
Traffic Congestion Ad-hoc Scrutiny Committee

12 October 2009

Report of the Director of Neighbourhood Services

Air Quality Update

Summary

1. In 2002, City of York Council declared an Air Quality Management Area (AQMA) based on predicted exceedances of the annual average nitrogen dioxide (NO₂) objective. The council has imposed its own stringent target on reducing levels of NO₂ within the AQMA to an average of 30 µg/m³ by 2011 as part of the City of York's Local Transport Plan 2006-2011 (LTP2). This LTP2 target is more stringent than the health-based national annual average air quality objective for nitrogen dioxide of 40 µg/m³. Air quality monitoring in the city has revealed that the local and national objective levels are still being exceeded at a number of locations.
2. The purpose of this report is to provide an update on Local Air Quality Management in York. The report will consider trends in levels of nitrogen dioxide measured around the city in recent years. The report is provided for information purposes.

Background

3. Due to the health implications and costs associated with air quality, the government set health based air quality objectives for seven of the most common pollutants¹. The Environment Act 1995 requires all local authorities to review and assess air quality in their areas and to declare Air Quality Management Areas (AQMA) where the air quality objectives set by the government are unlikely to be met.
4. In January 2002, City of York Council declared an Air Quality Management Area (AQMA) based on predicted exceedances of the annual average nitrogen dioxide objective in five areas of the city. These are identified at Annex B. An 'annual average' concentration refers to the average hourly concentration of a pollutant when recorded over a full 12 month period.
5. The declaration of the AQMA placed a legal duty on the council to improve air quality in the city and to demonstrate that it is actively pursuing the 40

¹ Pollutants include nitrogen dioxide, sulphur dioxide, particulate (PM₁₀), carbon monoxide, lead, benzene and 1,3 butadiene

ug/m³ annual objective. The original target date for this objective was 2005. EU legislation requires the 40 µg/m³ to be met in the UK by 2010. DEFRA is currently seeking an extension to this deadline due to widespread breaches across the UK. In order to demonstrate a commitment to improving air quality the council was required to prepare an Air Quality Action Plan (AQAP). The AQAP identifies measures the council intends to take to improve air quality in the city, following the declaration of the AQMA.

6. Nitrogen dioxide in York is the result of emissions of nitrogen oxides (NO_x) from a variety of different sources, the main ones being (in order of magnitude):
 - Transport related emissions, arising mainly from road transport but also including a small contribution from rail. This is the major threat to clean air in York.
 - Emissions from domestic and commercial space heating and any other local source emissions.
 - Emissions from large industrial chimney stacks.

Monitoring

7. The Environmental Protection Unit undertakes monitoring of air quality using both real-time monitoring equipment and nitrogen dioxide diffusion tubes. Since 1999, real-time monitoring of nitrogen dioxide and other pollutants has been undertaken at a total of 14 locations across York. These locations are shown in Annex B. Further details on current sites can be viewed at http://www.jorair.co.uk/station_07.php. Nitrogen dioxide is also monitored at 325 locations in the city using passive diffusion tubes. These tubes are located along all the main radial routes into the city and are collected and analysed on a monthly basis.

Health Effects

8. Nitrogen dioxide is a brown gas which can have both short term 'acute' effects and long term 'chronic' effects. As a result, DEFRA has set both long-term (annual) and short-term (hourly) objectives for this pollutant.
9. The short term 'acute' effects of nitrogen dioxide involve irritation of the eyes, nose and throat and can increase the symptoms of existing respiratory conditions such as asthma, bronchitis or emphysema. Monitoring work reported in City of York Council's most recent Update and Screening report (April 2009) showed that the short-term hourly objective for nitrogen dioxide is unlikely to be exceeded anywhere in the city. It should be noted that concentrations of nitrogen dioxide monitored along Bridge Street were indicative of a potential breach of the short-term objective, although it was concluded that this area of the city was unlikely to experience the type and duration of public exposure necessary to make this objective relevant. Based on current medical evidence, the short term concentrations of

nitrogen dioxide found in York are unlikely to give rise to acute health impacts.

