Report to	Norwich highways agency committee	**Item**
	17 September 2015	10
Report of	Head of city development services	
Subject	Air quality management plan	

Purpose

This report seeks comment on a draft air quality action plan to address transport related air quality issues in Norwich

Recommendation

Committee members are asked to comment on the draft action plan prior to consideration by the city council's cabinet at their October 2015 meeting.

Corporate and service priorities

The report helps to meet the corporate priority of a safe, clean and low carbon city and the service plan priority to prepare an air quality management action plan

Financial implications

The measures contained in the draft action plan will be funded from capital allocations associated with the delivery of the Transport for Norwich programme or within existing departmental budgets.

Ward/s: Mancroft and Thorpe Hamlet

Cabinet member: Councillor Bremner – Sustainable development

Contact officers

Andy Watt, head of city development services 01603 212691

Background documents

None

Report

Background

1. The quality of air is important to health and quality of life. All lower tier and unitary local authorities are obliged to review and assess air quality under the Environment Act 1995 in line with the Government's air quality strategy published in 2000 and updated in 2007. In conducting such reviews and in developing and implementing action plans to address air quality problems such authorities need to work closely with upper tier authorities as very often exceedances in air quality standards are transport related.

2. The council currently monitors air quality for two pollutants considered to be of concern to human health: nitrogen dioxide and particles, but has previously measured other pollutants ie carbon monoxide, sulphur dioxide and ozone. These other pollutants are no longer measured as there was no threat to the relevant air quality standards.

3. The city and county councils have had some success in addressing air quality 'hot-spots' in Norwich. Interventions at Grapes Hill have improved air quality on a sustained basis and reducing traffic on St Augustines Street has reduced levels of nitrogen dioxide.

4. However average levels of nitrogen dioxide remain high in parts of the city centre and at its boundary including Castle Meadow, St Stephens Street, King Street, Riverside Road and Bull Close Road. In view of this the council formally declared the whole of the city centre as an air quality management area in November 2012. Having identified the area the council is under an obligation to develop an air quality action plan with the objective of working towards achieving the air quality standards.

5. Work by AEA Technology identified emissions of oxides of nitrogen (NO_X) from traffic on roads close to the AQMAs as the most significant source contribution of NO_2. In view of this the council has worked with the county council as transport authority to develop an action plan to address this.

Draft action plan

6. The jointly developed draft action plan is appended to this report. Previous work to address air quality 'hot-spots' has been reviewed to help inform the action plan and it shows that road infrastructure changes would probably have the greatest impact on tackling air pollution issues (as demonstrated for the St Augustines area). Soft measures such as travel planning are seen to have less quantifiable and more long-term impacts. The Action Plan therefore concentrates significantly on road changes.

7. The overall aim of the interventions are to divert as much non-essential traffic out of the city centre by way of restricted road access measures and re-routing of main traffic flows. In addition, bus lanes and cycle routes are increased to give greater connectivity. Park & ride facilities are continuously reviewed for ongoing improvement to enhance passenger utilisation. In conjunction with road infrastructure changes, the plan is to also include new signage to encourage eco driving, and traffic optimisation measures (such as traffic light synchronisation), to optimise traffic flow, ease congestion and reduce queuing.

8. Improvements in air quality in Castle Meadow are anticipated as a result of building on the air quality measures already in place, principally in connection with the Low Emission Zone. This will include working with bus companies to take minimum vehicle emissions standards beyond Euro 3, aiming to achieve Euro 5 standard and better. It will also include reinforcement of the Road Traffic Regulations to ensure engine switch-off is complied with.

NORWICH City Council

Norfolk County Council

ENVIRONMENT ACT 1995 PART IV

LOCAL AIR QUALITY MANAGEMENT

AIR QUALITY ACTION PLAN

City of Norwich

August 2015

Adrian Akester
Head of citywide services
Norwich City Council

Andy Watt
Head of city development services
Norwich City Council

Tom McCabe
Executive Director of Community and Environmental Services
Norfolk County Council

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Environment Act 1995 imposes a statutory duty on Local authorities to review and assess the air quality in their districts to determine whether certain air pollutants are likely to meet prescribed government air quality objectives. The objectives give maximum allowable mass concentration limits for 8 different pollutants and, if exceeded, there is then a statutory duty to declare an Air Quality Management Area.

Norwich City Council has now completed 4 rounds of Review & Assessment, and is in the final stages of round 5. In November 2012, the council consolidated all previously declared AQMAs into a single central AQMA, broadly encompassing the area inside the inner ring road.

