Detailed Assessment of Air Quality in Tyne & Wear – Report

Carried out by:

Air Quality Consultants

On behalf of:

Newcastle City Council

Gateshead Council

City of Sunderland

South Tyneside Council

North Tyneside Council

Detailed Assessment of Air Quality in Tyne & Wear

Prepared by

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on behalf of

Newcastle City Council

Gateshead Council

Sunderland City Council

South Tyneside Council

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Executive Summary

Updating and Screening Assessments (USAs) carried out as part of the second round of Review and Assessment of air quality in the Tyne & Wear region, identified a number of locations where the UK Air Quality Objectives were at risk of being exceeded. Detailed Assessments have therefore been carried out to determine whether it is likely that the objectives will be exceeded at these locations, in order to determine the need for any Air Quality Management Areas (AQMAs).

The Detailed Assessments cover locations within each of the five local authorities that make up the Tyne & Wear Region. Most of the locations examined are busy roadside sites where the USA identified a risk that the annual mean nitrogen dioxide objective may be exceeded. At some of these locations, there was also a risk of the 24-hour PM_{10} (particulate matter less than 10 micrometers) objective being exceeded. A location near to an industrial source has also been considered because of a risk of the annual mean benzene objective being exceeded. Monitoring data collected since the publication of the USA, has identified additional locations with a risk of exceeding the objectives. These have also been subject to Detailed Assessments.

A combination of monitoring results and modelled data has been used to identify whether exceedences of the air quality objectives are likely. Particular attention has been paid to the presence of relevant receptors (residential properties, schools, hospitals etc) within the areas of potential exceedence.

The Detailed Assessments have determined that exceedences of the annual mean nitrogen dioxide objective are likely at a number of locations where there is relevant exposure. Air Quality Management Areas (AQMAs) will therefore be declared at the following locations:

- Newcastle – Jesmond Road, Jesmond Dene Road and Blue House Roundabout
- Gateshead – Trinity Court
- Sunderland –Trimdon Street roundabout and Chester Road/Ormond Street
- South Tyneside – Boldon Lane/Stanhope Road and A194 Leam Lane

At all of the other locations considered in the Detailed Assessments, it is un-likely that any air quality objectives will be exceeded and therefore Air Quality Management Areas are not required. However, monitoring will continue at many of these locations and the situation kept under review in future Progress Reports and Updating and Screening Assessments.

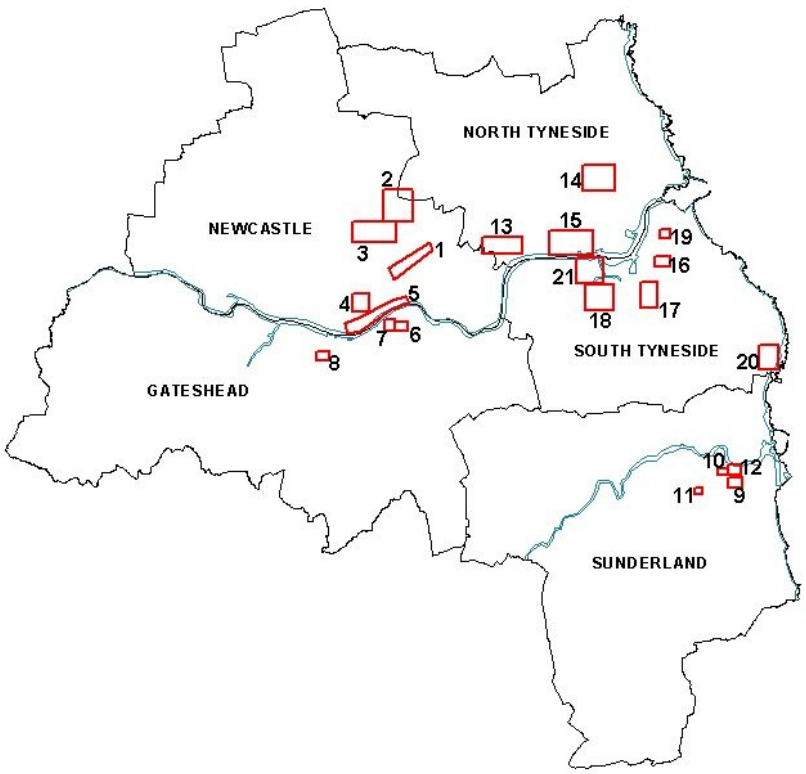
1 Introduction

1.1 Air Quality Consultants Ltd., has been commissioned by the five Tyne and Wear local authorities to carry out Detailed Assessments of air quality. The five local authorities covered by this report are:

- Newcastle City Council;
- Gateshead Council;
- Sunderland City Council;
- South Tyneside Council; and
- North Tyneside Council.

The local authorities forming the Tyne & Wear region are shown in Figure 1.

Figure 1 Map of Tyne & Wear Local Authorities and Locations Covered by Detailed Assessments



Areas covered by Detailed Assessment

1 Jesmond Road/Cradlewell
2 Haddricks Mill
3 Blue House/Jesmond Dene Road
4 Blenheim Street/Westgate Road
5 Quayside
6 Trinity Court/Regent Street
7 Melbourne Court
8 A1 Dunston
9 Stockton Road/Mary Street
10 Trimdon Street
11 Chester Road/Ormonde Street
12 St Marys
13 Wallsend High St
14 Billy Mill
15 Tyne Tunnel/Willington Quay
16 Dean Road
17 Boldon Lane/Stanhope Road
18 A194 Leam Lane
19 Fowler Street
20 Whitburn
21 Jarrow Priory

Introduction to the Second Round of Review and Assessment

1.2 The Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland[1] and the addendum to it, published in February 2003[2], set out a framework for air quality improvements, which includes a series of air quality objectives. National and international measures are likely to achieve these objectives in most locations, but where areas of poor air quality remain, local air quality management will be necessary. Part IV of the Environment Act 1995 requires local authorities to periodically review and assess the current, and likely future, air quality in their area. The role of this process is to identify areas where it is unlikely that the air quality objectives will be achieved. These locations must be designated as Air Quality Management Areas (AQMAs) and subject to active management.

1.3 Air quality objectives and Review and Assessment guidance change with advances in knowledge, much of which is learnt from the Review and Assessment process itself. As a result, Review and Assessment is a long-term, rolling process, structured as a series of 'rounds'. Most local authorities in England, Scotland and Wales have now completed the first round of Review and Assessment and the second round is currently underway.

1.4 The revised Local Air Quality Management Technical Guidance (LAQM. TG(03))[3] sets out a phased approach to Review and Assessment. This prescribes an initial Updating and Screening Assessment (USA), which all authorities must undertake. It is based on a checklist to identify any matters that have changed since the first round and may now require further assessment. If the USA identifies any potential areas where there is a risk that the objectives may be exceeded, which were not identified in the first round, then the Local Authority should progress to a Detailed Assessment (DA).

1.5 The purpose of the Detailed Assessment is to determine whether an exceedence of an air quality objective is likely and the extent of that likely exceedence. If it is found that an air quality objective is likely to be exceeded, than an Air Quality Management Area (AQMA) must be declared. Subsequent to the declaration of an AQMA, a further assessment needs to be carried out to ascertain the sources contributing to the exceedence and to calculate the magnitude of reduction in emissions required to achieve the objective. An Air Quality Action Plan then needs to be created, which identifies measures to improve air quality, in pursuit of the air quality objectives.

1.6 This report describes Detailed Assessments for the five Tyne & Wear local authorities. It evaluates the likelihood of air quality objectives being exceeded at a number of locations that were identified in the USAs. In all, 20 areas have been examined, as shown in Figure 1. The findings have been discussed in full with the local authorities.

The Air Quality Objectives

1.7 The Government's Air Quality Strategy[1] defines both standards and objectives for each of a range of air pollutants. The 'standards' are set as concentrations below which health effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of a particular pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The objectives are prescribed within The Air Quality (England) Regulations 2000[4] and The Air Quality (England) (Amendment) Regulations 2002[5]. This latter publication set revised, more stringent objectives for benzene and carbon monoxide which are relevant to this second round, but which were absent in the first. The addendum to the air quality strategy[2] contains provisional objectives for PM_{10} to be achieved in 2010. As these are not in the regulations, they do not strictly need to be covered in the Review and Assessment process. However, for completeness they are discussed in this report. Table 1 summarises the objectives, which are relevant to this report. Appendix 1 provides a brief summary of the health effects of the three pollutants under consideration.

1.8 The air quality objectives are only applicable where members of the public are likely to be regularly present and are likely to be exposed over the averaging time of the objective[3]. For annual mean and 24-hour objectives relevant exposure is limited to residential properties, schools and hospitals. The 1-hour objective applies at these and at any outdoor location where a member of the public might reasonably be expected to stay for the averaging period of the objective, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

Table 1 Air Quality Objectives Relevant to This Report.

Pollutant	Time Period	Objective	To be achieved by[1]
Nitrogen Dioxide	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year	2005
	Annual mean	40 µg/m^3	2005
Fine particles (PM10)[2]	24-hour mean	50 µg/m^3 not to be exceeded more than 35 times a year	2004
	Annual mean	40 µg/m^3	2004
	24-hour mean [3]	50 µg/m^3 not to be exceeded more than 7 times a year	2010
	Annual mean [3]	20 µg/m^3	2010
Benzene	Annual mean	16.25 µg/m^3	2003
	Annual mean	5.00 µg/m^3	2010

[1] The achievement dates are all by the end of the specified year.
[2] Measured by the gravimetric method.
[3] Provisional objective not included in the Regulations.

2 Assessment Methodology

Existing Air Quality

2.1 Air pollutant concentrations in the vicinity of an emission source will be related to both the source strength and the background concentration to which the local source is added. Background concentrations of nitrogen dioxide and PM_{10} across the Tyne & Wear region have been taken from the national maps of background concentrations available from the Air Quality Archive on the internet[6], and adjusted in the case of nitrogen dioxide using local monitoring data (Appendix 2).

