Three Rivers District Council
Air Quality Action Plan
2015 - 2020

2015 Edition

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1. Introduction

Since 2008 we have compiled annual reports detailing the action the Council has been taking to improve air quality in the Three Rivers district, through a variety of existing projects, initiatives and by air pollution monitoring and reporting. Some of the measures planned back in 2008 have progressed to fruition, while others have been less successful, due to the financial circumstances of the recession.

We must now look forward and consider the action we might reasonably be able to take over the next five years, bearing in mind that even deeper spending restrictions are planned within the lifetime of this Action Plan.

In terms of air pollution, Three Rivers is very similar to an outer London suburb. The majority of our population lives within the M25 and many workers commute into London or around the motorway network. Road transport emissions are the major contribution to the burden of air pollution we encounter in our district.

Tackling air pollution is vital to improve the health and quality of life of people who live in or visit Three Rivers, especially those who are vulnerable, such as children with asthma and older people with heart and respiratory diseases.

The House of Commons Environmental Audit Committee has published its report on air quality in the UK, this included evidence that estimated air pollution could be contributing to as many as 50,000 deaths in the UK per year. This is broadly in line with the result of a study commissioned by the Mayor of London, which suggested that around 4,300 deaths per year in London are partly caused by long term exposure to particulate matter (PM_{10} and $PM_{2.5}$), especially $PM_{2.5}$ which is widely acknowledged as being the pollutant which has the greatest effect on human health.

Three Rivers has met and will continue to meet the existing statutory air quality objectives for all but one pollutant: nitrogen dioxide (NO_2). Away from the M25, annual average levels of NO_2 are below air quality objective levels. However, our monitoring programme shows that the annual air quality objective for NO_2 was only marginally compliant during 2014 at one location; junction 18 of the M25, where the A404 crosses the motorway.

The proposals in this new air quality action plan for 2015 - 2020 aim to encourage reductions in emissions from road traffic, industry and homes. We also intend to keep the community and our partners well informed about air quality and the actions we can all take to reduce pollution or minimise its effects on vulnerable people. Some of the measures we are proposing, such as adopting the air*TEXT* service, have already been pioneered in London but are completely new to Three Rivers. Other measures, such as the ongoing encouragement to the public to consider smarter and more sustainable transport methods; cycling, walking and public transport, are familiar themes. Local authorities have a long tradition of measuring and reporting upon air pollution, so, during the lifetime of this Action Plan amongst other things, we aim to find out whether the pollution caused by high levels of very fine particles are a cause for concern locally. In addition, some completely new initiatives for the district are presented.

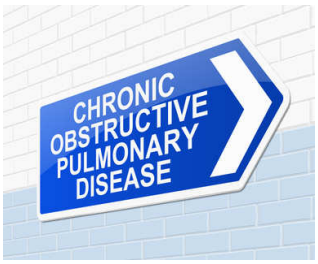
2. Sources and Effects of Air Pollution

Pollution arises from a number of sources such as road transport and domestic emissions and can also travel great distances. It has been shown that around 25% of nitrogen dioxide (NO_2) concentrations in and around the greater London area come from outside the conurbation, with around 40% of particles from external locations.

In addition emissions from non-road sources are not insignificant that in 2011 around 50% of all emissions of oxides of nitrogen in the London conurbation originated from non-road sources (mainly domestic and commercial gas boilers).

Nitrogen dioxide (NO_2) / Oxides of Nitrogen (NO_x)

Oxides of nitrogen (NO_x) are emitted from all combustion processes, the main sources of which are road transport, energy generation including domestic gas boilers and industrial combustion. NO_x is made up of two pollutants; nitric oxide (NO) and nitrogen dioxide (NO_2). NO_2 is the pollutant of most concern due to its health impacts. However, as NO easily converts to NO_2 it is therefore essential that measures should be implemented to control emissions of all NO_x. Road transport make up the largest contribution of ground level concentrations in urban areas, and the highest NO_x levels generally occur at the kerbside. In addition NO_x can react with Volatile Organic Compounds (VOCs) and sunlight to produce photochemical pollutants such as ozone. NO_x also contributes to the formation of secondary particles, which are associated with health effects.



The short term health effects of exposure to NO_2 are well established and at high concentrations can cause irritation of the lungs and can exacerbate existing lung conditions, including asthma and COPD (chronic obstructive pulmonary disease).

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter (PM_{10} and $PM_{2.5}$) is made up of various materials and chemical compositions. It is categorised by the size of the particle, for example PM_{10} is made up of particles with a diameter of less than 10 microns (µm) and $PM_{2.5}$ less than 2.5µm.

The majority of PM emissions locally are caused by road traffic, with engine emissions and tyre and brake wear being the main sources.

Construction sites, with high volumes of dust and emissions from machinery are also significant sources of local PM pollution, along with accidental fires and bonfires. However, a large proportion of PM comes from natural sources, such as sea salt, forest fires and Saharan dust, as well as from sources outside the locality caused by human activity. Small particles tend to be long-lived in the atmosphere and can be transported great distances. This imported PM forms a significant proportion of total PM in the South East.

Air Pollution and Health

The European Environment Agency describes air pollution as "the environmental factor with the greatest impact on health in Europe" and "responsible for the largest burden of environment-related disease". Estimated air pollution deaths in Hertfordshire rose from 5.8% in 2010 to 6.05% in 2011 and it is now the worst performing area outside London.

There is a clear link between poor air quality and health, high levels of pollutants such as nitrogen dioxide, sulphur dioxide and ozone can have impacts on sensitive people including children, the elderly and those who suffer from respiratory problems like asthma and bronchitis. Particulate matter aggravates heart and lung conditions, and research has found that about 5 percent of emergency hospital attendances for asthma could be avoided by meeting the PM_{10} air quality objective levels.

It has been estimated that the economic cost of the health impacts of poor air quality in London could be as high as £2 billion. Therefore reductions in missions and exposure can have significant savings in health budgets. Consequently it is worth investing in preventative health care measures such as the *air*TEXT service. Estimates have also shown that air pollution reduces life expectancy in the UK by an average of six months. The most important air pollutant in terms of health effects is Particulate Matter (PM) which is emitted from vehicle exhausts, chimneys or formed in the air from reactions between other pollutants. The World Health Organisation (WHO) has advised that there is no safe exposure level to PM. For people with lung and heart conditions, increases in PM air pollution can worsen their symptoms.

Air Quality Index

On 1st January 2012 DEFRA and the Devolved Administrations changed the air quality index for the UK. The index informs the public about daily changes in air quality using a 1-10 scale divided into four bands ('low', 'moderate', 'high' and 'very high'). This is similar to the index used for sun and pollen exposure. This index provides warnings of potentially health-damaging air pollution events before they happen and help susceptible people manage their condition and reduce the severity of their symptoms.

The daily air quality index comes in three parts and includes additional advice for susceptible individuals alongside advice for the general population, the revised air pollution banding and health advice is provided in Appendix II.

3. Air Pollution Monitoring and Current Air Pollution in Three Rivers

Our air pollution monitoring network comprises 5 non-automatic NO_2 monitoring locations using 8 diffusion tubes at roadside/kerbside and receptor sites, Details of these diffusion tube sites are provided in the 2013 USA Report at Appendix 1.

As part of the Air Quality Review and Assessment process all Local Authorities in the UK are required to produce periodic *Updating and Screening Assessment* (USA) reports of air quality in their area. Each USA is intended to identify significant changes in air quality that may have occurred since the last report, which might lead to a risk of the air quality objectives being exceeded.

The recent 2014 Progress Report (in fulfillment of Part IV of the Environment Act 1995 Local Air Quality Management) again confirms that just one residential location within the district only marginally met the annual air quality objective for NO_2 in the period April 2013 – March 2014. This is adjacent to the clockwise carriageway of the M25 at junction 18, where the A404 crosses the motorway. The monitoring location is within the grounds of a residential care home and is within the air quality management area. Monitoring will continue at this location to confirm, within the next 2 - 5 years, whether or not this AQMA may be revoked.

Air Quality Objectives in England

Pollutant	Air Quality Objective		Date to be achieved by	Achieved in TRDC?
	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 (NO_2)	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	Marginal compliance during 2013/14

Pollutant	Air Quality Objective		Date to be achieved by	Achieved in TRDC?
	Concentration	**Measured as**		
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	✓

The table above gives the indication that air quality in Three Rivers largely meets statutory objectives, but this is no cause for complacency. Our Air Quality Action Plan will assume that the 2013/14 compliance is not sustainable and therefore our plan, and the actions that Three Rivers DC might reasonably take to reduce air pollution, will continue until 2020.

4. Predicting future air quality in Three Rivers

The Environment Act 1995 requires local authorities to undertake regular reviews of current air quality in their area, and assess whether the air quality objectives are likely to be met by the compliance date in areas where exposure of the public is likely over the averaging period of the objective.

Where breaches of the air quality objectives are predicted, local councils must declare Air Quality Management Areas and produce Air Quality Action Plans, containing measures aimed at achieving the objectives. There is no legal requirement for councils to achieve the objectives, as a significant proportion of the air pollution in a particular area will have its source outside of that area and is therefore beyond the control of the local authority. The duty of councils is to take steps to try to meet the objectives, identify who is responsible for the pollution and seek their co-operation in minimising it.

A formal Review and Assessment process takes account of new and predicted major development within the local authority's area year on year. At the time of writing, no such development is foreseeable during 2015 and 2016 and detailed assessments, in terms of computer modelling, have not been carried out. The 2014 report is at Appendix I.

However the proposed expansion of Heathrow Airport and construction works for HS2 will have an unpredictable impact upon local air quality. It is only prudent to assume that this impact is unlikely to be beneficial within Three Rivers and that we shall need an Air Quality Action Plan for the next 5 years, at the very least.

5. Action Three Rivers has taken so far to Improve Air Quality

Air Quality Management Areas

In 2001 we declared 5 Air Quality Management Areas (AQMAs) centred upon 3 residential locations straddling the M25 motorway. In the absence of any reliable empirical data, such as actual pollution measurements, these declarations were made by relying upon mathematical computer modelling. Although this method was the best available at that time the calculations were incorrect and since 2001 we have been in a position to revoke all but one AQMA; our largest situated at Junction 18 of the M25, which is for the pollutant **NO_2**. We have been able to do this by monitoring levels of NO_2 within the areas and by reviewing the methods used to calculate the need for the AQMAs in the first place.

