

PROGRESS ON THE DERBY CITY COUNCIL'S AIR QUALITY IMPROVEMENT PROGRAMME.

Report of the Director of Corporate Services.

SUMMARY OF REPORT

1. The report updates progress on the City's Air Quality Management Area and requests specific action to be taken.

OPTIONS CONSIDERED

2. The Council regularly considers options to improve the City's air quality, through a cross service working party consisting of a number of professional officers. This group has regular contact with other local authorities working on similar projects, to share best practice.

RECOMMENDATIONS

- 3.1 The Cabinet recommends to the Council that they approve the submission of the PM₁₀ Stage 4 Report to Department of Environment, Food and Rural Affairs (DEFRA) and put it out for comprehensive public consultation.
- 3.2 The Cabinet recommends to the Council that they approve the deferral of drawing up Action Plans for the PM₁₀ AQMA because of the sustained improvements in air quality.
- 3.3 The Cabinet recommends to the Council that they make a request to DEFRA for an extension to the deadline for submission of the nitrogen dioxide Stage 4 Report.
- 3.4 The Cabinet recommends to the Council that they vary the Council's AQMA to exclude the stretch of the A52 between the Pentagon and Raynesway roundabouts.

REASONS FOR RECOMMENDATIONS

- 4.1 The Council's PM₁₀ AQMA is industry related and a solution will be achieved before the Government's deadline of December 2004.
- 4.2 The Council would have more confidence in its latest findings about the nitrogen dioxide AQMA if we had more time to process the City's most up to date traffic data.

- 4.3 A reduction in size of the Council's nitrogen dioxide AQMA will demonstrate that the City's air quality is improving.

MATTERS FOR CONSIDERATION

- 5.1 Local authorities that have declared Air Quality Management Areas (AQMA) are required, by Section 84 of the Environment Act 1995, to conduct a further Stage 4 review and assessment of the air quality within the AQMA that they have declared. The Stage 4 review and assessment is a further investigation into the air quality in the AQMA. It checks the findings of earlier stages in the review and assessment process concerning the declaration of AQMA. The findings of the Stage 4 review and assessment must be published within 12 months of the date of declaration of the AQMA. Also within 18 months of that date, local authorities are also required to publish their Action Plan for improving the air quality within the AQMA.
- 5.2 Since the declaration of the Council's two AQMA on 1 August 2001, the Environmental Health staff have been conducting a Stage 4 review and assessment of the air quality within both areas.
- 5.3 The Stage 4 review and assessment of the air quality within the PM₁₀ AQMA is complete. The report concludes that there has been a significant improvement in the air quality in the PM₁₀ AQMA and the statutory Standards were met in 2001. It is proposed to continue to monitor the air quality in the PM₁₀ AQMA for one year to check that the improvement is sustained.
- 5.4 Completion of the Stage 4 review and assessment for nitrogen dioxide has been delayed. This delay is a result of the late release by Central Government of the new emission factors for vehicles and also because time was needed to complete the traffic counts needed for the review and assessment process.
- 5.5 Sufficient information has become available to allow a reappraisal of that part of the AQMA around Highfield Lane and Carol Close. As a result of this reappraisal it is now proposed to vary the AQMA order to exclude the stretch of the A52 between the Pentagon and Raynesway roundabouts.
- 5.6 It is proposed to submit separate Stage 4 Reports on the PM₁₀ and nitrogen dioxide AQMA to the DEFRA and to request deferral for submission of the nitrogen dioxide report.