2.2 Information on air quality across the region has been collected from a number of measurement campaigns. The results of automatic air quality monitoring carried out in Tyne & Wear are published on the internet as part of the Tyne & Wear Air Quality Network (T&WAQN)[7], which is maintained by the University of Sunderland. Newcastle City Council also operates an urban background site as part of the Government's Automatic Urban and Rural Network (AURN)[6]. Results from the T&WAQN are summarised in Appendix 3. The locations of these monitoring sites are shown in Appendix 4. Details of the quality assurance and control procedures in place for each of the automatic monitoring stations are presented in Appendix 5.

2.3 Monitoring for nitrogen dioxide is also carried out using passive diffusion tubes, which are exposed for a month at a time, before being returned to the laboratory for analysis. Newcastle and Gateshead Councils use Jesmond Dene Laboratory for their diffusion tube analysis, whereas Sunderland and South Tyneside use tubes which are supplied and analysed by Gradko using the 50% TEA in acetone method. Lambeth Scientific Services supply and analyse diffusion tubes for North Tyneside. All of the data presented in this report have been adjusted to account for diffusion tube bias. Further details of the adjustment factors used, are supplied in Appendix 6.

2.4 This report has been prepared predominantly using the data that were available in October 2004. For many of the monitoring sites, data are not available for a full calendar year. Unless otherwise stated, all data presented in this report have been adjusted to an annual mean equivalent. Further details of these adjustments are provided in Appendix 7.

2.5 In order to calculate pollutant concentrations at receptors, the modelled concentration due to local roads has been added to an estimated background concentration. Comparison of the estimated background concentrations from the UK Air Quality Archive (www.airquality.co.uk),

with measured background concentrations, indicates that the estimated concentrations are too high for Tyne and Wear. Therefore, the estimated background concentrations used in the modelling have been adjusted by a factor derived from this comparison. Details of this comparison and adjustment are presented in Appendix 8.

Modelling

2.6 ADMS Roads (version 2.0) and atmospheric dispersion modelling software developed by Cambridge Environmental Research Consultants Ltd (CERC) was used to model nitrogen dioxide concentrations at the locations identified for Detailed Assessment. The following input data were utilised:

- Annual hourly average data and heavy duty/light duty vehicle mix obtained from the Tyne & Wear Traffic and Accident Data Unit. Future year traffic flows estimated using a combination of the national NRTF and local Tempro factors, as advised on the Review and Assessment Helpdesk website[8]. Further details are provided in Appendix 9.

- As measured speeds were unavailable, estimate speeds were used based on local knowledge, taking into account congestion at peak periods. Further details are provided in Appendix 9.

- The location of roads and buildings (including road width) were obtained using OS Landline Plus 1:10000 mapping information. Building heights alongside modelled roads (used for the model to calculate street canyon effects) were estimated from current local knowledge.

- Meteorological data from the Newcastle meteorological station, for 2003.

- The emission factors used were those built into the model derived from DMRB 2003.

2.7 The model has been verified by comparing the model results with local measurements and the model output adjusted accordingly. For the majority of areas, a regional adjustment factor has been applied, based on comparison of data at five continuous monitoring sites. At A1 Dunston in Gateshead, where the terrain is significantly different a local adjustment has been applied. Further details of model verification and adjustment are supplied in Appendix 10.

Uncertainty

2.8 There is an element of uncertainty in all measured and modelled data. This includes uncertainty within the model itself as well as in the input data (e.g. existing and predicted traffic flow and composition). There is also uncertainty arising from the year to year variability in air quality data, the likely reduction in background air quality concentrations and the monitoring equipment.

2.9 The uncertainty in modelled data has been minimised by carrying out model verification and adjustment. Any known uncertainty in measured data is highlighted in the discussion of the results. Due to the number and variety of locations covered in this assessment, no attempt has been made to quantify the level of uncertainty in the measured and modelled data presented in this report. However, the overall picture, in terms of all the available measured and modelled data and the quality of that data has been taken into consideration in the decision whether or not to declare an AQMA and, if an AQMA is required, the minimum extent of the boundary.

3 Newcastle

Locations to be considered in the Detailed Assessments

3.1 The conclusions of the Newcastle USA which was completed in May 2003 are summarised in Table 2. It was concluded that the objectives for carbon monoxide, lead, benzene, 1,3-butadiene and sulphur dioxide would all be achieved. However, Detailed Assessments would be required for a number of locations where potential exceedences of the annual mean nitrogen dioxide and 24-hour PM_{10} objectives were identified. In the City Centre, it was determined that there was sufficient evidence available to declare an AQMA based on measured and modelled exceedences of the annual mean nitrogen dioxide objective, without proceeding to a Detailed Assessment.

3.2 Subsequent to the publication of the USA an AQMA has been declared covering the City Centre area, as shown in Figure 1A. Newcastle City Council is currently preparing an Air Quality Action Plan, with aim of improving air pollution within the AQMA.

3.3 Monitoring data that have become available since the USA indicate that there may be a risk of the annual mean nitrogen dioxide objective being exceeded at relevant locations in the Quayside area of Newcastle. Therefore this location is also considered in the Detailed Assessment.

Table 2 Locations considered in the Newcastle Detailed Assessments

Pollutant	Conclusion
Conclusions of USA	
Carbon monoxide	DA not required
Benzene	DA not required
Lead	DA not required
1,3 –butadiene	DA not required
Sulphur dioxide	DA not required
Nitrogen dioxide	Declare AQMA - City Centre DA required - A1058 Jesmond Road, - A189 Haddricks Mill/Station Road junction, - Blue House Roundabout/Great North Road junction, - A186 Westgate Road/Blenheim Street
PM_{10}	DA required - A1058 Jesmond Road, - Swan House Roundabout, - Percy Street - City Centre
Additional locations identified since USA	
Nitrogen dioxide	DA required based on monitoring - Quayside

Detailed Assessments

A1058 Jesmond Road

3.4 Monitoring and DMRB modelling data in the USA, identified this as an area where there could be potential exceedences of both the annual mean nitrogen dioxide and 24-hour PM_{10} objectives. Monitoring data for the area are presented in Table 3 for the sites identified in Figures 1B and 1C. The monitoring results indicate that the annual mean nitrogen dioxide objective is being exceeded at a kerbside location near to the junction of Jesmond Road with Sandyford Road (site JR1, the Tyne & Wear trailer). This site is not strictly representative of relevant exposure, however, there are residential properties within a few metres of the road and given the magnitude of the exceedence at the kerbside, the monitoring suggests that it is likely that the objective will also be exceeded at these residential properties. Monitoring is currently being carried out at Jesmond Road Cemetery (JR2) using an automatic monitor, approximately 13m from the kerb. However, the nitrogen oxides data from this monitor are unreliable and therefore have not been published in this report. Diffusion tubes collocated with the Jesmond Road Cemetery monitor , indicate a concentration of 28 $\mu g/m^3$ at this location in 2005. Diffusion tube monitoring results from sites 1 to 6 show that the objective is expected to be achieved at all relevant locations near to the dual carriageway section of the A1058.

3.5 PM_{10} monitoring results from both the Tyne & Wear trailer and the Jesmond Road Cemetery monitor are presented in Table 4. Unlike the nitrogen oxides analyser, it is thought that the TEOM has been operating correctly at the Jesmond Road Cemetery monitoring site. Results from the Tyne & Wear trailer indicate that the 24-hour objective would be exceeded. However, as discussed above, the monitor was in a very much worst-case location. Therefore the DMRB has been used to estimate the PM_{10} concentration at Regency Court, which is the nearest relevant receptor to Jesmond Road (as described in Appendix 11). This calculation shows that the annual mean at Regency Court in 2003 would have been 31.1 $\mu g/m^3$. Using the relationship between annual mean and number of days greater than 50 $\mu g/m^3$ published in the Technical Guidance, the estimated number of days exceedence in 2003 would have been 32, which is below the permitted number of 35 prescribed in the objective. Taking into account the slight reduction in concentration from 2003 to 2004, and the significantly lower measured data for JR2, which is approximately 4 m further from Jesmond Road but closer to the junction with Sandyford Road than Regency Court, the objective is not likely to be exceeded at this location. Therefore, an AQMA is not required for PM_{10}.

3.6 Concentrations of nitrogen dioxide have been modelled alongside the A1058 using ADMS-Roads (for further information on model input and verification see the Methodology section). The model results, which show good agreement with the measured data, are shown in Figure 1D (further comparison of modelled with measured concentrations is presented in Appendix 12). These indicate that there are likely exceedences of the annual mean nitrogen dioxide objective at buildings near to the Jesmond Road/Stephenson Road/Sandyford Road junction. There are also likely exceedences, at building facades closest to Sandyford Road and Jesmond Road.

3.7 Based on the model results, which show good agreement with the measured concentrations, an AQMA will be declared, which, as a minimum, will cover all residential properties which fall within the modelled 40 $\mu g/m^3$ contour.

