

RYEDALE
DISTRICT
COUNCIL



2012 Air Quality Updating and Screening Assessment for *Ryedale District Council*



In fulfillment of Part IV of the
Environment Act 1995
Local Air Quality Management

May 2012

Local Authority Officer	Paul Hunt
Department	Health & Environment
Address	Ryedale House, Old Malton Road, Malton, North Yorkshire YO17 7HH
Telephone	01653 600666
e-mail	envhealth@ryedale.gov.uk
Report Reference number	LAQM/RDC/USA/2012
Date	May 2012

Executive Summary

This report is the latest updating and screening assessment of air quality in Ryedale. This is a continuation of a process to assess and review local air quality that began in 1999, with the last updating and screening assessment (USA) completed in May 2009.

The Updating and Screening Assessment has regard to the objectives set by the Air Quality (England) (Wales) Regulations 2000, the Air Quality (England) (Wales) (Amendment) Regulations 2002 and detailed technical guidance contained in LAQM.TG (09). The assessment considers new monitoring data; new objectives; new pollutant sources or significant changes to existing sources, either locally or in neighbouring authorities; and other local changes that have arisen since the last round of review and assessment and which might significantly affect air quality.

Previous assessments have shown that the annual mean air quality objective for nitrogen dioxide is not met at several relevant receptor locations in Malton town centre and led to declaration of the Malton Air Quality Management Area (AQMA) Order in December 2009.

This Updating and Screening Assessment concludes that with the exception Nitrogen dioxide in Malton, there is not a significant risk that any air quality objective will be exceeded at a location with relevant public exposure. Therefore this Authority should not undertake a Detailed Assessment for any pollutant.

Table of contents

1	Introduction	6
1.1	Description of Local Authority Area	6
1.2	Purpose of Report	7
1.3	Air Quality Objectives	8
1.4	Summary of Previous Review and Assessments	10
2	New Monitoring Data.....	16
2.1	Summary of Monitoring Undertaken	16
2.1.1	Automatic Monitoring Sites	16
2.1.2	Non-Automatic Monitoring Sites	16
2.2	Comparison of Monitoring Results with AQ Objectives	22
2.2.1	Nitrogen Dioxide	22
2.2.2	Benzene.....	28
2.2.3	Summary of Compliance with AQS Objectives	29
3	Road Traffic Sources	30
3.1	Narrow Congested Streets with Residential Properties Close to the Kerb	30
3.2	Busy Streets Where People May Spend 1-hour or More Close to Traffic.....	30
3.3	Roads with a High Flow of Buses and/or HGVs.....	30
3.4	Junctions	31
3.5	New Roads Constructed or Proposed Since the Last Round of Review and Assessment	31
3.6	Roads with Significantly Changed Traffic Flows	32
3.7	Bus and Coach Stations	33
4	Other Transport Sources	34
4.1	Airports	34
4.2	Railways (Diesel and Steam Trains).....	34
4.2.1	Stationary Trains	34
4.2.2	Moving Trains	34
4.3	Ports (Shipping).....	35
5	Industrial Sources	36
5.1	Industrial Installations	36
5.1.1	New or Proposed Installations for which an Air Quality Assessment has been Carried Out	36
5.1.2	Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced.....	36
5.1.3	New or Significantly Changed Installations with No Previous Air Quality Assessment ...	36
5.2	Major Fuel (Petrol) Storage Depots	36
5.3	Poultry Farms	37
6	Commercial and Domestic Sources	38

6.1	Biomass Combustion – Individual Installations	38
6.2	Biomass Combustion – Combined Impacts.....	40
6.3	Domestic Solid-Fuel Burning.....	40
7	Fugitive or Uncontrolled Sources	41
8	Conclusions and Proposed Actions.....	42
8.1	Conclusions from New Monitoring Data	42
8.2	Conclusions from Assessment of Sources	42
8.3	Proposed Actions.....	42
9	References.....	43

List of Tables

Table 1.1	Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.
Table 1.2	Previous Reports, Dates of Publication and Outcomes.
Table 2.1	Details of NO ₂ Monitoring Sites
Table 2.2	Diffusion Tube Bias Adjustment Factor
Table 2.3:	Details of Non-automatic Benzene Monitoring Sites
Table 2.4	Results of NO ₂ Diffusion Tubes in 2011
Table 2.5	Results of Nitrogen Dioxide Diffusion Tubes 2007 – 2011
Table 2.6	Annual Mean Benzene Levels 2011
Table 2.7	Results of Benzene monitoring 2007 – 2011
Table 6.1	Biomass Installation Background Adjusted Emission Rate and Threshold Emission Rate
Table A.1	2011 Monthly NO ₂ Diffusion Tube Results
Table B.1	Adjustments for Incomplete Data, Site 2 – Wheelgate 1
Table B.2	Adjustments for Incomplete Data, Site 4 – Old Maltongate 1
Table B.3	Adjustments for Incomplete Data, Site 8 – Castlegate 3
Table B.4	Adjustments for Incomplete Data, Site 10 – Yorkersgate 2
Table B.5	Adjustments for Incomplete Data, Site 11 & 12 - Newbiggin & Church St
Table B.6	Adjustments for Incomplete Data, Site 14 – Pickering
Table B.7	Adjustments for Incomplete Data, Site 15 - Sherburn
Table B.8	Adjustments for Incomplete Data, Site 16 – Helmsley
Table B.9	Adjustments for Incomplete Data, Site 17- Rillington

List of Figures

Figure 1.1 Plan of Ryedale District

Figure 1.2 Map of Malton Air Quality Management Area

Figure 2.1 Map of NO₂ Diffusion Tube Monitoring Sites within and in proximity to the Malton AQMA

Figure 2.2 NO₂ Trend Chart 2007 - 2011

Appendices

Appendix A Raw Monthly Nitrogen Dioxide Results

Appendix B Determination of Annualisation Factors where less than 12 months data obtained

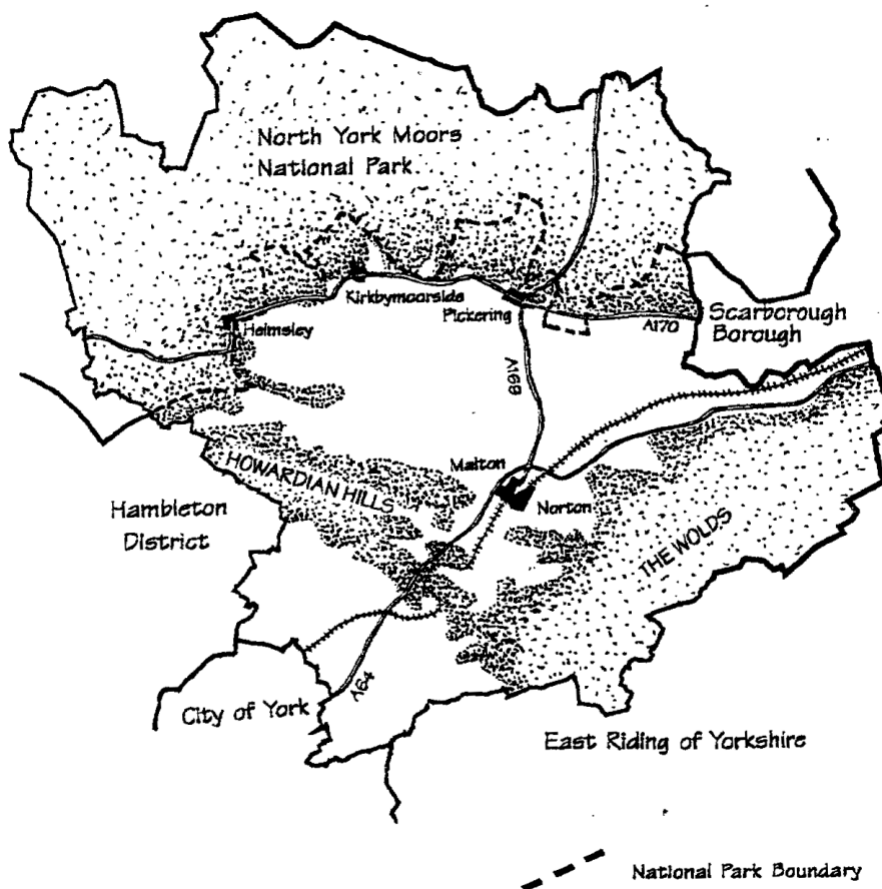
1 Introduction

1.1 Description of Local Authority Area

Ryedale is one of six districts in the County of North Yorkshire. It is located in the east of the region and is bounded by: Hambleton to the west; Scarborough to the north and east; Selby to the south; the unitary authority of East Riding of Yorkshire to the south east; and the City of York unitary authority to the west. Ryedale, with an area of 575 square miles (150,659 hectares), is the largest district in the County of North Yorkshire.