PUBLIC CONSULTATION EXERCISE ON THE COUNCIL'S PM₁₀ (PARTICLES) AQMA

- 6.1 Industrial emissions are the cause of the PM₁₀ AQMA. Road transport emissions are the cause of the nitrogen dioxide AQMA. The two AQMA's have different problems, with different causes and would require development of different Action Plans to provide solutions.
- 6.2 The Southern end of Victory Road was identified by the Council's Stage 3 review and assessment of air quality as an area where the standards for PM₁₀ were likely to be broken. The reason for the high levels of PM₁₀ was thought to be the QDF Components Foundry on Victory Road. The area was declared as an AQMA in August 2001. Since the preparation of the Stage 3 Report Environmental Health staff have been working with the management of QDF Components to obtain a reduction of particle emissions from the foundry. In October 2000 the foundry closed its die-casting operations with a resulting fall by 40% of particle emissions.
- 6.3 The City Council operates a monitoring station on the edge of the PM₁₀ AQMA and following the closure of the die-casting processes the monitoring results showed that in 2001 all of the PM₁₀ standards were met.
- 6.4 The management at QDF Components have already made substantial improvements to emissions from the foundry and the PM₁₀ air quality standards were achieved in 2001. Therefore it is likely that the air quality has improved sufficiently for the Air Quality Management Order to be revoked. There may be no need for the Council to draw up an Action Plan for that area. To be sure that the improvement is sustained it is proposed that the air quality monitoring continues for another year and that the results are reviewed again at that time.
- 6.5 The details of the monitoring, modelling and effects of new developments such as Riverlights and SWERF are all contained in the Stage 4 Report. The content of the report follows guidance given by DEFRA. The report also contains an update on the levels of benzene, lead, carbon monoxide, 1,3 butadiene and sulphur dioxide in the City.
- 6.6 It is proposed to submit the PM₁₀ report to DEFRA, to put it out for public consultation and to defer drawing up Action Plans until further monitoring results are available.

PROPOSED REDUCTION IN THE COUNCIL'S NITROGEN DIOXIDE AQMA

- 7.1 The nitrogen dioxide AQMA is a long thin area close to the Inner and Outer Ring Roads. The main source of nitrogen dioxide in this area is traffic. Each type of road vehicle produces a different mixture of pollutants. This is quantified by the emission factors, which are issued by Central Government. The last set of emission factors was released in 1999 and a new set were released in March 2002. The emission factors are used to predict how much pollution is generated by traffic on a given road if the number, type and speed of the vehicles is known.
- 7.2 Derby City Transport Engineers completed a survey of the number of movements, type and speed of vehicles in the AQMA in March 2002. The modelling work with these new emission factors and traffic counts will take several months to complete and it is unlikely that it could be done within the timescale allowed by DEFRA.
- 7.3 Consequently it is proposed that a request is made to DEFRA for a deferral of submission of the nitrogen dioxide Stage 4 Report. Delays to the preparation of Stage 4 Reports have been confirmed for several Authorities. In all cases the deferral has been permitted subject to the submission of regular progress updates.
- 7.4 The AQMA declared by the Council on 1 August 2001 links seven locations on the Inner and Outer Ring Roads where the Council's Stage 3 review and assessment of air quality indicated that the National Air Quality Strategy nitrogen dioxide objective level was unlikely to be achieved by the 2005 Target Date.
- 7.5 The area around Highfield Lane and Carol Close was identified by the Council's Stage 3 review and assessment of air quality as the only location on the A52 between the Pentagon and Raynesway roundabouts where nitrogen dioxide Objective levels are unlikely to be achieved by their Target date of December 2005.
- 7.6 In the absence of more detailed air quality and traffic data, the area was included in the Council's first AQMA. However, additional information obtained in the course of the Council's Stage 4 review and assessment has enabled a re-appraisal of the of the area and its inclusion within the AQMA.
- 7.7 A Technical Summary detailed the process and the outcome of that re-appraisal. This is available on request from Environmental Health & Trading Standards Division.
- 7.8 As a consequence of the reappraisal it is proposed to vary the AQMA order to exclude the section of the A52 between the Pentagon and Raynesway roundabouts.

- 7.9 This variation would have the effect of forming two new AQMAs. The first of these would enclose the existing Inner Ring Road, and the second, the Outer Ring Road from the Blue Peter Islands to the Kingsway/Utttoxeter New Road junction. The formation of the two new AQMAs would significantly assist production of the Action Plans as these two areas have very different traffic patterns and problems. If the AQMA is not split, it is unlikely that the action plan can be delivered within the statutory deadline. Plans showing the existing AQMA and the likely extent of the proposed two new AQMAs will be available for the Cabinet to view at this meeting.