Table 3 Nitrogen Dioxide Monitoring Data – A1058 Jesmond Road

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (μg/m^3)	Data capture (%)
2003 Measured						
JR1	Cradlewell, Jesmond Rd (T&W trailer)	Kerbside	No	Chemi-luminesence	**56**	95 (18/11/02 to 13/5/03)
1	Hilden Gardens	Roadside	Yes	Diffusion tube	34.0	92
2	Martell Gardens	Background	Yes	Diffusion tube	27.7	100
3	Dimbula Gardens	Background	Yes	Diffusion tube	27.8	100
4	Industry Road	Background	Yes	Diffusion tube	30.7	92
5	St Albans Cres	Background	Yes	Diffusion tube	28.3	100
6	Addycombe Terrace	Roadside	Yes	Diffusion tube	32.1	100
January to August 2004 measured adjusted to 2003						
1	Hilden Gardens	Roadside	Yes	Diffusion tube	28.8	88
2	Martell Gardens	Background	Yes	Diffusion tube	25.2	75
3	Dimbula Gardens	Background	Yes	Diffusion tube	25.2	88
4	Industry Road	Background	Yes	Diffusion tube	26.2	88
5	St Albans Cres	Background	Yes	Diffusion tube	25.6	88
6	Addycombe Terrace	Roadside	Yes	Diffusion tube	33.3	88
JR2	Jesmond Rd Cemetery	Intermediate	Yes	Diffusion tube	29.7	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
JR1	Cradlewell, Jesmond Rd	Kerbside	No	Chemi-luminesence	**53**	N/A
1	Hilden Gardens	Roadside	Yes	Diffusion tube	32.3 (27.3)	N/A
2	Martell Gardens	Background	Yes	Diffusion tube	26.2 (23.9)	N/A
3	Dimbula Gardens	Background	Yes	Diffusion tube	26.3 (23.9)	N/A
4	Industry Road	Background	Yes	Diffusion tube	29.1 (24.9)	N/A
5	St Albans Cres	Background	Yes	Diffusion tube	26.8 (24.3)	N/A
6	Addycombe Terrace	Roadside	Yes	Diffusion tube	30.5 (31.5)	N/A
JR2	Jesmond Rd Cemetery	Intermediate	Yes	Diffusion tube	N/A (28.2)	N/A
Objective = 40 μg/m^3 in 2005						

Table 4 PM_{10} Monitoring Data – A1058 Jesmond Road

Site number	Location	Site type	Relevant exposure	Monitor type	Annual mean conc. (µg/m^3)	Days > 50 µg/m^3	Data capture (%)
2003 Measured							
JR1	Cradlewell, Jesmond Rd (T&W trailer)	Kerbside	No	TEOM	34.4	**47** based on annual mean (41 measured in 6 mths)	92.7 (18/11/02 to 13/5/03)
JR2	Jesmond Rd Cemetery	Roadside	Yes	TEOM	19.5	3	75 (1/4/03 to 31/3/04
2004 projected from 2003							
JR1	Cradlewell, Jesmond Rd	Kerbside	No	TEOM	33.8	**43**	N/A
JR2	Jesmond Rd Cemetery	Roadside	Yes	TEOM	19.2	3	N/A
Objective for 2004					**40**	**35**	
Provisional objective for 2010					**20**	**7**	

All data are reported as TEOM x1.3

A189 Haddricks Mill/Station Road junction

3.8 DMRB modelling data in the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 5 for the sites identified in Figure 1E. The monitoring results indicate that the objective is expected to be achieved at locations near to Haddricks Mill Road and Killingworth Road, away from the junction. However, there are relevant locations much closer to the junction of Haddricks Mill Road with Hunters Road, than the monitoring sites.

3.9 Concentrations of nitrogen dioxide have been modelled alongside the A189 Haddricks Mill/Station Road junction using ADMS-Roads (for further information on model input and verification see the Methodology section). The initial model results, with the regional verification and adjustment applied, were higher than those measured in the area. Therefore local verification and adjustment has been carried out for this location. Further details are provided in Appendix 9. With the local verification and adjustment carried out, the model results showed good agreement with the monitoring (further comparison of modelled with measured concentrations presented in Appendix 12).The results are shown in Figure 1F. These indicate that the highest concentrations are likely to occur at locations on Station Road, near to the junction. However, the annual mean nitrogen dioxide objective is likely to be achieved at relevant locations in the area.

3.10 Based on monitored and modelled results, an AQMA is not required. However, monitoring will continue be carried out in Station Road close to residential premises representative of relevant exposure.

Table 5 Nitrogen Dioxide Monitoring Data – A189 Haddricks Mill/Station Road junction

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
No Measurements						
January to August 2004 measured adjusted to 2003						
102	4 Haddricks Mill Rd	Roadside	Yes – not worst case	Diffusion tube	25.9	100 (Apr-Sept)
103	17 Haddricks Mill Rd	Roadside	Yes – not worst case	Diffusion tube	30.7	100 (Apr-Sept)
104	Dene Park House, Killingworth Rd	Roadside	Yes – not worst case	Diffusion tube	23.9	100 (Apr-Sept)
105	1 Killingworth Rd	Roadside	Yes – not worst case	Diffusion tube	36.2	100 (Apr-Sept)
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
102	4 Haddricks Mill Rd	Roadside	Yes – not worst case	Diffusion tube	(24.5)	N/A
103	17 Haddricks Mill Rd	Roadside	Yes – not worst case	Diffusion tube	(29.1)	N/A
104	Dene Park House, Killingworth Rd	Roadside	Yes – not worst case	Diffusion tube	(22.7)	N/A
105	1 Killingworth Rd	Roadside	Yes – not worst case	Diffusion tube	(34.4)	N/A
Objective = 40 µg/m^3 in 2005						

Blue House Roundabout/Jesmond Dene Road

3.11 DMRB modelling data in the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 6 for the sites identified in Figure 1G. The monitoring results indicate that the annual mean objective is likely to be exceeded at Blue House, which is the only relevant receptor near to the Blue House Roundabout. Diffusion tube results for site 101, which is approximately 500m east of the junction on Jesmond Dene Road, also suggest exceedence of the objective at this relevant location. Diffusion tube 11 on Granstand Road is not representative of relevant exposure.

Table 6 Nitrogen Dioxide Monitoring Data – Blue House Roundabout/Great North Road junction

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (μg/m^3)	Data capture (%)
2003 Measured						
11	Grandstand Road	Roadside	No	Diffusion tube	**46.6**	92
126	Blue Hse Rbout East	Roadside	Yes	Diffusion tube	**46.0**	100 (Jul – Dec)
127	Blue Hse Rbout North	Roadside	Yes	Diffusion tube	34.7	100 (Jul – Dec)
128	Blue Hse Rbout South	Roadside	Yes	Diffusion tube	33.1	100 (Jul – Dec)
129	Blue Hse Rbout West	Roadside	Yes	Diffusion tube	35.3	100 (Jul – Dec)
January to August 2004 measured adjusted to 2003						
11	Grandstand Road	Roadside	No	Diffusion tube	39.4	88
101	16 Jesmond Dene Road	Roadside	Yes	Diffusion tube	**45.5**	100 (Apr-Sept)
126	Blue Hse Rbout East	Roadside	Yes	Diffusion tube	**51.7**	100
127	Blue Hse Rbout North	Roadside	Yes	Diffusion tube	**46.1**	100
128	Blue Hse Rbout South	Roadside	Yes	Diffusion tube	39.1	88
129	Blue Hse Rbout West	Roadside	Yes	Diffusion tube	**46.6**	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
11	Grandstand Road	Roadside	No	Diffusion tube	**44.2** (37.4)	N/A
101	16 Jesmond Dene Road	Roadside	Yes	Diffusion tube	N/A (**43.1**)	N/A
126	Blue Hse Rbout East	Roadside	Yes	Diffusion tube	**43.6** (**49.1**)	N/A
127	Blue Hse Rbout North	Roadside	Yes	Diffusion tube	32.9 (**43.7**)	N/A
128	Blue Hse Rbout South	Roadside	Yes	Diffusion tube	31.3 (37.0)	N/A
129	Blue Hse Rbout West	Roadside	Yes	Diffusion tube	33.5 (**44.1**)	N/A
Objective = 40 μg/m^3 in 2005						

3.12 Concentrations of nitrogen dioxide have been modelled alongside the Blue House Roundabout and Jesmond Dene Road using ADMS-Roads (for further information on model input and verification see the Methodology section). The results are shown in Figures 1H and 1I. At the Blue House roundabout, the model results, reflect monitored concentrations (further comparison

of modelled with measured concentrations presented in Appendix 12). These show that the annual mean nitrogen dioxide objective is likely to be exceeded at the Blue House, which is the only relevant exposure near to the roundabout. Approximately 500m to the east of the roundabout, on Jesmond Dene Road, the modelled results indicate that the nitrogen dioxide concentration is 36-38 $\mu g/m^3$ in the vicinity of diffusion tube 101. However, the predicted concentration in 2005, based on monitoring data, is 43.1 $\mu g/m^3$.

3.13 Based on monitored and modelled results, the Blue House will be declared an AQMA. Due to the uncertainty in the model results for the Jesmond Dene Road area an AQMA will be declared, which, as a minimum, will include any relevant properties which fall within the modelled 36 $\mu g/m^3$ contour. Additional work during the Further Assessment will help confirm the magnitude and extent of any exceedences along Jesmond Dene Road.

A186 Westgate Road/Blenheim Street

3.14 DMRB modelling data in the USA identified the A186 Westgate Road as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Subsequent to the USA, monitoring was increased in the Blenheim Street/Westgate Road area. A number of residential developments are currently being built along Blenheim Street, which will introduce sensitive receptors to this area. Monitoring data for the area are presented in Table 7 for the sites identified in Figure 1J. Monitoring results from site 109, which is a worst-case location on Westgate Road, near to the junction with Blenheim Road indicate that the annual mean nitrogen dioxide objective is unlikely to be exceeded at relevant locations on Westgate Street. However, there is one predicted exceedence in the Blenheim Street area at site 110. This site is on Bath Lane, approximately 30m from Blenheim Street. However, it is located next to a Warehouse and is influenced by idling lorries. Therefore this diffusion tube is to be relocated to a site which is more representative of relevant exposure, away from this localised source.

3.15 Based on the monitoring data presented above there is no requirement to declare an AQMA in the Blenheim Street/Westgate Road area. Therefore no modelling has been carried out for this area.

