 2001 Thurrock Council declared twenty AQMAs for exceeding threshold annual average limit values for nitrogen dioxide (NO_2), four of which were also designated for exceeding the 24-hour mean limit value for particulate matter (PM_{10}). Subsequently, an Air Quality Action Plan was published in November 2004.

Air quality in Thurrock was reassessed in 2004 through Detailed Assessment. The aim was to identify with reasonable certainty whether or not exceedences of the air quality objectives will be likely to arise. It identified that seven AQMAs should be revoked and two additional AQMAs to be designated. This resulted in a total of 15 AQMAs for exceeding the annual average NO_2 objective, four of which were previously designated for also exceeding the 24-hour mean PM_{10} objective. Source apportionment exercises determined that the primary cause of exceedence in all of the 15 AQMAs was road transport.

Of the 15 road transport related AQMAs in Thurrock shown in **Figure 2**, all were designated for exceeding the annual average nitrogen dioxide (NO_2) objective of 40µg/m^3. AQMAs 5, 7, 8 and 10 have also been jointly declared for also exceeding the 24-hour mean particulate matter (PM_{10}) objective of 50µg/m^3, which is not to be exceeded more than 35 times a year.

Figure 2: Thurrock AQMAs

AQMA	Pollutant	Description of Air Quality Management Area
1	NO_2	479 properties in Grays town centre and London Road Grays
2	NO_2	220 properties on London Road South Stifford and adjoining roads
3	NO_2	60 properties on the east side of Hogg Lane and Elizabeth Road
4	NO_2	56 properties to the west of Chafford Hundred Visitor Centre
5	NO_2 and PM_{10}	65 properties surrounding Warren Terrace, A13 and A1306
7	NO_2 and PM_{10}	2 hotels next to M25
8	NO_2 and PM_{10}	1 hotel next to Jct 31 of the M25
9	NO_2	1 Hotel next to Jct 31 of the M25
10	NO_2 and PM_{10}	76 properties on London Road Purfleet near to Jarrah Cottages
12	NO_2	15 properties on Watts Wood estate next to A1306
13	NO_2	15 properties on London Road Aveley next to A1306
15	NO_2	1 listed building near to M25 on edge of Irvine Gardens, South Ockendon
16	NO_2	1 Cottage next to M25 off Dennis Road
21	NO_2	1 hotel on Stonehouse Lane
23	NO_2	115 properties next to London Road West Thurrock
24	NO_2	Pending declaration – Calcutta Road in Tilbury

The spatial distribution of AQMAs in Thurrock is shown in **Figure 3.** It is evident from the map that almost all of the AQMAs in Thurrock occur in the western part of the borough.

Figure 3: Thurrock Air Quality Management Areas

▪ Current State of Air Quality in Thurrock

○ PM_{10}

Thurrock Council has declared four AQMAs (5, 7, 8 and 10) for also exceeding the 24-hour mean particulate matter (PM_{10}) objective of 50µg/m^3, which is not to be exceeded more than 35 times a year. However, as shown in **Figure 4** below, PM_{10} concentrations throughout the Borough have not exceeded the 24-hour mean objective more than 35 times a year since 2007 (Thurrock 2). As a result, the remainder of this report will therefore focus entirely on NO_2 concentrations.

Figure 4: 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 ?g 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 ?g 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 ?g 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 ?g 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 ?g 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)

- **NO_2**

All of Thurrock's AQMAs have been declared for exceeding the 40 µg/m^3 limit value of annual mean concentrations of NO_2. **Figure 5** below outlines the measured NO_2 concentrations within Thurrock's AQMAs between 2007 and 2011, with bold figure identifying exceedences of the limit value.

Figure 5: NO_2 Bias corrected diffusion tube monitoring in Thurrock - 2007 to 2011 (µg m^{-3})

AQMA	Site	2007	2008	2009	2010	2011
1	London Road Grays (R)	**43.61**	**42.99**	39.36	**40.33**	37.51
1	Queensgate Centre Grays (R)	**47.23**	**41.81**	37.12	37.78	34.19
1	Cromwell Road Grays (I)	37.39	37.62	34.07	33.63	30.84
1	Poison Store AURN Site (UB)	33.91	30.83	31.01	28.55	28.65
1	Stanley Road Grays (R)	34.97	35.53	32.55	35.85	27.95
2	London Road South Stifford (R)	**50.19**	**48**	**46.08**	**46.78**	**43.08**
3	Elizabeth Road (R)	**53.82**	**53.51**	**49.28**	**53.77**	**46.95**
3	Hogg Lane (R)	38.09	37.35	32.72	36.43	29.93
5	A1306 (R)	**64.04**	**58.12**	**50.62**	**55.58**	**53.04**
5	Howard Road (R)	38.11	38.28	33.72	36.61	29.2
7	Ibis Hotel (UB)	**57.94**	**50.07**	**47.56**	**51.96**	**50.62**
10	Jarrah Cottages (R)	**68.64**	**59.3**	**60.58**	**68.33**	**62.7**
12	Watts Crescent (R)	**46.37**	**43.97**	38.06	**42.22**	38.7
13	London Road Arterial Road (R)	**78.31**	**68.36**	**69.48**	**69.11**	**63.93**
13	London Road Arterial Road (North) (R)					**40.62**
13	London Road Arterial Road (South) (R)					36.59
15	Gatehope Drive (UB)	39.17	35.41	33.43	30.53	32.42
16	Kemps Cottage (UB)	**41.51**	34.88	36.11	32.48	35.89
21	Stonehouse Lane (R)	**59.57**	**52.1**	**54.08**	**59.2**	**54**
23	London Road W Thurrock (R)	**46.12**	**45.82**	39.04	39.43	38.8
24	Broadway Intersection (R)			39.17	**41.8**	**49.87**
24	St Andrews Road (R)			35.95	**42.71**	**47.66**
24	Calcutta Road East (R)			34.42	39.31	**41.34**
24	Calcutta Road North (R)			28.65	34.04	**40.84**
24	Dock Road (R)			36.21	**41.16**	39.83

Note: There is no diffusion tube monitoring undertaken within AQMA 4, and the A1306 roadside site within AMQA 5 is typically used as a proxy measurement for this AQMA.

○ Projecting 2015 Concentrations

As shown in the previous section, many of Thurrock's AQMAs did not achieve the 2010 target date for compliance with annual mean NO_2 limit values, and this is a common theme across the UK. As Defra initially requested a compliance time limit extension for NO_2 to 2015, it is important to consider what NO_2 concentrations within Thurrock's AQMAs may be in that year, to determine whether some areas may be expected to fall below the limit value by 2015, without any specified action.

Box 2.1 of Defra's LAQM Technical Guidance (TG09) allows a formulaic approach to projecting future year NO_2 concentrations for inner London, outer London and the rest of the UK. As Thurrock is not in "inner London", this formula has not been used, but predictions using the TG09 formulas have been used to project possible NO_2 concentrations in Thurrock's AQMAs using both the "outer London" formula, as well as the "rest of the UK" and these results are outlined in **Figure 6** below.

However, since publication of the Technical Guidance in 2009, Defra commissioned a separate study, published in 2012 by Bureau Veritas, to develop an "alternative" NO_2 forecasting method, as studies were consistently showing that recent monitoring data was suggesting that reductions in NO_2 concentrations in recent years have been much smaller than previously forecast. The study outlines that in some areas use of the Defra TG(09) projection formula may result in overly optimistic prediction of air quality for assessment covering years 2011 to 2020. To that end, Bureau Veritas developed an alternative forecasting method and this has also been utilised to determine 2015 concentrations of NO_2 in Thurrock's AQMAs and the results are outlined **Figure 6** below.

Using the "outer London" formula, it is predicted that only one AQMA in Thurrock will remain over the limit value in 2015, and given past experience this does appear to be extremely optimistic. The "rest of the UK" formula shows only six Thurrock AQMAs over the limit value in 2015, two of which are only marginally above, but this again this seems optimistic. The alternative method shows the highest predicted 2015 concentrations of NO_2 concentrations, with 10 AQMAs predicted to remain above the limit value by 2015. It was felt that this conservative estimate was the most appropriate to use in planning for air quality improvements in Thurrock.

Figure 6: Projected 2015 NO_2 Concentrations

AQMA	2011 Concentration	2015 Estimate (Outer London)	2015 Estimate (Rest of UK)	Alternative 2015 Forecast
1 (London Road)	37.51	27.65	28.31	36.50
1 (Queensgate Centre)	34.19	25.30	25.64	33.27
1 (Cromwell Road)	30.84	22.82	23.13	30.01
1 (Poison Store)	28.65	21.20	21.49	27.88
1 (Stanley Road)	27.95	20.68	20.96	27.20
2	**43.08**	31.76	32.52	**41.92**
3 (Elizabeth Road)	**46.95**	34.61	35.44	**45.69**
3 (Hogg Lane)	29.93	22.15	22.45	29.13
4*	**53.04**	39.10	**40.03**	**51.61**
5 (Eastern End)	**53.04**	39.10	**40.03**	**51.61**
5 (Howard Road)	29.20	21.53	22.04	28.41
7	**50.62**	37.32	38.21	**49.26**
8	**54.00**	39.81	**40.76**	**52.55**
9	**54.00**	39.81	**40.76**	**52.55**
10	**62.70**	**46.22**	**47.33**	**61.01**
12	38.70	28.53	29.21	37.66
13	**40.62**	29.94	30.66	39.53
15	32.42	23.90	24.47	31.55
16	35.89	26.46	27.09	34.93
21	**54.00**	39.81	**40.76**	**52.55**
23	38.80	28.60	29.29	37.76
24 (Pending Declaration)	***49.87***	*36.76*	*37.64*	***48.53***

**AQMA 4 contains no diffusion tube monitoring, and therefore the diffusion tube within the eastern end of AQMA 5 has been used as a proxy.*

▪ Prioritisation

○ Exclusion

In prioritising AQMAs for interim transport actions between 2012/13 and 2014/15, it was first necessary to determine whether there are any AQMAs that are unlikely to require any transport action at all. To that end, several AQMAs have been excluded from action planning on the following basis:

1) AQMAs where no relevant receptors or exposure exists, i.e. hotels; or
2) AQMAs that are either currently or forecast to be at least 10% lower than the pollution limit value in 2015, i.e. less than 36.0µ/m^3.