This Action Plan is a statutory requirement resulting from the declaration of the AQMA and the continued exceedence of the annual mean objective for nitrogen dioxide (NO_2), but for no other pollutants. The purpose of this statutory duty is to produce and implement an Action Plan to reduce local levels of the specified pollutant in the area declared.

Source apportionment exercises identify oxides of nitrogen from road traffic to be the most significant source of nitrogen dioxide and, more specifically, buses and taxis to be the main contributor. Oxides of nitrogen are a by-product of incomplete combustion.

By declaring an area of central Norwich as a single AQMA, it allows a more holistic approach to be adopted to try and reduce pollution levels as opposed to dealing with the problem of isolated pollution hot spots.

Air quality continues to be monitored in order to assess progress towards achieving the annual average nitrogen dioxide objective.

Air pollution has risen up the corporate agenda at Norwich City Council since the first round of Review & Assessment, and the Transport Planning Officer now has to consider air quality issues for all new developments. Norfolk County Council has incorporated a local air quality strategy into its Local Transport Plan to deal with air quality issues and to try and reduce pollution associated with traffic in all future plans.

This Action Plan is a progression from the previous Action Plan produced in 2004 after the first round of Review & Assessment. It identifies the strengths of the previous Action Plan, the strategies that had the greatest impact on improving air quality, and builds on this progress by concentrating on these strategies. As a result, this Action Plan focuses principally on road infrastructure changes designed to further pedestrianize and divert traffic away from the congested Norwich city centre. The purpose of the road changes are also to improve traffic flow by introducing more one way systems, optimising traffic flow at junctions and reduce vehicle queuing.

1. INTRODUCTION

The City of Norwich, situated in the east of England is the administrative centre of the County of Norfolk. It covers approximately 39 square kilometres and has a population of about 132,000. Norwich is the fourth most densely populated local authority district in the eastern region with approximately 34 people per hectare.

Although the administrative area of Norwich is geographically small, the role of the City is much larger as a regional centre with an extensive catchment covering most of Norfolk and parts of the adjacent County of Suffolk. Whilst the City itself is relatively compact, it is built on a radial pattern and, with a relatively large but low-density catchment, movement patterns are essentially disparate. Reliance on car-based travel, particularly beyond the urban area is very high, and the travel to work area (i.e. the area of Norwich in which most people both live and work) includes more than 376,000 people. Norwich suffers from traffic congestion, and major routes create blockages. Access by non-car modes to some parts of the City is difficult. In aggregate, it is these circumstances that principally create the air pollution issues in Norwich and, due to the complexity of these circumstances, makes them challenging to resolve.

Transport and traffic management are some of the most difficult issues facing the city. Norwich's economic prosperity depends upon large numbers of people from the surrounding areas being able to get into the city centre for work, for shopping and for leisure or tourist visits. The preferred form of transport for such journeys for most people would currently be the car but extensive Park & Ride facilities aim to reduce this impact and reliance, as does the improvements to public transport and other non-car modes of travel.

Norfolk County Council, in association with Norwich City Council, transport providers, local businesses and local communities have been working to improve accessibility for everyone around the City, as well as enhancing wider accessibility to Norfolk, the rest of the UK and Europe.

2. BACKGROUND

2.1 Introduction

Air pollution can cause both short term and long term effects on health, particularly in the young and elderly, or people with heart or lung conditions, or other breathing problems.

The pollutant of most concern in Norwich in terms of air quality is nitrogen dioxide (NO_2), as current levels to do not meet the national health-based standard of 40 µg/m^3 as an annual mean. In Norwich, the most significant source of NO_2 is from emissions of oxides of nitrogen (NO_x) from road traffic.

In developing this Air Quality Action Plan (AQAP) to improve air quality in Norwich, the Council has used Government guidance and the relevant publications by Environmental Protection UK (EPUK).

The main factors taken into consideration when devising the AQAP were to ensure that air quality improvement actions remain consistent with current Norfolk County Council and Norwich City Council policies including the Joint Core Strategy for Broadland, Norwich and South Norfolk councils; the City Centre Transport Plan, the Norwich Area Transportation Strategy and the Local Transport Plan etc.

The AQAP therefore aims to:

- Encourage sustainable transport;
- Increase accessibility and social inclusion;
- Improve health, safety and the environment;
- Support the local economy including commerce and tourism;
- Balance costs and benefits; and
- Maintain public input and support.

2.2 Policy Context

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality. This culminated in The Environment Act 1995. The Air Quality Strategy provides a framework for air quality control through air quality management and set standards. These and other air quality standards[1] and their objectives[2] have been enacted through the National Air Quality Standards (NAQS) in 1997, 2000 & 2010.