Table 7 Nitrogen Dioxide Monitoring Data – A186 Westgate Road/Blenheim Street

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
106	Blenheim St 2	Roadside	Yes	Diffusion tube	34.4	92
107	Blenheim St 3	Roadside	Yes	Diffusion tube	35.7	92
108	Blenheim St 4	Intermediate	Yes	Diffusion tube	31.4	92
109	Blenheim St 6	Roadside	Yes	Diffusion tube	38.8	92
110	Blenheim St 7	Intermediate	Yes	Diffusion tube	**42.5**	83
111	Blenheim St 8	Roadside	Yes	Diffusion tube	37.1	92
112	Blenheim St 9	Roadside	Yes	Diffusion tube	36.5	92
January to August 2004 measured adjusted to 2003						
106	Blenheim St 2	Roadside	Yes	Diffusion tube	37.1	100
107	Blenheim St 3	Roadside	Yes	Diffusion tube	35.2	100
108	Blenheim St 4	Intermediate	Yes	Diffusion tube	30.6	100
109	Blenheim St 6	Roadside	Yes	Diffusion tube	**41.0**	100
110	Blenheim St 7	Intermediate	Yes	Diffusion tube	**46.0**	100
111	Blenheim St 8	Roadside	Yes	Diffusion tube	35.7	100
112	Blenheim St 9	Roadside	Yes	Diffusion tube	36.3	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
106	Blenheim St 2	Roadside	Yes	Diffusion tube	32.6 (35.1)	N/A
107	Blenheim St 3	Roadside	Yes	Diffusion tube	33.8 (33.3)	N/A
108	Blenheim St 4	Intermediate	Yes	Diffusion tube	29.8 (29.0)	N/A
109	Blenheim St 6	Roadside	Yes	Diffusion tube	36.8 (38.9)	N/A
110	Blenheim St 7	Intermediate	Yes	Diffusion tube	**40.3 (43.6)**	N/A
111	Blenheim St 8	Roadside	Yes	Diffusion tube	35.1 (33.8)	N/A
112	Blenheim St 9	Roadside	Yes	Diffusion tube	34.6 (34.4)	N/A
Objective = 40 µg/m^3 in 2005						

Quayside

3.16 The Quayside area has been subject to a lot of regeneration over recent years, with the introduction of a number of residential developments, as well as hotels, bars and restaurants. Roads in the area are congested at peak times and there are a large number of taxis in the area at night. It was not identified in the USA as being an area requiring a Detailed Assessment. However, subsequent to the USA, diffusion tube monitoring has been carried out at a number of locations in the area, one of the reasons being to try to measure the impact of the closure of Dean Street to through traffic. The results suggest that the annual mean nitrogen dioxide may be exceeded. Monitoring data for the area are presented in Table 8 for the sites identified in Figure 1K. The monitoring results indicate that the annual mean nitrogen dioxide objective is not expected to be achieved at roadside locations in the Quayside area. Site 57, 58, 59 and 60 are not strictly representative of relevant exposure because they are located on traffic islands in the

centre of roads. However, concentrations at these sites are sufficiently elevated to indicate that the objective would also be exceeded at roadside locations. A number of buildings alongside the road are currently being developed for residential use.

3.17 In light of the magnitude of measured exceedences at relevant locations in the Quayside area it is proposed that the boundary of the existing AQMA is expanded to include the Quayside area (Figure 1L).

Table 8 Nitrogen Dioxide Monitoring Data – Quayside

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration ($\mu g/m^3$)	Data capture (%)
2003 Measured						
54	Quayside 13	Intermediate	Yes	Diffusion tube	**42.3**	83 (Jul-Dec)
55	Quayside 12	Roadside	Yes	Diffusion tube	**44.6**	83 (Jul-Dec)
56	Quayside 11	Roadside	Yes	Diffusion tube	**43.3**	83 (Jul-Dec)
57	Quayside 10	Kerbside	No	Diffusion tube	**50.4**	100
58	Quayside 9	Kerbside	No	Diffusion tube	**42.3**	100
59	Quayside 8	Kerbside	No	Diffusion tube	**47.0**	100
60	Quayside 7	Kerbside	No	Diffusion tube	**49.2**	100
61	Quayside 6	Kerbside	No	Diffusion tube	**55.5**	92
62	Quayside 5	Roadside	Yes	Diffusion tube	**43.9**	100
63	Quayside 4	Roadside	Yes	Diffusion tube	**43.4**	100
64	Quayside 3	Roadside	Yes	Diffusion tube	**47.5**	100
65	Quayside 2	Roadside	Yes	Diffusion tube	**52.2**	100
66	Quayside 1	Roadside	Yes	Diffusion tube	**64.5**	100
January to August 2004 measured adjusted to 2003						
54	Quayside 13	Intermediate	Yes	Diffusion tube	**45.0**	88
55	Quayside 12	Roadside	Yes	Diffusion tube	**43.0**	100
56	Quayside 11	Roadside	Yes	Diffusion tube	**49.7**	100
57	Quayside 10	Kerbside	No	Diffusion tube	**55.5**	100
58	Quayside 9	Kerbside	No	Diffusion tube	**54.4**	100
59	Quayside 8	Kerbside	No	Diffusion tube	**52.4**	100
60	Quayside 7	Kerbside	No	Diffusion tube	**59.6**	100
61	Quayside 6	Kerbside	No	Diffusion tube	**67.9**	100
62	Quayside 5	Roadside	Yes	Diffusion tube	**55.0**	100
63	Quayside 4	Roadside	Yes	Diffusion tube	**55.7**	100
64	Quayside 3	Roadside	Yes	Diffusion tube	**60.8**	100
65	Quayside 2	Roadside	Yes	Diffusion tube	**62.5**	88
66	Quayside 1	Roadside	Yes	Diffusion tube	**79.2**	63

Table 8 Contd.

2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
54	Quayside 13	Intermediate	Yes	Diffusion tube	**40.1 (42.7)**	N/A
55	Quayside 12	Roadside	Yes	Diffusion tube	**42.3 (40.7)**	N/A
56	Quayside 11	Roadside	Yes	Diffusion tube	**41.1 (47.1)**	N/A
57	Quayside 10	Kerbside	No	Diffusion tube	**47.8 (52.6)**	N/A
58	Quayside 9	Kerbside	No	Diffusion tube	**40.1 (51.5)**	N/A
59	Quayside 8	Kerbside	No	Diffusion tube	**44.5 (49.7)**	N/A
60	Quayside 7	Kerbside	No	Diffusion tube	**46.7 (56.5)**	N/A
61	Quayside 6	Kerbside	No	Diffusion tube	**52.6 (64.3)**	N/A
62	Quayside 5	Roadside	Yes	Diffusion tube	**41.7 (52.1)**	N/A
63	Quayside 4	Roadside	Yes	Diffusion tube	**41.2 (52.8)**	N/A
64	Quayside 3	Roadside	Yes	Diffusion tube	**45.0 (57.6)**	N/A
65	Quayside 2	Roadside	Yes	Diffusion tube	**49.5 (59.2)**	N/A
66	Quayside 1	Roadside	Yes	Diffusion tube	**61.1 (75.0)**	N/A
Objective = 40 $\mu g/m^3$ in 2005						

Swan House Roundabout, Percy Street and City Centre

3.18 Monitoring data presented in the USA, indicated that there could be potential exceedences of the 24-hour PM_{10} objective at the Swan House Roundabout, Percy Street and other City Centre locations. These potential exceedences were based on adjusting short-term monitoring data to an annual mean based on comparison with data from other sites. Monitoring data for the area, collected since the USA, are presented in Table 9 for the sites shown in Figure 1M. The monitoring results from the St Mary's Place site indicate that both statutory objectives are being achieved at urban background locations in the city centre.

3.19 A much longer period of monitoring is now available for the Percy Street site. The monitor is located at the roadside in Percy Street, which is a busy congested street, representative of a worst-case location in the city centre. The results for 2003 and 2004 indicate that both the annual mean and 24-hour PM_{10} objectives are being achieved at this worst-case location. Therefore it is not considered necessary to declare an AQMA for PM_{10} in the city centre.

3.20 The monitoring data for Swan House presented in the USA were collected when demolition work was being carried out adjacent to the site. Monitoring is no longer carried out at this site. However, demolition and construction work is now complete in this area and therefore it is unlikely that the PM_{10} objectives will be exceeded at this location.

Table 9 PM_{10} Monitoring Data – City Centre

Site	Site type	Monitor type	Annual mean concentration (µg/m^3)	Days > 50 µg/m^3	Data capture (%)
2003					
Percy Street	Roadside	TEOM	28.2	10	97.4
AURN St Mary's Place	Urban background	TEOM	20.2	8	96.2
January to August 2004 measured adjusted to 2003					
Percy Street	Roadside	TEOM	28.4	22	N/A
AURN St Mary's Place	Urban background	TEOM	20.1	4	N/A
January to August 2004 measured					
Percy Street	Roadside	TEOM	23	0	97.3
AURN St Mary's Place	Urban background	TEOM	16.3	0	96
Objective for 2004			**40**	**35**	
Provisional objective for 2010			**20**	**7**	

All data are reported as TEOM x1.3

Conclusions

3.21 The conclusions of these Detailed Assessments for Newcastle are summarised in Table 10. Additional AQMAs will be declared for Quayside, Jesmond Road, Blue House and Jesmond Dene Road.

Table 10 Conclusions of Detailed Assessments for Newcastle City Council

Pollutant	Location	Conclusion
Nitrogen dioxide	A1058 Jesmond Road,	AQMA to be declared
	A189 Haddricks Mill/Station Road junction,	AQMA not required
	Blue House Roundabout/Great North Road junction	AQMA to be declared
	A186 Westgate Road/Blenheim Street	AQMA not required
	Quayside	AQMA to be declared
PM_{10}	A1058 Jesmond Road	AQMA not required
	Swan House Roundabout	AQMA not required
	Percy Street	AQMA not required
	City Centre	AQMA not required

4 Gateshead

Locations to be considered in the Detailed Assessments

4.1 The conclusions of the Gateshead USA, which was completed in May 2003, are summarised in Table 11. It was concluded that the objectives for carbon monoxide, lead, benzene, 1,3-butadiene, sulphur dioxide and PM_{10} would all be achieved at relevant locations. However, a Detailed Assessment would be required for each of the busy junctions where potential exceedences of the annual mean nitrogen dioxide objectives were identified.

4.2 Monitoring data that have become available since the USA indicate that there may be a risk of the annual mean nitrogen dioxide objective being exceeded at relevant locations near to the A1 at Dunston and A184 Askew Road (Melbourne Court). Therefore these locations are also considered in the Detailed Assessments.

Table 11 Locations considered in the Gateshead Detailed Assessments

Pollutant	Conclusion
Conclusions of USA	
Carbon monoxide	DA not required
Benzene	DA not required
Lead	DA not required
1,3 –butadiene	DA not required
Sulphur dioxide	DA not required
Nitrogen dioxide	DA required - Trinity Court (A184/A167), - Regent Street/West Street
PM_{10}	DA not required
Additional locations identified since USA	
Nitrogen dioxide	DA required based on monitoring - A1 Dunston - Melbourne Court (A184 Askew Road)

Detailed Assessments

Trinity Court (A184/A167) and Regent Street/West Street

4.3 DMRB modelling data in the USA identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 12 for the sites identified in Figure 2A. The monitoring results indicate that there is a risk of the objective being exceeded in 2005 at diffusion tube location 42. This is attached to the property in Trinity Court that is closest to the roundabout and it is representative of relevant exposure. Monitoring at relevant locations further from the roundabout indicate that the area of exceedence may be small and confined to a few properties in Trinity Court.

