Department for Environment Food & Rural Affairs

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Air Quality Plan for the achievement of EU air quality limit value for nitrogen dioxide (NO_2) in North Wales (UK0042)

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Llywodraeth Cymru
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Contents

1 Introduction

1.1 This document

This document is the North Wales non-agglomeration zone (UK0042) updated air quality plan for the achievement of the EU air quality limit values for nitrogen dioxide (NO_2). This is an update to the air quality plan published in September 2011 (http://uk-air.defra.gov.uk/library/no2ten/).

This plan presents the following information:

- General information regarding the North Wales non-agglomeration zone
- Details of the NO_2 exceedance situation within the North Wales non-agglomeration zone
- Details of local air quality measures that have been implemented, will be implemented or are being considered for implementation in this non-agglomeration zone

This air quality plan for the North Wales non-agglomeration zone should be read in conjunction with the separate UK overview document and the list of UK and national measures. The UK overview document sets out, amongst other things, the authorities responsible for delivering air quality improvements and the list of UK and national measures that are applied in some or all UK zones. The measures presented in this zone plan, the accompanying UK overview document and the list of UK and national measures show how the UK will ensure that compliance with the NO_2 limit values is achieved in the shortest possible time.

This plan should also be read in conjunction with the supporting UK Technical Report 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 mean limit value: an annual mean concentration of no more than 40 μgm^{-3}
- The hourly limit value: no more than 18 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 allowed Member States to postpone this attainment date until 01/01/2015 at the latest provided air quality plans were established demonstrating how the limit values would be met by this extended deadline. Postponement of compliance until 01/01/2015 was granted by the European Commission for North Wales non-agglomeration zone.

1.3 Zone status

The assessment undertaken for the North Wales non-agglomeration zone indicates that the annual limit value was exceeded in 2013 but is likely to be achieved before 2020 through the introduction of measures included in the baseline.

1.4 Plan structure

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

Section 3 then presents the overall picture with respect to NO_2 levels in this non-agglomeration zone for the 2013 reference year of this air quality plan. This includes a declaration of exceedance situations within the non-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 non-agglomeration zone both before and after 2013 is given in section 4.

Baseline modelled projections for 2020, 2025 and 2030 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 implement. However, it has not been possible to quantify the impact of all the 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: North Wales
Zone code: UK0042
Type of zone: non-agglomeration zone
Reference year: 2013
Extent of zone: Figure 1 shows the area covered by the North Wales non-agglomeration zone.
Local Authorities within the zone: Figure 2 shows the location of Local Authorities within the non-agglomeration zone. A list of these Local Authorities is also given below. The numbers in the list correspond to the numbers in Figure 2.

1. Conwy County Borough Council
2. Denbighshire Council
3. Flintshire County Council
4. Gwynedd Council
5. Isle of Anglesey County Council
6. Powys County Council
7. Wrexham County 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 North Wales non-agglomeration zone (UK0042).

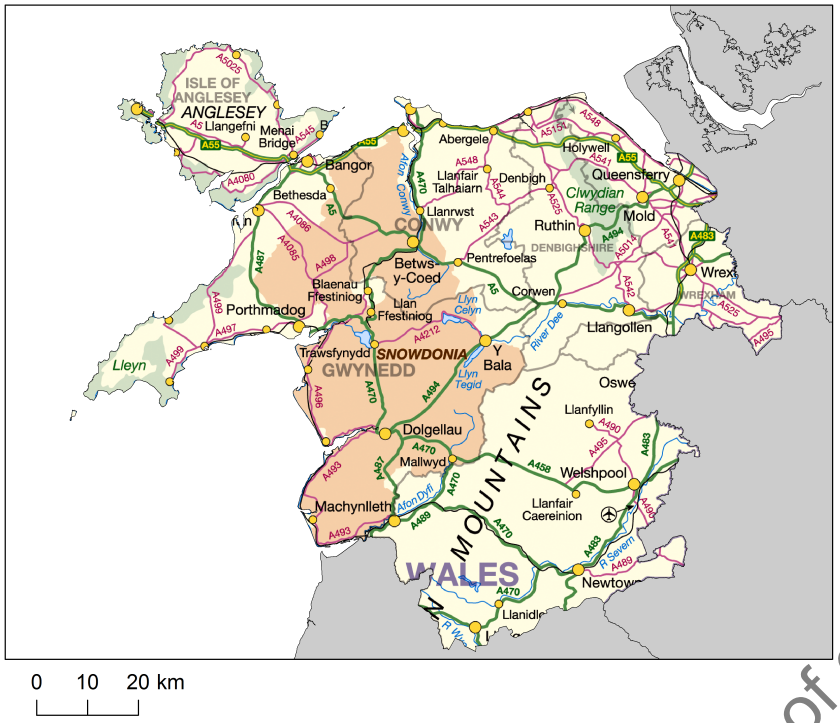
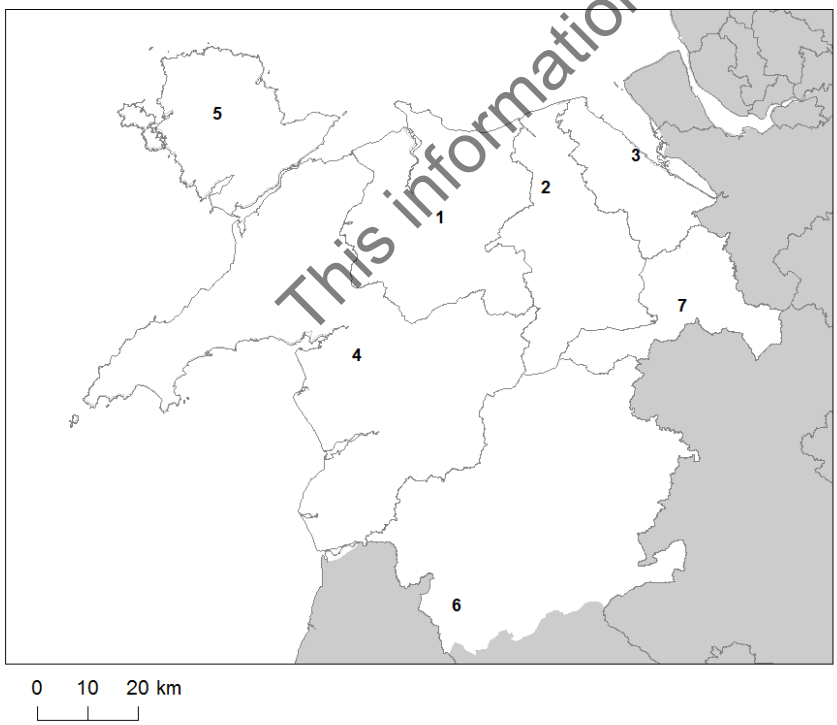