The Environment Act 1995 requires local authorities to undertake the review and assessment of local air quality. In areas where it is anticipated that an air quality objective will not be met, local authorities are required to declare an Air Quality Management Area. Once an Air Quality Management Area is declared, the local authority must develop an Action Plan which sets out how it will use the powers at its disposal in pursuit of the National Air Quality Objectives. However, local authorities are not obliged to achieve the objectives, as they do not have sufficient control over all of the sources which could potentially give rise to the breach. For example in England, major roads and motorways are usually under the control of the Highways Agency, and large industrial processes, including power stations, are regulated by the Environment Agency. The great majority of Air Quality Management Areas have been declared because of emissions from road transport.

Norwich City Council and Norfolk County Council recognise their role in pursuit of the achievement of the national objectives set out in the NAQS, and have been working closely to try and achieve these targets where Air Quality Management Areas have been declared.

2.3 Nitrogen Dioxide and Health Impacts

Environmental legislation introduced over the past fifty years has provided a strong impetus to reduce the levels of harmful pollutants in the UK; as a result, current concentrations of many recognised pollutants are now at the lowest they have been since measurements began. However, although the lethal city smogs of the 1950s, caused by domestic and industrial coal burning, have now gone for good, air pollution remains a problem in the UK. Medical evidence shows that many thousands of people still die prematurely every year because of the effects of air pollution. The proportion of air pollutants which comes from traffic has been increasing whilst the traditional heavy industrial pollution sources are in decline. In Norwich, road traffic is the primary source of NO_2 air pollution, as there is very little industrial pollution.

Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen which together are referred to as NO_x. All combustion processes produce some NO_x but only NO_2 is associated with adverse effects on human health. Nitrogen dioxide is mainly a secondary pollutant formed

[1] Refers to standards recommended by the Expert Panel on Air Quality Standards. Recommended standards are set purely with regard to scientific and medical evidence on the effects of the particular pollutants on health, at levels at which risks to public health, including vulnerable groups, are very small or regarded as negligible.

[2] Refers to objectives in the Strategy for each of the eight pollutants. The objectives provide policy targets by outlining what should be achieved in the light of the air quality standards and other relevant factors and are expressed as a given ambient concentration to be achieved within a given timescale.

by the oxidation of nitric oxide in the atmosphere. On a national level the main sources of NO_x are road transport (48%), power generation (20%), other industry (15%) and domestic sources (4%). The remainder arises from other forms of transport and commercial heating systems. In urban environments, the contribution from road traffic is much higher and, in the absence of localised point sources, accounts for the majority of NO_2 pollution. Measures to reduce road traffic pollution will therefore play a major role in meeting the air quality objective for NO_2.

As NO_2 has both short term and long term health effects, two objectives have been set for NO_2 concentrations. The first is an hourly objective currently set at 200 micrograms per cubic metre ($\mu g/m^3$) not to be exceeded more than 18 times a year. The second is an annual objective of 40 $\mu g/m^3$. Real time monitoring carried out in the city has shown that, for the most part, the hourly objective for NO_2 is being met in most locations. Where there have been exceptions to this hourly objective, i.e. the Castle Meadow area, specific circumstances such as road works causing traffic congestion have found to be the most likely cause. However, the results of the real time monitoring and monthly diffusion tube surveys indicate that the annual objective is currently being exceeded at several kerbside and roadside locations around the city and, unless circumstances change, may continue to do.

3. AIR QUALITY REVIEW AND ASSESSMENT

3.1 Overview

The main elements of the National Air Quality Strategy (NAQS) can be summarised as follows:

- The use of a health effect based approach using national air quality standards and objectives.
- The use of policies by which the objectives can be achieved and which include the consideration of important factors such as industry, transportation bodies and local authorities.
- The pre-determination of timescales with a target date for the achievement of objectives, and a commitment to review the Strategy every three years. At the present time, this Strategy is under review by Defra.

NAQS provides a framework for the improvement of air quality that is both clear and workable. The strategic principles to achieve this include:

- clear Governmental aims regarding air quality;
- clear and measurable targets;
- a balance between local and national action; and
- a transparent and flexible framework.

The air quality objectives set for specific pollutants can be found in **Appendix 1**.

3.2 Methodology

Government guidance suggested a phased approach to review & assessment (R&A). The intention was that local authorities should only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. Not every authority will therefore need to proceed beyond the first step in future rounds of R&A. In Norwich air quality was originally assessed in 4 stages:

- Stage 1: an initial study to identify which pollutants require further investigation;
- Stage 2: estimation, modelling or measurement of pollutants where this indicates national objectives will not be achieved;
- Stage 3: advanced modelling techniques used and emission inventories determined – Detailed Assessment.

Following the above process, Air Quality Management Areas (AQMAs) must be declared where it is concluded that local air quality will not meet national targets.