FINANCIAL IMPLICATIONS

8. There are no significant financial implications arising from this report.

LEGAL IMPLICATIONS

9. Local Authorities have a Statutory Duty to prepare a Stage 4 Report on the air quality in the AQMAs and to submit the report to DEFRA within 12 months of the date of declaration.

PERSONNEL IMPLICATIONS

10. There are no personnel implications arising from this report.

ENVIRONMENTAL IMPLICATIONS

11. The improvements in the PM₁₀ Area will be confirmed before the decision is made to either revoke the Air Quality Management Order or to draw up Action Plans.

EQUALITIES IMPLICATIONS

12. All citizens of Derby should have the benefit of good air quality.

Background papers:

Stage 1, 2,3 and 4 Reports on Derby's Air Quality (available on request from Environmental Services)

Technical Appendix A; A reassessment of the air quality within the nitrogen dioxide Air Quality Management Area at Highfield Lane (available on request from Environmental Health & Trading Standards Division).

Technical Appendix A

A Re-assessment of Air Quality within the Air Quality Management Area at Highfield Lane

1. Reason for the Reassessment
 - 1.1 The Stage 3 review and assessment modelling predicted that the 2005 level of nitrogen dioxide would be 49µg/m³ at the façade of the three properties in the Highfield Lane/Carol Crescent area nearest the A52. This was the only location along the A52 where nitrogen dioxide levels were predicted to exceed the Objective level of 40 µg/m³. However, as the model indicated that the Objective level was likely to be significantly exceeded, the Highfield Lane/Carol Crescent location was included in the nitrogen dioxide Air Quality Management Area.
 - 1.2 When the Stage 3 review and assessment was conducted, only the 1999 diffusion tube data was available. The Stage 4 review and assessment uses 3 years (1999,2000 and 2001) of diffusion tube data. The Stage 4 review and assessment also has the benefit of more up to date and more accurate traffic data, and includes a reappraisal of the topological data used by the Council's consultants who conducted the Stage 3 review and assessment.
 - 1.3 The Stage 4 review and assessment modelling predicts that the nitrogen dioxide level at the façade of the three properties in Highfield Lane/Carol Crescent closest to the A52 will be only 41.9µg/m³. Furthermore, predictions based on the three years of diffusion tube monitoring data that are now available suggest that the level of nitrogen dioxide in 2005 will be 7 - 10 µg/m³ less than the Objective level. Technical Appendix A of this report sets out the conclusions of the Stage 4 review and assessment contains the methodology that was used.

2. Background

- 2.1 Since 1999 a diffusion tube has been located in an alley leading from Highfield Lane to the footpath alongside the A52. The annual average nitrogen dioxide concentrations measured at this site were:

Table 1 – Highfield Land diffusion tube results.

Year	NO2 Concentration (µg/m ³)
1999	40.4
2000	34.5

2.2 Modelling to assess nitrogen dioxide levels in this area was carried out as part of the Stage 3 Review and Assessment using Design Manual Roads and Bridges (DMRB) and Atmospheric Dispersion Modelling System (ADMS). The modelling indicated that at this location there were 44 properties close to the A52 where the nitrogen dioxide Objective level might not be met in 2005. The 2005 level of nitrogen dioxide predicted by the modelling was 49 $\mu\text{g}/\text{m}^3$ at the façade of the properties nearest the road.

3. Air Quality Monitoring at all locations on the A52

3.1 A summary of monitoring results for nitrogen dioxide diffusion tubes at all the other locations along the A52 are shown in the Table 1 below.

The data is presented in 3 ways for each year:

- (i) The column containing raw data is the uncorrected annual average figure.
- (ii) The column headed “corr” is data that has been corrected by multiplying it by a factor derived by comparing the annual averages measured by real time monitor with those measured by its co-located diffusion tube.
- (iii) The column headed “pred” is the predicted level for 2005. These are based on factors contained in the Pollutant Specific Guidance. (Results for 2001 will be corrected against the real time data as soon as the data set for 2001 is complete.)

