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# Air Quality Plan for the achievement of EU air quality limit values for nitrogen dioxide ($NO_2$) in Bournemouth Urban Area (UK0015)

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# 1. Introduction

## 1.1. This document

This document is the Bournemouth Urban Area (UK0015) 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 Bournemouth Urban Area agglomeration zone
• Details of $NO_2$ exceedence situation(s) within the Bournemouth 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 Bournemouth 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 $\mu gm^{-3}$
• The hourly limit value: no more than 18 hourly exceedances of 200 $\mu gm^{-3}$ 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 Bournemouth Urban Area agglomeration zone indicates that the annual limit value is likely to be exceeded in 2010 but achieved 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 Bournemouth 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: Bournemouth Urban Area
Zone code: UK0015
Type of zone: agglomeration zone
Reference year: 2008
Extent of zone: Figure 1 shows the area covered by the Bournemouth 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.

1. Bournemouth Borough Council
2. Christchurch Borough Council
3. East Dorset District Council
4. New Forest District Council
5. Poole Borough
6. Purbeck District 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 Bournemouth Urban Area agglomeration zone (UK0015).**

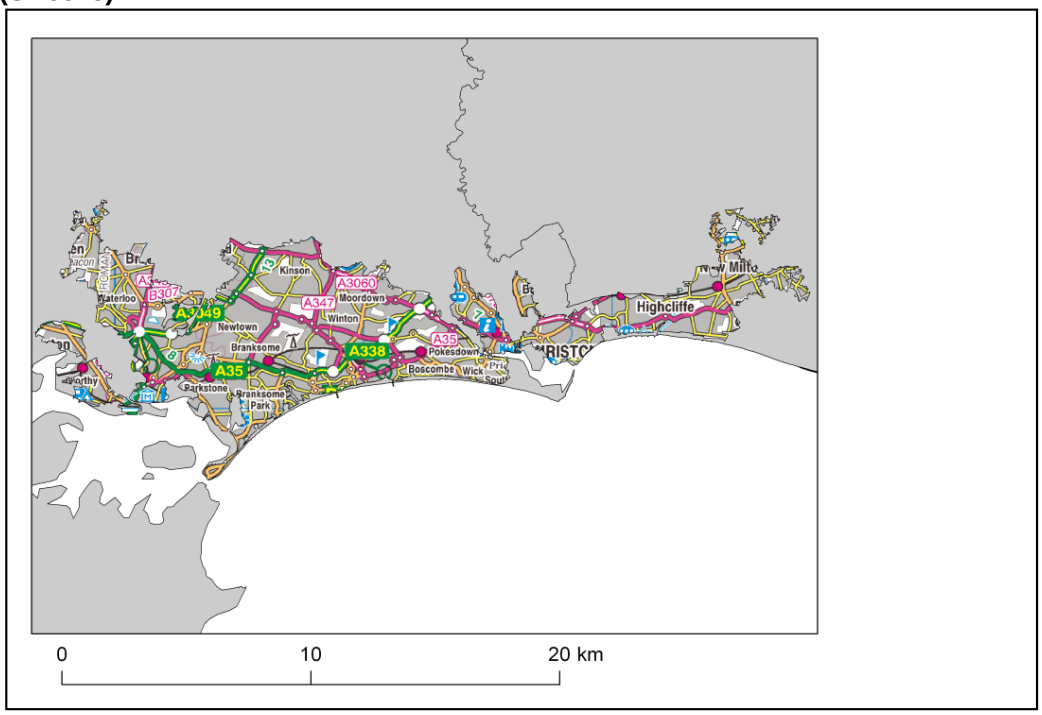
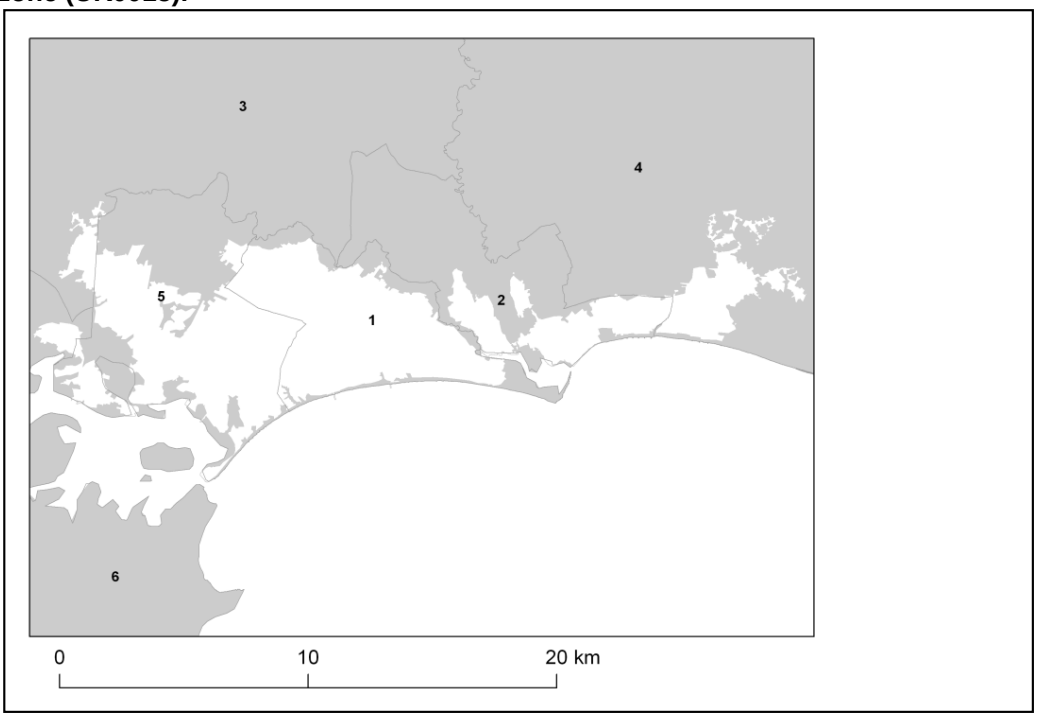