- Stage 4: declaration of AQMA and generation of an Air Quality Action Plan (AQAP) to develop and implement strategies that will ultimately deliver the National Air Quality Standards in the AQMA for each of the pollutants identified.

Though the Environment Act 1995 does not prescribe any timescale for preparing an action plan, the Government expects them to be completed between 12-18 months following the designation of any air quality management areas.

3.3 Results and Declaration

The Stage 1 review and assessment concluded that three pollutants required further investigation in order to ascertain whether the 2005 objectives would be achieved. These are nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and particulate matter (PM_{10}).

The Stage 2 review and assessment for SO_2 and PM_{10} concluded that objectives for 2005 would be achieved.

The review and assessment for NO_2 was taken straight to Stage 3 as it was clear from the initial review and assessment that it would not achieve the 2005 annual mean objective. The Stage 3 review and assessment subsequently confirmed that this to be the case.

As a result of the Stage 3 Review and Assessment, on 1st June 2003, Norwich City Council declared three AQMAs at St Augustine's Street, Grapes Hill and the Castle Area. All three areas were considered likely to exceed the 2005 NO_2 annual mean objective. An Action Plan was finalised in March 2004.

In 2009, Riverside Road was declared an AQMA, thus making four AQMAs in total.

In 2012, on account of further areas within the inner ring road being identified as borderline AQMAs, the four existing AQMAs were amalgamated into a single area, encompassing the whole of the inner city.

3.4 Source Apportionment

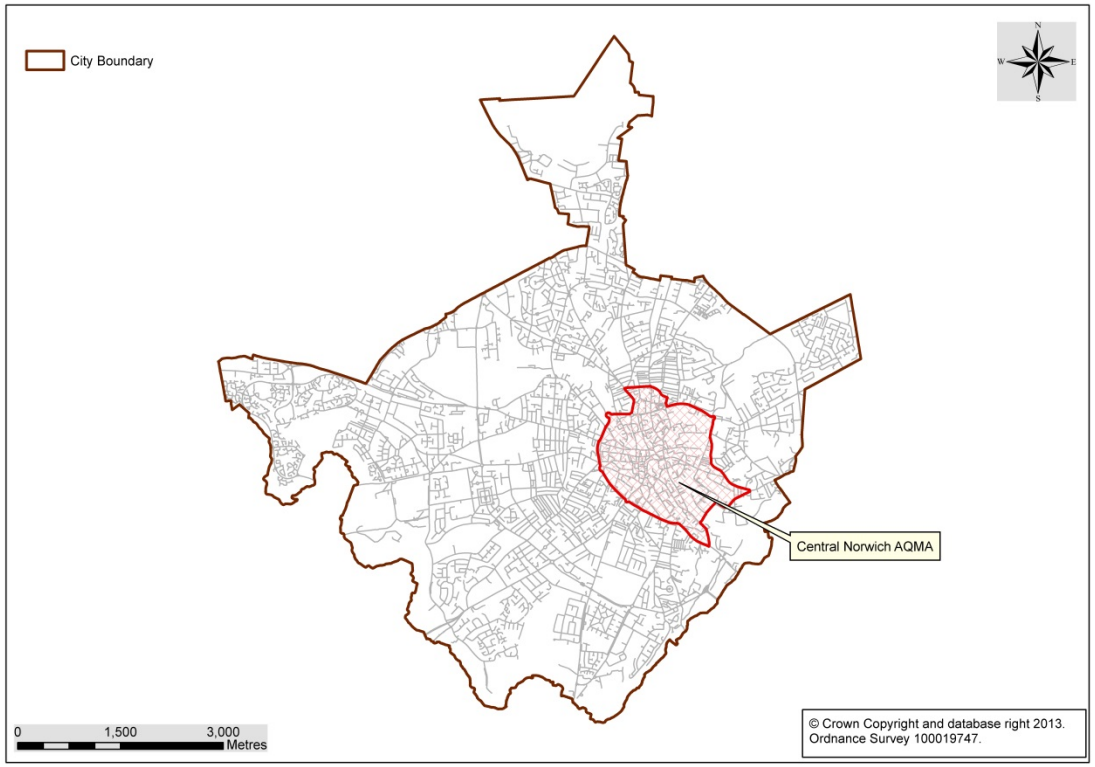
It is necessary to attribute exceedences of air quality objectives to a particular sector in order to subsequently identify how the air quality can be improved. Source apportionment work undertaken by AEA Technology identified emissions of oxides of nitrogen (NO_x) from traffic on roads close to the AQMAs as the most significant source contribution of NO_2. Emissions of NO_x from local traffic accounted for approximately 68 - 79% of the total modelled NO_x concentrations at the most affected properties within the AQMAs. Since this work was carried out there have been no significant changes in Norwich in terms of industrial development etc, so it is considered that this model is still applicable.