Under the first criteria, it was determined that in AQMAs 7, 8, 9 and 21, hotels are the only receptors within each AQMA. As hotels do not typically house permanent residents, these AQMAs do not present a risk of long term exposure to air pollutants. In accordance with LAQM TG (09), annual mean objectives should generally not apply at hotels (unless people permanently reside there). It has been confirmed with the hotels that they house no permanent residents. Therefore, these four AQMAs do not have any relevant exposure and, consequently, have been excluded from action to reduce air pollution, as they contain no relevant receptors.

Under the second criteria, we found that two of the AQMAs within Thurrock – AQMA 15 and AQMA 16 – should also be excluded from action planning. Concentrations of NO_2 in these two AQMAs are currently more than 10% below the limit value and are forecast to be even lower by 2015.

Additionally, as shown in **Figure 6** parts of AQMAs 1, 3 and 5 are also currently significantly more than 10% below the limit value and are forecast to be even lower by 2015. As only parts of these AQMAs meet this criterion, these AQMAs have not been excluded entirely from prioritisation, but transport measures will instead be focused only on those parts of these AQMAs that are above the limit value, which are as follow:

- AQMA 1: London Road only
- AQMA 3: Elizabeth Road only
- AQMA 5: Clockhouse Lane to B186/B146 junction (Pilgrim's Lane) only
-

○ Deferral

In addition to exclusion, there are several AQMAs where there is uncertainty regarding the air pollution problem, such in relation to sources of air pollutants, as well as fall off distances in relation to receptors. Developing transport actions for these AQMAs has therefore been deferred until a Further Assessment of the Borough (planned for 2013) is completed, as this assessment should provide additional information that will be critical to planning effective transport measures for improving air quality. Those AQMAs where planning actions will be deferred until Further Assessment is completed are outlined below.

AQMA 3

AQMA 3 on Elizabeth Road presents some significant issues regarding certainty of the air quality problems within this area. Although receptors are generally set back a bit from the road making some pollution fall off likely, it is unlikely to be to of a magnitude significant enough to mitigate air quality issues entirely. **Appendix A** shows the estimated fall off of NO_2 with distance for AQMA 3.

Source apportionment exercises (using road traffic data from Hogg Lane as a proxy), shows that total road transport emissions across all vehicles classes only contribute 18% to the total NO_2 concentrations, or 6.61 μ/m^3. The difficulty with this lies in the fact the measured 2011 NO_2 concentration on Elizabeth Road was 46.96 μ/m^3, which is 17.4% over the limit value. Therefore, closing Elizabeth Road to all traffic (which is unlikely to be pragmatic or feasible) would likely be the only way to effectively reduce transport emissions to bring AQMA 3 in line with the 40.0 μ/m^3 limit value. It is also uncertain whether road traffic patterns on Hogg Lane are truly representative of those on Elizabeth Road, as southbound traffic may be turning off onto Devonshire Road instead of proceeding onto Hogg Lane and vice versa.

Additionally, the removal of the Devonshire Road weight restriction is likely to introduce additional HGV traffic onto Elizabeth Road, as outlined in the *South Stifford Traffic Study* (Mouchel, 2011) and this could significantly alter the composition of the HGV source contributions to NO_2 concentrations. It therefore seems prudent to wait until this scheme is fully implemented, in order to understand its air quality impacts on AQMA 3 prior to devising transport measures and solutions for improving air quality.

Therefore, further investigation and work is required in AQMA 3 to garner a better and more detailed understanding of the sources of NO_2 and the contributions of these sources to annual mean NO_2 concentrations, as well as fall off distances and traffic monitoring. As a result of these uncertainties, developing transport actions to reduce NO_2 concentrations within this AQMA at this point in time is likely to be ineffective until a full understanding of the problems and issues within AQMA 3 on Elizabeth Road can be reached.

AQMA 4

AQMA 4 is very unusual in that no diffusion tubes are located within the AQMA and currently the diffusion tube at the eastern end of AQMA 5 is being used as a proxy. Additionally, there is a significant distance between the roadside and the receptor facades and, given that NO_2 concentrations fall off considerably with distance, the magnitude of the issue at the relevant receptor facades is uncertain. There is also very tall natural screening and bunding between the roadside and the receptor facades, which likely blocks a great deal of pollution from reaching the relevant receptors. These two issues, when coupled with a lack of monitoring equipment and data, create a significant amount of uncertainty regarding whether or not there is an NO_2 pollution issue at the relevant receptors within this AQMA and if so what the true magnitude of the problem is. This should be modelled through the Further Assessment to get a more complete picture and understanding of the air pollution issues within this AQMA.

AQMA 12

Properties (and therefore receptors) in AQMA 12 are generally set back by more than 16m from the roadside, making significant pollution fall off likely. To determine the likely magnitude of NO_2 pollution fall off with distance from the roadside, Defra's "NO_2 with Distance from Roads" calculator was used to estimate the likely annual mean concentration of NO_2 at the nearest receptor façade. For AQMA 12, input of the necessary data into the calculator revealed that, although the 2010 annual mean roadside NO_2 concentration is 42.22 μ/m^3 (and 2011 was even lower at 38.7 μ/m^3), the likely concentration at the receptor facades is estimated to be only 35.9 μ/m^3, which is slightly more than 10% below the limit value – a relatively safe margin. **Appendix A** shows the estimated fall off calculations in more detail.

Fall off distances for AQMA 12 should be modelled in more detail through the Further Assessment for the Borough before any transport action planning is undertaken.

AQMA 24 (Pending)

Finally, actions to reduce emissions from transport within AQMA 24 are not proposed within this report, as the extent and magnitude of the final declaration for this is currently unknown until formal Further Assessment and source apportionment exercises are undertaken.

○ Prioritisation

As a result of the exclusion and deferral exercises, **Figure 7** below outlines the remaining six AQMAs prioritised for interim transport actions between the 2012/13 and 2014/15 financial years, the dominant pollution sources and the magnitude level of action required. Although the annual mean limit value for NO_2 concentrations is 40.0 μ/m^3, due to annual fluctuations in NO_2 emissions from outside factors, such as climate and meteorology, 36.0 μ/m^3 should generally be aimed for.

Figure 7: AMQAs Prioritised for Interim Transport Actions

AQMA	Notes	Dominant Source	Level of Action Required
10	Highest NO_2 concentration	HGVs	High
5 (B186 to Clockhouse Lane only)	Second highest NO_2 concentration	Cars	High
2	Just above limit value	Local Background	Medium
13	Just above limit value (at receptor façade)	HGVs	Medium
23	Just below limit value	HGVs and Background	Low
1	Just below limit value	Buses	Low

○ Short-Term Air Quality Management Summary

Taking together the exclusion, deferral and prioritisation exercises carried out in the previous sections, a summary of the short-term management of air quality in Thurrock for each AQMA is outlined in **Figure 8** below.

Figure 8: Thurrock AQMAs

AQMA	Short-Term Management
1	Requires low level transport action, as detailed in **Section 4.6**.
2	Requires medium level transport action, as detailed in **Section 4.3**.
3	Awaiting Further Assessment to confirm air quality issues.
4	Awaiting Further Assessment to confirm air quality issues.
5	Requires high level transport action, as detailed in **Section 4.2**.
7	Possible revocation, as a hotel. To be confirmed through Further Assessment. No transport action required.
8	Possible revocation, as a hotel. To be confirmed through Further Assessment. No transport action required.
9	Possible revocation, as a hotel. To be confirmed through Further Assessment. No transport action required.
10	Requires high level transport action, as detailed in **Section 4.1**.
12	Awaiting Further Assessment to confirm air quality issues.
13	Requires medium level transport action, as detailed in **Section 4.4**.
15	Possible revocation, as continually more than 10% below limit value since 2008. To be confirmed through Further Assessment.
16	Possible revocation, as continually more than 10% below limit value since 2008. To be confirmed through Further Assessment.
21	Possible revocation, as a hotel. To be confirmed through Further Assessment. No transport action required.
23	Requires low level transport action, as detailed in **Section 4.5**.
24	Awaiting Further Assessment to confirm air quality issues.

▪ Interim Transport Action Plans

This chapter contains the interim transport action plans for the six prioritised AMQAs following on from exclusion and deferral. Each section outlines the existing air quality situations with each AQMA, as well as the source apportionment and current actions that are underway to improve air quality in these areas. Each section also includes a table showing possible transport actions that could be undertaken to improve air quality and these tables outline:

- the likely air quality impact of each action (with detailed estimates in μ/m^3 provided where possible);
- the magnitude (in £s where possible) and type of cost;
- Possible implementation timescales;
- Whether any alternative options are available; and
- Any additional comments/notes.

Following on from the summary table of possible actions is a discussion of the short-term transport actions that are recommend to be taken forward between 2012/13 and 2014/15.

○ AQMA 10 – London Road, Purfleet

Background

AQMA 10 is comprised of 76 properties on London Road in Purfleet including Jarrah Cottages and was declared in 2001 for exceeding both the annual mean NO_2 objective and the 24-hour mean PM_{10} objective. In 2011, the annual mean NO_2 concentration in this area was 57% above the limit value at 62.7 $\mu g/m^3$.