In 2007 we adopted an objective to provide encouragement and support the Highways Agency in any actions that will result in a reduction in pollution levels from the M25 motorway. At that time, prior to the widening to 4 lanes in each direction, the Highways Agency predicted that that *"the widening would relieve the congestion currently experienced and therefore improve air quality due to efficient engine performance."*

At that time our support to the Highways Agency consisted of an offer to relocate our fully automatic pollution monitoring station to a compound at Junction 18, adjacent to the anticlockwise entry slip and to share the running costs with the Agency. For a number of reasons, stated to be technical and operational, this offer did not come to fruition. However the Council will continue to work with the Highways Agency to promote air quality and reduce congestion wherever and whenever we can.

Encouraging Alternative Modes of Transport

We continue to support various initiatives developed by the County Council as part of the Hertfordshire Local Transport Plan. This Plan identifies a number of initiatives to encourage people to travel by modes of transport other than private car. These initiatives offer significant air quality benefits as they promote walking, cycling, public transport and other alternatives and improvements to car use, reducing overall emissions.

In 2013 The County Council's priorities were set out in the Local Transport Plan 3 (LTP3) and associated daughter documents, the Walking, Cycling and Bus Strategies.

The District is developing strategies to develop Sustainable Travel and Better Buses to inform how it will support the County Council's bus services. This will feed into the next Bus Strategy, which is also currently being revised to address proposals by the County Council to reduce it's funding for bus routes. The District Council has supported various local bus services in partnership with the County Council, to connect local people with essential services in areas where bus services are not provided by private bus companies. It currently supports services to connect South Oxhey with larger shopping centres and to improve access to local rail stations and hospitals, at a cost of nearly £90,000.

In 2010 a TravelSmart Project was introduced. Partly funded by the National Lottery, this was a Personalised Travel Planning initiative by Sustrans supported by TRDC, HCC and the Institute for Transport and Infrastructure Research (SocialData). The project aimed to reduce car use in the area by promoting the options for walking, cycling and use of public transport. By September 2011 an initiative involving Croxley Green was completed, resulting in measurable reductions in car dependency with more people walking, cycling and using public transport. The District Council intends to carry out similar projects in other parts of the District as funding becomes available.

We have also supported OLEV initiatives to install Electric Vehicle Charging points across the Country, with one well-used point installed and several more planned.

Encouraging Cycling

Cycle Routes

Working in partnership with other organisations including Hertfordshire County Council, the Canal and River Trust and neighbouring local authorities we are developing a network of safer, convenient and more attractive cycle routes throughout the District, to encourage cycling by all kinds of new and experienced users.

We support the County Council objectives to ensure that the design of new roads or road improvements promote the safety and needs of cyclists, to enable and encourage more bicycle journeys to replace car use.

Routes enhanced in response to the Three Rivers Cycling Strategy include:

The Grand Union Canal towpath improvements have created over 5 miles of new surfacing and improved widths to connect Rickmansworth and the National Cycle Network with Abbots Langley, Hunton Bridge, and the Kings Langley Business Area between 2013 and 2015.

The South Way Cycle way is a new 1.3 mile route built in 2014/12 which links an existing shared cycleway to a the new Leavesden estate and Country Park with the Grand Union Canal. It has several links with designated quiet routes in and around Abbots Langley and Leavesden and forms an important link for residents to reach the Canal towpath.

The Mill End to Rickmansworth route is nearly 2 miles long and was built in 2012. It introduced a signed advisory route on quiet residential roads to connect the Southern part of the District into the network, giving new and less experienced cyclists an alternative to the busy, narrow A412. It specifically gives access to local schools and connects the Maple Cross signed advisory route to the network.

The Maple Cross signed advisory route is a 1 mile route runs on widened shared footway on the A412 and service roads to provide a quieter option for people cycling to the village of Maple Cross and the Maple Cross Business Area which features several prestigious local businesses.

Schemes identified for development in the near future include routes linking Abbots Langley and Bedmond to the Garston Schools cluster, improvements to Rickmansworth Town Centre routes and an aspirational route to connect Chorleywood with the local and national cycle networks.

Greenways

We support and implement measures where appropriate to assist in the creation and maintenance of Greenways; a network of largely car free off-road routes allowing shared access for people of all abilities by foot, bicycle or on horseback. We plan to investigate linking essential services and public facilities within the district with Greenways, where possible linking into networks outside the District such as the Hertsmere Greenways and St. Albans Green Ring project.

One Greenway was completed in 2011, linking Mutton Wood, Oxhey Lane to the Merry Hill Greenway which goes on to Bushey Heath. Further schemes are under consideration including the Attenborough's Fields proposal which would link South Oxhey with Bushey Village to provide a viable and quiet alternative to the busy A411.

Measuring and Reporting upon Local Air Quality

We measure NO_2 at 5 locations within the District and our results are reported at http://www.hertsbedsair.net/. Our continuous automatic air pollution monitoring station at Rickmansworth Fire Station was decommissioned in November 2011 due to the cost of maintenance and reliability problems. There are no plans to reinstate it in its current form.

Land Use Planning

Our Core Strategy and development management policies require that we always take the impact upon air quality into account when considering all planning applications and particularly when these are within or closely adjoining any Air Quality Management Area. Air quality will taken into greater consideration in the future by greater inclusion in development plans which should follow current air

quality responsibilities as outlined in the relevant current planning guidance on air quality.

Applicants for Planning Permission are required to assess the impact of proposed development on air quality. The Policy states that development will not be permitted where there is an adverse effect on an Air Quality Management Area. Applicants are also required to submit a 'CPLAN Energy and Sustainability Statement' demonstrating the extent to which sustainability principles have been incorporated into the location, design, construction, future use of proposals and the expected carbon emissions.

Our on line sustainability statement includes a question 'Is your development in or near an Air Quality Management Area?' and includes a link to a map showing the AQMAs. If the answer is 'yes' then the applicant is asked 'Is the development expected to have any adverse impact on air quality?' and a link to the corresponding Development Management Policy DM8 is provided.

Development will not be permitted where it would have an adverse impact on air pollution levels, particularly where it would adversely affect air quality in an Air Quality Management Area. If the proposed development is within an AQMA then the applicant has to provide details of any remedial measures in the sustainability statement and these will be considered as part of the application process.

Energy Efficiency and Reducing Fuel Usage

Since 2007 much work has been done on the promotion of energy efficiency.

The Council's Home Energy priorities are set out in our HECA report 2013-15[1] and the Council is a founding member of *Green Deal Together*, a green deal provider funded by 15 local authorities.

The partnership with Mitsubishi has provided a ground source heat pump at Three Rivers House. In addition a solar PV array has been installed on Watersmeet theatre, office lighting has been optimised and changed over to sensor controlled LED, our main offices have installed a voltage optimisation system and our IT servers have been consolidated and updated.

As previous funding for energy efficiency ended, the Council has been at the forefront of a move to Green Deal through investment with other local authorities in establishing a Green Deal Provider Company. The Council was also successful in securing ECO[2] and DECC[3] (Department of Energy & Climate Change) Fuel Poverty funding which enabled a joint project with Watford Borough Council and Watford Community Housing Trust to deliver external wall insulation to a fuel poor and hard to treat estate in the district. This project has been completed and 118

As part of the Hertfordshire wide Keep Warm Stay Well initiative visits have been undertaken to vulnerable residents in the district providing bespoke advice on how to improve their home energy efficiency.

[1] http://tinyurl.com/nelwmw6
[2] http://tinyurl.com/bvkl426
[3] http://tinyurl.com/agedhw5

We continue to work with the Green our Herts awareness group of the Hertfordshire Sustainability Forum to promote sustainability including energy efficiency and have expanded the 'Our climate is changing website' across the county and rebranded it as Green our Herts[4]

We have continued to promote awareness of energy through the Green our Herts website and articles in Three Rivers Times and the Environment e-newsletter.

In conjunction with other Hertfordshire authorities we have raised awareness of energy use through an 'energy vampires' campaign, including adverts, posters and leaflets across the county.

A consultation was recently initiated on *Green Expectations*[5], a sustainability and climate change strategy which includes aims and objectives to reduce energy use.

No work has yet commenced on promoting reductions in fuel usage by the Council's vehicle fleet, which comprises directly owned refuse collection and street cleaning vehicles.

In 2010 a proposal was put forward to encourage the take up of low or zero emission vehicles by Council employees who use their own cars for business purposes. This proposal did not progress due to financial uncertainties at the time.

Green Travel Plans

These are initiatives aimed at encouraging employers to review the suitability of car pool schemes and any car allowance systems that they use, to establish the most effective system to include fairness and benefits to air quality.

Travel Plans are a very effective way for the Council to reduce car use through a grant of planning permission for certain new developments, by requiring employers and other local land owners to demonstrate how their new development will help meet this objective. Over 21 Plans have been agreed and are being monitored by the County Council to ensure their effectiveness.

[4] http://www.greenourherts.org.uk/

[5] http://www.threerivers.gov.uk/egcl-page/consultations

The Council also has a Travel Plan in place, which has been monitored and improved over the last eight years. It encourages staff to walk, cycle and car share using various tools and initiatives and is currently under review to improve it's effectiveness. The provision for cycling storage is currently oversubscribed and several new measures are planned to reduce the Council's car use.

Emissions from Industry, Commerce and Domestic premises

We regulate emissions from a range of industrial and commercial premises using the provisions of the Environmental Permitting Regulations 2010. In Three Rivers such premises and processes include petrol stations and dry cleaners, timber treatment and cement batching plant. We also regulate emissions from a crematorium. At the time of writing there are 24 such permits issued, which are renewed annually. They can be viewed at: http://tinyurl.com/kn69hj8

General Guidance to the permitting regime can be found at http://tinyurl.com/qyq9ot3

Short lived incidents of air pollution are often caused by construction and demolition sites, whether by windblown grit and dust or by the burning of waste. Controls are available under the Clean Air Act and Environmental Protection Act. Bonfires produce many forms of pollution. Bonfire smoke can have damaging health effects and although serious harm is unlikely if exposure is brief, it can cause significant problems for people with asthma, bronchitis and heart conditions. Bonfires generate around 30,000 nuisance complaints to local authorities each year. As well as causing health problems, smoke prevents neighbours from enjoying their gardens and opening windows or hanging washing out. We encourage alternative, more environmentally-friendly ways of disposing of refuse, by distributing home compost bins free of charge to residents and a free garden waste collection service.