**Figure 2. Map showing Local Authorities within the Bournemouth Urban Area agglomeration zone (UK0015).**



## 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):

• Bournemouth GB0741A (96.2%)

Full details of monitoring stations within the Bournemouth 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): 123 $km^2$
• Total population within zone (approx): 340957 people
• Total road length where an assessment of $NO_2$ concentrations have been made: 72.1 km in 2008 (and similar lengths in previous years).

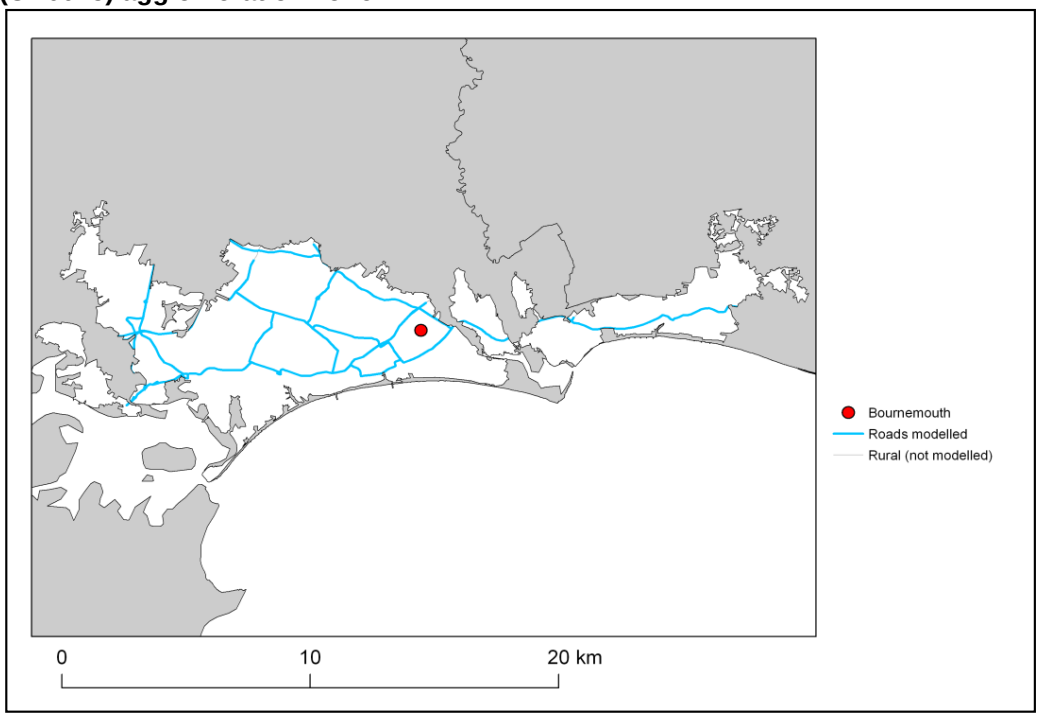
**Zone maps**
Figure 3 presents the location of the $NO_2$ monitoring stations within this zone for 2008 and the roads for which $NO_2$ concentrations have been modelled. $NO_2$ concentrations at background locations have been modelled across the entire zone at a 1 x 1 $km^2$ resolution.