Table 12 Nitrogen Dioxide Monitoring Data – Trinity Court (A184/A167)

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration ($\mu g/m^3$)	Data capture (%)
2003 Measured						
TC	Trinity Court	Roadside	Yes	Chemi-luminesence	N/A	N/A
2	Priory Court	Roadside	Yes	Diffusion Tube	37.6	100
42	Trinity Court	Roadside	Yes	Diffusion Tube	**44.7**	100 (June-Dec)
43	Regent Court	Roadside	Yes	Diffusion Tube	32.9	100 (June-Dec)
January to August 2004 measured adjusted to 2003						
TC	Trinity Court	Roadside	Yes	Chemi-luminesence	36.1	99.7 (Mar-Sept)
2	Priory Court	Roadside	Yes	Diffusion Tube	**40.5**	100
42	Trinity Court	Roadside	Yes	Diffusion Tube	**50.2**	100
43	Regent Court	Roadside	Yes	Diffusion Tube	38.5	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
TC	Trinity Court	Roadside	Yes	Chemi-luminesence	N/A (34.2)	N/A
2	Priory Court	Roadside	Yes	Diffusion Tube	35.6 (38.4)	N/A
42	Trinity Court	Roadside	Yes	Diffusion Tube	**42.4 (47.6)**	N/A
43	Regent Court	Roadside	Yes	Diffusion Tube	31.2 (36.5)	N/A
Objective = 40 $\mu g/m^3$ in 2005						

4.4 Concentrations of nitrogen dioxide have been modelled alongside the A184/A167 junction using ADMS-Roads (for further information on model input and verification see the Methodology section). The model results which are presented in Figure 2B, suggest that there are no potential exceedences of the annual mean nitrogen dioxide objective, at relevant locations. Although the model results show good agreement with the monitoring at locations 2, 43 and TC, at diffusion tube location 42, which is attached the property in Trinity Court closest to the junction, the model is under-predicting concentrations (further comparison of modelled with measured concentrations presented in Appendix 12). The measured data at this location indicate that the objective will be exceeded at this property, whereas the model suggests concentrations well below the objective. It is possible, that this under-prediction is due to uncertainties in the traffic data, which have been estimated for the nearby road at this location.

4.5 Based on monitored and modelled results, an AQMA will be declared, which as a minimum, will include Trinity Court and Peareth Court, which are the residential properties to the south west and north west of the junction.

Melbourne Court (A184 Askew Road)

4.6 Melbourne Court which is situated near to the A184 Askew Road was not identified in the USA as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. However, monitoring data from a kerbside location (Askew Road) carried out in 2003/4 indicated that there may be potential exceedences of the objective, therefore it has been included in this Detailed Assessment. Monitoring data for the area are presented in Table 13 and Figure 2C. The monitoring results indicate that, although concentrations at relevant locations are elevated, due to traffic emissions, it is unlikely that the objective will be exceeded at relevant locations in 2005.

4.7 Although monitoring data indicate that the nitrogen dioxide objective is likely to be achieved, concentrations have been modelled alongside the A184 Askew Road using ADMS-Roads as part of the model verification exercise (for further information on model input and verification see the Methodology section). The results, which show good agreement with the measured concentrations, are shown in Figure 2D (further comparison of modelled with measured concentrations presented in Appendix 12).

4.8 The model results confirm the findings of the monitoring data, that the annual mean objective is expected to be achieved at relevant locations in the area. Therefore an AQMA is not required at this location.

Table 13 Nitrogen Dioxide Monitoring Data – Melbourne Court

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (μg/m^3)	Data capture (%)
2003 Measured						
AR	Askew Road	Kerbside	No	Chemi-luminesence	**59.9**	95 (Oct 02-Sept 03)
MC	Melbourne Court	Roadside	Yes	Chemi-luminesence	33.9	91 (Nov 03 – Sept 04)
3	Melbourne Court	Roadside	No	Diffusion tube	**41.8**	92
37, 38, 39	Melbourne Court	Roadside	Yes	Diffusion tube	36.9	100 (Mar-Dec)
44	Adelaide Court	Roadside	Yes	Diffusion tube	29.3	86 (Jun-Dec)
45	Brisbane Court	Roadside	Yes	Diffusion tube	37.4	(Oct-Dec)
January to August 2004 measured adjusted to 2003						
AR	Askew Road	Kerbside	No	Chemi-luminesence	N/A	N/A
MC	Melbourne Court	Roadside	Yes	Chemi-luminesence	N/A	N/A
3	Melbourne Court	Roadside	No	Diffusion tube	38.2	63
37, 38, 39	Melbourne Court	Roadside	Yes	Diffusion tube	**40.4**	100
44	Adelaide Court	Roadside	Yes	Diffusion tube	30.7	88
45	Brisbane Court	Roadside	Yes	Diffusion tube	35.4	88
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
AR	Askew Road	Kerbside	No	Chemi-luminesence	**56.8**	N/A
MC	Melbourne Court	Roadside	Yes	Chemi-luminesence	32.1	N/A
3	Melbourne Court	Roadside	No	Diffusion tube	39.6 (36.2)	N/A
37, 38, 39	Melbourne Court	Roadside	Yes	Diffusion tube	34.9 (38.3)	N/A
44	Adelaide Court	Roadside	Yes	Diffusion tube	27.8 (29.1)	N/A
45	Brisbane Court	Roadside	Yes	Diffusion tube	35.4 (33.6)	N/A
Objective = 40 μg/m^3 in 2005						

A1 Dunston

4.9 The A1 near Dunston was not identified in the USA as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. However, monitoring data from a roadside location operated in 2004 indicated that there may be potential exceedences of the objective, therefore it has been included in the Detailed Assessment. Monitoring data for the area are presented in Table 14 for the sites identified in Figure 2E. Measured data for 2004 appear to be significantly higher than those for 2003. The reason for the much higher levels in

2004, when adjusted to 2003, is unclear. The predicted concentration in 2005 at the roadside monitoring site, based on the 2004 result is 40.5 µg/m^3 (i.e. marginally above the objective). However, the monitor is approximately 8 m closer to the road than any houses in the area indicating that objective is likely to be achieved at relevant locations in the area.

Table 14 Nitrogen Dioxide Monitoring Data – A1 Dunston

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
A1	A1 Dunston	Roadside	No	Chemi-luminesence	30.0	95.1
14	Park Terrace	Roadside	No	Diffusion tube	33.7	100
35, 40, 41	A1 Dunston	Roadside	No	Diffusion tube	33.0	100 (Mar-Dec)
January to August 2004 measured adjusted to 2003						
A1	A1 Dunston	Roadside	No	Chemi-luminesence	**42.8**	83 (Jan-Dec 04)
14	Park Terrace	Roadside	No	Diffusion tube	**40.9**	100
35, 40, 41	A1 Dunston	Roadside	No	Diffusion tube	**40.8**	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
A1	A1 Dunston	Roadside	No	Chemi-luminesence	28.5 (**40.5**)	N/A
14	Park Terrace	Roadside	No	Diffusion tube	31.9 (38.5)	N/A
35, 40, 41	A1 Dunston	Roadside	No	Diffusion tube	31.3 (38.8)	N/A
Objective = 40 µg/m^3 in 2005						

4.10 Concentrations of nitrogen dioxide have been modelled alongside the A1 at Dunston using ADMS-Roads (for further information on model input and verification see the Methodology section). The model does not have the capacity to model the full complexity of this type of location, where the motorway is in a cutting below the level of the receptors and the slip roads. To account for this difference, the model has been verified against local monitoring data, rather than the regional verification carried out for other locations in this assessment. As there are large differences in measured data for 2003 and 2004, local verification has been carried out using the 2004 data, adjusted to 2003, as this represents a worst case scenario. The model results with the local verification carried out are presented in Figure 2F (further comparison of modelled with measured concentrations presented in Appendix 12). The results presented in Figure 2F suggest that the annual mean nitrogen dioxide objective will be achieved at all relevant locations.

4.11 Based on the monitoring and modelled data, there is no requirement to declare an AQMA. However, due to uncertainties in the measurement and modelling results, the results of monitoring in the area will be kept under careful review.

Conclusions

4.12 The conclusions of these Detailed Assessments for Gateshead are summarised in Table 15. An AQMA will be required for Trinity Court.

Table 15 Conclusions of Detailed Assessments for Gateshead Council

Pollutant	Location	Conclusion
Nitrogen dioxide	Trinity Court (A184/A167)	AQMA required
	Regent Street/West Street	AQMA not required
	Melbourne Court (A184 Askew Road)	AQMA not required
	A1 Dunston	AQMA not required

5 Sunderland

Locations to be considered in the Detailed Assessments

5.1 The conclusions of the Sunderland USA, which was completed in 2003, are summarised in Table 16. It was concluded that the objectives for carbon monoxide, lead, benzene, 1,3-butadiene, sulphur dioxide and PM_{10} would all be achieved at relevant locations. However, DMRB model results indicated that there are busy junctions where potential exceedences of the annual mean nitrogen dioxide objectives could occur and thus Detailed Assessments would be required.

5.2 Since completion of the USA, plans have been put forward for the redevelopment of a large area of land between St Mary's Way and the River Wear. This development could introduce relevant receptors near to a busy road and therefore this area is also taken into consideration in the Detailed Assessments.