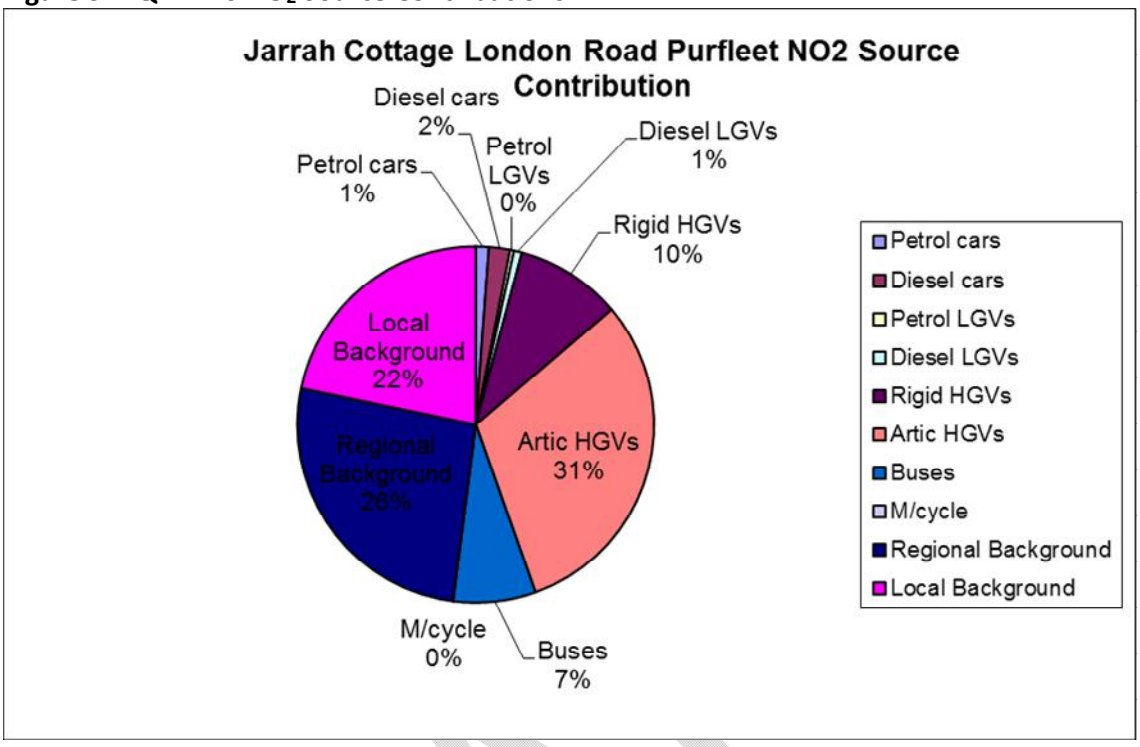
Although also declared for exceeding the 24-hour mean PM_{10} objective of 35 days per year, no PM_{10} monitoring locations in Thurrock have been shown to have exceeded this limit since 2007.

AQMA 10 on London Road in Purfleet provides access from the north, south and east to the industrial sites on the north side of the Thames in Purfleet, such as Esso and Cobelfret.

Sources of NO_2

Recent source apportionment exercises undertaken by the Thurrock Council Pollution Control Team have resulted in identifying the proportional source contributions within AQMA 10. As can be seen in **Figure 9** below, 26% of NO_2 emissions in this area arise from regional background sources, over which Thurrock Council has little, if any, influence and a further 22% arise from local background sources. Additionally, another 31% of NO_2 emissions arise from articulated HGVs, with a further 10% from rigid HGVs. This shows that HGVs are responsible for a significant proportion of NO_2 emissions within this AQMA, although background sources are also high.

Figure 9: AQMA 10 NO_2 Source Contributions



Current Actions to Reduce NO_2

Through its LSTF programme, Thurrock Council is currently undertaking a raft of freight measures focused on reducing emissions from HGVs. The programme includes the development of a Freight Quality Partnership (FQP) and this 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, such as AQMA 10. The Thurrock Freight Quality Partnership currently has 43 members, with a goal to increase this to 100 members by March 2015.

Through this forum, they will look to deliver opportunities for freight fleets to undergo Eco-driver training, including drivers within the council's own vehicle fleet. This measure will work to inform freight vehicle drivers of ways to improve fuel economy, reduce emissions and save money through more efficient driving practices. The SAFED driver training programme has been rolled out to six organisations to date, with a target to train 63 drivers per annum across ten organisations. Additionally, Eco-Driver training for 12 Ensign bus drivers began in March 2013, and if considered successful, will continue in 2013/14.

To further incentivise these projects, an "Eco-Stars" accreditation scheme has been adopted, where operators demonstrating significantly improved environmental performance and management, resulting from freight LSTF measures, can be recognised for their achievements. To date, 11 operators are signed up to the scheme, covering 403 vehicles, with a view to continuing to deliver at this rate to March 2015. It is estimated that the potential quantified level of emissions reduction as a result of the Eco Stars programme is 50% for NO_x and PM_{10}.

- **Figure 10: Recommend Transport Actions for AQMA 10**

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
Public Transport						
Hybrid Buses (Route 44)	Medium – Up to 2.0 µg/m^3	Approx. £275k per bus	Capital (operator)	Short	Funding secured for six from the DfT Green Bus Fund, but being used on Route 22	Bus Eco-Driver Training
Bus Eco-Driver Training (Route 44)	Low – up to 0.5 µg/m^3	Approx. £350 per driver	Revenue (LSTF)	Short	Ancillary benefits in other AQMAs, as well as fuel and CO_2 reductions	Hybrid Buses
HGVs						
FQP	None	Approx. £60k per annum	Revenue (LSTF)	Underway	No emissions reductions on its own, but needed to facilitate HGV measures	•
Eco-Freight Accreditation	None	Included in FQP	Revenue (LSTF)	Underway	No reductions on its own, but may encourage uptake of other measures	•
HGV Eco-Driver Training	Low - Up to 0.6 µg/m^3	Approx. £350 per driver	Revenue (LSTF)	Underway	Focused on Esso, Cobelfret, etc.	

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
HGV Weight Restriction on London Road within AQMA	High – Up to 25.0 µg/m^3	Medium	Revenue & Capital	Medium	May displace NO_2 emissions elsewhere and increase CO_2 emissions	HGV Distributor Road
HGV distributor road from London Road to freight destinations	High - Up to 25.0 µg/m^3	High	Capital	Long	As indicated in Purfleet Masterplan (Fig.11 p. 43)	Weight restriction

NO_2 Impact:

Low = < 1.0 µg/m^3
Medium = 1.0 – 5.0 µg/m^3
High > 5.0 µg/m^3

-

Cost:

Low = < £25k
Medium: £25-£100k
High = > £100k

Timescale:

Short: Possible by 2015
Medium: Between 2015 and 2017
Long: 2017 and beyond

Recommendations

Taken together, the LSTF freight measures being delivered in Thurrock are likely to provide some air quality benefits to AQMA 10 when coupled with other actions. However, as the AQMA with the highest pollutant concentrations (57% above the limit value), additional high-level action will be necessary in order to ensure the NO_2 limit value is met as soon as possible. Those items in **Figure 10** above are recommended for further investigation and/or implementation.

In the shorter term, there are several smaller scale measures that could be undertaken in order to improve air quality in AQMA 10 include:

Public Transport

- Provide eco-driver training for all bus drivers along Route 44;
- If a further 5th bidding round for the Green Bus Fund is announced in December 2013, bid to replace Route 44 buses with hybrid buses, which also run through AQMA 1, 2 and 23.

HGVs

- Ensure that the Freight Quality Partnership are aware of the impact of HGVs on AQMA 10 and that freight measures delivered through the Partnership are (where possible) focused on those HGVs travelling through this AQMA
- Establish a relationship with Esso, Cobelfret, Unilever, Pura Foods, etc (and any other major freight movement attractors) through the FQP, as these are the most likely origins and destinations of the HGVs travelling within this AQMA
- Provide eco-driver training for Esso, Cobelfret, Unilever and Pura Foods hauliers, if possible
- Encourage the uptake of the eco-freight accreditation scheme for Esso, Cobelfret, Unilever and Pura Foods hauliers

It is important to note that all of the above options taken together are unlikely to bring AQMA10 to below the limit value. Nearly a 23.0 $\mu g/m^3$ reduction on NO_2 concentrations is necessary in this AQMA and HGVs account for approximately 25.0 $\mu g/m^3$. Therefore, the most effective way to tackle this AQMA is likely to be to remove HGVs entirely, although this may prove difficult.

One option for removing HGV traffic from this section of London Road is to impose a weight restriction on HGVs. Although this is likely to be popular with residents, issues may arise from the industrial businesses that the weight restriction would impact upon. Additionally, a weight restriction may increase air pollution emissions elsewhere through displacement and increase fuel consumption (and therefore CO_2 emissions), as HGVs travel further out of their way to access their destinations.

The second option for reducing air pollution emissions in AQMA 10 to below the limit value is to build a HGV distributor road linking London Road to the industrial sites along the Thames in Purfleet, running to the south of London Road and AQMA 10, as proposed in the *Purfleet Master Plan* (TTGDC, 2007) and as shown in **Appendix A**. Although this is likely to be the most expensive option, it is likely to be the most amenable to residents and businesses alike. However, design options may be complicated by the rail line. There may be some

possibility of the road being privately funded through any planning applications coming forward for those industrial sites.

These options should be worked up and costed in more detail without delay in order to begin progressing a scheme with a view to implementing one of these schemes as soon as possible.

○ AQMA 5 – A1306, North Stifford

Background

AQMA 5 is comprised of 65 properties surrounding Warren Terrace, the A13 and the A1306 and was declared in 2001 for exceeding both annual average limit values for NO_2 and the 24-hour mean PM_{10} objective. In 2011, the highest measured NO_2 concentration in this area was 53.04 µg/m^3, which is 32.5% above the limit value.

AQMA 5 includes two diffusion tube monitoring locations and could be treated as two district areas: the western side of AQMA from the A126 to the B186 and the eastern end of the AQMA from the B186 to Clockhouse Lane. Given the significant difference in monitored pollution concentrations between the western side (29.2 µg/m^3) and the eastern side (53.04 µg/m^3) there may be scope to reduce the size of this AQMA to exclude the western area, which is well below the limit value. This interim action plan therefore only deals with the eastern part of AQMA 5 between the Pilgrims Lane roundabout (B186/B146) to Clockhouse Lane.

