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Air Quality Plan for the achievement of EU air quality limit values for nitrogen dioxide (NO_2) in Birkenhead Urban Area (UK0020)

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Contents

1. Introduction

1.1. This document

This document is the Birkenhead Urban Area (UK0020) air quality plan for the achievement of the EU air quality limit values for nitrogen dioxide (NO_2).

This plan presents the following information:

• General information regarding the Birkenhead Urban Area agglomeration zone
• Details of NO_2 exceedence situation(s) within the Birkenhead Urban Area agglomeration zone
• Details of local air quality measures that have been implemented, will be implemented or are being considered for implementation in this agglomeration zone.

This air quality plan for Birkenhead Urban Area should be read in conjunction with the separate UK overview document and the list of UK and national measures that are available on the Defra website (http://www.defra.gov.uk/environment/quality/air/air-quality/eu/). The UK overview document sets out, amongst other things, the authorities responsible for delivering air quality improvements and the national measures that are applied in some or all UK zones. The measures presented in this plan and the accompanying UK overview and list of UK measures show how the UK will ensure that compliance with the NO_2 limit values is achieved as soon as possible.

This plan should also be read in conjunction with the supporting UK technical report (http://www.defra.gov.uk/environment/quality/air/air-quality/eu/), which presents information on assessment methods, input data and emissions inventories used in the analysis presented in this plan.

1.2. Context

Two NO_2 limit values for the protection of human health have been set in the Air Quality Directive (2008/50/EC). These are:

• The annual limit value: an annual mean concentration of no more than 40 μgm^{-3}
• The hourly limit value: no more than 18 hourly exceedances of 200 μgm^{-3} in a calendar year

The Air Quality Directive stipulates that compliance with the NO_2 limit values will be achieved by 01/01/2010. However, where the limit values cannot be achieved by then, the Directive also allows Member States to postpone this attainment date until 01/01/2015 provided air quality plans are established demonstrating how the limit values will be met by this extended deadline.

1.3. Zone status

The assessment undertaken for the Birkenhead Urban Area agglomeration zone indicates that the annual limit value is likely to be exceeded in 2010. This is on the basis that there is uncertainty in the projections from the 2008 baseline and the 2009 assessment indicated that non-compliance was likely in this year. Compliance is expected before 2015 through introduction of the measures included in the baseline and the non-quantifiable local measures outlined in this plan. Postponement of the compliance date to 2015 is sought for this limit value for this zone.

The assessment undertaken for the Birkenhead Urban Area agglomeration zone indicates that the hourly limit value not exceeded in this agglomeration zone in 2008.

1.4. Plan structure

General administrative information regarding this agglomeration zone is presented in section 2.

Section 3 then presents the overall picture with respect to NO_2 levels in this agglomeration zone for the 2008 reference year of this air quality plan. This includes the declaration of exceedance situations

within the agglomeration zone and presentation of a detailed source apportionment for each exceedance situation.

An overview of the measures already taken and to be taken within the agglomeration zone both before and after 2010 is given in section 4.

Baseline modelled projections for 2010, 2015 and 2020 for each exceedance situation are presented in section 5. The baseline projections presented here include, where possible, the impact of measures that have already been taken and measures for which the relevant authority has made a firm commitment to take the measure(s). However, it has not been possible to quantify the impact of all measures. This section therefore also explains which measures have been quantified, and hence included in the model projections, and which measures have not been quantified.

2. General Information about the Zone

2.1. Administrative information

Zone name: Birkenhead Urban Area
Zone code: UK0020
Type of zone: agglomeration zone
Reference year: 2008
Extent of zone: Figure 1 shows the area covered by the Birkenhead Urban Area agglomeration zone

Local Authorities within the agglomeration zone: Figure 2 shows the location of Local Authorities within the agglomeration zone. A list of these Local Authorities is also given below. The numbers in this list correspond to the numbers in Figure 2.

Cheshire West and Chester Council (formerly 1. Chester District Council and 2. Ellesmere Port and Neston District Council)
3. Wirral Metropolitan Borough Council

(Note: Local Authority boundaries do not necessarily coincide with zone boundaries. Hence Local Authorities may be listed within more than one zone plan.)

Figure 1. Map showing the extent of the Birkenhead Urban Area agglomeration zone (UK0020).

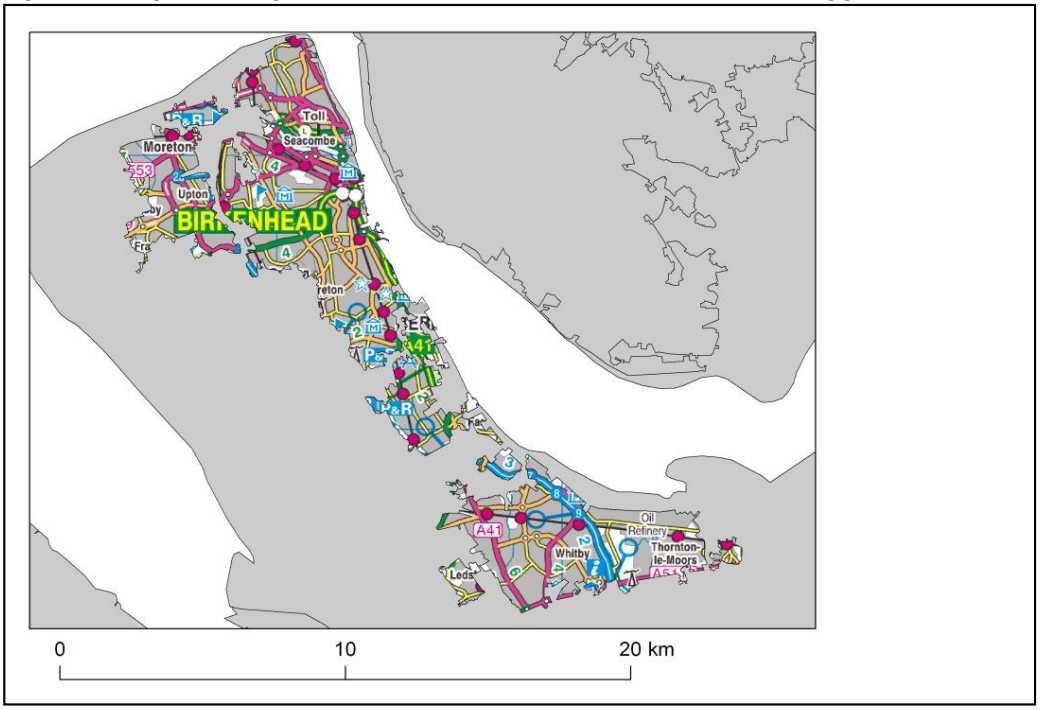


Figure 2. Map showing Local Authorities within the Birkenhead Urban Area agglomeration zone (UK0020).

2.2. Assessment details

Measurements
NO_2 measurements in this zone were available in 2008 from the following national network monitoring stations (NO_2 data capture for each station in 2008 shown in brackets):

• Wirral Tranmere GB0730A (98.2%)

Full details of monitoring stations within the Birkenhead Urban Area agglomeration zone are available from http://uk-air.defra.gov.uk/networks/network-info?view=aurn.

Modelling
Modelling for the 2008 reference year has been carried out for the whole of the UK (see the UK technical report). This modelling covers the following extent within this zone:

• Total background area within zone (approx): 92 km^2
• Total population within zone (approx): 266360 people
• Total road length where an assessment of NO_2 concentrations have been made: 71.9 km in 2008 (and similar lengths in previous years).

