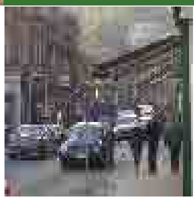
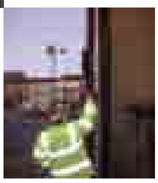




Environment Act 1995

Calderdale Air Quality Management Area (No 2)

Sowerby Bridge Further Assessment Report

August 2007

A Plain Language Guide to the Report

In 2006 Calderdale declared part of Sowerby Bridge as an **Air Quality Management Area** (**AQMA**) due to the levels of **nitrogen dioxide**, which has the chemical symbol **NO_2**. This brief guide gives a simple explanation of some of the terms and contents of the report. It is not intended to replace a reading of the report itself.

Justifying the AQMA- Measurement and Modelling of Nitrogen Dioxide

Section 2 of the report examines why the AQMA was necessary by reviewing the monitoring data and discussing a possible change in the AQMA boundary.

The Council uses two different methods to measure nitrogen dioxide. We use an electronic monitor called a 'Romon'. It continuously measures NO_2 and its results can be analysed hourly, monthly etc. We also use 'passive diffusion' test tubes to collect NO_2 from the air for 1 month. They are then analysed afterwards to give an average level of nitrogen dioxide for that month.

We derive average levels for a whole year from the two different sets of data. As the Romon gives more accurate readings than the tube we adjust the results from the tubes by comparing them with the results the Romon. This is called **bias correction**. If only a part-year of results is available for a tube we adjust those results by comparing them to tubes where a full year of results is available. This is called **period correction.** Sometimes where no data is available we use computer programs to predict or **model** levels of pollution. Modelling offers the best estimate of pollution, and the characteristics of traffic that are contributing most to pollution. However it is subject to several limitations and it cannot replace the value of actual measurement.

What are the likely levels of Nitrogen Dioxide in the future?

Vehicles burn fossil fuels eg petrol and diesel. Some fuels contain nitrogen impurities. Nitrogen also exists in the air we breath. Burning fuel in air allows the nitrogen to combine with oxygen to produce gases called **nitrogen oxides** (**NOx**). Complicated chemical reactions convert the NOx to NO_2. In 2010 the EU expects the UK to have reduced NO_2 pollution to acceptable levels, but work to bring about the reductions will not stop at 2010.

Section 4 discusses **background levels**, ie the levels that would exist were the local A58 traffic not there. Local and distant sources, eg local factories and distant traffic, contribute to this 'background'. Knowing the background levels today allows an assessment of the amount of pollution being caused by the A58 traffic today, and is used to predict the situation to 2010, and beyond.

Constant changes in the number and type of vehicles on our roads, speed, driving characteristics etc affect how much fuel is burned. Individual new vehicles are assumed to be more fuel-efficient and less polluting than older vehicles, and so pollution levels should fall. The computer models we use assume that a certain amount of NOx is converted to NO_2 to reflect this reduction.

However the exhaust systems of modern vehicles use catalytic converters. These trap nitrogen oxides, but allow nitrogen dioxide to escape. This means that the amount of nitrogen dioxide directly emitted by vehicles as a proportion of nitrogen oxides is increasing. Even if individual vehicles emit less pollution, more vehicles on our roads may cause levels of NO_2 to rise in some cases. Appendix A3 assumes a different rate of conversion of NOx to NO_2, based on local measurement. This new rate of conversion is used in some of the calculations in section 4 that predict what future levels might be, what is causing them, and what reduction in pollution is necessary.

Other Considerations For an Action Plan

This report will be used as the basis for an **Air Quality Action Plan** (**AQAP**) of measures to try to achieve more acceptable levels of NO_2. An AQAP is not just about reducing pollution. Reducing exposure to pollution and avoiding situations that prevent the dispersion of pollution is also important. Section 5 discusses local commuting and recent planning development, and how local and national policy might contribute to better air quality in Sowerby Bridge.

If you have any questions about this report, please do not hesitate to contact Environmental Health Services.

Calderdale Air Quality Management Area (No 2)

Sowerby Bridge Further Assessment Report

1. Introduction

An Air Quality Management Area (AQMA) covering the A58 corridor in Sowerby Bridge was declared on 26th July 2006, taking effect 1st August 2006.

The AQMA was designated under Section 83 Environment Act 1995 due, in part, to a known exceedence of the annual mean air quality objective for Nitrogen Dioxide (NO_2) as specified in the Air Quality (England) Regulations 2000. It was also part due to modelled evidence of a likely exceedence of that value.

Section 84(2) of the Act now requires further assessment of the AQMA. This further Assessment addresses the following issues

- Confirmation of the original assessment of air quality (Sections 2.1 and 2.2)
- Review of the existing AQMA boundary (Section 2.3)
- Review of Comments made by Statutory Consultees (Section 3)
- Calculation of the extent of improvement in air quality needed (Section 4)
- The impact of recent policy developments upon the AQMA (Section 5)

2 Confirmation of the original assessment of air quality

Essentially this comprises

- a review of the information available leading up to declaration of the AQMA
- assessment of information available post-declaration

Review of information available leading up to declaration of the AQMA

Sowerby Bridge air quality had been investigated and reported upon several times since the 1990s. This included a short period of continuous monitoring on Wharf Street in 2000.

Complaints about traffic congestion and air pollution arose thereafter and the Council agreed to carry out further air monitoring. A passive diffusion tube (C07) was relocated on Wharf Street and the annual mean for 2002 and 2003 from this one tube pointed to exceedence of the air quality objective. The 2003/04 Detailed Assessment reported a much-reduced level, falling within the objective.

In 2005 a need arose to survey air quality in the Calder Valley, east of Sowerby Bridge. Diffusion tubes were deployed on Wakefield Road, Bolton Brow (CV4) and Wharf Street (CV5) between May 2005 and July 2006. The Wharf Street site used by the groundhog in 2000 was earmarked for redevelopment. There was nowhere suitable to relocate this large monitor. Funding was secured to purchase and deploy a smaller ‘Romon’ air monitoring unit (designated ‘Romon 4’) outside Carlton Mill, Wharf Street in November 2005.

The boundary of the Calderdale AQMA (No 2) was determined by real-time monitoring, passive diffusion tube measurement, computer modelling using ADMS Urban 2.2 software, and by following the statutory guidance contained with LAQM.PG(03). The central area of the AQMA reflected measured levels of NO_2 from passive diffusion tubes CD7 and CV5 at building façades and by the real-time measurements of Romon 4 on Wharf Street. Most property here lies close to the A58 roadside. The eastern and northern areas were defined by CV4 at the roadside and by modelling outputs. Some residential property here is close to the roadside but there are also large plots of land open to redevelopment and hence relevant exposure. The southern area was derived from modelling outputs and affected land already in the process of redevelopment to provide relevant exposure.

The A58 corridor was modelled using ADMS Urban 2.2 and MapInfo as the visualisation tool, and weather and traffic data inputs to compute pollutant concentrations. There is always concern about the accuracy of modelling outputs, which arises from

- The representative nature of regional weather data compared to actual local weather. Calderdale possessed weather data sets for Leeds 2000, and for Bingley 2001-2005. Leeds and Bingley weather stations lie 28km and 16km east and northeast respectively of Sowerby Bridge. Datasets includes data for cloud cover, used to estimate solar radiation and hence the heating of air at ground level and, with wind data, permit modelling of distribution of pollution over the area. Cloud cover is determined at RAF Leeming 70km to the north-northeast.
- How representative modelling is of actual topography and buildings. Much of Town Hall Street and Wharf Street forms a street canyon, and the A6139 Tuel Lane and the A58 Bolton Brow and Upper Bolton Brow are steeply inclined roads.
- The accuracy of local traffic data, given a complex highway design with several junctions, peak time congestion, and variable traffic speeds. The council held 2003 and some 2005 data, primarily Annual Average Daily Traffic (AADT) two-way 24-hour flows, and a limited breakdown of the use-class gained from visual surveys in separate peak hour flows. It also held data from the deployment of Icoms TMS-SA radar traffic monitors for Bolton Brow in July 2005. This equipment measures traffic volume, speed and vehicle length, with longer vehicles being taken to be HGVs, PSVs articulated lorries etc.

In Figure 1 below yellow-shaded areas represent concentrations above 40μgm^{-3} NO_2 and these clearly impact on most of the properties fronting the A58. Orange-shaded areas represent concentrations of 49μgm^{-3} and above and blue areas below 40μgm^{-3}. Diffusion tubes CV4, CV5 and C07 are located around1st-floor level where some reduction in NO_2 concentration is assumed, albeit the model calculates emissions at ground level. Model outputs are comparable with the tubes results. CV4 suggests that elevated levels extend as far as the traffic junction with Bolton Brow.

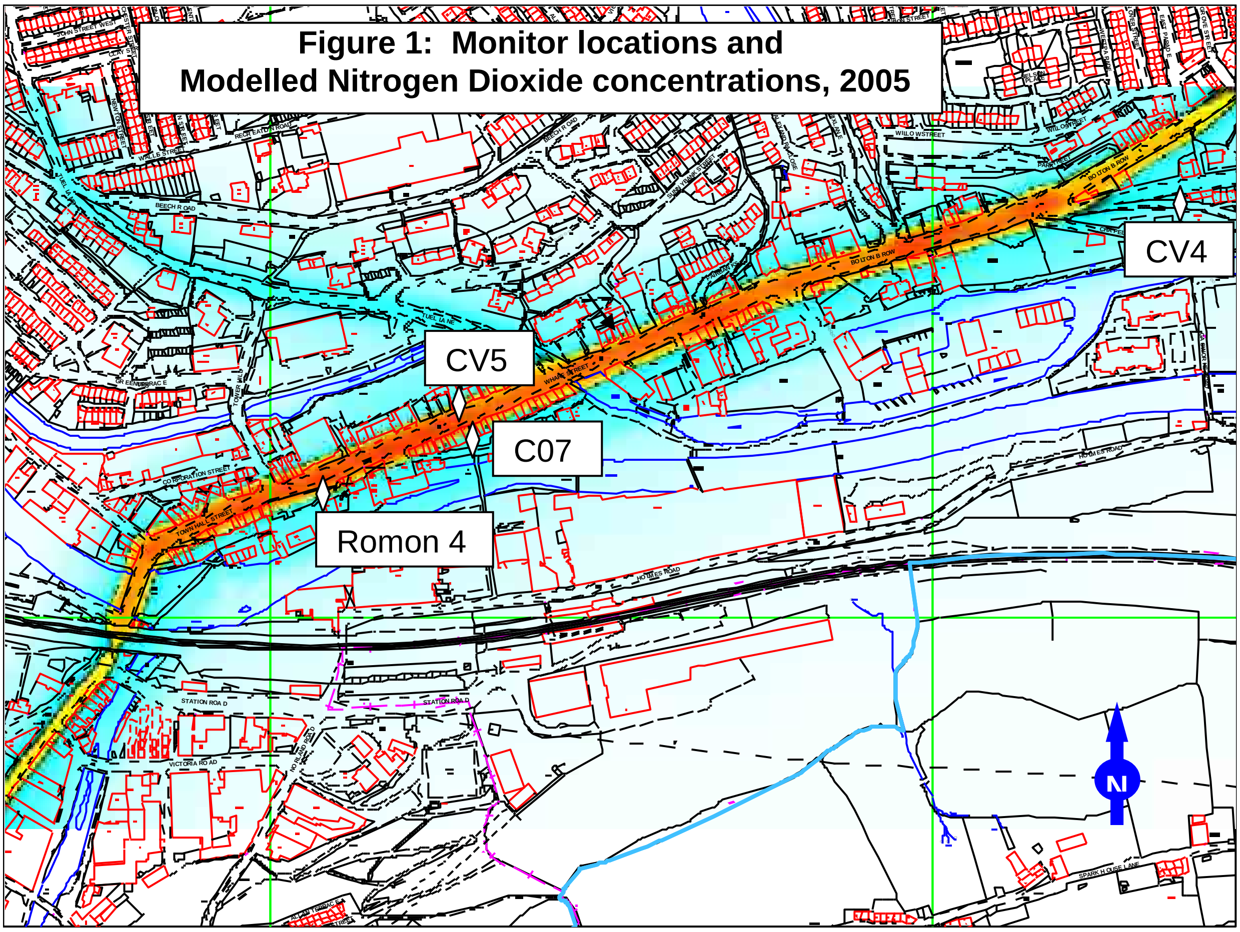
The data gathered is summarised in Tables 1 and 2 and in Figure 1 below.