## 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 Bournemouth Urban Area (UK0015) 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 $\mu gm^{-3}$)
• The hourly limit value (no more than 18 hourly exceedances of 200 $\mu gm^{-3}$ in a calendar year)

Within the Bournemouth Urban Area agglomeration zone only the annual limit value was exceeded in 2008. Hence, one exceedance situation for this zone has been defined, $NO_2$_UK0015_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: $NO_2$_UK0015_Annual_1

The $NO_2$_UK0015_Annual_1 exceedance situation covers all exceedances of the annual mean limit value in the Bournemouth 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, 12 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 51.5 $\mu gm^{-3}$. 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 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 $NO_2$_UK0015_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 $NO_2$_UK0015_Annual_1 for 2001 onwards, $\mu gm^{-3}$. (Data capture shown in brackets) (a)**

| Site name (EOI code) | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|
| Bournemouth (GB0741A) | 17 (69%) | 17 (91%) | 22 (93%) | 19 (96%) | 18 (94%) | 17 (93%) | 16 (94%) | 15 (96%) | 17 (99%) |

(a) Annual Mean Limit Value = 40 $\mu gm^{-3}$

**Table 2. Annual mean $NO_2$ model results in $NO_2$_UK0015_Annual_1 for 2001 onwards**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|
| Road length exceeding (km) | 4.2 | 0.0 | 25.5 | 10.8 | 10.8 | 8.5 | 10.8 | 12.0 | 12.0 |
| Background area exceeding ($km^2$) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Maximum modelled concentration ($\mu gm^{-3}$) (a) | 44.2 | 39.6 | 52.3 | 50.5 | 48.1 | 49.9 | 50.5 | 51.5 | 51.1 |

(a) Annual Mean Limit Value = 40 $\mu gm^{-3}$

**Table 3. Source apportionment summary information for 2008 in $NO_2$_UK0015_Annual_1 ($\mu gm^{-3}$).**

| 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 | 8.1 | (c) | |
| | From within the UK | 3.6 | (c) | 3.6 |
| | From transboundary sources (includes shipping and other EU Member States) | 4.5 | (c) | 5.1 |
| Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor) | Total | 17.0 | 11.0 | - |
| | From road traffic sources | 10.5 | 6.3 | 11.4 |
| | From industry (including heat and power generation) | 0.9 | (c) | 7.9 |
| | From agriculture | 0.0 | (c) | 0.0 |
| | From commercial/residential sources | 4.4 | (c) | 8.5 |
| | From shipping | 0.0 | (c) | 0.0 |
| | From off road mobile machinery | 1.2 | (c) | 13.0 |
| | From natural sources | 0.0 | (c) | 0.0 |
| | From transboundary sources | 0.0 | (c) | 0.0 |
| | From other urban background sources | 0.1 | (c) | 0.3 |
| Local sources (i.e. contributions from sources < 0.3 km from the receptor) | Total | 92.4 | 40.4 | - |
| | From cars | 54.1 | 22.7 | 54.1 |
| | From HGV rigid | 8.9 | 4 | 13.6 |
| | From HGV articulated | 4.8 | 2.2 | 8.9 |
| | From Buses | 11.9 | 5.3 | 11.9 |
| | From LGVs | 12.4 | 6.2 | 13.2 |
| | From motorcycles | 0.3 | 0.1 | 0.3 |
| Total (i.e. regional background + urban background + local components) | | 117.5 | 51.5 | - |

(a) The road with the highest modelled annual mean $NO_2$ concentration in this exceedance situation in 2008 is a section of the A338, traffic count point id 26967 (OS grid (m): 411850, 93950).
(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 4.7 $\mu gm^{-3}$. 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.**