Because of this we doubt that there is generally a need for bonfires, with exceptions for events like Guy Fawkes' Night and other cultural and religious festivals. We will continue to respond rapidly to bonfire complaints and enforce legislation where necessary.

6. Striving for Cleaner Air; 2015 to 2020 – Short/mid term proposals

The previous section describes the actions we have taken so far that will help to improve air quality in Three Rivers. Many of these actions are ongoing and progress will be reported in future additions of this report. However, there are two firm initiatives that the Council will take forward during the early stage of this action plan.

6.1 *air*TEXT

Operated by Cambridge Environmental Research Consultants Ltd (CERC) *air*TEXT currently provides an air quality forecasting service for 33 London Councils (plus Slough) reaching around 11,000 registered users; this service comprises the following components:

- Three-day forecasts of NO_2, PM_{10}, $PM_{2.5}$ and ozone at street-scale resolution across Greater London using CERC's ADMS-Urban modelling system[6], detailed local emissions data, hourly weather forecasts and European regional forecasts.
- Free air quality alerts by SMS text, email and voicemail sent directly to subscribers.
- A Twitter account for each Council; air quality alerts are tweeted.
- Daily Health Bulletins for each Council.
- 3-day forecasts of air pollution, UV, pollen and temperature range in PDF form, designed to be printed out and pinned up in public spaces.
- These are emailed directly to Council staff for onward dissemination, as well as being available to download from the *air*TEXT website.
- An app for iPhone and Android showing the same information as the Daily Health Bulletin: 2-day forecasts of air pollution, UV, pollen and temperature range for each borough
- The *air*TEXT website which includes:

    High-resolution zoom-able air pollution forecast maps

    'Pins', showing the borough forecast for 'today' and 'tomorrow' for each borough

    Access to the Daily Health Bulletins for every borough

    A sign-up page for the air quality alerts by text, voicemail and email (each borough has password-protected access to a private online database containing the details of each subscriber within their own borough)

The intention is that Three Rivers will engage this service from April 2015, for a 3 year subscription period. The aim is to promote local take-up and encourage

[6] http://tinyurl.com/p6tu39g

behavioural change, in terms of transport choices and personal protection during pollution episodes. Funding for this initiative has been made available by the Director of Public Health of Hertfordshire County Council.

6.2 *Monitoring for $PM_{2.5}$ (very fine particles)*

Hertfordshire is second only to London in terms of premature deaths caused by air pollution. Again working with the Director Public Health we intend to measure levels of $PM_{2.5}$ at two background locations within Three Rivers where human exposure to such particles occurs. $PM_{2.5}$ has only been monitored at just one location in Hertfordshire. Funding for this initiative is currently being finalised.

An *Osiris* ™ monitor for particulate matter.

Mounted on a lamppost it is mains powered and data is downloaded via mobile broadband.

What is $PM_{2.5}$ and why are we concerned about it?

Particulate matter (PM) is a term used to describe the mixture of solid particles and liquid droplets in the air. It can be either human-made or naturally occurring. Some examples include dust, ash and sea-spray. Particulate matter (including soot) is emitted during the combustion of solid and liquid fuels, such as for power generation, domestic heating and in vehicle engines. Particulate matter varies in size (i.e. the diameter or width of the particle). $PM_{2.5}$ means the mass per cubic metre of air of particles with a size (diameter) generally less than 2.5 micrometres (µm). $PM_{2.5}$ is also known as fine particulate matter (2.5 micrometres is one 400^{th} of a millimetre).

Inhalation of particulate pollution can have adverse health impacts and there is understood to be no safe threshold below which no adverse effects would be anticipated. The biggest impact of particulate air pollution on public health is understood to be from long-term exposure to $PM_{2.5}$, which increases the age-specific mortality risk, particularly from cardiovascular causes. Several plausible mechanisms for this effect on mortality have been proposed, although it is not yet clear which is the most important. Exposure to high concentrations of PM (e.g. during short-term pollution episodes) can also exacerbate lung and heart conditions, significantly affecting quality of life, and increase deaths and hospital admissions. Children, the elderly and those with predisposed respiratory and cardiovascular disease, are known to be more susceptible to the health impacts from air pollution. Potential mechanisms by which air pollution could cause cardiovascular effects are described

in the Committee on the Medical Effects of Air Pollution (COMEAP) report Cardiovascular Disease and Air Pollution (2006)[7].

Sources of $PM_{2.5}$

Human-made sources of $PM_{2.5}$ are more important than natural sources, which make only a small contribution to the total concentration. Within UK towns and cities, emissions of $PM_{2.5}$ from road vehicles are an important source. Consequently, levels of $PM_{2.5}$ (and population exposure) close to roadsides are often much higher than those in background locations. In some places, industrial emissions can also be important, as can the use of non-smokeless fuels for heating and other domestic sources of smoke such as bonfires. Under some meteorological conditions, air polluted with $PM_{2.5}$ from the continent may circulate over the UK – a condition known as the long range transportation of air pollution. Long range transport, together with pollution from local sources, can result in short term episodes of high pollution which might have an impact on the health on those sensitive to high pollution.

In addition to these direct (i.e. primary) emissions of particles, $PM_{2.5}$ can also be formed from the chemical reactions of gases such as sulphur dioxide (SO_2) and nitrogen oxides (NO_x: nitric oxide, NO plus nitrogen dioxide, NO_2); these are called secondary particles. Measures to reduce the emissions of these precursor gases are therefore often beneficial in reducing overall levels of $PM_{2.5}$.

Primary emissions of PM, the formation of secondary PM within the UK and long range transport of pollution from outside the UK all contribute to regional PM levels across the UK. Local primary emissions are also important in urban areas.

Legislative Controls for $PM_{2.5}$

European legislation sets out a number of requirements to control outdoor concentrations of $PM_{2.5}$. Member States are expected to ensure that the annual average concentration of $PM_{2.5}$ does not exceed 25 µg/m^3. The legislation also aims to reduce the levels of $PM_{2.5}$ to which the population is exposed: as no threshold for the effects of long-term exposure to particulate matter on mortality has been identified, continuing to reduce overall population exposure to $PM_{2.5}$ even below this target value will have important public health benefits. Each Member State should achieve an Exposure Concentration Obligation[8] (ECO) of no more than 20 µg/m^3 averaged nationally across background sites in major urban centres over 3 years. In addition, Member States are required to achieve a reduction in population exposure to $PM_{2.5}$ over a period of 10 years between 2010 and 2020.

Despite this there are no statutory Air Quality Objective for $PM_{2.5}$ in the UK, but Defra are currently running a consultation on review air quality management in England. Defra propose that $PM_{2.5}$ is included in local air quality management, in terms of measurement, reporting and action planning, but at the time of writing it is not known how strong the requirement will be. At the moment the requirement is for local authorities to have "regard to $PM_{2.5}$" in their air quality management work. This is

[7] http://tinyurl.com/ofwntwb

[8] http://tinyurl.com/6c3yjf4

considered too weak and instead local authorities should be required to *"work towards a decrease in public exposure (to air pollution) in all aspects of their work*". In addition to strengthening the requirement for action the explicit inclusion of exposure would more closely align Local Air Quality Management with Local Authority public health duties and also the EU Directive requirements on central government

Estimates of the Local Impact of $PM_{2.5}$

In April 2014 Public Health England published ***"****Estimating Local Mortality Burdens Associated with Particulate Air Pollution"*[9]

Reference to Table 1 on page 14 of this report reveals that in 2010 in Hertfordshire it is estimated there were 514 premature or "brought forward" deaths associated with particulate air pollution, amounting to 5258 life years lost. Three Rivers share of this was 43 deaths and 440 life years lost.

Estimates of the National Impact of $PM_{2.5}$

The public health burden of exposure to outdoor $PM_{2.5}$ is estimated to be equivalent to 29,000 deaths per year in the UK (COMEAP, 2010[10]), whilst reduced exposure could yield annual benefits of £9-20billion (Natural Capital Committee, 2014[11]).

Local steps to decrease $PM_{2.5}$ exposure

These could be accomplished by:

- A decrease in emissions from primary pollutants.
- A decrease in the emissions of $PM_{2.5}$ precursors. Particulate nitrate and volatile organic compounds make a large contribution to our $PM_{2.5}$ concentrations and exposure. These arise from many sources including a sizable contribution from traffic and industry. Measures taken locally to decrease NO_X emissions from traffic for example, would be beneficial.
- Good design in the planning process to encourage low emissions development.
- Good design in the planning process to separate the public from areas with high concentrations of $PM_{2.5}$; planning of low pollution routes to schools and the design of school sites.
- Greater active travel; walking and cycling along low pollution routes providing many public health co-benefits.

[9] http://tinyurl.com/o2kybfd
[10] http://tinyurl.com/qx8r8xy
[11] http://tinyurl.com/mvggd8c

7. Striving for Cleaner Air; 2015 to 2020 - Long Term Proposals

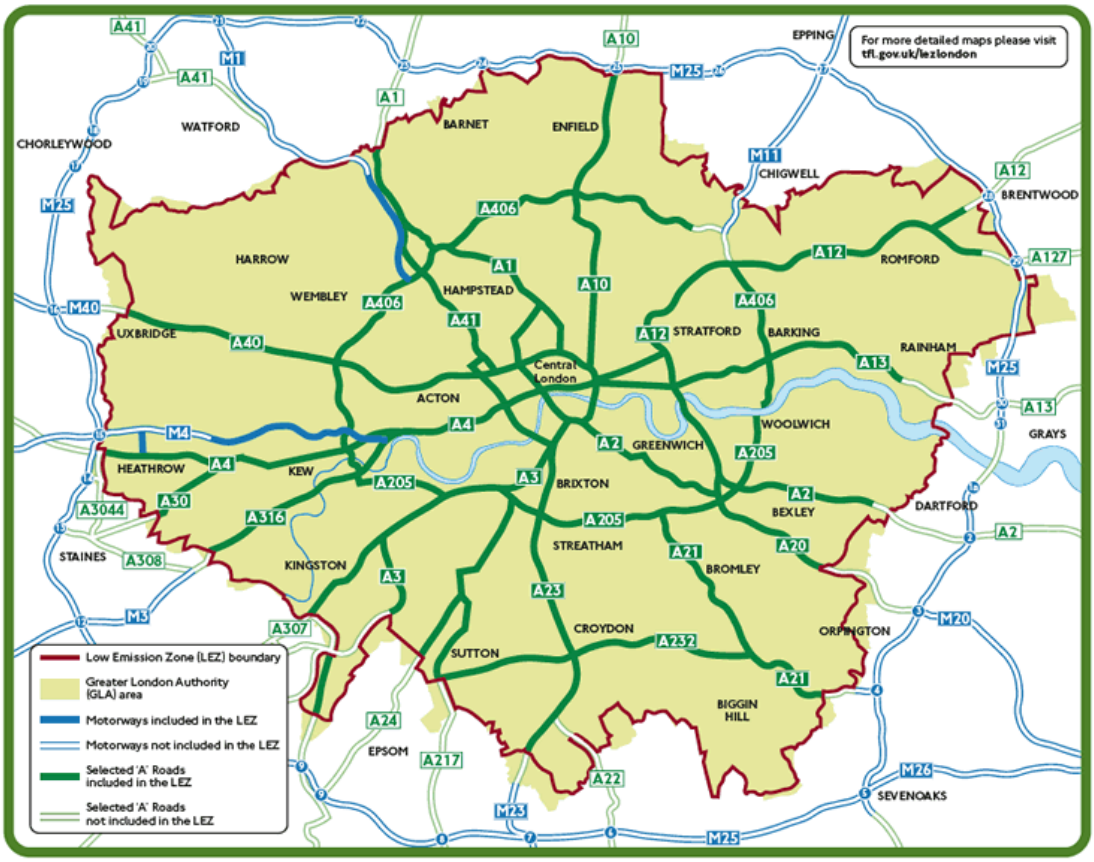
Extending the London Low Emission Zone up to (but not including) the M25 – Feasibility Study