Table 1: Results of Passive diffusion tube monitoring ($\mu g/m^3$)							
Tube Ref	**Location**	**Type**	**Year**				
			02	**03**	**04**	**05**	**06**
C07	Wharf Street	facade	50	50	39	40	65
CV4	4A Wakefield Road	roadside				36	48
CV5	Wharf Street	Kerbside				28	38

Notes to Table 1
data for CV4 and CV5 is for period May-Dec 2005
data for Jan-July 2006 uses a bias correction factor of 0.89 and a period correction factor of 1.02

Table 2: Continuous Monitoring Results in (µgm^{-3})				
Monitor	Monitoring Period	Annual average NO_2 concentration (µg/m^3)	No. of exceedences of 200µgm^{-3} hourly average	data capture
Groundhog	March-July 2000	33.5	1	94.4%
Romon 4	Nov – Dec 2005	56.2	0 in Nov-Dec 2005	97.0%
Romon 4	Jan-June 2006	50.4	0 in Jan-July 2006	95.3%

Figure 1: Monitor locations and Modelled Nitrogen Dioxide concentrations, 2005



The Updating and Screening Assessment 2005 (reported in 2006) concluded that NO_2 at the A58 at Sowerby Bridge was likely to exceed, if not already exceeding, an annual average AQO of 40µgm^{-3}. Unusually high levels of NO_2 were monitored across the region from October 2005 and recorded by Romon 4 upon installation in late 2005 until early 2006. They were seen as unrepresentative of normal levels. A provisional period correction (indicative of the considerations to be applied upon more detailed information becoming available) using data from Romon 2 at Huddersfield Road, Halifax suggested that levels around 40-45µgm^{-3} would be more realistic for this area. However the data still pointed to an exceedence of the annual mean AQO.

Calderdale stated that it would declare an AQMA for Sowerby Bridge under the Environment Act 1995. Statutory Guidance promoted inclusion of areas where modelling indicated poor air quality, and pointed to not sub-dividing blocks of terraced residential property, or of houses from their gardens and the AQMA boundary was drawn accordingly, as portrayed in Figure 2 below.

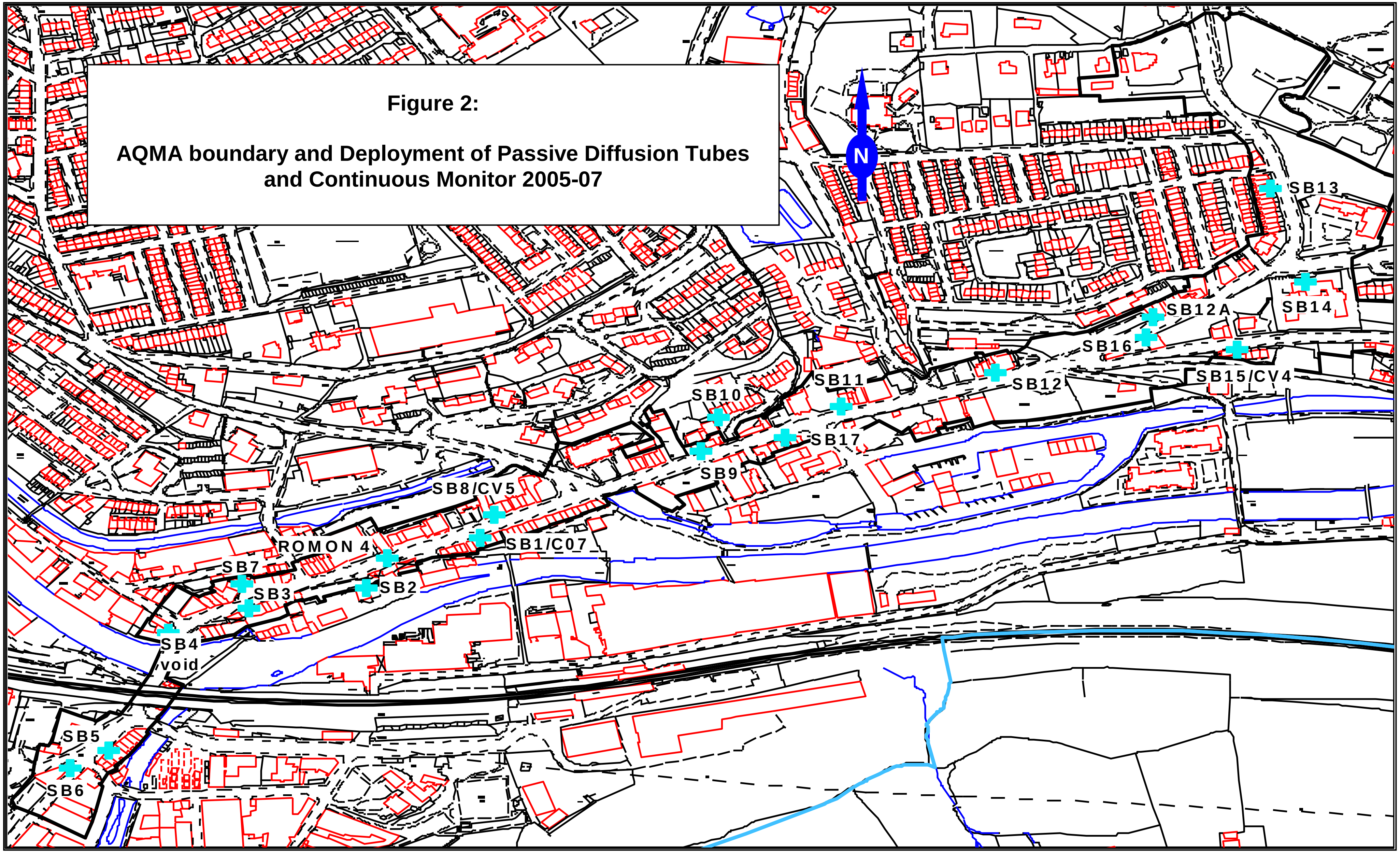


Figure 2:
AQMA boundary and Deployment of Passive Diffusion Tubes and Continuous Monitor 2005-07
N
SB13
SB14
SB12A
SB16
SB15/CV4
SB12
SB11
SB10
SB17
SB9
SB8/CV5
SB1/C07
ROMON 4
SB7
SB3
SB2
SB4
void
SB5
SB6

Assessment of information available post-declaration

Additional passive diffusion tubes were located within the AQMA, often at first floor level of building facades given that much of the local residential accommodation was “living above the shop”. SB4 proved too dangerous a location to service and was discontinued. The survey involving CV4 and CV5 concluded in July 2006. CV4 and CV5 were retained and with tube C07 were re-designated SB15, SB8 and SB1 respectively.

The AQMA took effect in August 2006. 18 passive diffusion tubes (prefix “SB”) and the continuous monitor ‘Romon 4’ were deployed in the AQMA as depicted in Figure 2 above. Monitoring data to December 2005 was published in the Updating and Screening Assessment 2005. Data to June 2006 is given in Tables 1 and 2 above. Data in respect of tubes SB1/C07, SB8/CV5 and SB15/CV4 for the whole of 2006 is given in Table 3A and for the other tubes from July 2006 to June 2007 in Table 3B below. Table 3C shows the calculation of the period correction factor for 2006. Data derived from Romon 4 for the whole of 2006 and to June 2007 is given in Table 4.

Table 3A: Passive Diffusion Tube Measurements (μgm^{-3}), 2006

Tube	Bias corrected annual mean
SB1 (C07)	67
SB8 (CV5)	37
SB15 (CV4)	48

Notes on Table 3A: SB8/CV5 and SB15/CV4 renamed August 2006, SB1/C07 renamed September 2006

Table 3B: Passive Diffusion Tube Measurements (μgm^{-3}), July 2006 – June 2007

Tube	July-Dec 2006, bias and period corrected mean	Jan-June 2007, bias corrected mean
SB2	28	30
SB3	40	49
SB5	45	46
SB6	50	51
SB7	41	42
SB9	47	47
SB10	27	26
SB11	38	35
SB12	47	44
SB12A	44	43
SB13	39	42
SB14	36	28
SB16	40	42
SB17	43	42
SB18	48	41

Notes on Table 3B: SB18 commenced September 2006, no results for SB16 for September 2006. No data for SB12A for April-June 2007 due to building works commencing at property. The period correction factor derived in Table 3C below was used to project the annual mean.

A provisional bias correction factor of 0.84 was derived from a colocated triple of diffusion tubes at Romon 2.

Table 3C: Derivation of Period Correction Factor (July-Dec 2006) for Table 3B using the Method set out in Paragraph 6.26/ Box 6.5 of TG(03)			
Tube ref	Am (2005)	Pm	Factor
CRH4	38	41	0.916
WV1	50	47	1.06
HB3	33	29	1.131
CS2	44	49	0.907
		Mean	1.003

Table 4: Continuous Monitoring Results in (μgm^{-3}) 2006-2007				
Monitor	Monitoring Period	Period average NO_2 concentration	No. of exceedences of $200\mu gm^{-3}$ hourly average	Percentage data capture
Romon 4	Jan–Dec 2006	50.1	4	95.7%
	Jan-June 2007	51.2	0	96.5%

Romon 4 shows no indication of any potential to exceed the AQO for no more than 18 exceedences of the hourly average for NO_2 of $200\mu gm^{-3}$. The data from Romon 4 and the passive diffusion tubes largely support the AQMA boundary as drawn, with only few locations that might warrant removal from the AQMA.