Figure 2: Map showing Local Authorities within the North Wales non-agglomeration zone (UK0042).



2.2 Assessment details

Measurements

NO_2 measurements in this zone were available in 2013 from the following national network monitoring stations (NO_2 data capture for each station in 2013 shown in brackets):

1. Aston Hill GB0031R (97%)
2. Mold GB0999A (82%)
3. Wrexham GB0755A (97%)

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

Modelling

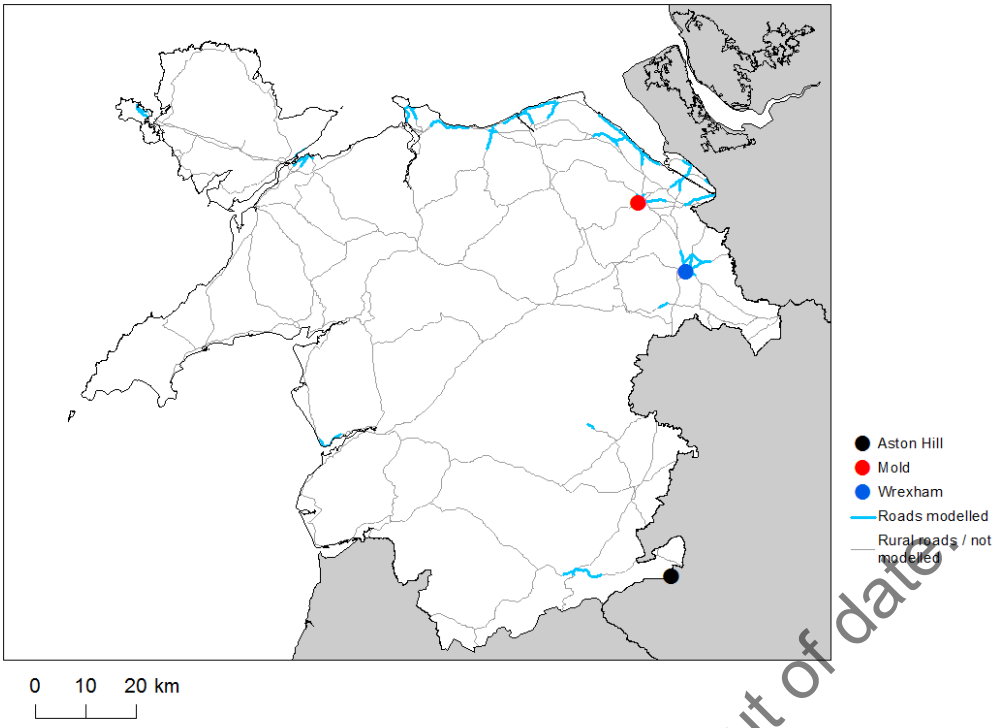
Modelling for the 2013 reference year has been carried out for the whole of the UK. This modelling covers the following extent within this zone:

- Total background area within zone (approx): 8,747 km^2
- Total population within zone (approx): 749,704 people
- Total road length where an assessment of NO_2 concentrations has been made: 152 km in 2013 (and similar lengths in previous years)

Zone maps

Figure 3 presents the location of the NO_2 monitoring stations within this zone for 2013 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 km x 1 km resolution.

Figure 3: Map showing the location of the NO_2 monitoring stations with valid data in 2013 and roads where concentrations have been modelled within the North Wales (UK0042) non-agglomeration zone.



2.3 Reporting under European Directives

From 2001 to 2012 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. Since 2013 reporting has been via an e-reporting system (Decision 2011/850/EU) http://cdr.eionet.europa.eu/gb/eu/.