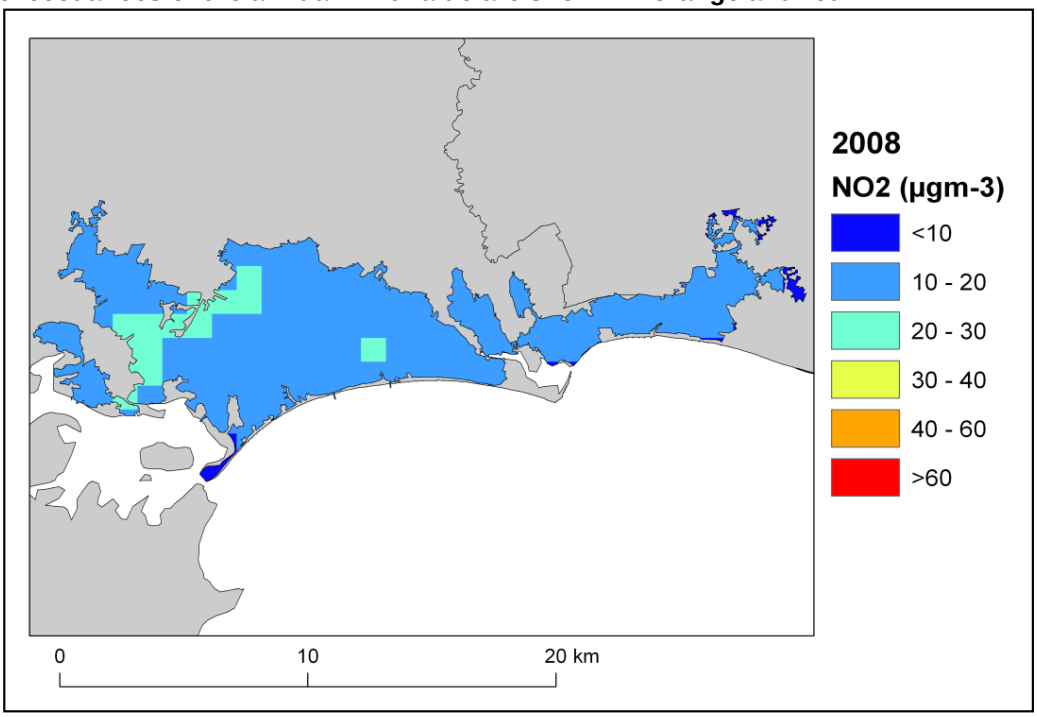
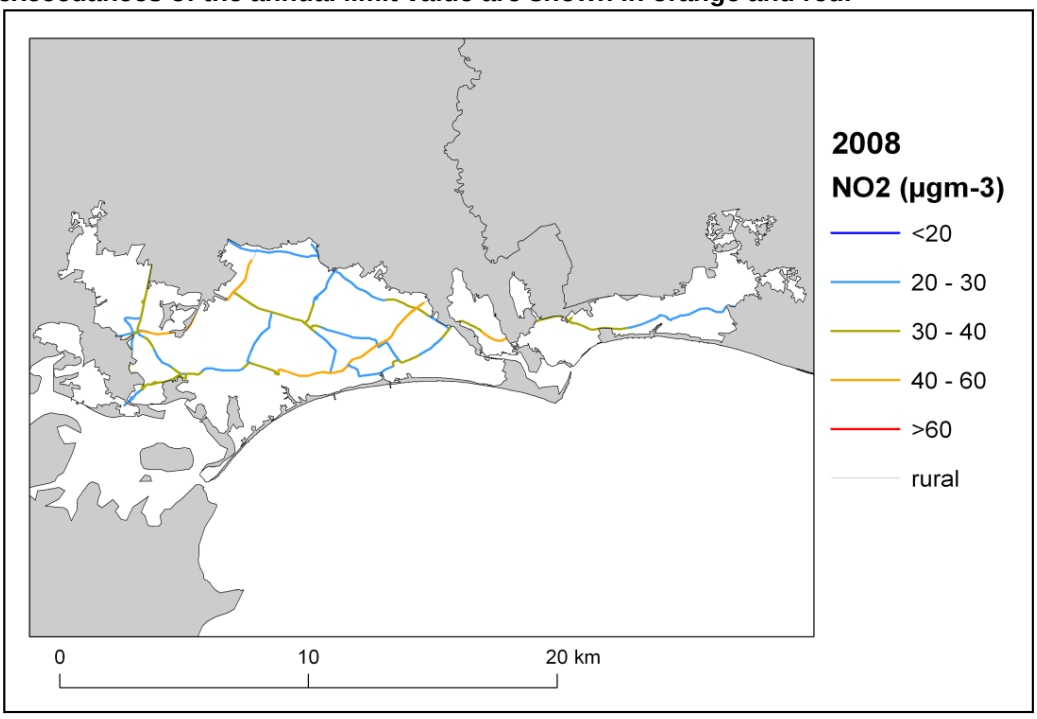





**Figure 5. Map of modelled roadside annual mean $NO_2$ concentrations 2008. Modelled exceedances of the annual limit value are shown in orange and red.**



# 4. Measures

## 4.1. Introduction

This section (section 4) gives details of measures that address exceedances of the $NO_2$ limit values within Bournemouth 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 54.1 $ugm^{-3}$ of $NO_X$ out of a total of 117.5 $ugm^{-3}$ of $NO_X$. Cars, buses, rigid HGVs and LGVs 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.