Redefinition of the AQMA boundary

Monitoring data shows levels of NO_2 in excess of the annual mean AQO at most monitoring locations in the AQMA as presently defined. However there a small number of locations where levels are lower than originally expected.

SB2 is positioned on the road facing façade of a small apartment block ('The Goits'), set 15m back from and below the level of the A58 Town Hall Street. The annual mean for the period July-December 2006 was $28\mu gm^{-3}$. 'The Goits', together with the private car-parking area immediately west might warrant removal from the AQMA. However a small number of apartments at the nearby Greenups Mill front onto Town Hall Street. There the bias corrected readings of SB3 ($49\mu gm^{-3}$) support those properties remaining within it.

SB6 is north of a mill building that was undergoing conversion to residential development at the time of declaring the AQMA. At the time the proposed internal layout, particularly in respect of the future addresses to be applied to the future dwellings was unclear. The bias and period corrected readings of 50 and $51\mu gm^{-3}$ raise the possibility that the new road facing apartments may be exposed to levels of NO_2 above the AQO.

SB10 is affixed to a façade of a house set in the 'Fairbanks' residential cul-de-sac and some 26m from the A58 and partially obscured from the main road by 57-65 Wharf Street.

The period-corrected mean for July-December 2006 was 27μgm^{-3}. Fairbanks itself is not within the AQMA, but land to the rear of 57-65 Wharf Street if put to residential use could create relevant exposure within the AQMA and so the boundary should remain unchanged at that location. St Peters Church at the junction of the A58 with the A6139 Tuel Lane is in an elevated position, with the church building itself set back off the roadside. With 'exposure' times largely within 1 hour it may present less of a concern than originally thought, and may warrant removal from the AQMA. SB9 nearby on Wharf Street is recording 47μgm^{-3} and clearly demonstrates how property closer to the road is more greatly influenced by emissions.

SB14 is in the grounds of Bolton Brow Junior and Infant school, off Wakefield Road. It is set back 11m from and below the A6142 Pye Nest Road. Whilst the school would present relevant exposure the recorded levels here showed only 36μgm^{-3} for July-December 2006 and 28μgm^{-3} for January –June 2007. This might merit removing the school from the AQMA, albeit regard would need to be had were any extensions subsequently proposed that brought accommodation closer to the roadside.

Tube SB13 is on a residential façade set a short distance back from the A58 Upper Bolton Brow and is reading 39-42μgm^{-3}. Although the A58 here inclines to the north, away from the A58/ A6142 junction, traffic at this point is generally accelerating away. The dwellings of Woodleigh, Jasmyn Royd and the Sacred Heart & St Patrick's Church are set much further back from the roadside and behind large stone boundary walls. Past experience has shown that a solid wall of sufficient height often prevents high levels of pollution from road traffic from reaching residential facades. Paragraph 6.12 of LAQM.TG(03) points to a separation distance of 10m from the roadside being sufficient from most A-class roads. As with the school there appears an argument to withdraw these properties from the AQMA as long as cognisance was taken of any proposed new build that would introduce relevant exposure closer to the roadside than existing. A similar argument applies to the lands of Crow Wood Park that are presently included within the AQMA.

South and West of the junction between the A58, the A6026 Wakefield Road and Chapel Lane lie two large plots of land. The first is a scrap yard accessed off Chapel Lane, the second a disused graveyard and a former chapel off Bolton Brow. In 2006 planning permission was obtained to redevelop each plot for residential use. In the case of the graveyard this was in conjunction with redevelopment of the chapel. If the chapel is converted to apartments there may be an argument to remove none roadside apartments from the AQMA if circumstances warrant that. At the scrap yard the applicant carried out air monitoring between January and July 2006 and purported that the air quality was well within the AQO. Given the present open nature of the scrap yard and graveyard, which may not allow pollution to concentrate as it does elsewhere on the A58 corridor, and the possibility that the developments may not yet proceed, there is no proposal to remove either plots from the AQMA at this point in time.

This data would therefore support shrinkage of the existing AQMA in discreet areas, and warrants examination of the possible need to extend the AQMA along the A58 West Street, but otherwise strongly supports all other locations remaining within the AQMA as currently defined. No changes to the boundary are proposed in the short term but may be appropriate within the next 12-18 months as and when further monitoring data is obtained.

On present information a redrawn AQMA could look similar to the area depicted in Figure 3 below.

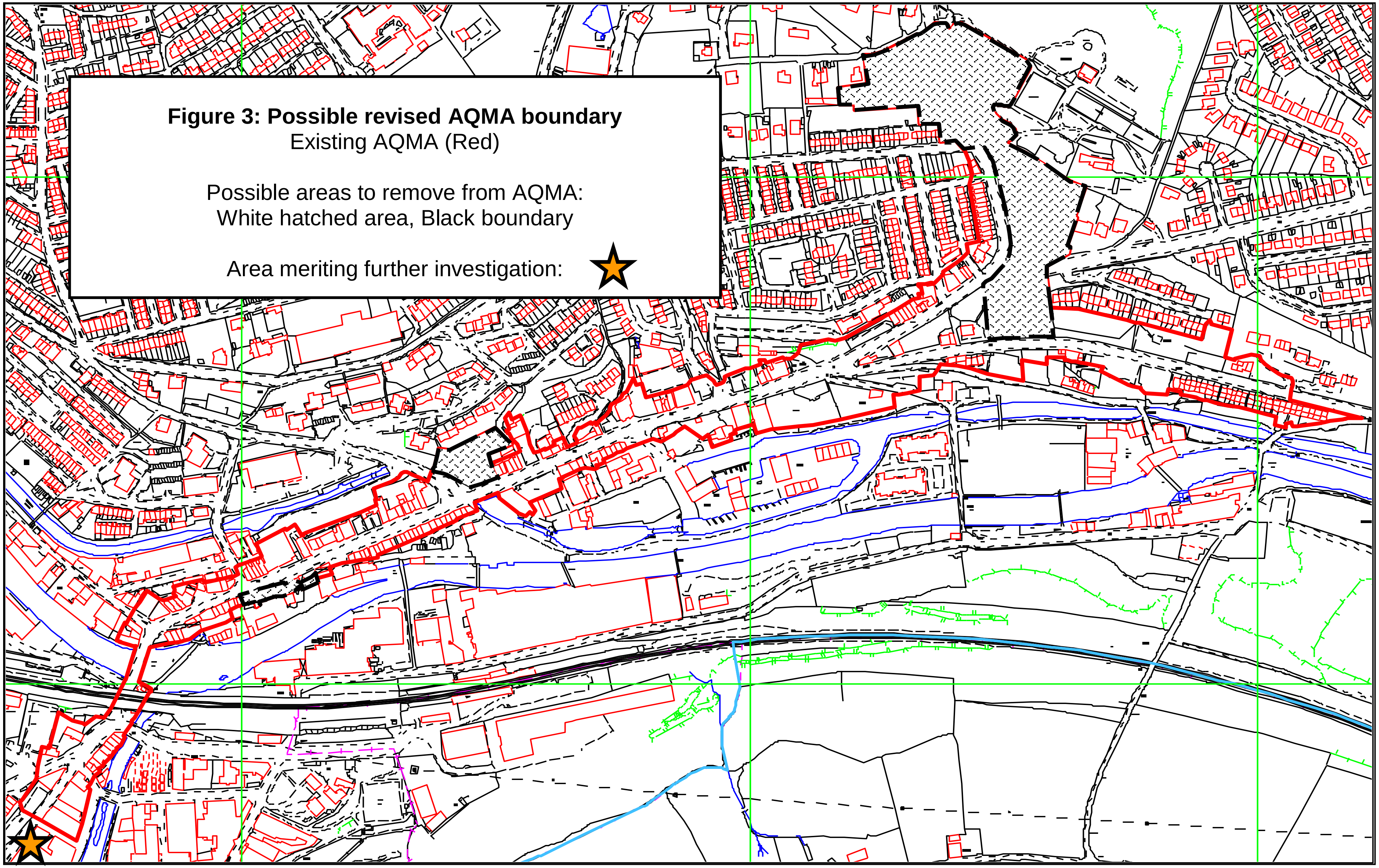


Figure 3: Possible revised AQMA boundary
Existing AQMA (Red)
Possible areas to remove from AQMA:
White hatched area, Black boundary
Area meriting further investigation:

3 Review of Comments made by statutory consultees

The intention to declare the A58 corridor was featured in the Updating and Screening Assessment 2005. Since the AQMA came into effect in November 2005 it has featured in the Detailed Assessment 2006 published April 2007.

No response has been received from any of the statutory consultees relating to the content of the Detailed Assessment 2006, as at July 2007.

4 Calculation of the extent of improvement in air quality needed

This section concentrates on

- determination of a background concentration of NO_2 for Sowerby Bridge for 2006 and projection of same to 2010
- establishing local traffic data source apportionment and model projections for 2006 and 2010

4.1 Background NO_2 concentration

In determining a representative background NO_2 concentration for the AQMA reference was had to existing and former passive diffusion tubes (see Figure 4 and Table 5 below), to projections of data using ADMS Urban software, and to projections using the National Atmospheric Emissions Inventory and LAQM.TG(03).