Table 2 - Monitoring results for A52 sites (results in $\mu\text{g}/\text{m}^3$)

Location	1999 Raw	1999 corr	99-05 pred	2000 Raw	2000 corr	00-05 pred	2001 Raw	2001 Corr	01 -05 Pred
Asterdale	32.0	30.8	26.4	30.0	26.3	23.1			
Kirk Leys N	38.7	37.2	31.9	35.7	31.4	27.6	30.6		27.7
Kirk Leys S	44.4	42.8	36.8	33.9	29.8	26.2			
Galway Ave	42.5	40.9	35.1	33.6	29.5	25.9	33.4		30.4
Meadow Ln	40.6	39.1	33.6	32.9	28.9	25.4	29.6		26.8
Highfield	42.0	40.4	34.7	39.3	34.5	30.3	29.5		26.8
Carol Cres							21.8		19.8
Council Hse	45.8	44.1	38.7	42.0	36.9	32.4	29.9		27.1
Factors		44.1/ 45.8	0.79/ 0.92		36.9/ 42.0	0.79/ 0.9			0.79/0.87

Note: The results in the table show that the 40 $\mu\text{g}/\text{m}^3$ standard for 2005 is being met at all sites along the A52 and has not been predicted to be broken at any of the sites along the A52 by a comfortable margin in any of the three years.

4. Stage 3 Modelling for Highfield Lane

4.1 The inputs to the model for Highfield Lane were:

- Traffic Speed along A52, 62kph
- Traffic flow vehicles per hour, 2485
- Tempo factor for medium growth used
- 6% HGV used

4.2 The traffic flow was derived from the 1996 traffic database. The trip adjustment factor representing medium growth was applied to the daily average counts to predict the traffic flow for 2005 near Highfield Lane. This gave the following values

Table 3 – Predicted traffic flow at Highfield Lane

1996 flow	Predicted 2005 Flow used in DMRB
50984	59640

4.3 The DMRB model was used in the Stage 3 review and assessment as a screening tool. This model is known to overpredict in most situations. Consequently if DMRB does not predict an exceedance at a location, it is unlikely that any more detailed modelling will be required.

4.4 When it was applied to the A52, the DMRB model indicated likely exceedances of the nitrogen dioxide standard at Kirk Leys Avenue and at Highfield Lane in 2005. Consequently, the more sophisticated ADMS model was applied to these locations. The contour lines for Kirk Leys Avenue produced by the ADMS model showed that none of the houses were sufficiently close to the road for it to be probable that there would be any receptors exposed to levels of nitrogen dioxide above the standard for 2005.

4.5 The DMRB predictions for Highfield Lane were higher than for Kirk Leys Avenue and this was reflected by the contour lines when ADMS was applied at this location. The modelling showed that it was probable that the standard for nitrogen dioxide would be exceeded at the 44 houses on Highfield Lane and Carol Close that were closest to the A52 and predicted a maximum nitrogen dioxide level of 49 µg/m³. Consequently an AQMA was declared around these properties.

5. Developments since the Stage 3 Report (Stage 4 Review and Assessment)

5.1 More recent traffic counts are now available for the A52.

These are shown in the Table below:

Table 4 – Recent Daily Traffic Counts for Highfield Lane

Year	Vehicles/day
1999	51716
2000	50234
2001	51596

- 5.2 These figures suggest that it would have been more appropriate to use the Tempro Low factor, rather than the Medium factor for the modelling. The figures also suggest that there has been a slight reduction in traffic flows on the A52 with slightly fewer vehicles in 2001 than in 1999.
- 5.3 As the LTP intends to restrict traffic growth to 1% across the outer cordon of the City, it is appropriate to use the latest traffic figures and the Tempro Low factor to predict the traffic flow in 2005 on the A52. This has been done and using the most recent count in 2001 gives a traffic flow in 2005 of 53691. This represents a decrease of almost 6000 vehicles (5949) when compared with the figure used in the Stage 3 assessment.
- 5.4 The Stage 3 assessment also used an estimated HGV percentage of 6%. The HGV percentage recorded for 1999 was 4.6%.
- 5.5 A re-examination of the distance between the houses and the A52 showed that the nearest was 35 m from the centreline of the road and 20 m from the kerbside. The distances used in the Stage 3 modelling were 28 m and 18 m respectively.
- 5.6 The more recent traffic data and the revised distances have been used to rework the DMRB predictions for all of the A52 locations and for the diffusion tube locations at both Highfield Lane and Carol Crescent. The new figures are shown in Table 4 below.

Table 5 – Stage 4 modelling results for Highfield Lane/Carol Crescent

	DMRB pred (A)	DMRB pred (B)	DMRB pred (C)	DMRB pred (D)
Kirk Leys N	40.1	39.3	37.5	
Kirk Leys S				
Galway Ave	33.3	32.8	31.7	
Meadow Ln	42.2	41.2	39.4	
Highfield	45.4	44.9	42.7	41.9
Carol Cres	41.6	41.4	38.9	38.3
Highfield Tube	40.4	39.9	39.5	36.7
Carol Cresc Tube	37.0	36.6	35.0	34.5

Predictions

- (A) predicted using 1999 flows, 6%HGVT and med growth from TEMPRO 2405v/hr
- (B) predicted using 1999 flows, 6%HGVT and low growth from TEMPRO 2325v/hr
- (C) predicted using 1999 flows, 4.6%HGVT and low growth from TEMPRO 2325v/hr
- (D) predicted using 1% growth from 2001 results 4.6%HGVT 2237v/hr

6. Conclusions

- 6.1. The monitoring results at both Carol Close and Highfield Lane show no breaches of the nitrogen dioxide annual average standards in 2000 or 2001.
- 6.2. The predictions based on that monitoring data show that the annual average nitrogen dioxide concentration is expected to be well below the objective for 2005 with predicted concentrations 7 to 10 $\mu\text{g}/\text{m}^3$ below the standard.
- 6.3. The most recent traffic data shows that the predicted traffic growth had been greatly overestimated.
- 6.4. DMRB modelling for 2005 using the latest traffic data shows a drop of more than $7\mu\text{g}/\text{m}^3$ for the Highfield properties nearest to the A52. (The previously predicted value was 49 with the old data to a new data value of $41.9\mu\text{g}/\text{m}^3$).
- 6.5. The diffusion tube site on Carol Close is 14m further away from the kerb than the closest building façade. At this site and at the closest building façade predictions from both monitored and DMRB methods indicate that the standard will be met.
- 6.6. The diffusion tube site at Highfield Lane is 10m further away from the A52 than are the closest properties. At this location, 30m from the kerb, predictions from both monitored data and DMRB methods indicate that the standard will be met.
- 6.7. Only 3 houses at Highfield Lane have any part of the building closer to the A52 than the diffusion tube location.
- 6.8. The predicted concentration at the closest façade of any of those three properties is only $1.9\mu\text{g}/\text{m}^3$ higher than the nitrogen dioxide Objective standard for 2005.

7. Proposal

- 7.1 DMRB is known to overpredict nitrogen dioxide concentrations and also given that the DMRB predictions are considerably higher than those based on monitored concentrations. Therefore, it is proposed to vary the Air Quality Management Order to remove the entire Highfield Lane location from the AQMA.
- 7.2 It is proposed to continue to monitor at the Highfield Lane site to check that the nitrogen dioxide levels continue to fall in line with the predictions. This is to ensure that the air quality at the three houses where the DMRB predictions are slightly above the standard is able to meet the standard in 2005.

Varying the AQMA Order will create two separate AQMAs. One of these will enclose the Inner Ring Road and the other, the Outer Ring Road. The creation of two separate AQMAs will simplify the development of Action Plans as the traffic patterns on the Inner and Outer Ring Roads are very different in nature.