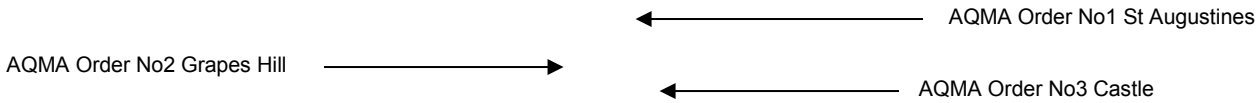
4. AIR QUALITY MANAGEMENT AREAS

4.1 Overview

In November 2012, Norwich City Council amalgamated all four previously declared AQMAs into a single AQMA which encompasses the whole of the city centre, the boundary of which is essentially defined by the inner ring road. This larger AQMA does not signify that the whole city centre exceeds the Government's objective level for nitrogen dioxide. The reasoning behind this approach is to allow more holistic and broader ranging actions to be implemented to tackle air quality issues. This approach also discourages the emphasis of simply resolving pollution hot spots, which then tends to just move the problem elsewhere.

Figure 1 Norwich Air Quality Management Area




AQMA Order No1 St Augustines
AQMA Order No2 Grapes Hill
AQMA Order No3 Castle

5. SUMMARY OF ACTION PLAN MEASURES IMPLEMENTED TO DATE

Action plan measure	Implemented	Outcome	Brief Comments
Infrastructure			
Declare area inside inner ring road an AQMA for NO_2 and revoke existing AQMAs	Nov-12	All existing AQMAs, plus those under review, have been amalgamated into a single AQMA. This encourages a more holistic approach to AQ when planning infrastructure changes.	Declaration of AQMA initiates requirement to generate an Action Plan.
Castle Meadow Low Emission Zone	Designed 2004/05, phased implementation 2006/07, completing in 2009	Continuous automatic monitoring showed a reduction in year on year NO_2 levels from 2007 to 2009. By contrast, 2010 to date shows a relatively stable, though increased, annual mean level. There have been increased hourly mean episodes during the same period also. Individual tubes on Castle Meadow show relatively stable levels.	Low Emission Zone includes application of Road Traffic Regulation Order & bus retro-fit programme. Measures still being implemented.
Bus/Rail Interchange	2009/10	Greater use of bus/rail link up	Part of Civitas funding
St Augustine's Road Layout Changes	2011	One-way gyratory system to reduce traffic levels in St Augustine's Street. In first 2 years of operation NO_2 levels reduced by approx $8\mu g/m^3$ and $4\mu g/m^3$ respectively	Air quality has shown improvement on St Augustine's Street following completion of the scheme. It has not yet achieved the objective, but NO_2 levels show a marked reduction over the preceding two years. Has also delivered regeneration and road safety benefits
Grapes Hill Road Layout Changes	Designed 2004/05, Implemented 2006	Layout and traffic light sequence changes resulted in reduced queuing on Grapes Hill. As a result, the 2008 detailed assessment concluded that the AQMA could be revoked.	AQMA now included in new central AQMA

Area Wide Measures, Initiatives & Policy Changes			
Bus Partnerships in LEZ	2009	Voluntary joint investment partnership established between First Bus, County Council and City Council during 2007 - 2010 period. This has delivered new Euro IV buses and improved fleet management.	Ongoing review of LEZ - Possible joint investment partnership to achieve minimum Euro V compliance in LEZ
Freight Distribution Centre	2009/10	Foulgers taking project forward. Increasing no. of companies using distribution centre resulting in fewer HGV's in city.	Distribution vehicles can use bus lanes. Funded by Civitas.
Park and Ride	2005	6 Park and Rides sites in Norwich with over 5,000 spaces - the most in the country. Circa 2.5 million passengers using Park and Ride each year Coach parking at Harford P&R	Along with promotions to use P&R, Norfolk County Council is developing a SMART ticketing system, meaning that those who travel more often pay less. NCC are also currently implementing a coach parking facility at Harford P&R. City centre parking tariffs encourage short/medium stay use which reduces peak hour movement, and consequently reduces congestion and traffic queues.
Norfolk Car Club - http://www.norfolkcarclub.com/	implemented in 2011 but ongoing	16 car club cars in Norwich & further 12 locations designated for use within 2 years. All planning developments >200 units will be required to fund at least one new car but in time expect to achieve funding for every 100 units. Research shows every new car club car equates to 12 cars not bought. Now contracted out to "Common Wheels".	Success grows membership numbers as users can be confident car will always be available when required.
Norfolk Liftshare https://norfolk.liftshare.com/default.asp		Norfolk Liftshare was set up by Norfolk County Council to help residents get around the county by sharing car journeys. The service is free and is available to all who live, work and travel in and around Norfolk. This site matches residents up with potential partners as a driver or passenger. Residents can choose to share car journeys as little or as often as they like.	Ongoing