SB10 at Fairbanks is 25m from the A58 and is partly shielded from the road by 51-57 and 61-65 Wharf Street. CV2 was on the A6026 Wakefield Road operated in May 2005- June 2006, 0.45 km east of the AQMA. In the absence of suitable other monitoring locations regard has been had to the background emissions published in August 2007 on the National Atmospheric Emissions Inventory (NAEI) (http://www.airquality.co.uk/archive/laqm/tools/43_2004.csv)

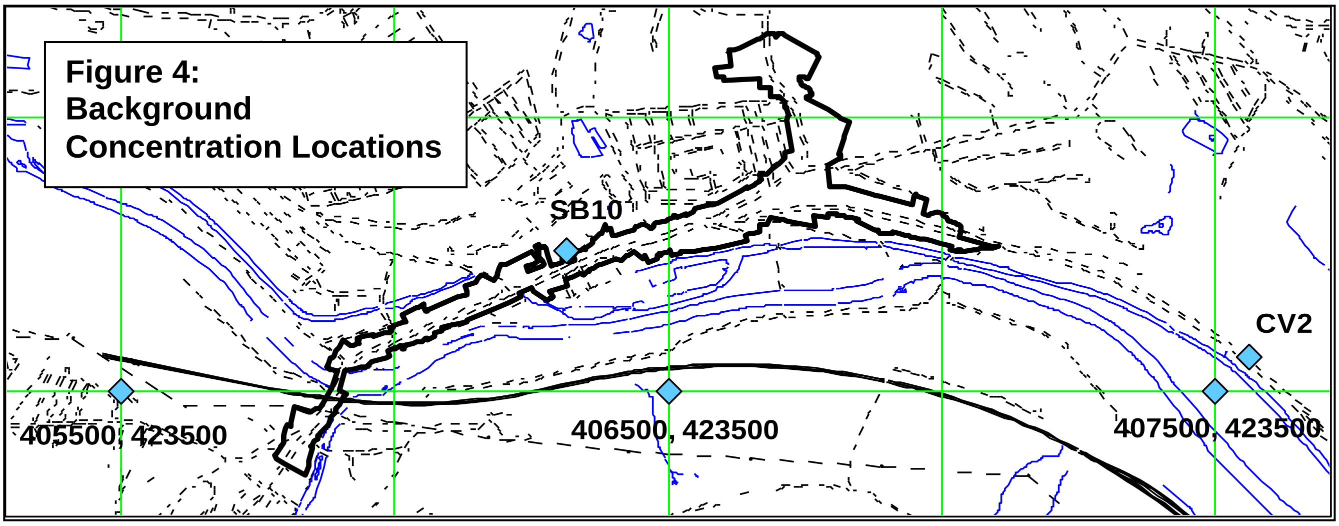


Table 5: Ambient NO_2 concentrations (μgm^{-3}) and projections to 2010							
Code	**Location**	**Type**	**2005**	**2006**	**Projection method to 2010**		
					NAEI	**LAQM. TG(03)**	**UKA-YAC 2010**
SB10	1 Fairbanks	Urban background		27		23.8	24.2
CV2	Wakefield Road, Copley	Urban roadside	16.8			14.6	14.9
NAEI	NGR 405500, 423500 (Sowerby)	Suburban background	17	16.6	15.3	14.6	14.9
	NGR 406500, 423500 (east of railway station)	Urban background	18.1	17.6	16.3	15.5	15.8
	NGR 407500, 423500 (near former CV2)	Urban background	18.8	18.3	16.9	16.1	16.4

Notes to Table 5
For this table only CV2 represents 12 calendar months measured data between May 2005 and April 2006, thus avoiding errors due application of a period correction factor. In this case annual bias correction factors were applied to 2005 and 2006 data and a simple arithmetic average of the sum obtained. Likewise the projection of 16.8μgm^{-3} to 2010 using Box 6.7 of TG(03) is a simple arithmetic average of the results of the calculation using both 2005 and 2006 as base year. Projection of 16.8μgm^{-3} is by using the UK archive year adjustment calculator v 2.2a (revised January 2006) (http://www.airquality.co.uk/archive/laqm/tools/Year_Adjustment_Calculator22a.xls) selecting 'roadside' exposure (given its location) and taking a simple arithmetic average of results from using both 2005 and 2006 as a base year.

SB10 represents measured data between July and December 2006 with period correction factor 1.003 and bias correction factor 0.89 to give an annual mean.

Projected values of NAEI data from 2005 to 2006 using Box 6.7 of TG(03). NAEI data for 2010 already given in UK air quality archive (http://www.airquality.co.uk/archive/laqm/tools/43_2004.csv). Alternate 2010 projection derived by using the year adjustment calculator (http://www.airquality.co.uk/archive/laqm/tools/Year_Adjustment_Calculator22a.xls)

The predominant wind direction is along the valley from the west. The determination of a representative background NO_2 concentration for the AQMA has proved difficult. The NAEI data for 2005, projected to 2006 suggests a background concentration in the region of 18μgm^{-3} NO_2.

This authority has concern over the application of period correction factors to the results of tubes deployed for the part-years involved in this study. The winters of 2004/05 and 2005/06 were marked by unusual rises in measured tube data that had not appeared in previous years, and applying period correction factors appear to unrealistically weight the uncorrected data. For that reason a 12 month period mean was derived for CV2 using data measured between May 2005-April 2006, bias corrected appropriately with 2005 and 2006 factors to give 16.8$\mu gm^{-3.}$ This appears to be a reasonable correlation to the NAEI estimate for grid reference 407500, 423500 of 18.3μgm^{-3}.

These estimates for background for 2006 of 17-18 μgm^{-3} are significantly lower than the measured data at SB10 which is 27μgm^{-3} in 2006. Whilst measurements are preferred to estimates, the disparity between the two sets of data does not offer an easy compromise. Unlike tube CV2 tube SB10 had not been deployed for a calendar year over 2005-2006. Despite SB10's location 25m from the roadside an assumption must be that it is nevertheless quite affected by traffic pollution, contrary to the other more open background locations. Given that CV2 offers some correlation with the NAEI estimate for NGR 407500, 423500 it is argued that for 2006 an assumed background level at that grid point of 18.3 μgm^3 is appropriate for this area in 2006.

The UK archive data and year adjustment tools were revised recently to account for current thought on the levels of NO_2 and NOx to be expected in 2010. However LAQM.TG(03) does not incorporate such revision. Excluding the TG(03) projections the remaining data points to a background level of 15-17μgm^{-3} of NO_2 in 2010, albeit the TG(03) projections do fit within this range. The projection for NGR 407500, 423500 is 16.9μgm^3 which is at the higher end of the range.

4.2 Local Traffic data

The following sources were used in the modelling

- Icoms radar deployment, Bolton Brow: July-August 2005
- National Traffic Surveys (link census counts) –measured 12 hour and estimated 24-hour flows, together with breakdown of vehicle use-class.
- Automatic traffic data (long term monitoring programme, 24hr AADT flows)

Traffic survey locations are depicted on Figure 5 below and the data obtained in Tables 6 to 9 below.

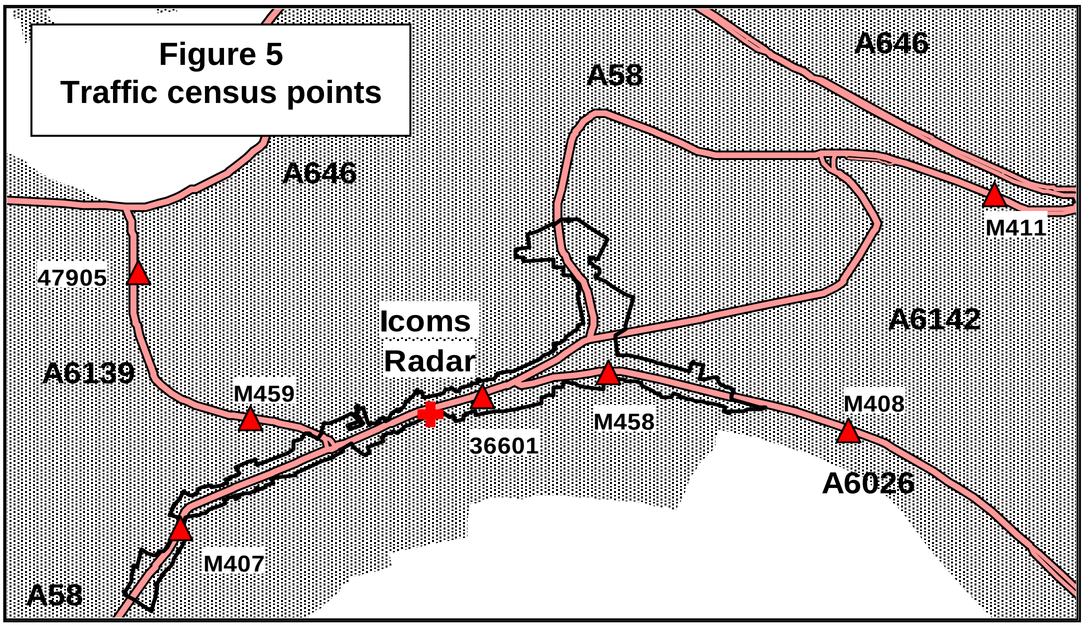


Table 6 below summarises the data derived from the deployment of 2 sets of Icoms Radar on the A58 Bolton Brow between July and August 2005.

From the Icoms data average weekday (Monday-Friday) eastbound traffic was 9645 vehicles, travelling at a typical speed of 27mph. Average traffic westbound was typically 8739 vehicles travelling at a typical speed of 35mph. The data points to a dramatic fall in numbers of vehicles and number of presumed HGV/PSV vehicles on Saturdays and moreso still on Sundays. This census occurred in the school summer holiday period and is perhaps unrepresentative of term-time traffic levels.

The greater average speed of westbound traffic may reflect the long uninterrupted descending road approaching the census point. The eastbound census point was at the bottom of the incline, and after a road junction and pedestrian crossing, where one might expect traffic to be slower at that point.

Table 6: Icoms derived Traffic data, A58 Bolton Brow, 2005

Eastbound Traffic	No. of Vehicles of length		Total traffic	Average Speed (V85) mph	% long vehicles (presumed HGV and PSV)
	up to 6m length	6m and longer			
Fri 22 July	9080	473	9553	26mph	5.0
Sat 23 July	9203	228	9431	28mph	2.4
Sun 24 July	7253	87	7340	29mph	1.2
Mon 25 July	8980	527	9507	27mph	5.5
Tues 26 July	9329	505	9834	27mph	5.1
Wed 27 July	9449	520	9969	27mph	5.2
Thurs 28 July	9212	529	9741	27mph	5.4
Fri 29 July	9273	494	9767	27mph	5.1
Sat 30 July	8649	226	8875	29mph	2.5
Sun 31 July	7506	111	7617	30mph	1.5
Mon 1 August	8710	483	9193	28mph	5.3
Tues 2 August	9123	476	9599	27mph	5.0
Westbound traffic	**No. of Vehicles of length**		**Total traffic**	**Average Speed (V85) mph**	**% long vehicles (presumed HGV and PSV)**
	up to 6m length	**6m and longer**			
Fri 22 July	8237	2239	10476	35mph	21.4
Sat 23 July	7236	1141	8377	36mph	13.6
Sun 24 July	5990	1124	7114	37mph	15.8
Mon 25 July	7244	1545	8789	35mph	17.6
Tues 26 July	7698	2370	10068	35mph	23.5
Wed 27 July	5130	1300	6430	35mph	20.2
Thurs 28 July	5850	885	6735	34mph	13.1
Fri 29 July	7480	1601	9081	35mph	17.6
Sat 30 July	7248	674	7922	35mph	8.5
Sun 31 July	5712	1078	6790	37mph	15.9
Mon 1 August	7037	1656	8693	35mph	19.0
Tues 2 August	7689	1954	9643	35mph	20.3

Several issues call into question the accuracy of the Icoms data. Recorded east- and westbound traffic differ by up to 3500 vehicles on a given day (see 27 July). We would not expect this range of difference in accurately recorded data, yet the Icoms recorded data correlates reasonably well with term-time data derived from using enumerators only 6 weeks earlier (see Table 7 below).