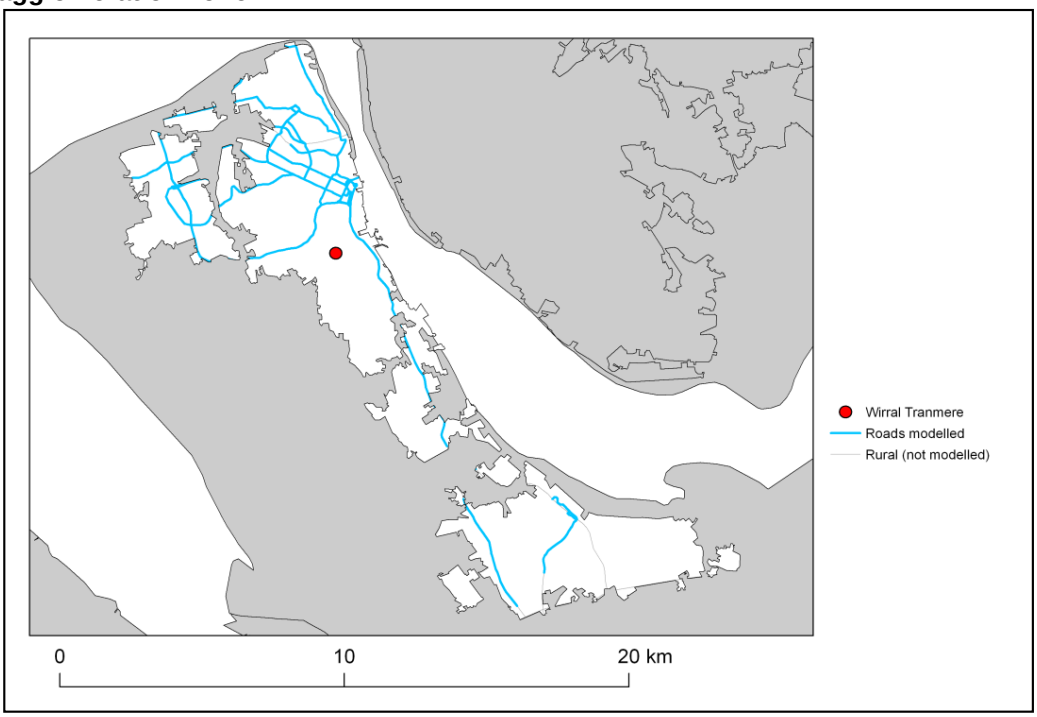
Zone maps
Figure 3 presents the location of the NO_2 monitoring stations within this zone for 2008 and the roads for which NO_2 concentrations have been modelled. NO_2 concentrations at background locations have been modelled across the entire zone at a 1 x 1 km^2 resolution.

2.3. Reporting Under European Directives

Since 2001 the UK has reported annually on air quality concentrations using a standard excel questionnaire (Decision 2004/461/EC). These questionnaires are available online from http://cdr.eionet.europa.eu/gb/eu/annualair

In addition, the UK has reported on air quality plans and programmes (Decision 2004/224/EC) on an annual basis depending on the reported concentrations in the previous year. Plans and programmes were first reported in this zone in 2005. Plans and programmes for 2005 and all other years for which they have been required are available from http://cdr.eionet.europa.eu/gb/eu/aqpp.

Figure 3. Map showing the location of the NO_2 monitoring sites with valid data in 2008 and roads where concentrations have been modelled within the Birkenhead Urban Area (UK0020) agglomeration zone.



3. Overall Picture for 2008 reference year

3.1. Introduction

There are two limit values for the protection of health for NO_2. These are:

• The annual limit value (annual mean concentration of no more than 40 μgm^{-3})
• The hourly limit value (no more than 18 hourly exceedances of 200 μgm^{-3} in a calendar year)

Within the Birkenhead Urban Area agglomeration zone only the annual limit value was exceeded in 2008. Hence, one exceedance situation for this zone has been defined, NO_2_UK0020_Annual_1, which covers the exceedance of the annual limit value. This exceedance situation is described below.

For both NO_2 limit values, a margin of tolerance for 2008 and other years has been defined in the Air Quality Directive (2008/50/EC). Data comparing assessed concentrations at locations within this agglomeration zone with the 2008 margin of tolerance are presented in the annual reporting questionnaire for 2008 (http://cdr.eionet.europa.eu/gb/eu/annualair).

3.2. Reference year: NO_2_UK0020_Annual_1

The NO_2_UK0020_Annual_1 exceedance situation covers all exceedances of the annual mean limit value in the Birkenhead Urban Area agglomeration zone in 2008.

Compliance with the annual limit value in this exceedance situation has been assessed using a combination of air quality measurements and modelling. Table 1 presents measured annual mean concentrations at national network stations in this exceedance situation since the 1st Daughter Directive (1999/30/EC) came into force in 2001. This shows that there were no measured exceedances of the annual limit value in this zone in 2008. Table 2 summarises modelled annual mean NO_2 results in this exceedance situation for the same time period. This table shows that, in 2008, 11.4 km of road length was modelled to exceed the annual limit value. There were no modelled background exceedances of this limit value. Table 2 also shows that the maximum modelled annual mean NO_2 concentration in 2008 was 44.1 μgm^{-3}. Maps showing the modelled annual mean NO_2 concentrations for 2008 at background and at roadside locations are presented in Figures 4 and 5 respectively. All modelled exceedances of the annual limit value are coloured orange or red in these maps.

The maximum measured concentration in the zone varies due to changes emissions and varying meteorology in different years. However, the models are also updated each year to take into account the most up-to-date science, so the modelled results for different years may not be directly comparable.The increase in the maximum modelled annual mean NO_2 concentration between 2008 and 2009 (44.1 μgm^{-3} to 60.9 μgm^{-3}) occurred because the location with the highest modelled concentration in this agglomeration zone moved between 2008 and 2009. The location with highest concentration in 2009 was included in the assessment for the first time in 2009.

The modelling carried out for this exceedance situation has also been used to determine the annual mean NO_X source apportionment for all modelled locations, along with an indicative annual mean NO_2 source apportionment. Table 3 presents summary source apportionment information in this exceedance situation for 2008, including:

• The modelled NO_X and indicative NO_2 source apportionment for the section of road with the highest modelled NO_2 concentration in this exceedance situation in 2008. This is important information because it shows which sources need to be tackled at the point with the largest compliance gap in the exceedance situation. It is not possible to calculate an unambiguous source apportionment for annual mean NO_2 concentrations for the reasons discussed in the UK Technical Report. We have, however, developed a method to provide an indicative source apportionment for annual mean NO_2 concentrations for these air quality plans. This method involves calculating the maximum and minimum possible contribution from each source to the NO_2 concentration. The final source apportionment has been calculated as the average of the minimum and maximum contributions for each source, with the results normalised so that the contributions sum to the total modelled NO_2

concentration. Further information on the methods used for source apportionment are provided in the UK Technical Report.

• The maximum NO_X contribution from each source from across all the roads included in this exceedance situation in 2008. This is important information because it highlights all the key sources that need to be tackled within the exceedance situation in order to achieve compliance across the entire area of the exceedance situation.

Figure A1.1 in Annex 1 presents the annual mean NO_X source apportionment for each section of road within the NO_2_UK0020_Annual_1 exceedance situation (i.e. the source apportionment for all exceeding roads only) in 2008. Roads have been grouped into motorways, trunk roads and primary road in this figure.