School Travel Plans	Ongoing process	All existing schools now have travel plans. New schools must have a travel plan implemented through their planning application. Norfolk County Council monitor these travel plans	Norfolk County Council to re-visit progress of school travel plans for schools located in new AQMA.
Parking Permits priced according to vehicle size	2007-08	Aim is for residents to opt for smaller, more fuel efficient car.	Pricing policy still in place
Real time bus smartphone App	-	Aim is for more people to use buses due to reliable timetabling information being readily available.	Buses fitted with a transmitter send a signal to a satellite that locates the exact position of the bus. This information is then sent to a real-time system.
Land Use Planning	Ongoing	High density developments encouraged in areas of high accessibility to encourage sustainable travel. Concept retained in emerging LDF.	Ongoing

Alternative Fuels			
Retro-fit	2005-2009	Bus fleet using Castle Area AQMA refitted to comply with Euro III standards or better. No further action	Retro-fit evaluated as part of CIVITAS SMILE project as part of wider project to introduce a Low Emission Zone
Bio-diesel	2005+	CIVITAS funded research identified up to 20% bio-diesel blends have no negative impact on engines but potentially improves NOx emissions.	Trials evaluated as part of CIVITAS SMILE project.
Bio-gas	2013+	Currently 7 biogas buses powered by gas sourced from food waste. Bio-gas has CO_2 and NOx benefits.	County encouraging introduction of more biogas fuelled buses.

`Leading by Example			
Vehicle Fleet	2012	Norwich City Council car fleet now includes electric as well as petrol efficient cars. County Council intend making better use of alternative fuels in its vehicle fleet.	4 Electric hook up points installed in St Giles car park for NCC electric vehicles.
Workplace Travel Plans & Initiatives	Ongoing process	Travel to work survey undertaken annually. Cycling and pedestrian routes reviewed and improvements made including increased cycle storage facilities. Increased promotion of buses serving County Hall. Financial incentives to encourage staff to cycle to work. A Travel Plan officer, sponsored through LSTF, was employed by Norfolk County Council to work on both the Council's Travel Plan and promote Travel Planning in key businesses.	Work is ongoing to install alternative technologies to promote remote working.

6. ACTION PLAN GOING FORWARD - 2015 ONWARDS

Action plan measure	Original Timescale	Outcome to date/AQ Progress	Comments
Infrastructure Changes			
Castle Meadow Low Emission Zone	Complete 2009 but ongoing improvement	Castle Meadow LEZ fully introduced with application of Traffic Regulation Condition & bus retro-fit programme. Outcome unclear as in recent years NO_2 been increasing but probably would have been worse without LEZ.	Ongoing review of LEZ and the requirement to further reduce bus emissions. We will work with the bus companies and aim to achieve Euro V compliance within a time period of 3 years. Review of ticketing procedure to reduce passenger queuing. Partnership with taxi companies to be investigated with aim to include minimum emission standards.
Establish central AQMA for NO_2 to incorporate existing AQMAs	2012	Implemented Nov 2012. Declaration requires Action Plan to be drafted within 18 months. Air quality is a material planning consideration for all developments inside AQMA which could have impact on NO_2. Promoted AQ consideration in infrastructure changes.	Allows more holistic approach to improving AQ and reducing NO_2 levels in areas where exceedences of AQ objective.
Chapelfield North/St Giles/Bethel St area scheme	New road layout to be implemented starting in 2014	Diffusion tubes installed on Chapelfield North to determine existing conditions prior to road changes being implemented.	Diffusion tubes expected to show improvement in NO_2 concentrations if new road layout reduces congestion as expected. Reduced congestion onto Chapelfield roundabout would have beneficial impact on congestion on Grapes Hill also.
Two way on Cleveland Road and a new junction arrangement at Cleveland Road/Chapelfield North	2014-2018	Detailed scheme approved. Linked with work to deliver Norwich Area Transport Scheme Implementation Plan (NATS IP)	New junction arrangements to facilitate Chapelfield North scheme.