In addition, the UK has reported on air quality plans and programmes (Decision 2004/224/EC) since 2003. Historic plans and programmes are available on http://cdr.eionet.europa.eu/gb/eu/aqpp.

3 Overall Picture for 2013 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 North Wales non-agglomeration zone the annual limit value was exceeded in 2013. Hence, one exceedance situation for this zone has been defined, NO_2_UK0042_Annual_1, which covers exceedances of the annual limit value. This exceedance situation is described below.

North Wales non-agglomeration zone had a time extension in place until 01/01/2015. While a location has a time extension in place, a margin of tolerance has been defined by the Air Quality Directive (2008/50/EC) which applies to the annual mean NO_2 limit value until the time extension expires. In this non-agglomeration zone the annual mean concentration of NO_2 did not exceed the limit value plus the maximum margin of tolerance (60 μgm^{-3}) in 2013, thus the non-agglomeration zone was reported to the European Commission as compliant for this year. For the purpose of this Air Quality Plan the exceedance situation is defined with respect to the NO_2 limit value, irrespective of the compliance status submitted for 2013.

3.2 Reference year: NO_2_UK0042_Annual_1

The NO_2_UK0042_Annual_1 exceedance situation covers all exceedances of the annual mean limit value in the North Wales non-agglomeration zone in 2013.

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 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 2013. Table 2 summarises modelled annual mean NO_2 concentrations in this exceedance situation for the same time period. This table shows that, in 2013, 7.7 km of road length was modelled to exceed the annual limit value. There were no modelled background exceedances of the annual limit value. Maps showing the modelled annual mean NO_2 concentrations for 2013 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 the maps.

The maximum measured concentration in the zone varies due to changes in 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 NOx source apportionment for all modelled locations. Emissions to air are regulated in terms of oxides of nitrogen (NOx), which is the term used to describe the sum of nitrogen dioxide (NO_2) and nitric oxide (NO). Ambient NO_2 concentrations include contributions from both directly emitted primary NO_2 and secondary NO_2 formed in the atmosphere by the oxidation of NO. As such, it is not possible to calculate an unambiguous source apportionment specifically for NO_2 concentrations; therefore the source apportionment in this plan is presented for NOx, rather than for NO_2 (for further details please see the UK Technical Report). Table 3 summarises the modelled NOx source apportionment for the section of road with the highest modelled NO_2 concentration in this exceedance situation in 2013. This is important information because it shows which sources need to be tackled at the location with the largest compliance gap in the exceedance situation.

Figure B.1 in Annex B presents the annual mean NOx source apportionment for each section of road within the NO_2_UK0042_Annual_1 exceedance situation (i.e. the source apportionment for all exceeding roads only) in 2013. In this figure roads have been grouped into motorways, primary roads (major roads managed by local authorities) and trunk roads (major roads managed by highways authorities).

Table 1: Measured annual mean NO_2 concentrations at national network stations in NO2_UK0042_Annual_1 for 2001 onwards, μgm^{-3} (a). Data capture shown in brackets.

Site name (EOI code)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Aston Hill (GB0031R)			10 (19)	6 (87)	5 (98)	5 (70)	13 (92)	6 (85)	5 (91)	6 (99)	5 (99)	4 (98)	5 (97)
Mold (GB0999A)										17 (31)	11 (92)	10 (76)	9 (82)
Wrexham (GB0755A)		24 (78)	25 (98)	21 (96)	19 (95)	21 (94)	20 (92)	20 (99)	21 (99)	24 (97)	19 (99)	20 (95)	22 (97)

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

Table 2: Annual mean NO_2 model results in NO_2_UK0042_Annual_1 for 2001 onwards.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Road length exceeding (km)	0.0	0.0	21.3	12.7	12.7	12.7	13.4	11.0	11.0	10.4	9.7	9.6	7.7
Background exceeding (km^2)	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum modelled concentration (μgm^{-3}) (a)	39.7	37.4	67.6	64.9	67.8	68.9	67.3	59.2	62.6	71.5	64	62	55

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

Table 3: Modelled annual mean NOx source apportionment at the traffic count point with the highest modelled concentration in 2013 in NO2_UK0042_Annual_1 (μgm^{-3}) (traffic count point 559 on the A494; OS grid (m): 330000, 366730).

Spatial scale	Component	Concentration at highest road link (a)
Regional background sources NOx (i.e. contributions from distant sources of > 30 km from the receptor).	Total	7.8
	From within the UK	4.0
	From transboundary sources (includes shipping and other EU member states)	3.8
Urban background sources NOx (i.e. sources located within 0.3 - 30 km from the receptor).	Total	14.9
	From road traffic sources	9.3
	From industry (including heat and power generation)	2.3
	From agriculture	NA
	From commercial/residential sources	1.3
	From shipping	0.1
	From off road mobile machinery	1.3
	From natural sources	NA
	From transboundary sources	NA
	From other urban background sources	0.5
Local sources NOx (i.e. contributions from sources < 0.3 km from the receptor).	Total	119.4
	From petrol cars	10.4
	From diesel cars	43.7
	From HGV rigid (b)	30.4
	From HGV articulated (b)	11.7
	From buses	6.6
	From petrol LGVs (c)	0.3
	From diesel LGVs (c)	16.1
	From motorcycles	0.2
	From London taxis	0.0
Total NOx (i.e. regional background + urban background + local components)		142.0
Total NO_2 (i.e. regional background + urban background + local components)		55

(a) Components are listed with NOx concentration of NA when there is no source from this sector.