Table 1. Measured annual mean concentrations at national network stations in NO_2_UK0020_Annual_1 for 2001 onwards, μgm^{-3}. (Data capture shown in brackets) (a)

Site name (EOI code)	2001	2002	2003	2004	2005	2006	2007	2008	2009
Wirral Tranmere (GB0730A)	22 (98%)	22 (94%)	27 (96%)	19 (94%)	17 (64%)	19 (94%)	19 (97%)	19 (98%)	19 (94%)

(a) Annual Mean Limit Value = 40 μgm^{-3}

Table 2. Annual mean NO_2 model results in NO_2_UK0020_Annual_1 for 2001 onwards

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Road length exceeding (km)	12.7	0.6	25.2	6.0	5.1	8.5	16.1	11.4	11.0
Background area exceeding (km^2)	2	0	0	0	0	0	0	0	0
Maximum modelled concentration (μgm^{-3}) (a)	47.5	41.4	48.9	45.5	46.9	46.1	49.0	44.1	60.9

(a) Annual Mean Limit Value = 40 μgm^{-3}

Table 3. Source apportionment summary information for 2008 in NO_2_UK0020_Annual_1 (μgm^{-3}).

Spatial scale	Component	Highest road link (a)		Maximum (b)
		NOx	NO2 (d)	NOx
Regional background sources (i.e. contributions from distant sources of > 30 km from the receptor)	Total	6.4	(c)	
	From within the UK	3.3	(c)	3.4
	From transboundary sources (includes shipping and other EU Member States)	3.1	(c)	3.2
Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor)	Total	31.6	16.7	-
	From road traffic sources	15.5	9.7	15.5
	From industry (including heat and power generation)	3.9	(c)	6.7
	From agriculture	0.0	(c)	0.0
	From commercial/residential sources	5.7	(c)	7.0
	From shipping	1.1	(c)	1.2
	From off road mobile machinery	5.2	(c)	5.7
	From natural sources	0.0	(c)	0.0
	From transboundary sources	0.0	(c)	0.0
	From other urban background sources	0.1	(c)	0.1
Local sources (i.e. contributions from sources < 0.3 km from the receptor)	Total	60.4	27.5	-
	From cars	34.7	15.5	34.7
	From HGV rigid	0.0	0	11.4
	From HGV articulated	0.0	0	19.1
	From Buses	13.6	6.1	37.7
	From LGVs	11.3	5.6	11.3
	From motorcycles	0.7	0.3	0.7
Total (i.e. regional background + urban background + local components)		98.4	44.1	-

(a) The road with the highest modelled annual mean NO_2 concentration in this exceedance situation in 2008 is a section of the A41, traffic count point id 81124 (OS grid (m): 332590, 388680).
(b) This column gives the maximum contribution for each component from all the roads included in the exceedence situation.
(c) The combined modelled annual mean NO_2 concentration contribution for these components is 7 μgm^{-3}. A more detailed NO_2 source apportionment is currently unavailable for these sectors.
(d) Source apportionment for NO_2 is indicative, see UK Technical Report.

Figure 4. Map of modelled background annual mean NO_2 concentrations 2008. Modelled exceedances of the annual limit value are shown in orange and red.

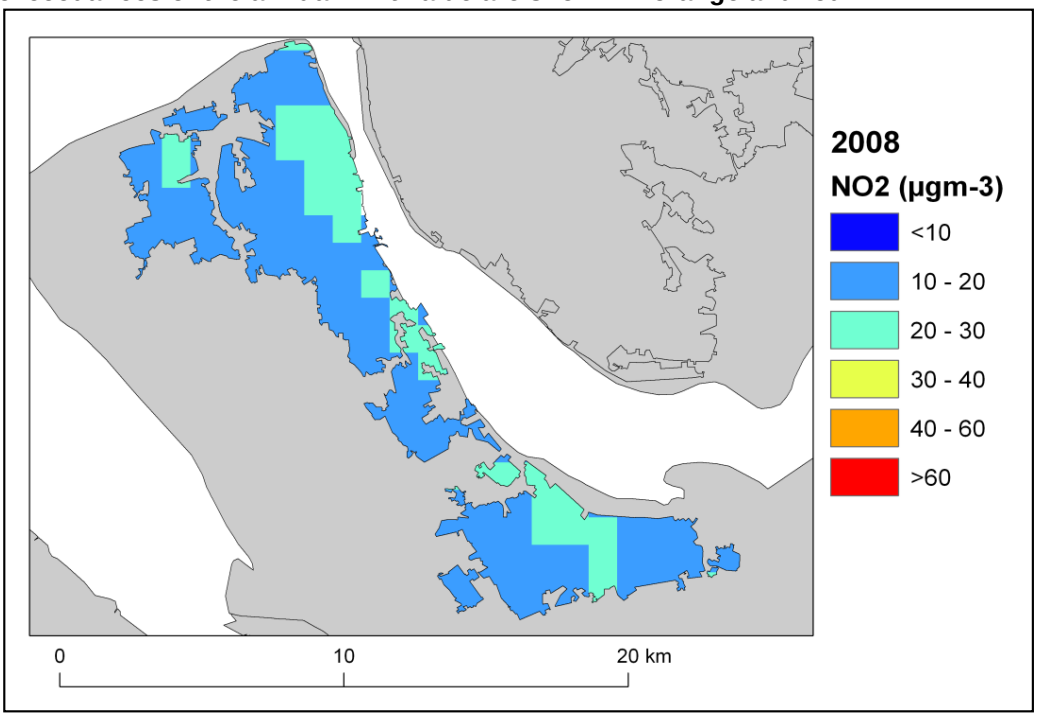
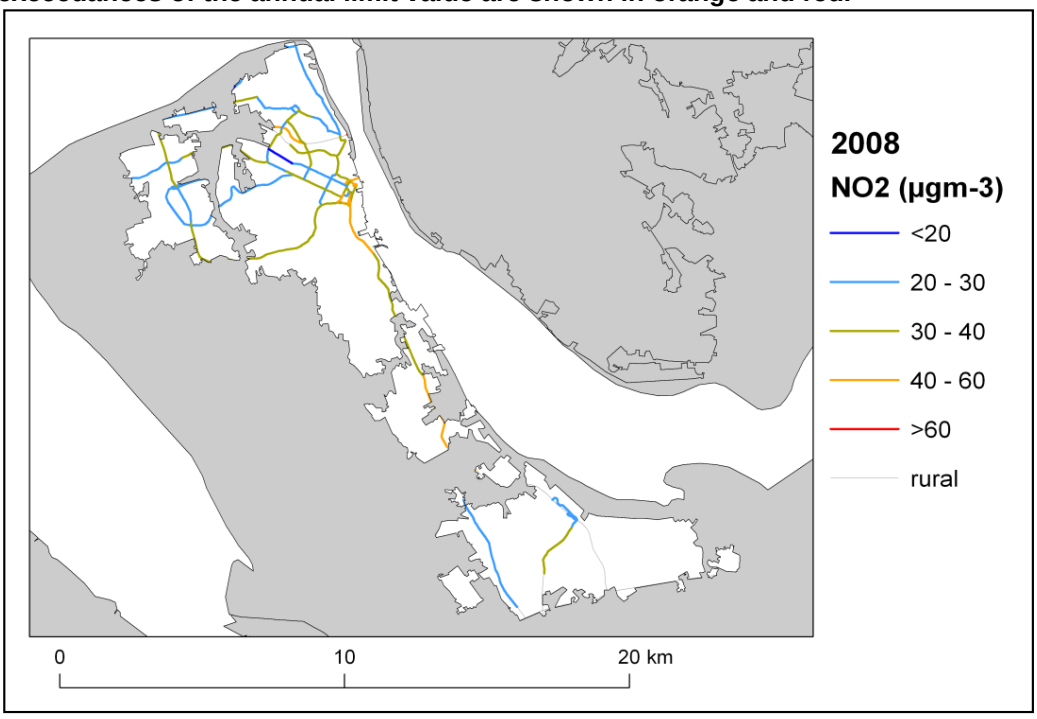


Figure 5. Map of modelled roadside annual mean NO_2 concentrations 2008. Modelled exceedances of the annual limit value are shown in orange and red.