At the time of data collection (autumn 2009), there were no relevant locally implemented action plans as these are not always appropriate.

## 4.4. Measures timescales

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

# 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 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: $NO_2$_UK0015_Annual_1

Table 4 presents summary results for the baseline model projections for 2010, 2015 and 2020 for the $NO_2$_UK0015_Annual_1 exceedance situation. This shows that the maximum modelled annual mean $NO_2$ concentration predicted for 2010 in this exceedance situation is 42.5 $\mu gm^{-3}$. By 2015, the maximum modelled annual mean $NO_2$ concentration is predicted to drop to 30.5 $\mu gm^{-3}$. Hence, the model results suggest that compliance with the $NO_2$ annual limit value can be achieved by 2015 under baseline conditions in this exceedance situation. 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 2015, the model results suggest that this location will continue to have the highest annual mean $NO_2$ concentration within this exceedance situation. However, in 2010 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 $NO_2$_UK0015_Annual_1**

| | 2008 | 2010 | 2015 | 2020 |
|---|---|---|---|---|
| Road length exceeding (km) | 12.0 | 5.2 | 0.0 | 0.0 |
| Background area exceeding ($km^2$) | 0 | 0 | 0 | 0 |
| Maximum modelled concentration ($\mu gm^{-3}$) (a) | 51.5 | 42.5 | 30.5 | 20.9 |

(a) Annual Mean Limit Value = 40 $\mu gm^{-3}$

**Table 5. Modelled source apportionment for 2010, 2015 and 2020 under baseline conditions for traffic count point 26967 on the A338 (the road section with the maximum modelled annual mean $NO_2$ concentration in 2008 in $NO_2$_UK0015_Annual_1. OS grid (m): 411850, 93950). 2008 results are also presented here for reference (units: $\mu gm^{-3}$).**

| 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 | 8.1 | 7.1 | 6.3 | 5.3 | (a) | (b) | (c) | (d) |
| | From within the UK | 3.6 | 3.2 | 2.8 | 2.4 | (a) | (b) | (c) | (d) |
| | From transboundary sources (includes shipping and other EU Member States) | 4.5 | 3.9 | 3.5 | 2.9 | (a) | (b) | (c) | (d) |
| Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor) | Total | 17.0 | 13.6 | 10.3 | 8.2 | 11.0 | 9.5 | 8.1 | 6.9 |
| | From road traffic sources | 10.5 | 7.2 | 4.9 | 3.4 | 6.3 | 6.1 | 5.6 | 5.1 |
| | From industry (including heat and power generation) | 0.9 | 0.8 | 0.8 | 0.8 | (a) | (b) | (c) | (d) |
| | From agriculture | 0.0 | 0.0 | 0.0 | 0.0 | (a) | (b) | (c) | (d) |
| | From commercial/residential sources | 4.4 | 4.4 | 3.9 | 3.5 | (a) | (b) | (c) | (d) |
| | From shipping | 0.0 | 0.0 | 0.0 | 0.0 | (a) | (b) | (c) | (d) |
| | From off road mobile machinery | 1.2 | 1.1 | 0.6 | 0.4 | (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 | 92.4 | 70.0 | 44.4 | 25.5 | 40.4 | 32.7 | 22.4 | 13.5 |
| | From cars | 54.1 | 36.3 | 25.0 | 16.6 | 22.7 | 16.6 | 12.6 | 8.8 |
| | From HGV rigid | 8.9 | 7.9 | 4.1 | 1.4 | 4.0 | 3.6 | 2.0 | 0.7 |
| | From HGV articulated | 4.8 | 4.2 | 2.1 | 0.7 | 2.2 | 1.9 | 1.0 | 0.4 |
| | From Buses | 11.9 | 10.7 | 6.3 | 2.9 | 5.3 | 4.9 | 3.1 | 1.5 |
| | From LGVs | 12.4 | 10.6 | 6.7 | 3.7 | 6.2 | 5.5 | 3.7 | 2.1 |
| | From motorcycles | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Total (i.e. regional background + urban background + local components) | | 117.5 | 90.7 | 61.0 | 39.0 | 51.5 | 42.1 | 30.5 | 20.4 |

(a) The total annual mean $NO_2$ contribution for all components labelled (a) in 2008 was modelled to be 4.7 $\mu gm^{-3}$.
(b) The total annual mean $NO_2$ contribution for all components labelled (b) in 2010 is predicted to be 3.4 $\mu gm^{-3}$.
(c) The total annual mean $NO_2$ contribution for all components labelled (c) in 2015 is predicted to be 2.5 $\mu gm^{-3}$.
(d) The total annual mean $NO_2$ contribution for all components labelled (d) in 2020 is predicted to be 1.8 $\mu gm^{-3}$.