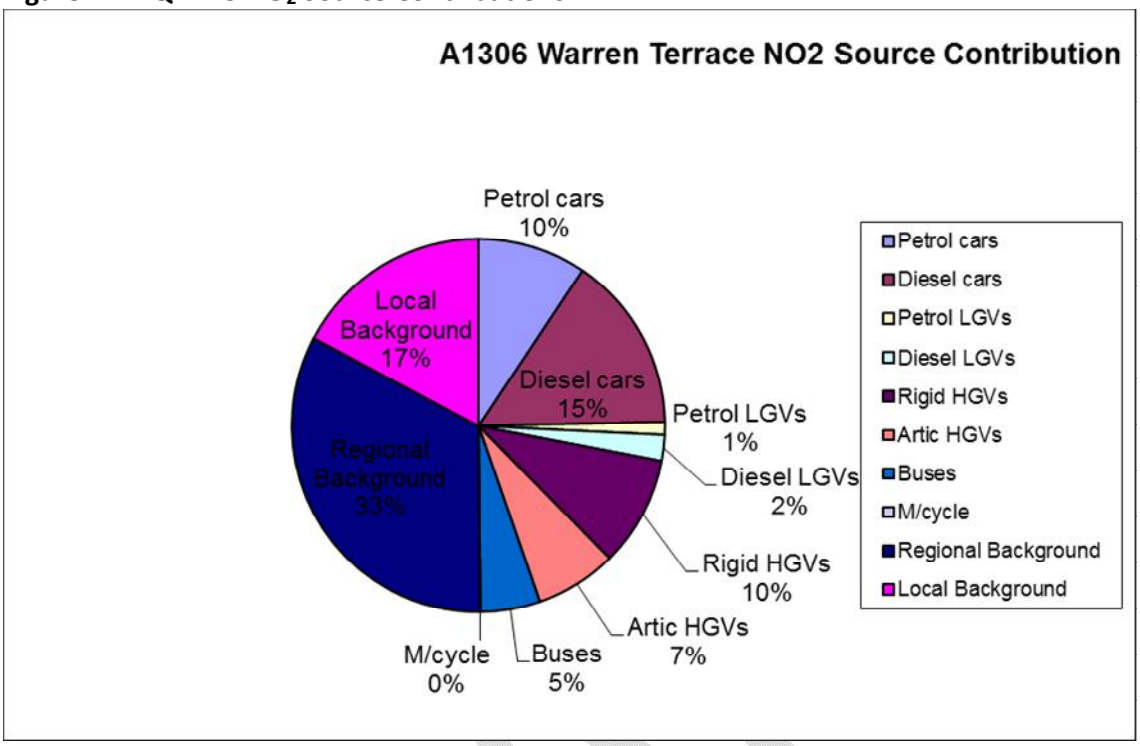
Although also declared for exceeding the 24-hour mean PM_{10} objective of 35 days per year, no PM_{10} monitoring locations in Thurrock have been shown to have exceeded this limit since 2007.

The A1306 through AQMA 5 provides access to the Lakeside Regional Shopping Centre and Retail Park and together these developments form one of Europe's largest shopping areas. South of the A1306 in AQMA 5 is Chafford Hundred, a large residential development in a former quarry area. The A1306 in AQMA 5 also provides access to the B186 to North Stifford and South Ockendon.

Sources of NO_2

Recent source apportionment exercises undertaken by the Thurrock Council Pollution Control Team have resulted in identifying the proportional source contributions within AQMA 5. As can be seen in **Figure 11** below, 33% of NO_2 emissions arise from regional background sources, over which Thurrock Council has little, if any, influence and a further 17% arise from local background sources. In terms of transport sources, 25% of NO_2 emissions arise from cars, 17% from HGVs, with a further 5% from buses and 3% from light goods vehicles.

Figure 11: AQMA 5 NO_2 Source Contributions



Current Actions to Reduce NO_2

In 2009 the traffic signals at the roundabout junctions of the B186/B146 were switched off in order to improve traffic flows and reduce delays. However, it does not appear to have influenced annual NO2 concentrations.

Chafford Hundred rail station now has an adopted Station Travel Plan, facilitated by the Thurrock LSTF programme. As a result of this travel plan, a new bus shelter has been installed in addition to CCTV and the bus service times have been modified in order to provide a more seamless and integrated service between rail and bus. A new two tier cycle parking stand has also been added for 28 bicycles (now 62 in total), and this is also covered by CCTV.

Lakeside Shopping Centre has a well-established workplace travel plan. Sainsburys at Chafford Hundred is currently in the process of developing a Workplace Travel Plan, as well as DHL at Lakeside and Costco on West Thurrock Way, and these have been facilitated through the Thurrock LSTF programme. It is possible that these travel plans could work to reduce traffic movements through AQMA 5.

Finally, the Thurrock LSTF programme has also facilitated the delivery of Personalised Journey Planning in Grays and Chadwell St Mary, and aims to provide this service to the whole of the Borough by March 2015. A workplace Personalised Journey Planning event has also been delivered at IKEA at Lakeside. Additionally, Eco-Driver training for 12 Ensign bus drivers began in March 2013, and if considered successful, will continue in 2013/14.

Figure 12: Recommended Transport Actions for AQMA 5

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
Fiscal Incentives						
Bus and Rail Fares to Lakeside	Low/Medium	Up to £5.70 per ticket, depending on subsidy	Revenue	Short	Could be tied in with Metrorail (LSTF)	
Cycling						
Cycle route improvements (B146 to Lakeside)	Low	£50,000 – £100,000	Capital (LSTF)	Short	Could be secured through s106 with Lakeside	
Cycle Parking	Low	£50 to £750 per stand	Capital (LSTF at rail station – S106 at Lakeside)	Short	Lakeside Shopping Centre. Increased cycle parking at Chafford Hundred Station complete.	
Public Transport						
Improve rail/bus interchange	Low	TBD	Capital	Complete	A new bus shelter with CCTV. Bus service times have been modified in order to provide a more seamless and integrated service between rail and bus.	
Hybrid Buses (Route 66 & 265)	Medium – Up to 1.3 $\mu g/m^3$	Approx. £275k per bus	Capital (operator)	Short	Available hybrids are being used on Route 22 and 100. If more become available Route 44 must take priority	Eco-Driver Training
Bus Eco-Driver Training (Route	Low – Up to 0.25 $\mu g/m^3$	£350 per driver	Revenue (LSTF)	Short	Ancillary benefits in other AQMAs, as well as fuel and CO_2 reductions	Hybrid Buses

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
66 & 265)						
Metrorail	Low	Medium	Capital an Revenue (LSTF)	Short	Focussed on trips to Lakeside initially. Could be complemented by fiscal incentives.	
Smarter Choices						
Personalised Journey Planning	Low/Medium	High	Revenue (LSTF)	Underway	Grays and Chadwell St Mary completed. Will be delivered to Chafford Hundred, North Stifford and South Ockendon between April and August 2013.	
Workplace Travel Planning	Low/Medium	Approx. £7.5 per WTP	Revenue (but should be supported by capital improvements)	Underway	Lakeside already has a travel plan; DHL, Costco and Sainsbury's in development.	
Traffic Management						
Traffic Management Schemes	Requires modelling	£120,000	Capital	Medium	Widen the road, formalise two lanes on northern approach. Will manage traffic rather than reduce traffic	
SCOOT/UTMC	Low/Medium	Already installed	Already installed	Short	Signals have been removed within the AQMA, but junctions leading to AQMA still signalised and could be recalibrated to minimise emissions.	

NO_2 Impact:

Low = < 1.0 µg/m^3
Medium = 1.0 – 5.0 µg/m^3
High > 5.0 µg/m^3

Cost:

Low = < £25k
Medium: £25-£100k
High = > £100k

Timescale:

Short: Possible by 2015
Medium: Between 2015 and 2017
Long: 2017 and beyond

Recommendations

As the AQMA with the second highest pollutant concentrations (32.5% above the limit value), high-level action will be necessary in order to ensure the NO_2 limit value is met as soon as possible in AQMA 5. This is a complex area, with a variety of sources, origins and destinations. As a result of this complexity, a raft of measures is likely to be necessary in order to bring NO_2 concentrations down to (or below) the limit value. Those items in **Figure 12** above are recommended for further investigation and/or implementation in the shorter-term and are discussed in more detail below.

Sustainable Transport and Lakeside

Lakeside boasts over 6,000 jobs and hosts nearly 500,000 visitors a week, with up to 30,279[1] vehicles accessing the site each day. It is estimated that 25%[1] of the traffic passing through AQMA 5 is going to or coming from Lakeside Shopping Centre, and this figure does not include those accessing the Lakeside Retail Park. The development is very accessible via public transport, with rail access from the Chafford Hundred station connected via a pedestrian bridge and its own on-site bus station. Lakeside offers nearly 19,000 car parking spaces, with around 13,000 free parking spaces at the shopping centre and approximately 6,000 at the retail park, and the availability of so many free car parking spaces does little to promote the use of sustainable transport. Free parking coupled with the convenience of arriving by car is likely to continue to win visitors over when public transport to the site is not free. Alternatives for promoting modal shift to more sustainable modes of transport will need to be explored.

Although sustainable transport infrastructure to Lakeside is generally good (if not excellent by public transport), more needs to be done to encourage employees and visitors to use sustainable modes of transport to access the site. Surveys in October 2010 indicated that 85% of people visiting the centre travel by car, 9% by bus, 5% by train and only 1% on foot, with cycling at 0%[1], showing there is scope to significantly increase the number of visitors accessing the shopping centre by sustainable modes of transport.

Similarly, 70% of those who work at Lakeside Shopping Centre arrive by car[1] and a forthcoming initiative being proposed by the Lakeside Travel Plan is to target employees within local areas who it is known drive, but could use the bus as it passes close to their residence. The recently approved Lakeside planning application (11/50433/TTGOUT) also proposes a new bus station, shuttle bus services, better pedestrian and cycle links *within* the Lakeside development itself, as well as off-site Variable Message Signing.

In the absence of the "stick" approach of car park charging to encourage a modal shift to less polluting forms of transport to Lakeside, a "carrot" approach could instead be adopted. This would require a focus on incentivising sustainable trips to Lakeside, such as through subsidised/reduced bus and rail ticket pricing or validation. On the rail side, this could be delivered partially through the Thurrock Local Sustainable Transport Fund "metrorail" project. This marketing and promotional campaign will focus on encouraging local people to utilise the train more for off-peak local journeys, and could be further promoted through discounted ticketing arrangements.

[1] Royal Haskoning, *Lakeside Shopping Centre Transport Assessment*, November 2011.

Completing sustainable transport infrastructure gaps to Lakeside could also help to promote sustainable transport to this site and work to reduce traffic flows within AQMA 5. For example, there is significant scope to improve cycling infrastructure both within and to Lakeside. The development of a better cycle and pedestrian route between the B146 and Lakeside beneath the A126 (as the pedestrian bridge from Lakeside is currently unsuitable for cyclists), which is part of the Core Walking and Cycling Routes network, should be fully explored.

Coupled with this, cycle parking facilities at Lakeside itself could be improved as the Shopping Centre provides 13,000 car parking spaces, but only 58 covered cycle parking stands. It could also be explored as to whether there is any scope for offering cycling parking *inside* the shopping centre at the access to the pedestrian bridge and this could be coupled with financial incentives, such as vouchers for use in the shopping centre, to encourage cycling.

It should be borne in mind that impact of these sustainable transport schemes (even taken together) on traffic levels on the A1306 within AQMA 5 may be significantly less than car park charging, but these types of schemes would be ideal to deliver in advance of car park charging, ensuring that excellent alternatives are available.