4. Measures

4.1. Introduction

This section (section 4) gives details of measures that address exceedances of the NO_2 limit values within Birkenhead Urban Area agglomeration zone. This includes both measures that have already been taken and measures for which there is a firm commitment that they will be taken.

Section 5 then explains the extent to which it has been possible to incorporate the impacts of these measures into the baseline modelling carried out for this assessment.

4.2. Source apportionment

It is important to understand which sources are responsible for causing the exceedance in order to most effectively tailor measures to address the NO_2 exceedance situation(s) described in section 3 above. This can be achieved by considering the source apportionment for the exceedance situation, also presented in section 3. A summary of what the source apportionment shows and the implications for which measures would therefore be appropriate is given here.

Local road traffic was the dominant source in this exceedance location in the reference year. The largest contribution was from cars at the location of maximum exceedance with a contribution of 34.7 ugm^{-3} of NO_X out of a total of 98.4 ugm^{-3} of NO_X. All vehicle types were important sources on the trunk roads with the highest concentrations. Cars and on some roads buses were important sources on the primary roads with the highest concentrations.

This indicates that appropriate measures should impact on local road traffic sources in this zone. Other measures may also be beneficial depending on the source apportionment for the urban background.

4.3. Measures

Measures potentially affecting NO_2 in this agglomeration zone have been taken and/or are planned at a range of administrative levels. These are:

- European Union
- National (i.e. England, Scotland, Wales, Northern Ireland or whole UK)
- Local (i.e. UK Local Authorities)

Details of European Union measures (e.g. euro standards, fuel quality directives, integrated pollution prevention and control) can be found on the European Commission's website (http://ec.europa.eu/environment/air/index_en.htm). Details of national measures are given in the UK overview document and list of UK and National measures.

Relevant Local Authority measures within this exceedance situation are listed in Table A2.1 (see Annex 2). Relevant Local Authority measures are considered to be those measures which directly target, or are in close geographical proximity to roads and/or background grid squares in exceedance of one or other of the NO_2 limit values. Other Local Authority measures may also have been taken in this zone, but they are not listed in this table. All the measures listed in Table A2.1 have been carried out, are in the process of being carried out or a firm commitment had been made to carry them out on the timetables listed at the point at which information on local measures was collected.

4.4. Measures timescales

Timescales for national measures are given in the UK overview document and list of UK and National measures.

Information on local measures was collected in autumn 2009. Hence, any Local Authority action plans and measures adopted by Local Authorities after this time have not been included in this air quality plan. Many of the measures listed in Annex 2 will either have happened before autumn 2009 or have

been planned for implementation before or during 2010. Others will be planned for after 2010. It should be noted that many of the measures taken before or during 2010 will continue to have a beneficial impact on air quality after the end of 2010.

Local Authorities report on progress with the implementation of their action plans annually and review action plan measures regularly. Where future Local Authority measures to improve air quality are under consideration these would be included in future local authority action plans and published by the local authority.

5. Baseline Model Projections

5.1. Overview of model projections

Baseline projections for 2010
Model projections for 2010, starting from the 2008 reference year described in section 3, have been calculated in order to determine whether compliance with the NO_2 limit values is likely to be achieved for each exceedance situation by the original deadline for compliance of 01/01/2010. Details of the methods used for the baseline emissions and concentration projections modelling are provided in the the UK technical report.

For national measures, it has not been possible to quantify the impact of all measures on emissions and ambient concentrations. The impact for all quantifiable measures has been included in the baseline projections.

The impacts of the individual Local Authority measures have not been explicitly included in the baseline model projections. However, measures may have been included implicitly if they have influenced the traffic counts for 2007 (used as a basis for the compilation of the emission inventory) or in the traffic activity projections to 2010 and beyond (used to calculate the emission projections). It should be recognised that these measures will have a beneficial impact on air quality, even if it has not been possible to quantify this impact here.

A number of the local measures in Table A2.1 can be considered to be 'smarter choices' measures (see http://www.dft.gov.uk/pgr/sustainable/smarterchoices/ctwwt/ for a detailed description of this type of measure). We have quantified the impact of this group of measures on a national scale within the projections. Details of how this has been done can be found in the UK technical report. Table A2.1 indicates which local measures we have considered to be 'smarter choices'.

Baseline projections for 2015
Model projections for 2015, starting from the 2008 reference year described above, have been calculated in order to determine whether compliance with the NO_2 limit values is likely to be achieved for each exceedance situation by the revised deadline for compliance of 01/01/2015 on the basis of EU-wide measures and the measures currently planned. This modelling is described in detail in the UK technical report. Many of the measures listed in annex 2 of this document and the supporting list of UK and national measures will continue or will continue to have an impact beyond the original deadline for compliance of 01/01/2010.

5.2. Baseline projections: NO_2_UK0020_Annual_1

Table 4 presents summary results for the baseline model projections for 2010, 2015 and 2020 for the NO_2_UK0020_Annual_1 exceedance situation. These results show that compliance with the annual limit value may be achieved in 2010, when the maximum annual mean NO_2 concentration in the exceedance situation is predicted to be 36.6 μgm^{-3}. However, uncertainty in the projections combined with the results of the 2009 assessment indicate that non-compliance is still the most likely outcome in 2010. Regardless of whether compliance can be achieved by 2010, the results suggest that compliance will be achieved by 2015 under baseline conditions, when the maximum annual mean NO_2 is predicted to be 27.2 μgm^{-3}. Postponement of the compliance date to 2015 is sought for this limit value in this zone.

The projected modelled NO_X and indicative NO_2 annual mean source apportionments for 2010, 2015 and 2020 at the location with the biggest compliance gap in 2008 are presented in Table 5. In 2010, the model results suggest that this location will continue to have the highest annual mean NO_2 concentration within this exceedance situation. However, in 2015 and 2020 the model indicates that the location with the highest annual mean NO_2 concentration within this exceedance situation will be elsewhere. Information regarding the new location with the highest NO_2 concentration, including the source apportionment is given in Table 6. The locations of maximum concentration in each year are given in the footnote to this table. This source apportionment information is useful because it shows which sources need to be tackled at the point with the largest compliance gap in the exceedance situation.

Table 7 shows the maximum NO_X contribution from each source apportionment component from any road across the whole exceedance situation. This source apportionment information is useful because it highlights all the key sources that need to be tackled within the exceedance situation in order to achieve compliance across the entire area of the exceedance situation. It should be noted that this table only includes roads which continue to be in exceedance in the relevant year. Hence, for example, the road with the largest contribution from cars in 2010 may no longer be included in the table in 2015 if the road is predicted to be compliant in 2015.

Figures 6 and 7 show maps of projected annual mean NO_2 concentrations in 2010, 2015 and 2020 at background and roadside locations respectively. Maps for 2008 are also presented here for reference.

It should be noted that the baseline projections presented here include the impacts of measures, where they can be quantified, that have already been or will be implemented.