Since 2003 there have been a number of reports[12] [13] that have investigated the feasibility and value of a Low Emission Zone that extends up to the M25.

Significant areas of Hertfordshire, Essex, Kent, Surrey and Buckinghamshire lie within the M25 ring. Locally, Hertsmere, Watford and Three Rivers have large urban and suburban areas of population that are not protected by the London LEZ. Indeed, such populations are likely to be disproportionately affected by vehicles that do not meet LEZ emission standards skirting the LEZ via local roads.

The London Low Emission Feasibility Study 2003 acknowledged both the benefits of a Low Emission Zone bounded by the M25 and the attendant difficulties in engaging with local authorities outside the Greater London Area for enforcement and monitoring.

Reference to the map below shows how the current London LEZ boundary is not coterminous with the M25 corridor. Only in Enfield is the LEZ boundary adjacent to the anticlockwise carriageway.



[12] http://tinyurl.com/jwhptl7
[13] http://tinyurl.com/qd99n7v

The London LEZ has been shown to work and we consider that the time is right to encourage the commissioning of further collaborative research into the feasibility of extending the London LEZ up to the M25. This could be in partnership with the other four upper tier transport authorities impacted by the boundary of the LEZ (Essex, Kent, Surrey and Buckinghamshire) or just with Hertfordshire, where three local Councils are affected.

Three Rivers Freight Routes

We intend to apply for grant funding for a feasibility study into changing local road layouts and freight routes. This with the aim of reducing exposure to particulate and NO_2 pollution from HGVs.

As an example, the Uxbridge Road through Mill End is commonly used by HGVs via Riverside Drive and junction 17 of the M25. For much of its length the Uxbridge Road is residential, with houses close to the centreline and in some locations with front doors and windows opening directly onto the pavement. A more suitable HGV freight route would require HGVs to use the dual carriageway of Rectory Road and the 40mph Chorleywood Road to junction 18. Houses here are set well back from the roadside and pollution exposure is likely to be much reduced. At junction 18 both clockwise and anticlockwise entry ramps descend onto the motorway, thereby assisting the vehicle obtain motorway joining speed.

At the moment, this supposition needs to be tested and a bid will be made for air quality grant funding to explore all freight routes in Three Rivers and to identify those suitable for change.

Emissions from Public Transport

It is apparent that some privately operated buses displaced from the London LEZ because they do not meet pollution emission limits are a relatively common sight in Three Rivers. This is another example of how being on the periphery of a long established LEZ might compromise local air quality and pubic health in Hertfordshire.

Many of these vehicles are used on school transport routes, no doubt on grounds of cost. However, it is worth noting that passengers (and drivers) are not protected from vehicle emissions just because they are inside the vehicle. In fact they can suffer the worst exposure.

It is concern that some of the oldest and most polluting of passenger vehicles are used to transport the next generation to and from school. It is proposed that air

quality grant funding be sought to research real time and continuous exposure by passengers, by means of small portable units which are easily carried by the passenger.

The aim is to obtain a body of evidence that will inform education authorities who commission school transport contracts and the extended Low Emission Zone feasibility study.

Appendices

Appendix I

Air Quality Progress Report 2013

THREE RIVERS DISTRICT COUNCIL

JoynesNash

Acoustics · Environmental · Public Health

2013 Air Quality Progress Report for Three Rivers District Council

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

July 2013 Final

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Date	July 2013

Executive Summary

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. This report represents an update on the air quality in Three Rivers District Council area.

The monitoring of nitrogen dioxide and PM_{10} was undertaken at the continuous monitoring site in Rickmansworth was discontinued in September 2011. However, 16 nitrogen dioxide diffusion tubes continue to be placed at sites around the district. This monitoring identified that there were exceedences of the nitrogen dioxide annual mean air quality objective within the Air Quality Management Area at Chorleywood. The diffusion tube on All Saints Lane, Croxley Green measured bias adjusted results below the objective but based on low data capture. This diffusion tube has now been relocated to a site on Watford Road and will be reported in the next LAQM report.

All other nitrogen dioxide diffusion tube results were substantially below the nitrogen dioxide annual mean air quality objective, including those in the Kings Langley and Chandlers Cross Air Quality Management Areas (AQMAs).

It is therefore recommended, in light of the monitoring data for 2010 and 2011, along with the conclusions from Stage 4 report in 2003[5], that the AQMAs for NO2 at Kings Langley and Chandlers Cross be revoked along with the AQMA for PM10 at Chandlers Cross. Three Rivers District Council's Executive Committee approved the revocation of this AQMA and the intention is that the revocation be completed prior to the next review and assessment report.

A Detailed Assessment is not required for any pollutant at this stage; however, changes to the deployment of diffusion tube sites have been made to more fully understand relevant exposure in the remaining NO2 AQMA in Chorleywood.

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Introduction

Description of Local Authority Area

Three Rivers is a sub-urban District of 88.8 square kilometres located in south-west Hertfordshire. It borders Watford and Hertsmere boroughs to the east, Buckinghamshire County (Chiltern and South Bucks Districts) to the west, St Albans City & District and Dacorum Borough to the north, and the London Boroughs of Hillingdon and Harrow to the south.

The key road links through the District are the M1 and M25 motorways, which are significant sources of local air pollutant emissions. There are no significant pollutant sources within the District apart from road traffic emissions.

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.

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 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 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

Summary of Previous Review and Assessments

First Round of Review and Assessment

Unlike the current format of the Updating and Screening Assessment, Detailed Assessment and Further Assessment, round one of the review and assessment process was split into four staged reports, with each being more detailed than the last. The Council concluded there were three locations of relevant public exposure where the NO_2 and PM_{10} objectives were unlikely to be met.

Further assessment of the subsequent AQMAs confirmed that exceedences were likely, but it was recommended that the areas covered by the AQMAs for NO_2 should be reduced and the AQMAs for PM_{10} be revoked. However, in February 2004 it was decided, by the Committee of Members, to keep the original AQMAs in place.

Second Round of Review and Assessment

The Assessment concluded that exceedences in the existing AQMAs were likely, but no further potential exceedences were identified. Therefore a Detailed Assessment was not required.

Third Round of Review and Assessment

The Assessment indicated that the only likely NO_2 exceedences were within the existing AQMAs. Therefore a Detailed Assessment was not required.

The report recommended that the Council should consider reinstating diffusion tube monitoring at AQMA receptors close to the M25, to assess current NO_2 annual mean concentrations with a view to revoking one or more of the existing AQMAs.

Air Quality Action Plan 2007

Three Rivers District Council produced their Air Quality Action Plan in June 2007 stating their intentions for working towards reaching the air quality objectives included in the Air Quality Regulations, for the purposes of LAQM.

In pursuit of these objectives, Three Rivers District Council set out in its Action Plan to encourage direct action on the M25, although it was recognised that ultimately the Highways Agency had full control over the motorway. The Action Plan also set out a series of measures to improve air quality across the whole of the District. These included: public transport schemes; a travel wise initiative; encouraging cycling; greenways; alternative fuel usage and car pooling schemes. The Action Plan also identified the importance of considering air quality within planning applications.

The five current AQMAs in the district as described on the Air Quality Archive website are:

1) Chorley Wood NO_2 AQMA - Along the M25 from just south of Junction 18 to just north of where the motorway crosses the River Chess extending 74m either side of the centreline.

2) Chorleywood PM_{10} AQMA - A slightly narrower area from just north of Junction 18, along the M25 to just north of where the motorway crosses the River Chess extending 38m either side of the centreline.

3) Chandlers Cross NO_2 AQMA - An area along the M25 from just west of where Chandler's Lane crosses the M25 to the beginning of Junction 19 of the motorway extending 74m either side of the centreline.

4) Chandlers Cross PM_{10} AQMA - A slightly narrower area than that for NO_2 extending 38m either side of the centreline.

5) Kings Langley NO_2 AQMA - An area surrounding where the M25 crosses the railway extending 74m either side of the centreline.

Maps of the locations of these AQMAs can be seen in the following figures.