Figure 1.1 shows a plan of the district detailing its boundaries, broad topographical features, major towns, trunk roads and railways.

Figure 1.1 - Plan of Ryedale District



Ninety per cent of the districts land area is used for agricultural purposes and more than 10% of the workforce is employed in this sector. Agriculture and forestry together employ 15% of the workforce compared with less than 2% nationally.

Mineral extraction is undertaken at more than ten sites around the district. The Vale of Pickering is the site of a land based natural gas extraction field. Gas is piped from several well sites to a 50 MW electricity generating station at Knapton near Malton.

Ryedale has a diverse range of industries and a high proportion of small firms employing less than 25 people. The economy is characterised by a mixed manufacturing sector with emphasis on hi-tech research and development, and manufacturing for national and international markets. There are however several large firms, each employing some several hundreds of people, these include a number of food processing operations and construction materials manufacturers.

Industrial activity is largely concentrated at sites in or adjacent to the four market towns. These include three small/medium-sized industrial estates at Malton/Norton, two at Pickering, and one each at Helmsley and Kirkbymoorside. Significant industrial sites also exist elsewhere, notably at Sherburn and Knapton.

The major road network consists of the A64 (Leeds to Scarborough), A170 and A169 shown in Figure 1.1. Malton, where Ryedale District Council's headquarters are located, is in the centre of Ryedale's road network. The A64 York-Malton-Scarborough road follows the Derwent Valley and the northern edge of the Wolds. The A170 Thirsk - Pickering - Scarborough Road climbs the steep escarpment at Sutton Bank at the western edge of the district and connects the market towns along the southern boundary of the North York Moors. The A169 connects Malton and Pickering whilst the B1248 provides an important route via the Wolds to Beverley and Hull.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical

Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

First Round Review and Assessment

Ryedale District Council published its First Round Review and Assessment of Air Quality in two stages. Stage 1, published in 1999, concluded that the risk of exceedence of air quality objectives for each of the following pollutants was negligible: Benzene, Carbon monoxide, Lead and 1,3-Butadiene. In relation to three other key pollutants: Sulphur dioxide; Nitrogen dioxide; and PM₁₀, it was deemed necessary to proceed to a more detailed Second Stage review and assessment. The Second Stage review and assessment was published in June 2000 and concluded that the risk of exceedence of air quality objectives for these three pollutants was also negligible.

Second Round Review and Assessment

Following a detailed evaluation of the First Round of reviews and assessments Defra determined that the Second Round of reviews and assessments should follow the detailed technical guidance set out in LAQM.TG (03) – and should be carried out in two steps:

- An Updating and Screening Assessment (USA) to identify and consider any changes since the first round and to reach a view as to whether a detailed assessment is required for one or more pollutants.
- A Detailed Assessment should be carried out for pollutants where the updating and screening assessment shows there to be a significant risk that an objective will not be met.

The Council submitted its Second Round USA to Defra and the other statutory consultees in May 2003. The assessment concluded that the risk of exceedence of air quality objectives for Nitrogen dioxide and PM₁₀ was not negligible at certain

relevant receptor locations and that therefore a Detailed Assessment should be undertaken in respect of those two pollutants. The detailed assessment report was published in May 2004. It concluded that the UK air quality objectives for NO₂ and PM₁₀ would be met at all relevant locations in Ryedale and, therefore, that Ryedale District Council was not required to declare an air quality management area for either pollutant.

The LAQM framework requires that local authorities undertake USA's every third year. To ensure continuity in the intervening years, when authorities are not carrying out a USA or a Detailed Assessment, local authorities are required to produce Progress Reports. Progress reports are intended to provide both a review and update on air quality issues by addressing in particular new monitoring results and information on new local developments that might affect air quality. The intention is to ensure that changed circumstances warranting a detailed assessment will be identified early and acted upon without undue delay.

Progress Reports are not designed to represent a further USA. However, if a Progress report identifies a risk of an air quality exceedence then the authority should proceed to a Detailed Assessment and not delay until the next USA.

These requirements and the rest of the LAQM framework are set out in the policy and technical guidance documents LAQM.PG(09), and LAQM.TG(09).

A Progress Report was completed and submitted to Defra in May 2005. The Progress Report showed that there was not a significant risk that any of the air quality objectives which are at present included in Regulations for local air quality management purposes would be exceeded at any location with relevant public exposure.

Third Round Review and Assessment

The Council's Third USA of Air Quality was submitted to Defra in May 2006. The USA took account of the objectives set by the Air Quality (England) (Wales) Regulations 2000, the Air Quality (England) (Wales) (Amendment) Regulations 2002

and detailed technical guidance contained in LAQM.TG (03), and LAQM.TG (03) Update – January 2006. The assessment considered new monitoring data; new objectives; new pollutant sources or significant changes to existing sources, either locally or in neighbouring authorities; and other local changes that had arisen since the second round of review and assessment and that might significantly affect air quality. The Third Round USA concluded that In respect of all seven relevant pollutants it is unlikely that an air quality objective will be exceeded at any location with relevant public exposure and therefore a Detailed Assessment was not required in relation to any of pollutant.

In 2007 a further Progress Report was completed and submitted to Defra providing a review and update on air quality issues by addressing in particular new monitoring results and information on new local developments that might affect air quality. The report concluded that annual mean Nitrogen dioxide concentrations (measured using diffusion tubes) at certain relevant receptor locations along road links in the town centre of Malton exceeded the air quality objective. There were no breaches of any of the other air quality objectives presently included in Regulations for Local Air Quality Management purposes at any location with relevant public exposure.

Consequently it was determined that the Council should undertake a Detailed Assessment for Nitrogen dioxide. The purpose of the Detailed Assessment being to determine:

- whether an Air Quality Management Area (AQMA) should be declared by the Council; and
- the extent of any AQMA, should it be found necessary to declare one.

Submission of the Detailed Assessment was delayed in order to allow real time monitoring to be undertaken for a continuous period of 12 months. There was a further delay whilst air quality modelling was undertaken. Consequently the Detailed Assessment Report was not submitted to Defra until March 2009.

The Detailed Assessment Report concluded that the annual mean NO₂ objective was being exceeded at several relevant receptor locations in Malton Town Centre and

that an AQMA should be declared following a period of consultation, in the course of which consideration would be given to the boundary of the AQMA.

In accordance with the conclusions of the Third Round Detailed Assessment, in December 2009 following a period of consultation, an Order (The Malton Air Quality Management Area Order) was made by the Council. The Order designated an area in the centre of Malton as an Air Quality Management Area. The Order related to current and projected levels of nitrogen dioxide which breached, or are likely to breach, the nitrogen dioxide (annual mean) air quality objective ($40 \mu\text{g}/\text{m}^3$) as prescribed by the Air Quality (England) Regulations 2000 (as amended). A map of the AQMA is shown below in Figure 1.2.