The Icoms radar records vehicle length. The recorded data was interrogated to discern the number of vehicles of 6m and longer, on the simple assumption they were HGVs and PSVs. Eastbound a typical weekday percentage of assumed HGVs / PSVs was a constant 5-5.5% (average 5.2%). This would not be an unrealistic level in many circumstances for such vehicles on our local roads. However that for westbound traffic ranged from 13% to 23.5% (average 19.1%) ie some 3 to 13 times more westbound HGVs/PSVs than eastbound ones. Whereas one might well expect more car journeys in school term compared to school holiday periods this is arguably not so for HGVs and PSVs.

Table 7 below details the results of a 12-hour Peak time (7am –7pm) traffic as part of a National Traffic Survey, performed by enumerators on Monday 6 June 2005 (ie school term time). From the 12-hour data 24-hour AADTs are estimated. The estimated 24 hour AADT count from this survey for the west bound A58 of 9241 vehicles compares reasonably well to 8789 vehicles for Monday 25 July and 8693 vehicles for Monday 1 August in the Icoms Survey. The estimated AADT 24 hour count from this survey for the east bound A58 of 9935 vehicles compares less reasonably to 9507 vehicles for Monday 25 July and 9193 vehicles for Monday 1 August recorded in the Icoms Survey.

Table 7: Traffic Census, -site 36601- A58 Bolton Brow, Monday 6 June 2005

Direction of Count Eastbound/Westbound*	Pedal Cycle	Motor Cycle	Cars & Taxis	PSV	Light Goods	Rigid Axle vehicles	Articulated Axle vehicles	TOTAL	%age vehicles > 1.5t
Measured 12 hour WB count	30	74	6251	203	1383	335	80	8356	7.4
Estimated 24 hour WB count								9241	
Measured 12 hour EB count	13	91	6874	223	1374	346	63	8984	7.0
Estimated 24 hour EB count								9935	
Estimated AADT 24 hour 2 way count								19176	

Determination of vehicle class solely by length within Icoms is not conclusive. It does not determine the number of axles, or height of a vehicle above ground to aid classification. Vehicle class would be obvious to an enumerator and the data represented in Table 7 points to a HGV/PSV level of 7- 7.4% compared to the 5-23% of the Icoms derived data.

Two other traffic censuses are detailed below for the A58 at Sowerby Bridge in 2005. Census point M407 on County Bridge is south of the A58/A6139 junction, south of the Icoms site and south of site 36601. Site M411 lies to the north east of the AQMA, east of the A58 / A6142 junction and is an indicator of vehicles entering / leaving the northern part of the AQMA. The data is presented in Tables 8 and 9.

Table 8: Site M407 A58 Town Hall St (County Bridge) 2005 total vehicles									
Traffic Direction	24hour weekday	08:00-09:00 weekday	17:00-18:00 weekday	24hour Saturday	08:00-09:00 Saturday	17:00-18:00 Saturday	24 hour Sunday	08:00-09:00 Sunday	17:00-18:00 Sunday
South	11150	740	940	9720	790	800	7330	630	650
North	11430	920	760	9660	750	710	7950	5400	620

Table 9: Site M411 A58 Rochdale Rd (East of A6142) 2005 total vehicles									
Traffic Direction	24hour weekday	08:00-09:00 weekday	17:00-18:00 weekday	24hour Saturday	08:00-09:00 Saturday	17:00-18:00 Saturday	24 hour Sunday	08:00-09:00 Sunday	17:00-18:00 Sunday
West	8650	520	760	8120	750	630	6010	610	530
East	9900	920	630	9060	670	690	6950	610	590

Vehicles enter and leave the A58 at the A6139 Tuel Lane junction. The AADT 24 hour weekday flows for sites M407 and M411 are 22580 and 18550 respectively. This data is comparable with that for site 36601 which has an AADT flow of 19176, but not so with the Icoms data which suggested an AADT flow of 18384. Hence both in volume and class the accuracy of the Icoms derived data is doubtful. For the purpose of any calculations the data contained within Sites M407, site 36601 and site M411 will be assumed.

Other data for the A6139 and A6026 may also be needed. The available data is sourced from 2002 and 2005 and is presented in Tables 10 and 11 below.

Table 10: Traffic Census data 2005					
Site No	Road	Location	Northbound/ Eastbound	Southbound/ Westbound	2005 AADT flow
M408	A6026	Wakefield Road	7690	7470	15160
M458	A6026	Wakefield Road	6320	6000	12320
M459	A6139	Tuel Lane	5420	6200	11620

Table 11: site 47905 Traffic Census, A6139 Tuel Lane, Friday 31 May 2002									
Northbound Count / Southbound Count	Pedal Cycle	Motor Cycle	Cars & Taxis	PSV	Light Goods	Rigid Axle vehicles	Articulated Axle vehicles	TOTAL	%age vehicles > 1.5t
Measured 12 hour SB count	10	67	4116	77	674	162	10	5116	4.9
Estimated 24 hour SB count								5625	
Measured 12 hour NB count	9	44	2880	73	594	123	11	3734	5.5
Estimated 24 hour NB count								4106	
Estimated 24 hour 2-way count								9731	

The Council also referred to the Department for Transport's "Transport Statistics Bulletin – Road Traffic Statistics for Great Britain 2005 – Statistics Report SB (06)28" of July 2006. This document would describe the A58 and A646 as Principal Urban 'A' roads, maintainable by the local authority, and offers the following in respect of such roads

- some 80% of all motor traffic is cars and taxis
- typically between 18700 and 20000 vehicles a day would be a typical motor vehicle flow for the Yorkshire and Humberside region.
- goods vehicle traffic peaks slightly during the autumn period and mid week (Wednesdays/ Thursdays) Goods vehicle traffic is concentrated between 6am and 5pm, tailing off outside normal working hours
- car traffic on urban roads is more evenly distributed throughout the year and rises slowly from Mondays, peaking on Fridays.

In 2005 the A58 AADT 24 hour flows were at or slightly above this regional average at 18550-22580 vehicles (see tables 7-10) but the proportion of cars and taxis to all motor vehicles is below the regional 80% average for the A58 (site 36601) at 68%.

4.3 Source apportionment for 2006, and modelling projections for 2010

Sowerby Bridge and particularly the AQMA lies at the junction of the Ryburn and Calder Valleys and the predominant wind direction is from the west. Paragraph 6.05 LAQM.TG(03) holds that the main sources of NO_x are transport and electricity generation. Assessment was made of major boiler plant or other activity located within 1km of the existing AQMA that might affect NO_x levels, either by direct emissions or by indirect emissions (eg traffic attending the site).

Sowerby Bridge has had a variety of industry in the past including several large mills subject to heavy industrial uses. Over the years some of these have converted from large single user to multiple smaller industrial users and also to residential use. Remaining within 1km of the AQMA boundary, and listed from west to east, these include

- Ryburn High school, Sowerby

- Supermarket, Sowerby New Road including a medium sized car park
- Public Swimming pool, Hollins Mill Lane
- West End Mills, West Street
- Denroyd Ltd Holmes Road
- Dugdale plc Valley Mill, Holmes Road
- Railway Station, Station Road, Sowerby Bridge
- medium sized car park serving 2 small supermarkets, the proposed market area and existing Town Hall Street / Wharf Street shops.
- Sowerby Bridge High school, Gratrix Lane
- HBOS data Centre, Wakefield Road, Copley

There are no power plants within the AQMA boundary, and the only significant boiler plant is found at a local school downwind of the AQMA and at the HBOS data centre also downwind. Both high schools are outside the AQMA. The railway station off Station Road is lightly trafficked. Any emissions from the industrial plant off Holmes Road are presumed to dissipate to the east, there being no evidence of elevated levels at SB2 or CV2. The HBOS data centre is a large site but 0.5km east of the AQMA at its eastern extreme. In all cases any contributions made by these commercial / industrial sources to background levels is assumed to be incorporated in the background value of 18μgm^{-3} for 2006.

The A58/ A6142, the A6026 and the A6139 are the main transportation routes in the AQMA. The A646 and the Halifax–Sowerby Bridge-Manchester / Blackpool / Preston railway line lie just outside of the AQMA. There is also the Rochdale canal which is primarily used by leisure traffic albeit the canal is not considered to be a major contributor to local NO_2 levels. The rail line is lightly trafficked, although there is a station lying to the south of the AQMA, and paragraph 6.50 of LAQM.TG(03) does not suggest it would be a significant local contributor to NO_2. The main source of nitrogen dioxide in this locality is from traffic using A58 and its contributory roads.

Paragraph 6.71 and Box 6.9 of LAQM.TG(03) offer a mechanism to derive NO_2 from NO_x for road traffic sources. Normally I ppb of NO_x is held as the simple sum of 1ppb NO and 1ppb NO_2, with most NO_2 arising from conversion of NO_x in the atmosphere. Within the ADMS model it is also assumed that a small proportion of NO_2 comes from direct emissions. However, notwithstanding the dynamics of actual traffic conditions and driving patterns, no two vehicles of identical age, make and model, emit identical levels of pollution and there is argument that the direct NO_2 emission component factored within the model is unrepresentative of actual conditions. The TG(03) method was adapted to account for actual emissions by the local traffic fleet, and hence the amount of primary emitted $NO_{2,}$ by referencing measured NO_2 levels to measured NO_x levels. Equivalent NO_x values for background NO_2 (20μgm^{-3}) and the AQO (40μgm^{-3}) were derived from recorded data at Romon 1 for January-September 2006 (see Figure A3 in Appendix 3 below). They are used in Figure 6 below to show the extent of reduction needed locally to bring NO_2 within acceptable levels.

Against an assumed background level of 18.3μgm^{-3} for 2006 Figure 6 suggests that NO_x levels on the A58 at Town Hall Street at receptor Romon 4 need to be reduced by 72μgm^{-3} in order to meet the Air Quality Objective of 40μgm^{-3}. Given paragraph 4.3 alludes to no significant industrial sources impacting in the AQMA this equates to 54% of NO_x emissions from road traffic.

Paragraph 6.06 of LAQM.TG(03) holds that nitrogen oxides emissions from road transport are expected to fall to 2010 and beyond, with urban traffic NO_x falling by some 20% between 2000 and 2005, and by 46% between 2000 and 2010. Using the NAEI year adjustment calculator with 2006 as base year, for roadside reduction levels are projected to 2010 and shown in Table 12 below. In 2010 Table 12 suggests the annual mean NO_2 concentration at Romon 4 would be 44μgm^{-3}. The background concentration is projected at around 15μgm^{-3} (See Table 5 above).

Figure 6: Apportionment of NO_2 and NO_x emissions in the AQMA

The contributors to NO_x levels at Romon 4 are road traffic and the background.