Table 4. Annual mean NO_2 model results in NO_2_UK0020_Annual_1

	2008	2010	2015	2020
Road length exceeding (km)	11.4	0.0	0.0	0.0
Background area exceeding (km^2)	0	0	0	0
Maximum modelled concentration (μgm^{-3}) (a)	44.1	36.6	27.2	19.5

(a) Annual Mean Limit Value = 40 μgm^{-3}

Table 5. Modelled source apportionment for 2010, 2015 and 2020 under baseline conditions for traffic count point 81124 on the A41 (the road section with the maximum modelled annual mean NO_2 concentration in 2008 in NO_2_UK0020_Annual_1. OS grid (m): 332590, 388680). 2008 results are also presented here for reference (units: μgm^{-3}).

Spatial scale	Component	NOx				NO2 (indicative)			
		2008	2010	2015	2020	2008	2010	2015	2020
Regional background sources (i.e. contributions from distant sources of > 30 km from the receptor)	Total	6.4	5.6	4.9	4.0	(a)	(b)	(c)	(d)
	From within the UK	3.3	2.9	2.5	2.1	(a)	(b)	(c)	(d)
	From transboundary sources (includes shipping and other EU Member States)	3.1	2.7	2.4	2.0	(a)	(b)	(c)	(d)
Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor)	Total	31.6	26.3	19.7	15.7	16.7	14.6	12.0	10.0
	From road traffic sources	15.5	11.1	7.4	4.8	9.7	9.4	8.3	7.5
	From industry (including heat and power generation)	3.9	3.5	3.3	3.0	(a)	(b)	(c)	(d)
	From agriculture	0.0	0.0	0.0	0.0	(a)	(b)	(c)	(d)
	From commercial/residential sources	5.7	5.7	5.2	4.8	(a)	(b)	(c)	(d)
	From shipping	1.1	1.0	1.0	1.0	(a)	(b)	(c)	(d)
	From off road mobile machinery	5.2	4.9	2.6	1.8	(a)	(b)	(c)	(d)
	From natural sources	0.0	0.0	0.0	0.0	(a)	(b)	(c)	(d)
	From transboundary sources	0.0	0.0	0.0	0.0	(a)	(b)	(c)	(d)
	From other urban background sources	0.1	0.1	0.1	0.1	(a)	(b)	(c)	(d)
Local sources (i.e. contributions from sources < 0.3 km from the receptor)	Total	60.4	45.8	29.8	17.7	27.5	22.0	15.2	9.3
	From cars	34.7	23.3	16.1	10.7	15.5	11.1	8.2	5.6
	From HGV rigid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	From HGV articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	From Buses	13.6	12.2	7.2	3.3	6.1	5.6	3.5	1.7
	From LGVs	11.3	9.7	6.1	3.4	5.6	5.0	3.3	1.9
	From motorcycles	0.7	0.6	0.5	0.3	0.3	0.3	0.2	0.2
Total (i.e. regional background + urban background + local components)		98.4	77.8	54.5	37.4	44.1	36.6	27.2	19.3

(a) The total annual mean NO_2 contribution for all components labelled (a) in 2008 was modelled to be 7 μgm^{-3}.
(b) The total annual mean NO_2 contribution for all components labelled (b) in 2010 is predicted to be 5.2 μgm^{-3}.
(c) The total annual mean NO_2 contribution for all components labelled (c) in 2015 is predicted to be 3.7 μgm^{-3}.
(d) The total annual mean NO_2 contribution for all components labelled (d) in 2020 is predicted to be 2.5 μgm^{-3}.

Table 6. Modelled source apportionment for 2010, 2015 and 2020 under baseline conditions for traffic count point with the highest concentration in these years in NO_2_UK0020_Annual_1 (a). 2008 results are also presented here for reference (units: μgm^{-3}).

Spatial scale	Component	NOx				NO2 (indicative)			
		2008	2010	2015	2020	2008	2010	2015	2020
Regional background sources (i.e. contributions from distant sources of > 30 km from the receptor)	Total	6.4	5.6	4.9	4.0	(b)	(c)	(d)	(e)
	From within the UK	3.3	2.9	2.5	2.1	(b)	(c)	(d)	(e)
	From transboundary sources (includes shipping and other EU Member States)	3.1	2.7	2.4	2.0	(b)	(c)	(d)	(e)
Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor)	Total	31.6	26.3	19.9	16.2	16.7	14.6	12.0	10.2
	From road traffic sources	15.5	11.1	6.5	4.2	9.7	9.4	8.8	8.0
	From industry (including heat and power generation)	3.9	3.5	4.4	4.2	(b)	(c)	(d)	(e)
	From agriculture	0.0	0.0	0.0	0.0	(b)	(c)	(d)	(e)
	From commercial/residential sources	5.7	5.7	4.9	4.6	(b)	(c)	(d)	(e)
	From shipping	1.1	1.0	1.2	1.2	(b)	(c)	(d)	(e)
	From off road mobile machinery	5.2	4.9	2.8	2.0	(b)	(c)	(d)	(e)
	From natural sources	0.0	0.0	0.0	0.0	(b)	(c)	(d)	(e)
	From transboundary sources	0.0	0.0	0.0	0.0	(b)	(c)	(d)	(e)
	From other urban background sources	0.1	0.1	0.1	0.1	(b)	(c)	(d)	(e)
Local sources (i.e. contributions from sources < 0.3 km from the receptor)	Total	60.4	45.8	29.8	17.7	27.5	22.0	15.2	9.3
	From cars	34.7	23.3	16.1	10.7	15.5	11.1	8.2	5.6
	From HGV rigid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	From HGV articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	From Buses	13.6	12.2	7.2	3.3	6.1	5.6	3.5	1.7
	From LGVs	11.3	9.7	6.1	3.4	5.6	5.0	3.3	1.9
	From motorcycles	0.7	0.6	0.5	0.3	0.3	0.3	0.2	0.2
Total (i.e. regional background + urban background + local components)		98.4	77.8	54.6	38.0	44.1	36.6	27.2	19.5

(a) The road with the maximum annual mean NO_2 concentration in different years is as follows. 2008: A section of the A41 (count point id 81124). 2010: A section of the A41 (count point id 81124). 2015: A section of the A41 (count point id 81123). 2020: A section of the A41 (count point id 81123). (OS grid (m): 332590, 388680; 332590, 388680; 332590, 388680; 332590, 388680).
(b) The total annual mean NO_2 contribution for all components labelled (b) in 2008 was modelled to be 7 μgm^{-3}.
(c) The total annual mean NO_2 contribution for all components labelled (c) in 2010 is predicted to be 5.2 μgm^{-3}.
(d) The total annual mean NO_2 contribution for all components labelled (d) in 2015 is predicted to be 3.2 μgm^{-3}.
(e) The total annual mean NO_2 contribution for all components labelled (e) in 2020 is predicted to be 2.2 μgm^{-3}.

Table 7. The maximum NO_X contribution from each source from across all the roads included in the exceedance situation on which exceedances remain in 2010, 2015 and 2020 under baseline conditions. Zeros indicate that there are no exceedances in the relevant year.