Fourth Round Review and Assessment

The Council's Fourth USA of Air Quality was submitted to Defra in May 2009. The USA took account of the objectives set by the Air Quality Regulations 2000 (as amended) and detailed technical guidance contained in LAQM.TG (09). The assessment considered new monitoring data; new objectives; new pollutant sources or significant changes to existing sources, either locally or in neighbouring authorities; and other local changes that had arisen since the third round of review and assessment and that might significantly affect air quality. The Fourth Round USA concluded that with the exception of Nitrogen dioxide (annual mean objective), it is unlikely that an air quality objective will be exceeded at any location with relevant public exposure and therefore a Detailed Assessment was not required in relation to any other pollutant.

In 2010 a further Progress Report was completed and submitted to Defra. The report concluded that outside the Malton AQMA there were no breaches of any air quality objectives presently included in Regulations for Local Air Quality Management purposes at any location with relevant public exposure.

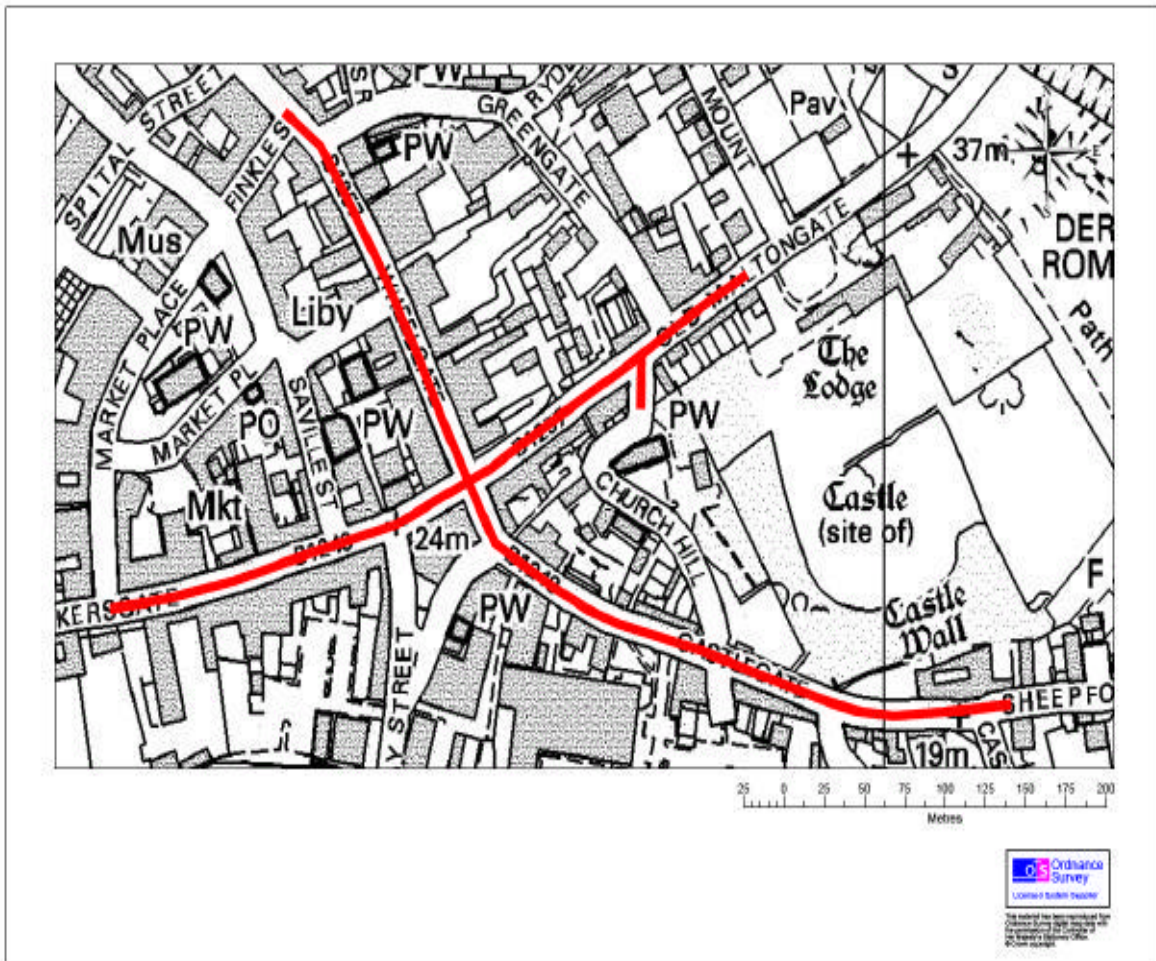
In 2011 a Further Assessment was completed which confirmed that the boundaries and extent of the Malton AQMA had been set appropriately. The assessment also apportioned the sources of nitrogen dioxide pollution and quantified the required

reduction from road traffic – the primary source. Also in 2011, a Progress Report concluded that outside the Malton AQMA there were no breaches of any air quality objectives presently included in Regulations for Local Air Quality Management purposes at any location with relevant public exposure.

Table 1.2 Previous Reports, Dates of Publication and Outcomes.

ROUND	STAGE	DATE COMPLETED	OUTCOME
1	1	1999	2 nd Stage Assessment Required for Sulphur dioxide; Nitrogen dioxide; and PM ₁₀
1	2	2000	No further Action Required
2	USA	2003	Detailed Assessment Required for Nitrogen dioxide; and PM ₁₀
2	Detailed Assessment	2004	No further Action Required
2	Progress Report	2005	No further Action Required
3	USA	2006	No further Action Required
3	Progress Report	2007	Detailed Assessment Required for Nitrogen dioxide
3	Detailed Assessment	2009	Air Quality Management Area Designation (Malton AQMA 14 December 2009)
4	USA	2009	No further Action Required (besides AQMA designation)
4	Progress Report	2010	No further Action Required
	Further Assessment	2011	Requirement for AQMA confirmed, source apportionment undertaken and required reduction in NO ₂ from local road traffic identified.
4	Progress Report	2011	No further Action Required

Figure 1.1 Map of Malton AQMA



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

No automatic monitoring was undertaken in the period covered by this report

2.1.2 Non-Automatic Monitoring Sites

Ryedale District Council operates a network of nitrogen dioxide diffusion tubes across Malton and Norton. In the last 12 months two new sites were added to this network. There are several other sites elsewhere in the district. Figure 2.2 shows the location of the Malton and Norton sites and details of all the sites are set out in Table 2.2. The samples are analysed by Environmental Services Group, Didcot (ESG) (formerly Harwell Scientifics) in accordance with Scientifics standard operating procedure HS/WI/1015 issue 15. This method meets the guidelines set out in DEFRA's 'Diffusion Tubes For Ambient NO₂ Monitoring: Practical Guidance'. The tubes are prepared by spiking acetone-triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes are desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection. The laboratory is UKAS accredited for the preparation and testing of NO₂ diffusion tubes.