Smarter Choices

Personalised Journey Planning focuses on making direct contact with residents, and in some cases employees, to provide travel information and support for sustainable transport, motivating people to consider a modal shift for their daily journeys. Thurrock's Local Sustainable Transport Fund (LSTF) programme includes the delivery of Personalised Journey Planning and this is currently focused on rolling out Personalised Journey Planning to residents of Chafford Hundred, North Stifford and South Ockendon, as residents of these areas are likely to be making vehicle trips through AQMA 5. This should be complete by August 2013.

The LSTF programme also includes funding for developing workplace travel plans at the largest employers, particularly those in Grays Town Centre, and this programme should continue to be rolled out. Additionally, Thurrock Council should liaise with the Travel Plan Coordinator for Lakeside Shopping Centre to determine whether they require any additional support either for developing or delivering travel plan measures. Work to this effect could also help to identify any complementary sustainable transport infrastructure required outside of Lakeside, which could either be delivered by Thurrock Council or through s106 agreements for development at Lakeside.

Traffic Management

The use of Urban Traffic Management and Control (UTMC) for improving air quality should be fully maximised within and around this AQMA, where there are a number of traffic signals. It is understood that many of the junctions along the A1306 already have UTMC and possibly also SCOOT. SCOOT (Split Cycle Offset Optimisation Technique) can respond automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road. SCOOT typically reduces traffic delay by an average of 20% in urban areas, but also contains other traffic management facilities such as bus priority, traffic

gating, and most importantly in this case, vehicle emissions estimates. It should be checked that, where SCOOT is available, it is being fully utilised to optimise vehicle emissions within AQMA 5 and beyond to those junctions affecting traffic within the AQMA (such as at the A1012 junction). As signals have been turned off at the Pilgrims Lane junction, the use of UTMC/SCOOT is no longer feasible there, but UTMC can be used in the junctions at either end of AQMA 5.

In 2010, Colin Buchanan produced the *Thurrock Infrastructure Prioritisation and Implementation Programme*. This study concluded that there were likely to be an infrastructure deficits within AQMA 5, with the A1306 being "above desired capacity" (i.e. where flow is between 85-100% of capacity) in the 2006 base year and predicted that the road would be "above capacity" by 2021 (i.e. where flows are 100-115% of capacity), with the junction at the B186 well above capacity (i.e. where flows are greater than 115% of capacity). They recommended a junction improvement to the A1306/B146/B186 roundabout to widen the road and formalise the two lanes on the southbound approach and lengthen the flare on the eastbound approach arm[2] in order to increase capacity and reduce congestion.

The report also outlined that the A1306/A1012 junction was "above desired capacity" and would be well above capacity (PM only) by 2025. It recommended that the offset and green time on all arms of the A1306/A1012 junction be adjusted, which may impact on traffic flows within AQMA 5.

These junction deficit solutions will need to be studied in further detail from an air quality perspective to determine whether they would lead to NO_2 emissions reductions from traffic.

Summary

In the shorter-term, Thurrock Council should consider implementing the following measures without delay:

- Metrorail (including financial incentives for using rail to access Lakeside)
- Provide bus Eco-Driver training (Routes 66 and 265)
- Improve cycle access to Lakeside via the B146 Fenner Road *and* cycle parking at Lakeside
- Identify which junctions affecting AQMA 5 have SCOOT and ensure they are utilised to optimise vehicle emissions
- Continue delivering personalised journey planning to Chafford Hundred, North Stifford and South Ockendon residents
- Liaise with Lakeside Travel Plan co-ordinator to determine whether any support is needed from Thurrock Council
- Continue with workplace travel plans in the area already under development
- Prior to delivering any traffic management schemes that may affect the A1306, model potential air quality impacts

[2] SKM Colin Buchanan, *Thurrock Lakeside Basin Preliminary Infrastructure Assessment*, March 2012.

○ AQMA 2 – London Road, South Stifford

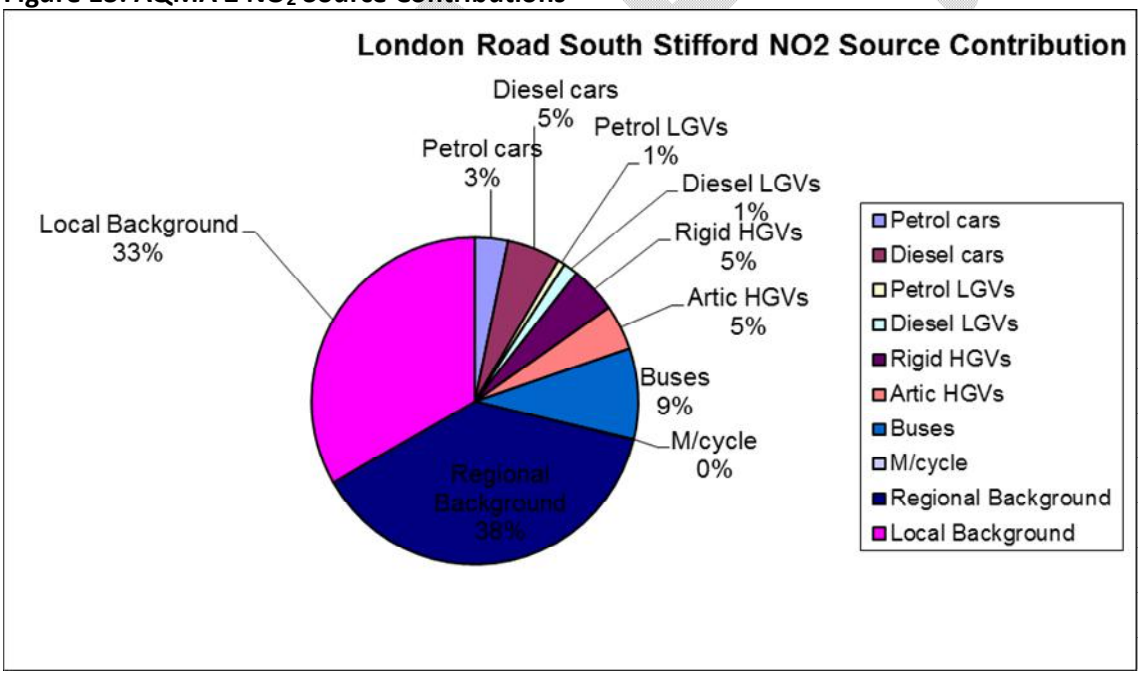
Background

AQMA 2 is comprised of 220 properties on London Road South Stifford and adjoining roads and was declared in 2001 for exceeding threshold limit values for annual mean NO_2 concentrations. In 2011, the annual mean NO_2 concentration in this area was 7.75% above the limit value at 43.1 µg/m^3.

Sources of NO_2

Recent source apportionment exercises undertaken by the Thurrock Council Pollution Control Team have resulted in identifying the proportional source contributions within AQMA 2. As can be seen in **Figure 13** below, 38% of NO_2 emissions arise from regional background sources, over which Thurrock Council has little, if any, influence and a further 33% arise from local background sources, which Thurrock Council may be able to influence through discussion with local industrial businesses within and near to this AQMA. Additionally, another 10% of NO_2 emissions arise from HGVs, with a further 9% from buses, 8% from cars and 2% from light goods vehicles.

Figure 13: AQMA 2 NO_2 Source Contributions



Current Actions to Reduce NO_2

Through its LSTF programme, Thurrock Council is currently undertaking a raft of freight measures focused on reducing emissions from HGVs. The programme includes the development of a Freight Quality Partnership (FQP) and this 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, such as AQMA 10. The Thurrock Freight Quality Partnership currently has 43 members, with a goal to increase this to 100 members by March 2015.

Through this forum, they will look to deliver opportunities for freight fleets to undergo Eco-driver training, including drivers within the council's own vehicle fleet. This measure will work to inform freight vehicle drivers of ways to improve fuel economy, reduce emissions and save money through more efficient driving practices. The SAFED driver training programme has been rolled out to six organisations to date, with a target to train 63 drivers per annum across ten organisations.

To further incentivise these projects, an "Eco-Stars" accreditation scheme has been adopted, where operators demonstrating significantly improved environmental performance and management, resulting from freight LSTF measures, can be recognised for their achievements. To date, 11 operators are signed up to the scheme, covering 403 vehicles, with a view to continuing to deliver at this rate to March 2015. It is estimated that the potential quantified level of emissions reduction as a result of the Eco Stars programme is 50% for NO_x and PM_{10}.

Recently, the HGV weight restrictions were lifted from Devonshire Road, allowing HGVs to now use this route to connect to and from London Road in South Stifford and the A1012, which provides access to the A1306 and the A13. The *South Stifford Traffic Study* (Mouchel, 2011) estimated that HGV movements through AQMA 2 should be reduced to between 0 and 100 movements a day with a new weight restriction in place on London Road. This should provide a NO_2 reduction of between 3.9 and 4.5 $\mu g/m^3$, which would put NO_2 concentrations in AQMA 2 just below the 40.0 $\mu g/m^3$ limit value.

Ensign bus route 22 has recently been replaced with hybrid buses, and this should lead to some reduction in NO_2 emissions from public transport within AQMA 2. Additionally, Eco-Driver training for 12 Ensign bus drivers began in March 2013, and if considered successful, will continue in 2013/14.

Figure 14: Recommended Transport Actions for AQMA 2

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments
Public Transport					
Hybrid Buses (Route 22, 44, 73, 83 and/or 100)	Medium – Up to 2.0 µg/m^3	Approx. £275k per bus	Capital (operator)	Complete	Funding secure the DfT Green Route 22 and 1
Bus Eco-Driver Training (Routes 22, 22A, 44, 73, 73A, 83 and 100)	Low – Up to 0.3 µg/m^3	£350 per driver	Revenue (LSTF)	Underway	Ancillary bene AQMAs, as we CO_2 reductions
Traffic Management					
Road Layout Review	Low	High	Capital	Short-Medium	Could be tied priority
HGVs					
HGV Weight Restriction	Approx. 3.0 µg/m^3	High	Capital	Complete	Must be enf effective
Eco-Driver Training (HGVs)	Low – up to 0.1 µg/m^3	£350 per driver	Revenue (LSTF)	Underway	Marginal redu to HGV restrict

NO_2 Impact:
Low = < 1.0 µg/m^3
Medium = 1.0 – 5.0 µg/m^3
High > 5.0 µg/m^3

Cost:
Low = < £25k
Medium: £25-£100k
High = > £100k

Timescale:
Short: Possible by 2015
Medium: Between 2015
Long: 2017 and beyond

Recommendations

Although the LSTF freight work and the Devonshire Road weight restriction removal scheme will clearly help address the air quality problem significantly, further action may be required in order to ensure the limit value is continually met in AQMA 2, particularly as *sert* has not been approved for major scheme funding by the DfT. Those items in **Figure 14** above are recommended for further investigation and/or implementation in the shorter-term and are discussed in more detail below.