**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 $NO_2$_UK0015_Annual_1 (a). 2008 results are also presented here for reference (units: $\mu gm^{-3}$).**

| 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 | 8.1 | 6.9 | 6.3 | 5.1 | (b) | (c) | (d) | (e) |
| | From within the UK | 3.6 | 2.8 | 2.8 | 2.0 | (b) | (c) | (d) | (e) |
| | From transboundary sources (includes shipping and other EU Member States) | 4.5 | 4.2 | 3.5 | 3.0 | (b) | (c) | (d) | (e) |
| Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor) | Total | 17.0 | 28.8 | 10.3 | 16.5 | 11.0 | 15.9 | 8.1 | 10.9 |
| | From road traffic sources | 10.5 | 7.0 | 4.9 | 3.2 | 6.3 | 12.6 | 5.6 | 9.2 |
| | From industry (including heat and power generation) | 0.9 | 6.8 | 0.8 | 6.3 | (b) | (c) | (d) | (e) |
| | From agriculture | 0.0 | 0.0 | 0.0 | 0.0 | (b) | (c) | (d) | (e) |
| | From commercial/residential sources | 4.4 | 2.9 | 3.9 | 2.4 | (b) | (c) | (d) | (e) |
| | From shipping | 0.0 | 0.0 | 0.0 | 0.0 | (b) | (c) | (d) | (e) |
| | From off road mobile machinery | 1.2 | 12.2 | 0.6 | 4.6 | (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 | 0.0 | 0.1 | 0.0 | (b) | (c) | (d) | (e) |
| Local sources (i.e. contributions from sources < 0.3 km from the receptor) | Total | 92.4 | 56.9 | 44.4 | 18.9 | 40.4 | 26.6 | 22.4 | 9.9 |
| | From cars | 54.1 | 23.5 | 25.0 | 10.8 | 22.7 | 10.7 | 12.6 | 5.6 |
| | From HGV rigid | 8.9 | 12.0 | 4.1 | 2.2 | 4.0 | 5.5 | 2.0 | 1.1 |
| | From HGV articulated | 4.8 | 7.6 | 2.1 | 1.3 | 2.2 | 3.5 | 1.0 | 0.6 |
| | From Buses | 11.9 | 2.7 | 6.3 | 0.7 | 5.3 | 1.3 | 3.1 | 0.4 |
| | From LGVs | 12.4 | 10.8 | 6.7 | 3.8 | 6.2 | 5.6 | 3.7 | 2.1 |
| | From motorcycles | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Total (i.e. regional background + urban background + local components) | | 117.5 | 92.7 | 61.0 | 40.4 | 51.5 | 42.5 | 30.5 | 20.9 |

(a) The road with the maximum annual mean $NO_2$ concentration in different years is as follows. 2008: A section of the A338 (count point id 26967 ). 2010: A section of the A3049 (count point id 28471 ). 2015: A section of the A338 (count point id 26967 ). 2020: A section of the A3049 (count point id 28471 ). (OS grid (m): 411850, 93950; 411850, 93950; 411850, 93950; 411850, 93950).
(b) The total annual mean $NO_2$ contribution for all components labelled (b) in 2008 was modelled to be 4.7 $\mu gm^{-3}$.
(c) The total annual mean $NO_2$ contribution for all components labelled (c) in 2010 is predicted to be 3.3 $\mu gm^{-3}$.
(d) The total annual mean $NO_2$ contribution for all components labelled (d) in 2015 is predicted to be 2.5 $\mu gm^{-3}$.
(e) The total annual mean $NO_2$ contribution for all components labelled (e) in 2020 is predicted to be 1.7 $\mu gm^{-3}$.