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). Quarterly summaries of participating laboratories' performance in the WASP scheme over the preceding 12 months are prepared by AEA on behalf of Defra. The summaries are available via links on the Local Authority Air Quality Support Website at <http://laqm.defra.gov.uk/diffusion-tubes/ga-gc-framework.html>

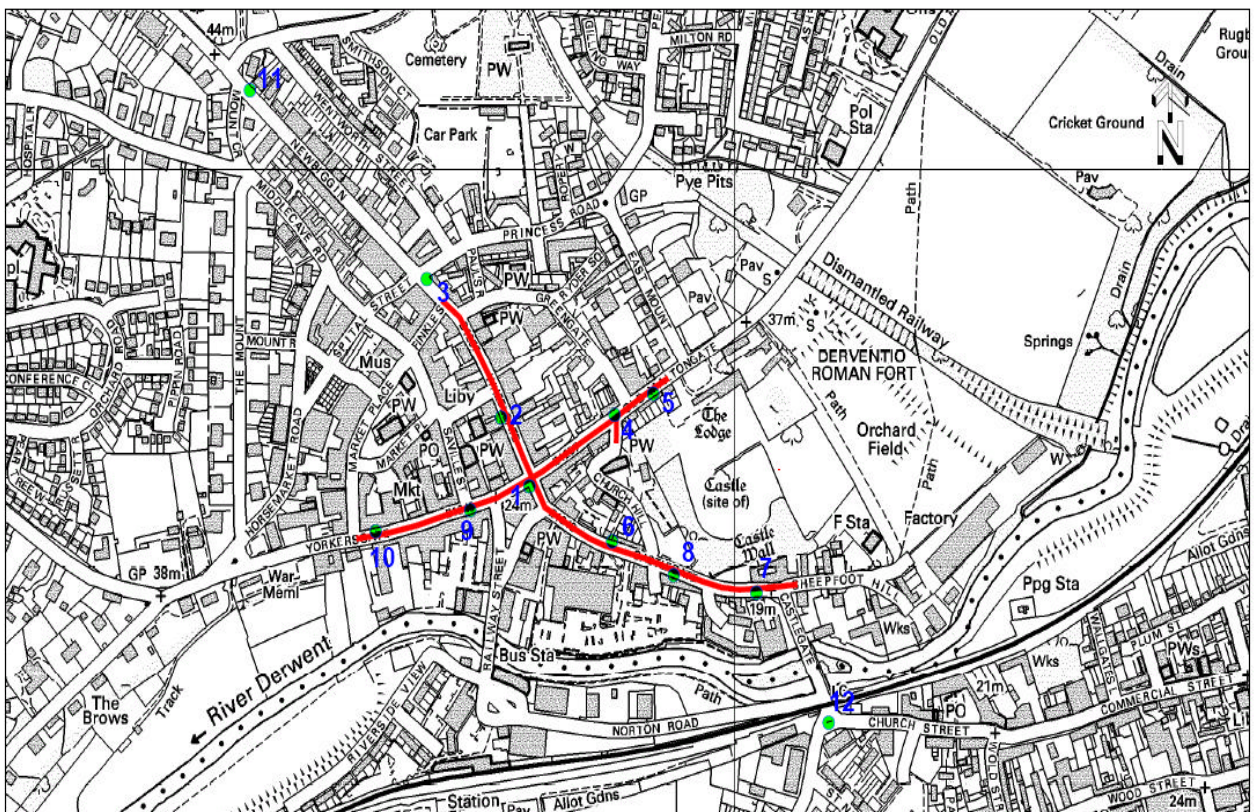
The latest performance summary (which covers the period 1 January 2011 to 31 December 2011) states that 100% of the results submitted by ESG were satisfactory.

Triplicate diffusion tubes are exposed at one of the sites in the Malton AQMA (Site 1) to allow an indication of the precision of the diffusion tubes to be determined. This is

done using a spreadsheet provided by The Defra Local Authority Air Quality Support website at <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>

Results for tubes exposed in triplicate in 2011 were found to have good precision. Precision is an indication of the reproducibility of results, and tubes are said to have good precision when the coefficient of variation between the triplicate tubes for eight or more months (during a twelve month period) is less than 20%, and the average coefficient of variation for all periods is less than 10%. In 2011 the average coefficient of variation (CV) during the 12 month period of triplicate exposure at Site 1 was 7% and the CV was less than 20% for 11 out of 12 months. Triplicate results were not available for 1 month because of the loss of two tubes.

Figure 2.1 Map Showing Location of NO₂ Diffusion Tube Monitoring Sites in and within the vicinity of the Malton AQMA



© Crown Copyright and database right 2012. Ordnance Survey 100019406.

Table 2.1 Details of NO₂ Monitoring Sites

Site Name	Site Type	OS Grid Ref	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road	Is monitoring collocated with a Continuous Analyser (Y/N)	Does this location represent worst-case exposure?
1 - Yorkersgate – Castlegate, Butcher Corner, Malton	Roadside	X 478739 Y 471654	Y	Y (5m)	3m	N	Y
2 – Wheelgate (1), Malton	Roadside	X 478703 Y 471729	Y	Y (1m)	2m	N	Y
3 – Wheelgate (2), Malton	Roadside	X 478609 Y 471880	N	Y (m)	2m	N	N
4 - Old Malton Gate (1), Malton	Kerbside	X 478847 Y 471732	Y	Y (1m)	1m	N	Y
5 - Old Malton Gate (2), Malton	Roadside	X 478896 Y 471755	Y	Y (1m)	3m	N	Y
6 – Castlegate (1), Malton	Roadside	X 478844 Y 471594	Y	Y (2m)	2m	N	N
7 – Castlegate (2), Malton	Roadside	X 479027 Y 471538	Y	Y (1m)	2m	N	Y
8 – Castlegate (3), Malton	Roadside	X 478922 Y 471557	Y	Y (1m)	3m	N	Y
9 – Yorkersgate (1), Malton	Kerbside	X 478664 Y 471628	Y	Y (1m)	1m	N	Y
10 – Yorkersgate (2), Malton	Roadside	X 478544 Y 471605	Y	Y (1m)	2m	N	N
11 – Newbiggin, Malton	Roadside	X 478521 Y 472150	N	Y (3m)	3m	N	N
12 – Church Street, Norton	Kerbside	X 479116 Y 471394	N	Y (10m)	1m	N	N
13 – Scarborough Road, Norton	Roadside	X 479751 Y 471532	N	Y (1m)	2m	N	Y
14 - Pickering	Roadside	X 479943 Y 483823	N	Y (25m)	2m	N	Y
15 - Sherburn	Roadside	X 495853 Y 476755	N	Y (2m)	3m	N	Y
16 - Helmsley	Kerbside	X 461280 Y 483829	N	Y (25 m)	1m	N	Y
17 - Rillington	Roadside	X 485365 Y 474583	N	Y (12 m)	3m	N	N

Diffusion Tube Bias Adjustment and Ratification of Monitoring Data

Although diffusion tubes do not provide the same level of precision and accuracy as automatic analysers they have certain advantages that make them very useful. They are inexpensive and easy to use which means that monitoring can be carried out at a relatively large number of sites.

The accuracy of measurements obtained using diffusion tubes is expressed as percentage bias relative to the measurements made using a chemiluminescence analyser (the European reference method for measuring nitrogen dioxide concentrations). Bias arises because of:

- the interference of sunlight, wind, temperature and moisture during tube exposure; and
- variations in results arising from laboratory analysis.

Generally diffusion tubes tend to overestimate nitrogen dioxide levels. In order to compensate for this the results obtained using diffusion tubes must be corrected by applying a bias adjustment factor. Bias adjustment factors are determined by means of co-location studies. This involves exposing diffusion tubes alongside an automatic analyser. A bias adjustment factor can then be determined by dividing the annual mean concentration measured by the automatic analyser by the annual mean concentration as measured using co-located diffusion tubes.

Selection of Bias Adjustment Factor

Local authorities must decide whether to use the result of a local co-location study (if available) or the overall result of relevant studies detailed in the LAQM Support Tool. In making a choice of which bias adjustment factor to use, local authorities must consider a number of points. These are set out in the Technical Guidance LAQM. TG (09) – Box 3.3.

Defra's website includes Local Air Quality Support pages at <http://laqm.defra.gov.uk/> including the latest version of a '*Nitrogen Dioxide Diffusion Tube Bias Adjustment*' tool accessed at: <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

This tool consists of a spreadsheet containing details of local authority co-location study results from around the UK. The spreadsheet shows annual bias factors for each study and each laboratory, together with a combined annual 'national' bias adjustment factor for each particular laboratory. The spreadsheet was updated in March 2012. For ESG the spreadsheet gives an overall bias adjustment factor for

2011 of 0.84, based on 22 studies. As no locally derived bias factor is available for 20011, it is most appropriate to use the overall bias factor (0.84).