(b) HGV = heavy goods vehicle

(c) LGV = light goods vehicle

Figure 4: Map of modelled background annual mean NO_2 concentrations 2013. Modelled exceedances of the annual limit value are shown in orange and red.

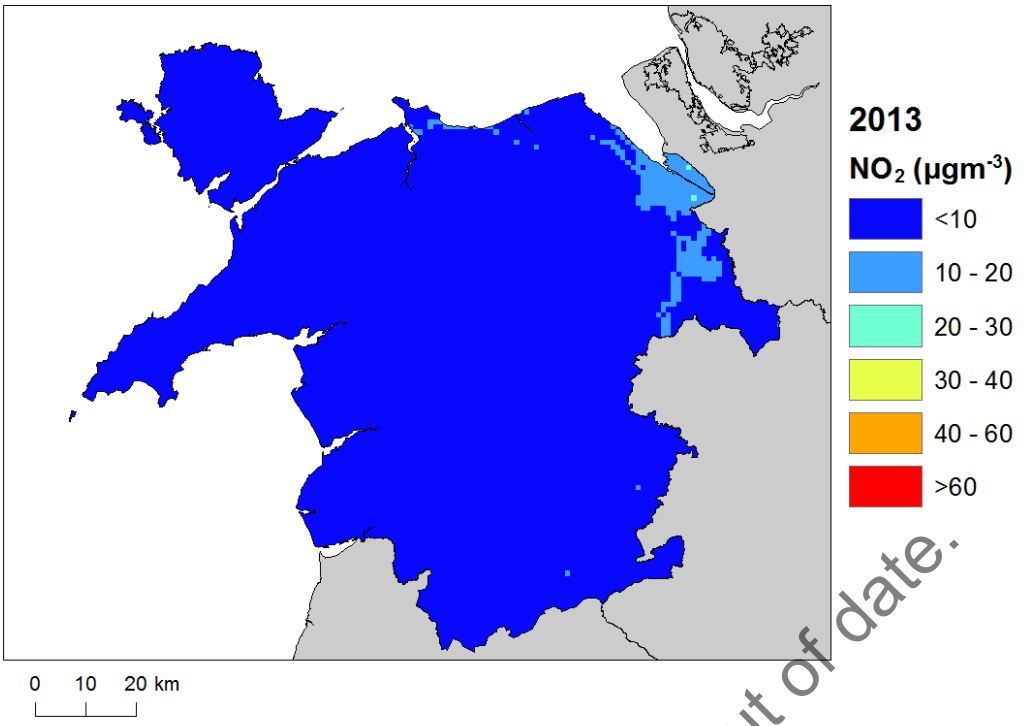
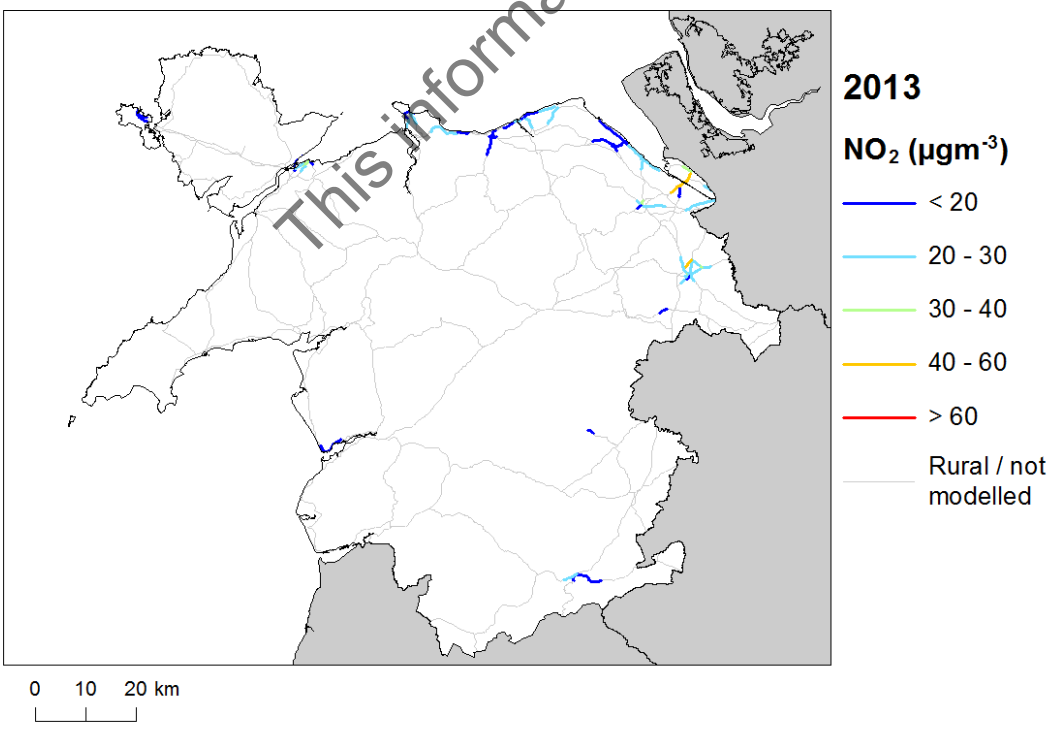


Figure 5: Map of modelled roadside annual mean NO_2 concentrations 2013. Modelled exceedances of the annual limit value are shown in orange and red.