**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 | 3.6 | 3.2 | 0.0 | 0.0 |
| | From transboundary sources (includes shipping and other EU Member States) | 5.1 | 4.4 | 0.0 | 0.0 |
| Urban background sources (i.e. sources located within 0.3 - 30 km from the receptor) | From road traffic sources | 11.4 | 7.2 | 0.0 | 0.0 |
| | From industry (including heat and power generation) | 7.9 | 7.1 | 0.0 | 0.0 |
| | From agriculture | 0.0 | 0.0 | 0.0 | 0.0 |
| | From commercial/residential sources | 8.5 | 4.4 | 0.0 | 0.0 |
| | From shipping | 0.0 | 0.0 | 0.0 | 0.0 |
| | From off road mobile machinery | 13.0 | 12.2 | 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 | 0.3 | 0.1 | 0.0 | 0.0 |
| Local sources (i.e. contributions from sources < 0.3 km from the receptor) | From cars | 54.1 | 36.3 | 0.0 | 0.0 |
| | From HGV rigid | 13.6 | 12.1 | 0.0 | 0.0 |
| | From HGV articulated | 8.9 | 7.8 | 0.0 | 0.0 |
| | From Buses | 11.9 | 10.7 | 0.0 | 0.0 |
| | From LGVs | 13.2 | 11.3 | 0.0 | 0.0 |
| | From motorcycles | 0.3 | 0.3 | 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.**