Spatial scale	Component	NOx			
		2008	2010	2015	2020
Regional background sources (i.e. contributions from distant sources of > 30 km from the receptor)	From within the UK	3.4	0.0	0.0	0.0
	From transboundary sources (includes shipping and other EU Member States)	3.2	0.0	0.0	0.0
Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor)	From road traffic sources	15.5	0.0	0.0	0.0
	From industry (including heat and power generation)	6.7	0.0	0.0	0.0
	From agriculture	0.0	0.0	0.0	0.0
	From commercial/residential sources	7.0	0.0	0.0	0.0
	From shipping	1.2	0.0	0.0	0.0
	From off road mobile machinery	5.7	0.0	0.0	0.0
	From natural sources	0.0	0.0	0.0	0.0
	From transboundary sources	0.0	0.0	0.0	0.0
	From other urban background sources	0.1	0.0	0.0	0.0
Local sources (i.e. contributions from sources < 0.3 km from the receptor)	From cars	34.7	0.0	0.0	0.0
	From HGV rigid	11.4	0.0	0.0	0.0
	From HGV articulated	19.1	0.0	0.0	0.0
	From Buses	37.7	0.0	0.0	0.0
	From LGVs	11.3	0.0	0.0	0.0
	From motorcycles	0.7	0.0	0.0	0.0

Figure 6. Background baseline projections of annual mean NO_2 concentrations in 2010, 2015 and 2020. 2008 is also included here for reference. Modelled exceedances of the annual limit value are shown in orange and red.

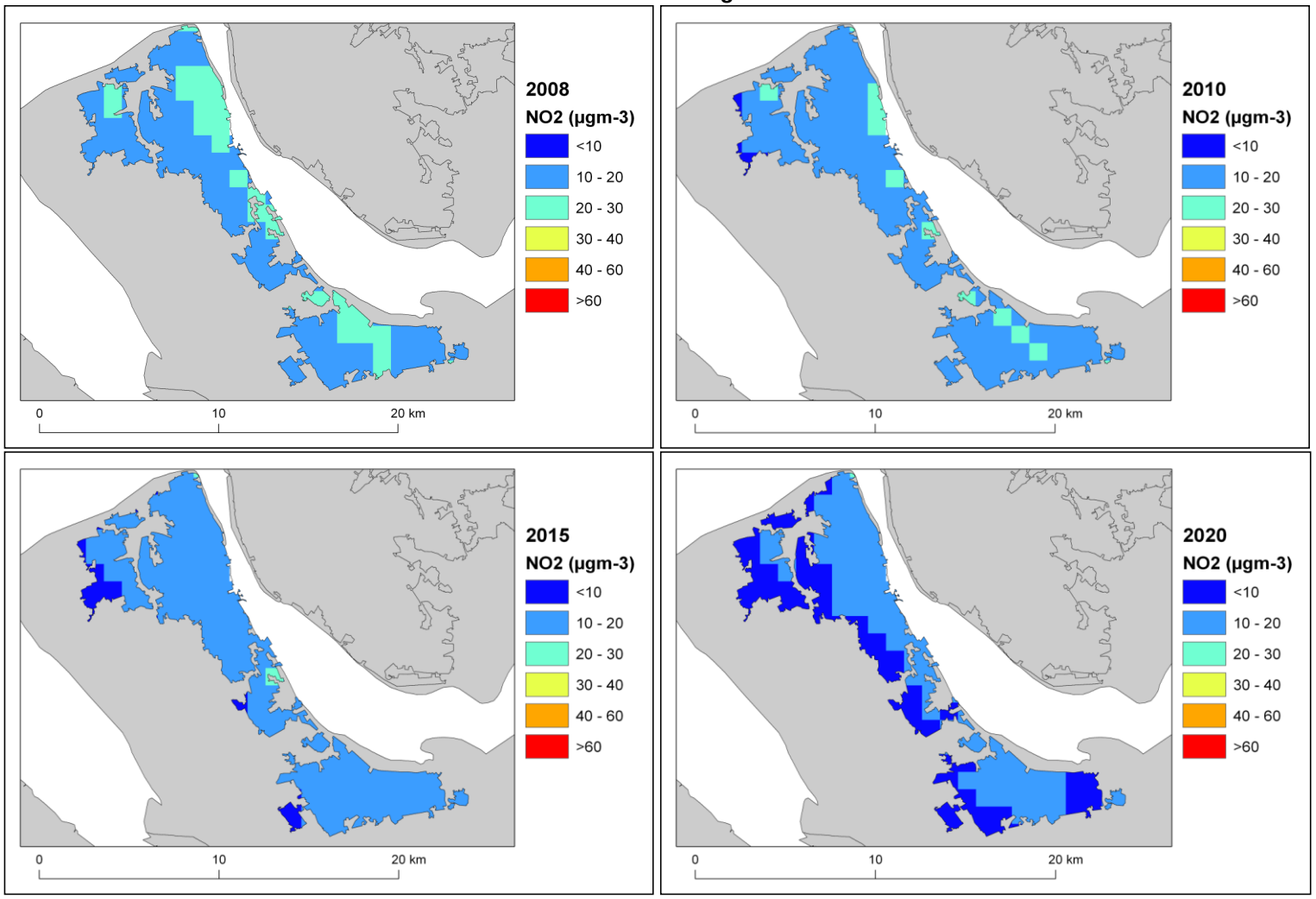
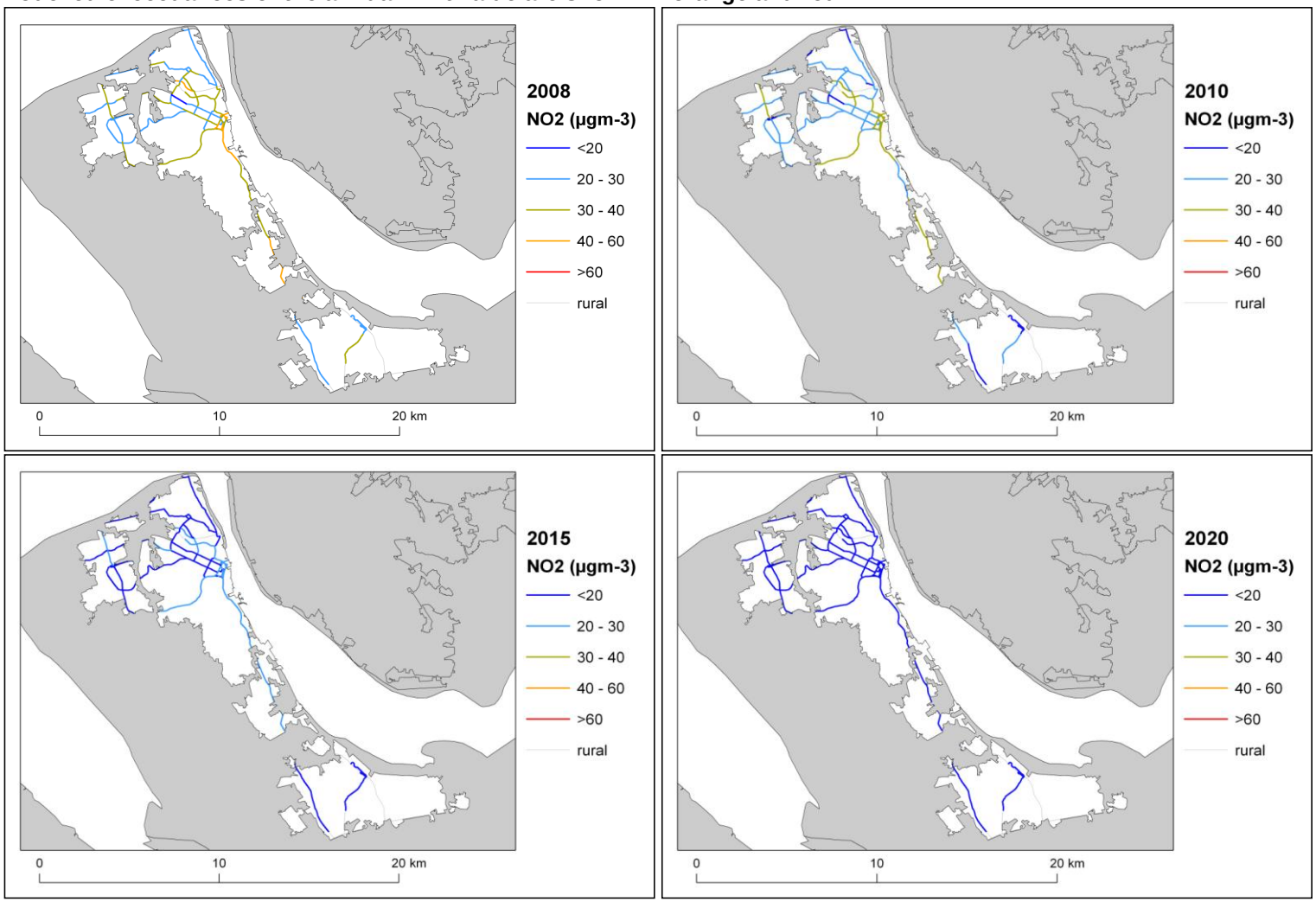