10. The long term 'chronic' effects of nitrogen dioxide are associated with a gradual deterioration in the health of people who are already suffering from lung diseases, and an increased susceptibility to respiratory infections within the general population. In York the annual average nitrogen dioxide objective has been found to be currently exceeded at a number of locations around the inner ring road. There are also a number of locations along the radial routes into the city where concentrations are approaching the annual average objective level. Based on current medical evidence it is likely that annual average concentrations of nitrogen dioxide in some areas of the city are having an adverse impact on the long term health of the more vulnerable members of York's population.
11. Many scientific studies have investigated the link between air pollution (mainly those pollutants in the air quality objectives) and health. Hoek et al. (2002) investigated the health impacts associated with living in proximity to main roads and concluded that long-term exposure to traffic-related air pollution might shorten life expectancy. The prevalence of childhood asthma has also been shown to increase in children living in close proximity to main roads (Paramesh, 2002). It is believed that children in particular are at risk since they take more breaths per unit body weight and have immature immune systems. Indeed, there are links between increased infant mortality and traffic-related pollutants (WHO, 1997). The elderly, and those individuals who are already suffering from poor health, are also at risk. A recent epidemiological study in Oslo, Norway, which investigated the relationship between NO₂ and PM₁₀ exposures with cause-specific mortality, discovered those persons with a pre-existing medical condition (e.g. chronic pulmonary disease) to be more susceptible to air pollution at lower levels than the general population (Naess et al., 2006). The same study found an increase in cause-specific deaths in the elderly (age 50-90) above a NO₂ concentration threshold of 40µg/m³, with the relationship increasing in severity for those individuals aged 71-90. In 2001, the Committee on the Medical Effects of Air Pollutants (COMEAP) published a report on the long-term effects of particulate air pollution on mortality. Since then, the evidence base regarding the effects of long-term exposure to air pollutants on health has strengthened.
12. In York the five areas of concern are located on or near to the inner ring road and are characterised by their enclosed nature and long periods of congested traffic. In each case there are residential properties located within five metres of the kerbside which constitute 'relevant' locations for the purpose of Local Air Quality Management. Relevant locations can be defined as outdoor, non-occupational locations (e.g. schools, care homes, hospitals and residential properties) where members of the public are likely to be regularly exposed to pollutants over the averaging time of the air quality objectives. The five areas of air quality concern in York are called the 'Technical Breach Areas' (see shaded areas in Annex B).

Air Quality Monitoring Update

13. In April 2009, City of York Council submitted an 'Update and Screening' report to DEFRA. This report provided an update on new air quality monitoring results collected during 2008 and considered historical trends in air quality data. The full report can be viewed at <http://www.jorair.co.uk/downloads.php>
14. The Update and Screening Report concluded that there are still numerous relevant locations within the current AQMA where the annual average nitrogen dioxide concentrations remain above the objective level of 40µg/m³. The report advised that the current AQMA must be retained in its current form for the time being, although some reduction in the size of the technical breach areas may become appropriate in the future.
15. Monitoring in 2008 indicated breaches of the annual average nitrogen dioxide objective in all of the technical breach areas. For reference, these areas are detailed in the table below. The table also shows which wards the technical breach areas fall within.

Technical Breach Area	Ward
Gillygate / Lord Mayor's Walk	Guildhall
Lawrence Street	Guildhall / Fishergate / Hull Road
Fishergate / Paragon St	Fishergate
Holgate Road / Blossom St	Micklegate
Nunnery / Prices Lane	Micklegate