Traffic Management

A number of traffic management schemes have been undertaken in this area in recent years for road safety and traffic reduction purposes and such schemes have proved effective, shown by decreases in traffic along London Road. However, the implementation of such schemes has likely led to a substantial amount of stop-start and erratic driving that can lead to increases in vehicle emissions, therefore neutralising the air quality benefits enjoyed from the initial reduction in traffic volumes. It is therefore recommended that, since *sert* has not been approved for funding, this stretch of London Road between Grays and the A282 be reviewed, to determine what could be done to reduce the number of pinch points in this AQMA (as well as AQMA 1 and AQMA 23 on either side), and introduce a more even flow of traffic, where doing so would not compromise road safety or induce additional traffic movements back onto this road.

Public Transport

Several bus services run along London Road through AQMA 2 and two of these routes (22 and 100) have been converted to hybrid buses already. However, bus route 44 runs through AQMA 2, as well as AQMA 1, 10 and 23, and the 426 bus movements a day along London Road are estimated to contribute 9% to total NO_2 emissions in AQMA 2. Therefore, there is scope to reduce emissions from buses by ensuring that, if further hybrid buses become available, they are run along route 44, as this will maximise air quality benefits in a number of AQMAs. Additionally, the provision of eco-driver training for bus drivers of all routes passing through AQMA 2 should help to reduce emissions both within this AQMA and throughout the other parts of the Borough where these routes run.

Summary

The recommendations for improving air quality within AQMA 2 are therefore as follow:

- If a further 5th bidding round for the Green Bus Fund is announced in December 2013, bid to replace Route 44 buses with hybrid buses, which also run through AQMA 1, 10 and 23
- Provide eco-driver training for bus drivers operating on routes 22, 22A, 44, 73, 73A, 83, 100 and 201
- Consider undertaking a London Road pinch point review with a view to smoothing traffic flows
- Ensure weight restriction is adequately enforced

○ AQMA 13 – A1306, Aveley

Background

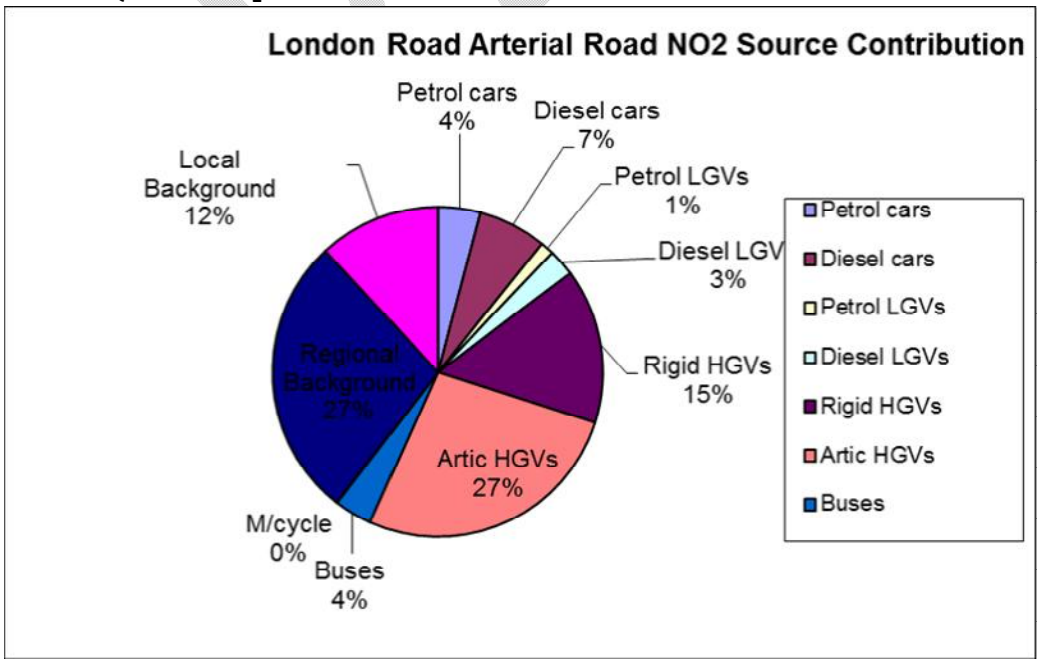
AQMA 13, comprised of 15 properties on London Road in Aveley next to the A1306, was declared in 2001 for exceeding threshold limit values for annual mean NO_2 concentrations. In 2011, the NO_2 concentrations at the roadside in this area were measured at 63.93 µg/m^3.

Additionally, in February 2011 a diffusion tube was placed on one of the property facades within the AQMA to give a clearer indication of the magnitude of the problem at the receptor façade, where public exposure is most likely and therefore most relevant. This shows annual average NO_2 concentrations in 2011 being 40.62 µg/m^3, which is only slightly above the annual average 40.0 µg/m^3 limit value. Although this data can be used to give an indication of the magnitude of the pollutant's fall off between the roadside and receptor facade, the results should be treated with some caution until a longer and more established monitoring programme has been carried out.

Sources of NO_2

Recent source apportionment exercises undertaken by the Thurrock Council Pollution Control Team have resulted in identifying the proportional source contributions within AQMA 13. As can be seen in **Figure 15** below, 27% of NO_2 emissions arise from regional background sources, over which Thurrock Council has little, if any, influence. Additionally, another 27% of NO_2 emissions arise from articulated HGVs, with a further 15% from rigid HGVs. This shows that HGVs are responsible for the majority of NO_2 emissions within this AQMA.

Figure 15: AQMA 13 NO_2 Source Contributions



Current Actions to Reduce NO_2

Through its LSTF programme, Thurrock Council is currently undertaking a raft of freight measures focused on reducing emissions from HGVs. The programme includes the development of a Freight Quality Partnership (FQP) and this 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, such as AQMA 10. The Thurrock Freight Quality Partnership currently has 43 members, with a goal to increase this to 100 members by March 2015.

Through this forum, they will look to deliver opportunities for freight fleets to undergo Eco-driver training, including drivers within the council's own vehicle fleet. This measure will work to inform freight vehicle drivers of ways to improve fuel economy, reduce emissions and save money through more efficient driving practices. The SAFED driver training programme has been rolled out to six organisations to date, with a target to train 63 drivers per annum across ten organisations.

To further incentivise these projects, an "Eco-Stars" accreditation scheme has been adopted, where operators demonstrating significantly improved environmental performance and management, resulting from freight LSTF measures, can be recognised for their achievements. To date, 11 operators are signed up to the scheme, covering 403 vehicles, with a view to continuing to deliver at this rate to March 2015. It is estimated that the potential quantified level of emissions reduction as a result of the Eco Stars programme is 50% for NO_x and PM_{10}.

Signal timings at the junction of the A1306 and A1090 were adjusted in December 2011 in an attempt to reduce queuing in the northbound lane of the A1306. This will need to be monitored carefully to determine the impact this alteration has on pollution levels.

Additionally, investigation has been undertaken to identify the costs of trialling pollution absorbent paint, KNOxOUT, in this area. This paint purports to be an air cleaning paint that uses a catalyst to break down and neutralise NOx emissions. The Council are currently in the process of preparing to consult residents affected by the scheme.

Figure 16: Recommended Transport Actions for AQMA 13

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
Traffic Management						
Signal Timing adjustment	Low	Low	Revenue	Complete	12 month watching brief should be undertaken to determine air quality impact	MOVA
MOVA	Medium	£20-30k	Capital	Short		Signal Timing Adjustment
HGVs						
FQP	None	High (£60k per annum)	Revenue (LSTF)	Underway	No emissions reductions on its own, but needed to facilitate HGV measures	
Eco-Freight Accreditation	None	Included in FQP?	Revenue (LSTF)	Underway	No reductions on its own, but may encourage uptake of other measures	•
HGV Eco-Driver Training	Low - Up to 0.9 µg/m^3	£350 per driver	Revenue (LSTF)	Underway		
Other						
Pollution Absorbent Paint / Pollution Barrier	To be determined	Low	Capital	Underway	Must be undertaken in consultation with residents	

NO_2 Impact:
Low = < 1.0 Low = < 1.0 µg/m^3
Medium = 1.0 – 5.0 µg/m^3
High > 5.0 µg/m^3

Cost:
Low = < £25k
Medium: £25-£100k
High = > £100k

Timescale:
Short: Possible by 2015
Medium: Between 2015 and 2017
Long: 2017 and beyond

Recommendations

Taken together, the measures being delivered in Thurrock are likely to provide some air quality benefits to AQMA 13. However, additional action may be required in order to ensure the NO_2 limit value is met as soon as possible, and actions should be focused on reducing the queuing and idling at the junction of AQMA 13, which, other than the number of HGV movements as a whole, is likely to be significantly impacting on the emissions profile within this AQMA. Those items in **Figure 16** above are recommended for further investigation and/or implementation in the shorter-term and are discussed in more detail below.

Traffic Management

It is recommended that a watching brief is kept on the impact of the signal timing alteration for at least twelve months. This watching brief should include analysis both at the roadside diffusion tube as well as the residential façade over the period of at least a year in order to determine the change in annual mean concentrations of NO_2.

If it is determined that the signal timing adjustment has not or will not produce the reduction in NO_2 required, consideration should be given next to upgrading the signal further, if possible, to integrate a MOVA (Microprocessor Optimised Vehicle Actuation) system into the junction. This system is adaptive and can respond automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road.

HGVs

Small-scale HGVs measures should also be implemented, in combination with the traffic management measures listed above, to ensure that NO_2 concentrations at the receptor façade achieve the limit value. HGV measures that are recommended to be taken forward in the short-term include:

- Ensuring that the Freight Quality Partnership are aware of the impact of HGVs on AQMA 13 and that freight measures delivered through the Partnership are (where possible) focused on those HGVs travelling through this AQMA
- Establishing a relationship with any known major freight movement attractors through the FQP, as these are the most likely origins and destinations of the HGVs travelling within this AQMA
- Providing eco-driver training to hauliers known to be regularly travelling through this AQMA
- Encouraging the uptake of the eco-freight accreditation scheme for hauliers known to regularly be travelling through this AQMA

○ AQMA 23 – London Road West Thurrock

Background

AQMA 23 is comprised of 115 properties next to London Road in West Thurrock and was declared in 2001 for exceeding threshold limit values for annual mean NO_2 concentrations. In 2011, the annual mean NO_2 concentration in this area was marginally below the limit value at 38.8 µg/m^3.