Table 16 Locations considered in the Sunderland Detailed Assessments

Pollutant	Conclusion
Conclusions of USA	
Carbon monoxide	DA not required
Benzene	DA not required
Lead	DA not required
1,3 –butadiene	DA not required
Sulphur dioxide	DA not required
Nitrogen dioxide	DA required - Stockton Road/Mary Street Junction - Trimdon Street Roundabout - Chester Road/Ormonde Street
PM_{10}	DA not required
Additional locations identified since USA	
Nitrogen dioxide	DA required because potential introduction of relevant locations - St Mary's Way

Detailed Assessments

Stockton Road/Mary Street Junction

5.3 Stockton Road/Mary Street junction is located in a predominantly commercial area near to the Stockton Road/St Michaels Way roundabout in Sunderland City Centre, near to the bus station. It is the closest permanent residence to the roundabout and surrounded on two sides by roads carrying predominantly buses and HGVs. DMRB modelling data in the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 17 for the sites identified in Figure 3A. The monitoring results indicate that there is a risk of a very marginal exceedence of the objective at a relevant location adjacent to the Stockton Road/Mary Street junction. However, this is based on a worst-case interpretation of the January to September 2004 data (i.e. adjusted to approximate a 2003 annual mean). The full 12 months monitoring for 2003 (which was generally higher than previous years) indicate that the objective will be achieved at this location. A continuous monitor has recently been installed at the junction of Stockton Road and Mary Street. At the present time, only a short-period of data is available, however this is presented in Table 17 to provide an indication of concentrations at this location.

5.4 Concentrations of nitrogen dioxide have been modelled in the Stockton Road/Mary Street area using ADMS-Roads (for further information on model input and verification see the Methodology section). The initial model results, with the regional verification and adjustment applied, were significantly higher than those measured in the area. This is probably due an inaccuracy in the emission factors used, where the heavy duty vehicle emission factor was applied to the high number of buses, which on some roads are 100% of the traffic flow. Therefore local verification and adjustment was carried out for this location. Further details are provided in Appendix 9. The model results are shown in Figure 3B (further comparison of adjusted modelled with measured concentrations presented in Appendix 12). These indicate that concentrations of the nitrogen dioxide are likely to be well below 40 $\mu g/m^3$ in the vicinity of the Stockton Road/Mary Street junction .

5.5 Based on the monitoring and modelled data, there is no requirement to declare an AQMA. However, due to uncertainties in the measurement and modelling results, the results of the continuous monitoring being carried out adjacent to the Stockton Road/Mary Street junction will be kept under careful review.

Table 17 Nitrogen Dioxide Monitoring Data –Stockton Road/Mary Street junction

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
94	Stockton Road/Mary Street	Roadside	Yes	Diffusion tube	**40.7**	100
116	Derwent Street	Roadside	Yes	Diffusion tube	27.8	100 (Apr-Dec)
117	Holmside next to Savannah	Roadside	No	Diffusion tube	**41.0**	100 (Apr-Dec)
86	Alice Street	Roadside	Yes	Diffusion tube	23.5	100
January to August 2004 measured adjusted to 2003						
94	Stockton Road/Mary Street	Roadside	Yes	Diffusion tube	**42.7**	88
116	Derwent Street	Roadside	Yes	Diffusion tube	30.4	100
117	Holmside next to Savannah	Roadside	No	Diffusion tube	**46.3**	88
86	Alice Street	Roadside	Yes	Diffusion tube	26.0	88
16th November 2004 to 4th January 2005 measured adjusted to 2003						
CH	Stockton Road/Mary Street	Roadside	Yes	Chemiluminesence	37.2	98
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
94	Stockton Road/Mary Street	Roadside	Yes	Diffusion tube	38.6 **(40.5)**	N/A
116	Derwent Street	Roadside	Yes	Diffusion tube	26.4 (28.8)	N/A
117	Holmside next to Savannah	Roadside	No	Diffusion tube	38.9 **(43.9)**	N/A
86	Alice Street	Roadside	Yes	Diffusion tube	22.3 (24.6)	N/A
CH	Stockton Road/Mary Street	Roadside	Yes	Chemiluminesence	N/A (35.3)	N/A
Objective = 40 µg/m^3 in 2005						

Trimdon Street Roundabout

5.6 DMRB modelling data in the USA, identified the Trimdon Street Roundabout as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 18 for the sites identified in Figure 3c. The diffusion tube monitoring results indicate that there is a risk of an exceedence of the objective at this kerbside location, however this is not reflected in the automatic monitoring results (tubes 100, 103 and 104 are located adjacent to the inlet for the continuous monitor). The worst-case relevant exposure in this area is 8m further from the road than the kerbside monitors and it is likely that based on the automatic monitoring the objective will be achieved at relevant locations in the vicinity of the automatic monitor. However, there are no monitoring data available from Trimdon Street, which has buildings near to the kerb on either side and could be described as 'canyon-like'.

Table 18 Nitrogen Dioxide Monitoring Data – Trimdon Street Roundabout

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
TS	Trimdon Street	Kerbside	No	Chemi-luminesence	**N/A**	N/A
100, 103, 104	Trimdon Street (as TS)	Kerbside	No	Diffusion tube	**42.6**	100
January to August 2004 measured adjusted to 2003						
TS	Trimdon Street	Kerbside	No	Chemi-luminesence	36	Feb-Jul
100, 103, 104	Trimdon Street (as TS)	Kerbside	No	Diffusion tube	**42.7**	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
TS	Trimdon Street	Kerbside	No	Chemi-luminesence	N/A (34)	N/A
100, 103, 104	Trimdon Street (as TS)	Kerbside	No	Diffusion tube	**40.4** (**40.5**)	N/A
Objective = 40 µg/m^3 in 2005						

5.7 Concentrations of nitrogen dioxide have been modelled in the Trimdon Street Roundabout area using ADMS-Roads as part of the model verification exercise (for further information on model input and verification see the Methodology section). The model results show a reasonable agreement with the measured values and are presented in Figure 3D (further comparison of modelled with measured concentrations presented in Appendix 12). These indicate that the objective is not likely to be achieved at the façade of one building on Trimdon Street, closest to the roundabout, and locations near to Silksworth Row. There is relevant exposure above shops at both of these locations**.**

5.8 Based on the modelled data, an AQMA is required at this location. As a minimum, this will cover, any relevant locations that fall within the modelled 40 µg/m^3 contour. Additional monitoring will be carried out, using diffusion tubes, near to the façade of residential buildings within the modelled 40 µg/m^3 contour.

Chester Road/Ormonde Street

5.9 DMRB modelling data in the USA, identified the Chester Road/Ormonde Street junction as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 19 for the sites identified in Figure 3E. The monitoring results indicate that the objective will be achieved at diffusion tube monitoring site 123, however this monitor is not representative of worst-case exposure. A continuous monitor

has been installed at a roadside location adjacent to a residential property in Ormonde Street, however due to power supply problems, only a short period of data is available.

5.10 Concentrations of nitrogen dioxide have been modelled near to the Chester Road/Ormond Street junction using ADMS-Roads (for further information on model input and verification see the Methodology section). The model results show good agreement with the measured values and are presented in Figure 3F (further comparison of modelled with measured concentrations presented in Appendix 12). These indicate that exceedences of the nitrogen dioxide objective are likely at a few properties close to the junction.

5.11 Based on the monitoring and the modelled data, an AQMA will be declared. As a minimum, this will cover, any relevant locations that fall within the modelled 40 $\mu g/m^3$ contour.

Table 19 Nitrogen Dioxide Monitoring Data – Chester Road/Ormonde

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration ($\mu g/m^3$)	Data capture (%)
2003 Measured						
123	163 Chester Road	Roadside	Yes – not worst-case	Diffusion tube	N/A	N/A
January to August 2004 measured adjusted to 2003						
123	163 Chester Road	Roadside	Yes – not worst-case	Diffusion tube	39.0	100 (Apr-Sept)
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
123	163 Chester Road	Roadside	Yes – not worst-case	Diffusion tube	N/A (37.0)	N/A
Objective = 40 $\mu g/m^3$ in 2005						

St Mary's Way

5.12 St Mary's Way was not identified in the USA as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective at relevant locations. However, there are plans to redevelop the area north of St Mary's Way, which is currently vacant. This could introduce new relevant receptors into the area and possibly create a 'canyon' effect along St Mary's Way, leading to a possible increase in concentrations at existing residential locations to the south. Monitoring data for the area are presented in Table 20 for the sites identified in Figure 3H. The monitoring results indicate that the objectives are currently expected to be achieved by a reasonable margin at existing building facades. At the present time it is not

possible to assess the impact of the newly created 'canyon' effect or the effect on the proposed residential properties. However, plans for development will be kept under review.

Table 20 Nitrogen Dioxide Monitoring Data – St Mary's Way

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
29	Arndale House, St Mary's Way	Intermediate	Not at present	Diffusion tube	33.6	100
118	27 Bridge Street	Roadside	Yes	Diffusion tube	29.5	100
January to August 2004 measured adjusted to 2003						
29	Arndale House, St Mary's Way	Intermediate	Not at present	Diffusion tube	31.1	75
118	27 Bridge Street	Roadside	Yes	Diffusion tube	34.3	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
29	Arndale House, St Mary's Way	Intermediate	Not at present	Diffusion tube	31.9 (29.5)	N/A
118	27 Bridge Street	Roadside	Yes	Diffusion tube	28.0 (32.5)	N/A
Objective = 40 µg/m^3 in 2005						

Conclusions

5.13 The conclusions of the Detailed Assessments for Sunderland are summarised in Table 21. AQMAs are required for Trimdon Street roundabout and the Chester Road/Ormonde Street junction.

Table 21 Conclusions of Detailed Assessments for Sunderland Council

Pollutant	Location	Conclusion
Nitrogen dioxide	Stockton Road/Mary Street	AQMA not required
	Trimdon Street Roundabout	AQMA required
	Chester Road/Ormonde Street	AQMA required
	St Mary's Way	Future proposals for area to be kept under review.

6 North Tyneside

Locations to be considered in the Detailed Assessments

6.1 The conclusions of the North Tyneside USA, which was completed in May 2003, are summarised in Table 22. It was concluded that the objectives for carbon monoxide, lead, benzene, 1,3-butadiene and sulphur dioxide would all be achieved at relevant locations. However, monitoring and DMRB model results indicated that potential exceedences of the annual mean nitrogen dioxide objectives could occur at Wallsend High Street and Billly Mill Roundabout and thus Detailed Assessments would be required. An industrial source of PM_{10} in the Willington Quay area had led to numerous complaints about dust and smoke. It was therefore concluded that a Detailed Assessment was required for PM_{10} in this area.