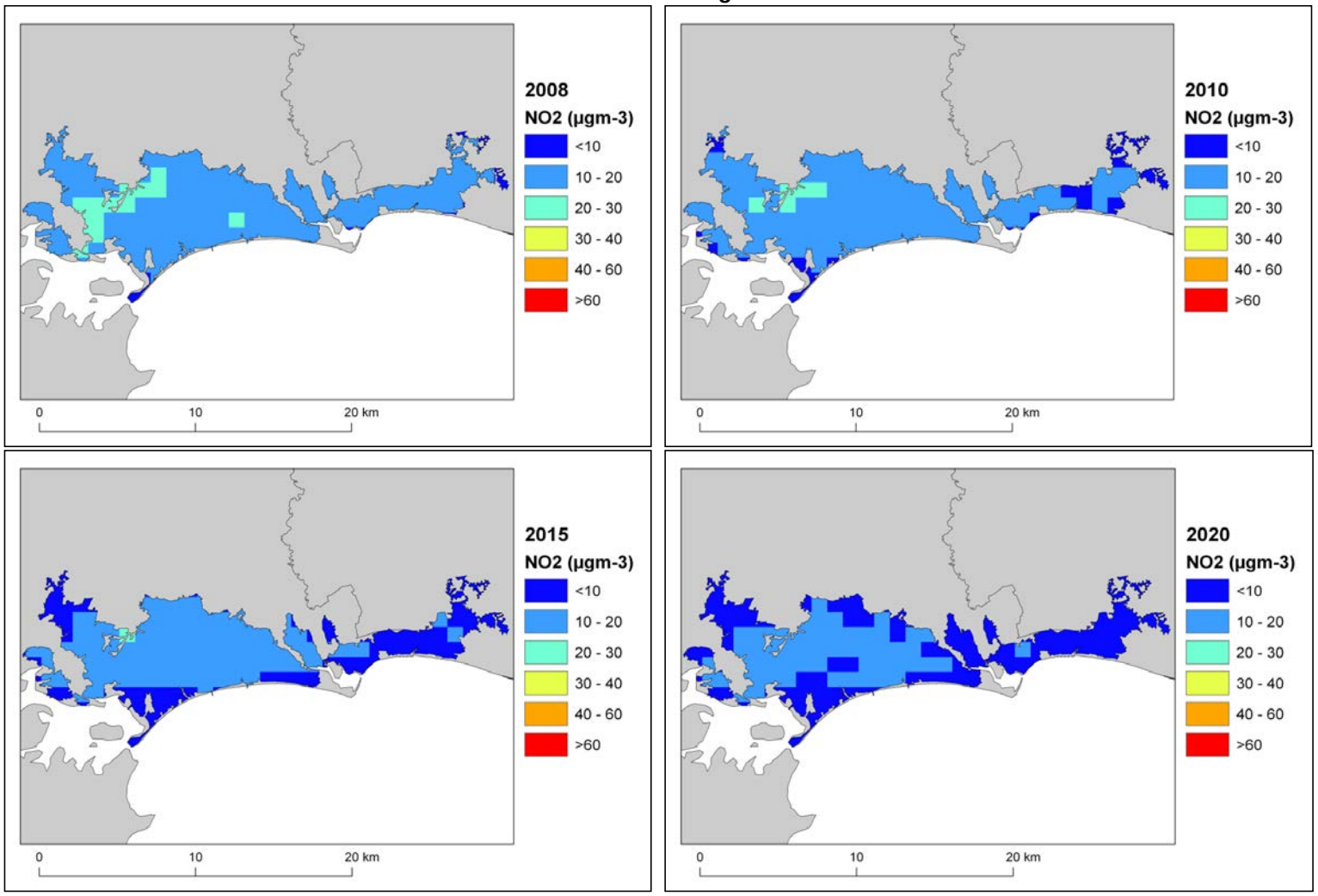
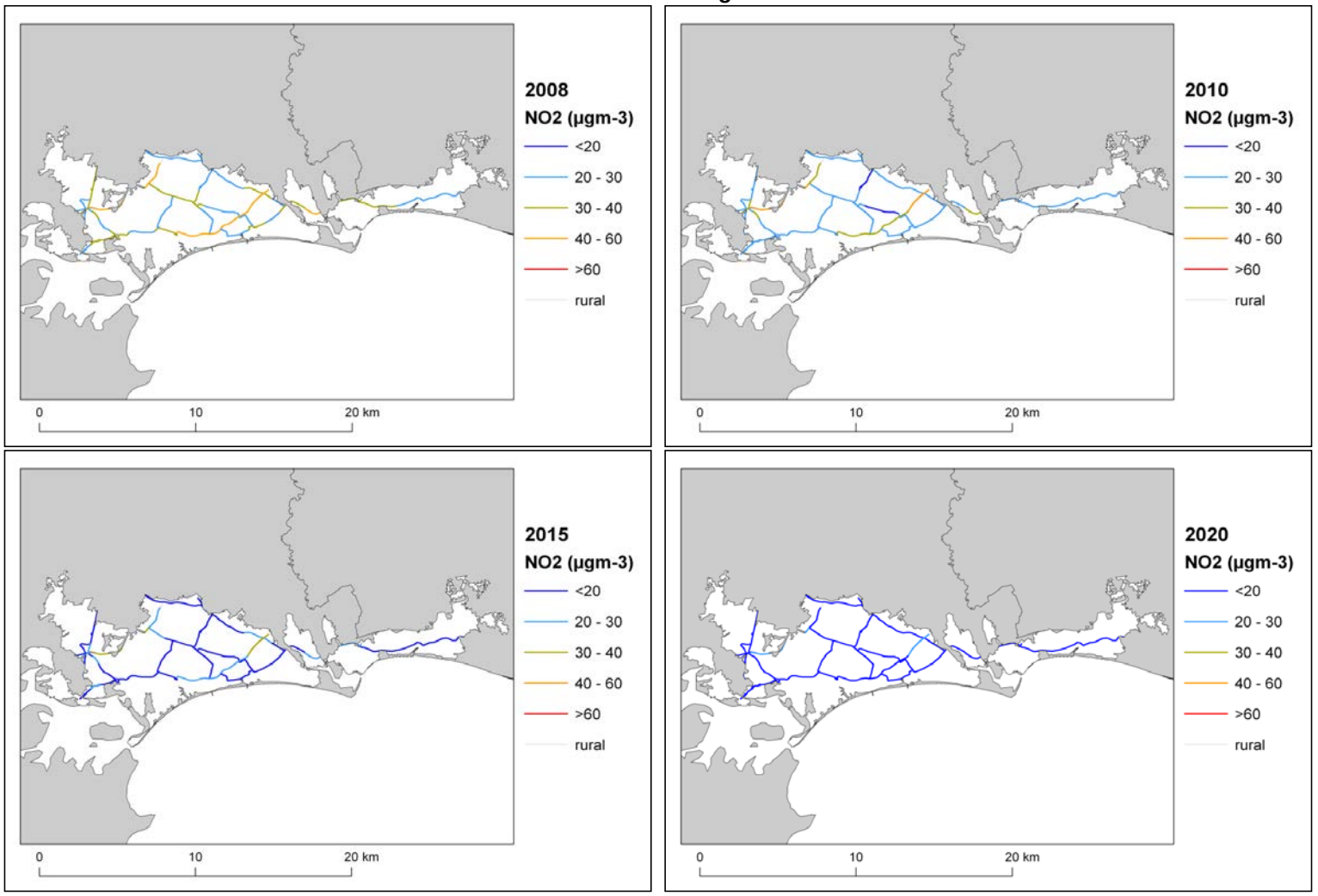


**Figure 7. Roadside baseline projections of annual mean $NO_2$ concentrations in 2010, 2015 and 2020. 2008 is also included here for reference. Modelled exceedances of the annual limit value are shown in orange and red.**



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# List of Annexes

Annex 1: Source apportionment graphs
Annex 2: Tables of measures

# 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