Sources of NO_2

Detailed transport source apportionment exercises undertaken during Further Assessment of this AQMA in 2007 determined that HGVs were responsible for approximately 43.6% of NO_x emissions within the AQMA, with the majority (45%) arising from background sources. However, this should be treated with caution, as it estimated bus contributions at zero, despite bus route 44 travelling regularly (every 30 minutes) through this AQMA.

Current Actions to Reduce NO_2

Through its LSTF programme, Thurrock Council is currently undertaking a raft of freight measures focused on reducing emissions from HGVs. The programme includes the development of a Freight Quality Partnership (FQP) and this 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, such as AQMA 10. The Thurrock Freight Quality Partnership currently has 43 members, with a goal to increase this to 100 members by March 2015.

Through this forum, they will look to deliver opportunities for freight fleets to undergo Eco-driver training, including drivers within the council's own vehicle fleet. This measure will work to inform freight vehicle drivers of ways to improve fuel economy, reduce emissions and save money through more efficient driving practices. The SAFED driver training programme has been rolled out to six organisations to date, with a target to train 63 drivers per annum across ten organisations.

To further incentivise these projects, an "Eco-Stars" accreditation scheme has been adopted, where operators demonstrating significantly improved environmental performance and management, resulting from freight LSTF measures, can be recognised for their achievements. To date, 11 operators are signed up to the scheme, covering 403 vehicles, with a view to continuing to deliver at this rate to March 2015. It is estimated that the potential quantified level of emissions reduction as a result of the Eco Stars programme is 50% for NO_x and PM_{10}.

Ensign bus route 22 has recently been replaced with hybrid buses, and this should lead to some reduction in NO_2 emissions from public transport within AQMA 2. Additionally, Eco-Driver training for 12 Ensign bus drivers began in March 2013, and if considered successful, will continue in 2013/14.

Figure 17: Recommended Transport Actions for AQMA 23

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
Public Transport						
Hybrid Buses (Route 22 and 44)	Low	Approx. £275k per bus	Capital (operator)	Route 22 Complete	Funding secured for six from DfT, and being used for Route 22	Bus Eco-Driver Training
Bus Eco-Driver Training (Routes 22 & 44)	Low	£350 per driver	Revenue (LSTF)	Underway	Ancillary benefits in other AQMAs, as well as fuel and CO_2 reductions	Hybrid Buses
Traffic Management						
Road Layout Review	Low	High	Capital	Short-Medium	To smooth traffic flows and reduce pinch points	
HGVs						
FQP	None	High (£60k per annum)	Revenue (LSTF)	Underway	No emissions reductions on its own, but needed to facilitate HGV measures	
Eco-Freight Accreditation	None	Included in FQP?	Revenue (LSTF)	Underway	No reductions on its own, but may encourage uptake of other measures	•
HGV Eco-Driver Training	Low	£350 per driver	Revenue (LSTF)	Underway	Focused on AQMA 23 origins/destinations	

NO_2 Impact:
Low = < 1.0 µg/m^3
Medium = 1.0 – 5.0 µg/m^3
High > 5.0 µg/m^3

Cost:
Low = < £25k
Medium: £25-£100k
High = > £100k

Timescale:
Short: Possible by 2015
Medium: Between 2015 and 2017
Long: 2017 and beyond

Recommendations

Taken together, the LSTF freight measures being delivered in Thurrock are likely to provide some air quality benefits to AQMA 23. However, additional action should be delivered in order to ensure that NO_2 concentrations remain below the limit value. Those items in **Figure 17** are recommended for further investigation and/or implementation in the shorter-term and are discussed in more detail below.

A number of traffic management schemes have been undertaken in this area in recent years for road safety and traffic reduction purposes and such schemes have proved effective, shown by decreases in traffic along London Road. However, the implementation of such schemes can cause a substantial amount of stop-start and erratic driving that can lead to increases in vehicle emissions, therefore neutralising the air quality benefits enjoyed from the initial reduction in traffic volumes.

As *sert* has not being approved for DfT funding, it is recommended that the whole of London Road between Grays and the A282 be reviewed, to determine what could be done to reduce the number of pinch points in AQMA 23 as well as AQMA 2, in order to introduce a more even flow of traffic, where doing so would not compromise road safety or induce additional traffic movements back onto this road.

Two bus services run along London Road through AQMA 23, route 22 and 44. In particular, route 44 runs through AQMA 1, AQMA 2 and AQMA 10 as well. Since October 2012, Ensign has been running six hybrid buses along Route 22. However, there is scope to reduce emissions from buses further by ensuring that where hybrid buses are available that they are run along route 44 next as a matter of priority (to maximise air quality benefits in the greatest number of AQMAs), as well as ensuring that bus drivers for these routes have been given an appropriate level of eco-driver training.

The recommendations for improving air quality within AQMA 23 are therefore as follow:

- Identify those large businesses along London Road in AQMAs 2 and 23 with a large amount of freight operations with a view to:
    - Establishing a relationship with relevant businesses along London Road in West Thurrock through the FQP
    - Encouraging the uptake of the eco-freight accreditation scheme for HGVS with origins and/or destinations within this area
    - Providing eco-driver training for businesses and hauliers operating HGVs through this AQMA
- If a further 5th bidding round for the Green Bus Fund is announced in December 2013, bid to replace Route 44 buses with hybrid buses, which also run through AQMAs 1, 2 and 10
- Provide eco-driver training for bus drivers operating on routes 22 and 44
- Consider undertaking a London Road pinch point review with a view to smoothing traffic flows

○ AQMA 1 – London Road, Grays

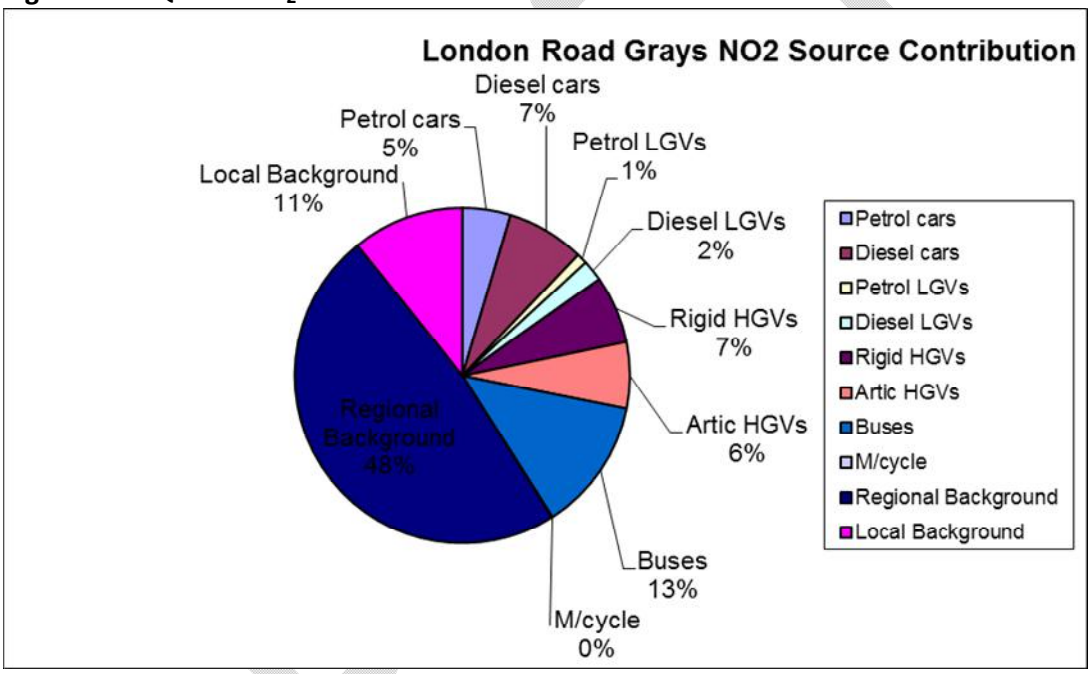
Background

AQMA 1 is predominantly comprised of Grays Town Centre. It is the largest AQMA in Thurrock and was declared in 2001 for exceeding threshold limit values for NO_2. Pollutant concentrations in this area are monitored through four diffusion tubes. In 2011, the highest NO_2 concentration was 37.51 µg/m^3, which is around 6% below the limit value.

Sources of NO_2

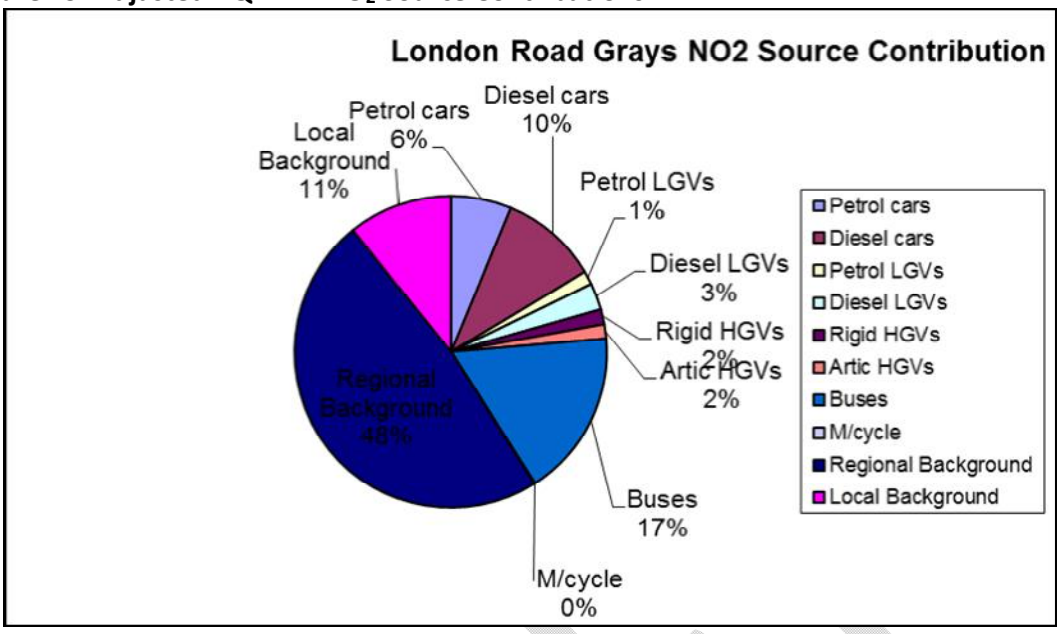
Recent source apportionment exercises undertaken by the Thurrock Council Pollution Control Team have resulted in identifying the proportional source contributions within AQMA 1. As can be seen in **Figure 18** below, 48% of NO_2 emissions arise from regional background sources, over which Thurrock Council has little, if any, influence and a further 11% arise from local background sources. Additionally, another 13% of NO_2 emissions arise from HGVs, with a further 13% from buses, 12% from cars and 3% from light goods vehicles.