Table 22 Locations considered in the North Tyneside Detailed Assessments

Pollutant	Conclusion
Conclusions of USA	
Carbon monoxide	DA not required
Benzene	DA not required
Lead	DA not required
1,3 –butadiene	DA not required
Sulphur dioxide	DA not required
Nitrogen dioxide	DA required - Wallsend High Street - Billy Mill Roundabout
PM_{10}	DA required – Willington Quay/Tyne Tunnel

Detailed Assessments

Wallsend High Street

6.2 Diffusion tube monitoring and DMRB modelling data in the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 23 for the sites identified in Figure 4A. The monitoring results from diffusion tube W1 indicate that the objective may be exceeded at roadside locations

in the 'canyon like' section of Wallsend High Street. However, this tube is located near to the automatic analyser, which has measured much lower concentrations. The data from the automatic analyser can be taken to be more accurate than the diffusion tube data, indicating that the objective will actually be achieved at this location. The data for diffusion tube site W3 indicate that there could be a very slight exceedence of the objective at this kerbside location.

Table 23 Nitrogen Dioxide Monitoring Data – Wallsend High Street

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration ($\mu g/m^3$)	Data capture (%)
2003 Measured						
W1	High St West	Roadside	Yes	Diffusion tube	**44.4**	92
W3	Station Rd /High St East	Kerbside	No	Diffusion tube	38.4	83
W4	Park Road /High St East	Roadside	Yes	Diffusion tube	**40.7**	100
W11	Pollution Station High St West	Roadside	Yes	Diffusion tube	27.4	92
January to August 2004 measured adjusted to 2003						
STW	Wallsend High St	Roadside	Yes	Chemi-luminesence	34.9	99 (Apr – Oct)
W1	High St West	Roadside	Yes	Diffusion tube	**49.3**	67
W3	Station Rd /High St East	Kerbside	No	Diffusion tube	**42.8**	100
W4	Park Road /High St East	Roadside	Yes	Diffusion tube	33.6	78
W11	Pollution Station High St West	Roadside	Yes	Diffusion tube	26.3	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
STW	Wallsend High St	Roadside	Yes	Chemi-luminesence	N/A (33.0)	N/A
W1	High St West	Roadside	Yes	Diffusion tube	**42.1 (46.8)**	N/A
W3	Station Rd /High St East	Kerbside	No	Diffusion tube	36.4 (**40.5**)	N/A
W4	Park Road /High St East	Roadside	Yes	Diffusion tube	38.6 (31.8)	N/A
W11	Pollution Station High St West	Roadside	Yes	Diffusion tube	26.0 (24.9)	N/A
Objective = 40 $\mu g/m^3$ in 2005						

6.3 Concentrations of nitrogen dioxide have been modelled alongside Wallsend High Street using ADMS-Roads (for further information on model input and verification see the Methodology section). The model results show reasonable agreement with the measured values and are presented in Figure 4B (further comparison of modelled with measured concentrations presented

in Appendix 12). These confirm the findings of the automatic monitoring that the annual mean nitrogen dioxide objective is not likely to be exceeded alongside the 'canyon' section of Wallsend High Street. The model results also fit well with the monitoring at the junction of Station Road with High Street, which suggest concentrations only marginally below the objective at the building façade. However, there is no relevant exposure at the buildings included in the 38 / 40 µg/m^3 contour.

6.4 Based on modelled and monitored data, an AQMA is not required. However, monitoring will continue, including a location on Station Road close to residential premises representative of relevant exposure.

Billy Mill Roundabout

6.5 DMRB modelling data in the USA, identified the Billy Mill Roundabout as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 23 and Figure 4C. The monitoring results indicate that there could be a slight exceedence of the objective at the kerbside on the roundabout, however, the objective is unlikely to be exceeded at relevant locations.

Table 23 Nitrogen Dioxide Monitoring Data – Billy Mill Roundabout

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
BM	Billy Mill	Roadside	Yes	Chemi-luminesence	17.3	100 (Mar 00 – Aug 00)[a]
NS8	Rbout between Beach Rd and Queen Alexandra Rd	Kerbside	No	Diffusion tube	**42.9**	100 (Jul-Dec)
January to August 2004 measured adjusted to 2003						
NS8	Rbout between Beach Rd and Queen Alexandra Rd	Kerbside	No	Diffusion tube	**43.2**	78
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
BM	Billy Mill	Roadside	Yes	Chemi-luminesence	16.4	N/A
NS8	Rbout between Beach Rd and Queen Alexandra Rd	Kerbside	No	Diffusion tube	**40.7 (40.9)**	N/A
Objective = 40 µg/m^3 in 2005						

[a] Not adjusted to 2003.

6.6 Concentrations of nitrogen dioxide have been modelled in the Billy Mill Roundabout area using ADMS-Roads (for further information on model input and verification see the Methodology section). The model results, which are slightly higher than those measured at the kerbside, are presented in Figure 4D (further comparison of modelled with measured concentrations presented in Appendix 12). These indicate that the annual mean nitrogen dioxide objective is likely to be achieved at relevant locations near to Billy Mill roundabout. However, there are residential properties within the modelled 38 $\mu g/m^3$ contour in Regent Terrace and Lynn Road.

6.7 Based on modelled and monitored data, an AQMA is not required. However, monitoring will continue. Consideration will be given to moving diffusion tubes to locations that are more representative of relevant exposure, in Regent Terrace and Lynn Road.

Willington Quay/Tyne Tunnel

6.8 A number of industrial processes, including a wood chip manufacturer, a fixed stone crusher and screen, and the Tyne Tunnel entrance and ventilation shaft are located in the Willington Quay area. A number of complaints have been received from local residents in the past about dust problems in the area and this led to the decision to carry out a Detailed Assessment of PM_{10}. A PM_{10} monitor has now been installed to the south west of the Tyne Tunnel Ventilation Shaft (Figure 4E). The results in Table 24 show that both the annual mean and 24-hour PM_{10} objectives are likely to be achieved. From investigation of complaints, the main source of the dust was found to be the 'Just Wood' wood-chip manufacturing site. This process has now ceased operation on the site, and no further complaints about dust have been received. As the major source of dust emissions has now been removed from the site and monitoring data indicate that current levels are below the air quality objectives, an AQMA is not required at this location.

6.9 As part of the planning application for a new Tyne Crossing, an Environmental Statement[9] has been prepared. The conclusions of this were that in the vicinity of the portals, air quality would improve due to reduced congestion. At locations near to roads leading to the crossings pollutant concentrations were predicted to remain the same or increase slightly. However, at all relevant locations the air quality objectives were expected to be achieved, both with and without the scheme.

Table 24 PM_{10} monitoring data – Willington Quay/Tyne Tunnel

Site	Site type	Monitor type	Annual mean concentration (µg/m^3)	Days > 50 µg/m^3	Data capture (%)
2003					
Tyne Tunnel nr Ventilation shaft	Urban background	Beta gauge – heated inlet[a]	30.5	14	97.2 (Apr 03 – Mar 03)
2004 Projected from 2003					
Tyne Tunnel nr Ventilation shaft	Urban background	Beta gauge – heated inlet[a]	30.0	27[b]	
Objective for 2004			**40**	**35**	
Provisional objective for 2010			**20**	**7**	

[a] Results from beta gauge multiplied by 1.3 to estimate gravimetric equivalent.
[b] Number of days estimated from annual mean.

Conclusions

6.10 The conclusions of these Detailed Assessments for North Tyneside are summarised in Table 25. No AQMAs are required, although monitoring should continue at relevant locations in the areas covered in this assessment.

Table 25 Conclusions of Detailed Assessments for North Tyneside Council

Pollutant	Location	Conclusion
Nitrogen dioxide	Wallsend High Street	AQMA not required
	Billy Mill Roundabout	AQMA not required
PM_{10}	Willington Quay/Tyne Tunnel	AQMA not required

7 South Tyneside

Locations to be considered in the Detailed Assessments

7.1 The conclusions of the South Tyneside USA, which was completed in 2003, are summarised in Table 26. It was concluded that the objectives for carbon monoxide, lead, 1,3-butadiene, PM_{10} and sulphur dioxide would all be achieved at relevant locations. However, diffusion tube monitoring results indicated potential exceedences of the annual mean nitrogen dioxide objective thus Detailed Assessments would be required. A fuel storage depot was identified as having sufficient petrol throughput to require a Detailed Assessment for benzene.

7.2 Since publication of the USA a number of additional diffusion tube monitoring sites have been installed. Examination of the data from these sites highlights some additional areas where there could be a risk of an exceedence of the annual mean nitrogen dioxide objective. Therefore these are also covered in the Detailed Assessments.

Table 26 Locations considered in the South Tyneside Detailed Assessments

Pollutant	Conclusion
Conclusions of USA	
Carbon monoxide	DA not required
Benzene	DA required – fuel storage depot Priory Road, Jarrow
Lead	DA not required
1,3 –butadiene	DA not required
Sulphur dioxide	DA not required
Nitrogen dioxide	DA required - Dean Road, South Shields
PM_{10}	DA not required
Additional locations identified since USA	
Nitrogen dioxide	- Boldon Lane/Stanhope Road - A194 Leam Lane between John Reid Road and Lindisfarne Roundabout - Fowler Street

Detailed Assessments

Dean Road, South Shields

7.3 A very precautionary approach to diffusion tube bias was used in the Updating and Screening Assessment. Using this approach diffusion tube monitoring, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data, adjusted using a more realistic approach, are presented in Table 27 for the sites identified in Figure 5A. The monitoring results indicate that the objective is expected to be achieved at this location and therefore an AQMA is not required.

Table 27 Nitrogen Dioxide Monitoring Data – Dean Road, South Shields

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration ($\mu g/m^3$)	Data capture (%)
2003 Measured						
37	Dean Rd	Roadside	Yes	Diffusion tube	30.0	100
63	Dean Rd Roundabout	Roadside	Yes	Diffusion tube	N/A	N/A
January to August 2004 measured adjusted to 2003						
37	Dean Road	Roadside	Yes	Diffusion tube	33.9	71
63	Dean Rd Roundabout	Roadside	Yes	Diffusion tube	34.1	57
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
37	Dean Road	Roadside	Yes	Diffusion tube	28.5 (32.1)	N/A
63	Dean Rd Roundabout	Roadside	Yes	Diffusion tube	N/A (32.3)	N/A
Objective = 40 $\mu g/m^3$ in 2005						

Boldon Lane/Stanhope Road

7.4 Diffusion tube monitoring carried out since the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 28 for the sites identified in Figure 5B. The monitoring results indicate that it is likely that the objective will be exceeded at kerbside locations on Boldon Lane. Relevant exposure is located above shops, which are approximately 2m further from the kerb than the monitoring sites.