Table 2.2 Diffusion Tube Bias Adjustment Factor

<i>Source of Factor</i>	<i>Bias Adjustment Factor</i>
Defra LAQM National Diffusion Tube Bias Spreadsheet V.03/12	0.84

Benzene

In Ryedale Benzene monitoring is undertaken at four roadside sites using Tenax ATD tubes (passive diffusion tubes), which are exposed for successive periods of one month. These tubes also allow determination of ambient concentrations of other hydrocarbon pollutants, namely Toluene, Ethyl-benzene, m,p-xylene and o-xylene. The monitoring sites are roadside sites chosen because of their relatively high road traffic volumes and close proximity to relevant exposure locations. Details of site locations are shown in Table 2.4.

Tenax tubes used by Ryedale District Council are supplied and analysed by ESG Ltd. Standard preparation and sample measurement is carried out according to in house method HS/WI/3015.

The samples are analysed by thermal desorption-gas chromatography-mass spectrometry on a Markes ATD and an Agilent GC -MS.

A Quality Control tube purchased from an external standard source, with known analyte loading, is run with each sequence of samples and we are advised that QC results were all within the action limits.

Table 2.3 - Details of Non-automatic Benzene Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Yorkersgate - Castlegate, Butcher Corner, Malton	Roadside	X 478739 Y 471654	Benzene	N	Y(5m)	3m	Y
Norton - Church St /Welham Rd Junction	Kerbside	X 479116 Y 471394	Benzene	N	Y(17m)	1m	Y
Pickering - Eastgate A170/A169 Junction	Roadside	X 479943 Y 483823	Benzene	N	Y(25m)	2m	Y
Helmsley - Marketplace	Kerbside	X 461280 Y 483829	Benzene	N	Y(25m)	1m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Diffusion Tube Monitoring Data

Bias adjusted 2011 annual mean NO₂ concentrations are detailed in Table 2.4. Exceedences of the annual mean objective level (40 µg/m³) are shown in emboldened text. Where monitoring was undertaken for less than 12 months of the year or where data is missing for one or more monthly periods, the annual mean has been annualised using the methodology in Box 3.2 of TG (09). This involved the use of monitoring data for 2011 from four urban background continuous monitoring sites that form part of the national network and are within a radius of ~50 miles of Malton.

All the raw (unadjusted) monthly results are detailed in Appendix 1 of this Report. The adjustments made to annualise data for those sites where data capture was less than 9 months are detailed in Appendix B.

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011	Data set with less than 12 months has been annualised* (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.84)
								2011 (mg/m ³)
1	Yorkersgate – Castlegate, Butcher Corner, Malton	Roadside	Y	Triplicate	12 months	N/A	N	42
2	Wheelgate (1), Malton	Roadside	Y	N	9 months	Y	N	44
3	Wheelgate (2), Malton	Roadside	N	N	12 months	N/A	N	28
4	Old Malton Gate (1): Malton	Kerbside	Y	N	11 months	Y	N	38
5	Old Malton Gate (2): Malton	Roadside	Y	N	12 months	N/A	N	41
6	Castlegate (1): Malton	Roadside	Y	N	12 months	N/A	N	35
7	Castlegate (2): Malton	Roadside	Y	N	12 months	N/A	N	49
8	Castlegate (3): Malton	Roadside	Y	N	11 months	Y	Y	41
9	Yorkersgate (1): Malton	Kerbside	Y	N	12 months	N/A	N	46
10	Yorkersgate (2): Malton	Roadside	Y	N	11 months	Y	N	31
11	Newbiggin (Malton)	Roadside	N	N	7 months	Y	N	24
12	Church St (Norton)	Kerbside	N	N	7 months	Y	N	24

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011	Data set with less than 12 months has been annualised* (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.84)
								2011 (mg/m ³)
13	Scarborough Rd Norton	Roadside	N	N	12 months	N/A	N	25
14	Pickering	Roadside	N	N	11 months	Y	N	27
15	Sherburn	Roadside	N	N	11 months	Y	N	30
16	Helmsley	Kerbside	N	N	5 months	Y	N	22
17	Rillington	Roadside	N	N	10 months	Y	N	22

Means "annualised" in accordance with technique detailed in Box 3.2 of TG(09), if monitoring not carried out for the full year.

Comparison of Monitoring Results with Air Quality Objectives

Sites where AQO Exceeded

The results show that in 2011 the annual mean AQO was exceeded at five monitoring sites (Sites 1, 2, 5, 7, 8 & 9), each of which lies within the Malton AQMA. One of the sites (Site 5) where the AQO was exceeded, albeit marginally, is close to the limits of the AQMA. However, this does not indicate that there is a need to consider extending the AQMA any further along Old Maltongate. This is because beyond the current boundary there are no relevant receptor locations (building facades) in close proximity to the roadside.

Sites where AQO not exceeded

There were no exceedences of the AQO at any of the sites outside the AQMA. Site 6 is a long term site within the AQMA, in a relatively open and exposed location. No annual mean concentration measured at the site has exceeded the AQO over the 12 years during which the site has been in use.

Site 3, is just outside the AQMA and is used to provide an indication of whether the AQMA boundary is set appropriately, as is Site 10, which is just within the AQMA.

Exceedences of the 1-hour objective may occur at roadside sites if the annual mean exceeds $60 \mu\text{g}/\text{m}^3$. There were no sites where the annual mean exceeded or approached this level.

All the sites are shown in relation to the AQMA in Figure 2.1.

Trends

Table 2.5 shows bias adjusted annual mean NO_2 levels at various sites for the five years from 2007 to 2011. The measured concentrations have been adjusted using the overall bias factor for each particular year in question, as published in the latest version of the national database.

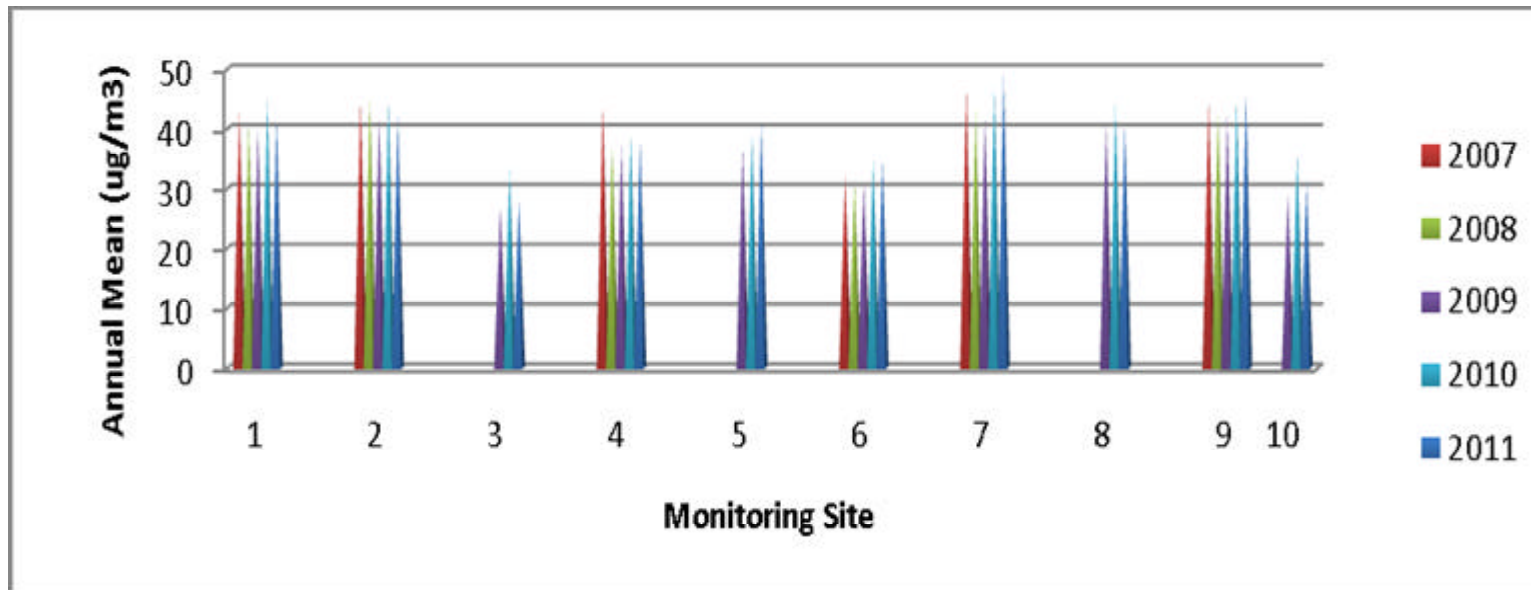
Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) mg/m ³				
			2007 (Bias Adjustment Factor =0.82)	2008 (Bias Adjustment Factor = 0.78)	2009 (Bias Adjustment Factor = 0.82)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor =0.84)
1	Yorkersgate – Castlegate, Butcher Corner, Malton	Y	43	41	40	45	42
2	Wheelgate (1), Malton	Y	45	45	42	45	44
3	Wheelgate (2), Malton	N	-	-	27	33	28
4	Old Malton Gate (1): Malton	Y	44	37	37	39	38
5	Old Malton Gate (2): Malton	Y	-	-	37	39	41
6	Castlegate (1): Malton	Y	32	31	31	35	35
7	Castlegate (2): Malton	Y	47	43	42	47	49
8	Castlegate (3): Malton	Y	-	-	41	44	41
9	Yorkersgate (1): Malton	Y	45	43	42	45	46
10	Yorkersgate (2): Malton	Y	-	-	29	36	31
13	Scarborough Rd Norton	N	-	28	26	29	25
14	Pickering	N	32	30	29	32	27
15	Sherburn	N	28	-	30	35	30
16	Helmsley	N	19	22	22	23	22
17	Rillington	N	24	25	25	25	22