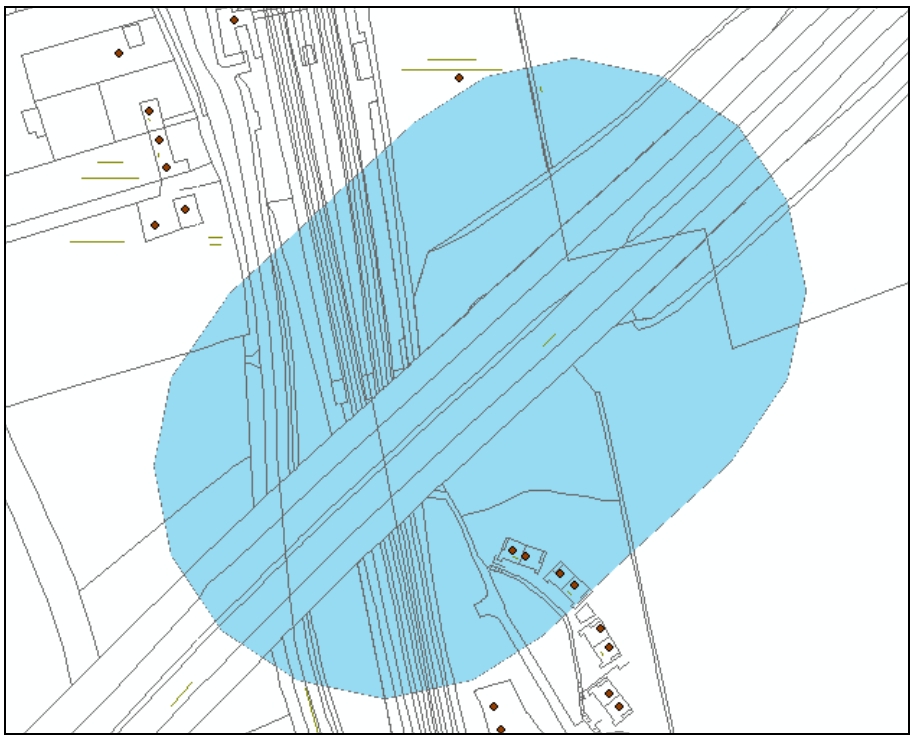

Figure 1.1: Kings Langley NO_2 AQMA 1
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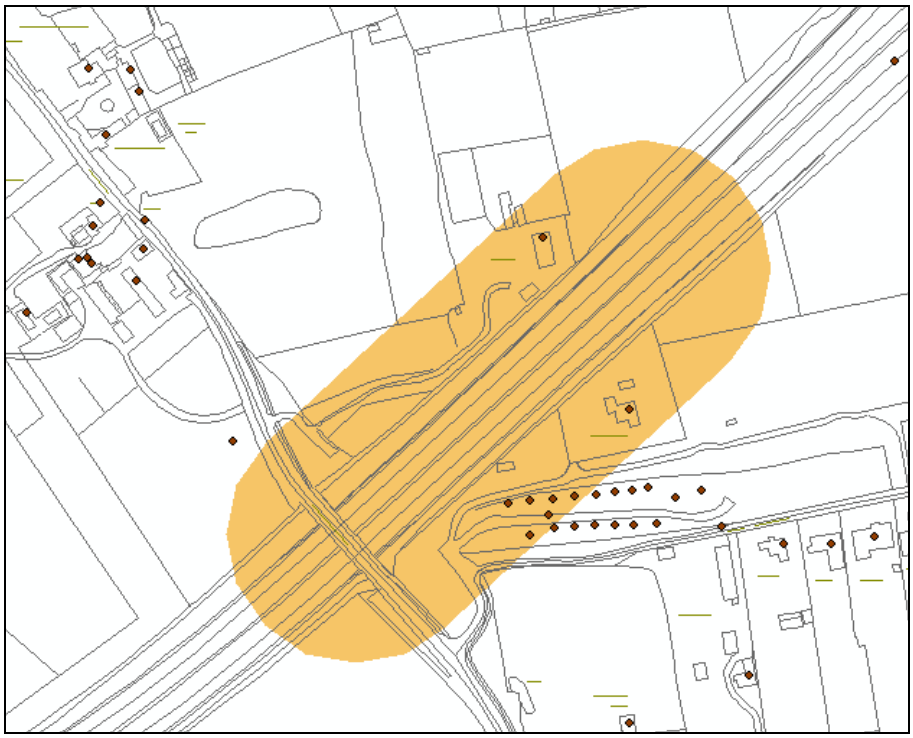

Figure 1.2: Chandlers Cross NO_2 AQMA 2
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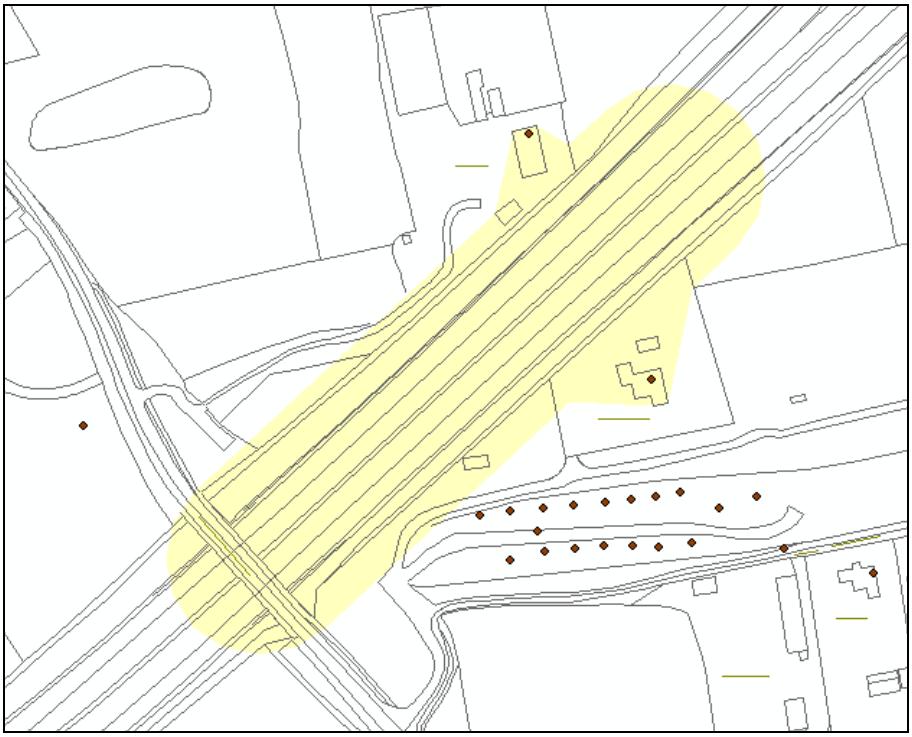

Figure 1.3: Chandlers Cross PM_{10} AQMA 2

Figure 1.4: Chorleywood NO_2 AQMA 3
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Figure 1.5: Chorleywood PM_{10} AQMA 3
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Air Quality Progress Report 2008

The report recommended that monitoring of NO_2 using diffusion tubes be reinstated at the following sites: TR13 (within the Chorleywood AQMA); TR15 (within the Chandlers Cross AQMA); TR16 (The Retreat, within the Kings Langley AQMA) and; TR10 (All Saints Lane, Croxley Green).

It was concluded that as the annual mean NO_2 air quality objective was exceeded at TR10 and TR13 monitoring should continue at these locations and again be

assessed within the 2009 Updating and Screening Assessment. It was also suggested that the Council consider monitoring NO_2 at other sites of relevant public exposure that could be affected by the widening of the M25. Continued commitment was also given monitoring of NO_2 and PM_{10} at the Three Rivers Rickmansworth.

Air Quality Reports from 2008 - 2012

Due to a number of reasons no reports were submitted to defra between 2008 and 2012. This means that the USA for 2009 was not submitted nor any reports following that year. Following discussions with the LAQM helpdesk in 2012, it was agreed that the submission of a USA for 2012 should be submitted to update the years since the last report.

1.4.7 Updating and Screening Assessment 2012

The 2012 Updating and Screening Assessment was therefore duly completed, submitted and positively appraised by defra. This Updating and Screening Assessment identified that no Detailed Assessment was required for any pollutant.

Following on from the Stage 4 report undertaken in 2003[5], monitoring undertaken in the AQMAs of Kings Langley and Chandlers Cross confirmed that there was no requirement for the AQMAs to be retained. It was therefore proposed that the AQMAs for NO2 at Kings Langley and Chandlers Cross be revoked along with the AQMA for PM10 at Chandlers Cross. The AQMAs for NO2 and PM10 at Chorleywood would be retained pending further more relevant monitoring.

It was stated that the next course of action for air quality was to revoke the AQMAs as outlined above and submit a Progress Report in 2013.

New Monitoring Data

Summary of Monitoring Undertaken

Automatic Monitoring Sites

Due to financial pressures on services at Three Rivers District Council the automatic monitoring site in Rickmansworth was discontinued in September 2011. This continued pressure means that this site remains off -line.

Non-Automatic Monitoring Sites

In 2010, Three Rivers District Council re-instated 8 NO_2 diffusion tube sites, the locations of which can be seen in figures 2.2 to 2.9 and the details of which can be seen in table 2.2. At four of these locations diffusion tubes were co-located in triplicate resulting in the deployment of 16 nitrogen dioxide tubes in total. The diffusion tubes are supplied by ESG Didcot (formerly Harwell Scientific Services) and the preparation is 50% TEA in acetone. Further information on the QA/QC procedures for the diffusion tubes can be seen in Appendix A.