4 Measures

4.1 Introduction

This section gives details of measures that address exceedances of the NO_2 limit values within North Wales non-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 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 μgm^{-3} of NOx out of a total of 142 μgm^{-3} of NOx. Cars, rigid HGVs, articulated HGVs and LGVs were important sources on the trunk roads with the highest concentrations. For all road links concentrations of NOx from diesel cars were approximately four times greater than NOx emissions from petrol cars. NOx concentrations from petrol LGVs are a small component of total NOx concentrations and less than 2% of total NOx from LGVs.

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

4.3 Measures

Measures potentially affecting NO_2 in this non-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 the list of UK and national measures.

Relevant Local Authority measures within this exceedance situation are listed in Table C.1 (see Annex C). Table C.1 lists measures which a local authority has carried out or is in the process of carrying out, plus additional measures which the local authority is committed to carrying out or is investigating with the expectation of carrying out in the future. Additional local measures which will deliver air quality improvements in North Wales non-agglomeration zone have been provided by the Welsh Government and these are listed in Table C.2.

The Local Transport Plan aims to improve connections to key destinations and markets, enhance access to employment and services, increase levels of walking and cycling, bring improved safety and security and at the same time bring benefits and minimise impacts on the environment. The plan encourages sustainable travel that can help to reduce emissions e.g. resolving and reducing congestion and journey times, increasing levels of cycling and walking. The undertaking of travel planning and travel marketing activities with employees and the business community to increase awareness of and access to sustainable travel opportunities and reducing the need to travel. There are some traffic planning and management initiatives being undertaken in the Area that will shift transport modes and therefore reduce emissions.

The National Transport Finance Plan includes measures which involve the locations covered by the 2013 exceedence and the Air Quality Management Area at Newtown.

4.4 Measures timescales

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

Local Authorities report on progress with the implementation of their action plans annually and review action plan measures regularly. Information on local measures was collected in February/March 2015. Hence, any Local Authority action plans and measures adopted by Local Authorities after this time have not been included in this air quality plan, unless additional information was provided during the consultation process.

The reference year for this air quality plan is 2013. Where measures started and finished before 2013, then the improvement in air quality resulting from these measures will have already taken place before the reference year and the impact of these measures will have been included in the assessment where the measure has had an impact on the statistics used to compile the emission inventory. Many measures started before the reference year and will continue to have a beneficial impact on air quality well beyond the reference year. Measures with a start date before 2013 and an end date after 2013 may have an impact on concentrations in the reference year and a further impact in subsequent years. Where the Status column in Annex C is 'Implementation', this shows that this measure is already underway or that there is a commitment for this measure to go ahead. Where the Status is 'Planning', 'Preparation' or 'Other' the level of commitment is less clear and it is possible some of these measures may not go ahead.

5 Baseline Model Projections

5.1 Overview of model projections

Model projections for 2020, 2025 and 2030, starting from the 2013 reference year described in section 3, have been calculated in order to determine when compliance with the NO_2 limit values is likely to be achieved on the basis of EU, regional and local measures currently planned. Details of the methods used for the baseline emissions and projections modelling are provided in 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 2012 (used as a basis for the compilation of the emission inventory) or in the traffic activity projections to 2020 and beyond (used to calculate the emissions 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.

5.2 Baseline projections: NO_2_UK0042_Annual_1

Table 4 presents summary results for the baseline model projections for 2020, 2025 and 2030 for the NO_2_UK0042_Annual_1 exceedance situation. This shows that the maximum modelled annual mean NO_2 concentration predicted for 2020 in this exceedance situation is 35 μgm^{-3}. Hence, the model results suggest that compliance with the NO_2 annual limit value is likely to be achieved before 2020 under baseline conditions in this exceedance situation.

Figures 6 and 7 show maps of projected annual mean NO_2 concentrations in 2020, 2025 and 2030 for background and roadside locations respectively. Maps for 2013 are also presented here for reference.

It should be noted that the baseline projections presented here include the impacts of some 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_UK0042_Annual_1.

	2013	2020	2025	2030
Road length exceeding (km)	7.7	0.0	0.0	0.0
Background exceeding (km^2)	0	0	0	0
Maximum modelled concentration NO_2 (μgm^{-3}) (a)	55	35	28	25
Corresponding modelled concentration NOx (μgm^{-3}) (b)	142	76	57	50

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

(b) NOx is recorded here for comparison with the NOx source apportionment graphs for 2013 presented in Annex B of this plan. Limit values for EU directive purposes are based on NO_2.