The results in the table indicate a slight overall reduction in 2011 annual mean levels at sites within the AQMA in comparison with 2010. At Sites within the AQMA (1, 2, 4, 5, 6, 7, 8, 9 & 10) the change in annual mean concentration ranged from ~ -7% to ~ +5%.

The results show a high degree of consistency over the five years both in terms of the levels measured at each particular site and the sites at which the AQO is breached. There is no discernable upward or downward trend in levels over the five year period. This is illustrated by the chart in Figure 2.2 which shows annual mean levels at the sites from 2007 to 2011.

Figure 2.2: NO2 Trend Chart 2007 - 2011



2.2.2 Benzene

Table 2.6: Annual Mean Benzene Levels 2011

Site	2011 Annual Mean Concentration $\mu\text{g}/\text{m}^3$	Objectives	
		31/12/2003 running annual mean $\mu\text{g}/\text{m}^3$	31/12/2010 annual mean $\mu\text{g}/\text{m}^3$
Malton (Roadside)	1.0	16.25	5
Norton (Roadside)	0.7	16.25	5
Pickering (Roadside)	0.9	16.25	5
Helmsley (Kerbside)	0.7	16.25	5

The results in Table 2.6 show that measured concentrations, which are considered to be representative of public exposure, were all significantly less than the 2003 and 2010 objectives at all four sites.

Trend analysis of data for the period 2007 to 2011 in Table 2.7 shows that levels were consistently well below the AQO's at all four sites, with relatively minor year to year fluctuations and an overall reduction over the five year period.

Table 2.7 - Results of Benzene monitoring 2007 - 2011

Location	2011 Annual Mean Concentration (ug/m ³)	2010 Annual Mean Concentration (ug/m ³)	2009 Annual Mean Concentration (ug/m ³)	2008 Annual Mean Concentration (ug/m ³)	2007 Annual Mean Concentration (ug/m ³)
Malton (Roadside)	1.0	1.6	1.2	2.0	1.7
Norton (Roadside)	0.7	0.6	0.7	1.5	1.4
Pickering (Roadside)	0.9	0.4	0.8	1.5	1.5
Helmsley (Kerbside)	0.7	1.0	0.7	0.7	1.5

...

2.2.3 Summary of Compliance with AQS Objectives

Ryedale DC has examined the results from monitoring in the district. Concentrations of nitrogen dioxide outside of the AQMA are all below the objectives at relevant locations. Concentrations of benzene are all below the objectives at relevant locations therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Previous review and assessments have reported that outside the Malton AQMA Ryedale DC did not have any streets which meet the criteria set out in Section A.1 - Box 5.3 of TG(09), which had not already been considered. Using local knowledge no such streets have been identified that have not been assessed previously.

Ryedale DC confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Previous review and assessments have reported that Ryedale DC did not have any street locations, which meet the criteria set out in Section A.2 - Box 5.3 of TG(09), which had not already been considered. Using local knowledge no such streets have been identified that have not been assessed previously.

Ryedale DC confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Previous review and assessments have reported that Ryedale DC did not have any roads which meet the criteria set out in Section A.3 - Box 5.3 of TG(09). Using local knowledge no such roads have been identified.

Ryedale DC confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.4 Junctions

Previous review and assessments have reported that outside the Malton AQMA Ryedale DC did not have any junction which meet the criteria set out in Section A.4 - Box 5.3 of TG(09), which had not already been considered. Using local knowledge no new junctions or junctions that were not previously assessed have been identified.

Ryedale DC confirms that there are no new/newly identified busy junctions.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Last years Progress report identified proposals for the construction of a new eastbound diverge slip road, 2 no. roundabouts and tie-ins to the existing slip roads on land at A64 Malton Road, junction with B1248 Scarborough Road, North Yorkshire (The Brambling Fields Interchange). The scheme is designed to provide an alternative route for traffic travelling east bound on the A64 to gain access to Norton avoiding the need to travel through Malton (i.e. Butcher Corner). The scheme also provides an alternative route for local traffic to travel between Malton and Norton without the need to cross the level crossing between Malton and Norton. The scheme is therefore intended to reduce the volume of traffic travelling through the town centre (including the Malton AQMA).

Planning approval for the scheme was granted in September 2011 and details included in the Councils 2012 Air Quality Action Plan.

The assessment of the environmental impact of the junction improvements was undertaken by WSP Environment & Energy. The assessment of air quality impact used the air pollutant dispersion model ADMS Roads to predict the effects of

changes to traffic flows on NO₂ and PM10 levels at specific relevant receptor exposure locations with and without the improvements (WSP, 2011b).

The assessment predicts that the development will cause both significant increases and decreases in concentrations of NO₂ and PM10 due to the redistribution of traffic flows. The residual significance was predicted to be moderate adverse to very large beneficial for annual mean NO₂, and slight adverse to moderate beneficial for PM10. The majority of receptors are predicted to experience a beneficial impact i.e. a reduction in NO₂ and PM10 concentrations.

No exceedences of the objectives for PM10 were predicted either with or without the Proposed development in place. The results of the local air quality assessment for annual mean NO₂ in relation to humans show that the number of exceedences of the annual mean objective reduces from six without the Proposed Development to two with the Proposed Development in place. Additionally, the results show that NO₂ concentrations are predicted to reduce at all receptor and monitoring locations within the Malton AQMA and any increases in concentrations predicted elsewhere would not cause any new exceedences of the annual mean objective for human receptors.

The Air Quality section of the Impact Assessment, which also includes plans showing modelled receptor locations and tables of modelled NO₂ concentrations with and without the junction improvements, was attached to the Action Plan.

Ryedale DC has assessed proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

As set out in 3.5 above the Brambling Fields Interchange scheme is designed to provide an alternative route for traffic travelling east bound on the A64 to gain access to Norton avoiding the need to travel through Malton (i.e. Butcher Corner). The scheme also provides an alternative route for local traffic to travel between Malton and Norton without the need to cross the level crossing between Malton and Norton.