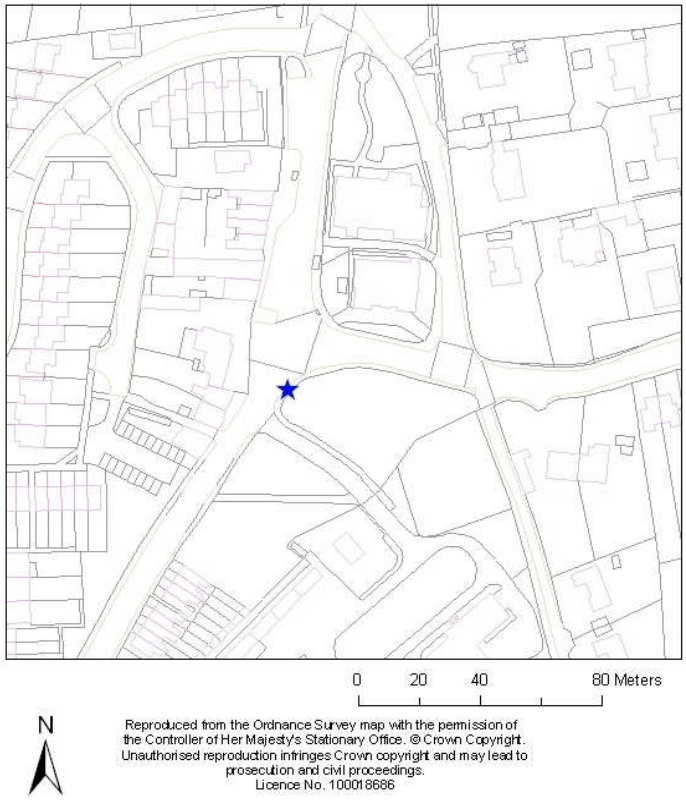

Figure 2.2. Map of All Saints Lane, Croxley Green diffusion tube site

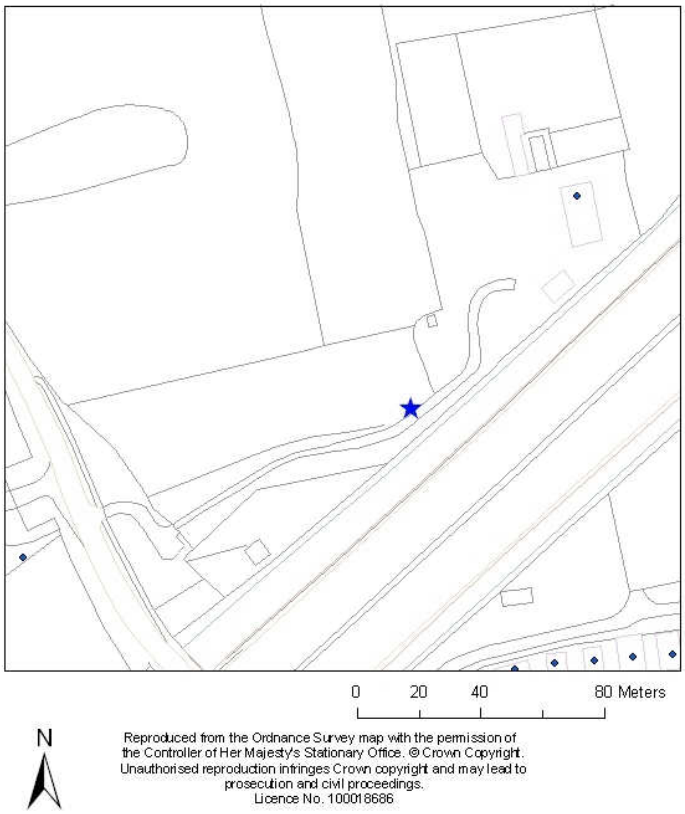

Figure 2.3. Map of Glen View, Chandlers Cross diffusion tube site

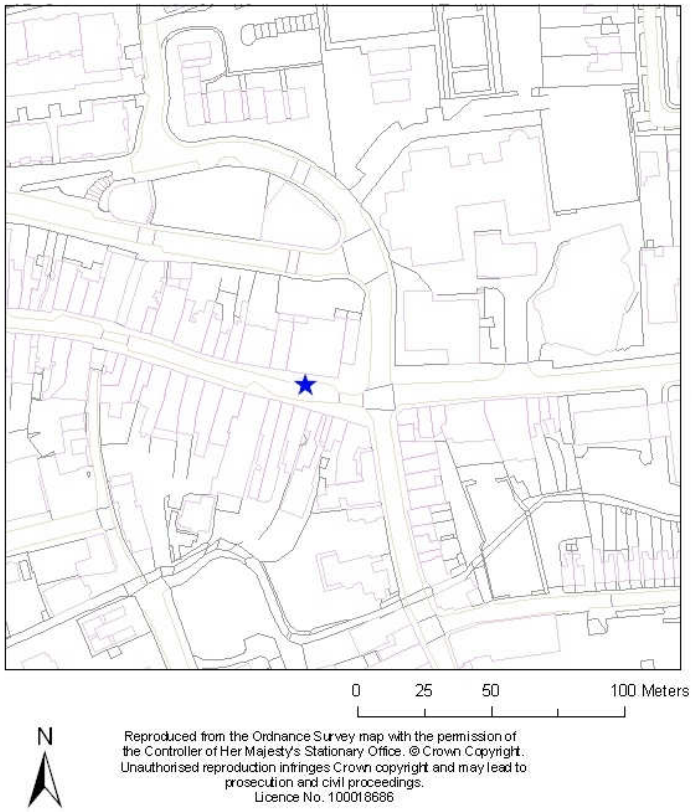

Figure 2.4. Map of High Street, Rickmansworth diffusion tube site

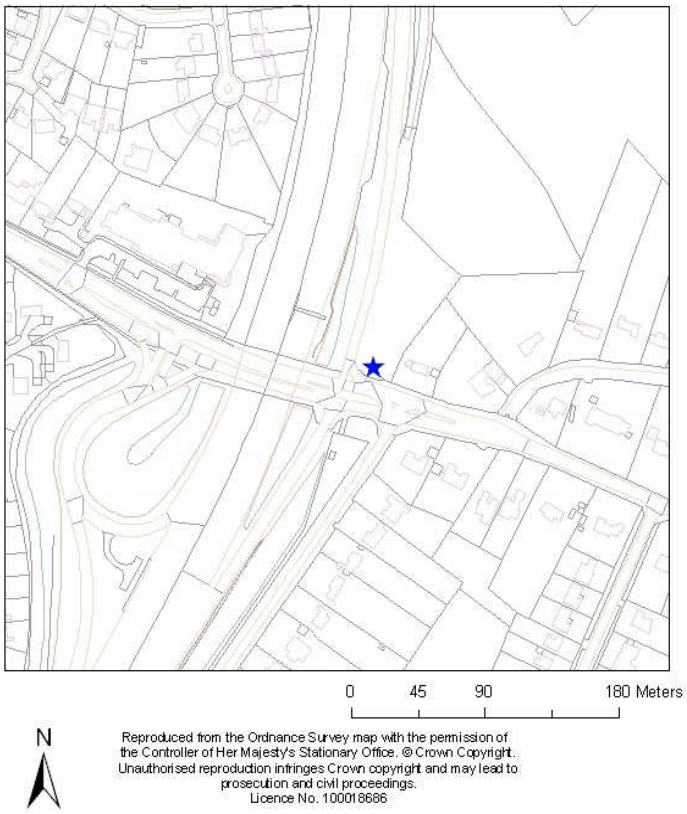

Figure 2.5. Map of Junction 18 (M25) Chorleywood diffusion tube site

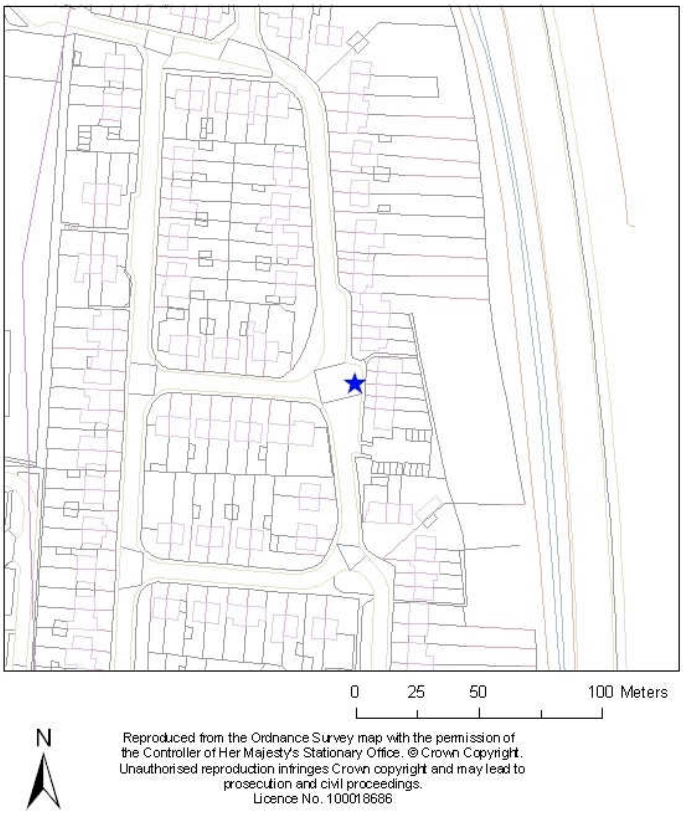

Figure 2.6. Map of Lemonfield Drive, Garston diffusion tube site

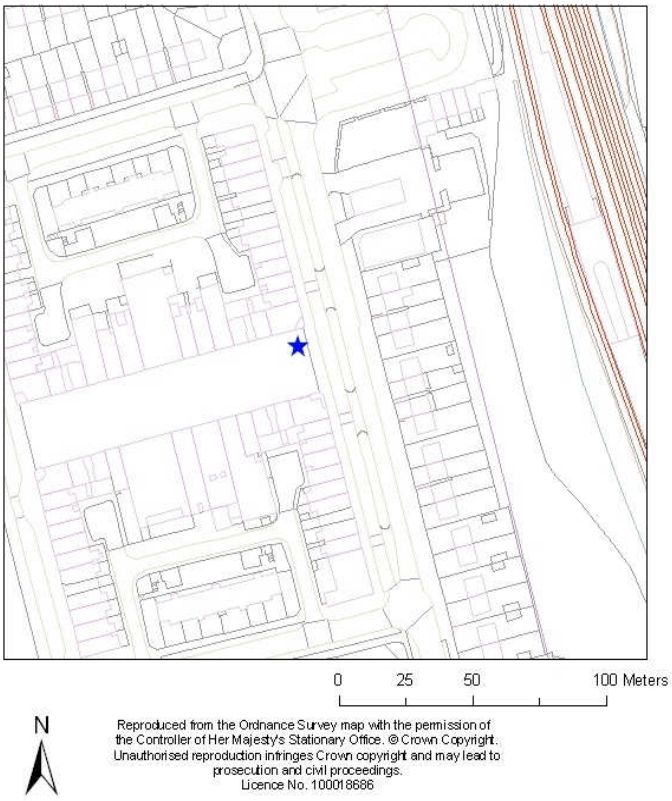

Figure 2.7. Map of Prestwick Road, South Oxhey diffusion tube site

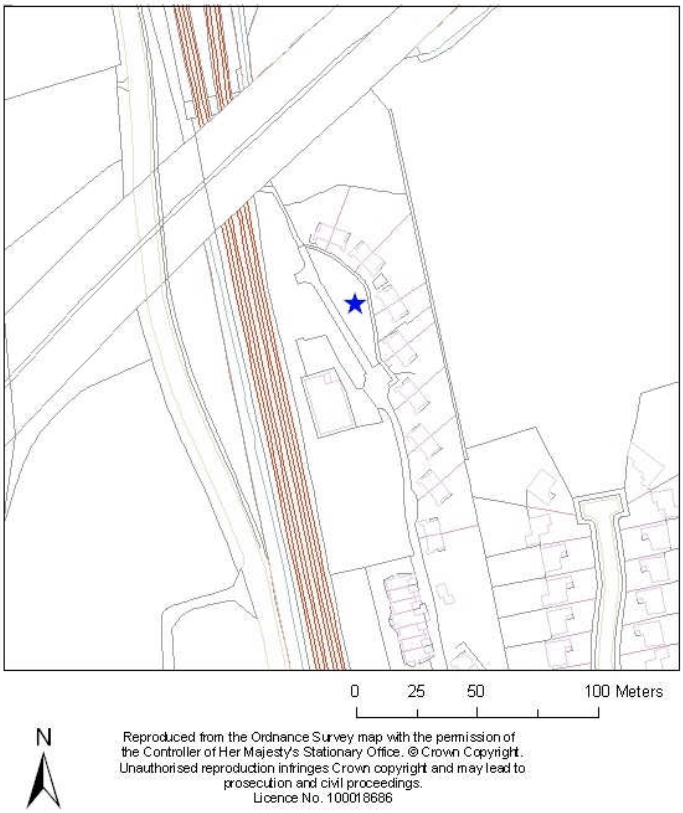

Figure 2.8. Map of The Retreat, Abbots Langley diffusion tube site

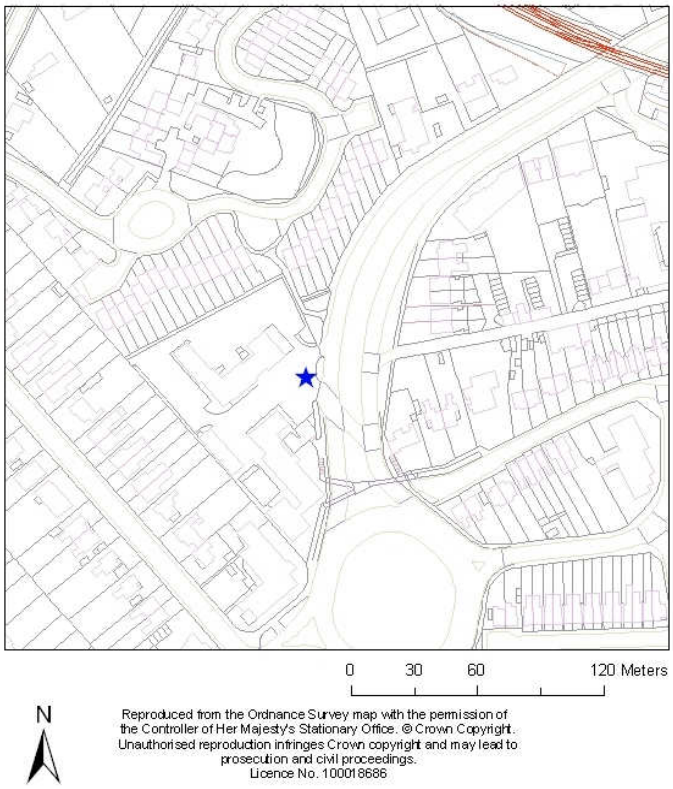

Figure 2.9. Map of Rectory Road, Rickmansworth diffusion tube site

Table 2.2 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?
TR21	High Street, Rickmansworth	Kerbside	506005	194455	X	NO_2	N	N	N (1m)	1	N
TR22	Rectory Road, Rickmansworth	Intermediate	505486	194480	X	NO_2	N	N	N (30m)	10	N
TR25	All Saints Lane, Croxley Green	Kerbside	507000	195300	X	NO_2	N	N	N (24)	1	N
TR26	Glen View, AQMA Chandlers Cross	Background	506500	198600	X	NO_2	Y	N	N (97)	17	N
TR29	The Retreat, Kings Langley	Background	508100	201800	X	NO_2	Y	N	N (7)	4	N
TR32	Lemonfield Drive, Garston	Background	512300	200760	X	NO_2	N	N	N (5)	2	N
TR33	Junction 18, M25	Kerbside	504300	196300	X	NO_2	Y	N	N (35)	1	N
TR36	Prestwick Road, South Oxley	Intermediate	511744	193289	X	NO_2	Y	N	N (6)	5	N

Comparison of Monitoring Results with Air Quality Objectives

Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

Due to financial pressures on services at Three Rivers District Council the automatic monitoring site in Rickmansworth was discontinued in September 2011. This continued pressure means that this site remains not in operation. There is therefore no automatic data to compare with the air quality objective.

Diffusion Tube Monitoring Data

The diffusion tube monitoring results for 2012 can be seen in table 2.3 below. The results have been bias corrected using the national bias factor as presented in the defra spread sheet. The 2010 and 2011 data has also been presented in table 2.4 below. The 2010 data has been annualised and bias adjusted as the tubes were only reinstated in May of that year. The bias adjustment factors and a full dataset of the monthly mean values for 2012 (not bias corrected) are presented in Appendix A and B. Although some of the tubes have been co-located in triplicate at some of these sites, the averages have not been taken and all tube site results have been shown. Additionally, the 2011 and 2012 tube sites with less than 75% data capture (9 months) have not been corrected as the collection rates are so low in 2011 and the site is 24 metres from the nearest relevant exposure. The distance corrected tube results have also not been presented as if this was undertaken no exceedences of the annual mean objective would be shown. The results from diffusion tubes inside AQMAs are examined first, followed by results from outside AQMAs.

Diffusion tube Results from Within AQMAs

The Retreat, Kings Langley

The three nitrogen dioxide diffusion tubes sited at The Retreat in 2012 (TR30, 31 and 32) recorded bias adjusted annual mean concentration of 27.2, 26.7 and 27.9$\mu g/m^3$respectively based on a 100% data capture rate for all tubes. This is well below the annual mean objective of 40 $\mu g/m^3$. The 2010 results, annualised from 8 months data and 2011 data are also well below the annual mean objective. As recommended in the USA 2012 this AQMA is to be revoked. Three Rivers District Council's Executive Committee approved the revocation of this AQMA and the intention is that the revocation be completed prior to the next review and assessment report.

Glen View, Chandlers Cross