Table 28 Nitrogen Dioxide Monitoring Data – Bolden Lane/Stanhope Road

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
38	Boldon Ln	Kerbside	No, exposure approx 2m further from kerb	Diffusion tube	34.9	100
64	Boldon Ln, opp Winskells	Kerbside	Yes	Diffusion tube	N/A	N/A
January to August 2004 measured adjusted to 2003						
38, 60	Boldon Ln	Kerbside	No, exposure approx 2m further from kerb	Diffusion tube	**46.4**	100
64	Boldon Ln, opp Winskells	Kerbside	Yes	Diffusion tube	**49.6**	86
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
38, 60	Boldon Ln	Kerbside	No, exposure approx 2m further from kerb	Diffusion tube	33.1 (**44.0**)	Tube 60 not available for 2003
64	Boldon Ln, opp Winskells	Kerbside	Yes	Diffusion tube	N/A (**47.0**)	N/A
Objective = 40 µg/m^3 in 2005						

7.5 Concentrations of nitrogen dioxide have been modelled at the Boldon Lane/Stanhope Road and Boldon Lane/Harton Lane junctions using ADMS-Roads (for further information on model input and verification see the Methodology section). The model results, which show reasonable agreement with the measured values, are presented in Figures 5C and 5D (further comparison of modelled with measured concentrations presented in Appendix 12). These indicate that the annual mean nitrogen dioxide objective is likely to be exceeded at building facades near to the road along Boldon Lane, and Stanhope Road and Harton Lane, near to the junctions with Boldon Lane.

7.6 Based on the monitoring and modelled data, an AQMA will be declared. As a minimum this will cover, any relevant locations that fall within the modelled 40 µg/m^3 contour. Additional work to determine the magnitude and extent of exceedences will be carried out in the Further Assessment to be carried out once an AQMA has been declared.

A194 Leam Lane

7.7 Diffusion tube monitoring carried out since the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 29 for the sites identified in Figure 5E. The monitoring results indicate that there is a risk of exceedences of the annual mean nitrogen dioxide objective at kerbside sites near to the Lindisfarne and John Reid Road roundabouts. However, relevant exposure near to Lindisfarne roundabout is located much further from the kerb than the kerbside monitor. Only a marginal exceedence is predicted at the kerbside and therefore it is unlikely that there would be an exceedence of the objective at the façade of the nearest building. At the Auckland Terrace monitoring site, the predicted concentration, based on monitoring is high enough above the objective, that modelling is required to determine whether there would be an exceedence at the building façade.

Table 29 Nitrogen Dioxide Monitoring Data – A194 Leam Lane

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration ($\mu g/m^3$)	Data capture (%)
2003 Measured						
36	John Reid Rd	Kerbside	No	Diffusion tube	27.3	100
49	Lindisfarne Rbout	Kerbside	No	Diffusion tube	37.3	100
69	Auckland Terrace	Kerbside	No	Diffusion tube	N/A	N/A
January to August 2004 measured adjusted to 2003						
36	John Reid Rd	Kerbside	No	Diffusion tube	32.1	100
49, 53	Lindisfarne Rbout	Kerbside	No	Diffusion tube	**42.9**	100
69	Auckland Terrace	Kerbside	No	Diffusion tube	**46.1**	100
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
36	John Reid Rd	Kerbside	No	Diffusion tube	25.8 (30.4)	N/A
49, 53	Lindisfarne Rbout	Kerbside	No	Diffusion tube	35.4 (**40.7**)	Site 49 only in 2003
69	Auckland Terrace	Kerbside	No	Diffusion tube	N/A (**43.7**)	N/A
Objective = 40 $\mu g/m^3$ in 2005						

7.8 Concentrations of nitrogen dioxide have been modelled alongside the A194 Leam Lane between Lindisfarne Roundabout and John Reid Road using ADMS-Roads (for further information on

model input and verification see the Methodology section). The results, which are presented in Figures 5F and 5G, indicate that the model has over-predicted concentrations compared to those measured, especially in the vicinity of the A19 (further comparison of modelled with measured concentrations presented in Appendix 12). This is possibly due to the different dispersion characteristics from the A19, which is a dual carriageway on an overpass, compared to the locations used for the regional model verification. There are no automatic monitoring data available to carry out a local verification exercise, therefore the regional verification factors have been applied. However, the model results should be treated with a degree of caution. Based on the modelled 40 µg/m^3 contour, there could be likely exceedences of the annual mean nitrogen dioxide objective at relevant locations adjacent to the A194, near to the John Reid Road roundabout and Lindisfarne roundabouts. Properties to the east of the A19 could also be exposed to concentrations above the objective.

7.9 Based on the monitoring and modelled data, an AQMA will be declared. As a minimum, this will cover any relevant locations that fall within the modelled 40 µg/m^3 contour. Additional work during the Further Assessment will help confirm the magnitude of any exceedences in the vicinity of these two junctions.

Fowler Street

7.10 Diffusion tube monitoring carried out since the USA, identified this as an area where there could be potential exceedences of the annual mean nitrogen dioxide objective. Monitoring data for the area are presented in Table 30 for the sites identified in Figure 5H. The monitoring results indicate that it is likely that the objective will be exceeded at kerbside locations near to the junction of Beach Road. However, the nearest buildings are approximately 10m from the kerb and are commercial. Therefore there is no relevant exposure at this location and an AQMA is not required.

Table 30 Nitrogen Dioxide Monitoring Data – Fowler Street

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured						
No Monitoring data available						
January to August 2004 measured adjusted to 2003						
65	Fowler Street	Kerbside	No	Diffusion tubes	**45.2**	71
2005 Projected from 2003 (from 2004 adjusted to 2003 in brackets)						
65	Fowler Street	Kerbside	No	Diffusion tubes	**(42.8)**	N/A
Objective = 40 µg/m^3 in 2005						

Priory Road, Jarrow

7.11 The USA, identified the petrol terminal at Priory Road, Jarrow as having sufficient petrol throughout to require a Detailed Assessment for benzene. Monitoring has since been carried out using diffusion tubes at a number of sites in the area and the results are presented in Table 31 for the sites identified in Figures 5I and 5J. The monitoring results indicate that both the 2003 and 2010 benzene objectives are expected to be achieved at worst-case locations around the site and therefore an AQMA is not required.

Table 31 Benzene Monitoring Data – South Tyneside

Site number	Location	Site type	Relevant exposure	Monitor type	Concentration (µg/m^3)	Data capture (%)
2003 Measured (May 2003 to April 2004)						
B1	Moor Ln, Harton	Petrol station	Yes	Diffusion tube	1.6	92
B2	Follonsby Terr, Wardley	Busy road	Yes	Diffusion tube	1.2	100
B3	Slake Rd, Jarrow	Petrol terminal	Yes	Diffusion tube	1.2	100
B4	Rolling Mill Rd, Jarrow	Industrial	No	Diffusion tube	1.1	100
B5	Church Bank, Jarrow	Petrol terminal	No	Diffusion tube	1.4	100
B6	Curlew Rd, Jarrow	Petrol terminal	No	Diffusion tube	2.3	100
B7	Spencer St, Jarrow	Industrial	Yes	Diffusion tube	1.2	100
B8	Priory Rd, Jarrow	Petrol terminal	No	Diffusion tube	1.8	100
B9	Elison Street, Jarrow	Industrial	Yes	Diffusion tube	1.1	100
B10	North St, Cleadon	Petrol station	Yes	Diffusion tube	1.9	100
Objective for 2003 = 16.25 µg/m^3 **Objective for 2010 = 5.00 µg/m^3**						

Conclusions

7.12 The conclusions of the Detailed Assessments for South Tyneside are summarised in Table 31. AQMAs are required for the Boldon Lane/Stanhope Road junction and the A194 Leam Lane.

Table 31 Conclusions of Detailed Assessments for South Tyneside Council

Pollutant	Location	Conclusion
Nitrogen dioxide	Dean Road	AQMA not required
	Boldon Lane/Stanhope Road	AQMA required
	A194 Leam Lane	AQMA required
	Fowler St	AQMA not required
Benzene	Priory Road, Jarrow	AQMA not required.

8 Tyne and Wear Summary

8.1 Detailed Assessments of air quality have been carried out for the five Tyne & Wear Local Authorities. These focussed on areas that were identified as being at risk of exceeding air quality objectives, in either the Updating and Screening Assessment or subsequent monitoring.

8.2 These Detailed Assessments have been carried out using a combination of monitoring data and modelled concentrations. Concentrations of pollutants have been modelled using the dispersion model ADMS-Roads, and the model results verified against monitoring carried out across the Tyne & Wear region.

8.3 The results of these Detailed Assessments have determined that there are likely exceedences of the annual mean nitrogen dioxide objective at a number of locations where there is relevant exposure, and therefore Air Quality Management Areas (AQMAs) will be declared at the following locations:

- Newcastle – Jesmond Road, Jesmond Dene Road and Blue House Roundabout
- Gateshead – Trinity Court
- Sunderland –Trimdon Street Roundabout and Chester Road/Ormond Street
- North Tyneside - No AQMAs required
- South Tyneside – Boldon Lane/Stanhope Road and A194 Leam Lane

[1] DETR (January 2000), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.
[2] Defra, (February 2003), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum.
[3] Defra, (February 2003), Local Air Quality Management, Technical Guidance LAQM.TG(03).
[4] The Air Quality (England) Regulations 2000, Statutory Instrument 928
[5] The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043
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[8] Defra 2004, Review and Assessment Helpdesk website. www.uwe.ac.uk/aqm/review
[9] Arup Transport, New Tyne Crossing Environmental Statement, May 2002.