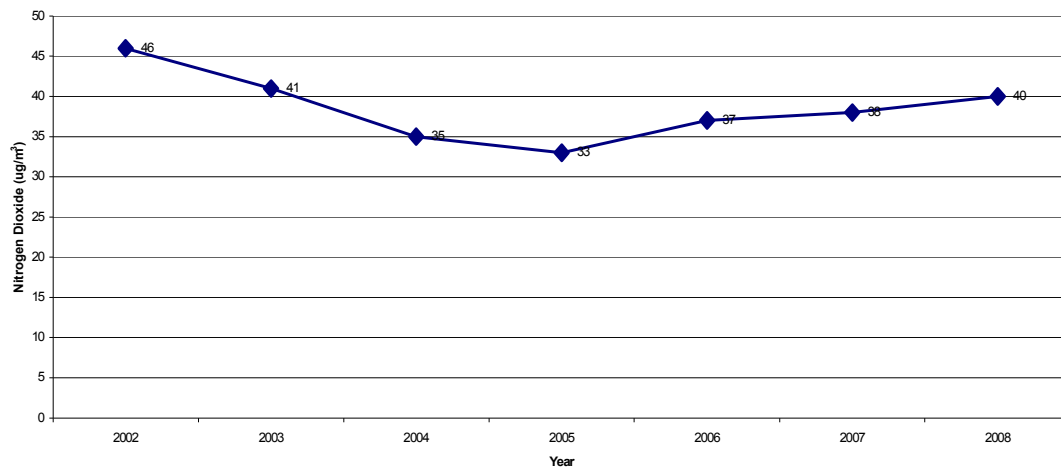
16. Trend analysis of nitrogen dioxide concentrations across the AQMA for the past seven years has not shown any significant improvement in air quality during this period. Between 2002 and 2005 annual average nitrogen dioxide concentrations across the AQMA appeared to be reducing, but this trend was reversed in 2006. For the past three years, year on year increases in annual average nitrogen dioxide concentrations across the AQMA have been recorded. This is also reflected in the LTP2 Air Quality indicator (see later).
17. Outside the AQMA, annual average nitrogen dioxide concentrations appear to have generally stabilised, with the exception of a few small areas as follows :
 - Fulford Main Street – elevated levels of nitrogen dioxide have been monitored in the vicinity of Fulford Main Street and Heslington Lane. A real-time monitoring station has been installed at this location and the results of this monitoring will be reported to DEFRA in September 2009 as part of a 'Detailed Assessment' report. Should the Detailed Assessment conclude that the annual average nitrogen dioxide objective is being exceeded in this area a new AQMA will need to be declared and an Air Quality Action Plan for this area drawn up.

- The Stonebow and Salisbury Terrace – both these areas have exhibited elevated levels of nitrogen dioxide in recent years. Any further deterioration in air quality in these two areas will trigger the need for further Detailed Assessments.

LTP2 Air Quality indicator

18. Although the long term aim of the council remains to meet the annual average nitrogen dioxide objective in all areas of the city, modelling and monitoring of air quality indicated that this may not be possible within the financial constraints of the second Local Transport Plan (LTP2). The setting of a $40\mu\text{g}/\text{m}^3$ annual average nitrogen dioxide objective for the whole city to be delivered through the measures in LTP2 alone was considered to be unrealistic at the time.
19. In setting the air quality target for LTP2 the emphasis was placed on the need to demonstrate an ongoing year on year improvement in annual average nitrogen dioxide concentrations across the Air Quality Management Area (AQMA). This was to ensure that the council remains on track to meet the $40\mu\text{g}/\text{m}^3$ objective level at all locations in the city.
20. For the purpose of setting a realistic but challenging air quality target for LTP2, 40 nitrogen dioxide diffusion tube monitoring locations were identified across the AQMA. Annual average nitrogen dioxide concentrations for all 40 sites are calculated and the mean of the 40 results for each calendar year is recorded.
21. The LTP2 indicator (7A) target is as follows - 'The mean of annual average nitrogen dioxide concentrations measured at 40 locations within the AQMA not to exceed $30\mu\text{g}/\text{m}^3$ by 31st December 2011'. Results from recent years are shown in the table and graph below :

Year	LTP2 Indicator 7A : Air Quality
2002	$46\mu\text{g}/\text{m}^3$
2003	$41\mu\text{g}/\text{m}^3$
2004	$35\mu\text{g}/\text{m}^3$
2005	$33\mu\text{g}/\text{m}^3$
2006	$37\mu\text{g}/\text{m}^3$
2007	$38\mu\text{g}/\text{m}^3$
2008	$40\mu\text{g}/\text{m}^3$