Bus only through-traffic on Theatre Street and removal of general traffic except buses, taxis and cyclists from Rampant Horse Street	2013-2019	Detailed scheme approved. Linked with work to deliver NATS IP	Part of city centre measures to reduce through traffic
Little Bethel Street closure	2013-2020	Detailed scheme approved. Linked with work to deliver NATS IP	Part of Chapelfield North scheme and city centre measures.
Southbound bus lane on Grapes Hill	2013-2017	Detailed scheme approved. Linked with work to deliver NATS IP	Improvements to facilitate bus rapid transit on Dereham road bus corridor.
St Stephens Street and Surrey Street bus only	2013-2021	Detailed scheme approved. Linked with work to deliver NATS IP	Part of Chapelfield North scheme and city centre measures.
Westlegate - removal of straight ahead traffic movement	2013-2022	Detailed scheme approved. Linked with work to deliver NATS IP	Part of city centre measures to reduce through traffic
Extension of Postwick Park and Ride site	2013-2023	Linked with work to deliver NATS IP	Capacity Improvements
Review of traffic light times/synchronisation to optimise traffic flow for all new road layout schemes	2014/15	Review congestion patterns before and after new road layout schemes. Yet to be implemented	Congestion should be minimised
Construction of Northern Distributor Road (NDR)	2018+	Moving traffic out of city will help relieve congestion in the city. Yet to be implemented	Diffusion tube monitoring will show any generic decline in NO_2 levels once NDR complete
Bus only on All Saints Green	2017 Long term	Waiting detailed design. Linked with work to deliver NATS IP	Closure of All Saints Green to all general traffic except buses.

Golden Ball Street and Farmers Avenue two-way	2017 onwards	Awaiting detailed design. Linked with work to deliver NATS IP	To reduce congestion and facilitate city centre road layout changes
Removal of general traffic except buses, taxies and cyclists from Red Lion Street	2017 onwards	Awaiting detailed design. Linked with work to deliver NATS IP	To reduce congestion and facilitate city centre road layout changes
Full closure of Westlegate	2017 onwards	Awaiting detailed design. Linked with work to deliver NATS IP	To reduce congestion and facilitate city centre road layout changes
Removal of general traffic except buses, cyclists and taxies from Prince of Wales Road (except Eastern section)	Long term - post NDR	Awaiting detailed design.	Long term goal once NDR has been completed
Bus only on Prince of Wales Road and Agricultural Plain	Long term - post NDR	Awaiting detailed design.	Long term goal once NDR has been completed
Removal of some non-bus, taxi or cycle through traffic from Tombland	Long term - post NDR	Awaiting detailed design	To reduce congestion and facilitate city centre road layout changes
Cycling City Roads bid for funds complete and successful	Funds secured 2013	Funding has been secured from DoT & local money for a £5.55 million transformation of the pedalway connecting the Norfolk and Norwich University Hospital in the west of the city to Heartsease and Salhouse Road in the east. This will enable the whole eight-mile route to be ridden confidently and safely by everyone.	Cycle routes extended and more joined up. Will encourage cycling as improved road safety.

Informative Measures			
Signage to inform of AQMA in known congested areas. Signage to also encourage engine switch-off and display waiting time at traffic lights.	2014	Secure funding from County to implement signage.	Signage educates road users & reinforces AQMA
Area Wide Measures & Procedural Changes			
Relocation of diffusion tubes to more representative locations, in accordance with best practice.	Completed	More representative assessment of NO_2 levels with respect to exceedences of annual objective.	Typical monitoring locations for sensitive receptors to give more accurate assessment of NO_2 concentrations.
School Travel Plans	Implemented but requires updating	To date 88 school travel plans in place. County to request updated travel plans for schools inside new AQMA. Travel Plan to focus on using buses, cycling and walking to school to ensure travel by private car is minimised.	New schools must have a travel plan implemented through their planning application.
Biogas	2013+	Anglian buses currently have 7 biogas buses powered by gas sourced from food waste. Biogas has both Nox, CO_2 and particulates benefits. Aim is to increase the number of biogas buses in operation and encourage more bus companies to follow suit.	

8. CONCLUSIONS

In November 2012 due to high levels of nitrogen dioxide emissions from road traffic, and the possible requirement to declare further AQMAs, Norwich City Council declared the whole of the city centre bounded approximately by the inner ring road as a single Air Quality Management Area. As a result, an Air Quality Action Plan is required under the Environment Act 1995.

Source apportionment studies, and results from the previous action plan measures, identified road infrastructure changes would probably have the greatest impact on tackling air pollution issues. This was particularly well demonstrated for the St Augustines area. Soft measures were seen to have less quantifiable and more long-term impacts. The Action Plan therefore concentrates significantly on road changes. The overall aim of the modifications is to divert as much non-essential traffic out of the city centre by way of restricted road access measures and re-routing of main traffic flows. In addition, bus lanes and cycle routes are increased to give greater connectivity. Park & ride facilities are continuously reviewed for ongoing improvement to enhance passenger utilisation. In conjunction with road infrastructure changes, the plan is to also include new signage to encourage eco driving, and traffic optimisation measures (such as traffic light synchronisation), to optimise traffic flow, ease congestion and reduce queuing.