The AQMA at Chandlers Cross contains 2 properties and a number of mobile homes along the M25 including Glen View which is the closest property to the carriageway. The three diffusion tubes sited at this location (TR26, 27, 28) are exposed at the same distance from the carriageway as Glen View and in 2012 recorded bias adjusted annual means of 29.8, 27.8 and 27.9$\mu g/m^3$respectively based on 10,11 and 12 months data capture respectively. These levels are substantially below the annual mean objective of 40 $\mu g/m^3$as they were in 2010 and 2011, again, probably as a result of the topography of this location which results in the measured levels being lower than expected. As recommended in the USA 2012 this AQMA is to be revoked. Three Rivers District Council's Executive Committee approved the revocation of this AQMA and the intention is that the revocation be completed prior to the next review and assessment report.

Junction 18, M25 – Chorleywood

The Chorleywood AQMA extends along a 1.4km stretch of the M25 400 metres to the south and 1km to the north of junction 18. South of the junction there are 3 properties east of the carriageway and 4 to the west and to the north of the junction

there are numerous properties to the west of the carriageway. The diffusion tube site is located on the eastern side of junction 18 adjacent to the M25/A404 off slip and in 2012 the bias adjusted results obtained from this location are 42.3, 47.1 and 45.3$\mu g/m^3$ based on capture rates of 8, 7 and 9 months respectively. Although the diffusion tube is not representative of relevant exposure, and does not represent a full years measurements these results represent a breach of the annual mean objective and indicate that the AQMA is still required at this location. As the site does not represent relevant exposure, the USA 2012 recommended that the AQMA be retained whilst redeploying tubes to obtain a more representative understanding of nitrogen dioxide levels at the relevant receptors. In October 2012, they were redeployed to the western side of junction 18 within the grounds of Sunrise Senior Living residential home – which is the reason for the low data capture rate in 2012. In the latter months of 2012 the results at the new location were affected as the tubes were continually being found on the ground and the data has not therefore been reported. However, in early 2013 the site was relocated to another position at the same home and should yield results for 2013 on which to base some conclusions about relevant exposure. The grid reference of the new location is 504165, 196287 and will be reported upon on the 2014 report.

Diffusion Tube Sites outside of AQMAs

None of the diffusion tube sites outside of the AQMAs recorded levels which exceeded the annual mean objective. The closest tube site to do so was the one located at All Saints Lane, Croxley Green. The bias adjusted annual mean concentration was measured at 33.9$\mu g/m^3$ in 2012 but the data capture for this year was only 4 months – approximately 33%. No annualisation was undertaken for this result due to the sporadic nature of the missing results; however, the site is also located 24 metres from a relevant receptor. Due to the continued issues with low data capture this tube has been relocated in Watford Road, Croxley Green at grid reference 507131, 195284. This site should result in greater data capture to ensure more representative results for next year and this will be reported in the next LAQM report.

All other NO2 diffusion tube site results were well below the annual mean objective concentration. The Prestwick Road, South Oxhey site recorded eight months of results which has not been annualised, however, the results were 26.1 $\mu g/m^3$ in 2012– well below the annual mean objective and some 6 metres from the nearest relevant receptor. The other sites: High Street, Rickmansworth; Rectory Road, Rickmansworth (3 tubes); and Lemonfield Drive, Garston recorded between 75% and 100% data capture with bias adjusted levels between 26 and 29$\mu g/m^3$– substantially below the annual mean objective. Again, in light of these results it is recommended that the Rectory Road site in Rickmansworth be reduced from three tubes to one diffusion tube.

The diffusion tube monitoring results indicate that the hourly mean air quality objective for nitrogen dioxide will not be exceeded at any location in the district.