The 2006 annual mean NO_2 at Romon 4 on Wharf Street is 50μgm^{-3} and annual mean NO_x is 164μgm^{-3}. The background NO_2 level is 18.3μgm^{-3} equating to 31μgm^{-3} NO_x. The background component is 19% of measured total NO_x (31/164*100%). By inference the road component is 81%, equating to 133μgm^{-3} NO_x.

At Romon 4 the annual mean NO_2 concentration needs to be reduced from 50μgm^{-3} to 40μgm^{-3} to comply with the AQO. From Appendix A3 40μgm^{-3} NO_2 is equivalent to 92μgm^{-3} NO_x.

To reduce the NO_2 the reduction needed in total NO_x is 164 - 92 = 72μgm^{-3}. This is equivalent to 44% (ie 72/164*100%) of the total NO_x.

If the necessary NO_2 reduction were to come solely from changes to road traffic then road NO_x emissions would need to be reduced by 54% (ie 72/133*100%).

Table 12 suggests that NO_2 concentrations in the western area of the AQMA in 2010 will continue to exceed the Air Quality Objective. Furthermore the reductions in NO_2 assumed by TG(03) may not necessarily be relied upon in light of concerns that newer vehicles are now suspected of creating more primary NO_2 emissions than previously thought. As the vehicle fleet is constantly being renewed it is yet to be seen how the findings from modelling will correlate to actual measurement.

Modelling is a term used to describe several tools used for predicting future levels in an area or at specific receptor points, and hence the likely exposure of residents to nitrogen dioxide in future years to be made and areas of likely exceedence of the air quality objective to be determined. It is also used to quantify the relative component sources. There are inherent inaccuracies in modelling, it being difficult to replicate the actual dynamic of traffic volumes, speeds, acceleration, deceleration, congestion, and to accurately reflect the make up of the vehicle fleet on a given day apropos "new" or "old" vehicles and sub-classes of vehicle. Consequently comparison of

Table 12: Continuous Monitoring and Passive Diffusion Tube Measurements of NO_2 Estimate of reading as at 2010 (µgm^{-3})				
	Uncorrected data (µg/m^3) 2006	Period and Bias corrected 2006	Projected reading 2010 (ADMS Urban)	Projected reading 2010 (Netcen)
Romon 4	50.1	50.1	43	44
SB1	76	67	55	58
SB2	31	28	27	24
SB3	46	40	35	35
SB4	Not deployed	-	-	-
SB5	51	45	39	39
SB6	56	50	43	44
SB7	46	41	38	36
SB8	41	36	32	32
SB9	53	47	40	41
SB10	31	27	25	23
SB11	42	38	33	33
SB12	53	47	39	41
SB12A	49	44	39	38
SB13	44	39	36	34
SB14	41	36	34	31
SB15	54	48	40	42
SB16	45	40	35	35
SB17	49	43	38	37

modelled concentrations to measured values show that it cannot replace the accuracy of measurement

ADMS Urban was also used to project nitrogen dioxide levels. Results are given in Table 13 below. This model uses spatial calculation to project pollution levels in notional grid squares, which can be of any size from 10m x 10m. The size of the grid squares is important. Clearly traffic does not instantly achieve a different speed and maintain it between adjacent squares. In reality acceleration is recognised as a highly polluting event. Smaller grids which might better reflect changes in speed require a greater data input to populate the model and make for a greater computational load, but offer a more “accurate” output.

The model can account for topography but this greatly increases the computational load, and experience suggests it has little effect on computed results. No modelling tool can account for all sources of nitrogen impacting in the area modelled with many smaller sources simply assumed in the “background” or other data input; this model only distinguishes between Heavy Goods Vehicles and Light Vehicles and sub-divisions within such groups are not recognised. In any event large amounts of *local* traffic and weather data often simply do not exist. An alternative approach using 500m x 500m grid squares or focusing on specified key receptors requires much less computational load. Barriers to dispersion as presented by buildings and walls are only factored into calculations where they form part of a street canyon. Relationships are still suggested by model outputs and hence the extent of dispersion to be indicated in the outputs, this offers the best use of the model.

Known and estimated traffic data, traffic speeds and congestion derived in 2005/06, the Bingley 2006 weather dataset were fed into the model. NO_x concentrations were projected for receptor positions within the AQMA. The model was then re-run to represent various scenarios eg no HGV component, changes in speed, no congestion, reduced traffic volume etc. This allowed individual contributions to overall emissions to be estimated. The results are presented in Table 13 below.

Table 13: Estimate of Emissions of NO_2 from A58 traffic in μgm^{-3}
(%age component of all traffic, '+ve' values represent reductions in levels)

Receptor points	Measured 2006, bias and period corrected	All Traffic (modelled)	No HGVs		Reduction in traffic by 50%, with congestion factor unchanged		Reduction in traffic by 75%with congestion factor unchanged		No congestion		No congestion and traffic speeds increased by $10kmh^{-1}$		No HGV and No congestion	
SB1	67	51	35	32%	49	4%	48	6%	34	34%	32	37%	27	48%
SB2	28	29	24	17%	27	8%	25	12%	26	11%	26	12%	23	21%
SB3	40	41	31	25%	37	9%	35	13%	34	17%	33	19%	27	33%
SB5	45	43	29	33%	39	9%	36	15%	36	16%	34	19%	25	41%
SB6	50	57	36	36%	55	3%	55	4%	32	44%	31	46%	24	58%
SB7	41	31	25	20%	29	6%	28	9%	26	16%	26	17%	23	26%
SB8	37	51	34	33%	49	5%	48	7%	33	36%	31	39%	26	49%
SB9	47	41	30	26%	36	10%	34	16%	35	15%	33	17%	27	32%
SB10	27	29	24	18%	27	7%	26	10%	25	14%	25	15%	22	23%
SB11	38	39	29	26%	36	7%	34	11%	31	20%	30	22%	25	34%
SB12	47	45	32	29%	42	6%	41	9%	33	26%	32	28%	27	40%
SB12A	44	37	29	22%	32	13%	29	21%	34	7%	33	9%	27	25%
SB13	39	33	26	22%	30	9%	28	14%	30	10%	28	15%	24	27%
SB14	36	33	26	23%	30	10%	28	15%	29	13%	28	16%	24	28%
SB15	48	41	31	25%	36	12%	33	20%	36	11%	35	14%	29	30%
SB16	40	44	32	27%	39	13%	35	20%	38	14%	37	17%	29	34%
SB17	43	47	33	30%	45	6%	43	9%	34	29%	33	31%	27	43%
Romon 4	50.1	49	34	30%	46	5%	45	7%	33	32%	32	34%	27	45%

Several scenarios were modelled. The base model used traffic data and observations at various times of day to develop a diurnal profile and to model queues. The base model was adjusted to account for inclines on Bolton Brow and included canyons on West Street and Wharf Street. The match between the base model and the measured data was close except at the tube SB7, which is in a courtyard opening onto the A58, and certain tubes in the street canyons (SB1 and SB6), where one would expect that exact matches would be difficult to obtain. All reductions expressed as percentages are as comparisons with the base model predictions.

Table 13 suggests that HGV traffic accounts for the single biggest component of traffic-related NO_2 emissions, in the range of 17-36% of the total. Reference to tables 7 and 13 suggest that on the relatively level section of A58 near Romon 4 HGVs comprise 7% of traffic but 30% of emissions and this is presumed typical. Tackling this source offers the greatest reductions to be made in emissions.

Road speed and congestion are other factors that can be tackled to achieve significant overall improvements. The model is populated with data accommodating the fact that the HGV traffic moves at slower speeds on certain sections of the road. Previous modelling experience has shown that reducing traffic speeds across all classes of vehicle by 10km/hr increase NOx emissions by 3-9%, again with the greater effect being felt on inclined sections of road.

Eliminating congestion alone appears to reduce emissions by around 15% and in conjunction with increasing traffic speeds by 10km/hr would results in savings of 18%. It has been noted that congestion in Sowerby Bridge can be severe throughout the day, but is particularly bad when traffic is diverted from the M62. This has been known to happen several times a week at certain times of year.

There is no suggestion that this set of scenarios is complete or comprehensive. More complex models could be set up to vary several parameters together, but it is clear that the major contributions have been identified and potential savings indicatively quantified.

In summary HGVs are found to make the most significant contribution to nitrogen dioxide levels, with congestion also making a significant contribution.

5 The impact of recent policy developments upon the AQMA

5.1 National Policy (NO_2 and NO_x)

The Government published its revised Air Quality Strategy in July 2007.

It states that NO_2 is associated with adverse effects on human health but accepts that there is debate as to the extent of some of those effects. It maintains that at high levels NO_2 causes inflammation of the airways and that over the long term it may affect lung function and (other existing) respiratory ailments. It also enhances allergic responses in sensitive individuals. It advises that high levels of NOx can adversely affect vegetation, and contribute to the acidification (making environments more acid) and eutrophication (excess nitrogen in soil) of sensitive habitats, which leads to loss of biodiversity. NOx also contributes to ground level ozone production which can affect human and plant health.

The government expects NO_2 levels to continue to fall, but not as fast as previously expected, nor as fast as levels of nitric oxide (NO). It believes that an increase in road traffic NOx emissions directly emitted as NO_2 is due to an increasing number of light duty diesel vans and cars fitted with oxidation catalysts to meet Euro 3 emission standards. It predicts that there will be exceedences of NO_2 above the AQO alongside some busy major roads well beyond 2010.

No change is proposed to the air quality objectives for NO_2, although the World Health Organisation may yet argue for a lowering of the annual mean objective of $40\mu gm^{-3}$. The government strongly advocates that air quality issues should be dealt with in a holistic, multi-disciplinary and multi-agency way. It sees it as vital that all those organisations, groups and individuals that have an impact upon local air quality, should work towards the objectives of an adopted action plan.

5.2 Car Ownership and Commuter Statistics

The Department for Transports' document "Focus on Personal Travel Statistics 2005" charts national and regional trends in car ownership for the period 1980-2002. Together with data extrapolated from the 2001 and 1991 UK national census Calderdale shows an increasing trend in car ownership, with fewer households without cars, and an increase in households with 2 or more cars.

Households with no car or van fell from 39% in Calderdale in 1991 to 31% in 2001. The national average dropped from 41% to 26% and in 2002/03 the average in the Yorkshire and Humberside region was 31%.

Households with 1 car or van increased from 42% to 44% between 1991 and 2001 in Calderdale. Nationally and regionally 45% households have 1 car. Nationally this figure has remained constant over 1980-2002.

Households with 2 or more cars or vans in Calderdale increased from 19% in 1991 to 25% in 2001 in Calderdale Nationally the rise was from 15% in 1980 to 29% in 2002. Regionally for the year 2002/03 24% households had two or more cars.