Figure 6: Background baseline projections of annual mean NO_2 concentrations in 2020, 2025 and 2030. 2013 is also included here for reference. Modelled exceedances of the annual limit value are shown in orange and red.

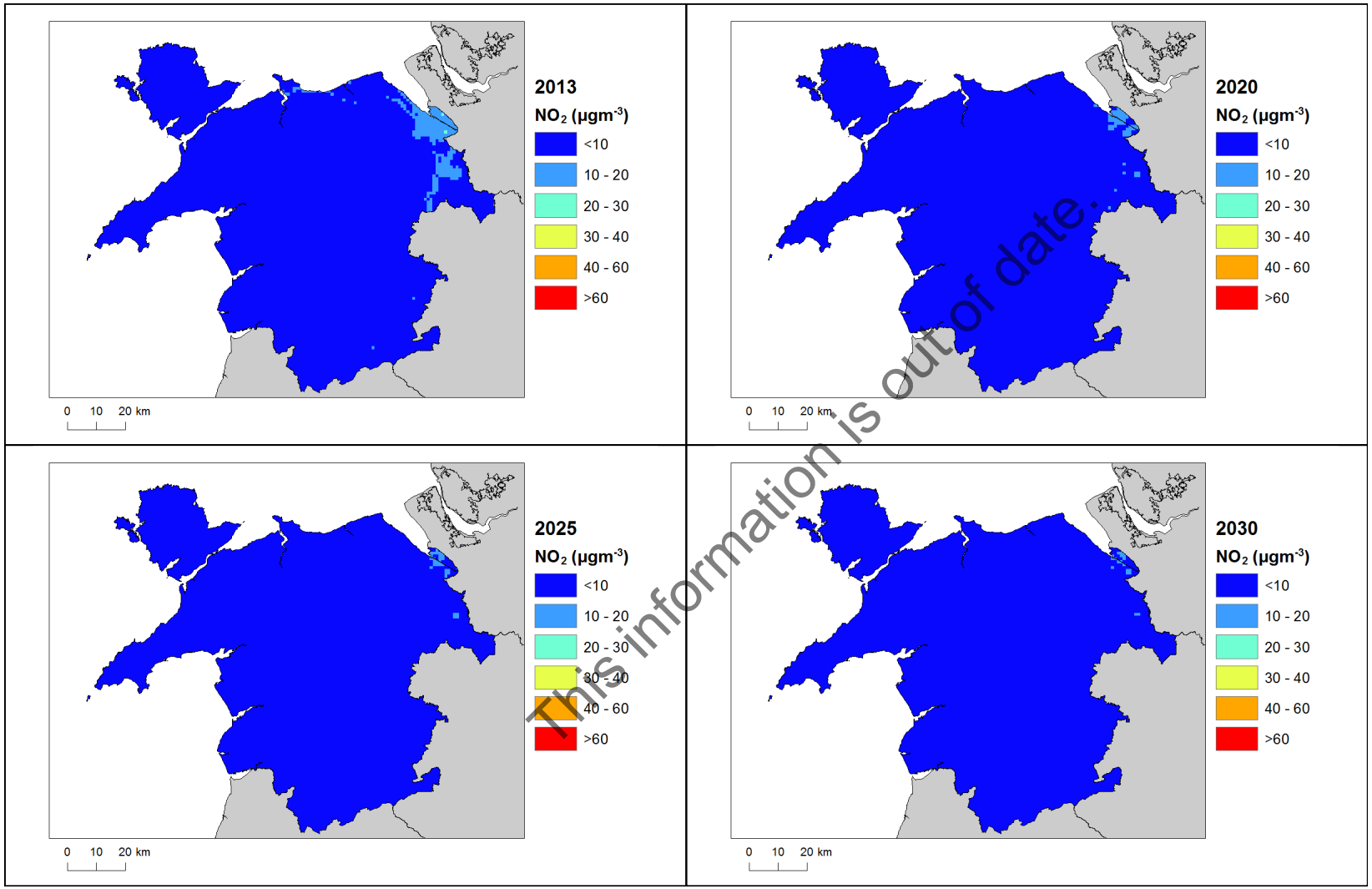
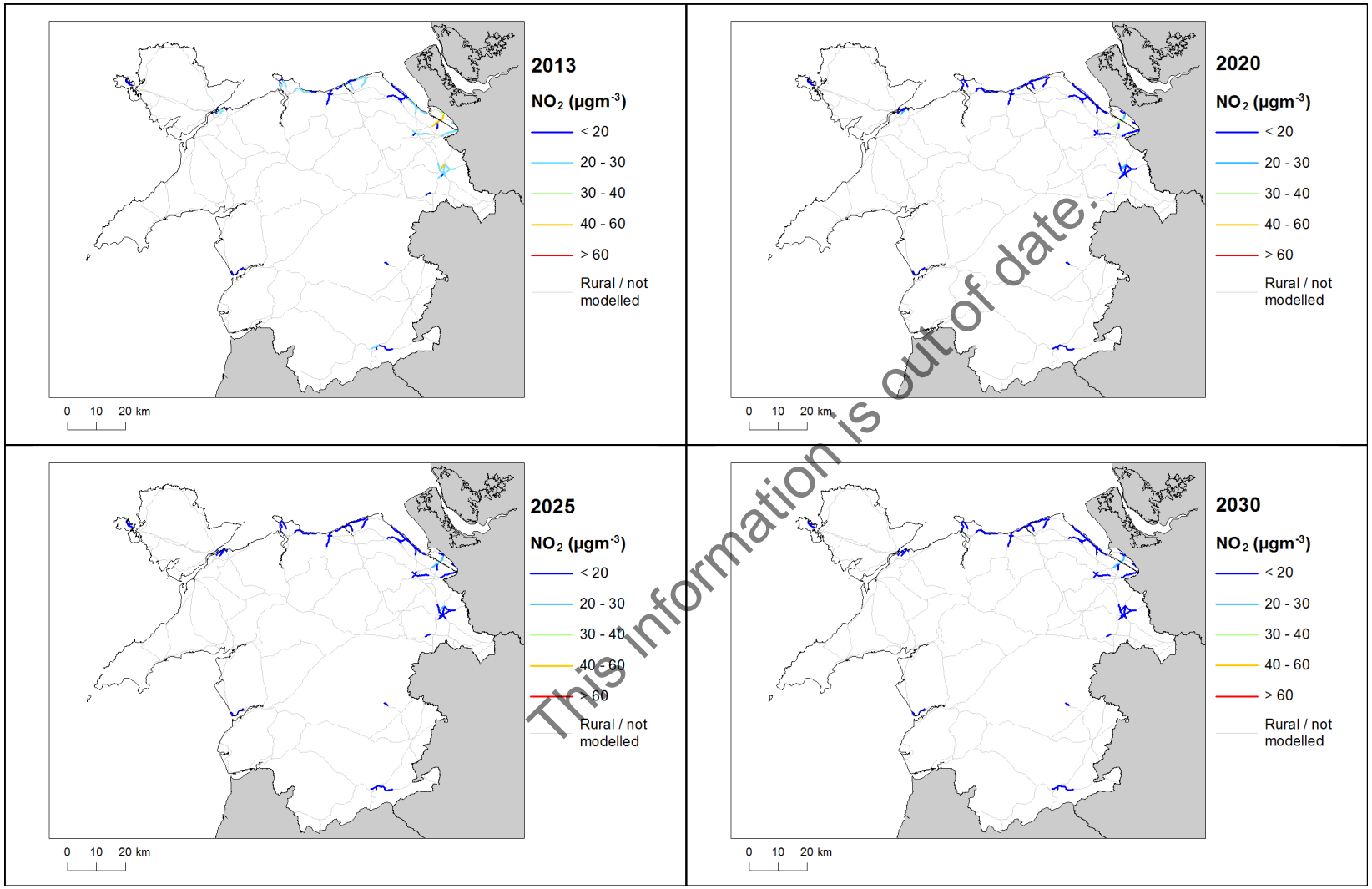