Figure 18: AQMA 1 NO_2 Source Contributions



However, there is currently a HGV weight restriction in place within AQMA 1, but the DfT traffic counter is just west of this restricted area. The *South Stifford Traffic Study* (Mouchel, 2011) found that there is evidence that up to 100 HGVs a day ignore the weight restriction on London Road within AQMA 1. HGV figures for source apportionment were therefore adjusted to account for the weight restriction, including those vehicles that ignore it. This resulted in an adjusted source apportionment for AQMA 1, and can be seen in **Figure 19**, below.

Figure 19: Adjusted AQMA 1 NO_2 Source Contributions



As can be seen in Figure 18 above, HGVs are likely to only account for 4% of NO_2 concentrations within AQMA 1. This significantly alters the road transport composition of source contributions, making buses the highest contributors at 17%, followed closely by cars at 16%. The focus for short-term transport actions clearly lies in reducing emissions from buses and cars.

Current Actions to Reduce NO_2

Thurrock's LSTF programme includes the delivery of Workplace Travel Planning, which is focused on large employers, particularly those found in Grays Town Centre. Additionally, the Thurrock LSTF programme is delivering Personalised Journey Planning in Grays. Taken together, these measures should help to bring about a modal shift from people travelling by car toward more sustainable transport modes, such as walking, cycling and public transport. Reductions in car use should lead to requisite reductions in air pollutions emissions in AQMA 1.

Ensign bus route 22 has recently been replaced with hybrid buses, and this should lead to some reduction in NO_2 emissions from public transport within AQMA 2. Additionally, Eco-Driver training for 12 Ensign bus drivers began in March 2013, and if considered successful, will continue in 2013/14.

Finally, HGV weight restrictions were recently lifted from Devonshire Road, allowing HGVs to now use this route to connect to and from London Road in South Stifford and the A1012, which provides access to the A1306 and the A13. Although London Road in AQMA 1 already had a weight restriction in place, the *South Stifford Traffic Study* (Mouchel, 2011) estimated that up to 100 HGVs a day have been ignoring this. However, in March 2012 Thurrock Council reiterated the weight restrictions on this part of London Road through a Traffic Regulation Order.

Figure 20: Recommended Transport Actions for AQMA 1

Measure	AQ Impact	Cost	Cost Type	Possible Implementation Timescale	Comments	Alternative?
Public Transport						
Hybrid Buses	Medium – Up to 2.0 µg/m^3	Approx. £275k per bus	Capital (operator)	Complete	Six secured through DfT funding and are being run on Route 22 and 100 (2013)	Bus Eco-Driver Training
Bus Eco-Driver Training (Routes 22, 22A, 44, 73, 73A, 83 and 100)	Low – Up to 0.35 µg/m^3	£350 per driver	Revenue (LSTF)	Underway	Ancillary benefits in other AQMAs, as well as fuel and CO_2 reductions	Hybrid Buses
Traffic Management						
SCOOT/UTMC	Low	Medium	Capital & Revenue	Short	Ensure SCOOT is programmed to optimise emissions or UTMC to smooth traffic flows	
HGVs						
HGV Weight Restriction	Approx. 3.7 µg/m^3	High	Capital	Complete	Must be enforced to be effective	•

NO_2 Impact:

Low = < 1.0 µg/m^3
Medium = 1.0 – 5.0 µg/m^3
High > 5.0 µg/m^3

Cost:

Low = < £25k
Medium: £25-£100k
High = > £100k

Timescale:

Short: Possible by 2015
Medium: Between 2015 and 2017
Long: 2017 and beyond

Recommendations

Taken together, the LSTF measures being delivered in Thurrock are likely to provide some air quality benefits to AQMA 1, particularly in terms of reducing emissions from cars. However, additional action should be delivered in order to ensure that NO_2 concentrations remain below the limit value and this should clearly be focused on reducing emissions from buses. Those items in **Figure 20** above are recommended for further consideration and/or implementation in the shorter-term for improving air quality within AQMA 1 are therefore as follow:

- If a further 5th bidding round for the Green Bus Fund is announced in December 2013, bid to replace Route 44 buses with hybrid buses, which also run through AQMA 2, AQMA 10 and AQMA 23
- Provide eco-driver training for bus drivers operating on routes 22, 22A, 44, 73, 73A, 83 and 100
- Ensure the HGV weight restrictions are enforced
- Use UTMC to optimise traffic flows and emissions

▪ Summary

This Interim Air Quality Action Plan focuses on short-term transport actions that could lead to further revocations of AQMAs over the next couple of years. **Figure 21** below provides an overall summary of all of the transport measures that are recommended to be taken forward for improving air quality between 2012/13 and 2014/15, within the prioritised AQMAs as a matter of urgency and priority.

Figure 21: Interim Transport Air Quality Actions – Summary Table

Measure	AQMA(s) Affected	Priority	Costs and Funding	When	Notes
Public Transport					
Hybrid Buses	AQMA 1, AQMA 2, & AQMA 23 (Route 22) AQMA 1, AQMA 2, AQMA 23, & AQMA 10 (Route 44) AQMA 5 (Route 66)	High	Green Bus Fund Round 5 (if forthcoming) – Capital	Complete on Route 22 and 100 Route 44: 2014/15	Route 22 is currently running six hybrid buses through AQMAs 1, 2 and 23. Route 44 as next priority, then Route 66.
Bus Eco-Driver Training (Routes 22, 22A, 44, 66, 73, 73A, 83, 100 and 265)	AQMA 1, AQMA 2, AQMA 5, AMQA 10, & AQMA 23	Medium	Revenue - LSTF	All Ensign drivers by March 2015, if possible	Route 100 and 265 (First Bus) in conjunction with Essex CC
Metrorail	AQMA 5	Medium	Revenue - LSTF	Tiered fare structure in place by March 2015	Part of promotional campaign should focus on access to Lakeside
Public Transport Ticketing to Lakeside	AQMA 5	Medium	Revenue – LTP/ Lakeside Shopping Centres	2013/14	Could be tied in with Metrorail

Measure	AQMA(s) Affected	Priority	Costs and Funding	When	Notes
HGVs					
HGV Weight Restriction	AQMA 1 & AQMA 2	High	Capital – LTP Revenue (enforcement) – LTP	Complete	Must be enforced to be effective
Freight Quality Partnership	AQMA 10, AQMA 13 & AQMA 23	Low	Revenue – LSTF	Underway	Have been briefed to focus on Purfleet
Eco-Freight Accreditation	AQMA 10, AQMA 13 & AQMA 23	Medium	Revenue – LSTF	Underway	Have been briefed to focus on Purfleet
HGV Eco-Driver Training	AQMA 10, AQMA 13 & AQMA 23	High	Revenue – LSTF	Underway	Have been briefed to focus on Purfleet
HGV Weight Restriction **or** Distributor Road	AQMA 10	High	Capital – S106/Regional Growth Fund	2013/14 - Investigation 2014/15 - Design 2015/16 - Implementation	Funding sources should be investigated for distributor road, such as Regional Growth Fund or S106
Cycling Infrastructure					
Cycle Routes	AQMA 5	High	Capital – LSTF/LTP/s106	2013/14 – Design 2014/15 - Implementation	Core Walking and Cycling Network between Chafford Hundred Station and Lakeside Fenner Road Access
Cycle Parking	AQMA 5	High	Capital – LSTF/LTP/s106	2012/13 – Chafford Hundred Station (Complete) Lakeside – dependant on development timescales	

Measure	AQMA(s) Affected	Priority	Costs and Funding	When	Notes
Smarter Choices					
Workplace Travel Planning	AQMA 1 and AQMA 5	High	Revenue – LSTF	Underway	
Personalised Journey Planning	AQMA 1 and AQMA 5	High	Revenue – LSTF	• Grays and Chadwell St Mary – complete • Chafford Hundred, North Stifford, South Ockendon – 2013/14	
Traffic Management					
London Road Layout/Pinch Point Review	AQMA 1, AQMA 2 & AQMA 23	Medium	Capital – LTP (TMP)	2013/14 - Investigation 2014/15 - Design 2015/16 - Implementation	
A1306 schemes	AQMA 5	Medium	Capital– LTP (TMP)	2013/14 - Investigation 2014/15 - Design 2015/16 - Implementation	Proposed schemes need to be modelled for air quality impacts
UTMC/SCOOT	AQMA 1 & AQMA 5	High	Capital – LTP (TMP) Revenue – LTP (TMP)	2013/14	ETCC to manage, once online
MOVA	AQMA 13	High	Capital – LTP	2013/14	

Appendix A

Figure A1: AQMA 3 NO_2 Fall-Off with Distance from Road (2010)

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

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Enter data into the yellow cells

Step 1	**How far from the KERB was your measurement made (in metres)?**	(Note 1)	**0.512658**	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	(Note 1)	**7.4**	metres
Step 3	**What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**25.72**	$\mu g/m^3$
Step 4	**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**53.77**	$\mu g/m^3$
Result	**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)	**40.5**	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Issue 4: 25/01/11. Created by Dr Ben Marner; Approved by Prof Duncan Laxen. Contact: benmarner@aqconsultants.co.uk

Figure A2: AQMA 12 NO_2 Fall-Off with Distance from Road (2010)

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

-

Enter data into the yellow cells

Step 1	**How far from the KERB was your measurement made (in metres)?**	(Note 1)	**2.111094**	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	(Note 1)	**16.2110077**	metres
Step 3	**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)	**29.1656**	µg/m^3
Step 4	**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)	**42.22**	µg/m^3
Result	**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)	**35.9**	µg/m^3

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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Figure A3: Purfleet Master Plan Road Hierachy, showing example HGV Distrbutor Road