The scheme is intended to result in a significant redistribution of traffic thereby reducing the volume of traffic travelling through the town centre (including the Malton AQMA).

The assessment of air quality impact, undertaken by WSP Environment & Energy, concludes that no exceedences of the objectives for PM₁₀ were predicted either with or without the Proposed development in place. The number of exceedences of the NO₂ annual mean objective reduces from six without the Development to two with the Development in place. Additionally, NO₂ concentrations are predicted to reduce at all receptor and monitoring locations within the Malton AQMA and any increases in concentrations predicted elsewhere would not cause any new exceedences of the annual mean objective for human receptors.

Ryedale DC has assessed newly identified roads with significantly changed traffic flows, and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.7 Bus and Coach Stations

Previous review and assessments have reported that Ryedale DC did not have any Bus & Coach Station which meet the criteria set out in Section A.7 - Box 5.3 of TG(09). This position is unchanged.

Ryedale DC confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Ryedale District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

This source has been considered in previous review and assessments which have concluded that there are no locations in the district where emissions from railway locomotives would result in exceedence of the sulphur dioxide objectives. There has been no change in this situation.

4.2.1 Stationary Trains

This source has been considered in previous review and assessments which have concluded that there are no locations in the district where the criteria set out in Section B.2 of Box 5.4 of TG(09) are met. There has been no change in this situation.

Ryedale District Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

This source has been considered in previous review and assessments which have concluded that there are no locations in the district where the criteria relating to moving locomotives set out in Section B.2 of Box 5.4 of TG(09) are met. None of the railway lines identified in Box 5.4 as having a high number of diesel locomotive movements are within the Ryedale district.

Ryedale District Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

There are no shipping ports in the Ryedale district.

Ryedale District Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

Ryedale District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Ryedale District Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Ryedale District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

This source has been considered in the previous updating and screening assessment which concluded that there were no petrol stations in the Ryedale district that met the criteria set out in Section C.32 of Box 5.5 of TG(09). The position has not changed.

Ryedale District Council confirms that there are no petrol stations meeting the specified criteria.

5.3 Poultry Farms

Ryedale DC has checked the IPPC Public Register and confirmed that there are no poultry farms in the district that meet or exceed the criteria within section C4 of Box 5.5 of LAQM TG(09). The Environment Agency has confirmed that there are no poultry farms in the district, or in close proximity to the boundary with any neighbouring local authority that meet or exceed the criteria.

Ryedale District Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Proposals for new biomass installations may be identified through the planning development control process. Assessment of the air quality impact of an individual biomass installation at Kirkdale Manor, Nawton has shown that for this installation the impact is not significant.

This is a single 250Kw Lina-KA Type P250 wood chip powered installation that provides heating and hot water to 25 domestic properties.

This assessment has adopted the procedures laid down within Box 5.8 of LAQM.TG (09). Information on the installation characteristics was obtained from the operator.

As mass emission data was not obtainable, this information has been derived from the Table A2.20 of LAQM.TG (09). The fuel used is wood chip and it has been assumed that the PM₁₀ and NO_x emissions factors for an advanced boiler are most appropriate, i.e. 76 and 150 g/GJ net respectively. Emission rates were calculated using the net thermal input capacity of the boiler.

Background pollution concentrations were obtained from Estimated Background Air Pollution Maps downloaded from <http://laqm.defra.gov.uk/maps/maps2010.html>, which provide total annual mean concentrations based on 1km x 1km grid squares. These values were used to calculate background adjusted pollutant emission rates using the formulae given in 5.77, 5.81 and 5.84 of LAQM TG(09).

Effective stack height has been calculated using the methodology in Box 5.6 of LAQM.TG (09). Using the nomograms in figures 5.19 – 5.21 of LAQM.TG (09), the calculated background adjusted emission rate may then be compared with a threshold emission rate for each particular pollutant for a given effective stack height and diameter to assess the significance of the air quality impact of the installation.

Details of the emission rates, adjusted rates and threshold rates are given in Table 6.1 below.

Table 6.1: Biomass Installation Background Adjusted Emission Rate and Threshold Emission Rate

	PM10	Annual Mean NO2	Hourly Mean NO2
Emission Rate (g/s)	0.019	0.0375	0.0375
Background Concentration (ug/m3)	14	7	7
Background Adjusted Emission Rate (g/s)	0.0011	0.0011	0.0081
Threshold Emission Rate for 5 metre effective stack height - 0.35m (g/s)	.002	.0055	0.023

Values of PM₁₀, annual mean NO₂ and hourly mean NO₂ background adjusted emission rates are all lower than the appropriate threshold emission rates determined from the nomograms.

This indicates that emissions from the biomass installation are not significant and a detailed assessment is not required.

Ryedale DC has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

The combined impacts of biomass combustion was considered in the Councils previous updating and screening assessment in 2009 which concluded that the impacts could not lead to unacceptable PM₁₀ concentrations in Ryedale. There has been no significant change to the position since that time.

Ryedale DC has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

Previous assessments have indicated that there are no locations in the district where domestic coal burning takes place at levels that may give rise to exceedences of any SO₂ air quality objective. Patterns of domestic coal burning have not changed significantly since the last updating & screening assessment.

Ryedale DC confirms that there are no areas of significant domestic fuel use in the Local Authority area and concluded that it will not be necessary to proceed to a detailed assessment.

7 Fugitive or Uncontrolled Sources

These sources were considered in previous assessments, which considered various potential sources including seven Part B mineral installations, with particular attention paid to any with relevant exposures (one or more residential properties) within 200 metres of dust emission sources. There have been no significant changes with regard to these sources (except that two of the mineral installations are no longer operational) and no new relevant exposures near to these sources.

Ryedale District Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Diffusion tube monitoring has not identified any actual or potential AQO exceedences at relevant locations outside the Malton AQMA. Monitoring results within the AQMA show that there has been no significant change in NO₂ levels and that that the AQMA designation and the boundaries of the AQMA continue to be appropriate.

8.2 Conclusions from Assessment of Sources

Assessment of emission sources (including any new or significantly changed sources) including, road transport and other transport, industrial installations, commercial/domestic, and fugitive emissions has not identified any potential exceedences outside the existing AQMA.

8.3 Proposed Actions

- This Updating and Screening Assessment has not identified the need to proceed to a Detailed Assessment for any pollutant.
- This Updating and Screening Assessment has not identified the need for additional monitoring, or changes to the existing monitoring programme.
- Ryedale District Council will submit a Progress Report in 2013.
- Ryedale District Council will continue with the implementation of the Malton Air Quality Action Plan which was approved by the Council in January 2012 and accepted by Defra following appraisal.

9 References

The Air Quality (England) (Wales) Regulations 2000, SI 298 Stationery Office 2000.

The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), Stationery Office 2002.

Defra, **Summary of Laboratory Performance in WASP NO2 Proficiency Testing Scheme for Rounds 108-115 (Jan 2011 – Dec 2011)**. *Reports are prepared by Health and Safety Laboratory, March 2011.*

Defra **The Air Quality Strategy for England, Wales, Scotland and Northern Ireland**, 2007

Defra. **Local Air Quality Management – Technical Guidance LAQM. TG (09)**. 2009.

Defra, **Local Air Quality Management – Policy Guidance LAQM. PG (09)**, 2009.

Defra, **Local Air Quality Management – Progress Report Guidance LAQM. PRG (03)**, December 2003.

Ryedale District Council. **Malton Air Quality Action Plan**, January 2012.

Ryedale District Council. **Review and Assessment of Air Quality in Ryedale – Progress Report**, May 2011

Ryedale District Council. **Review and Assessment of Air Quality in Ryedale – Further Assessment Report**, January 2011.

Ryedale D C – **Updating and Screening Assessment**, May 2009.