22. Air pollution levels vary from area to area and from day to day. Levels of pollution can be influenced by a number of things including local landscape and topography, traffic flows and speeds, seasonal variations, prevailing wind direction and local weather conditions.
23. As can be seen from the table above, a reversal in the previous decline in LTP Indicator 7A was observed between 2005 and 2008. Increased levels of traffic using the city centre / inner ring road is thought to be partly responsible for this increase. In recent years there has been an increase in the level of relatively cheap long-stay, private car parking in and around the city centre, controlled by private operators. This could be attracting people back to using their own cars rather than public transport, particularly for travel to the city centre.
24. Another factor influencing the increase in nitrogen dioxide concentrations in the AQMA could be emerging increases in primary NO₂ emissions from some modern vehicles (Trends in Primary Nitrogen Dioxide in the UK, Air Quality Expert group, (2007)). All vehicles emit nitrogen dioxide (NO₂) and nitric oxide (NO) as a direct result of the combustion process. NO₂ and NO emitted in this way are called 'primary' pollutants and together are referred to as NO_x. Once released into the atmosphere the primary NO can react with other chemicals to produce more NO₂. The NO₂ produced by this route is called 'secondary' NO₂. Until recently it was generally accepted that primary NO₂ emissions only made up about 5-10% of the total NO_x emissions from vehicles, the rest being created in the atmosphere as secondary NO₂. Recent studies have shown that although the total NO_x emission from modern vehicles has decreased, the percentage being emitted as NO₂ has increased. This is a particular problem with modern diesel vehicles where oxidising exhaust after- treatment technologies have become necessary to reduce emissions of carbon monoxide and particulates.
25. The Local Transport Plan (2006-2011) mid-term report indicates an overall reduction in area-wide traffic mileage for the peak periods (Indicator 3B). Furthermore, vehicle congestion delay time is shown to be reducing (Indicator 6C). However, the report makes reference to an 'increasing trend in travel to city centre' which could be responsible for the increases in

concentrations of nitrogen dioxide seen in the AQMA recent years. Indeed, the change in AM peak period traffic flow to city centre (LTP2 Indicator 3D) increased by 25.8% between the base year of 2005/06 and 2007/08. It is thought that an increase in private car parking provision in or near the city centre could be responsible for this (Reference : LTP 2006-2011 Mid Term Report Annex B). LTP indicator 3B also indicated over a 4% increase in off-peak traffic levels in the city between 2003/04 and 2007/08. This could be indicative of peak-hour spreading, where vehicle owners are choosing to use the road network outside the traditional peak hour times to avoid delays.

The future for improving air quality in the city

26. City of York Council has already achieved a lot in terms of modal shift to walking, cycling and public transport, but the levels of NO₂ still appear to be deteriorating. Whilst City of York Council can strive to achieve more in these areas, only a step change in transport policy is likely to deliver any measurable and sustainable improvement.
27. At a national level DEFRA is required to meet the EU limit values for nitrogen dioxide by 2010. Unlike the UK air quality objectives, the EU limit values are legally binding and will attract EU fines if not delivered. Like most other Western European countries DEFRA is currently in the process of applying for additional time to meet the requirements of the Directive, extending the compliance date to 2015. If this application is successful DEFRA will have to clearly demonstrate that it is strengthening policies on local air quality management and instigating a change in approach.
28. Early indications from DEFRA are that it will be increasing the focus on Low Emission Strategies (LES). Particular emphasis will be placed on :
 - Encouraging uptake of Euro VI HGVs and buses
 - Encouraging uptake of Euro VI cars
 - Revisiting feasibility of widespread vehicle retrofitting
 - Encouraging setting up of Low Emission Zones (LEZs)
29. In addition it will be reviewing the effectiveness of the Local Air Quality Management (LAQM) process with a view to focusing more on the delivery of Air Quality Action Plans (AQAPs) rather than ongoing review and assessment. Other approaches are being taken elsewhere in Europe, Germany for example, has already applied for additional time to comply with the Directive limit values. They are proposing 40 Low Emission Zones across the country to deal with the issue of poor air quality.
30. Taking into consideration the information from DEFRA and the need for a step change in local policy it would seem that a move towards developing and delivering a Low Emissions Strategy (LES) as part of the city's next Local Transport Plan (LTP3) would be appropriate for further detailed discussion at this time. The development of such a policy would also need to feed into the Local Development Framework (LDF) process and carbon

management policies, as the remit needs to cover both current and future emission sources, and deal with all types of emission source.