Figure 7. Roadside baseline projections of annual mean NO_2 concentrations in 2010, 2015 and 2020. 2008 is also included here for reference. Modelled exceedances of the annual limit value are shown in orange and red.



References

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Decision 2004/224/EC. Commission Decision of 20 February 2004 laying down arrangements for the submission of information on plans or programmes required under Council Directive 96/62/EC in relation to limit values for certain pollutants in ambient air. From the Official Journal of the European Union, 6.3.2004, En series, L68/27

Decision 2004/461/EC. Commission Decision of 29 April 2004 laying down a questionnaire to be used for annual reporting on ambient air quality assessment under Council Directives 96/62/EC and 1999/30/EC and under Directives 2000/69/EC and 2002/3/EC of the European Parliament and of the Council. From the Official Journal of the European Union, 30.4.2004, En series, L 156/78

UK technical report, UK overview document and List of UK and National measures are available at http://www.defra.gov.uk/environment/quality/air/air-quality/eu/

CDR Central Data Repository. http://cdr.eionet.europa.eu/

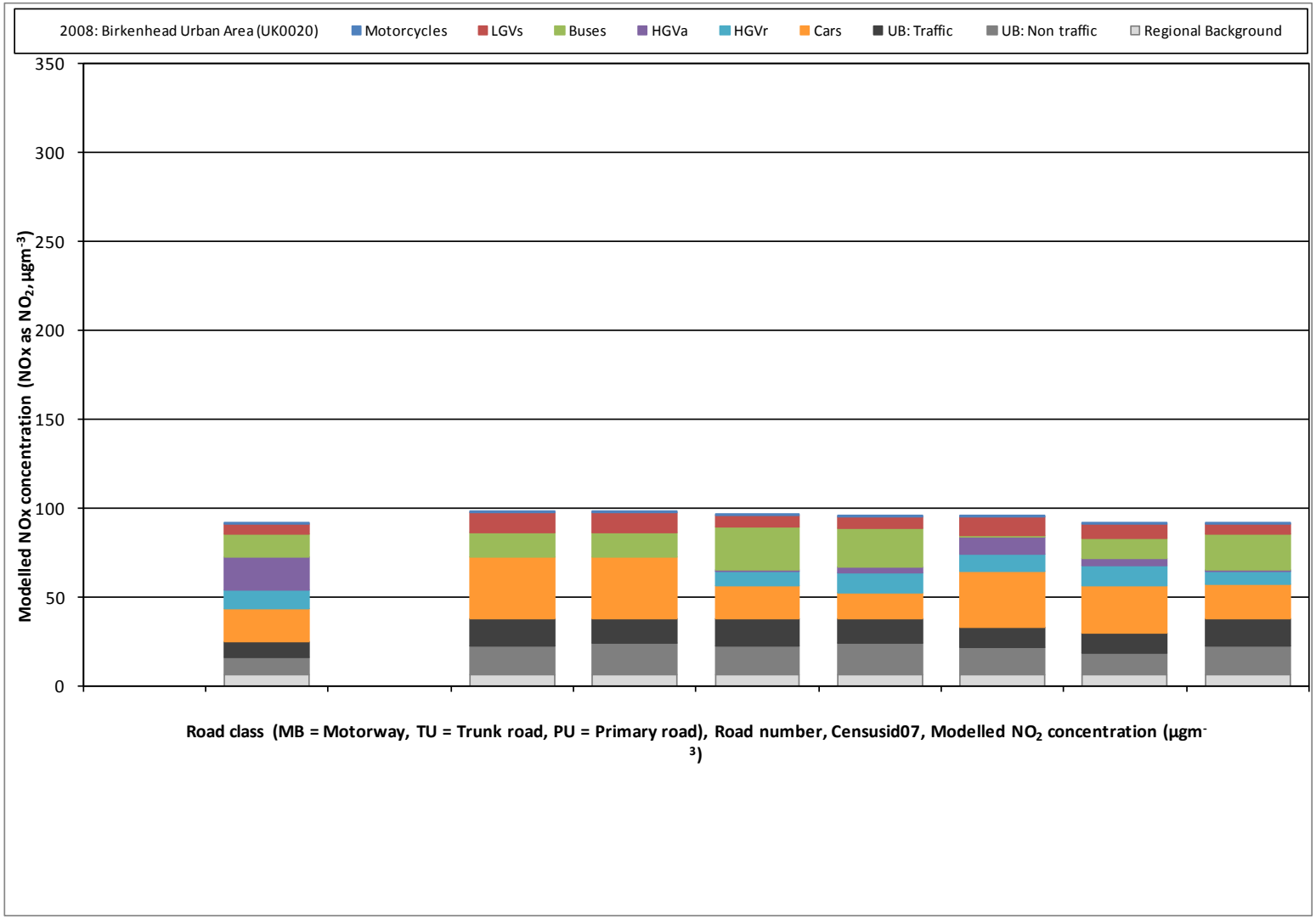
Air Quality Directive 2008/50/EC. Council Directive 2008/50/EC, of 21 May 2008. On ambient air quality and cleaner air for Europe. From the Official Journal of the European Union, 11.6.2008, En series, L152/1

1st Daughter Directive 1999/30/EC. Council Directive 1999/30/EC, of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (The First Daughter Directive). From the Official Journal of the European Communities, 29.6.1999, En Series, L163/41.

List of Annexes

Annex 1: Source apportionment graphs

Figure A1.1 Annual mean roadside NO_X source apportionment plots for all roads exceeding the annual mean NO_2 limit value in 2008



Annex 2: Tables of measures

Table A2.1 Relevant Local Authority measures taken before or during 2010 within Birkenhead Urban Area (UK0020)

LA (a)	Measure code (b)	Title	Description	Other information
Ellesmere Port and Neston	Local_Ellesmere_E1	Feasibility of repositioning road sensor away from Cambridge road lights	To increase 'green time' for northbound traffic on Whitby Road.	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_1
Ellesmere Port and Neston	Local_Ellesmere_E2	Feasibility of rerouting traffic in AQMA.	To reduce the impact of queuing vehicles on Whitby Road.	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_2
Ellesmere Port and Neston	Local_Ellesmere_E3	Investigate feasibility of optimising traffic signals / installing MOVA system.	Responsive traffic light signals allow smoother flow of vehicles on main routes	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007/2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_3
Ellesmere Port and Neston	Local_Ellesmere_E4	Investigate potential for scheduling of commercial delivery times in AQMA	To decrease obstructions from delivery vehicles	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_4
Ellesmere Port and	Local_Ellesmere_E5	Focus on parking	To reduce congestion in the AQMA.	• Type: Technical • Sources affected: Transport