Figure 7 shows the complex traffic network at Sowerby Bridge. The A646 is the main east-west commuter route between Halifax, Hebden Bridge and Todmorden. Passing north of the A58 it does not impact on the AQMA, unless the eastbound A646 is used with the A6319 and A6026 to access Elland, Huddersfield, or the M62 east, or to provide an alternative route to Brighouse avoiding Halifax. The A58 and A672 connect the M62 west, Oldham, Rochdale, Rishworth and Ripponden with Sowerby Bridge and Halifax. This route does pass through the AQMA. Connection to Elland, Brighouse or the M62 East is possible via the A6026 but long distance traffic would more likely choose to travel to a more appropriate junction of the M62.

Some data exists regarding commuting (see Table 14 below) but it is difficult to determine exact figures for travel via the A58 at Sowerby Bridge as it involves both origins and destinations that are inside and outside of Sowerby Bridge and inside and outside Calderdale.

Table 14: Modes of Travel for Calderdale Residents and All People working in Calderdale				
Mode of Travel	Calderdale Residents in Employment		All people working in Calderdale, inc non-residents	
	1991	2001	1991	2001
Car driver	57.3%	62.8%	56.4%	62.2%
Car Passenger	8.3%	8.1%	8.3%	8.6%
Train	1.6%	2.3%	0.7%	0.9%
Bus	17.3%	12.3%	18.4%	13.0%
Foot	13.6%	11.8%	14.3%	12.5%
Cycle / Motorcycle	2.0%	1.8%	2.0%	1.9%
Other		0.8%		0.9%

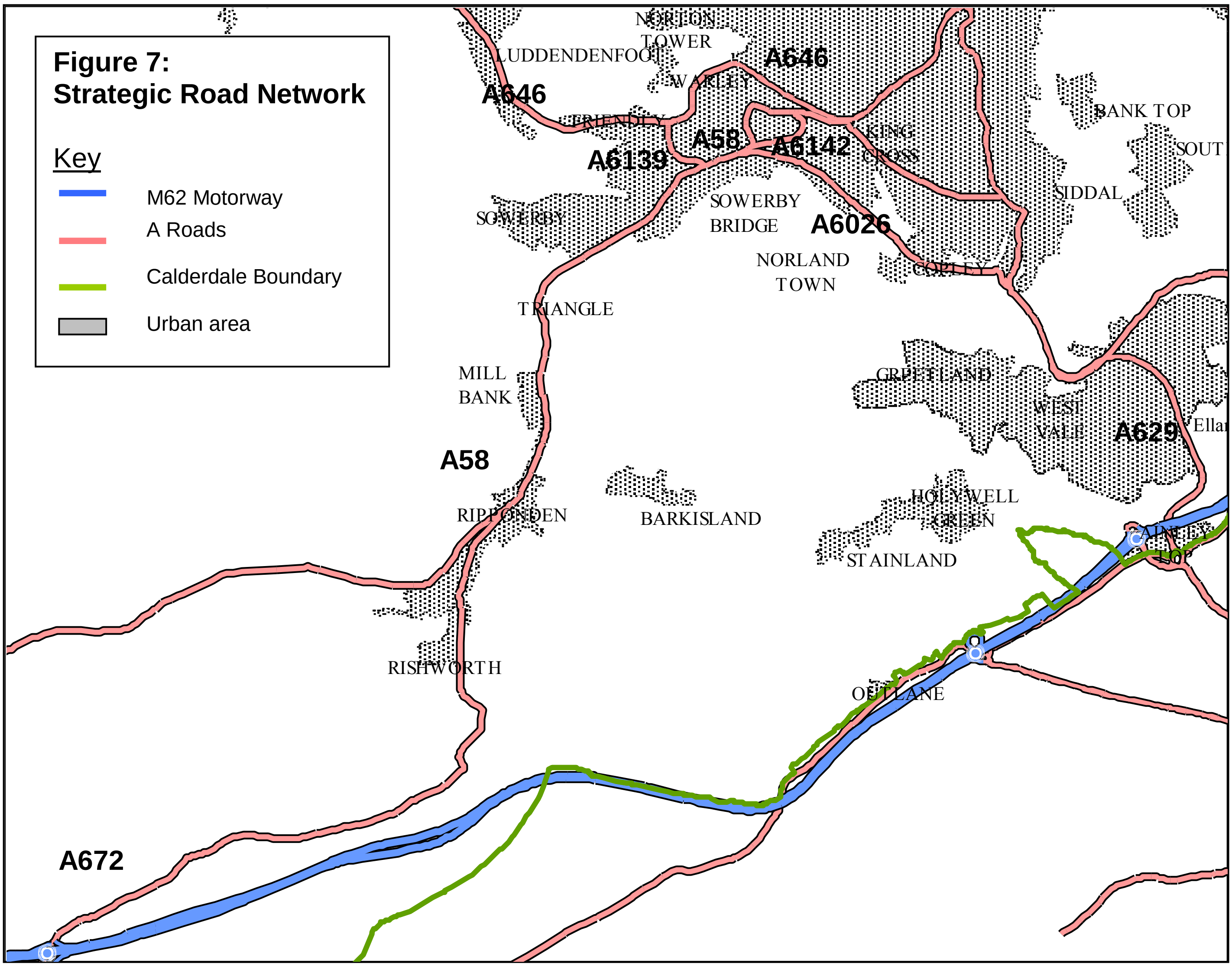


Figure 7: Strategic Road Network

What can be discerned is that

- Analysis of the 1991 and 2001 census data shows that in-commuters to the Calderdale Borough as a whole rose by 21.2 % and out-commuting by 25.5% over that decade. In simple terms about 45,000 people travel into or out of the Borough to go to work each day. The mode of transport is given in Table 14 above.

- Travel to work journeys between Calderdale and Greater Manchester / the North-west increased substantially between 1991 and 2001, with a 60% Outbound rise to 4281 and a 54% inbound rise to 2274

- Excluding travel within the wards, journeys from Sowerby Bridge and Ryburn wards to work, which include Ripponden, Rishworth, Mill Bank and Barkisland increased by 55% between 1991 and to 8059 in 2001

- Journeys from other areas to Sowerby Bridge and Ryburn wards for work increased from 2662 in 1991 to 3896 in 2001 (46%).

- About 1800 travel from the Ryburn valley through Sowerby Bridge to work in other parts of Calderdale, Bradford, Leeds and beyond.

- 1050 travel from wards at the eastern end of Calderdale through Sowerby Bridge to the western part of the district and towards Burnley, Bacup and Colne.

- 430 from other areas of Calderdale, Bradford and Leeds travel to the Ryburn valley to work and a further 300 continue towards Greater Manchester.

- We also received data on traffic flows at rush hour for 2003 from Transport Section. For Sowerby Bridge this showed an increase of 46.1% from 1993 to 2003 between 8am and 9am, and 41.9% between 5 and 6 pm.

Paragraph 4.3 points to the importance of minimising journeys via this A58 corridor, because of their contribution to NOx emissions, which in turn points to a need for a greater understanding of the number, type of and need for journeys. This should be addressed as part of the Action Plan.

5.3 Local policy

At the time of declaring the AQMA the main planning development controls lay in the 2004 replacement Urban Development Plan which was adopted by Calderdale MBC as the Local Planning Authority in August 2006. This provides the following planning polices EP1 and EP2:

EP1 “Protection of Air Quality” states
Development which might cause air pollution (including that from modes of transport) will only be permitted if: -

i) *it would not harm the health and safety of users of the site and surrounding area; and*
ii) *it would not harm the quality and enjoyment of the environment.*

EP2 “Development within an Air Quality Management Area” states
Within a declared Air Quality Management Area, development will be permitted provided it can be demonstrated that the pollution levels, if any, would be consistent with the objectives/and or targets of an Action Plan and would not lead to unacceptable pollution levels.

EP1 and EP2 have specific application, yet EP1 and arguably EP2 are also deficient in a key respect, being worded in terms of development that would cause air pollution rather than be exposed to it. EP2 is also restricted to the objectives of an action plan (AQAP). LAQM.PG(03) recommends such plans be created within 12-18 months of declaring an AQMA, which means that EP2 cannot apply until an AQAP is in place. There is a need to strengthen EP1 and EP2.

There are other development control policies that are pertinent. Housing policies H1 (separation of housing and industry), H2 (primary housing areas), H9 (non-allocated sites) and H13 (affordable housing) are all subject to avoiding the creation of significant traffic amenity, environmental or other problems, albeit air quality is not specifically mentioned. Additionally policy T18 specifies maximum parking allowances. There may be no need to provide parking within designated town centre areas. Policy T21 promotes car free and low car ownership housing.

The Calderdale AQMA (No 2) is a well-defined area with minimum opportunity for new development but there are some large garden areas identified in paragraph 2.3 above, and a small number of brownfield plots or vacant buildings, in the latter case in the Bolton Brow / Chapel Lane area. Prior to declaration of the AQMA in August 2006 planning permission was granted to build a new supermarket off Sowerby New Road. Since then several planning applications in and near the AQMA have been made and are discussed below. By its nature pollution levels in the AQMA exceed the Air Quality Objective, but the AQMA includes areas where there currently are no receptors, These include some large sites which because of their size and proximity to the A58 or other main roads experience high levels of pollution on at least one façade, but not necessarily on others.

- Planning applications. A number of planning applications for sites within and close to the AQMA were lodged or determined since August 2006 including

06/02037/CON-11 Town Hall Street: Change of use from ground floor shop to Hot food takeaway- Refused

06/01859/CON Former Bank 21 - 23 Town Hall Street : Change of use to mixed commerical and residential use- Refused but overturned on appeal

07/00588/FUL Java Restaurant 75 Wharf Street: Provision of car wash- Refused

07/00112/CON 3 - 4 Regent Parade, Wharf Street : Change of use from A1 (Retail) to retail A2 (Financial & Professional Services)

06/01401/COU29 Wharf Street –Provision of Taxi office with parking - Refused

07/00267/OUT Land adjacent 131 Bolton Brow- Rebuild two storey terraced house as previously existed (Outline)- Refused

06/02421/FUL to build 15 apartments on land adjacient Methodist Church Chapel Lane- Approved.

Of these the application of most concern was 06/01859/CON for 21 - 23 Town Hall Street. The application sought to provide residential accomodation when none had previously existed. The council refused the application on air quality grounds. This refusal was overturned on appeal to the Planning Inspectorate (PINS). The main grounds cited were

- The government's own Air Quality Strategy questioned the effect of NO_2 upon health.
- In the absence of an Action Plan in force planning policy EP2 could not be used, and EP1 did not relate to new exposure.
- Regeneration and Building Conservation was more important in this case
- Residential accomodation was already provided above other shops and this proposal would be no different.

Calderdale argued that PINS determination of the appeal seemed to ignore much of the statutory guidance LAQM.PG(03) placed upon Calderdale, and took a dubious interpretation of PPS23. The only mechanism to challenge the PINS decision was in the High Court. Calderdale complained to DEFRA about the PINS interpretation of PG(03) but to no avail, and a challenge in the High Court against one government service, based on its interpretation of another government department's guidelines was not contemplated.