Table 2.3 Results of NO_2 Diffusion Tubes 2012

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months)	2012 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.79
TR21	High Street, Rickmansworth	Kerbside	N	N	9	24.6
TR22	Rectory Road, Rickmansworth A	Intermediate	N	N	12	28.4
TR23	Rectory Road, Rickmansworth B	Intermediate	N	N	12	29.3
TR24	Rectory Road, Rickmansworth C	Intermediate	N	N	12	27.1
TR25	All Saints Lane, Croxley Green	Kerbside	N	N	7	33.9
TR26	Glen View, AQMA Chandlers Cross A	Background	Y	N	12	29.8
TR27	Glen View, AQMA Chandlers Cross B	Background	Y	N	12	27.8
TR28	Glen View, AQMA Chandlers Cross C	Background	Y	N	12	27.9
TR29	The Retreat, Kings Langley A	Background	Y	N	12	27.2
TR30	The Retreat, Kings Langley B	Background	Y	N	12	26.7
TR31	The Retreat, Kings Langley C	Background	Y	N	12	27.9
TR32	Lemonfield Drive, Garston	Background	N	N	12	26.2
TR33	Junction 18, M25 A	Kerbside	Y	N	11	**42.3**
TR34	Junction 18, M25 B	Kerbside	Y	N	11	**47.1**
TR35	Junction 18, M25 C	Kerbside	Y	N	11	**45.3**
TR36	Prestwick Road, South Oxley	Intermediate	Y	N	10	26.1

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Table 2.4 Results of NO_2 Diffusion Tubes (2008 to 2012)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias[a]		
			2010 (Bias Adjustment Factor = 0.86)	2011 (Bias Adjustment Factor = 0.84)	2012 (Bias Adjustment Factor = 0.79)
TR21	Kerbside	N	31.2	29.2	24.6
TR22	Intermediate	N	35.2	26.7	28.4
TR23	Intermediate	N	31.4	28	29.3
TR24	Intermediate	N	31.8	29	27.1
TR25	Kerbside	N	**40.0**	**54.2**	33.9
TR26	Background	Y	24.3	29.3	29.8
TR27	Background	Y	25.2	29.1	27.8
TR28	Background	Y	23.7	32	27.9
TR29	Background	Y	33.6	28.2	27.2
TR30	Background	Y	33.5	28	26.7
TR31	Background	Y	32.2	28.4	27.9
TR32	Background	N	30.8	28.3	26.2
TR33	Kerbside	Y	**48.0**	**44.3**	**42.3**
TR34	Kerbside	Y	**43.1**	**50.5**	**47.1**
TR35	Kerbside	Y	**46.5**	**47.6**	**45.3**
TR36	Intermediate	Y	32.3	32.8	26.1

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Particulate Matter (PM_{10})

Due to financial pressures on services at Three Rivers District Council the automatic monitoring site in Rickmansworth was discontinued in September 2011. There is therefore no PM10 monitoring data to report or compare to the objective.

Sulphur Dioxide (SO_2)

Three Rivers District Council does not monitor for sulphur dioxide.

Benzene

Three Rivers District Council does not monitor for benzene.

Other Pollutants Monitored

Three Rivers District Council does not monitor for any other pollutants.

Summary of Compliance with AQS Objectives

Three Rivers District Council has examined the results from monitoring in the district. Concentrations at relevant locations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment, however, a tube site has been relocated to obtain measurements with relevant exposure to ascertain levels at Junction 18, Chorleywood within the intended retained AQMA.

New Local Developments

Three Rivers District 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.

Three Rivers District 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.**

Air Quality Planning Policies

The most recent planning policy regarding air quality is in Policy DM9 of the Development Management Policies LDD which will be adopted by the Council in July 2013.

This Policy outlines the LAQM responsibilities in relation to national air quality objectives and highlights that any emissions from any development, including indirect emissions, must be considered in determining planning applications. It states that applicants should have regard to any emissions arising from the proposed use/development and seek to minimise those emissions to control any risks arising and prevent any adverse impact on local amenity.

The policy goes on to state in section C that development will not be permitted where it would have an adverse impact on air pollution levels, particularly where it would adversely affect air quality in an Air Quality Management Area.

This policy document can be found at http://www.threerivers.gov.uk/getresource.aspx?file=_development%20management%20policies%20LDD%20proposed%20submisssion%20july%202012.pdf

Local Transport Plans and Strategies

Hertfordshire County Council has published Hertfordshire's Local Transport Plan 2011-2031 and recognises within that document that poor air quality can be a serious threat to health whilst also acknowledging that emissions from transport are a major source of air pollution. Air quality is specifically addressed in Challenge 3.2 which is to 'Improve the health of individuals by encouraging more physically active travel and improving areas of poor air quality'.

Specifically, it states that in those areas where there are specific air quality problems that the County Council (who are responsible for the local highway network) will work closely with district councils to seek to reduce the level of traffic emissions. It states that this can be done by addressing congestion in the area or by looking to limit the most polluting vehicles, such as HGV's.

A copy of the Local Transport Strategy for Hertfordshire can be found at www.hertsdirect.org/docs/pdf/l/ltp3vol1.pdf .

Climate Change Strategies

Three Rivers District Council has produced a document called Green Expectations which is a draft Sustainability Strategy for the district. The document sets out how the authority aims to continue to reduce its impact on the local and global environments. The document has been approved by the Council's Executive Committee and is to go out to public consultation in the near future.

Conclusions and Proposed Actions

Conclusions from New Monitoring Data

The nitrogen dioxide monitoring results from the Kings Langley and Chandlers Cross AQMAs indicate that the NO2 annual mean objective is still currently being comfortably met. The results for the Chorleywood AQMA are inconclusive due to monitoring with no relevant exposure. The diffusion tubes have been relocated at relevant exposure to fully identify whether there is a requirement to retain this AQMA.

The nitrogen dioxide diffusion tube monitoring results in the district outside of the AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

Conclusions relating to New Local Developments

No significant changes or developments have been identified since the last submitted air quality report which is likely to lead to significant increases in any pollutant prescribed in the Air Quality Strategy. A Detailed Assessment is therefore not required.

Proposed Actions

This Progress Report has identified that no Detailed Assessment is required for any pollutant.

As per the USA 2012, monitoring undertaken in the AQMAs of Kings Langley and Chandlers Cross continue to show that there is no requirement for the AQMAs to be retained. It is therefore proposed that the AQMAs for NO2 at Kings Langley and

Chandlers Cross be revoked along with the AQMA for PM10 at Chandlers Cross. The AQMAs for NO2 and PM10 at Chorleywood will be retained pending further more relevant monitoring. Three Rivers District Council's Executive Committee approved the revocation of this AQMA and the intention is that the revocation be completed prior to the next review and assessment report.

The current triplicate deployment at Chorleywood has been removed and been relocated at a site within the AQMA which is representative of relevant exposure in an attempt to more fully assess NO2 levels in this area. It is also proposed that the triplicate NO2 diffusion tube sites at Chandlers Cross and Kings Langley be reduced to one for one more year to ensure measured levels remain low. The triplicate diffusion tube site located in Rectory Road shall be reduced to one tube.

The next course of action for air quality is to revoke the AQMAs as outlined in this report and submit a Progress Report in 2014.

References

1. Part IV of Environment Act 1995: Local Air Quality Management. Technical Guidance LAQM.TG (09). Defra, February 2009.

2. The Air Quality (England) Regulations 2000 (Statutory Instrument 2000 No. 928), March 2000.

3. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007. Volume 1 and 2, ISBN 978-0-171692-5

4. The Air Quality Amendment Regulations 2002, ISBN 0 11061468 2.

Appendices

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

Diffusion Tube Bias Adjustment Factors

Three Rivers District Council has not run a local triplicate co-location study so uses a national factor as given on the review and assessment help desk website for ESG Didcot (formerly Harwell Scientific Services). The preparation method is 50% TEA/acetone. Results of the last two years were:

2010: 0.86
2011: 0.84
2012: 0.79

The date of the table release was June 2013.

QA/QC of diffusion tube monitoring

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO_2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in their Local Air Quality Management work.

Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the WASP scheme.

The WASP Rounds R113 – R120 (Apr 2011 – Mar 2013) show that ESG Didcot (formerly Harwell Scientific services) were classed as Satisfactory.

Appendix B: Monthly Mean Diffusion Tube Results for 2012

Site	*Environment*	*Location*	*Easting*	*Northing*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
TR21	kerbside	High Street Rickmansworth	506000	194400	50		29	35	28	26	27	27	35			51
TR22	intermediate	Rectory Road Rickmansworth A	505500	194400	45	34	34	30	30	27	27	31	45	36	51	41
TR23	intermediate	Rectory Road Rickmansworth B	505500	194400	44	44	27	28	34	25	24	27	32	39	61	60
TR24	intermediate	Rectory Road Rickmansworth C	505500	194400	45	44	36	31	33	25	26	27	31	37	36	40
TR25	kerbside	All Saints Lane Croxley Green	507000	195300		56	37	42	37							
TR26	background	Glen View Chandlers Cross A	506500	198600	44	38	42	33		19	35	36	35		56	41
TR27	background	Glen View Chandlers Cross B	506500	198600	42	38	30	16	32		34	24	34	41	45	49
TR28	background	Glen View Chandlers Cross C	506500	198600	37	37	29	32	32	32	32	38	34	35	49	37
TR29	background	The Retreat Kings Langley A	508100	201800	48	44	36	27	33	24	28	25	30	33	46	39
TR30	background	The Retreat Kings Langley B	508100	201800	39	48	22	33	33	24	28	27	36	36	45	34
TR31	background	The Retreat Kings Langley C	508100	201800	45	50	39	31	32	25	28	28	38	34	44	30
TR32	background	Lemonfield Drive Garston	512309	200760	26	46	40	27	30	25	21	29	34	34	46	41
TR33	kerbside	Junction 18 M25 A	504300	196300	74	71	57	46	29	40	56	54				
TR34	kerbside	Junction 18 M25 B	504300	196300	81	70	46	54	51			54	61			
TR35	kerbside	Junction 18 M25 C	504300	196300	81	68	44	53	51	51	52	54	62			
TR36	intermediate	Prestwick Road South Oxhey	511726	193374		43		27	30	22	21		31	35	48	39

Table B.1. Nitrogen dioxide diffusion tube monthly results for 2012

Appendix II:

Air pollution levels and health advice; table of UK Air Pollution Bandings

The Department of Health has developed an air pollution banding system which helps sensitive people manage their health. Maximum levels of five key air pollutants are considered by the system below:

Air Pollution Banding	Value	Accompanying Health Messages for At Risk individuals*	Accompanying Health Message for the General Population
Low	1 - 3	**Enjoy** your usual outdoor activities	**Enjoy** your usual outdoor activities
Moderate	4 - 6	Adults and children with lung problems, and adults with heart problems, **who experience symptoms**, should **consider reducing** strenuous physical activity, particularly outdoors.	**Enjoy** your usual outdoor activities.
High	7 - 9	Adults and children with lung problems, and adults with heart problems, should **reduce** strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also **reduce** physical exertion.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should **consider reducing** activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should **avoid** strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	**Reduce** physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.

*Adults and children with heart or lung problems are at greater risk of symptoms. Follow your doctor's usual advice about exercising and managing your condition. It is possible that very sensitive individuals may experience health effects even on Low air pollution days. Anyone experiencing symptoms should follow the guidance provided below