LA (a)	Measure code (b)	Title	Description	Other information
Neston		contraventions in the town centre area.		• Spatial scale: local • Implementation date: 2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_5
Ellesmere Port and Neston	Local_Ellesmere_E6	Investigate benefit of replacing Whitby Rd / Cromwell Rd signals with a mini-roundabout	Temporary roundabout used for bridge repairs. Possible improvement in traffic flow	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_6
Ellesmere Port and Neston	Local_Ellesmere_A1	Arrange for statutory roadside vehicle emissions testing in AQMA	Raise profile of AQMA issues and target highly polluting vehicles.	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2006/2008 • Reduction timescale: Medium term • Regulatory: Yes • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_7
Ellesmere Port and Neston	Local_Ellesmere_A2	Annual MOT-type tests on licensed taxis and private hire vehicles performed by the EPNBC depot.	To ensure that vehicles are maintained to a recognised high standard.	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Medium term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_8
Ellesmere Port and Neston	Local_Ellesmere_A3	Visual emissions assessments of idling taxis at town centre rank.	To minimise excess emissions throughout the year.	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Medium term • Regulatory: No • Smarter Choices (c) : No • Reference (d):

LA (a)	Measure code (b)	Title	Description	Other information
				Local_zone20_Ellesmere_AQActionplan_9
Ellesmere Port and Neston	Local_Ellesmere_A4	Consideration to be given to incentivising the use of less polluting vehicles through licensing.	To minimise excess emissions throughout the year.	• Type: Economic/fiscal; Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2010 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_10
Ellesmere Port and Neston	Local_Ellesmere_A5	Corporate procurement policies to give consideration to more sustainable fleet vehicles wherever possible.	Council leading by example. To reduce the environmental impact from the authority's own operations.	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_11
Ellesmere Port and Neston	Local_Ellesmere_H1	Maintain close liaison between Environmental Protection and Development Control for planning applications.	To assess potential air quality impacts at application stage	• Type: Technical • Sources affected: Transport; Commercial and residential sources • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_12
Ellesmere Port and Neston	Local_Ellesmere_H2	Central Ellesmere Port Area Action Plan (CEPA) to include specific air quality measures	AQMA lies within CEPA	• Type: Technical • Sources affected: Other • Spatial scale: local • Implementation date: 2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_13
Ellesmere Port and Neston	Local_Ellesmere_H3	Supplementary Planning Document (SPD) on S106	To highlight possible air quality impacts prior to development. To mitigate the impacts of developments.	• Type: Technical • Sources affected: Transport; Commercial and residential sources • Spatial scale: local

LA (a)	Measure code (b)	Title	Description	Other information
		agreements for new developments. Focus on e.g. transport infrastructure including cycling, walking and highway improvements.		• Implementation date: 2008 • Reduction timescale: Long term • Regulatory: Yes • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_14
Ellesmere Port and Neston	Local_Ellesmere_F1	Provision of health bandings and general information via electronic display boards (PDUs)	Enables public – vulnerable groups in particular – to make informed decisions about local air quality.	• Type: Education/information • Sources affected: Other • Spatial scale: local • Implementation date: 2003 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_15
Ellesmere Port and Neston	Local_Ellesmere_F2	Provision of public information via council website	Provide an accessible source of air quality information including current data and health bandings.	• Type: Education/information • Sources affected: Other • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_16
Ellesmere Port and Neston	Local_Ellesmere_G1	Promote benefits of public transport (including links to bus / train timetables) on Airwatch website and public display units	Increases accessibility of public transport information	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_17
Ellesmere Port and Neston	Local_Ellesmere_A6	Publicise VOSA's Smoky Vehicle hotline on website &	Targets vehicles having disproportionate impact on local air quality	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2007

LA (a)	Measure code (b)	Title	Description	Other information
		public display units		• Reduction timescale: Medium term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_18
Ellesmere Port and Neston	Local_Ellesmere_A7	Promote Energy Saving Trust (formerly Powershift) scheme	Encourages use of cleaner fuels by individuals and businesses in local area	• Type: Education/information • Sources affected: Transport; Commercial and residential sources • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_19
Ellesmere Port and Neston	Local_Ellesmere_G2	Promote initiatives suchas 'Bike Week and 'Walk to Work Day'	Encourages community involvement in sustainable modes of transport.	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Short term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_20
Ellesmere Port and Neston	Local_Ellesmere_H4	Additional NO_2 diffusion tubes to be sited within AQMA	Enhanced spatial coverage of AQMA corridor to characterise ambient NO_2.	• Type: Technical • Sources affected: Other • Spatial scale: local • Implementation date: 2005 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_21
Ellesmere Port and Neston	Local_Ellesmere_H5	Strategic review of AQ monitoring provision and locations	To ensure that all areas of relevant exposure have been considered in line with LAQM	• Type: Technical • Sources affected: Other • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_22

LA (a)	Measure code (b)	Title	Description	Other information
Ellesmere Port and Neston	Local_Ellesmere_G3	Quality bus partnership	Improved bus stop facilities including raised kerbs and kneeling buses for improved accessibility	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_23
Ellesmere Port and Neston	Local_Ellesmere_G4	Install signage at railway station to indicate the nearest bus stop(s)	Information may encourage patronage of public transport	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_24
Ellesmere Port and Neston	Local_Ellesmere_F3	Whitby Park education trail	Raise awareness of AQ issues in line with KS2 targets.	• Type: Education/information • Sources affected: Other • Spatial scale: local • Implementation date: 2008 • Reduction timescale: Long term • Regulatory: No • Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_25
Ellesmere Port and Neston	Local_Ellesmere_G5	Support and help to promote the cycling strategy	Encourages alternative modes of transport	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2008 • Reduction timescale: Medium term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_26
Ellesmere Port and Neston	Local_Ellesmere_G6	Investigate the potential for provision of secure cycle storage in town centre	Encourages alternative modes of transport	• Type: Technical • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Long term • Regulatory: No

LA (a)	Measure code (b)	Title	Description	Other information
				• Smarter Choices (c) : No • Reference (d): Local_zone20_Ellesmere_AQActionplan_27
Ellesmere Port and Neston	Local_Ellesmere_G7	Support and help to promote the 'Feet First' walking strategy for Cheshire	Promotes fitness on foot. Challenges reliance on cars.	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Short term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_28
Ellesmere Port and Neston	Local_Ellesmere_G8	Corporate Travel Plans, voluntary and statutory (section 106 agreements)	Encourages alternative modes of transport	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Medium term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_29
Ellesmere Port and Neston	Local_Ellesmere_G9	Journeys to Schools (LTP)	Reduces home to school car journeys	• Type: Education/information • Sources affected: Transport • Spatial scale: local • Implementation date: 2007 • Reduction timescale: Medium term • Regulatory: No • Smarter Choices (c) : Yes • Reference (d): Local_zone20_Ellesmere_AQActionplan_30

(a) Name of responsible Local Authority.
(b) The Letter in the measure code indicates the main source sector that will be affected by the measure. Letters are assigned as follows: A - measures to reduce emissions from mobile sources, B - measures to reduce emissions from stationary sources, C - fuels and petrol stations, D - Economic incentives to reduce emissions (e.g. congestion charging, controlled parking zones), E - measures related to traffic planning/redesigning infrastructure, F - information/educational measures, G - change of transport mode (e.g. scheme to encourage people out of cars and onto bikes), H - Other.
(c) Measures have been classified as 'smarter choices' or not based on expert judgement
(d) References available for download from: http://uk-air.defra.gov.uk/library/NO_2ten/