Traffic management measures have been proposed, introduced or extended since declaration of the AQMA. These include

- The Calderdale Car club- a scheme that offers discounted car parking for those sharing cars for their journeys.

- Metrocard – a scheme offering discounted public transport.

For the next 2 years the UDP will run in parallel with a nascent Local Development Framework (LDF), which will ultimately replace it. The LDF comprises Local Development Documents (LDDs) and Development Plan Documents (DPDs) that form the basis for the Council's policies. Originally LDFs were envisaged as dynamic and flexible, so allowing the planning system to respond to change more quickly. This is not now the case although the preparation, monitoring and review of the LDF is a continuous process. A further proposal, pertinent to both planning development and traffic management, is the creation of an advice leaflet (to feature Calderdale's 6 AQMAs as of August 2007) for use in connection with proposed planning development in or near AQMAs. This is a more speedy response to what is now a lengthy process to amend individual polices under the LDF.

The leaflet will identify Calderdale's 3 AQMAs including Sowerby Bridge, reflect the advice of the National Society for Clean Air and Statutory Guidance PPS 23:2004 and LAQM:PG(03), and discuss the need for restricting development and associated traffic and hence pollution impacts in the planning application process.

The likely costs and benefits of these and other measures will be discussed in the air quality action plan.

6 Summary and Conclusions

This report estimates that the background concentration of Nitrogen Dioxide (NO_2) in the Sowerby Bridge area in 2006 is 18.3μgm^{-3}, and that this background level is presently projected to fall to about 15μgm^{-3} in 2010.

It notes that in 2006 real-time measured annual mean levels of NO_2 are in the region of 50μgm^{-3}, such levels being clearly in excess of the Air Quality Objective (AQO). Whilst it recognises that the extent of the AQMA declared in 2005 following computer prediction might be justifiably changed following actual measurements now to hand, the scope for change is more limited than that in Calderdale AQMA No1, as reported in the Further Assessment for that area. Part of the existing AQMA is expected to remain at or above the AQO of 40μgm^{-3} to 2010 and beyond.

If, as argued in the body of this report, the most significant source of NO_2 in the area arises from road traffic, NO_x from traffic emissions must be reduced by some 54% to meet the Air Quality Objective. Calculations suggest that 6-7% of the traffic fleet, in the form of HGVs and PSVs, are responsible for some 17-36%, typically 30% of the NO_2 emitted. Concentrating on reducing emissions from this sector and making this traffic flow more freely might offer the most significant benefits, albeit attention to schemes to reduce all traffic along this stretch of the A58, and to make what traffic does use it move more fluidly will have some benefit of reducing emissions. Such matters will be more fully explored in the Air Quality Action Plan (AQAP), due in 2008.

Equally attention will need be given to careful consideration of planning development in or near to the AQMA and to strengthening the council's current policy in this respect.

The Council's intention is to maintain the existing NO_2 monitoring network in the AQMA for the near future, and to review the monitoring network to facilitate the assessment of measures yet to be introduced under the AQAP.

Environmental Health Services
Calderdale Metropolitan Borough Council
August 2007

This Assessment is open to public consultation until October 1st 2007.

Comments should be made to Head of Service
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Appendix 1: Quality Control

Equipment

The Romon automatic monitoring stations are operated under a maintenance contract with the supplier, Casella covering six-monthly servicing and callout to emergencies. The analysers are ML9841Bs, which operate by splitting an air sample, analysing one subsample for NO and the other for total NOx. This largely avoids problems associated with taking serial samples.

Calderdale staff who are familiar with the equipment carry out weekly manual span and zero checks according to written procedures based on training from the supplier. In-line filters are checked and changed as required. This means that the Romons are physically checked for vandalism or obvious faults (such as impending pump / air conditioning failure) weekly. The results of the span and zero checks are recorded for use in the calculation of NO_2 concentrations.

Diffusion Tubes are supplied and analysed by West Yorkshire Analytical Services. They are prepared using 50% TEA in acetone and are exposed for approximately 1 month.

Raw Data

The Romons are polled every day and the data is stored in a database on a standalone PC. The data is checked every working morning as a means of spotting problems with the analysers. If no data has been received there is a system of remote checking (on demand polling) which is followed up if necessary by a site visit. Unusual results are followed up either by Casella, who can retrieve data from the Romons, or by a site visit.

The database is backed up to the Calderdale network every week.

Calculated Data

The mean NO_2 concentrations are calculated in Excel every month using the factors calculated from the span and zero measurements. The calculated values are graphed to quickly identify any unusual patterns or negative values. These are investigated and, where appropriate, unexplained suspect data is rejected.

The raw data is retained so that if it comes to light that the analysis is suspect we can always go back and recalculate.

There is a gradual drift in the analyser response and it has been necessary on several occasions to have the analysers serviced before the six months are up in order to improve confidence in the calculated concentrations.

Appendix 2: Bias Correction and Period Correction Factors

The bias correction factor was derived from a triple of passive diffusion tubes co-exposed with Romon 4, which is inside AQMA No 1. These Tubes are referenced “BS1”, “BS2”, and “BS3”. This factor is therefore highly relevant to the tubes exposed in the AQMA.

Table A2.1: Derivation of Bias Correction Factor 2006						
Month	Romon 4 Average (μgm^{-3})	Tube BS1 (μgm^{-3})	Tube BS2 (μgm^{-3})	Tube BS3 (μgm^{-3})	BS Tube average (μgm^{-3})	factor
Jan	63.99	72	79	79	76.67	0.83
Feb	57.17	61	57	63	60.33	0.95
Mar	60.75	44	53	65	54	1.13
Apr	55.94		62		62	0.90
May	52.34	43	57	23	41	1.28
Jun	58.15	69	71	73	71	0.82
Jul	55.96	63	66	58	62.33	0.90
Aug	52.4	55	59	56	56.67	0.92
Sep	57.34	64	67	68	66.33	0.86
					mean	0.95

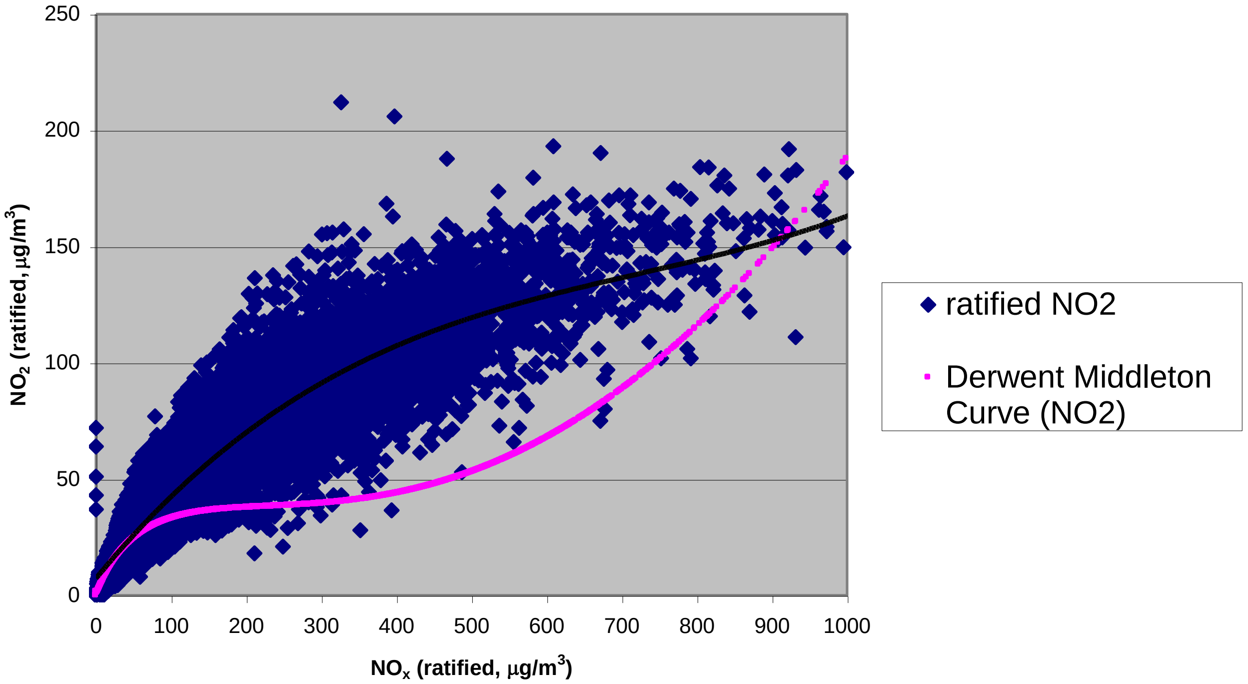
The period correction factor applied to the diffusion tube results was derived using data from tubes CRH4, CS2, HB3 and HB4 for the period January to September 2006. The details are shown in Table A2.2 below.

Table A2.2: Derivation of period correction factor			
Tube	2005 Average (μgm^{-3})	Average for period (Jan –Sep 2006) (μgm^{-3})	factor
CRH4	38	40.3	1.09
CS2	44	45.3	0.97
HB3	33	26.4	1.26
HB4	37	44.0	0.84
		mean	1.04

Appendix 3: Determination of NO_x from NO_2

"Measured" NO_2 is determined by subtracting measured NO from measured NO_x. Such measured values reflect the actual vehicle fleet, actual driving characteristics and actual vehicle emissions (and other environmental emissions) at any given time at the point of measurement, in this case Romon 4. In the case of vehicle emissions the amount of NO_2 emitted directly as a primary pollutant, as opposed to primary NO_x emissions which then evolve in the atmosphere into NO_2, is constantly varying. For the period January to September 2006 a range of NO_2 concentrations were determined from measured NO_x values, and a line of best fit drawn (see Figure A3 below). Computer models assume a certain relationship of direct to indirect emissions of NO_2 from vehicle engines, such an assumption represented by the Derwent-Middleton Curve, and the same fleet composition for the period modelled. Figure A3 shows that projected NO_2 levels based on those assumptions do not compare well to those derived from measurement.

Figure A3: Correlation between measured and projected NO_2 and NO_x emissions, Romon 1, January - September 2006.



For the purpose of the calculations of Figure 6 in the main report it is necessary to determine a local level of NO_x that represents the Air Quality Objective of $40\mu gNO_2/m^3$. Interpolation of the graph puts this at $92\mu gNO_x/m^3$

Calderdale Council

If you would like this information in another format or language, please contact:
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আপনি যদি এই তথ্য অন্য কোন মাধ্যম অথবা ভাষায় চান তাহলে দয়া করে যোগাযোগ করুন ঃ

اگر آپکو یہ معلومات کسی دوسری زبان
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