Improvements in air quality in Castle Meadow are anticipated as a result of building on the air quality measures already in place, principally in connection with the Low Emission Zone. This will include working with bus companies to take minimum vehicle emissions standards beyond Euro 3, aiming to achieve Euro 5 standard and better. It will also include reinforcement of the Road Traffic Regulations to ensure engine switch-off is complied with.

Both City & County councils are committed to improving air quality across the whole of Norwich. Many of the measures implemented in the 2004 Action Plan are still ongoing and supported. These include school and workplace travel plans, promoting alternative fuel use, land use planning, leading by example, continued support of Norfolk's car sharing and Car Club schemes, Travelwise initiative and promoting freight distribution centres. All major developments in the city centre will have significant regard to air quality with a strong emphasis on sustainable travel methods. The NDR is expected to divert traffic away from Norwich as a whole, and hence contribute to the more general improvement in Norwich’s air quality.

It is expected that the road infrastructure changes, in addition to all of the other proposed and ongoing measures, will achieve measureable improvements in air quality, particularly in the central AQMA.

Norwich City Council and Norfolk County Council are committed to improving air quality in the AQMA to bring it in line with the National Air Quality Standard for nitrogen dioxide. This Air Quality Action Plan will help guide the overall strategy to achieve the government’s air quality objective.

APPENDIX 1: NATIONAL AIR QUALITY OBJECTIVES

National air quality objectives and European Directive limit and target values for the protection of human health						
Pollutant	**Applies**	**Objective**	**Concentration measures as**	**Date to be achieved by**	**European obligations**	**Date to be achieved by**
Particles (PM_{10})	UK	50µgm-3 not to be exceeded more than 35 times a year	24 hour mean	31/12/04	50µgm^{-3} not to be exceeded more than 35 times a year	1/1/05
	UK	40µgm^{-3}	Annual mean	31/12/04	40µgm^{-3}	1/1/05
	Indicative 2010 objectives for PM_{10} (from the 2000 Strategy and 2003 Addendum) have been replaced by an exposure reduction approach for $PM_{2.5}$					
Particles ($PM_{2.5}$) Exposure Reduction	UK	25µgm^{-3}	Annual mean	2020	Target value25 µgm^{-3}	2010
	UK urban areas	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020	Target of 20% reduction in concentrations at urban background	Between 2010 and 2020
Nitrogen dioxide	UK	200µgm^{-3} note to be exceeded more than 18 times a year	1 hour mean	31/12/05	200µgm^{-3} note to be exceeded more than 18 times a year	1/1/10
	UK	40µgm^{-3}	Annual mean	31/12/05	40µgm^{-3}	1/1/10
Ozone	UK	100µgm^{-3} not to be exceeded more than 10 times a year	8 hour mean	31/12/05	Target of 120µgm^{-3} not to be exceeded more than 25 times a year averaged over 3 years	21/12/10

Sulphur dioxide	UK	266µgm^{-3} not to be exceeded more than 35 times a year	15 minute mean	31/12/05		
	UK	350µgm^{-3} not to be exceeded more than 35 times a year	1 hour mean	31/12/04	350µgm^{-3} not to be exceeded more than 35 times a year	1/1/05
	UK	125µgm^{-3} not to be exceeded more than 35 times a year	24 hour mean	31/12/04	125µgm^{-3} not to be exceeded more than 35 times a year	1/1/05
Polycyclic Aromatic Hydrocarbons	UK	0.25ngm^{-3} B[a]P	As annual average	21/12/10	Target of 1ngm^{-3}	31/12/12
Benzene	UK	16.25 µgm^{-3}	Running annual mean	31/12/03		
	England and Wales	5µgm^{-3}	Annual average	31/12/10	5 µgm^{-3}	1/1/10
1,3-butadiene	UK	2.25µgm^{-3}	Running annual mean	31/12/03		
Carbon monoxide	UK	10mgm^{-3}	Maximum daily running 8 hour mean/in Scotland as running 8 hour mean	31/12/03	10mgm^{-3}	1/1/05
Lead	UK	0.5µgm^{-3}	Annual mean	31/12/04	0.5 µgm^{-3}	1/1/05
	UK	0.25µgm^{-3}	Annual mean	31/12/08		

APPENDIX 2: STAKEHOLDER CONSULTATION LIST

Anglian Buses
Broadland DC
Chamber of Commerce
Environment Agency
First Bus
National Express
Norfolk County Council
Norwich City Council
South Norfolk DC