Ryedale District Council – **Detailed Assessment of Air Quality in Ryedale**, March 2009.

Ryedale District Council. **The Malton Air Quality Management Area Order 2009**

Ryedale D C – **Review and Assessment of Air Quality In Ryedale – Progress Report**, March 2007.

Ryedale D C – **Updating And Screening Assessment**, April 2006.

Ryedale D C – **Review and Assessment of Air Quality In Ryedale – Progress Report**, May 2005.

Ryedale D C – Detailed Assessment, May 2004.

Ryedale D C – **Updating and Screening Assessment**, May 2003.

Ryedale D C – **Second Stage Review and Assessment of Air Quality in Ryedale District**, June 2000

Ryedale D C – **First Phase Review and Assessment of Air Quality in Ryedale District**, March 1999

WSP. **A64 Brambling Fields Interchange Impact of the Proposed Development on dust and local air quality**, 2011

Appendix A: Raw Monthly Nitrogen Dioxide Monitoring Results

Appendices

Table A.1: 2011 NO2 Diffusion Tube Results (not bias adjusted)

Site ID	Site	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	Yorkersgate –Castlegate, Butcher Corner (TriPLICATE Exposure)	68.8	51.6	51.6	42.9	44.2	42	39.4	44.2	46.9	49.5	57.3	48.3
		59.9	58.8	58.7	47.2	52.6	44.9	40.4	47.3	-	52.4	57.7	55.5
		65.3	57.3	47.8	47.2	46.3	36.9	40.8	44.9	-	36.3	56	52.3
2	Wheelgate (1), Malton	72.3	-	-	45	47.6	44.4	42.5	47.3	-	48.9	54.6	50.7
3	Wheelgate (2), Malton	51.5	43.3	34.5	37	25.3	22.1	31.4	24.8	26.4	36.5	40.6	24.6
4	Old Malton Gate (1): Malton	59.9	48.1	49.8	45.6	36.2	41	42.1	41.2	43.5	36.8	49.8	-
5	Old Malton Gate (2): Malton	62.9	56.8	53.6	44.9	42.7	36.8	37.9	43.7	50.7	42.4	58.6	43.9
6	Castlegate (1): Malton	55.5	45	47.6	40.8	30.1	32.1	42.1	34.9	36	43.7	49.7	36
7	Castlegate (2):Malton	73.6	53.1	52.1	42.7	57.6	47.9	47.4	55.9	47.2	101.8	59.3	57.2
8	Castlegate (3): Malton	58.2	60.9	59.4	47.2	47.3	44.8	-	22.5	53.7	53.8	52.2	48
9	Yorkersgate (1): Malton	62.7	63.4	61.4	48.3	53.9	41	40.9	45.5	67.1	57.9	60.3	47.4
10	Yorkersgate (2): Malton	54.3	39.8	40.5	38.9	26.9	24.5	38.6	37	33.6	-	40.7	26
11	Scarborough Rd,Norton	50.3	34	35.4	32.8	20.8	20.5	27.6	27.6	27.6	30.6	36	27.2
12	Newbiggin, Malton	-	-	-	-	-	17.6	25.2	23.1	28.8	28.8	31.6	25.2
13	Church Street, Norton	-	-	-	-	-	19.8	20.6	23.2	30.3	27	33.9	28.4
14	Pickering	52.8	23.9	37.3	30.5	26.9	25.1	27.2	-	34.5	32.9	38.7	32.7
15	Sherburn	14.8	22.7	47.5	42.1	39.5	-	27.2	40.7	44.6	32.5	47.1	37
16	Helmsley	32.8	-	-	-	-	16.3	18.3	-	-	30.8	36.5	-
17	Rillington	38.5	19.5	31.4	29	-	-	22.5	11.7	29.8	32.4	37.5	20

Appendix B: Determination of Annualisation Factors where less than 9 months data obtained

Because at some sites monitoring data was not obtained for the entire 12 months of the year, the average monthly mean for these sites was been annualised in order to obtain the most appropriate estimate of the annual mean concentration at those sites. Appropriate adjustment factors to annualise the data were determined using the methodology set out in Box 3.2 of TG (09). This involves calculation of the ratio of the annual mean (AM) and period mean (PM) at between two and four nearby long-term sites. The period mean is the average monthly value at each comparator site for those months for which data is available at the site(s) with incomplete data. The comparator site data was obtained from Defras Online Air Pollution Data Archive at:

http://uk-air.defra.gov.uk/data/data_selector?q=70593#mid

For example a Site 2 (Wheelgate 1) no data was obtained for the months of February, March & December therefore the period mean at the comparator sites was the average of the January and April to November monthly concentrations at the four comparator sites. The adjustment factor applied to the incomplete data is the average value of the four AM:PM ratios calculated, as shown in Table B.1 below. Details of the calculations for adjustment factors at the other sites are shown in Tables B.2 to B.9.

Table B.1 Adjustment Factors for Incomplete Data, Site 2 – Wheelgate 1

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	27.4	1.04
Leeds Centre	Urban Background	37.8	35.8	1.06
Middlesbrough	Urban Background	18.3	17.6	1.04
Barnsley	Urban Background	19.9	18.8	1.06
			Average	1.05

Table B.2 Adjustment Factors for Incomplete Data, Site 4 – Old Maltongate 1

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	28.2	1.02
Leeds Centre	Urban Background	37.8	37.5	1.01
Middlesbrough	Urban Background	18.3	18.3	1.0
Barnsley	Urban Background	19.9	20.5	0.97
			Average	1.0

Table B.3 Adjustment Factors for Incomplete Data, Site 8 – Castlegate 3

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	30	0.96
Leeds Centre	Urban Background	37.8	37.5	1.01
Middlesbrough	Urban Background	18.3	18.7	0.98
Barnsley	Urban Background	19.9	20.5	0.97
			Average	0.98

Table B.4 Adjustment Factors for Incomplete Data, Site 10 – Yorkersgate 2

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	28.5	1.01
Leeds Centre	Urban Background	37.8	36.9	1.02
Middlesbrough	Urban Background	18.3	18.4	0.99
Barnsley	Urban Background	19.9	19.7	1.01
			Average	1.01

Table B.5 Adjustment Factors for Incomplete Data, Sites 11 and 12 – Newbiggin - Malton and Church St. - Norton

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	26.9	1.07
Leeds Centre	Urban Background	37.8	37.2	1.02
Middlesbrough	Urban Background	18.3	16.0	1.14
Barnsley	Urban Background	19.9	17.7	1.12
			Average	1.09

Table B.6 Adjustment Factors for Incomplete Data, Site 14 - Pickering

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	29.4	0.98
Leeds Centre	Urban Background	37.8	38.5	0.98
Middlesbrough	Urban Background	18.3	18.7	0.98
Barnsley	Urban Background	19.9	20.5	0.97
			Average	0.98

Table B.7 Adjustment Factors for Incomplete Data, Sites 15 – Sherburn

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	29.4	0.98
Leeds Centre	Urban Background	37.8	38.5	0.98
Middlesbrough	Urban Background	18.3	18.8	0.97
Barnsley	Urban Background	19.9	20.5	0.97
			Average	0.98

Table B.8 Adjustment Factors for Incomplete Data, Site 16 - Helmsley

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	28.5	1.01
Leeds Centre	Urban Background	37.8	34.3	1.10
Middlesbrough	Urban Background	18.3	19.8	0.92
Barnsley	Urban Background	19.9	21.6	0.92
			Average	0.99

Table B.9 Adjustment Factors for Incomplete Data, Site 17 -Rillington

Site	Site Type	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean $\mu\text{g}/\text{m}^3$	Ratio
Hull Freetown	Urban Background	28.7	30.2	0.95
Leeds Centre	Urban Background	37.8	39.3	0.96
Middlesbrough	Urban Background	18.3	19.8	0.92
Barnsley	Urban Background	19.9	21.3	0.93
			Average	0.94