Figure 7: Roadside baseline projections of annual mean NO_2 concentrations in 2020, 2025 and 2030. 2013 is also included here for reference. Modelled exceedances of the annual limit value are shown in orange and red.



Annexes

A References

Air Quality Expert Group (AQEG, 2004). Nitrogen Dioxide in the United Kingdom. http://uk-air.defra.gov.uk/library/aqeg/publications

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, L156/78

Decision 2011/850/EU Commission Implementing Decision of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality. From the Official Journal of the European Union, 17.12.2011,En series, L335/86

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.

UK overview document, List of UK and National Measures and the UK technical report are available at: http://www.gov.uk/defra.

B Source apportionment graphs

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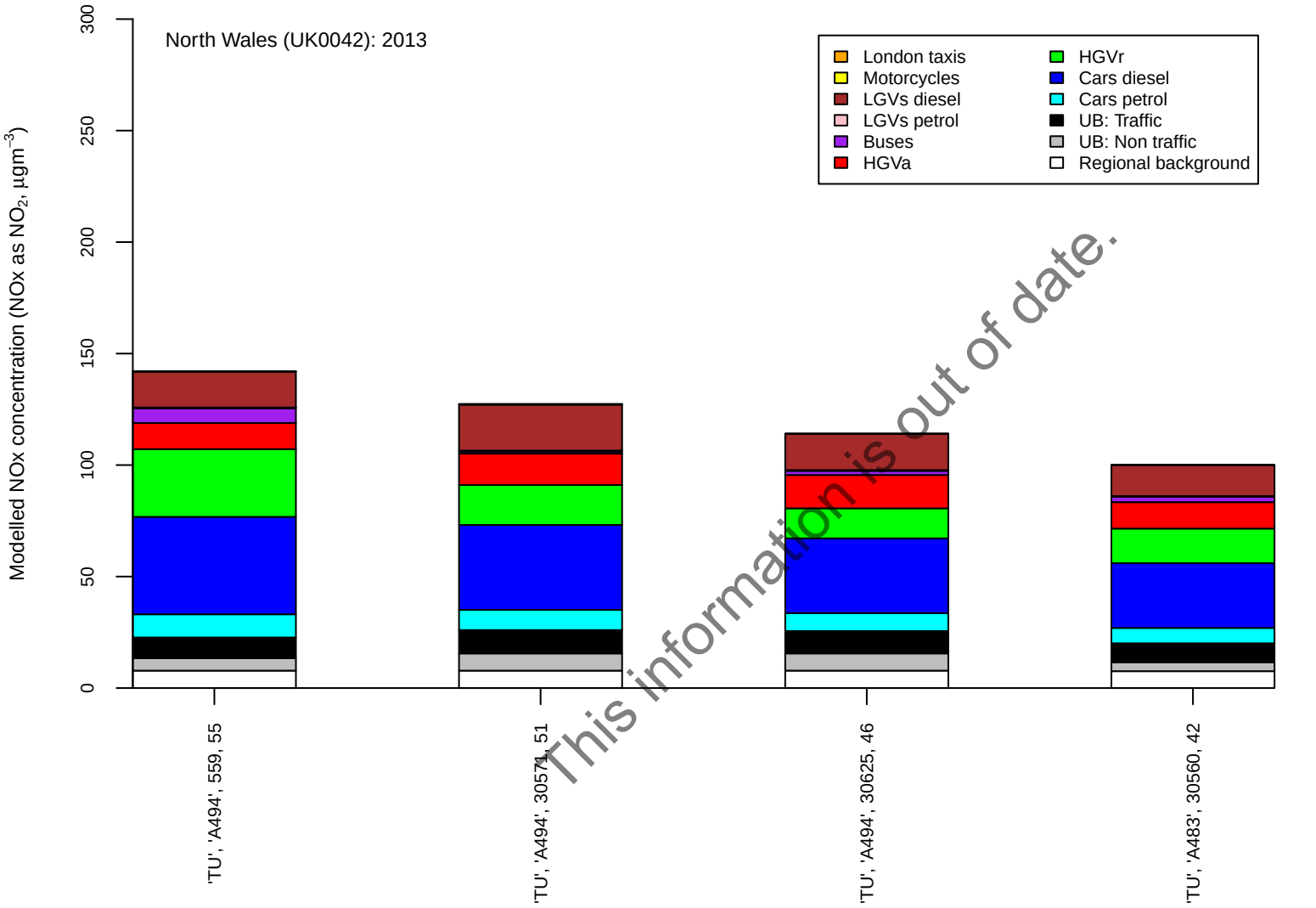
Figure B.1: Annual mean roadside NO_X source apportionment plots for all roads exceeding the annual mean NO_2 limit value in 2013.



Road class (MU = motorway, PU = primary road, TU = trunk road), road number, census id 12 and modelled NO_2 concentration (μgm^{-3})

C Tables of measures

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Table C.1 Relevant Local Authority measures within North Wales (UK0042)

Measure code	Description	Focus	Classification	Status	Other information
Flintshire County Council_0	Move traffic lights and stop zone at Junction	Reduce emission levels at the only property in the AQMA	Traffic planning and management: Other measure	Planning	Start date: 2015 Expected end date: 2015 Spatial scale: Local Source affected: Transport Indicator: Reduce exceedances Target emissions reduction: 0.02

Table C.2 Additional measures provided by the Welsh Government which will deliver air quality improvements within North Wales (UK0042)

Measure code	Description	Focus	Classification	Status	Other information
Welsh Government Transport 1	Improved Integration at Transport Interchanges Mon a Menai Gwynedd.	Part of the Sustainable Travel Centres Initiative.	Transport Planning and Management: Improvement of Public Transport	Implementation	Start date: 2011 Expected end date: 2013 Spatial scale: Local Source affected: Transport Indicator: N/A Target emissions reduction: Not yet quantified
Welsh Government Transport 2	Personalised Workspace and School Travel Planning Programme	Part of the Sustainable Travel Centres Initiative, to encourage people to walk, cycle and use public transport for more of their everyday journeys. Providing personalized travel planning in the Mon a Menai area. Also developed school and workplace travel planning toolkits.	Traffic Planning and Management: Encouragement of Shift of Transport Modes	Implementation	Start date: 2011 Expected end date: 2015 Spatial scale: Local Source affected: Transport Indicator: N/A Target emissions reduction: Not yet quantified
Welsh Government Transport 3	A483/A489 Newtown Bypass	Reducing congestion and traffic volume in Newtown due to diversion of traffic onto new road.	Traffic Planning and Management: Other Measure	Preparation	Start date: 2015 Expected end date: Post 2020 Spatial scale: Local Source affected: Transport Indicator: N/A Target emissions reduction: Not yet quantified
Welsh Government Transport 4	Scheme to improve the A494/A55/A548 Deeside corridor	Pending further work	Traffic Planning and Management: Other Measure	Preparation	Start date: 2019 Expected end date: Post 2020 Spatial scale: Local Source affected: Transport Indicator: N/A Target emissions reduction: Not yet quantified
Welsh Government Transport 5	Traffic Officer Service	Officers assist in ensuring congestion is minimised on M4 Motorway and A55 Expressway.	Traffic Planning and Management: Other Measure	Implementation	Start date: 2009 Expected end date: Ongoing Spatial scale: Local Source affected: Transport Indicator: N/A Target emissions reduction: Not yet quantified