31. EPU officers made it clear during the development of LTP2 and the AQAP that the measures contained within it would not deliver the air quality objectives at all locations within the AQMA. The measures in the AQAP were the best available within the local policy and financial constraints at the time that the documents were written. It has always been recognised by EPU that there needs to be significant improvements to deliver the air quality objectives across the whole of the AQMA.
32. The air quality steering group (AQSG) was first established by EPU officers during the drawing up of the first Air Quality Action Plan (AQAP1) for York. At this time the main purpose of the group was to act as a discussion forum where key officers from different work areas could comment on the advantages and disadvantages of measures suggested through public consultation for inclusion in AQAP1. Through these discussions the working group was able to agree on a series of measures and key action points to be included in the final AQAP1 document. Due to the success of the group it was extended to incorporate other work areas (eg. safety, accessibility) and used by transport planning unit (TPU) staff in a similar way for helping to develop the measures in LTP2 (and the associated AQAP2 document).
33. During 2008 the air quality steering group was re-established to help facilitate implementation of the measures contained in AQAP2 (Annex U of LTP2). Since the steering group was re-established it has been used as a forum to report to other officers on the initial findings of the LEZ scoping study (EMAP, Oct 2007), on potential issues in Fulford (EMAP, Sept 2008) and other ongoing work looking toward a future transport strategy for the city (Traffic Congestion Ad-Hoc Scrutiny Committee) . It has also been used as a general forum for raising awareness amongst officers of the importance of encouraging cleaner vehicles and alternative fuels, and for preventing any further growth in city centre traffic levels. For example, the group has recently been investigating the apparent increase in the number of privately owned long stay car parks close to the AQMA and possible solutions to this. The group has also worked together closely on the Fulford Road corridor scheme consultation to ensure air quality is considered fully in this process. Links to the carbon management agenda are also being considered via partnership working with the sustainability team.
34. At present the AQSG remains as an informal officer working group for sharing thoughts and ideas and identifying problems rather than a group that develops and delivers specific projects. The delivery aspect of air quality improvement is mainly through the development and delivery of LTP documents (and the AQAP incorporated within them). The overall content of LTP documents are the responsibility of TPU staff, with the air quality annexes being written by EPU staff in a supporting role. As the AQAP documents form an annex to the LTP, their content is limited by the wider aims and priorities of the main LTP document and can not contain anything that does not form an intrinsic part of the LTP. Reporting to members on

the proposed content of these documents and on annual progress is an important part of these processes and is undertaken routinely.

35. The mid term report for LTP2 was produced in December 2008. Some of the key air quality improvement measures in AQAP2, and progress made with such measures, are detailed in Annex A.
36. LTP3 represents the next big opportunity for improving air quality further in York. The Environmental Protection Unit will, through the Air Quality Steering Group, strive to ensure that air quality improvement is represented at the highest possible level within LTP3.

Consultation

37. Under the requirements of the Environment Act 1995, City of York Council must 'review and assess' air quality and report its findings to the Department for Environment, Food and Rural Affairs (DEFRA). All air quality reports produced as part of this review and assessment process must be sent to DEFRA for approval.

Options

38. Members are asked to note the contents of this report which is provided for information purposes.

Analysis

39. Not applicable.

Corporate Strategy

40. Monitoring air quality, providing information to the public about air quality, and developing strategies to improve air quality contribute towards delivering the corporate priorities on improving the health of residents and encouraging the use of sustainable modes of transport.

Implications

41. **Equalities** – Children, the elderly and those with existing respiratory and cardiovascular illnesses may be more susceptible to poor air quality.
42. **Legal** - The council has a statutory duty to periodically review and assess local air quality against national air quality objectives and report it's findings to DEFRA. As the council has declared an AQMA and produced an AQAP it is also obliged to submit regular AQAP progress reports to DEFRA demonstrating that it has a continued commitment to improving air quality in the city. Under the provisions of the Freedom of Information Act 2000 air quality data must be made freely available to members of the public upon request.

43. There are no known Financial, HR, IT, Crime and Disorder, Property or Other implications associated with this information report

Risk Management

44. This section is not applicable.

Recommendation

45. Members are asked to note the contents of this report which is provided for information purposes.

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Report Approved



Date 23/6/09

Specialist Implications Officer(s) N/A

Wards Affected:

All



For further information please contact the author of the report

Background Papers: None

Annexes :

Annex A : Key air quality improvement measures in AQAP2

Annex B : City of York Council's Air Quality Management Area (AQMA) & Real Time Monitoring Sites